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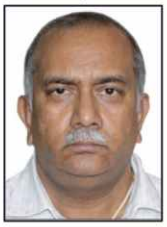

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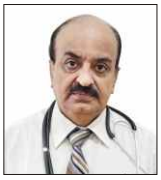
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13th September, 2025 ■ The Stadel Hotel ■ Salt Lake Stadium ■ Salt Lake

Editorial

Nutrition in Palliative Care

Nutrition plays a vital role in palliative care, focusing on improving the Quality of Life for patients with serious illnesses. Here are some key aspects :

(1) Symptom Management :

- ❒ Nutrition can help manage symptoms like nausea, fatigue, and weight loss, common in palliative care patients.
- ❒ Tailored dietary plans can alleviate discomfort and enhance comfort.

(2) Personalized Approach :

- ❒ Each patient's nutritional needs vary based on their condition, treatment, and preferences.
- ❒ Collaboration with dietitians ensures care plans meet individual needs.

(3) Hydration :

- ❒ Adequate hydration is crucial, especially for patients experiencing dry mouth or difficulty swallowing.
- ❒ Offering fluids frequently and in forms that suit the patient's condition (eg, Ice chips, Popsicles) can help.

(4) Food Preferences :

- ❒ Respecting patient food preferences can improve appetite and satisfaction.
- ❒ Small, frequent meals may be better tolerated than large meals.

(5) Nutritional Supplements

- ❒ Supplements can help meet calorie and protein needs when patients struggle to eat enough.
- ❒ Oral nutritional supplements or fortified foods may be recommended.

(6) Emotional and Social Aspects :

- ❒ Mealtimes can provide emotional comfort and social interaction.
- ❒ Sharing meals with family or caregivers can enhance the patient's experience.

(7) Challenges :

- ❒ Loss of appetite, taste changes and difficulty swallowing are common challenges.
- ❒ Working with healthcare providers to address these issues is essential.

(8) Cultural Sensitivity :

- ❒ Respecting cultural dietary preferences can improve patient satisfaction and comfort.
- ❒ Incorporating familiar foods into the diet plan can provide emotional support.

In palliative care, the goal of nutrition is not necessarily to extend life but to enhance its quality, providing comfort and support to patients and their families.

Hony Editor, JIMA **Kakali Sen**

Original Article

A Study of Renal Doppler Indices in Chronic Liver Disease and It's Role in Predicting Hepatorenal Syndrome

Parthasarathy Barathan[1], Pranay Chittimala[2], K Kirubhakaran[3]

Abstract

Background : Patients with Chronic Liver Disease (CLD) are often prone to develop Renal impairment. Due to this Renal impairment patient may also develop serious complications like Hepatorenal syndrome. Renal impairment is mainly caused due to Renal arterial vasoconstriction. Renal arterial vasoconstriction can be assessed using Duplex Doppler Ultrasonography of kidney.

Aims & Objective : To know the Renal Doppler Indices in CLD patients and its role in predicting Hepatorenal syndrome.

Materials and Methods : This study was a hospital based prospective cross sectional study, conducted at General Medicine Department, VMKV Medical College and Hospitals, Salem. Patients of age more than 18 years with ultrasound showing evidence of chronic liver disease were included in the study. A simple random sampling was used to select the patients for the study.

Results : Majority of the subjects were aged 41-50 years (38.0%) followed by 26.0% of the subjects were aged 31-40 years. Majority of the patients nearly 20.0% of the cases had fever, 62.0% of the cases had abdominal distension and 42.0% of them had pain abdomen. In the present study, 46.0% of the cases were of cirrhosis, 54.0% of the cases had coarse texture and 12.0% of the subjects had splenomegaly.

Conclusion : Renal duplex Doppler ultrasonography can non-invasively identify a subgroup of non-azotemic patients with liver disease that is at significantly higher risk for subsequent development of kidney dysfunction and the hepatorenal syndrome.

Key words : Chronic Liver Disease, Hepatorenal syndrome.

Chronic Liver Disease (CLD) refers to the steady loss of liver functionality over a period exceeding six months. This decline affects vital processes such as the production of clotting agents and essential proteins, the removal of toxic metabolic byproducts, and the elimination of bile. The condition involves ongoing inflammation, damage and repair within the liver tissue, ultimately resulting in scarring (fibrosis) and, over time, cirrhosis[1]. Patients with Chronic Liver Disease are usually prone to develop Renal impairment. Hepatorenal Syndrome (HRS) represents the most severe form of kidney impairment seen in individuals with CLD and is linked to a markedly reduced life expectancy[2].

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Editor's Comment :

- Renal Doppler ultrasonography is a simple, reliable and non-invasive tool for assessing renal circulation in chronic liver disease.
- Elevated Resistive Index (RI) values significantly correlate with disease severity and risk of hepatorenal syndrome.
- Early detection with Doppler can help predict and manage renal dysfunction in cirrhotic patients ?

Renal impairment is mainly caused due to Renal arterial vasoconstriction. This vasoconstriction can persist even weeks to months prior to elevation of Blood Urea and Serum Creatinine[3]. Renal arterial vasoconstriction can be assessed using Duplex Doppler ultrasonography of kidney. Duplex Doppler ultrasound of the kidneys offers a simple, non-invasive technique for evaluating renal blood circulation and measuring arterial resistance, which serves as an indicator of vasoconstriction[4,5].

The Resistance Index (RI) is the most commonly applied measurement for assessing resistance within the arteriolar blood vessels. This RI can be assessed by analysing a simple Doppler Waveform. Normal value of RI is 0.5-0.7 and is calculated at the Arcuate arteries of interlobar arteries[6].

How to cite this article : A Study of Renal Doppler Indices in Chronic Liver Disease and It's Role in Predicting Hepatorenal Syndrome. Barathan P, Chittimala P, Kirubhakaran K. *J Indian Med Assoc* 2025; **123(9):** 14-7.

To better understand how measuring the Resistance Index (RI) might help predict kidney dysfunction in individuals with Chronic Liver Disease (CLD), we conducted an analysis of intrarenal arterial RI values in such patients. These values were then compared with serum creatinine levels, which serve as an indicator of renal impairment severity. The primary objective of our research was to assess how effectively renal duplex ultrasonography can aid in diagnosing and anticipating the early onset of hepatorenal syndrome.

Materials and Methods

The present study was a hospital based prospective cross sectional study, conducted at General medicine Department, VMKV Medical College and Hospitals, Salem. The study period was performed between February, 2021 and December, 2022. Patients above 18 years with ultrasound showing evidence of chronic liver disease were included in the study. Patients with Systemic hypertension and Type 1 or 2 diabetes mellitus, patients on treatment with drugs causing nephrotoxicity and patient with acutely ill infections, Malignancy disorders, nephron diseases were excluded for the study. A simple random sampling was used to select the patients for the study. Before taking part in the study, every participant gave their informed consent in writing. A semi-structured and pre-formulated questionnaire served as the tool for conducting interviews with the participants. Collected responses were documented using Microsoft Excel 2019 and statistical evaluation was carried out with SPSS version 16.0. Numerical data were summarized as means along with their standard deviations, while categorical data were represented as percentages. The Chi-square test was employed to compare differences in proportions, with statistical significance determined at a p-value threshold of below 0.05.

Results

In the present study, majority of the subjects were aged 41-50 years (38.0%) followed by 26.0% of the subjects were aged 31-40 years and 84.0% of the participants were male and 16.0% of the cases were female. Majority of the patients nearly 20.0% of the cases had fever, 62.0% of the cases had abdominal distension, 42.0% of them had pain abdomen, 8.0% of the cases had loss of appetite and 28.0% of the cases had pedal edema. In the present study, 46.0% of the cases were of cirrhosis, 54.0% of the cases had coarse texture, 12.0% of the subjects had splenomegaly and 6.0% of the cases had portal hypertension. Renal artery doppler finding was between 0.5-0.7 in 42.0% of the cases and 58.0% of the cases had >0.71 and the mean RAD was 0.71±0.05 (Tables 1-6).

Table 1 — *Socio-demographic profile and clinical presentation of study subjects (n=50)*

Variables		Frequency (n)	Percentage (%)
Age	31-40	13	26
	41-50	19	38
	51-60	13	26
	>60	5	10
Gender	Male	42	84
	Female	8	16
Clinical presentation	Fever	10	20
	Abdominal distension	31	62
	Pain abdomen	21	42
	Loss of appetite	4	8
	Pedal edema	14	28
	Breathlessness	2	4
	Vomiting	3	6
	Altered sensorium	5	10

Table 2 — *Clinical findings of study subjects (n=50)*

Variables	Frequency	Percentage
Ascites	36	72
Edema	25	50
Jaundice	27	54
Urine output- Decreased	22	44
Alcoholic	37	74
Hepato Renal Syndrome	13	26

Table 3 — *Laboratory findings*

Variables	Minimum	Maximum	Mean ± SD
T Bilirubin	0.9	16.6	4.43 3.42
D Bilirubin	0.2	16.9	2.32 2.92
I Bilirubin	0.2	18.3	2.31 3.15
SGOT	17	470	95.94 84.43
SGPT	6	432	53.0 64.16
ALP	60	310	154.78 63.19
Albumin	1.9	3.5	2.62 0.45
Urea	8	153	34.70 22.87
Creatinine	0.6	4.4	1.34 0.73
Sodium	112	141	131.36 6.34
Potassium	2.4	6.2	3.90 0.70

Table 4 — *Ultrasound abdomen, Renal artery Doppler and Child PUGH Grade of study subjects*

Variables		Frequency	Percentage
Ultrasound abdomen	Cirrhosis	23	46%
	Coarse echotexture	27	54%
	Splenomegaly	6	12%
	Portal Hypertension	3	6%
Renal artery Doppler-Resistive Index	0.5-0.70	21	42%
	>0.71	29	58%

Table 5 — *Association of RI with Child Pugh grade*

	Mean ± SD
A	0.63 ± 0.04
B	0.69±0.06
C	0.73 ± 0.04

ANOVA F value = 8.02, p=<0.0001*, Statistically significant

Table 6 — *Association of RI with Hepato Renal syndrome*

HRS	Minimum	Maximum	Mean ± SD
Yes	0.63	0.78	0.74 ± 0.04
No	0.58	0.79	0.70 ± 0.06

T VALUE= 2.22, P=0.001*, Statistically significant

Discussion

Hepatorenal Syndrome (HRS) represents a life-threatening complication arising in individuals with advanced liver disease. Reliable indicators for timely detection and identification of patients at heightened risk are currently insufficient. This study aimed to assess the utility of renal Duplex ultrasonography as a tool for early detection and diagnosis of HRS.

HRS frequently develops in the context of end-stage liver cirrhosis and is primarily caused by intense vasoconstriction within the renal circulation, ultimately resulting in a reduced Glomerular Filtration Rate (GFR). It remains a prevalent issue among patients with severe cirrhosis. According to a significant five-year investigation, approximately 40% of cirrhotic individuals who developed ascites eventually progressed to HRS[7].

In the present study, majority of the subjects were aged 41-50 years (38.0%) followed by 26.0% of the subjects were aged 31-40 years and 84.0% of the participants were male and 16.0% of the cases were female. A study done by Francoz C, *et al*[8] observed that the mean age of the participants was around 49.56 years and 80.0% of them were males and 20.0% were females.

In the current study, 62.0% of the cases had abdominal distension followed by 42.0% of the cases had pain abdomen, 28.0% of the cases had pedal edema and 20.0% of the cases had fever. Majority of them had (72.0%) ascites and 50.0% of the cases had edema. Similarly, a study done by Kellum JA, *et al*[9] reported that ascites was seen among 80% of the cases, 36.0% had fever and 13.0% had pedal edema.

In the present study, T Biliubin ranged from 0.9-6.6 and the mean was 4.43 ±3.42, D Biliubin ranged between 0.2-16.9 and the mean was 2.32 ±2.92, I. Biliubin ranged between 0.2-18.3 and the mean was 2.31±3.15, SGOT ranged between 17-470 and the mean was 95.94±84.43, SGPT ranged between 6-432 and the mean was 53.0±64.16, ALP was ranged between 60-310 and the mean was 154.78±63.19.

Similarly, in a study done by Belcher JM, *et al*[10] , notable differences were reported in prothrombin concentration, serum albumin, and serum bilirubin levels between the two patient groups, with the second group exhibiting more pronounced abnormalities in these parameters. In contrast, another study by Ruiz del, *et al*[11] concluded that individuals suffering from cirrhosis, Hepatorenal Syndrome (HRS), and significant ascites may experience impaired kidney function due to elevated Intra-abdominal Pressure (IAP). Lowering IAP through paracentesis combined with albumin administration appears to enhance creatinine clearance, likely as a result of improved renal perfusion, which is indicated by a reduction in the Resistive Index (RI) on Doppler ultrasound.

In the present study, 46% of the cases had cirrhosis, 54% of the cases had coarse texture, 12% of the subjects had splenomegaly and 6% of the cases had portal hypertension. A study by Arroyo V, *et al*[12] observed that 65% of the cases had irregular liver surface, heterogenous, homogenous and fatty echo texture was seen among 78% of the cases.

In this study, the mean RI value with grade A was 0.63 ± 0.04, with grade B was 0.69 ± 0.06 and with grade C was 0.73 ± 0.04. It was observed that there was a statistically significant association between RI and Child PUGH score and the RI was significantly higher among cases with increased grade. Similarly, a study done by Belcher JM, *et al*[10] observed that individuals with cirrhosis but without ascites had markedly higher intrarenal Resistive Index (RI) values compared to healthy subjects. Moreover, patients with ascites exhibited even greater RI levels, despite having normal serum creatinine concentrations.

The present study observed a significant positive correlation (r=0.27, p<0.05*) between Serum creatinine and Renal arterial resistance index. Similarly, study done by Belcher JM, *et al*[10] reported that the levels of serum creatinine did not have a statistically significant association with the value of RI, a finding which was discordant to the observation made in the present study.

Conclusion

Duplex-Doppler ultrasound serves as a simple, dependable, and non-invasive approach for evaluating blood flow within intralobar arteries, particularly in patients with liver cirrhosis. It enables early identification of alterations in renal circulation, frequently preceding any noticeable symptoms of kidney dysfunction. Additionally, this imaging technique aids in recognizing cirrhotic individuals who may be at an increased likelihood of developing hepatorenal syndrome.

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Conflict of interest : None

References

1 Vilstrup H, Amodio P, Bajaj J, Cordoba J, Ferenci P, Mullen KD, *et al* — Hepatic encephalopathy in chronic liver disease: 2014 Practice Guideline by the American Association for the Study of Liver Diseases and the European Association for the Study of the Liver. *Hepatology* 2014; **60(2):** 715-35.

2 Dissegna D, Sponza M, Falleti E, Fabris C, Vit A, Angeli P, *et al* — Morbidity and mortality after transjugular intrahepatic portosystemic shunt placement in patients with cirrhosis. *Eur J Gastroenterol Hepatol* 2019; **31(5):** 626-32.

3 Heidelbaugh JJ, Bruderly M — Cirrhosis and chronic liver failure: part I. Diagnosis and evaluation. *Am Fam Physician* 2006; **74(5):** 756-62.

4 Poynard T, Mathurin P, Lai CL, Guyader D, Poupon R, Tainturier MH, *et al* — PANFIBROSIS Group. A comparison of fibrosis progression in chronic liver diseases. *J Hepatol* 2003; **38(3):** 257-65.

5 Bataller R, North KE, Brenner DA — Genetic polymorphisms and the progression of liver fibrosis: a critical appraisal. *Hepatology* 2003; **37(3):** 493-503.

6 Tsuchida T, Friedman SL — Mechanisms of hepatic stellate cell activation. *Nat Rev Gastroenterol Hepatol* 2017; **14(7):** 397-411.

7 Lo RC, Kim H — Histopathological evaluation of liver fibrosis and cirrhosis regression. *Clin Mol Hepatol* 2017; **23(4):** 302-307.

8 Francoz C, Nadim MK, Baron A, Prié D, Antoine C, Belghiti J, *et al* — Glomerular filtration rate equations for liver and kidney transplantation in patients with cirrhosis: validation of current recommendations. *Hepatology* 2014; **59(4):** 1514-21.

9 Kellum JA, Lameire N — Diagnosis, evaluation, and management of acute kidney injury: a KDIGO summary (Part 1). *Critical Care* 2013; **17(1):** 1-5.

10 Belcher JM, Parikh CR, Garcia–Tsao G — Acute kidney injury in patients with cirrhosis: perils and promise. *Clinical Gastroenterology and Hepatology* 2013; **11(12):** 1550-8.

11 Ruiz del, Arbol L, Monescillo A, Arocena C, Valer P, Gines P, *et al* — Circulatory function and hepatorenal syndrome in cirrhosis. *Hepatology* 2005; **42(2):** 439-47.

12 Arroyo V — Acute kidney injury (AKI) in cirrhosis: should we change current definition and diagnostic criteria of renal failure in cirrhosis. *Journal of Hepatology* 2013; **59(3):** 415-7.

Original Article

A Study on Clinico-radiological Profile of Temporal Arteritis in South Bengal

Praveen Kumar Yadav[1], Surya Kant Maurya[2]

Abstract

Background : To study the demographic, clinical and laboratory profile of patients with temporal arteritis.

Materials and Methods : Seven consecutive confirmed cases of Temporal arteritis attending the neurology clinic of super speciality hospital, Durgapur, West Bengal during August, 2021 to November, 2022 were included in the study. Neurological examination of all patients were done by the same Neurologist. ESR, CRP and USG Doppler were done of all patients along with other required investigations.

Results : A total of 7 patients fulfilled the criteria for diagnosis of temporal arteritis and included in study. Out of 7 patients, 6 were male and 1 was female. Male female ratio was 6:1. Most common age group was 60-70 years. Mean age of onset was 70 years (range 61-82yrs). All the patients had recent onset of headache. Typical manifestations included new temporal headache (100%), temporal artery tenderness (85.71%) and jaw claudication (14.28%). ESR & CRP were raised in 85.71%. USG Doppler was done in all 7 patients, 6 of them being suggestive of temporal arteritis. All patients responded to steroid therapy and symptomatically improved. All were being follow-up regularly, and no relapse was noted after stopping of steroid therapy.

Conclusion : Early diagnosis and treatment are required to prevent systemic and ocular complications. Response to steroid therapy was excellent.

Key words : Temporal Arteritis, Headache Elderly.

Temporal arteritis, also referred to as Giant cell Arteritis is most common granulomatous vasculitis of the median and large size vessels involving the extracranial branch of carotid artery. It is first discovered by Hutchinson in 1890[1]. After that more clearly defined by Horton, *et al* in 1932[2].

Temporal arteritis is more common among North European, annual incidence rate is more than 20 cases per 1,00,000 populations at risk and less common in Mediterranean population[3]. Incidence in Asian countries is believed to be very low or, with incidence reported in Japan is as low as 1.47 per 100,000[4].

Classical clinical presentation of temporal arteritis are sudden onset temporal headache, fever, fatigue, jaw claudication, scalp tenderness, polymyalgia rheumatica and visual symptoms. Polymyalgia Rheumatica (PMR) is an inflammatory condition, which is characterized by pain with stiffness of proximal muscles and it is associated with raised ESR and CRP[5]. A non-compressible halo sign of a temporal /or axillary artery in USG Doppler may replace the requirement of temporal artery biopsy for the diagnosis of temporal arteritis[6]. Most important complication of temporal arteritis is blindness due to ischemic optic neuropathy, which usually can be prevented by early diagnosis and treatment[7].

Editor's Comment :

- Temporal Arteritis is a common treatable cause of headache in elderly population which is underdiagnosed.
- Early Diagnosis can lead to prevention of complications like blindness and stroke.
- Temporal artery Doppler is a sensitive, cheap and widely available non invasive investigation to ascertain the diagnosis.

Aims and Objectives

To study the demographic, clinical and laboratory profile of patients with temporal arteritis.

Materials and Methods

Seven consecutive confirmed cases of Temporal arteritis attending the neurology clinic of super speciality hospital, Durgapur, West Bengal during August, 2021 to November, 2022 were included in the study. Neurological examination of all patients were done by the same Neurologist. ESR, CRP and

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USG Doppler were done of all patients along with other required investigations.

Inclusion Criteria :

Diagnosed cases of temporal arteritis by using ACR/ EULAR classification criteria 2022 for Giant Cell Arteritis were included in study.

Exclusion Criteria :

Alternate diagnoses mimicking vasculitis like Takayasu's Arteritis, Polyarteritis Nodosa, Behcet's disease, primary central nervous system vasculitis were excluded.

Results

A total of 7 patients fulfilled the criteria for diagnosis of temporal arteritis and included in study. Out of 7 patients, 6 were male and 01 was female. Male female ratio was 6:1. Most common age group was 60-70 years. Mean age of onset was 70 years (range 61-82 years). All the patients had recent onset of headache. Typical manifestations included new temporal headache (100%), temporal artery tenderness (85.71%) and jaw claudication (14.28%). ESR & CRP were raised in 85.71%. USG Doppler was done in all 7 patients, 6 of them being suggestive of temporal arteritis. All patients responded to steroid therapy and symptomatically improved. All were being follow-up regularly, and no relapse was noted after stopping of steroid therapy (Table 1).

Discussion

Temporal arteritis exclusively occurs in elderly person over age of 50 years. It's pathophysiology is still not very clear. However old age, genetic factors[8,9] and environmental factors[10,11] may have the role in etiology. Both cellular and humoral immune system have been involved in pathogenesis[12]. Activated T cells produce interferon gamma, which seems to have a major role in the pathogenesis and clinical manifestations[13].

Table 1 — *Clinical and Investigation findings of the cases*

Age (year)	Sex (M/F)	New Temporal headache	Temporal Artery Tenderness	JAW Claudication	ESR	CRP	USG Doppler	Comorbidity
68	F	+	+	-	^	^	+	HTN/CAD
82	M	+	-	-	^	^	+	HTN/Ca Prostate with metastasis
72	M	+	+	-	^	^	+	HTN
61	M	+	+	-	N	N	+	HTN
61	M	+	+	-	^	^	+	HTN
70	M	+	+	-	^	^	+	HTN/DM
76	M	+	+	+	^	^	Normal	DM

The 2022 American College of Rheumatology/EULAR GCA Classification Criteria has been validated to use in clinical research[14]. In old revised ACR Criteria, TAB (temporal biopsy) results were required, which is an invasive intervention for patient and may give false negative result in case of patchy involvement of artery. In recent 2022 ACR/EULAR GCA Classification Criteria, presence of either definitive vasculitis on temporal artery biopsy or halo sign on temporal artery ultrasound is required. Halo sign is defined by the presence of an homogenous, hypoechoic wall thickening on ultrasound. New criteria incorporate modern imaging techniques and have excellent specificity and sensitivity[14].

2022 American College of Rheumatology/ Eular Classification Criteria for Giant Cell Arteritis[14] :

(1)	**Absolute Requirement- age ≥50 years at time of diagnosis**	
(2)	**Additional clinical criteria-**	
	Morning stiffness in shoulders/neck	+2
	Sudden visual loss	+3
	Jaw or tongue claudication	+2
	New temporal headache	+2
	Scalp tenderness	+2
	Abnormal examination of temporal artery (absent or diminished pulse, tenderness or hard cord like appearance)	+2
(3)	**Laboratory, imaging, and biopsy criteria-**	
	Maximum ESR ≥50mm/hour or maximum CRP ≥10 mg/litre	+3
	Positive temporal artery biopsy or halo sign on temporal artery ultrasound	+5
	Bilateral axillary involvement (luminal damage-stenosis, occlusion, or aneurysm)	+2
	FDG-PET activity throughout aorta (Abnormal fluorodeoxyglucose(FDG) uptake)	+2

Some of the score of 10 items, if present. A score of ≥6 points is needed for the classification of Giant Cell Arteritis/Temporal Arteritis

Reported age in most of the published series from different zones of world is above 70 years, the mean age of our present study was 70 years, which was similar to case reports from India[15-18]. Most case series have reported either female predominance or no gender variation[15,16,19-21]. But in our study shows male predominance. Six patients out of 7 were male. The actual variation of this variation is not known, but may be due to difference in health seeking behaviour among gender.

Headache is reported at about 87% of patients in temporal arteritis[20]. In our study all patients have

presented with headache (100%). Jaw claudication reported in study from south India is about 22.22%[22]. While in our study only one patient out of 7 (14.28%) had presented with jaw claudication. Characteristics inflammatory markers (ESR & CRP) are often elevated in temporal arteritis. Maximum ESR ≥50mm/hour or maximum CRP ≥10mg/litre, values prior to initiation of treatment for vasculitis[14], are considered as raised. ESR & CRP may be normal in 4% cases of confirmed cases of temporal arteritis[23]. In our study 1 patient out of 7 had normal ESR & CRP. These were raised (85.71%) in other 6 patients.

Temporal artery tenderness was noted in 6 out of 7 patient (85.71%) in our study, while it is reported at about 70.6% in some other studies[24]. In previous series reported from Japan, USG Doppler finding demonstrating halo sign is about 83%[25]. In our study USG Doppler was positive (halo sign) in 85.71% patients. Steroid therapy is effective in symptomatic relief (100%) and relapse is noted in 11.7% cases[24]. In our study steroid therapy was given to all patient and all responded to the therapy (100%) and no relapse was reported.

Conclusion

Temporal Arteritis is a common treatable cause of headache in elderly population which is underdiagnosed. Early Diagnosis can lead to prevention of complications like blindness and stroke.

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Conflict of Interest : None

References

1 Hutchinson J — On a peculiar form of thrombotic arteritis of the aged which is sometimes productive of gangrene. *Arch Surg (London)* 1890; **1:** 323-9.
2 Horton BT, Magath BT, Brown GE — Arteritis of temporal vessels: report of 7 cases. *Proc StaV Meet Mayo Clin* 1937; **12:** 548-53.
3 Nesher G, Breuer GS — Giant cell arteritis and Polymyalgia Rheumatica: 2016 update. *Rambam Maimonides Med J* 2016; **7:** Article e0035, 10.5041/RMMJ.10262 Review
4 Kobayashi S, Yano T, Matsumoto Y, Numano F, Nakajima N, Yasuda K, *et al* — Clinical and epidemiologic analysis of giant cell (temporal) arteritis from a nationwide survey in 1998 in Japan: The first government-supported nationwide survey. *Arthritis Rheum* 2003; **49:** 594-8.
5 Raheel S, Shbeeb I, Crowson CS, Matteson EL — Epidemiology of polymyalgia rheumatica 2000-2014 and examination of incidence and survival trends over 45 years: a population-based study. *Arthritis Care Res (Hoboken)* 2017; **69(8):** 1282-5.
6 Dejaco C, Ramiro S, Duftner C — EULAR recommendations for the use of imaging in large vessel vasculitis in clinical practice. *Annals of the Rheumatic Diseases* 2018; **77:** 636-43.
7 David B — Hellmann; Giant Cell Arteritis, Polymyalgia Rheumatica, and Takayasu's Arteritis. In: Kelley's Textbook of Rheumatology. 9th edition, Budd RC, Firestein GS, *et al* editors. ELSEVIER, Philadelphia, 2013: 1461-80.
8 Gonzalez-Gay MA, Amoli MM, Garcia-Porrua C, Ollier WE — Genetic markers of disease susceptibility and severity in giant cell arteritis and polymyalgia rheumatica. *Semin Arthritis Rheum* 2003; **33:** 38-48.
9 Alvarez-Rodriguez L, Martínez-Taboada VM, López-Hoyos M, Mata C, Fernandez Prieto L, Agudo-Bilbao M, *et al* — Interleukin-12 gene polymorphisim in patients with giant cell arteritis, polymyalgia rheumatica and elderly-onset rheumatoid arthritis. *Clin Exp Rheumatol* 2009; **27:** 14-8.
10 Gabriel SE, Espy M, Erdman DD, Bjornsson J, Smith TF, Hunder GG, *et al* — The role of parvovirus B19 in the pathogenesis of giant cell arteritis: A preliminary evaluation. *Arthritis Rheum* 1999; **42:** 1255-8.
11 Salvarani C, Gabriel SE, O'Fallon WM, Hunder GG — The incidence of giant cell arteritis in Olmsted County, Minnesota: Apparent fluctuations in a cyclic pattern. *Ann Intern Med* 1995; **123:** 192-4.
12 Weyand CM, Goronzy JJ — Medium- and largevessel vasculitis. *N Engl J Med* 2003; **349:** 160-9.
13 Weyand CM, Hicok KC, Hunder GG, Goronzy JJ — Tissue cytokine patterns in patients with polymyalgia rheumatica and giant cell arteritis. *Ann Intern Med* 1994; **121:** 484-91.
14 Ponte C, Grayson PC, Robson JC — For the DCVAS Study Group, *et al* 2022 American College of Rheumatology/EULAR classification criteria for giant cell arteritis. *Annals of the Rheumatic Diseases* 2022; **81:** 1647-53.
15 Desai MC, Vas CJ — Temporal arteritis. The Indian scene. *J Assoc Physicians India* 1989; **37:** 609-11.
16 Singh S, Balakrishnan C, Mangat G, Samant R, Bambani M, Kalke S, *et al* — Giant cell arteritis in Mumbai. *J Assoc Physicians India* 2010; **58:** 372-4.
17 Mathew T, Aroor S, Devasia AJ, Mahadevan A, Shobha V, Nadig R, *et al* — Temporal arteritis: A case series from south India and an update of the Indian scenario. *Ann Indian Acad Neurol* 2012; **15:** 27-30.
18 Kumar R, Gupta H, Jadhav A, Khadilkar S — Bitemporal scalp, lip and tongue necrosis in giant cell arteritis: A rare presentation. *Indian J Dermatol* 2013; **58:** 328.
19 Laldinpuii J, Sanchetee P, Borah AL, Ghose M, Borah NC — Giant cell arteritis (temporal arteritis): A report of four cases from north east India. *Ann Indian Acad Neurol* 2008; **11:** 185-9.
20 Gonzalez-Gay MA, Barros S, Lopez-Diaz MJ, Garcia-Porrua C, Sanchez-Andrade A, Llorca J — Giant cell arteritis: Disease patterns of clinical presentation in a series of 240 patients. *Medicine (Baltimore)* 2005; **84:** 269-76.
21 Souza AW, Okamoto KY, Abrantes F, Schau B, Bacchiega AB, Shinjo SK — Giant cell arteritis: A multicenter observational study in Brazil. *Clinics (Sao Paulo)* 2013; **68:** 317-22.
22 Vankalakunti M, Dharmanand BG, Chandra S, Pai SA — Giant cell arteritis: A clinical and pathological study. *Natl Med J India* 2010; **23:** 18-20.
23 Kermani TA, Schmidt J, Crowson CS, Ytterberg SR, Hunder GG, Matteson EL, *et al* — Utility of erythrocyte sedimentation rate and C-reactive protein for the diagnosis of giant cell arteritis. *Semin Arthritis Rheum* 2012; **41:** 866-71.
24 Sharma A, Sagar V, Prakash M, Gupta V, Khaire N, Pinto B, *et al* — Giant cell arteritis in India: Report from a tertiary care center along with total published experience from India. *Neurol India* 2015; **63:** 681-6
25 Imai N, Kuroda R, Konishi T, Serizawa M, Kobari M — Giant cell arteritis: Clinical features of patients visiting a headache clinic in Japan. *Intern Med* 2011; **50:** 1679-82.

Original Article

Antenatal Ultrasound Parameters of Fetal Hydronephrosis in Correlation with Postnatal Outcome — A Prospective follow-up study

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Abstract

Background : Ultrasonography during pregnancy significantly improves the detection of Antenatal Hydronephrosis (ANH). However, the key challenge is differentiating between infants who needs further investigation and potential early intervention to prevent future complications or renal damage and those who do not require additional follow-up.

Aims and Objective : To evaluate antenatal Ultrasound (US) and correlate with postnatal ultrasound for detecting fetal hydronephrosis. The objective is to determine the role antenatal ultrasound parameters in predicting the outcomes of fetal hydronephrosis.

Materials and Methods : A prospective follow-up study involving 50 antenatal mothers was conducted over two years at the Department of Radiodiagnosis, Aarupadai Veedu Medical College and Hospital. The study included patients who come during routine prenatal ultrasound examinations, were diagnosed with antenatal hydronephrosis.

Results : Among the 50 newborns delivered, 27 were male and 23 were female. The average Gestational Age (GA) at which fetal hydronephrosis was diagnosed was 26 weeks. Most cases were transient and resolved spontaneously; however, other urologic anomalies required follow-up and intervention. Our study demonstrated a significant correlation between the degree of hydronephrosis and the postnatal outcomes of the neonates.

Conclusion : This study confirmed that infants with moderate and severe grades of hydronephrosis are at a greater risk of postnatal urinary tract anomaly. The risk of pathologic postnatal outcome of antenatal hydronephrosis may be quantified by the measurement of Renal Pelvic Anteroposterior Diameter (RPAPD).

Key words : Antenatal Hydronephrosis, Transient Hydronephrosis, Ultrasonography, Posterior Urethral Valve, Vesicoureteric Reflux, Anteroposterior Diameter.

Growing range of imaging modalities, diagnostic procedures, and even in-utero therapies have made fetus a unique patient lately[1]. Following the introduction of high-quality Ultrasonography (US) screening in pregnancy, the actual prevalence of urological anomalies has come to attention[2,3]. Congenital Anomalies of the Kidneys and Urinary Tract (CAKUT) has been found to show higher detection in recent years due to increased prenatal screening and it is the most typical cause of chronic kidney disease[4,5]. One such common condition which is found frequently is fetal hydronephrosis, due to its greater occurrence among urinary tract congenital abnormalities[6].

Editor's Comment :

- Most antenatal hydronephrosis is transient, but moderate-severe cases have a significantly higher risk of postnatal urinary tract anomalies and possible intervention.
- Antenatal ultrasound - particularly the Renal Pelvic Anteroposterior Diameter (RPAPD) - effectively stratifies this risk and should guide counselling, early postnatal imaging, and urology referral.

Fetal hydronephrosis is an abnormality that is a common congenital disorder that has attracted attention in recent years[7,8]. Prenatal ultrasound can detect this condition, which has been defined by renal parenchymal atrophy and improper dilatation of renal pelvis and calyces[9,10]. The frequency of occurrence of prenatally identified hydronephrosis ranges from 0.7 to 5.6%, with affecting bilaterally reported about 16-55% of cases and occasionally combined with other abnormalities also[11]. Numerous researches have evaluated the predictive value of fetal Renal Pelvic Dilatation (RPD) in regard to anomalies of the urinary tract. One of these is the Renal Pelvic Anteroposterior Diameter (RPAPD), which is the most often utilized measurement and is currently employed extensively in prenatal diagnosis[12].

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Antenatal Hydronephrosis (ANH) remains asymptomatic at birth in majority of infants. The main challenge lies in distinguishing among infants in need of additional research in order to potentially intervene before signs, problems emerge[13]. Based on that management varies from simple to medical or surgical management. A careful selection of fetuses with prenatal pyelectasis for postnatal follow-up should be targeted to decrease needless parental anxiety and to provide more cost-effective care. This study can help in assessing the outcome of fetal hydronephrosis by evaluating both antenatal and postnatal ultrasound and identifying milder and more dangerous types. Therefore, they could receive counselling for routine follow-up, fast assessment, and quick action including surgical intervention as required.

Materials and Methods

The study was conducted in the Department of Radiodiagnosis at Aarupadai Veedu Medical College and Hospital, Kirumampakam, Puducherry, following approval from the Institutional Human Ethics Committee (IHEC NO: AV/IHEC/2022/136). It was designed as a prospective follow-up study, involving antenatal mothers undergoing prenatal scans. The study was conducted over a period of two years.

A sample size of 50 participants was determined based on a similar study by Shagufta W, *et al*, which predicted a difference of 0.47 mm in antenatal and postnatal anteroposterior (AP) diameters, with a standard deviation of 1. A significance level of 5% and a power of 80% were used to calculate the sample size. Participants included antenatal mothers diagnosed with fetal hydronephrosis. Mothers who did not provide consent and fetuses diagnosed with other congenital anomalies were excluded from the study.

Ultrasonographic assessments were conducted using a Mindray DC80 ultrasound machine, with ultrasound gel facilitating the clear visualization of target organs. Data collection commenced after obtaining written informed consent from participants, who were informed of the study's objectives. The study included mothers undergoing Nuchal Translucency (NT) scans, anomaly scans, or growth scans, specifically those diagnosed with fetal hydronephrosis. Postnatal outcomes were assessed with the mother's consent, and antenatal ultrasonographic findings were correlated with postnatal hydronephrosis outcomes.

For statistical analysis, categorical variables were summarized as frequency and percentage, while continuous variables were expressed as mean ± standard deviation. Depending on the normality of data distribution, either a paired t-test or Wilcoxon test was used to compare postnatal and antenatal AP diameters. A p-value of less than 0.05 was considered statistically significant, and data analysis was performed using SPSS version 28.

Results

A total of fifty expectant mothers who met the inclusion criteria participated in this study. Of the 50 newborns delivered, 54% were male, and 46% were female. Antenatal hydronephrosis was diagnosed at an average gestational age of 26 weeks. The mean right renal pelvic diameter was 6.2 mm before birth, which reduced to 5.1 mm postnatally. Similarly, the mean left renal pelvic diameter was 6.3 mm antenatally and decreased to 4.9 mm after birth.

Among the 50 cases, 78% were unilateral, and 22% were bilateral. Of the unilateral cases, 32% involved the right kidney, while 46% affected the left kidney. Regarding the severity of hydronephrosis, 64% had mild hydronephrosis, 28% had moderate hydronephrosis, and 8% had severe hydronephrosis.

In terms of the underlying causes, 72% of cases were classified as transient hydronephrosis, 14% had pelviureteric junction obstruction, 8% had vesicoureteric reflux, 2% had a posterior urethral valve, and 4% were diagnosed with multicystic dysplastic kidney. Outcomes showed that 84% of cases resolved spontaneously, 6% were managed conservatively, 2% required follow-up and 8% underwent surgical intervention. All mild cases were identified as transient hydronephrosis postnatally. Among the moderate cases, 4 were transient hydronephrosis, 3 were vesicoureteric reflux, 6 were pelviureteric junction obstruction, and 1 was multicystic dysplastic kidney. Of the severe cases, 1 was multicystic dysplastic kidney, 1 was pelviureteric junction obstruction, 1 was a posterior urethral valve, and 1 was vesicoureteric reflux.

All mild cases resolved spontaneously. Among the moderate cases, 10 resolved spontaneously, 3 were managed conservatively and 1 required surgical intervention. Of the severe cases, 3 required surgical intervention and 1 was advised to undergo follow-up. A statistically significant association was found between the severity of hydronephrosis grading and

postnatal diagnosis (p<0.001), as well as between the severity of grading and postnatal outcomes (p<0.001).

Discussion

Our present study is conducted to evaluate the postnatal outcome of fetus identified with antenatal fetal hydronephrosis using ultrasound parameters and also to assess the correlation of grading of severity with postnatal diagnosis and outcome. In the recent years, considering the burden of increased number of infants diagnosed with hydronephrosis on fetal ultrasonography, Our study analyses the clinical outcome in a group of infants with antenatal hydronephrosis.

Our study included 50 cases, of whom 54% (27) were male and 46%(23) were female. Our findings indicate a higher prevalence of antenatal hydronephrosis in males compared to females. Similarly, a study by Signorelli M, *et al*, involving 375 infants, also found a greater incidence of hydronephrosis in males compared to females[3]. In our study, most cases of fetal hydronephrosis were diagnosed during the late second trimester (27 cases, 54%) or the early third trimester (23 cases, 46%). The average gestational age for detecting fetal hydronephrosis was found to be 26 weeks. Similarly, the study by Balasankar, *et al*, which included 76 infants, reported 57.5% of cases diagnosed in the late second trimester and 37.5% in the third trimester[14].

Among the fifty cases studied, fetal hydronephrosis was unilateral in 78% (39) cases and bilateral in 22% (11) cases . Of the unilateral cases, 16 were on the right side and 23 were on the left side, indicating a higher prevalence of left-sided hydronephrosis. This finding aligns with Manju, *et al* study, which reported a higher incidence of hydronephrosis on the left side (35%) compared to the right side (30%)[15]. In our study 64% (32 out of 50) of cases are mild graded, 28% cases are moderate graded (14 out of 50) and 16.2% (4 out of 50) cases are severely graded. This grading is done based on anteroposterior diameter of renal pelvis. Similarly, many studies have graded fetal hydronephrosis using renal pelvic APD. One among them is Sadeghi, *et al* who observed 65% of normal kidney,18% of mild to moderate hydronephrosis and 17% of severely affected hydronephrosis in his study during ultrasound[16]. This study identified the causes of antenatal hydronephrosis in the following order of frequency: 72% were cases of transient hydronephrosis (36 out of 50); 14% were due to pelviureteric junction obstruction (7 out of 50); 8% were attributed to vesicoureteric reflux (4 out of 50); 2% were caused by posterior urethral valve (1 out of 50); and 4% were related to multicystic dysplastic kidney (2 out of 50).

In line with findings by Passerotti, *et al* transient or non-obstructive hydronephrosis was the most common postnatal diagnosis, observed in 52.2% of patients. Pelviureteric junction obstruction (UPJO) was found in 12.9% and Vesicoureteric Reflux (VUR) in 19.5%. Passerotti also noted that 8% of those with UPJO and ureteral obstruction presented with normal or mild hydronephrosis on their initial ultrasound[17]. Transient hydronephrosis was found to be the most common etiology for antenatal hydronephrosis. Among thirty-six cases diagnosed, Majority showed mild grade followed by four moderate grades of hydronephrosis. Almost all cases showed resolution at 1 month of postnatal follow-up. PUJO was the second most common etiology diagnosed and also the most common structural abnormality diagnosed among the study population. A total of seven cases were presented with PUJO of which six cases are moderate and one case is severe grade of postnatal hydronephrosis. Among those infants, two underwent surgical intervention called pyeloplasty by 3-5 months of postnatal life, two of them were resolved and three had conservative management.

Vesicoureteric reflux was found among 8% of the study population. Three of them had moderate hydronephrosis and one had severe hydronephrosis who later underwent surgery of ureteric reimplantation. Moderate cases showed resolving features during follow-up. PUV was found in one case who underwent immediate surgical intervention called cystoscopic fulguration. Because of severe hydronephrosis the child was taken up for vesicostomy. This was diagnosed among 4% of the study population. Two cases presented with moderate antenatal hydronephrosis in which one had follow-up and other had resolved (Tables 1-3).

The analysis of this study revealed that among infants with transient hydronephrosis, the majority had mild, followed by moderate and then severe antenatal grading. For infants with significant uropathy, such as pelviureteric junction obstruction, posterior urethral valve, or multicystic dysplastic kidney, most presented with severe antenatal grades of hydronephrosis.

Table 1 — *Side and severity of antenatal hydronephrosis*

	Side	Frequency	Percent
Side	Bilateral	11	22.0
	Left	23	46.0
	Right	16	32.0
Severity	Mild	32	64.0
	Moderate	14	28.0
	Severe	4	8.0

Table 2 — *Comparison between grading of severity and postnatal diagnosis*

	Postnatal Diagnosis					Total	Chi square P value
	MCKD	PUJO	PUV	TRAN	VUR		
Grading :							
Mild	0	0	0	32	0	32	47.881
Moderate	1	6	0	4	3	14	<0.001*
Severe	1	1	1	0	1	4	
Total	2	7	1	36	4	50	

Table 3 — *Comparison between grading of severity and postnatal outcome*

	Postnatal Outcome				Total	Chi square P value
	Conser-vative	Follow-up	Resolved	Surgical intervention		
Grading :						
Mild	0	0	32	0	32	48.831
Moderate	3	0	10	1	14	<0.001*
Severe	0	1	0	3	4	
Total	3	1	42	4	50	

Overall, 64% of infants with mild hydronephrosis, 28% with moderate hydronephrosis, and 8% with severe hydronephrosis developed subsequent postnatal urinary tract abnormalities. Consistent with findings from Livera, *et al* the risk of postnatal pathology increased with the severity of antenatal pelvic dilatation - 11.9% for mild, 45.1% for moderate and 88.3% for severe hydronephrosis[18]. Statistical analysis confirmed that as when the grade of antenatal hydronephrosis increases from mild to moderate to severe, the risk of developing subsequent postnatal uropathy also increases, with a p-value of less than 0.001.

Overall, 84% of infants with antenatal hydronephrosis experienced resolution of the condition. Among the study group, 8% underwent surgical intervention, another 8% were managed conservatively and 2% required follow-up. It was noted that infants with moderate to severe antenatal hydronephrosis were at a higher risk for surgical intervention. However, Gotoh, *et al*. proposed that surgery might not be necessary if the Anteroposterior Diameter (APD) is less than 20 mm between 30 and 40 weeks of gestation[19,20]. Our statistical analysis demonstrated that as the grade of antenatal hydronephrosis progresses from mild to moderate to severe, the likelihood of requiring postnatal surgical intervention also increases, as suggested by p-value of less than 0.001.

A significant positive correlation was observed between the severity grading from antenatal ultrasound and the urinary tract anomalies identified postnatally, with a p-value of less than 0.001. A significant positive correlation was observed between higher grades of antenatal hydronephrosis and both postnatal outcomes and the need for surgical intervention.

The limitations of the present study are as follows. The research population is very limited and there was not enough time for follow-up. Longer follow-up of the infant is necessary for assessing the better outcome. Also, several radiologists have conducted the ultrasonography and therefore interobserver variance must be considered.

Conclusion

This study found a notable link between the severity of hydronephrosis and neonatal outcomes after birth. Children with any degree of Antenatal Hydronephrosis (ANH) are more prone to experiencing postnatal issues compared to the general population. Moderate to severe ANH, in particular, is associated with a higher risk of pathology, highlighting the need for detailed postnatal diagnostic evaluation. To better understand the risk of disease and determine appropriate treatments for different levels of ANH, a thorough prospective analysis of prenatal ultrasound parameters is crucial. Effective communication with parents is also essential for developing a comprehensive management plan based on both prenatal and postnatal ultrasound findings.

References

1 Ntusi NA, Samuels P, Moosa S, Mocumbi AO — Diagnosing cardiac disease during pregnancy: imaging modalities. *Cardiovasc J Afr* 2016; **27(2):** 95-103.

2 Toiviainen-Salo S, Garel L, Grignon A, Dubois J, Rypens F, Boisvert J, *et al* — Fetal hydronephrosis: is there hope for consensus? *Pediatr Radiol* 2004; **34(7):** 519-29.

3 Signorelli M, Cerri V, Taddei F, Groli C, Bianchi UA — Prenatal diagnosis and management of mild fetal pyelectasis: implications for neonatal outcome and follow-up. *Eur J Obstet Gynecol Reprod Biol* 2005; **118(2):** 154-9.

4 Walawender L, Becknell B, Matsell DG — Congenital anomalies of the kidney and urinary tract: defining risk factors of disease progression and determinants of outcomes. *Pediatr Nephrol* 2023; **38(12):** 3963-73.
5 Stonebrook E, Hoff M, Spencer JD — Congenital Anomalies of the Kidney and Urinary Tract: A Clinical Review. *Curr Treat Options Pediatr* 2019; **5(3):** 223-35.
6 Oliveira EA, Oliveira MC, Mak RH — Evaluation and management of hydronephrosis in the neonate. *Curr Opin Pediatr* 2016; **28(2):** 195-201.
7 Has R, Sarac Sivrikoz T — Prenatal Diagnosis and Findings in Ureteropelvic Junction Type Hydronephrosis. *Front Pediatr* 2020; **8:** 492.
8 Safdar O, Safhi MA, Saggaf O, Algethami HR, Alhalabi M, Alnajrani EM, *et al* — Assessment of the Etiologies and Outcomes of Antenatal Hydronephrosis in Patients at King Abdulaziz University Hospital. *Cureus* 2020; **12(4):** e7615.
9 Choi YH, Cheon JE, Kim WS, Kim IO — Ultrasonography of hydronephrosis in the newborn: a practical review. *Ultrasonography* 2016; **35(3):** 198-211.
10 Hindryckx A, De Catte L — Prenatal diagnosis of congenital renal and urinary tract malformations. *Facts Views Vis Obgyn* 2011; **3(3):** 165-74.
11 Plevani C, Locatelli A, Paterlini G, Ghidini A, Tagliabue P, Pezzullo JC, *et al* — Fetal hydronephrosis: natural history and risk factors for postnatal surgery. *J Perinat Med* 2014; **42(3):** 385-91.
12 de Paula Pereira G, Bunduki V, Hase EA, Francisco RP, Zugaib M — Prenatal natural history of isolated fetal mild bilateral pyelectasis. *Clinics (Sao Paulo)* 2016; **71(9):** 511-6.
13 Sinha A, Bagga A, Krishna A, Bajpai M, Srinivas M, Uppal R, *et al* — Revised guidelines on management of antenatal hydronephrosis. *Indian J Nephrol* 2013; **23(2):** 83-97.
14 Sathyan S — A Study on Postnatal Evaluation and Followup of Infants with Antenatally detected Hydronephrosis: Madurai Medical College, Madurai; 2017.
15 Jadav R, Manjuprasad G — Post natal management of antenatally detected hydronephrosis. *Journal of Evolution of Medical and Dental Sciences* 2018; **7(53):** 5587-91.
16 Sadeghi-Bojd S, Kajbafzadeh A-M, Ansari-Moghadam A, Rashidi S — Postnatal evaluation and outcome of prenatal hydronephrosis. *Iranian Journal of Pediatrics* 2016; **26(2)**.
17 Passerotti CC, Kalish LA, Chow J, Passerotti AMA, Recabal P, Cendron M, *et al* — The predictive value of the first postnatal ultrasound in children with antenatal hydronephrosis. Journal of Pediatric Urology 2011; **7(2):** 128-36.
18 Livera L, Brookfield D, Egginton J, Hawnaur J — Antenatal ultrasonography to detect fetal renal abnormalities: a prospective screening programme. *British Medical Journal* 1989; **298(6685):** 1421-3.
19 Gotoh H, Masuzaki H, Fukuda H, Yoshimura S, Ishimaru T. Detection and assessment of pyelectasis in the fetus: relationship to postnatal renal function. *Obstetrics & Gynecology* 1998; **92(2):** 226-31.
20 Psooy K, Pike J — Investigation and management of antenatally detected hydronephrosis. *Can Urol Assoc J* 2009; **3(1):** 69-72.

Original Article

The Association of Refractive Errors with Concomitant Strabismus and Amblyopia on Children Aged 2 Years to 12 years — A Cross Sectional Study in Kolkata, West Bengal

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Abstract

Background : Global estimates show, about 12 million children are visually disabled owing to errors of refraction, which if left uncorrected may lead to concomitant strabismus and amblyopia.

Aims and Obectives : The objectives of the study were to know the distribution patterns and different types of refractive errors in children along with their demographic details and to study the mutual associations of refractive errors, concomitant strabismus and amblyopia in the study group.

Materials and Methods : 493 eyes in 250 children 2-12 years of age were selected from patients attending Out Patients Department of Ophthalmology, Department in a Tertiary Medical Care Centre.

Results : Most common type of refractive error was Myopia (51.2%, n=128) and astigmatism was the least common type (9.6%,n=24). 39.2%(n=98) subjects were hypermetropic. Simple myopic type was the most common type (87.5% n=21) of astigmatism in study population. Strabismus was present in 22.8% of the study subjects (n=57). Esotropia was the most common type of strabismus associated with refractive errors. Amblyopia was present in 29(11.6%) study subjects.

Conclusion : Most common type of amblyopia was anisometropic amblyopia.

Key words : Myopia, Hypermetropia, Esotropia, Exotropia.

Global estimates show, about 12 million children are visually disabled owing to errors of refraction[1]. Hence, refractive errors were one of the priority areas for Vision 2020, a global initiative for prevention of preventable blindness introduced by the World Health organization[2]. Different studies have reported a varied rates of prevalence for myopia (4.1%, 7.4%, 19.45%) and hyperopia (0.8%, 7.7%, 8.38%) in Indian children[3-5]. These studies confirm that many children are in need of spectacle correction which is often overlooked, specially in rural parts of India. Even global data suggests that, main causes of visual impairment are uncorrected refractive errors (Myopia, Hyperopia & Astigmatism) 43%, cataract 33%, Glaucoma 2%[6]. National estimates show, prevalence of concomitant strabismus in children varied from 2.3% to 6.0%[3,5]. Starbismus causes loss of binocular vision, depth perception and amblyopia, contributing thereby to pediatric visual impairment. Coupled with the fact , that, long term surgical success rate for strabismus is poor, strabismus adds to psychosocial consequences in terms of self-image, negative social prejudice,and even lower chance to get employed. Amblyopia develops if a young child fails to use one or both eyes normally. This happens due to poor development of neural mechanism of vision involving the brain. This visual loss is correctable only if appropriate measures are applied at appropriate time. The visual impairment usually becomes permanent if amblyopia is not treated before the age of about 7-8years[6].

Editor's Comment :

- The current study highlights the fact, that, even mild to moderate refractive errors can lead to strabismus leading to amblyopia.
- This makes parental awareness to be of utmost importance.
- Findings of this study may be utilized in formulation of strategies to limit onset of amblyopia in children, which can impact their future educational opportunities and employability.

The novelty of the present study is it has addressed children attending hospital for eye check-up rather than school students attending a class of a school in most of the other studies of the same kind.Besides, the current study is also unique, as it includes children younger than school going age, which has not been

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sufficiently dealt by other previous studies.

The present study aimed to study the association of refractive errors with concomitant strabismus and amblyopia in children aged 2 to 12 years attending a tertiary care hospital over the period of two and half years. The objectives of the study were to know the distribution patterns and different types of refractive errors in children along with their demographic details and to study the mutual associations of refractive errors ,concomitant strabismus and amblyopia in the study group.

Materials and Methods

This was a hospital based cross sectional observational study. Study period was from January, 2019 to June, 2021 (two and half years approximately). Place and setting of study was, it was conducted in Ophthalmology Outpatient Department of a Regional Institute of Ophthalmology, Medical College, Kolkata, West Bengal.Study population was newly diagnosed cases of refractive error (based on clinical examination, retinoscopy tests) were included in the study. Cases were selected from patients attending Out Patients Department. 493 eyes in 250 children (7 of them had unilateral refractive error) (based on Clinical examination, retinoscopy tests) with refractive errors were selected from patients attending Out Patients Department of a tertiary Medical Care Centre. The sample size was calculated using online statistical software[7] setting the parameters of 95% confidence interval and 5% as the margin of error. Institutional Ethics Committee approval vide Ref No MC/KOL/IEC/NON-SPON/172/11-2018 Dated 22.12.2018 was obtained prior to study. Parental informed consent and assent forms (both verbal and written as applicable) were obtained in each case as per ICMR guidelines.

Children aged 2 years to 12 years being newly diagnosed with refractive error (both unilateral and bilateral) were included in the study. Subjects with history of ocular trauma, presence of cataract in either or both eye, patients having disease of anterior segment, orbit, adnexa, posterior segment, patients having history of previous intraocular surgery, presence of any systemic illness, incomitantsquint, patients not willing to take part in the study, or having congenital anomalies were excluded from the study.

Total number of children screened were 300 children. Out of which 250 met incusion criteria.

Patients attending ophthalmology Outpatient Department with complaint of dimness of vision or routine eye check-up (in small children) were subjected to complete Ophthalmological examination. After examination, patients meeting the inclusion criteria were recruited for the study. Detailed information about the study was given to the participants (for grown up children) and their parents/ legal guardians in clear, understandable words and proper written informed assent was taken. The selected subjects underwent the detailed ocular examination. Anterior segment was examined using slit lamp biomicroscopy and the posterior segment was examined using Indirect Ophthalmoscope. Best Corrected Visual Acuity (BCVA) was measured by Snellen's Chart and Logmar chart (using Lea's symbol for children who could not read). Retinoscopy was used for conducting objective refraction in all children.

All measurements were taken independently by two of the authors (Author 2 and 3). The reason for taking measurement twice was to reduce the chance of human error while doing objective refraction by retinoscopy in children. It is also difficult to get cooperation from small children to perform the test. Severity of refractive error was determined.

Statistical analysis plan : The collected data was entered for analysis in Microsoft Excel. Descriptive statistics (mean, standard deviations and range) were employed to describe continuous variables, while frequency distributions were obtained for dichotomous variables. The intraclass correlation coefficient of the investigators for inter-rater reliability, measured using SPSS software was 0.92 with 95% confidence interval.

Results

A total of 250 children were enrolled for the study out of which 7 children had unilateral refractive error. Hence, 493 eyes of 250 children were studied. Out of the total 250 children, 142(56.8%) were male and 108(43.2%) were female. A male : female ratio of 1.31:1. Majority went to private school. Majority (54%) were from urban areas. Mean age of study participants was 7.07±2.58. Most common type of refractive error was Myopia (51.2%, n=128) and astigmatism was the least common type (9.6%, n=24). 39.2%(n=98) subjects were hypermetropic. Simple myopic type was the most common type (87.5% n=21) of astigmatism in study population. Strabismus was present in 22.8% of the study subjects (n=57).

Among the children with myopia, 23 had some sort of ocular deviation, and around 90.5% (19 out of 23) had exotropia. However, around 34.6% of the children with hypermetropia had strabismus and 90% of this number had esotropia. All cases of strabismus belonged to the concomitant variety as the angle of

squint did not vary with direction of gaze.

Esotropia was the most common type of strabismus associated with refractive errors (63.2%, n=36). Mean age of onset of strabismus was 3.02±1.46 years. Amblyopia was present in 29(11.6%) study subjects**.** Most common type of amblyopia was anisometropic amblyopia (62.1%, n=18). More than half of the study subjects had a family history of refractive error (52.4%, n=131). Majority of the subjects had visual acuity ranging from 6/6 to 6/12 (29.8%, n=149). Most of the children suffered from mild to moderate degree of refractive error in all categories. Overall, 64.75% children were having mild (≤1.5D) refractive error whereas only 1% children were having very severe refractive error of more than 5D**.**

Discussion

Most of the previous studies done to analyse the pattern of refractive errors in children are either school screening or population based and require huge economic resources[8,9]. The present study being a hospital-based study is unique as it has been conducted in the OPD premises without the need of extra manpower and equipment's.

The prevalence of refractive errors was slightly higher in males as compared to females, though this difference was not statistically significant. Comparable result was reported in a hospital-based study done by Matta S, *et al* in New Delhi[10]. In the population based study done by Dulani N, *et al* in Jaipur, Rajasthan female preponderance was seen[8]. Results of the study done by Pavithra MB, *et al*[9] in Bangalore also reported that females are more affected by refractive errors, which is not comparable with the present study. This shows that in hospital based studies like the present study, a male preponderance was observed. On the contrary population-based studies showed a female predilection for refractive errors. The reason for this difference is not clear, but the possible cause of this difference may be ignorance towards the needs of female child or may be due to the social stigma linked use of spectacles by females.

In the present study strong family history of refractive error was present. The association between family history of refractive error in parents or siblings was significant in the studies conducted by Pavithra MB, *et al*[9] and Hashemi H, *et al*[11].This indicates a relationship between refractive errors and heredity.

Myopia (51.2%)was the leading cause of refractive error in the study population. In a survey conducted by Lin LL, *et al*[12] in Taiwan to study the prevalence among school children, the rate of myopia increased from 20% at 7 years, to 61% at 12 years, and 81% at 15 years. In the study by Niroula, *et al* on school going children in Nepal, prevalence of myopia was 4.05%, hyperopia (1.24%) and astigmatism (1.14%)[13]. In the present study the uncorrected visual acuity in one or both eyes at the time of presentation was better than 6/12 in 54% eyes, 6/18 to 6/36 in 41.8% eyes and less than or equal to 6/60 in 4.2% eyes. Similar results were obtained by Niroula, *et al*[13] in their study. Hence, majority of children with refractive error present with mild to moderate decrease in visual acuity (≤6/36). In the present study, the prevalence of astigmatism was 9.6%, which was much lower than a study done by Matta S, *et al* in New Delhi[10], where it was found to be 27.4%.However the latter study was carried out in adolescents. Pavithra MB, *et al*[9] noted a low prevalence of astigmatism (1.6%), similar to the present study most likely because of a similarity in age structure of the subjects undergoing study. Table 1 outlines the comparative data pertaining to the prevalence of refractive errors of previous studies.

Zhang XJ, *et al*[14] and Hashemi H, *et al*[15], in their population based have reported a lower prevalence of strabismus. As per Zhang XJ, *et al* Strabismus is most commonly associated with hypermetropia (Odds Ratio 2.56) followed by anisometropia (odds ratio of 2.47). From a physiological perspective, one can explain the increased association of esotropia with hypermetropia. There is an increased accommodative effort by the hyperopic child to focus an image on the retina stimulating convergence, hence leading to esotropia in long term. This is called fusional divergence insufficiency.

The prevalence of amblyopia in this clinic based study was considerably higher (11.6%) while its prevalence

Table 1 — *Comparison of study findings.*

Author	Place of study	Sample size	Study Population	Prevalence of Myopia	Prevalence of Hypermetropia	Prevalence of Astigmatism
Matta, *et al*[10], 2006	New Delhi	1000	12-17 years	55.6%	16.9%	27.4 %.
Dulani N,[8] 2014	Rajasthan	928	5-18 years	63.47%	11.35%	25.18%
Pavithra MB[9], 2013	Bangalore	1378	7-15 years	4.4%	1.03%,	1.6%
Hashemi H, *et al*[18], 2014	Iran	451	14-21 years	29.3%	21.7%	20.7%
Niroula DR[13], 2009	Nepal	964	10-19 years	4.05%	1.24%	1.14%
Present Study, 2025	Eastern India	250	2-12 years	51.2%	39.2%	9.6%

in than a school based population study by Ganekal S, *et al* (1.1%)[16]. Unilateral amblyoia is far more common than bilateral amblyopia as reported by McKee SP, *et al*[17]. Findings of the present study were similar in this regard which showed, 68.5% of amblyopic children were unilateral and 31.5% bilateral. 0 to 7 years is considered to be the most vital time for development of vision. Strabismus developing during such period can cause amblyopia[18].

In the current study most of the children suffered from mild to moderate degree of refractive error in all categories. Myopia up to 2.75D and hypermetropia as well as astigmatism up to 1.5 D was present in majority of the eyes. This finding is in agreement with studies by Hashemi H, *et al*[18] and Krishnamurthy H, *et al*[19].

The current study highlights the need of parent education on association of amblyopia with strabismus and refractive errors. Parents often overlook the urgent need of early diagnosis and proper management of childhood refractive errors, even the mild to moderate ones, in order to prevent development of amblyopia and its sequelae. Awareness campaigns utilizing social media can prove to be a feasible approach to solve this problem.

Limitations of the study :

The size of the study population is a limitation of the study. The result would have been more reliable if it was done in a bigger sample size. Another limitation of the study is the population chosen for the study was children attending hospital, which increases the possibility of getting more number of children having visual disturbances to get included in the study and the number not exactly representing the prevalence in general population. If the study population was chosen from the community, it would have been more representative of the general population.

Conclusion

The current study highlights the fact, that, even mild to moderate refractive errors can lead to strabismus leading to amblyopia. This makes parental awareness to be of utmost importance. The study also shows the epidemiology of refractive errors with its sequalae, in the Eastern part of India in a pre-dominantly urban setting. Findings of this study can be utilized in formulation of strategies to limit onset of amblyopia in children, which can impact their future educational opportunities and employability.

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Conflict of Interest : None

References

1 Burton MJ, Ramke J, Marques AP, Bourne RRA, Congdon N, Jones I, *et al* — The Lancet Global Health Commission on Global Eye Health: Vision beyond 2020. *Lancet Glob Health* 2021; **9:** e489-e551.
2 World Health Organization. World Report on Vision. Available online: https://www.iapb.org/wp-content/uploads/2020/09/world-vision-report-accessible1.pdf.
3 Sheeladevi S, Seelam B, Nukella PB, Modi A, Ali R, Keay L — Prevalence of refractive errors in children in India: a systematic review. *Clin Exp Optom* 2018; **101(4):** 495-503.
4 Ganekal S, Jhanji V, Liang Y, Dorairaj S — Prevalence and etiology of amblyopia in Southern India: results from screening of school children aged 5-15 years. *Ophthalmic Epidemiol* 2013; **20(4)** :228-31.
5 Dandona R, Dandona L, Srinivas M — Population-based assessment of refractive error in India: the Andhra Pradesh eye disease study. *Clin Exp Ophthalmol* 2002; **30:** 84-93.
6 Gopal SKS, Kelkar J, Kelkar A, Pandit A — Simplified updates on the pathophysiology and recent developments in the treatment of amblyopia: A review. *Indian J Ophthalmol* 2019; **67(9):** 1392-9. doi: 10.4103/ijo.IJO_11_19.
7 Raosoft ref Sample size calculator [Internet]. [cited 2023Jan12]. Available from: http://www.raosoft.com/samplesize.html
8 Dulani N, Dulani H — Prevalence of refractive errors among school children in Jaipur, Rajasthan. *Int J Sci Study* 2014; **2(5):** 52-5.
9 Pavithra MB, Maheshwaran R, Rani Sujatha MA — A study on the prevalence of refractive errors among school children of 7-15 years age group in the field practice areas of a medical college in Bangalore. *Int J Med Sci Public Health* 2013; **2(3):** 641-5.
10 Matta S, Matta P, Gupta V, Dev V — Refractive errors among adolescents attending ophthalmology OPD. *Indian Journal of Community Medicine* 2006; **31(2):** 114.
11 Hashemi H, Nabovati P, Yekta A, Ostadimoghaddam H, Behnia B, Khabazkhoob M — The prevalence of strabismus, heterophorias, and their associated factors in underserved rural areas of Iran. *Strabismus* 2017; **25(2):** 60-6.
12 Lin LL, Shih YF, Hsiao CK, Chen CJ, Lee LA, Hung PT — Epidemiologic study of the prevalence and severity of myopia among schoolchildren in Taiwan in 2000. *J Formos Med Assoc Taiwan Yi Zhi* 2001; **100(10):** 684-91.
13 Niroula DR, Saha CG. Study on the refractive errors of school going children of Pokhara city in Nepal. *Kathmandu Univ Med J KUMJ* 2009; **7(25):** 67-72.
14 Zhang X, Lau Y, Wang Y, Kam K, Ip P, Yip W, *et al* — Prevalence of strabismus and its risk factors among school aged children: the Hong Kong Children Eye Study. *Sci Rep* 2021; **11(1):** 13820.
15 Hashemi H, Pakzad R, Heydarian S, Yekta A, Aghamirsalim M, Shokrollahzadeh F, *et al* — Global and regional prevalence of strabismus: a comprehensive systematic review and meta-analysis. *Strabismus* 2019; **27(2):** 54-65.
16 Ganekal S, Jhanji V, Liang Y, Dorairaj S — Prevalence and etiology of amblyopia in Southern India: results from screening of school children aged 5-15 years. *Ophthalmic Epidemiol* 2013; **20(4):** 228-31.
17 McKee SP, Levi DM, Movshon JA — The pattern of visual deficits in amblyopia. *J Vis* 2003; **3:** 380-405.
18 Hashemi H, Rezvan F, Beiranvand A, Papi OA, Yazdi HH, Ostadimoghaddam H, *et al* — Prevalence of refractive errors among high school students in Western Iran. *Journal of Ophthalmic and Vision Research* 2014; **9(2):** 232-9.
19 Krishnamurthy H, Tanushree V¸ D'Silva AJ, Mobin G, Kantharaju KP — Prevalence of refractive errors among school children of 5-15 years age group in Mysore District. *Int J Sci Study* 2014; **2(8):** 150-4.

Original Article

Unveiling the complexity of Recurrent Small Bowel Obstruction — A Tertiary Care Experience from Kashmir Valley

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Abstract

Background : Recurrent small bowel obstruction is a common surgical affliction emerging as an aftermath of postoperative adhesion formation. This study was aimed at finding the etiology, contributing factors leading to recurrent small bowel obstruction and seeking, in its essence, the model of best possible management.

Materials and Methods : Prospective and retrospective analysis of 297 patients of small bowel obstruction was done in a tertiary care institute over a period of ten years from May, 2012 to April, 2022.

Results : Recurrent small bowel obstruction was seen in 83 (27.9%) cases. There was no statistically significant difference in the recurrence of obstruction between the cases managed conservatively and those operated for the same indication. However, the patients managed conservatively (NOM group) were re-admitted sooner than patients who were surgically treated (NOM group). Within the conservative Non-operatively Managed (NOM) group, 20% of cases were readmitted within 1 year, 35% within 1 to 5 years and 45% after 5 years. In the Operatively Managed (OM) group, 15% of cases were readmitted within 1 year, 25% within 1 to 5 years and 60% after 5 years. The number of prior episodes of obstruction turned out to be a significant predictive factor (p 0.028), as a harbinger of recurrence. Patients having only 1 episode of obstruction had 17% recurrence rate, cases with 2 to 3 episodes of obstruction had recurrence rate of 50%. Notably, for patients with more than 3 episodes of obstruction, the recurrence rate rose to 75%. The number of previous laparotomies was significantly associated with the increase in recurrence of small bowel obstruction (p-value 0.030).

Conclusion : Postoperative small bowel obstruction is a common surgical entity with prohibitively high recurrence rates. The number of prior episodes of recurrence is a significant predictive factor. The higher the number of prior episodes, the more the chances of recurrence. The number of previous laparotomies is significantly associated with the increase in recurrence of small bowel obstruction.

Key words : Small Bowel Obstruction, Adhesions, Recurrent Small Bowel Obstruction, Laparotomy, Recurrence Rate.

Editor's Comment :

- Postoperative small bowel obstruction is a common condition with high risk of recurrence.
- The likelihood of recurrence increases significantly with number of prior episodes and previous laparotomies.
- Early identification of high risk patients may help to guide management strategies.

Small bowel obstruction is a common surgical condition encountered in general surgical practice. It accounts for one in every five patients of acute surgical admissions[1]. Bowel obstruction is defined by the lack of aboard transit of intestinal contents, regardless of etiology[2]. It can be partial or complete and dynamic or adynamic. Small and large bowel obstruction may occur separately or may present simultaneously in metabolic, electrolyte abnormalities or some neurological diseases. The etiology of small bowel obstruction can be secondary to causes present within the lumen (intra-luminal), or within the wall of intestines (intra-mural) or outside the wall of intestine (extrinsic). Intra-abdominal adhesions related to prior abdomen surgery account for 75% of cases of small bowel obstruction[3]. Other causes may be hernias, tumors, enterocoliths, foreign bodies and bezoars. Malignant tumors commonly metastatic account for approximately 20% cases of small bowel obstruction[4]. Patients commonly present with peri-umbilical abdominal pain that waxes and wanes over 1 to 3 minutes intervals. Other symptoms may be vomiting, abdominal distention and/or constipation. In the instances of strangulation, the nature of pain may progress from being colicky to persistent bothering with further increase in depth as well as severity. The patient may be febrile and develop hypotension, tachycardia, and/or oliguria consequent upon massive fluid sequestration. Plain

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radiography of abdomen in standing and supine positions is the earliest investigation to confirm or lead towards the diagnosis of the obstruction of small bowel. The plain erect radiographic findings include triad of dilated small bowel loops (>3cm in diameter), multiple air-fluid levels and paucity of air in the colon, sensitivity ranges 70% to 80%[5]. Computed tomography is 80% to 90% sensitive and 70% to 90% specific in the detection of small bowel obstruction[5]. Clinically stable patients with their first episode of obstruction are managed by conservative Non-operative Management (NOM). Operative Management (OM) strategies appear best for those experiencing the second episode. Neither NOM nor OM yields acceptable outcomes in patients experiencing third or later episodes[6].

Materials and Methods

The study was conducted in the Department of General and Minimal Invasive Surgery, SKIMS, India, over a period of ten years from May, 2012 to April, 2022. This retrospective-prospective observational study was carried out after clearance from institutional Ethical committee. The retrospective analysis was carried out from May, 2012 to May, 2019 and the prospective study was done from June, 2019 to April, 2022.

The records of all patients in the retrospective group were collected from the Medical Records Department (MRD) and analyzed for relevant data including admission notes, radiology reports and operative notes. The analysis of the prospective group was also performed as per the same proforma.

Detailed history and thorough general physical and systemic examination were recorded in each patient at the time of admission. Serial clinical examination including abdominal girth and digital rectal examination and any sign of strangulation was strictly monitored and documented.

All the patients were subjected to baseline investigation including complete blood count (CBC), Kidney and Liver Function Tests (KFT, LFT), serum electrolytes with lactate, chest radiograph, standing and supine radiographs of abdomen. Special investigations including abdominal ultrasonography, computed tomography scan of abdomen and/or oral contrast study was done in most of the cases to confirm the diagnosis. Patients who underwent surgical intervention (OM) were given pre-operative antibiotics (2nd or 3rd generation cephalosporin and tinidazole) as a standard protocol. These patients were subsequently put under care in the postoperative ward for 24-48 hours. All the patients were attached to our out-patient department for follow-up after discharge.

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc, Chicago, Illinois, USA). We used Student's paired T-test for comparing continuous variables as frequencies and percentages.

Results

A total of 297 patients aged between 15 to 75 years with mechanical small bowel obstruction were analyzed over a period of 10 years. Out of 297 patients studied there were 166 (56%) males and 131 (44%) females. The mean age of males was 43.56±9.58 years and that of females was 41.84±10.43 years.

71.3% (212) of our patients were managed conservatively (NOM group) while 28.62% (85) patients needed surgical interventions (OM group). History of recurrent obstruction was found in 27.9% (83) patients. There was no statistically significant difference in the rates of recurrent obstruction between the two groups ie, NOM versus OM groups.

54.2% of patients had a history of previous operative interventions. Out of them 29.2% had a history of gynecological operations followed by appendectomy (26%), colonic surgery(15.5%), Cholecystectomy and other biliary surgeries(4.3%), Hernia surgery(2.5%). 22.4% had underwent laparotomy for trauma, firearm injury and gut perforations.

The average time of presentation since previous surgery was 18 months. Most of the patients developed obstruction within one year of previous abdominal surgery (42.2%). In 32.29% developed obstruction between 1 to 5 years and 25.47% after 5 years of previous surgery. However, the patients managed conservatively (NOM group) were readmitted much earlier than the patients who were surgically managed (OM)(Table 1).

Factors predicting the recurrence of small bowel obstruction were also studied. The number of prior episodes of recurrence scored to be a significant predictive factor (p = 0.041). Of the 53 patients who had experienced a single prior episode, recurrence occurred

Table 1 — *Re-admission Rates*

Management Group	< 1 year		1-5 Years		> 5 Years	
	No	percentage	No	percentage	No	percentage
Conservative	12	20%	21	35%	28	45%
Operative	3	15%	5	25%	14	60%
Total	15	20%	26	32%	42	48%

in 9 patients (17%). Among the 26 patients with 2 to 3 previous episodes, 13 experienced recurrence (50%). 4 patients with more than three prior episodes recurrence was observed in 75 percent of patients.

Postoperative adhesive small bowel obstruction recurred more frequently than other etiologies (p = 0.042). Of the 168 patients with adhesion obstruction, recurrence was seen in 58 patients (35.9%). The number of previous laparotomies also was significantly associated with recurrence (p = 0.030)(Table 2).

Recurrence was studied with respect to the type of previous surgery and operative findings. However, no statistically significant difference was found with respect to the type of previous surgery or operative findings (Table 3).

Among the 38(44.7%) patients who underwent adhesiolysis, recurrence was observed in 13(34.2%) cases. Of the 27(31.7%) patients who underwent resection anastomosis, 5(18.5%) experienced recurrence. Among 4(4.7%) patients who had undergone enterotomy, recurrence occurred in 1 patient (25%). 5 (5.8%) patients with hernia surgery had recurrence rate of 20%.

Table 2 — *Previous Laparotomies*

No of previous laparotomies	Number	Recurrence	Percentage	p-value
1	118	30	25.4	0.03
2	34	17	50	
>2	16	11	68.7	
Total	168	58	35.9	

Table 3 — *Operative Finding*

Operative finding		Number	Recurrence	p- value
Peritoneal contamination	Present	23	10 (43.5%)	0.305
	Absent	62	17 (27.4%)	
Perforation	Present	17	8 (47.0%)	0.495
	Absent	68	20 (29.4%)	
Perforation operation delay :	<24 hours	4	1 (25.0%)	0.599
	1- 2 days	6	2 (33.3%)	
	> 2 days	7	5 (71.4%)	

Discussion

While the diagnosis of small bowel obstruction can be straight forward, management is a challenging task for any surgeon, more so profoundly in recurrent cases in Accident Emergency (AE) settings. Any type of abdominal surgery can result in the genesis of post-operative intraperitoneal adhesions or bands that may lead to recurrent small bowel obstruction. Adhesions are an unavoidable, unfavorable aftermath of any abdominal surgery. Intra-abdominal adhesions are responsible for 49% to 80% cases small bowel obstruction, making it the most common causative factor[7-12]. Despite advances in preoperative recognition of small bowel obstruction, better operative facilities like newer energy sources and better postoperative care, the morbidity and mortality associated with recurrent small bowel obstruction is still prohibitively very high. The present study was done to analyze the incidence, etiology, contributive risk factors and management of recurrent small bowel obstruction in our tertiary care institute.

A total of 297 patients were included in our study. Males outnumbered the females with male female ratio of 1.27.The results are comparable with the study done by Adhikari S and others[13].

In our study, recurrent obstruction was seen in 83 (27.9%) cases. There was no statistically significant difference in the recurrence of obstruction between the cases managed conservatively, NOM group (29%) and those managed surgically, OM group (22.9%). However, the patients managed conservatively (NOM group) were readmitted sooner than patients who were treated by operative means (OM group). In the conservative NOM group 20% of cases were readmitted within 1 year, 35% within 1 to 5 years and 35% after 5 years. In the operatively managed OM group, 15% of cases were readmitted within 1 year, 25% within 1 to 5 years and 60% after 5 years. G Miller, *et al*[14] in a study of 410 patients found a recurrence rate of 34% in the conservative group and 32% in the surgically treated group. They found that non operatively managed patients were readmitted sooner than surgically treated cases (median 0.7 v 2 years).

54.2% of our patients had a history of previous operative interventions. Out of them 29.2% had history of gynecological operations followed by appendectomy (26%), exploratory laparotomies (22.4%), colon surgery (15.5%), hepatobiliary surgery (4.3%) and hernia surgery (2.5%). The study done by G Miller, *et al* found 24 percent of their patients had previous colorectal surgery (24 per cent), followed by gynecological surgery (22 per cent), herniorrhaphy (15 per cent) and appendectomy (14 per cent)[14] .

Factors predicting the recurrence of small bowel obstruction were studied. The number of prior episodes of recurrence came out to be a significant factor (p=0.028). The greater the number of prior episodes, the more the chances of recurrence. Patients who had only 1 episode of obstruction, the recurrence rate was 17%, cases with 2 to 3 episodes of obstruction, the recurrence rate was 50%. Notably, for patients with

more than 3 episodes of obstruction, the recurrence rate rose to 75%. Our findings are comparable with the study done by G Miller and others[14].

The number of previous laparotomies was significantly associated with increase in recurrence of small bowel obstruction (p=0.030). Of 168 cases of adhesion obstruction, 118(70.2%) had undergone only one laparotomy previously, while 34 (20.2%) cases had undergone laparotomy previously twice and 16 (9.6%) had undergone laparotomy more than two times previously. In 25.4% of patients with previous one laparotomy recurred, 50% of patients with previous two laparotomies recurred and 68.7% of cases with more than three laparotomies recurred. Miller and others[14] in their study of 410 cases found that 43% of cases presented with obstruction after one laparotomy, 28% after two previous laparotomies, 11% after three, 9% after four or more and 9% of cases had undergone no previous abdominal surgery. Bjørg-Tilde Svanes Fevang[15] in a study of 443 cases found that 17% of cases had no previous abdominal surgery, 60% had one previous laparotomy, 17% two and 6% had three or more previous laparotomies and they found that repeated surgery for acute small bowel obstruction not only portended an increased risk of readmission for acute small bowel obstruction, but also an increased risk of needing small bowel resection and having complications if operation was at all required.

Postoperative adhesive small bowel obstruction recurred more than other etiologies (p=0.042). Of 168 cases of postoperative adhesion, 58 (35.9%) cases recurred. Of the total 85 operated patients, recurrence was seen in 22 (25.9%) of cases and regarding the type of previous surgery, 34.2% cases of adhesiolysis recurred, 18.5% cases of resection anastomosis recurred, 25% cases of enterotomy recurred, 20% cases of hernia repair recurred and of all the other procedures, 18.2% recurred. Barkan H and others[16], found recurrent small bowel adhesion obstruction in 53% after initial episodes and in 85% or more in second or later episodes and much more rapid after third and later episodes. Recurrence was seen in 43.5% of patients with peritoneal contamination found previously on laparotomy, 47% of patients with perforation previously and 71% of cases with perforation operation delay of more than 2 days.

Conclusion

Postoperative small bowel obstruction places itself as one of the most waxing and common surgical entities with prohibitively high recurrence rates. The propensity for recurrence escalates in direct correlation with the number of prior episodes, with the history of previous laparotomies serving as a notably reliable predictive factor. We advocate for additional studies aimed at unraveling this perplexing issue, not only to alleviate the strain on the overstretched healthcare system, particularly in underdeveloped nations, but also to mitigate the prospect of recurrent suffering for affected patients.

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References

1 Belyaev ON, Muller C, Uhl WH — Small Bowel Obstruction. 2009. In: Bland KI, Buchler MW, Csendes A, Sarr MG, Garden OJ, Wrong J (eds) General Surgery. Springer, London.
2 Go KL, Jordan JR, Sarosi, Jr GA, Behrns KE — Small Bowel Obstruction. In: Zinner Mj, Ashley SW, Hines O.eds. Maingot's Abdominal Operations, 13e. Mcgraw Hill; 2019.
3 Brunicardi F, Andersen DK, Billiar TR, Dunn DL, Kao S, Hunter JG, (Eds), (2019). Schwartz's Principles of Surgery, 11e. McGraw Hill
4 Townsend JCM, Beauchamp RD, Evers BM, Mattox KL — *Sabiston textbook of surgery* (20th ed.). Chapter 50. 2016.
5 Maglinte DD, Heitkamp DE, Howard TJ — Current concepts in imaging of small bowel obstruction. *Radiol Clin N Am* 2003; **41:** 263.
6 Rakesh V, Sanjay K, Subrat R, Yoel P, Sudhir J — Role of water-soluble contrast study in adhesive small bowel obstruction: A randomized controlled study. *Indian J Surg* 2007; **69(2):** 47-51.
7 Butt MU, Velmahos GC, Zacharias N —• Adhesional small bowel obstruction in the absence of previous operations: management and outcomes. *World J Surg* 2009; **33:** 2368e71.
8 Chen XZ, Wei T, Jiang K, Yang K, Zhang B, Chen ZX, *et al* — Etiological factors and mortality of acute intestinal obstruction: a review of 705 cases. *Zhong Xi Yi Jie He Xue Bao* 2008; **6(10):** 1010-6.
9 Szomstein S, Lo Menzo E, Simpfendorfer C, Zundel N, Rosenthal RJ — Laparoscopic lysis of adhesions. *World J Surg* 2006; **30(4):** 535-40..
10 Kendrick ML — Partial small bowel obstruction: clinical issues and recent technical advances. *Abdom Imaging* 2009; **34:** 329e34.
11 Gingalewski C, Lalikos J — An unusual cause of small bowel obstruction: herniation through a defect in the falciform ligament. *J Pediatr Surg* 2008; **43:** 398e400.
12 Menzies D, Ellis H — Intestinal obstruction from adhesionsd how big is the problem? *Ann R Coll Surg Engl* 1990; **72:** 60e3.
13 Adhikari S, Hossein M, Das A, Mitra N, Ray U — Etiology and outcome of acute intestinal obstruction: A review of 367 patients in Eastern India. *Saudi J Gastroenterol* 2010; **16(4):** 285.
14 Miller G, Boman J, Shrier I, Gordon PH — Natural history of patients with adhesive small bowel obstruction. *Br J Surg* 2000; **87(9):** 1240-7. doi: 10.1046/j.1365-2168.2000.01530.x.
15 Bjørg-Tilde Svanes Fevang, Jonas Fevang. Long-term Prognosis after Operation for Adhesive Small Bowel Obstruction *Ann Surg* 2004; **240(2):** 193-201.
16 Barkan H, Webster S, Ozeran S — Factors predicting the recurrence of adhesive small bowel obstruction. *Ann J Surg* 1995; **170:** 361-65.

Original Article

Undeniable Role of Poor Patient Preparation in the Generation of Preanalytical Errors in Government — Run Tertiary Care Hospital in Eastern India : A Pilot Study

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Abstract

Background : Quality in laboratory medicine ensures the delivery of an accurate, precise, repeatable and reliable report to help patients in diagnosis as well as therapeutic monitoring. Inspite of total lab automation, human involvement cannot be negated and hence errors do occur in every step which may cause unnecessary delay in the final report. Pre analytical errors add upto almost 70% of all errors occurring in laboratory diagnostics. Pre-analytical variables can be divided into two phases-(i) non controllable (ii) controllable. We conducted a pilot study in a tertiary care government run hospital in eastern India to find out the most common cause of preanalytical reason of delayed reporting.

Materials and Methods : For a period of 3 months (June, 2018 - August, 2018), serum samples and requisitions from OPD and from IPD, routinely coming to Department of Biochemistry, Government run Super-speciality Tertiary Care Hospital in Eastern India, were collected and checked for avoidable pre-analytical parameter ie, missing requisitions/ samples, wrong identification, insufficient quantity, lipemia and hemolysis. Such samples were separately tabulated into distinct groups for further analysis. Statistical analysis was done in Microsoft Excel.

Analysis and Result : Out of a total number of 36,515 samples from OPD and 30,395 samples from IPD, the percentage of lipemic samples for 3 months was found to be 0.071%, Hemolyzed samples 0.0259%, insufficient sample 0.0309%, no sample or no requisition amounting to 0.02%, the total pre-analytical controllable errors amounting to 0.208%. Lipemia seemed to be the most significant cause of such preanalytical reason for delay or rejections.

Conclusion : Proper training of personnel involved in sample collection regarding patient preparation, time of sample collection, duration of fasting for patients for collection of samples for certain parameters, requirement of sample quantity for individual parameters to be run in departmental machines would reduce errors, delays in reporting and inappropriate rejection of samples and would give a better Turnaround Time (TAT).

Key words : Quality, Preanalytics, Lipemia, TAT.

It is the necessity in today's universe to talk both in terms of quality and quantity and when we talk about health care, quality is the thing of utmost interest. Quality in laboratory medicine ensures the delivery of an accurate, precise, repeatable and reliable report to help patients in diagnosis as well as therapeutic monitoring. Quality should be guaranteed in all the steps of total testing procedure which starts from ordering of test to delivery of report to the patient. Lundberg introduced the concept of the 'brain-to-brain loop' in laboratory medicine which actually signified the conception of the provisional diagnosis in the minds of the referring clinician and thereby selecting the panel of laboratory tests to confirm the diagnosis for which in turn patients undergo the tests and final step is the delivery of reports to the referring clinician for further management[1,2]. Total Testing Procedure (TTP) may be classified into nine steps as: requisition, collection, identification, transportation,

Editor's Comment :

- This article points out the importance of patient preparation in diagnosis as well therapeutic monitoring of patients from the laboratory Medicine point of view which will definitely play a unprecedented role in patient care and management by the Clinicians .
- The tertiary care government hospital which serves a wide catchment area having a variety of population from both different educational and socio economic strata will be at a position to create awareness amongst the patients about the proper patient care, preparation for different investigation and treatment thereafter.

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preparation, analysis, reporting, and corrective / preventive action, if any required[1,2]. Even after this, samples need to be archived or retained in a proper way for future reference. Every step requires manual interference in one way or the other. Even in this era of Total Laboratory Automation, human involvement cannot be negated altogether, though almost a ten-fold reduction in the analytical error rate has been achieved due to improvements in the standardization and reliability of analytic techniques, reagents, and instrumentation, and advancements in information technology, quality control and quality assurance methods[3]. There lies the importance of source of human errors in every step which may have a great impact at the final delivery of report to the patient.

Evidences have shown that errors in the loop mostly occur outside analytical phase, either in the pre-analytical phase and in some cases in the post analytical phase[4,5]. The Technical Committee of the International Organization for Standardization (ISO/ TC 212) has defined comprehensively the errors occurring in laboratory testing and has given stress on a patient-centered approach and the need for evaluation of all steps of the testing process, irrespective of whether they fall under the direct control of laboratory[6].

Pre-analytical errors add upto almost 70% of all errors occurring in laboratory diagnostics. Studies have been conducted to find the nature of the error which have revealed that most errors do occur during patient preparation, sample collection, transportation and preparation for analysis and storage, with added weightage on transportation of samples[7].

Pre-analytical variables can be divided into two phases-(i) non controllable, (ii) controllable. Non-controllable variables consist of exercise, stress, age, sex, positional effects, and menstruation. Controllable pre-analytical errors are mostly due to human error related to patient and care- taker's way of understanding and following instruction and also the phlebotomist's particularity in collecting samples following proper guidelines. The most commonly reported types of pre-analytical error are: (a) lost sample and/or inappropriate /no test request, (b) improper /no identification details, (c) contamination from infusion route, (d) hemolyzed, (e) improperly clotted samples due to improper mixing of anticoagulants, (f) insufficient samples, (g) inappropriate vials, (h) inadequate blood to anticoagulant ratio and (i) improper transport, sample spillage and storage conditions, inappropriate temperature monitoring[8]. As per the ISO 15189: 2022 standard for laboratory accreditation, the pre-analytical phase may be defined as the procedures serially starting from the clinician's request, preparing for the examination requisition, patient, preparation, collection of the primary sample, and transportation of the sample/s to and within the laboratory till beginning of the analytical examination. Hence, it is imperative to evaluate, monitor and thus improve all the procedures and processes involved in the preanalytical segment of laboratory medicine.

We conducted a retrospective hospital-based analytical study in a Government run tertiary care 5000 bedded set-up of eastern India to find out the type of pre-analytical error occurring and generate a customized plan to reduce the same for effective maintenance of Turn-around Time (TAT) and delivering error free reports to patients easing early appropriate intervention as required .

Aims and Objective

The study was aimed to evaluate a few controllable pre-analytical variables known to significantly impact the smooth and efficient functioning of the 24x7 laboratory in the Department of Biochemistry in a Government run super-speciality Tertiary Care Hospital in Eastern India.

Settings and Design : The study conducted was a hospital-based retrospective analytical study

Materials and Methods

For a period of 3 months (June 2018-August 2018), serum samples and requisitions from Out-patient Department (OPD) and from In-patient Department (IPD), routinely coming to Department of Biochemistry, Government run Super-speciality Tertiary Care Hospital in Eastern India, were collected and checked for avoidable pre-analytical parameter missing requisitions/samples, wrong identification (samples with name, age, sex, bed no in case of indoor patients, OPD ticket number in outdoor cases, patient identification number / barcode mismatching with the respective test requisition form or TRF provided from indoor departments or phlebotomy area of central laboratory), insufficient quantity, lipemia and hemolysis. Such samples were separately tabulated into distinct groups for further analysis. Statistical analysis was done in Microsoft ExceL (Fig 1).

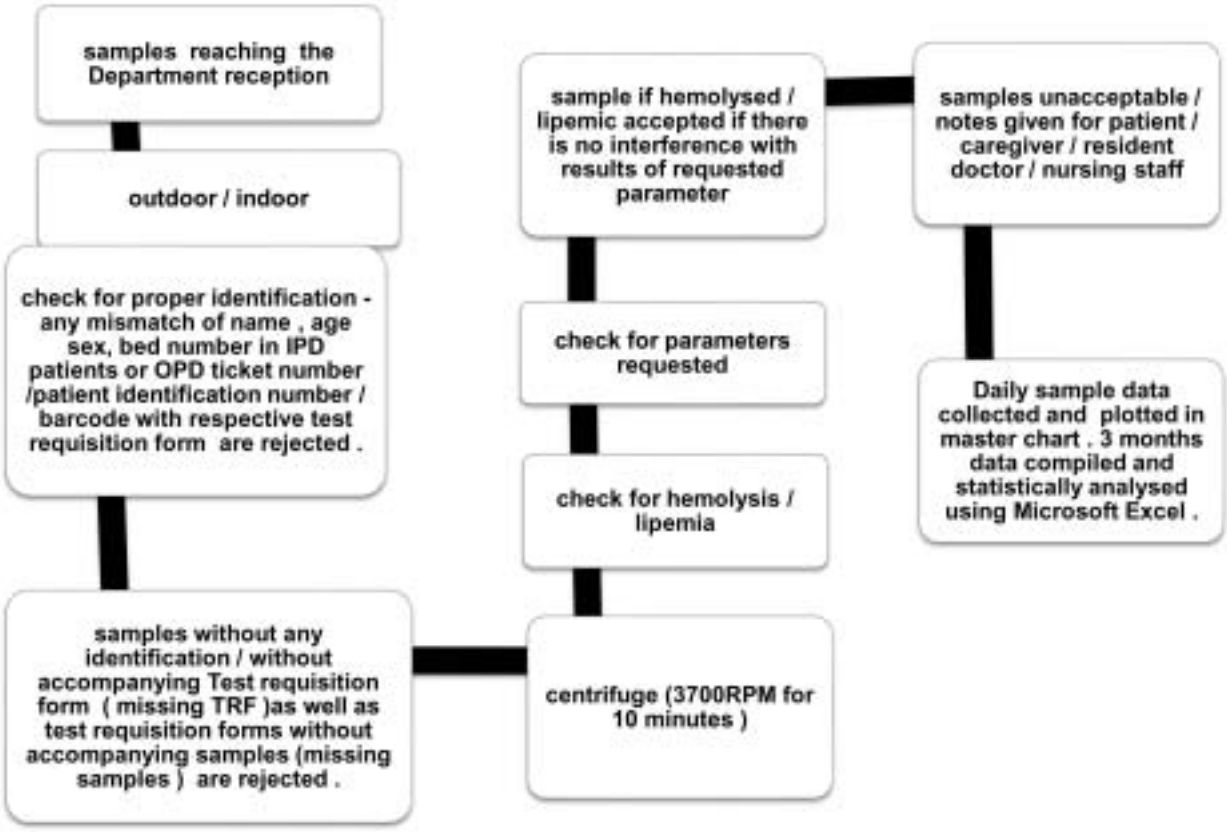

Fig 1 — Methodology followed for data collection

Results

Over a period of 3 months (June, 2018 - August, 2018) from OPD a total number of 36,515 serum samples and requisitions from Out-patient Department (OPD) and 30,395 samples from In-patient Department (IPD), routinely coming to Department of Biochemistry, Government run Super-speciality Tertiary Care Hospital in Eastern India were collected. Number of lipemic samples was 4792, hemolyzed samples were 1748, insufficient samples was 2085 in number, total number of parameters ordered being 2,90,274. The percentage of lipemic samples for 3months was found to be 0.071%. Hemolyzed samples for the month 0.0259%, insufficient sample 0.0309%, no sample or no requisition amounting to 0.02%, the total pre-analytical controllable errors amounting to 0.208%. Lipemic samples comprised of the most significant part in the controllable pre-analytical error which is attributed to the faulty patient preparation. Lipemic samples were identified and patients were notified for repeat sampling with proper instructions and proper preparation.

Pre-analytical errors from the indoor and outdoor patients are not similar. Out of the total number of hemolysed samples, 50% come from indoor and 50% from outdoor patients, however for lipemia number of error samples are more from Outdoor (33%) than from Indoor (77%). Insufficient sample volume are more from indoor (60%) than from outdoor (40%), while no requisition, wrong identification and wrong vial are more from outdoor samples than from indoor samples.

Discussion

The IFCC working group on laboratory errors and patients safety was launched with the primary goal of identifying and evaluating Quality Indicators and related quality specifications in order to address all the stages of the TTP. This was in compliance with Standard UNI 11097, according to which a quality indicator is, 'the information, qualitative or quantitative, that is able to evaluate its change during the time and to verify the defined quality goals, in order to take the correct decisions and choices' 'the information, qualitative or quantitative, that is able to evaluate its

change during the time and to verify the defined quality goals, in order to take the correct decisions and choices'[10-12]. Quality indicators should be selected in a way for each lab with the prerequisites fulfilled namely (a) relevance and applicability to the clinical laboratory; (b) scientific soundness, with a focus on assuring quality in laboratory reporting; (c) feasibility, both regarding the availability of data and the definition of thresholds for acceptable performance; (d) timeliness.

In a Government run tertiary health care set up , the pre-analytical phase can be further classified as a'pre-pre-analytical phase' and a 'true' pre-analytical phase. The true pre-analytical phase starts within the laboratory when the lab receives the specimen. The former phase, which comprises initial procedures usually performed in the clinical departments at the bedside or at the collection centre of the Central laboratory of the hospital, mostly not under the control of laboratory personnel, includes test requesting, patient and sample identification, patient preparation / instructions to the patients / counseling the patients regarding some procedures and sample collection. The latter involves the steps required to prepare samples for analysis (centrifugation, aliquoting, sorting and transportation).

The result of our study clearly indicated that hemolysis and lipemia are the two major pre analytics in the laboratory with significant effects. The data clearly indicates that the lipemic sample load from outdoor cases are mostly due to improper patient preparation which on investigation pointed towards very important facts .In government run tertiary care hospital with a huge out patient load and limited man power patients avoid standing in queue for requisition and instruction for patient preparation which are often not the same . Moreover language and communication skill of the personnel counseling the patient and patient party is not up to the mark. It is often difficult for the treating physician to counsel and instruct every individual patient for individual parameter in the outdoor setting where the patient load is almost 240-260 patients per doctor . It has also been pointed out that patient standing for long in the queue often for more than 4-5 hours for their turn for sample collection violate the guideline.

Insufficient sample volume from indoor samples point out to the fact of requesting for panel of test without clinical history to guide the laboratory for the urgency of certain parameters over others. This results in unavoidable delay of reports and repeat sampling.

Analytic hemolysis interfere when the constituents in erythrocytes are more than that in plasma. The release of erythrocyte constituents can result in increased values for serum concentrations of parameters like potassium, phosphate AST, LDH etc. Dilution is another possible cause especially for grossly hemolyzed samples, and may result in decreased values. Hb absorbance peak occur at ~417, 540, and 575 nm and at 415 nm (Soret wave), therefore at these wavelengths, spectrophotometric interference occurs due to an increase in the optical absorbance or a change in the blank value. Free hemoglobin also has pseudo-peroxidase activity which interferes in the bilirubin estimation by inhibiting the diazonium color formation[13-15]. Sample collection in pediatric patient population being very challenging with a large percentage of hemolysis occurring during sample collection by heal prick method often leads to sample rejection / faulty reporting. A slight decrease in glucose and uric acid can be seen which may be due to a premature decomposition of hydrogen peroxide by Hb. Dilutional effect may even be caused by the leakage of intracellular components in the surrounding fluid especially in case of severe hemolysis which may cause lower values for glucose, sodium and calcium[16]. CK is not a constituent of erythrocytes; however, intracellular adenylate kinase may cause interference in the CK assay. Correction can be done by adding inhibitors such as adenosine monophosphate and diadenosine pentaphosphate, or by substracting the activity measured in the absence of creatine phosphate[17]. Routine free Hb level determination in serum or plasma, or any other automated detection of the degree of hemolysis although recommended, yet it is not feasible on part of a government run set up with continuously increasing load, constraint in manpower and financial resources[18].

Lipemia is a turbidity of the sample caused by accumulation of lipoprotein particles. Lipemia is the leading cause of rejected samples with the frequency almost 4-fold higher in outdoor patients than in hospital patients. Not only pre-analytical conditions but also certain pathological conditions (multiple myeloma, diabetes mellitus, acute pancreatitis, kidney failure or hypothyreosis) do result in lipemic samples. The largest particles, chylomicrons (particle size of 70-1000 nm), have the greatest potential cause of sample turbidity.

The most common cause of lipemic sample is improper patient preparation, mostly due to inadequate interval between meals and sample collection. Another cause of lipemia in indoor patients may be parenteral administration of synthetic lipid emulsions. It is a practical difficulty in emergency patients to allow for adequate interval between meals and sample collection leading to lipemic samples which may have interference on different parameter relevant for patient management.

Lipemia may cause interference in capillary electrophoresis of serum proteins. When analyzing patient samples with increased concentration of triglycerides, an abnormal morphology of the alpha-2-globulin fraction has been detected. This finding has been replicated when spiking native samples with sample containing high concentration of triglycerides. The peak height is correlated with the triglyceride concentration which suggested interference in a dose-dependent manner[19]. Lipemia can also non-specifically interfere in various immuno-assays. Lipoproteins may interfere with antigen-antibody reaction by blocking the binding sites on antibodies even when antibodies are bound to a solid surface. Depending on the nature of the reaction, the interference may cause either, falsely elevated or falsely decreased result[20].

The amount of absorbance of light by lipoprotein particles is inversely proportional to the wavelength and decreases from 300 to 700 nm, without any specific absorption peaks. Therefore, methods that use lower wavelengths are affected more by lipemia, as the absorbance is highest in that part of the spectra[21].

Many clinical chemistry methods (like alanine aminotransferase, ALT; aspartate aminotransferase, AST; glucose) use reaction NAD(P)+ ”! NAD(P)H + H+ as an indicator reaction for determining concentration or activity of the analyte. Since the change of absorbance is measured at 340 nm, most of these methods are strongly affected by lipemia giving falsely high results.

Plasma consists of approximately 92% of water and 8% of lipids. In lipemic samples, the proportion of lipid phase increases and can be up to 25%. Analytes, distributed in the aqueous part, now actually distributed in only 75% of the sample, (eg electrolytes) hence, measurement if these analytes get affected especially when the methodology used measure concentration of electrolytes in the total plasma volume (including the lipid phase), as in case of flame photometry or indirect potentiometry[22-24]. The result will show falsely decreased concentration of electrolytes because of the high dilution prior to analysis. Thus, this gives an erroneous calculation of the measured analyte concentration. This effect is noticed at grossly lipemic samples (over 17 mmol/L of triglycerides).

After procuring the sample, the most common practice before analyte measurement is centrifugation for obtaining serum or plasma. Centrifugation causes the particles to distribute according to their density: chylomicrons and VLDL particles having low density will form the topmost layer in the tube, distinctly while the constituents in the plasma get distributed depending on their polarity: thus, hydrophobic analytes are found to be distributed in the lipid phase whereas the hydrophilic/ polar analytes are found to be distributed in the aqueous phase (small molecules, electrolytes). When aspirated by the probe of the instrument, for measurement, most analyzers obtain sample from the upper part of the tube, due to the presence of sensors preventing the probe from going too deep into the tube. This can result in falsely decreased concentration of electrolytes and metabolites. The opposite is valid for non-polar substances (some drugs, like valproic acid or steroid hormones). The non-polar analytes will accumulate in the upper lipid layer, and their concentration will be falsely decreased in the lower part of the tube.

Errors like insufficient sampling; wrong vials can be rectified with proper training to the respective personnel involved in the activity regarding the requirement of volume of sample for each parameter to be tested by the instrument in the laboratory. Also measures can be taken by the clinician in mentioning the urgency in the requirement of relevant parameters for patient treatment while the’ not so important parameters’ can be taken care of with subsequent samples on intimation. Transcription errors can again be subdivided into (a) ‘true’ misidentification of patients and/or mismatch and (b) nominal identification errors (eg, age, gender etc) that do not ‘significantly’ compromise patient safety. Proper training and careful handling can effectively decrease such errors to a large extent though can’t be completely negated.

Limitation :

The samples reaching the receiving section of the

Department were only taken into account. Samples lost during transportation, from respective departments and outdoor collection site to the department, were not taken into acount.

Conclusion

The study concluded that a large number of patients are improperly instructed or lack proper understanding of instruction which leads to faulty patient preparation and hence affects the sample quality often to the level of not being able to report or even generate faulty reports if the technologists are not careful enough. This leads to wastage of man power and resource as well as delay in reports which can cause delay in patient management. The phlebotomists/ technologists as well as resident doctors and nursing staffs who are entitled for collection of samples from outdoor and indoor patients need to be trained in proper technique of sample collection, usage of tourniquets. They need to be trained about proper patient preparation, time of sample collection, duration of fasting in patients for collection of samples, requirement of sample quantity for individual parameters to be run in the machines as well as commonly encountered interferences for reporting of samples.

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Conflict of interest : The authors declare that they have no conflict of interest.

References

1 Lundberg GD — Acting on significant laboratory results. *JAMA* 1981; **245(17):** 1762-3. doi:10.1001/jama.1981.03310420052033
2 Plebani M, Laposata M, Lundberg GD — The brain-to-brain loop concept for laboratory testing 40 years after its introduction. *Am J Clin Pathol* 2011; **136(6):** 829-33. doi:10.1309/AJCPR28HWHSSDNON
3 Plebani M — Errors in clinical laboratories or errors in laboratory medicine? *Clin Chem Lab Med* 2006; **44(6):** 750-9. doi:10.1515/CCLM.2006.123
4 Plebani M — The detection and prevention of errors in laboratory medicine. *Ann Clin Biochem* 2010; **47(Pt 2):** 101-10. doi:10.1258/acb.2009.009222
5 Barth JH — Clinical quality indicators in laboratory medicine. *Annals of Clinical Biochemistry* 2012; **49(1):** 9-16. doi:10.1258/acb.2011.011126
6 International Organization for Standardization. ISO/ PDTS 22367:2008. Medical laboratories – Reduction of error through risk management and continual improvement. Geneva, Switzerland: ISO 2008.
7 Lippi G, Chance JJ, Church S — Preanalytical quality improvement: from dream to reality. *Clin Chem Lab Med* 2011; **49(7):** 1113-26. doi:10.1515/CCLM.2011.600
8 Carraro P, Plebani M — Errors in a stat laboratory: types and frequencies 10 years later. *Clin Chem* 2007; **53(7):** 1338-42. doi:10.1373/clinchem.2007.088344
9 International Organization for Standardization. (2022). Medical laboratories: particular requirements for quality and competence (4th ed.). https://www.iso.org/standard/76677.html
10 Sciacovelli L, Plebani M — The IFCC Working Group on laboratory errors and patient safety. *Clin Chim Acta* 2009; **404(1):** 79-85. doi:10.1016/j.cca.2009.03.025.
11 Ente Nazionale Italiano di Unificazione. UNI 11097:2003. Quality management - Quality indicators and quality management synoptical tables - General guidelines. UNI; 2003.
12 Sciacovelli L, O'Kane M, Skaik YA — Quality Indicators in Laboratory Medicine: from theory to practice. Preliminary data from the IFCC Working Group Project "Laboratory Errors and Patient Safety". *Clin Chem Lab Med* 2011; **49(5):** 835-844. doi:10.1515/CCLM.2011.128
13 Thomas L — Haemolysis as influence and interference factor. eJIFC C vol 13 no 4: Available at: http://www.ifcc.org/ejifcc/vol13no4/130401002.htm. Acessed: September 25, 2010.
14 Sonntag O — Haemolysis as an interference factor in clinical chemistry. *J Clin Chem Clin Biochem* 1986; **24(2):** 127-39.
15 Grafmeyer D, Bondon M, Manchon M, Levillain P — The influence of bilirubin, haemolysis and turbidity on 20 analytical tests performed on automatic analysers. Results of an interlaboratory study. *Eur J Clin Chem Clin Biochem* 1995; **33(1):** 31-52. doi:10.1515/cclm.1995.33.1.31
16 Yücel D, Dalva K — Effect of in vitro hemolysis on 25 common biochemical tests. *Clin Chem* 1992; **38(4):** 575-7.
17 Szasz G, Gerhardt W, Gruber W, Bernt E — Creatine kinase in serum: 2. Interference of adenylate kinase with the assay. *Clin Chem* 1976; **22(11):** 1806-11.
18 Simundic AM, Topic E, Nikolac N, Lippi G — Hemolysis detection and management of hemolyzed specimens. *Biochem Med (Zagreb)* 2010; **20:** 154-9.
19 Bossuyt X, Schiettekatte G, Bogaerts A, Blanckaert N — Serum protein electrophoresis by CZE 2000 clinical capillary electrophoresis system. *Clin Chem* 1998; **44(4):** 749-59.
20 Schiettecatte J, Anckaert E, Smitz J — Interferences in Immunoassays. In: Chiu, NHL, Christopoulos TK, editors. Advances in Immunoassay Technology [Internet]. London: IntechOpen; 2012 [cited 2022 Aug 10]. Available from: https://www.intechopen.com/chapters/33740 doi: 10.5772/35797
21 Kroll MH, McCudden CR — Endogenous Interferences in Clinical Laboratory Tests. Icteric, Lipemic and Turbid Samples. Berlin, Boston: De Gruyter, 2012. http://dx.doi.org/10.1515/9783110266221.
22 Lyon AW, Baskin LB — Pseudohyponatremia in a Myeloma Patient: Direct Electrode Potentiometry is a Method Worth its Salt. *LabMedicine* 2003; **34:** 357-60.
23 Fortgens P, Pillay TS — Pseudohyponatremia revisited: a modern-day pitfall. *Arch Pathol Lab Med* 2011; **135(4):** 516-9. doi:10.5858/2010-0018-RS.1
24 Kim GH. Pseudohyponatremia: Does It Matter in Current Clinical Practice? *Electrolyte Blood Press* 2006; **4(2):** 77-82. https://doi.org/10.5049/EBP.2006.4.2.77

Original Article

Hybrid Technique Repair of Ventral and Midline Incisional Hernias — Experience from Rural Hernia Surgical Center

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Abstract

Background : Hybrid repair is increasingly becoming common technique in patients with large ventral and incisional hernias. It reduces length of hospital stay, postoperative pain, complications. Main advantages are avoidance of larger scars, effective fascial closure, cosmetic acceptance, and less surgical challenge as intra-corporeal suturing could be avoided. Hence, aim of this study was to assess technical feasibility, patient safety and complications using hybrid technique of hernia repair in patients with ventral and midline incisional hernias.

Materials and Methods : Retrospective analysis of data of patients with midline abdominal wall hernias (vertical defect size >4cm and <8cm and width <4cm) visiting rural hospital with facility for hernia repair from 2018 through 2021 were included in the study. Patient demographics, BMI, previous surgeries, co-morbidities, operative time, length of hospital stay, post-operative complications, and recurrence were assessed.

Results : Data of 112 patients were analyzed. Mean age was 47 ± 12.34 years, females were 58. The mean hernia defect size was 22.95 ± 5.06 cm^2. Mean operating time was 100.54 ± 15.47 minutes. Four patients were converted to open repair. The mean length of stay was 5.61 ± 2.31 days. One patient had injury to inferior epigastric vessel intra-operatively; and in the postoperative period, one patient developed spontaneous pneumothorax which was managed conservatively and another patient succumbed to pulmonary embolism. Of 4 patients converted to open technique, two developed seroma, of which one patient had Clavien Dindo class 1 surgical site infection.

Conclusion : Hybrid repair for midline ventral and incisional hernias appears to be safe and reproducible. It also overcomes technically difficult to reduce hernias requiring extensive adhesiolysis. It offers all advantages of laparoscopic repair minimizing the risks associated with it.

Key words : Hybrid Repair, Ventral Hernia, Incisional Midline Hernia.

European Hernia Society (EHS) and American Hernia Society (AHS) guidelines are recommended for classification and management of abdominal wall incisional or primary midline hernias[1]. Repair of these hernias has undergone paradigm shift from open onlay mesh repair to sublay mesh repair to Intraperitoneal Onlay Mesh Repair (IPOM), laparoscopic retrorectus repair, ventral transabdominal pre-peritoneal repair and many newer techniques including robotic approaches[2,3].

The advantages of IPOM are lesser steep learning curve compared to other advanced minimally invasive hernia repair techniques including IPOM-plus, and offers all benefits of laparoscopic hernia surgery – less operative time, less postoperative pain, early mobilization, and shorter hospital stay[4,5]. The main disadvantages of IPOM are postoperative bulging at the ventral/ incisional hernial sites, seroma, pseudo-recurrence, meshoma due to improper placement of tackers or trans-fascial sutures, and the cost of the composite mesh. This bulging can be addressed by IPOM-plus and seromas are less[6,7].

Although EHS and AHS guidelines recommend closure of fascial defects when feasible to decrease the postoperative Surgical Site Occurrences (SSO)[8], its technical challenge in laparoscopic IPOM-plus. In few cases reduction of hernial sac contents is technically demanding and difficult adhesiolysis

Editor's Comment :

- Hybrid technique repair offers a versatile and effective approach for all giant ventral, midline and incisional hernias, leveraging the strengths of both open and laparoscopic methods, providing a balance between durability and minimally invasive benefits to reduce complications and improve patient outcomes.

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results in dreaded complications – bowel injuries, and unnecessary enterotomies. To minimize these risks techniques such as laparoscopically assisted approach or limited conversion or hybrid approach have been described[9-11].

Hybrid technique utilizes both laparoscopic sac reduction, adhesiolysis and visualization of intra-abdomen aided by limited mini laparotomy and followed by laparoscopic mesh placement. These offer safe alternative to formal laparotomy in incarcerated hernias or in patients requiring extensive bowel adhesiolysis[12]. Defect closure using hybrid repair is shown to reduce adverse SSOs in few studies[13-15]. At present the data on outcomes of hybrid technique for ventral/ midline incisional hernias is evolving. In this retrospective analysis we described technique of and intra- and postoperative complications of ventral and midline incisional hernias using novel hybrid approach.

Materials and Methods

This retrospective study analyzed the data of patients with ventral or midline abdominal incisional hernias visiting the facility for hernia repair between April, 2018 to October, 2021 at rural surgical setup of southern India.

Inclusion Criteria :

Patients with meeting following criteria were included.

(1) EHS M3 – umbilical hernia (from 3 cm above till 3 cm below the umbilicus),

(2) EHS M4 – infraumbilical hernia (from 3 cm below the umbilicus till 3 cm above the pubis),

(3) EHS W1 – width of hernia, <4cm size of hernia defect,

(4) Additionally, above hernias with vertical defects between 4cm and 8cm were included.

Exclusion criteria :

Following patients were excluded from the study.

(1) Patients who underwent previous umbilical or infraumbilical hernia repairs by (a) IPOM technique or (b) IPOM plus technique.

(2) Unfit for general anesthesia.

All these patients underwent surgery under free government scheme. Data of patient demographics, occupation, duration of hernia, previous surgeries, co-morbidities, imaging details, operative time, length of hospital stay, postoperative complications and recurrence at 6 months was collected and analyzed.

Imaging : Every patient who had hernia had an initial abdominal ultrasound with a thorough evaluation of the abdominal wall defects. In few patients, plain computed tomography was also done when needed to improve the delineation of defects on a case-by-case basis.

Mesh : A rectangular shaped composite 3D dual mesh (parietal – polyester, visceral – polyurethane) of size 7.5x15cm pre-fitted with polyester sutures at 4 corners was used in all cases.

Surgical Technique : Surgery was performed under general anesthesia with patient placed in supine position with left hand tucked alongside the patient. Prophylactic antibiotic was administered just after intubation. Nasogastric tube was placed and confirmed, Foleys catheter was placed, and surgical site was prepared and draped. Laparoscopic monitor was placed on the patients right-side and procedure performed in following steps.

Step 1 – Laparoscopic approach: Standard pressure pneumoperitoneum (14-15mmhg) was created using Veres needle through Palmer's point followed by port placements as shown in Fig 1-a. Diagnostic laparoscopy was performed with reduction of hernia sac contents (Figs 1-b, 1-c) and parietal wall and bowel/omentum adhesions if any were released. Entire anterior abdominal wall was inspected for any occult hernias.

Step 2 – Combined laparoscopic and transcutaneous approach: Hernia defect vertical length and width were measured. Multiple transcutaneous 1-0 polypropylene sutures were placed through hernia defect edges through stab incisions using suture passer as described in Fig 2.

After placing all transcutaneous hernia edge sutures, pneumoperitoneum was reduced to 8-10mmhg and all these sutures were tied and buried (Figs 1-d, 1-e).

Alternatively, in cases where contents could not be reduced through totally laparoscopic approach (Fig 1-j), 3-4cm mini-incision (Fig 1-k) was made, sac was dissected, contents were reduced (Fig 1-l), followed by hernial defect closure using 1-0 polypropylene suture (Fig 1-m).

Step 3 – Laparoscopic approach: The dual mesh was inserted into the peritoneal cavity through 10mm port (Fig 1-f) and apposed to the anterior abdominal wall centering over the closed hernial defect and four sutures at the corners of the mesh were brought out through stab incisions for trans-fascial fixation and additional trans-fascial sutures were taken along the edges of mesh, (Figs 1-g; 1-m, 1-n). Proper mesh apposition was confirmed and no tackers were used (Fig 1-h), pneumoperitoneum was released, fascial closure of 10mm port was done, followed by skin closure of all ports (Figs 1-i, 1-0).

Postoperative care : All patients were mobilized the same day and allowed liquid diet on day-1 and if tolerated regular diet was allowed. Three doses of intravenous antibiotics were administered in the peri-operative period. After discharge, patients were followed up at one week, 1 month, 3 months and at 6 months postoperatively. Postoperative complications and SSO were recorded.

Pain management : All patients received intravenous inj. Diclofenac sodium 50mg every 8th hourly on 1st post-operative day and were given tablet diclofenac from 2nd postoperative day on need basis. No patients received any opioid analgesia.

Data Collection and statistical analysis : The data was collected in predefined proforma, analyzed using Microsoft excel. Categorical variables were summarized as frequencies and proportions whereas the continuous variables were summarized as mean (SD) or median (IQR) based on the normal distribution of data.

Results

Data of total of 112 patients were included and analyzed (Table 1). The mean age of the study group was 47.35 ± 12.34 years. There was equal distribution of both sexes (females - 58, males - 54). All patients were either homemakers or farmers. The mean BMI of the patients was 22.23 ± 1.98 kg/m^2. Presenting symptom was only swelling in 64 patients and in the remaining 48 patients there was associated mild discomfort or vague pain along with swelling. The median duration of the hernia was 10 (6-12) months. 74 patients had history of undergoing previous open surgery. None of these patients could recollect any Surgical Site Infection (SSI) during these surgeries. There were 81 patients who were either hypertensive or diabetic. Forty-one males were smokers. A total of 40 patients had EHS type M3 and 72 patients had

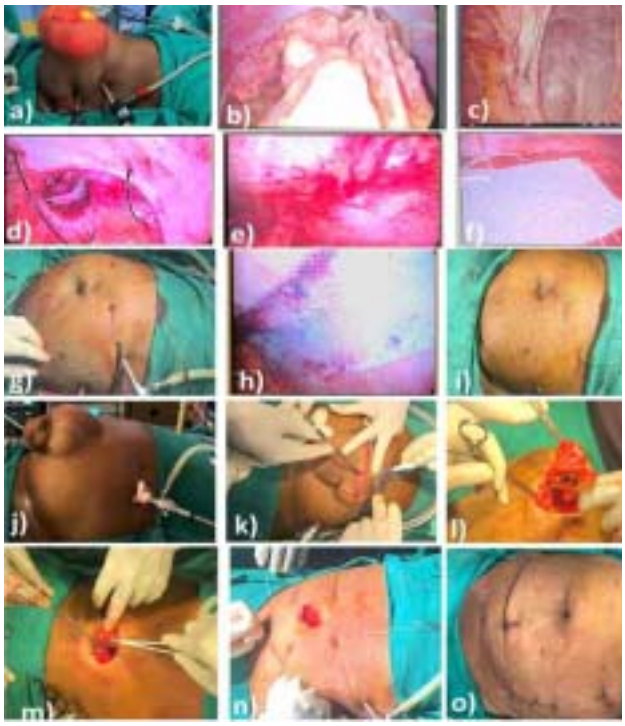

Fig 1 — Technical details are described in the text: a) EHS M3 defect, b) laparoscopic view of sac with contents, c) hernia sac after content reduction, d) transcutaneous sutures through hernia defect edges placed with laparoscopic assisted e) hernia site after defect closure f) dual mesh in peritoneum g) trans-fascial sutures of mesh edges and additional trans-fascial sutures before tying h) mesh apposition to parietal wall centred over hernia defect, i) post procedure completion. Figs j-o: incarcerated hernia steps – mini-laparotomy incision (k), sac dissection (l), defect closure (m), trans-fascial sutures (n) and post procedure appearance (o). [(Figs a, d, e, f, g, h, and i are from same patient and Figs b, c another patient), (Figs j, k, l, and o are from same patient, m and n another patient)].

Table 1 — *Demographics and baseline details.*

Parameter		N=112
Age (mean ± SD) years		47.35 ± 12.34
Sex :	Female	58
	Male	54
Occupation :	Farmer	88
	Homemaker	24
BMI kg/m^2 (mean ± SD)		22.23 ± 1.98
Presenting symptoms	Swelling only	64
	Swelling with associated vague pain	48
H/o Previous Surgery		74
Co-morbidities		81
EHS type :	M3	40
	M4	72
Duration of Hernia (median, (IQR)) months		10 (6-12)
Hernia Defect size	Vertical length (v) (mean ± sd) cm	6.10 ± 0.96
	Width (w) (mean ± SD) cm	3.74 ± 0.44
	Defect size (v x w) cm^2	22.95 ± 5.06

SD : Standard Deviation, BMI: body mass index, EHS: European Hernia society, M3: umbilical hernia, M4: infraumbilical hernia, IQR: Inter Quartile Range, v: vertical length of hernia defect, w: width of hernia defect, cm: centimeters

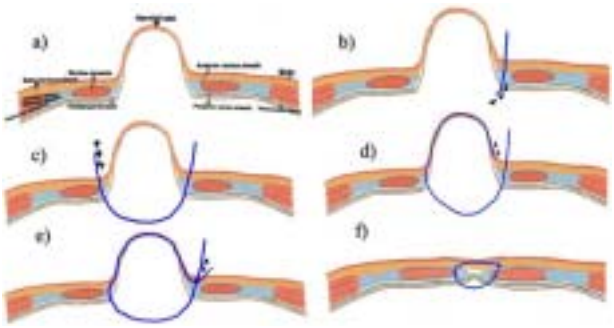

Fig 2 — Transcutaneous hernia defect closure: Suture is passed from outside through one edge of defect (b) and brought out throuhg other edge of defect (c), then suture is advanced through skin and hernia sac as in (d) followed by suture ligation and burrying in subcutanoues plane as in (e) and (f).

EHS type M4 hernias. The average size of vertical length hernial defect size was 6.10 ± 0.96 cm, width was 3.74 ± 0.44 cm, defect size was 22.95 ± 5.06 cm^2.

Outcomes : Outcomes are described in Table 2.

Mean operating time – The mean operation time in the study population was 100.54 ± 15.47 minutes. *Mini laparotomy* – Only 31 patients required targeted mini laparotomy to reduce hernia contents. In remaining patients' defect was approximated using only transcutaneous approach. *Conversion to open technique:* All patients could effectively be managed by hybrid approach except in 4 cases who required conversion to open only mesh repair because of technical difficulty. *Length of hospital stay:* The median length of hospital stay was 5 (4-6) days. The patient who developed spontaneous pneumothorax stayed for 10 days, patient with seroma stayed for 10 days and patient with superficial SSI stay for 6 days.

Complications : There was injury to inferior epigastric artery in 1 patient while taking trans-fascial suture and bleeding was controlled with bipolar electrocautery device. Only 2 cases of open mesh repair developed seroma. Both cases were managed expectantly. One of these seroma patients developed superficial surgical site infection (grade I Clavien Dindo) which was managed with regular dressing. One patient developed right sided spontaneous pneumothorax (could be ruptured small pulmonary bulla) which was noticed on 2nd postoperative day as patient experienced chest pain and cough; managed conservatively with discharge on 10th post-operative day. Another patient developed pulmonary embolism on 3rd post-operative day and subsequently succumbed during the hospital courses.

Table 2 — *Outcome measures*

Measure	N
Mean operating time (minutes)	100.54 ± 15.47
Average operating time/patient	
<90 min	46 patients
91-100 min	47 patients
101-120 min	16 patients
>120 min	3 patients
Conversion to open	4 patients
Intra-op complicationsInferior epigastric artery injury	1 patient
Non-surgical complications	
Spontaneous Pneumothorax	1 patient
Pulmonary embolism	1 patient
Mean length of hospital stay	
Mean ± SD (days)	5.61 ± 2.31
Median (IQR) (days)	5 (4-6)
Average length of stay/patient	
3 days	1
4-6 days	99
7-9 days	7
10-12 days	5
Mortality	1
Surgical site occurrences	
Seroma	2
SSI infection	1
Recurrence	1

SD: Standard Deviation, IQR: Inter Quartile Range, SSI: Surgical Site Infection

Recurrence : Only one patient had recurrence at 6 months of follow up period. This patient was 31years old female with BMI of 27kg/m^2 with vertical hernial defect size of 6 cm and later was managed with open onlay repair.

Discussion

The midline abdominal incisional or ventral hernias management is witnessing paradigm shift with newer techniques and approaches. The evolving evidence on safety and advantages of hybrid repairs in technically difficult IPOM-plus approach effectively avoids open repair technique. In this novel hybrid technique safety, perioperative complications and short-term outcomes were studied.

The hybrid repair combines both laparoscopic and open approaches and has advantages of both approaches. The first description of hybrid technique of repair for recurrent incisional hernias and procedural safety was published in 2009. In this series, total of 6 patients were included, with an average defect size of 116 to 187cm^2 and a 24-36 cm double-layer Polytetrafluoroethylene (PTFE) mesh was used[11]. In our study mean vertical hernia defect size was 6.10 ± 0.96 cm, width was 3.74 ± 0.44 cm, defect size was 22.95 ± 5.06 cm^2. This procedure

was relatively easy with mean operating time 100.54 ± 15.47 min and 4 patients were converted to complete open onlay repair. Also, procedure was safe with no inadvertent visceral injuries and inadvertent injury to inferior epigastric artery in one patient. Two patients in converted to open repair developed SSOs (seroma) of which one had superficial SSI (grade I Clavien Dindo) and one patient had recurrence at 6 months. The findings of our study are similar to the published literature, in term of operative time and complications[16].

Our technique adhered to the recommended guidelines of fascia closure[8]. This novel technique as described in Fig 2 effectively approximated hernia defects using transcutaneously placed sutures overcoming the challenge of intracorporeal suturing and followed by IPOM mesh placement. The hernia defect edges approximation could be reproduced in all cases with ease. Though surgical guidelines recommend the closure of fascia to prevent, reduce the hernia recurrences, a randomized study with long term follow up with median follow-up period of 87 months, with 125 patients completing follow up, found no differences between hybrid repair with fascia closure versus laparoscopic IPOM repair[13].

The laparoscopic step in this hybrid repair offers all the benefits of the minimally invasive hernia surgery – visualizes intra-abdominal pathologies, identifies multiple abdominal wall defects, less tissue trauma, less tissue dissection hence less pos-operative pain, and shorter hospital stay[14,15]. The length of hospital stay was 5.64 ± 2.31 days. Though we did not use the visual analogue score for pain calculation, most of the patients did not require analgesics for long time.

A systematic review of hybrid repair for incisional hernias of the abdominal wall analyzed data of 232 patients post complications and recurrence rates. The reported incidences of complications were seroma formation (5.47%), wound infections (6.53%) and chronic pain (4.49%); and recurrence was seen in 3.29% of patients[17]. Another systematic review and meta-analysis of hybrid repair for incisional hernia for intra- and post- operative complications studied data of 1681 patients from 11 published studies. The incidence of pooled intra-operative complication rate was 1.8% in hybrid repairs compared to laparoscopic repairs of 2.8%. The postoperative prevalence of surgical site occurrences (hybrid 23% versus laparoscopic 26%, p = 0.02) and surgical site occurrences requiring interventions (hybrid 1.5% versus laparoscopic 4.1%, p<0.01) were significantly less in hybrid repair compared to laparoscopic repair. Though majority of studies included in the analysis were retrospective, data favored the safety and efficacy of hybrid repair in abdominal wall incisional hernias[15].

Hence, hybrid approach is technically easier – easily reproducible as proper approximation of hernia defects could be achieved with novel transcutaneous sutures or through mini-laparotomy overcoming the challenge of intracorporeal suturing of abdominal wall, and help in appropriate mesh placement; safer – can completely visualize the whole abdomen, potentially minimizes risks of enterotomies, or other injuries and further the targeted mini-laparotomy can be used in incarcerated hernias or difficult to reduce hernias or for difficult adhesiolysis; and better short-term outcomes as it decreases length of stay, post-operative pain, and postoperative SSOs.

Limitations :

Our study had few limitations. This was retrospective analysis and hence potential for selection bias. Only available data of patients was included hence small sample size. The patient included were all operated under government free scheme hence had to stay longer for administrative reasons including procedural approvals. In this study standard pain calculation was not done as no such protocol was existed for analgesics. We only included vertical defect sizes <8cm and width of <4cm as only the above mentioned IPOM mesh size was available in our hospital under government scheme. Nonetheless, this technique could be extended with caution to larger defects provided primary fascial closure is achieved and larger and longer follow up studies are required to assess benefits in long-term SSOs.

Conclusion

In conclusion, the results of study demonstrated this novel hybrid repair technique was safe and offers all the benefits of minimally invasive surgeries in difficult to reduce hernias and difficult adhesiolysis with acceptable postoperative complications and could be reproducible with relative ease by novice hernia surgeons and in rural hernia set up with basic laparoscopic training. Technique is safer with less length of hospital stay and favourable postoperative recovery.

Data availability : The data sets analysed during the current study are available from the corresponding author.

Conflicts of Interest : The authors declare that no competing interests exist.

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References

1 Muysoms FE, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E, *et al* — Classification of primary and incisional abdominal wall hernias. *Hernia* 2009; **13(4):** 407-14. doi: 10.1007/s10029-009-0518-x.

2 Köckerling F, Hoffmann H, Mayer F, Zarras K, Reinpold W, Fortelny R, *et al* — What are the trends in incisional hernia repair? Real-world data over 10 years from the Herniamed registry. *Hernia* 2021; **25(2):** 255-65. doi: 10.1007/s10029-020-02319-y.

3 Mitura K — New techniques in ventral hernia surgery - an evolution of minimally-invasive hernia repairs. *Pol Przegl Chir* 2020; **92(3):** 48-56. doi: 10.5604/01.3001.0013.7857.

4 Li J, Wang Y, Wu L — The Comparison of eTEP and IPOM in Ventral and Incisional Hernia Repair: A Systematic Review and Meta-analysis. *Surg Laparosc Endosc Percutan Tech* 2022; **32(2):** 252-8. doi: 10.1097/SLE.0000000000001035.

5 Tasdelen HA — Comparison of outcomes of the extended-view totally extraperitoneal rives-stoppa (eTEP-RS) and the intraperitoneal onlay mesh with defect closure (IPOM-plus) for W1-W2 midline incisional hernia repair-a single-center experience. *Surg Endosc* 2023; **37(4):** 3260-71. doi: 10.1007/s00464-023-09922-x.

6 Wiessner R, Vorwerk T, Tolla-Jensen C, Gehring A — Continuous Laparoscopic Closure of the Linea Alba with Barbed Sutures Combined with Laparoscopic Mesh Implantation (IPOM Plus Repair) As a New Technique for Treatment of Abdominal Hernias. *Front Surg* 2017; **4:** 62. doi: 10.3389/fsurg.2017.00062.

7 Chelala E, Baraké H, Estievenart J, Dessily M, Charara F, Allé JL — Long-term outcomes of 1326 laparoscopic incisional and ventral hernia repair with the routine suturing concept: a single institution experience. Hernia 2016; **20(1):** 101-10. doi: 10.1007/s10029-015-1397-y.

8 Henriksen NA, Montgomery A, Kaufmann R, Berrevoet F, East B, Fischer J, *et al* — European and Americas Hernia Societies (EHS and AHS). Guidelines for treatment of umbilical and epigastric hernias from the European Hernia Society and Americas Hernia Society. *Br J Surg* 2020; **107(3):** 171-90. doi: 10.1002/bjs.11489.

9 Eitan A, Bickel A — Laparoscopically assisted approach for postoperative ventral hernia repair. J Laparoendosc Adv Surg *Tech A* 2002; **12(5):** 309-11. doi: 10.1089/109264202320884036.

10 Sharma A, Mehrotra M, Khullar R, Soni V, Baijal M, Chowbey PK — Limited-conversion technique: a safe and viable alternative to conversion in laparoscopic ventral/incisional hernia repair. *Hernia* 2008; **12(4):** 367-71. doi: 10.1007/s10029-008-0363-3.

11 Griniatsos J, Yiannakopoulou E, Tsechpenakis A, Tsigris C, Diamantis T — A hybrid technique for recurrent incisional hernia repair. *Surg Laparosc Endosc Percutan Tech* 2009; **19(5):** e177-80. doi: 10.1097/SLE.0b013e3181bb859c.

12 Stoikes N, Quasebarth M, Brunt LM — Hybrid ventral hernia repair: technique and results. Hernia 2013; **17(5):** 627-32. doi: 10.1007/s10029-013-1092-9.

13 Hiekkaranta JM, Ahonen M, Mäkäräinen E, Saarnio J, Pinta T, Vironen J, *et al* — Laparoscopic versus hybrid approach for treatment of incisional ventral hernia: a 5-10-year follow-up of the randomized controlled multicenter study. *Hernia* 2023. doi: 10.1007/s10029-023-02849-1. Epub ahead of print.

14 Ahonen-Siirtola M, Nevala T, Vironen J, Kössi J, Pinta T, Niemeläinen S, *et al* — Laparoscopic versus hybrid approach for treatment of incisional ventral hernia: a prospective randomised multicentre study, 1-year results. *Surg Endosc* 2020; **34(1):** 88-95. doi: 10.1007/s00464-019-06735-9.

15 van den Dop LM, De Smet GHJ, Kleinrensink GJ, Hueting WE, Lange JF — Hybrid operation technique for incisional hernia repair: a systematic review and meta-analysis of intra- and postoperative complications. *Hernia* 2021; **25(6):** 1459-1469. doi: 10.1007/s10029-021-02497-3.

16 van den Dop LM, de Smet GHJ, Bus MPA, Lange JF, Koch SMP, Hueting WE — A new three-step hybrid approach is a safe procedure for incisional hernia: early experiences with a single centre retrospective cohort. *Hernia* 2021; **25(6):** 1693-701. doi: 10.1007/s10029-020-02300-9.

17 Sharma A, Sinha C, Baijal M, Soni V, Khullar R, Chowbey P — Hybrid approach for ventral incisional hernias of the abdominal wall: A systematic review of the literature. *J Minim Access Surg* 2021; **17(1):** 7-13. doi: 10.4103/jmas.JMAS_146_19.

Original Article

Fournier's Gangrene : An Analysis of 50 Cases and Validation of a Modified Severity Scoring System

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Abstract

Background : The aim is to enhance the scoring system for Fournier's Gangrene patients, thereby facilitating the creation of more effective and feasible management strategies.

Materials and Methods : We analyzed 50 patients who underwent surgery for Fournier's gangrene in the last 5 years using logistic regression and a prospectively maintained database. We then adopted a novel scoring system that combined this data with Fournier's Gangrene Severity Index (FGSI). We created a novel predictive scoring system based on the physiological score, age score and the extent of gangrene.

Results : The 50 patients had a mortality rate of 21%. The new scoring system (MFGSI), with a threshold value of 9, observed a 94% probability of death with a score greater than 9. When the score is 9 or less, there is an 81% probability that death will occur (P<0.001). The Receiver Operating Characteristics (ROC) analysis concluded that the new scoring system was more powerful than the FGSI (P = 0.002).

Conclusions : The power of the modified scoring system introduced in this study proves that in patients with Fournier's gangrene, the extent of the gangrene as well as the patient's age and physiological status have a significant effect on the outcome.

Key words : Fournier's Gangrene, Necrotizing Fasciitis, FGSI, MFGSI, Extent of Gangrene, APACHE II, Prognostic Scoring.

Fournier's Gangrene (FG) is a life-threatening necrotizing soft tissue infection of the perineum, genitalia, and perianal regions. First described by Baurienne in 1764 and later characterized by the French venereologist Jean Alfred Fournier in 1883, it continues to be recognized as one of the most dreaded surgical emergencies. Despite advances in critical care, antibiotics, and surgical techniques, mortality remains unacceptably high, ranging between 20-67% in different series[1-4].

The disease originates from anorectal, urogenital, or cutaneous infections that spread along fascial planes with alarming rapidity. The synergistic action of aerobic and anaerobic organisms leads to fulminant tissue necrosis, systemic sepsis, and multiorgan dysfunction. Factors such as diabetes mellitus, immunosuppression, alcoholism, chronic renal failure, and advanced age worsen prognosis[5,6].

Editor's Comment :

- Necrotizing fasciitis is a serious, rapidly advancing infection that can be fatal if not treated promptly.
- Early diagnosis and aggressive surgical intervention are crucial for survival.
- Clinicians should maintain a high index of suspicion and prioritize immediate action over waiting for diagnostic confirmation.
- Additionally, ensuring satisfactory environmental hygiene and keeping blood glucose levels under control are key preventive measures against this life-threatening condition.

Need for Prognostic Scoring :

Because FG is highly unpredictable, clinicians rely on severity indices to stratify risk and guide management. The APACHE II and FGSI are widely used scoring systems. FGSI, derived by Laor, *et al* through modifications of APACHE II, considers physiological and laboratory parameters. A cut-off score of >9 correlates with 75% mortality, whereas ≤9 indicates improved survival[7].

While valuable, FGSI does not fully account for extent of disease, which intuitively influences outcomes. Patients with localized perineal involvement fare better than those with thigh or abdominal wall extension. Researchers including Uludag and Yilmazlar have

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proposed incorporating disease extent and age into modified indices for better prognostication[8,9].

Aims and Objectives

Our study aimed to :

Analyze clinical characteristics, management and outcomes of 50 patients with Fournier's gangrene.

Validate a Modified Fournier's Gangrene Severity Index (MFGSI) incorporating:

Acute physiological status (from FGSI).

Patient age.

Anatomical extent of gangrene.

Compare predictive accuracy of FGSI *versus* MFGSI using statistical modeling and ROC curve analysis.

By developing a more robust tool, we sought to aid surgeons in early identification of high-risk patients and optimize resource allocation in critical settings.

Materials and Methods

Study Design and Population

This was a retrospective analysis of prospectively maintained records from the General Surgery Department, conducted between January, 2019 – August, 2024.

Inclusion criteria :

All patients diagnosed with Fournier's gangrene involving urogenital or anorectal regions.

Exclusion criteria :

Isolated abscesses without necrotizing fasciitis.

Ethical Considerations :

The study was approved by the Institutional Ethics Committee. Confidentiality was maintained and patient identifiers were excluded.

Clinical Management Protocol

All patients were managed as per departmental protocols:

Immediate resuscitation with IV fluids, correction of electrolyte imbalances, and broad-spectrum antibiotics.

Early surgical debridement within 12 hours of admission. Repeated debridements were performed until healthy granulation tissue appeared.

Microbiological cultures obtained intraoperatively guided antibiotic modification.

Supportive care included blood transfusions, nutritional supplementation, urinary diversion (Foley catheter/cystostomy), and fecal diversion (colostomy) in select patients.

Patients with severe sepsis or organ dysfunction were admitted to ICU and received vasopressors or ventilatory support as indicated.

Study Variables

Demographic and clinical variables included :

Age, sex, comorbidities, symptom duration, referral status.

Laboratory parameters: serum sodium, potassium, creatinine, hematocrit, bicarbonate, WBC count.

Clinical severity indices : APACHE II, FGSI.

Extent of gangrene (classified into 3 grades) (Fig 1):

Grade I : confined to perianal/urogenital/perineal regions.

Grade II : extended to pelvic/pubic region.

Grade III : beyond pelvis into thigh/abdominal wall.

Outcomes : survival, ICU admission, ventilator requirement, hospital stay.

Modified Fournier's Gangrene Severity Index (MFGSI).

MFGSI = FGSI (physiological + lab parameters) + Age score (+1 if =60 years) + Extent score (1 for Grade I, 2 for Grade II, 3 for Grade III).

Statistical Analysis

Chi-square and Fisher's exact tests for categorical variables.

Wilcoxon and Kruskal-Wallis tests for continuous data.

Logistic regression for mortality predictors.

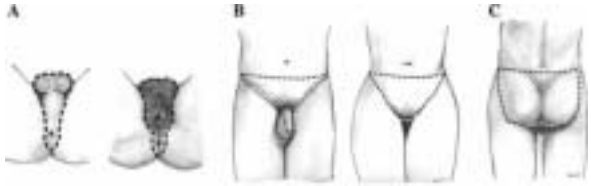

Fig 1 — Anatomical limit-based grading. (A) Grade I dissemination. (B) Grade II dissemination, front view in man and woman and back. (C) Grade III dissemination, extension of the disease to all other parts was considered

ROC curve analysis to determine mortality cut-off scores and compare predictive accuracy of FGSI *versus* MFGSI.

Analyses were performed using SPSS v15 and MedCalc v7.2.1.0. Statistical significance was set at $p<0.05$.

Results

Demographic and Clinical Profile

50 patients included: 36 males (72%) and 14 females (28%).

Median age : 57 years (range: 24-85).

Survivors had significantly lower median age (55 years) compared with non-survivors (62 years; $p = 0.002$).

Comorbidities : 58% had type II diabetes mellitus; others included hypertension and chronic kidney disease.

Symptom duration : median 7 days before admission.

Referral status: 68% referred from secondary centers.

Outcomes

Mortality: 11/50 patients (22%). Causes included septic shock (5), multiorgan failure (4) and cardiogenic shock (2).

ICU care: 13 patients required ICU, with 8 requiring mechanical ventilation. Mortality was significantly higher in ventilated patients ($p < 0.001$).

Hospital stay: median 14 days for survivors *versus* 7 days for non-survivors ($p = 0.002$).

Gangrene Extent and Mortality

Grade I (21 patients): 100% survival

Grade II (15 patients): 4 deaths (27%)

Grade III (14 patients): 7 deaths (50%)

Mortality correlated significantly with extent of disease ($p < 0.001$).

Microbiology

Polymicrobial growth: 48% cases.

Common isolates: E coli, Proteus, Enterococci, Streptococci, Staphylococcus aureus.

One patient with Candida albicans infection succumbed.

Scoring Systems

FGSI:

Median score survivors: 4 (range 0-11).

Median score non-survivors: 14 (range 3-23).

ROC AUC = 0.843 (cut-off 11; sensitivity 64.7%, specificity 100%).

MFGSI:

Cut-off = 9 points.

Patients >9 had 94% mortality probability.

Patients ≤9 had 81% survival probability.

ROC AUC = 0.947, significantly superior to FGSI ($p = 0.002$) (Fig 2).

Discussion

Fournier's gangrene continues to challenge surgeons despite modern advances. Our analysis of 50 patients revealed three principal independent predictors of mortality: age, physiological derangement (FGSI), and extent of gangrene.

Role of Age

Consistent with Clayton, *et al*[11] and Laor, *et al*[12] we observed significantly higher mortality among older patients. Advanced age impairs immune function, wound healing and tolerance to sepsis, thus worsening prognosis. Patients ≥60 years had nearly 10-fold higher odds of mortality.

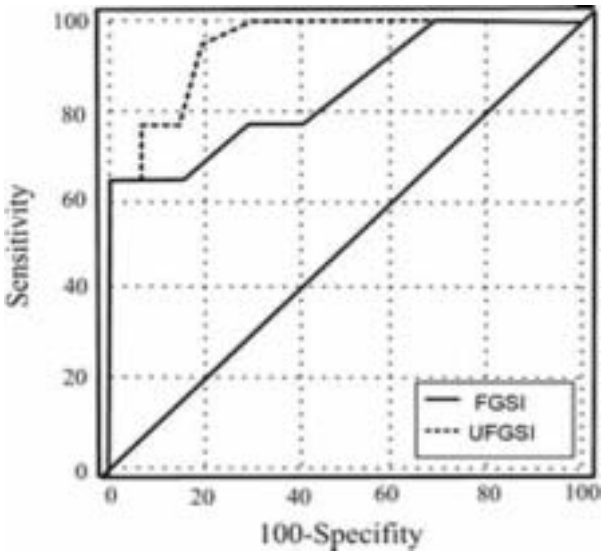

Fig 2 — Displays the results of the ROC analysis comparing the two scoring systems

Extent of Gangrene as a Prognostic Factor

While previous studies hinted at disease extent influencing outcome, few integrated it into predictive scoring. Our findings strongly support Yilmazlar, *et al*[15] who emphasized anatomical spread as a major determinant. Grade III disease (extension beyond pelvis) carried a 50% mortality risk.

Comparison of FGSI and MFGSI

The FGSI has been widely validated but remains imperfect: some low-score patients die, while some high-scorers survive. By incorporating age and gangrene extent, our MFGSI markedly improved predictive accuracy (AUC 0.947). Thus, MFGSI offers clinicians a practical, more reliable bedside tool for risk stratification.

Implications for Clinical Practice

Patients with MFGSI >18 invariably died, underscoring the need for early aggressive resuscitation, extensive debridement and possible prioritization for ICU admission.

Scores ≤9 predict survival with high probability, allowing resource optimization by safely managing such patients in wards rather than ICUs.

The tool can assist surgeons in counseling families, triaging referrals and planning staged reconstructions.

Limitations

Retrospective, single-center study.

Limited sample size (n=50).

Lack of long-term follow-up regarding functional or reconstructive outcomes.

Validation in larger multicentric cohorts is warranted.

Conclusion

Fournier's gangrene remains a rapidly progressive, potentially fatal infection with substantial morbidity and mortality. Traditional indices such as FGSI provide useful prognostic guidance but fail to consider disease extent, a crucial determinant of outcome.

Our study validates a Modified Fournier's Gangrene Severity Index (MFGSI) incorporating age and anatomical extent of gangrene in addition to physiological parameters. The MFGSI demonstrated superior predictive power compared to FGSI, with a clear cut-off at 9 points for mortality risk stratification.

By offering a more accurate prognostic framework, the MFGSI can guide timely surgical aggressiveness, critical care allocation, and patient counseling. Future prospective multicentric studies are recommended to further validate and refine this scoring system.

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Conflict of Interest : None

References

1 Ersay A, Yilmaz G, Akgün Y — Factors affecting mortality of Fournier's gangrene: review of 70 patients. *ANZ J Surg* 2007; **77:** 43-8.
2 Smith GL, Bunker CB, Dinneen MD — Fournier's gangrene. *Br J Urol* 1998; **81:** 347-55.
3 Fournier A — Gangrènefoudroyante de la verge. *Semaine Med* 1883; **3:** 345-8.
4 Jayalal JA — Fournier's Gangrene and its Management-A Prospective Study. *Journal of Surgery Research and Practice* 2023; **4(1):** 1-12. https://doi.org/10.46889/JSRP.2023. 4105
5 Manoah A — Necrotizing Fasciitis: A Vicious Soft Tissue Infection, Indian Journal of Public Health Research and Development/Volume 15 No. 1, January-March 2024.
6 Morpurgo E, Galandiuk S — Fournier's gangrene. *Surg Clin North Am* 2002; **82:** 1213-24
7 Karthick D — Risk Stratification of Covid -19 Patients Using The Apache-11 Score, World journal of pharmaceutical and medical and medical research www.wjpmr.com SJIF Impact Factor: 5.922 ISSN 2455-3301
8 Yanar H, Taviloglu K, Ertekin C — Fournier's gangrene: risk factors and strategies for management. *World J Surg* 2006; **30:** 1750-4.
9 Korkut M, Içöz G, Dayangaç M — Outcome analysis in patients with Fournier's gangrene: report of 45 cases. *Dis Colon Rectum* 2003; **46:** 649-52
10 Short B — Fournier gangrene: an historical reappraisal. *Intern Med J* 2018; **48(9):** 1157-60.
11 Clayton MD, Fowler JE, Sharifi R — Causes, presentation and survival of fifty-seven patients with necrotizing fasciitis of the male genitalia. *Surg Gynecol Obstet* 1990; **170:** 49-53.
12 Laor E, Palmer LS, Tolia BM, Reid RE, Winter HI — Outcome prediction in patients with Fournier's gangrene. *J Urol* 1995; **154:** 89-9
13 Jayalal JA — Validation of LRINEC Scoring System for Predicting Mortality inn Necrotising Fasciitis : A Prospective Observational Study. *International Journal of Scientific Research (IJSR)* 2024; **13(4):** Print ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
14 Palmer LS, Winter HI, Tolia BM, Reid RE, Laor E — The limited impact of involved surface area and surgical débridement on survival in Fournier's gangrene. *Br J Urol* 1995; **76:** 208-12.
15 Yilmazlar T, Ozturk E, Ozguc H — Fournier's gangrene: an analysis of 80 patients and a novel scoring system. *Tech Coloproctol* 2010; **14:** 217-23. https://doi.org/10.1007/s10151-010-0592-1
16 Eke N — Fournier's gangrene: a review of 1726 cases. *Br J Surg* 2000; **87:** 718-28.
17 Yilmazlar T, Ozturk E, Alsoy A, Ozguc H — Necrotizing soft tissue infections: APACHE II score, dissemination, and survival. *World J Surg* 2007; **31:** 1858-62.
18 Lin E, Yang S, Chiu AW — Is Fournier's gangrene severity index useful for predicting outcome of Fournier's gangrene? *Urol Int* 2005; **75:** 119-22.

Original Article

A Retrospective Study of Medicolegal Autopsies Requiring the Aid of Histopathological Examination, Encountered in a Tertiary Care Hospital in Eastern India and the associated Spectrum of Pathological Conditions

Somnath Das[1], Rina Das[2], Sarbashis Hota[3]

Abstract

Background : Few studies in the past have addressed the issue of efficacy and importance of Histopathological examination in Medicolegal autopsy. As pathological autopsy is rarely performed in this state owing to obvious issues of consent, the trends of disease extrapolated from medicolegal autopsies by histopathological examination, can partially supplement the existing gap of knowledge, particularly for organs like heart, brain, liver, and lung, which seldom undergoes resection.

Aims and Objective : (1) To study the spectrum of pathological conditions related to cases of medicolegal autopsies performed in this three-year time interval. (2) To identify the variables influencing the histopathological diagnosis in cases of medicolegal autopsy in the present infrastructure. (3) To estimate the efficacy of histopathological examination in explaining the cause of death in medicolegal autopsies.

Materials and Method : An observational retrospective cross-sectional study was undertaken in the Department of Pathology in collaboration with the Department of Forensic Medicine & Toxicology, R G Kar Medical College and Hospital, Kolkata for a 3-year duration. All the cases of medico-legal autopsies requiring histo-pathological examination where the cause of death was kept pending (obscure autopsy) of the cause mentioned as natural were taken. The necessary details of the cases and the reports were collected from Departmental archives with a review of the histopathology slides.

Results : Cause of death could be established in a good number of cases among the obscure autopsy group, whereas diversified histopathological findings were noticed among the other cases of natural deaths which revealed the pathological spectrum of diseases obtained, was helpful as a reflection of prevalent patterns of general population.

Conclusion : Routine histological examination of medicolegal autopsy cases may not be recommended based on the current infrastructural scenario. However, it can supplement and enrich our understanding of pathological conditions causing death, which may be already apparent on gross examination and even reveal very rare and fascinating cases, as experienced in our study.

Key words : Autopsy, Histopathology, Cause of Death.

Since Edward Bulkley performed the first Medicolegal Autopsy in colonial India[1], Medicolegal Autopsy became a part and parcel of any inquest procedure - and the tradition continues to date. However, the relative paucity of Histopathology labs and trained personnel as compared to the enormous number of autopsies performed over the year, limits the number of histopathological examinations associated with autopsy, in our country. Few studies in the past have addressed the efficacy and importance of HPE in Medicolegal Autopsy in India, particularly in the state of West Bengal, which has a rich history in the development of Forensic medicine tracing from the colonial past.

Editor's Comment :

- Routine histological examination of medicolegal autopsy enriches the understanding of pathological conditions causing death.
- Pathological spectrum of diseases obtained through autopsy can reflect prevalent patterns of disease in the general population.

Aims and Objective

(1) To study the demographic profile of the cases of

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Medicolegal Autopsies requiring the aid of histopathological examination in the three-year time frame

(2) To study the spectrum of pathological conditions related to cases of Medicolegal Autopsies performed in this time frame where the cause of death was either natural or obscure.

(3) To identify the variables influencing the histopathological diagnosis in cases of Medicolegal Autopsy in the present infrastructure

(4) To estimate the efficacy of histopathological examination in explaining the cause of death in Medicolegal Autopsies

Materials and Methods

An observational Retrospective cross-sectional study was undertaken in the Department of Pathology in collaboration with the Department of Forensic Medicine and Toxicology, R G Kar Medical College and Hospital, Kolkata, 12-month duration from 2021 to 2023.

All the cases of Medicolegal Autopsies whose cause of death were written to be natural or obscure undergoing histo-pathological examination (mostly brought dead in the ER with a possibility of natural death) within the 3-year interval (from March, 2021 to March, 2023) were included in the study. Among the cases, the COVID-19-positive cases were excluded from the study. The tissues that were visibly decomposed and the biopsy samples obtained from living patients as a part of clinical workup or therapeutic management were also excluded from the study.

The necessary details of the cases and the reports were collected from the Medical records department with preparation and interpretation of the histopathology slides from archived Formalin fixed paraffin embedded blocks. The collected data was tabulated and statistical analysis was done by SPSS version 25.

Analysis and Result

In Table 1 out of the total 28 cases, 82.14% cases were from male subjects and 38.1% of cases (with known age group) were below 40 years by age.

In Table 2 Spectrum of predominant pathological conditions with respect to individual organs.

Table 3 illustrating the relative contribution of histopathological examination in modifying the cause of death obtained from autopsy (excluding the two cases with complete autolysis).

Table 4 showing the distribution of cases according to cause of death apparent from autopsy with respect to contribution from histopathological examination (excluding the two cases with complete autolysis).

The Fisher exact test statistic value is 0.0022. The result is significant at $p<0.05$

In Table 5 distribution of degree of autolysis in cases with respect to the time interval (in days) between the date of autopsy and the date of receiving in the department.

A Statistically significant association is found between time interval and degree of autolysis of tissue (P= 0.033). Among the tissues preserved for 60 days or less, only 21.4% showed features of autolysis; whereas, 83.4% of the tissues underwent autolysis,

Table 1 — *Distribution of cases according to age range and Sex*

Age Range	Male	Female	Total
21-30	2	1	3
31-40	3	2	5
41-50	5	0	5
51-60	3	0	3
61-70	4	1	5
Not Known	6	1	7
Total	23	5	28

Table 2 — *Spectrum of predominant pathological conditions with respect to individual organs*

Heart	Lung	Liver	Kidney
Atherosclerosis (5)*	Pulmonary edema (4)	Hepatic Steatosis (4)	Chronic Pyelonephritis (2)
Healed infarct (1)	Lobar Pneumonia (1)	Cirrhosis of liver (1)	Interstitial nephritis (1)
Myocardial infarction (1)	Fungal Pneumonia (1)		Myeloma kidney (1)
Calcific aortic stenosis (1)	ARDS in plasma cell leukaemia (1)		ESRD (1)
Pericarditis (1)			

*Two cases of the autolyzed sample included

Table 3 — *Showing the relative contribution of histopathological examination*

Cause of death from autopsy findings (n=26)			
Obscure (n=14)		Diseased condition of organ/organs (n=12)	
HPE reveals co-morbidity to explain the cause of death (n=8)	HPE reveals specific organ-related findings to explain the cause of death (n=6)	HPE reveals organ related specific findings sufficient to establish the cause of death (12)	HPE reveals non-specific organ-related findings insufficient to establish the cause of death (0)

Table 4 — *Distribution of Cause of Death*

	Specific information on co-morbid pathology obtained from HPE		
		Yes	No
Written Cause of death at autopsy report	Yes	12	0
	No (obscure autopsy)	6	8

Table 5 — *Distribution of Degree of Autolysis*

Time interval in days	No autolysis	Partial/complete autolysis	Total
1-60	11(78.6%)	3(21.4%)	14(100%)
60-120	4(50%)	4(50%)	8(100%)
Beyond 120	1(16.6%)	5(83.4%)**	6 (100%)
Total	16 (57.1%)	12(42.9%)	28(100%)

**Two cases of complete autolysis included

which were kept for more than 120 days.

Discussion

The medicolegal autopsies examined in this study comprise cases from a wide age range, the lowest being 25 years to the highest being 69 years (Table 1). Male cases are over represented as compared to females, in this study. This may be because male cases are the predominant section coming for autopsy as a whole.

The histopathological spectrum of diseases is summarized organwise in Table 2, which is concordant with the study of Singh HC, *et al*[1], performed in the nearby state of Orissa, India. Two representative cases showing pulmonary edema (Fig 1) and hepatic steatosis (Fig 2) are the commonest findings with respect to the lungs and liver respectively. Singh H C, *et al*[2] performed a study on 100 cases over four years. Myocardial infarction and fatty liver were found to be the most common histopathological findings. Seven cases of liver cirrhosis, 5 cases of pyelonephritis, and 6 cases of Tuberculosis were the other notable clinical conditions apparent in their study.

In our study, the microscopic findings were sufficient enough to explain the cause of death in 76.92% of cases (sparing the two cases with complete autolysis). However, it has supplemented and enriched our understanding of pathological conditions causing death, which was apparent or was suspected on gross examination. It has also uncovered a few pathological conditions that were not suspected during gross examination in the obscure cases (Table 3). The contribution of histopathology in obtaining specific information on the pathological conditions to establish the cause of death in such autopsies was found to be statistically significant (Table 4). Still, it should be noted that the contribution of conventional histopathology is meager in elucidating the cause of death in truly obscure autopsies when other ancillary investigations are not done. Cases with cardiac arrhythmia or acute poisoning often end fatally without leaving any specific sign on microscopical examination too[3]. So, Routine histological examination of medicolegal autopsy cases seems to have limited value based on the current infrastructural scenario.

Views provided by Pathak A, *et al*[3] the crucial issue of routine histopathological examination of viscera in medicolegal autopsy provides hardly any benefit in ascertaining the cause of death. In their three-year study based on Rajkot, they found only 5.56% of cases benefited from tissue examination. Though they do not disapprove of the rational use of histopathology in selective obscure cases, from a medico-legal point of interest, the relative contribution may be sparse in routine autopsy, according to their point-of-view. Molina D K, *et al*[4] demonstrated, in only a single case out of the 189 cases, cause of death was affected by histological examination. Underscoring the fundamental difference between the aims of medicolegal and pathological autopsy, they concluded that the routine practice of histopathology in medicolegal cases is often unnecessary. However, Parai JL, *et al*[5], in contrast to Pathak A, stated a strong inclination towards microscopic examination of tissues to confirm or refute the gross findings; notwithstanding the issue of apparent cost implications implicated in it.

Nonetheless, the pathological spectrum of diseases obtained is helpful as a reflection of prevalent patterns of disease in the general population; especially where routine pathological autopsy is not performed as evident in the studies of Sindhura J, *et al*[6], Khiste JS, *et al*[7] and Singh HC, *et al*[2]. Especially, they may be helpful for assessment of burden of disease in the brought dead patients. Moreover, incidentally, it can reveal very rare and academically fascinating cases, as experienced in two instances in our study.

In one such case conducted by the authors, the retroperitoneal fatty tissue sent separately was diffusely infiltrated by sheets of atypical plasma cells. On finding the same, other tissues were subjected to histopathology and were found that ganglions of paravertebral sympathetic chains were also

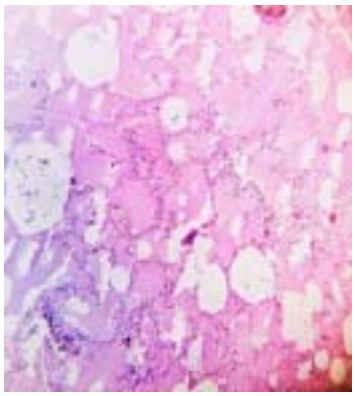

Fig 1 — Pulmonary edema, H&E, 400X

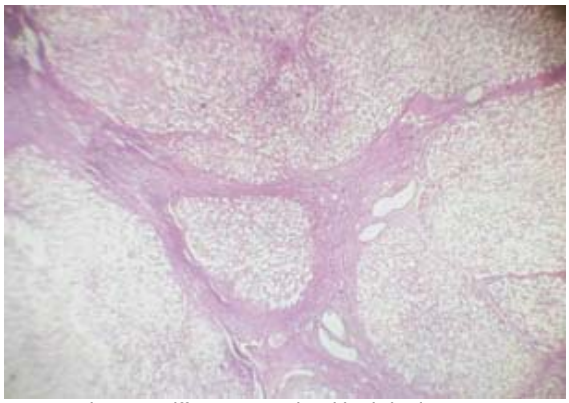

Fig 2 — Diffuse steatosis with cirrhotic change, H&E, 100X

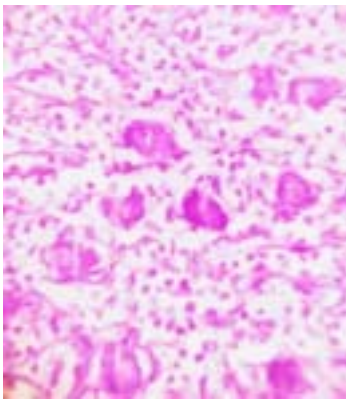

Fig 3 — Atypical plasma cells infiltrating ganglion cells of paravertebral sympathetic chains, H&E, 400X

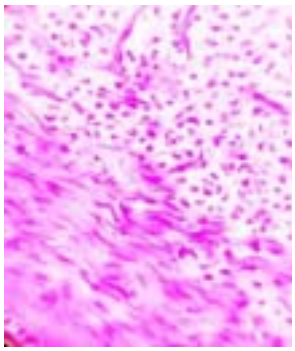

Fig 4 — Atypical plasma cells infiltrating large nerve bundles, H&E, 400X

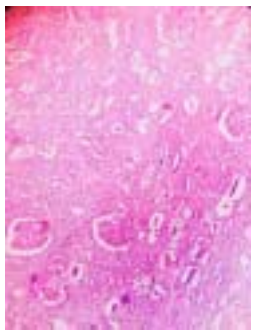

Fig 5 — Diffuse sheet-like infiltration of atypical plasma cells in the renal parenchyma with features of myeloma kidney, H&E, 100X

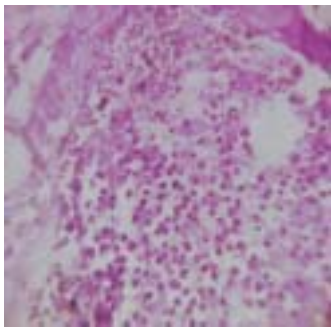

Fig 6 — Atypical plasma cells inside a large blood vessel within a section from lung, H&E, 400X

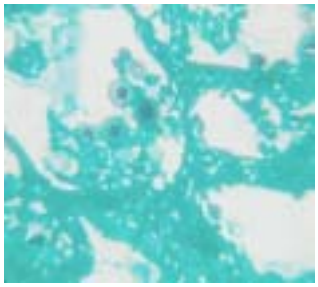

Fig 7 — Capsulated fungal body in alveolar spaces, GMS, 400X

encroached by neoplastic cells (Fig 3) and the spinal nerve bundles were infiltrated with atypical plasma cells (Fig 4). Not only that, previous history of existing multiple myeloma was there and the renal findings were consistent with myeloma kidney (Fig 5). The lung tissue showed features of pulmonary edema, but most astonishingly, the large blood vessels of the lung were studded with atypical plasma cells and plasmablasts (Fig 6). So, the diagnosis suggests towards a case of Plasma cell Leukaemia with diffuse involvement of retroperitoneal organs.

The second case was one from a young patient, whose demise was suspected as a sudden cardiac death. Multiple solid whitish nodules (some with calcification) were present on bilateral lungs, more towards the periphery of lower lobes and sub-pleural location. Based on gross findings, our suspicion was either Tuberculosis or a cancerous deposit; though, owing to the age of the patient as well as the location, both the differentials seemed to be very unlikely. Histopathological examination revealed, large areas of coagulative necrosis in the lung in different stages of healing with two thrombosed medium-sized blood vessels. Additionally, numerous large yeast forms of fungus with broad-based budding were found in the necrosed areas admixed with inflammatory cells. The morphological features on GMS stain (Fig 7) were suggestive of Blastomyces sp; a very uncommon finding altogether.

Few rare and unexpected cases like giant cell myocarditis, pulmonary hamartoma, aortic dissecton, broncho-pulmonary aspergillosis and dual pathology in lung (coexistent adenocarcinoma and tuberculosis) are reported by Sindhura, *et al*. Khiste JS, *et al*[4] reported two cases of Aspergillosis, pulmonary cryptococcosis and a case of metastatic round cell tumour. An interesting case of sickle cell disease causing vaso-occlusive crisis and a case of Rabies with Negri bodies in brain are reported by Singh HC, *et al* in similar settings. Similar uncommon cases have been reported by Hadijev R, *et al*[8],Panchal MG, *et al*[9] and Kaur M, *et al*[10] in their autopsy series. Sharma D, *et al*[11] have described one case of each fat embolism, amniotic fluid embolism, Takayasu arteritis, and pneumocystis jiroveci pneumonia associated with

CMV infection in their study. They concluded that histopathological examination was crucial to pinpoint the cause of death in a considerable number of medicolegal autopsies.

Autolysis of Tissue :

A Significant association is found between the degree of autolysis of specimens with the interval between specimen harvesting and reception in the Department of Pathology (Table 5). It underscores the improper way of preservation in formalin, which is at least frequent in our setup. Appropriate maintenance of formalin volume with sectioning of solid organs before final despatch ensures proper fixation and prevents degeneration by autolysis[12]. The ideal duration of formalin fixation should not exceed 48 hours[13]. Shortening of the period between specimen harvesting and receiving the specimen in the pathology department, which often happens due to complex judicial procedures, is recommended - as over-fixation may be detrimental, if ancillary investigations like Immunohistochemistry[14] are planned further.

Conclusion

Routine histological examination of medicolegal autopsy cases may not be recommended based on the current infrastructural scenario. However, it can supplement and enrich our understanding of pathological conditions causing death, which may be already apparent on gross examination. The relative contribution of conventional histopathological techniques in ascertaining the cause of death in obscure cases is still rudimentary; however, they can generate information on associated co-morbid conditions in such cases.

Nonetheless, the pathological spectrum of diseases obtained is helpful as a reflection of prevalent patterns of disease in the general population; especially where routine pathological autopsy is not performed. Moreover, incidentally, it can reveal very rare and fascinating cases, as experienced in our study. Appropriate maintenance of formalin volume with sectioning of solid organs before final despatch ensures proper fixation and prevents degeneration by autolysis. Shortening the period between specimen harvesting and receiving the specimen in the pathology department, which often happens due to complex judicial procedures, is recommended;- as over-fixation may be detrimental, if ancillary investigations like Immuno-histochemistry are planned further.

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References

1 Mathiharan K — Origin and development of forensic medicine in India. *American journal of Forensic medicine and Pathology* 2005; **26(3):** 254-60.
2 Singh H C, Mohapatra K, Mishra J — Interesting and unexpected histopathological findings in medicolegal autopsy case-An experience in a tertiary care centre. *Annals of International Medical and Dental Research* 2021; **7(3):** 345-52.
3 Pathak A — Histopathological examination in medico-legal autopsy pros & cons. *Journal of Indian Academy of Forensic Medicine* 2010; **32(2):** 128-31. DOI:10.1177/0971097320100210
4 Molina DK, Wood LE, Frost RE — Is routine histopathologic examination beneficial in all medicolegal autopsies? *Am J Forensic Med Pathol* 2007; **28(1):** 1-3.
5 Parai JL, Milroy CM — The utility and scope of forensic histopathology. *Acad Forensic Pathol* 2018; **8(3):** 426-51.
6 Sindhura M, Bhaskar RV, Lakshmi CV — Histopathological surprises in Medico legal autopsies- a two year experience. *Journal of Medical Science and Clinical Research* 2020; **8(2)**.
7 Khiste JS, Dantkale SS, Pandit GA, Bendre MA — Histomorphological study of medicolegal autopsy cases. *International Journal of Dental and Medical Sciences Research* 2021; **3(2):** 92-7.
8 Hadijev R, Tankova M, Philipov S — The importance of histological examination in forensic medical practice. *Medicolegal Update* 2022; **22(1)**.
9 Panchal MG, Sonwane RG —Histopathological study of MLC and autopsy cases in our hospital. *Indian Journal of Forensic Medicine and Pathology* 2019; **12(2)**.
10 Kaur M, Bhandari L, Bodal VK, Kaur S — A pathologist's perspective on histopathology examination of autopsies and various incidental findings. *Indian Journal of Forensic Medicine and Toxicology* 2021; **15(4)**.
11 Sharma D, Gupta A, Dewan K, Patiri K, Gupta K, Singh UR — Role of histopathological examination in medicolegal autopsies in unravelling precise causes of mortality. *National journal of laboratory Medicine* 2021; **10(4):** P001-004.
12 Carson FL, Hladic C — Histo-technology: a self instructional text. American society of clinical pathology press, 3rd Edition.
13 Suvarna SK, Layton C, Bancroft JD — Bancroft's theory and practice of histological techniques. Churchill Livingstone, Seventh Edition.
14 Dabbs DJ — Diagnostic Immunohistochemistry: Theranostic and genomic applications. Elsevier, Fifth Edition.

Review Article

Body Farms : Should We Seriously Consider them in India?

Sunil M Doshi[1]

Abstract

Background : Time since death is a crucial component of postmortem examination that provides valuable information despite being estimated within a range of certain hours, days or months. Parameters to measure time since death or postmortem interval are largely depending upon local environmental conditions. Body farms are platforms where forensic experts study human decomposition in prospective manner under different climatic conditions and ecological zones.

Conclusion : Currently, opinions pertaining to postmortem interval are based on textbooks or research papers which themselves are lacking in reflecting findings from prospective body farming studies in absence of availability of such facilities with India.

Key words : Body Farms, Time Since Death, Post Mortem Interval, Anthropology.

Taphonomy is the study of decaying organisms over time along with their process of fossilization as well as to understand how site ecology affects the process of decomposition which ultimately provides base to estimate postmortem interval or time since death[1]. Much of the difficulty in determining time since death stems from the lack of systematic observation and research on the decomposition rate of the human body[2]. As far as Indian researches are concerned; a study shows that only a handful of researches have focused on time since death in spite of it being an important component of every postmortem report in India[3]. The factors affecting time since death are highly localized and vary even from one spot to another. So, there is need to have prospective researches to actually understand the local factors and their influences on various parameters based on which the opinions about postmortem intervals are documented in postmortem reports. The only way to execute this is to establish body farms in India. Body farms are research facilities where forensic experts study human cadavers to learn how they decompose, or breakdown under different circumstances[4]. So basically, this facility offers a natural local environment to study real-time changes of decomposition, aiming to develop local standards for measuring time since death prospectively. Fresh human body, with known time since death, is to be reserved in a designated facility to allow its natural decay. Researchers will visit the facility at specified intervals to observe and document the changes after death that takes place in that particular setting.

Editor's Comment :

- Body-farming facilities provide a platform to study one of the most important objectives of an autopsy, estimation of time since death, in a prospective manner.
- Since the parameters for determining time since death depend largely on environmental and other local factors, the absence of such facilities in India forces forensic experts to rely mostly on Western texts when framing legal opinions.
- Therefore, this long-neglected area requires urgent attention in the present era to create more accurate standards tailored to the Indian subcontinent.

Shift from Animal to Human Cadavers :

Non-human animal proxies have been used to study taphonomic changes with pigs being the most common choice[5]. However, Decomposition studies with pigs as proxies for human cadavers scientifically lacking in studying differences in decomposition sequences/rates relative to humans. Differences in decaying process between humans and pigs can have significant effects on estimation of human PMI using pig corpses. A study concluded that Standards for PMI estimation derived from porcine models may not directly apply to humans and may need adjustment[6]. The establishment of the Anthropological Research Facility (ARF), the Forensic Anthropology Center (FAC), at the University of Tennessee can be considered as beginning of modern era in forensic investigations related to estimating postmortem interval and which is also responsible for shifting researches from retrospective studies to prospective studies conducted in a controlled environment with

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possible manipulation of variables[7]. Currently, there are eight operational Human Taphonomy Facilities (HTFs) or body farms in the USA, one in Australia and one in The Netherlands, with plans to create another in Australia, Canada, and more in continental Europe[8]. In India, few scientists are working in this direction with aims and objectives pertaining to researches on postmortem interval, skeleton collection of Indian origin and providing services to law enforcement[9,10]. However, with very limited resources available to them.

Working Pattern of Body Farms :

Body farms typically run on human bodies donated for this specific purpose. In earlier practices, unclaimed bodies were utilized, often with limited information about the donor in western countries. Data of consented donor is collected at the time of agreement for body donation ie, age, sex, occupation, medical conditions, family history, height, weight, habits, socio-economic status, education etc along with photographs. After death, these donated bodies are placed in various settings within the facility, such as open-air environments, inside model houses or cars, with windows either closed or open, until they are skeletonized. Each body is properly tagged to ensure identification can be maintained throughout the study till the skeletonization phase. Sometimes cages are used to protect bodies from scavengers like vultures and other animals. Throughout the process, meticulous records are kept regarding decomposition changes, insect activities, and weather conditions. These observations are documented either daily or at predetermined intervals, often accompanied by photographs. Lastly, entire skeleton is recovered and stored under the collection centres for further academic activities and anthropological researches.

Why it becomes need of Hour ?

Time since death is a crucial component of postmortem examination that provides valuable information despite being estimated within a range of certain hours or days or months. Numerous court judgements emphasize the importance of time since death and one can find end numbers of judgements where time since death or postmortem interval are discussed and taken in to account thoroughly[11-13]. In one of the case, Hon'ble Allahabad high court quoted,

"*Time since death It is very important from a medico-legal point of view that a medical jurist should always be prepared to give an opinion as to the time which elapsed since death, when a body is brought to him for post-mortem examination. The points to be noted in ascertaining the time are warmth or cooling of the body, the absence or presence of cadaveric hypostasis, rigor mortis and the progress of decomposition. All these points have been discussed at full length, but it must be remembered that the conditions producing these changes vary so much in each individual case, that only a very approximate time of death can be given"*

Currently, opinions pertaining to postmortem interval are largely dependent on textbooks or research papers which themselves are lacking in reflecting findings from prospective body farming studies. In absence of such facilities, Forensic experts often base their opinions on generalized data, which may not accurately reflect local environmental factors that can significantly influence the postmortem interval. For example, time of development of rigor mortis or marbling in northern part of India can be different from that of southern regions. To improve the reliability in estimating time since death, there is a clear need for the establishment of region-specific body farming facilities within India. These facilities would conduct research in controlled environments that reflect local conditions and allowing more accuracy by taking in to account the region-specific influencing factors. This approach would enhance the scientific basis for experts' opinions, ensuring that they are backed up by empirical evidences rather than generalized norms.

Challenges ahead :

The primary challenge is obtaining human cadavers. The donation of bodies for academic and research purposes has its inherent sensitivity due to cultural, religious, caste and regional considerations. In India, there is a shortage of human cadavers for medical education due to low awareness, strong religious beliefs and customs as well as concerns about whether donated bodies will be treated with respect and dignity or not[14]. Therefore, spreading awareness about this novel concept of body farming among Indian citizens and encouraging sufficient body donations for this purpose would be challenging. However, unidentified and unclaimed bodies can still be valuable for research, provided appropriate facilities and regulations are in place. If a virtual autopsy satisfies the important objects of conducting routine postmortem, dissection can be omitted to preserve the body for the purpose of body farming.

The second challenge involves obtaining financial support from the state governments or central government, as the case may be. This concept requires acceptance not only from the public but also from the government. In India, where mortuary facilities often lack adequate infrastructure, resources and sanitation in many places[15,16], chances are negligible for the administration to consider this concept. The third challenge is to designate suitable locations and gaining acceptance from local communities. In the US, initial resistance to such facilities was observed among scientists, citing concerns such as odour, scavenger activity, the sight of dead bodies, groundwater contamination etc. In India, where population density is much higher, finding locations away from human activities for such facilities would be challenging. Significant amount of expenditure would be required to develop such landscapes with secure boundaries to prevent unauthorized access and to maintain the confidentiality and decorum of the site. The fourth challenge is to have human resources to operate these facilities. Experts with Master's in forensic medicine are essential for conducting researches and managing body farms. Later on, specialized courses can be developed in collaboration with universities to train experts in this particular field. These professionals can then be recruited within law enforcement agencies and other relevant institutions to support investigations effectively.

Conclusion

To conclude, Body farm, not only does it serve the purpose of providing platform to conduct semi-controlled actualistic research to test hypotheses using large samples of human bodies with known PMI and to compare patterns and rates of decomposition between climatic and ecological zones[17], but also it creates opportunities for anthropologists, osteologists and forensic experts to more effectively assist law enforcement in solving crimes.

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References

1 Varlet V, Joye C, Forbes SL, Grabherr S — Revolution in death sciences: body farms and taphonomics blooming. A review investigating the advantages, ethical and legal aspects in a Swiss context. *International Journal of Legal Medicine* 2020; **134:** 1875-95.
2 Mann RW, Bass WM, Meadows L —. Time since death and decomposition of the human body: variables and observations in case and experimental field studies. *Journal of Forensic Sciences* 1990; **35(1):** 103-11.
3 Doshi SM — Trend of researches in Forensic Medicine and Toxicology: An Indian scenario. *Journal of Indian Academy of Forensic Medicine* 2019; **41(4):** 232-6.
4 Washburne S — Clues in Corpses: A Closer Look at Body Farms. United Kingdom: Greenhaven Publishing LLC. 2017.
5 Haglund WD, Sorg MH, editors. Advances in forensic taphonomy: method, theory, and archaeological perspectives. CRC Press; 2001 Jul 30.
6 Keough N, Myburgh J, Steyn M — Scoring of decomposition: a proposed amendment to the method when using a pig model for human studies. *Journal of Forensic Sciences* 2017l; **62(4):** 986-93.
7 Shirley NR, Wilson RJ, Jantz LM — Cadaver use at the University of Tennessee's anthropological research facility. *Clinical Anatomy* 2011; **24(3):** 372-80.
8 Williams A, Rogers CJ, Cassella JP — Why does the UK need a Human Taphonomy Facility? *Forensic Science International* 2019; **296:** 74-9.
9 Insaaf.Investigative scientific & anthropological analysis facility [Internet]. Org.in. [cited 2024 Jul 9]. Available from: http://www.insaaf.org.in/index.html
10 Holla A — Telling the bane from the bone [Internet]. Mumbai Mirror. 2010 [cited 2024 Jul 9]. Available from: https://mumbaimirror.indiatimes.com/others/sunday-read/telling-the-bane-from-the-bone/articleshow/16033803.cms
11 Vijay Bahadur @ Pahdai vs State of U.P [Internet]. indiankanoon.org. 2019 [cited 2024 Jul 10]. Available from: https://indiankanoon.org/doc/17040079/
12 Sooraj vs The State of Kerala [Internet]. indiankanoon.org. 1993 [cited 2024 Jul 10]. Available from: https://indiankanoon.org/doc/1880018/
13 Appellant vs The State of Assam [Internet]. indiankanoon.org. 2022 [cited 2024 Jul 10]. Available from: https://indiankanoon.org/doc/133991621/
14 Rokade SA, Gaikawad AP — Body donation in India: Social awareness, willingness, and associated factors. *Anatomical Sciences Education* 2012; **5(2):** 83-9.
15 Hussain AJ, Mohiddin SK — Mortuary management and public health. *Journal of Indian Academy of Forensic Medicine* 2021; **43(2):** 145-8.
16 Khilji S, Nigam M, Nigam K — Variation in Resource Supply of Mortuary for Autopsy at Tertiary Care Center-A Nation-Wide Survey. *Journal of Indian Academy of Forensic Medicine* 2024; **46(1):** 35-8.
17 Wescott DJ — Recent advances in forensic anthropology: decomposition research. *Forensic Sciences Research* 2018; **3(4):** 278-93.

Case Report

Uncommon Ocular Parasitosis : A Case Report from Dadra & Nagar Haveli

Komal Parikh[1], D B Zala[2], Ankush Sanghai[3], Manjula J Babariya[4], Kshipra Chauhan[5], Vikram Khan[6]

Abstract

Background : This case report presents a rare occurrence of ocular parasitosis in a 10-year-old girl who complained of itching, redness, and a thread-like structure in her left eye. Despite prior treatment by a private practitioner, her condition worsened, prompting her parents to seek specialized care. Clinical examination revealed a motile worm in the anterior chamber of the left eye, likely due to the patient's close association with animals and poor sanitary practices. Surgical intervention was performed to remove the worm, and the patient responded well to treatment, with no signs of systemic or further ocular parasitic infection during follow-up. This case highlights the importance of promoting proper sanitary practices and raising awareness about zoonotic parasitic infestations to control their incidence. Further epidemiological surveys and awareness programs are warranted to mitigate the impact of ocular parasitosis and improve public health outcomes.

Key words : Ocular Parasitosis, Motile Worm, Zoonotic Infestations.

Ocular parasitosis, caused by parasites such as protozoa, nematodes, cestodes, and trematodes, is a condition known to affect the eye[1]. This type of parasitosis is predominantly zoonotic, meaning it can be transmitted to humans from animals through arthropod vectors[2]. Although nematode parasites typically do not multiply within their definitive hosts, they can migrate to various parts of the body, including the eye, during their life cycle[3]. Instances of ocular parasitosis have been documented in India due to different parasites. For instance, Loa loa infestations have been reported in Delhi[4], Nagpur[5], Mumbai[6], Guwahati[7], Chennai[8] and *Brugia malayi* in Coimbatore[9]. Moreover, *Wuchereria bancrofti* infestation has been recorded in Delhi[10] and Thelazia in Assam[11]. This case report presents a unique occurrence as it is the first recorded instance of worm infestation in the eye within the tribal District of Dadra & Nagar Haveli, India.

Case Report

In this extraordinary case report, we recount the presentation and successful management of ocular nematode parasitosis in a 10-year-old girl at Shri Vinoba Bhave Civil Hospital, Silvassa. The young patient arrived at the eye OPD with complaints of itching, redness, and a sensation of a thread-like structure in her left eye that had persisted for a month despite previous treatment by a private practitioner. Alarming her parents further, they noticed a white, motile worm in her left eye, leading them to seek specialized care. Clinical examination by the ophthalmologist revealed a photophobic, undulating, long translucent worm in the anterior chamber of the left eye. Conjunctival congestion and mild corneal edema were observed, while the right eye appeared normal. Despite initiating treatment with Ofloxacin and Prednisolone eye drops, along with Homatropine, the patient's condition showed no improvement after three days. Consequently, a surgical intervention was planned for the removal of the parasite worm. Through a successful superior temporal limbal stab incision, a live adult worm was extracted and sent for identification. Microscopic examination revealed a slender, white worm approximately 9 mm long and 0.1 to 0.2 mm wide, displaying active motility. While definitive speciation was challenging, expert analysis suggested that the worm was probably a zoonotic filarial species. Postoperatively, the patient's visual acuity gradually improved, reaching 20/20 in five days with continued use of Ofloxacin and Prednisolone eye drops. Systemic diethylcarbamazine treatment was administered for 21 days, and during follow-up visits, the patient displayed no signs of systemic or further ocular parasitic infection. This case emphasizes the importance of considering parasitic infestations, even rare ones, in cases of persistent ocular symptoms and highlights the significance of timely surgical intervention and appropriate management for successful outcomes.

Editor's Comment :

- A fascinating case of ocular parasitosis in a 10-year-old girl, highlighting the importance of sanitary practices and zoonotic awareness.
- Additional details on the specific parasite and preventive measures would enhance the report's impact.

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Fig 1 — Presence of a worm in the anterior chamber of the eye

Discussion

Ocular parasitosis in humans is more commonly found in geographical areas where environmental factors and poor sanitary conditions create a favorable environment for parasitism between humans and animals[1]. In the case we are presenting, the patient had close association with animals, possibly contributing to the parasitic infection. Ophthalmic involvement of parasitic worms typically affects the periorbital region, intraocular structures, subconjunctival tissues, or eyelids[12-13]. In our study, we found the worm located in the anterior chamber of the eye, a location consistent with previous reports[5,7,10]. Although our study successfully identified the presence of the worm in the eye, species identification, the route of infection, and the parasite's vector remained unknown. Surgical intervention was the chosen approach for treating ocular parasitosis in our case, which aligns with the treatment strategies reported in other studies[14-15]. Treatment typically involves surgical procedures, deworming, or the removal of nodules or granulomas associated with the parasitic infection.

The rising number of such cases is a concerning indicator that necessitates increased awareness and dissemination of knowledge regarding such infections. Underreporting of cases often results from a lack of awareness and limitations in diagnostic modalities. Raising awareness about ocular parasitosis and improving diagnostic capabilities are essential steps towards early detection and appropriate management of such cases.

Conclusion

This rare case of ocular parasitosis in a 10-year-old girl emphasizes the need for awareness about proper sanitary practices, especially in areas with close human-animal association. To control the incidence of zoonotic parasitic infestations, more epidemiological surveys and awareness programs are essential. Timely diagnosis and appropriate management, such as surgical intervention, can significantly improve outcomes and prevent complications. Implementing preventive measures and increasing knowledge about these infections are crucial for safeguarding public health.

Fig 2 — Showing the Close-up of Ocular Parasite: Microscopic Image at 4X

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References

1 Nimir AR, Saliem A, Ibrahim IAA — Ophthalmicparasitosis: a review article. *Interdiscip Perspect Infect Dis* 2012; 587402
2 Otranto D, Eberhard M — Zoonotic helminths affecting the human eye. *Parasites Vectors* 2011; **4:** 41.
3 Klotz S, Penn C, Negvesky G, Butrus S — Fungal and parasitic infections of the eye. *Clin Microbiol Rev* 2000; **13(4)**: 662-85.
4 Nayak B, Sinha S, Nayak L — Loa loa in the vitreous cavity of the eye. *BMJ Case Rep* 2016; 1-2.
5 Qazi MS, Khetan SP, Tankhiwale SS — An adult worm in the eye. *Inter J Med Dent Sci* 2016; **5(2)**: 1269-71.
6 Bhedasgaonkar S, Baile RB, Nadkarni S, Jakkula G, Gogri P — Loa loamacro filariasis in the eyelid: case report of the first periocular subcutaneous manifestation in India. *J Parasit Dis* 2011; **35(2)**: 230-1.
7 Barua P, Barua N, Hazarika NK, Das S — *Loa loa* in the anterior chamber of the eye: a case report. *Indian J Med Microbiol* 2005; **23 (1)**: 59-60.
8 Fredrick N, Nirmal S, Sukanya SP — Subconjunctival *Loa Loa*worm - A case report. *TNOA J Ophthalmic Sci Res* 2018, **56:** 26-8
9 Myint K, Sahay R, Mon S, Saravanan VR, Narendran V, Dhillon B — "Worm in the eye'': the rationale for treatment of DUSN in south India. *Br J Ophthalmol* 2006; **90**: 1125-7.
10 Khokhar S, Patil B, Sharma R, Sinha G, Gupta S, Kakkar P, *et al* — Live *Wuchereria bancrofti*in anterior chamber of the eye: A case report. *Trop J Med Res* 2015; **18(1)**: 45-7.
11 Mahanta J, Alger J, Bordoloi P — Eye infestation with Thelazia species. *Indian J Opthalmol* 1996; **44**: 99-101.
12 Joseph K, Vinayakumar VR, Criton S, Vishnu MS, Pariyaram SE — Periorbital mass with cellulitis caused by microfilare Indian. *J Med Microbiol* 2011; **29(4)**: 431-33.
13 Bhat S, Sofia O, Raman M, Biswas J — A case of sub conjunctival dirofilariasis in South India. *J OpthalInflamm Infect* 2012; **2**: 205-6.
14 Bhat KS, Kotigadde S, Bhat KN, Pare P— Subconjunctival dirofilariasis: Case studies with review of literature. *Trop Parasitol* 2014; **4(2)**:119-21.
15 Choure AC, Palewar MS, Dohe VB, Mushingkar SS, Madhuri K, Bharadwaj RS — Sub conjunctival dirofilariasis caused by Dirofilariarepens: A case report with short review. *Indian J Patho Microbiol* 2015; **58**: 332-34.

Letter to the Editor

[The Editor is not responsible for the views expressed by the correspondents]

Unraveling 'Khanni': A Socio-Cultural Misbelief and Practice in Neonatal Care Across Karnataka's Malenadu Region

Sir, — Understanding newborn care practices is imperative due to their cultural significance and alignment with traditional beliefs, particularly during the childbirth period. Effective development of behavior change strategies hinges on this comprehension. In India, where religious, cultural, regional, and socio-economic diversities abound, the adaptation of interventions becomes paramount[1-3]. It is noteworthy that numerous harmful practices pervade neonatal and child care around the world, spanning from unhygienic cord cutting and delayed breastfeeding to the application of branding marks for treating diseases[4-6]. I am writing to bring to your attention to one such belief and practice prevalent in the Malenadu and coastal regions of Karnataka. This belief locally referred to as "Khanni" in kannada language revolves around a misconception regarding the suture lines on a newborn's head and its potential implications for the child's health.

In this region, it is believed that in this disease the newborns head enlarges if not treated promptly, the infant's skull will split – referring to the suture lines, leading to dire consequences, including the death of the newborn. As a remedy, individuals resort to a traditional practice of administering small pin- head sized burns at the juncture of the metopic suture on the infant's forehead, using materials such as mud bangles or pins. It is imperative to highlight that this belief and practice are not only based on unfounded medical reasoning but also pose significant risks to the health and well-being of newborns. The application of burns, albeit small, can lead to infections, scarring, and other complications, thereby exacerbating rather than alleviating any perceived issues with the infant's suture lines.

As advocates for evidence-based medical practices and the promotion of community health, it is essential to address and dispel such misconceptions. Educating communities about the normal anatomy of a newborn's skull and the importance of seeking medical advice from qualified healthcare professionals for any concerns regarding infant health is paramount. I urge the medical community to collaborate with local healthcare providers, community leaders, and educators to implement targeted educational campaigns aimed at dispelling myths like "Khanni" and promoting safe, evidence-based practices for newborn care in the Malenadu region and beyond. By raising awareness and fostering informed discussions, we can work towards ensuring the health and well-being of all individuals, especially the most vulnerable members of our communities.

References

1 Sinha LN, Kaur P, Gupta R, Dalpath S, Goyal V, Murhekar M — Newborn care practices and home-based postnatal newborn care programme – Mewat, Haryana, India, 2013. WPSAR. 2014 Sep 30; **5(3):** 22-9.

2 Withers M, Kharazmi N, Lim E — Traditional beliefs and practices in pregnancy, childbirth and postpartum: A review of the evidence from Asian countries. *Midwifery* 2018; **56:** 158-70.

3 Reshma RS — Cultural practices and beliefs on newborn care among mothers in a selected hospital of mangalore taluk. *Journal of Health and Allied Sciences NU* 2014; **4(2):** 21-6.

4 Kesterton AJ, Cleland J — Neonatal care in rural Karnataka: healthy and harmful practices, the potential for change. *BMC Pregnancy Childbirth* 2009; **9(1):** 20.

5 Khare C, Sharma PK, Chanchlani R — Branding- A Barbaric Practice for the Treatment of Childhood Ailments. *Indian J Pediatr* 2024; **91(6):** 626-6.

6 Ghafel HH, Al-Jubouri MB — Using unsafe traditional practices by Iraqi mothers to treat newborns' problems. *Heliyon* 2024; **10(6):** e27842.

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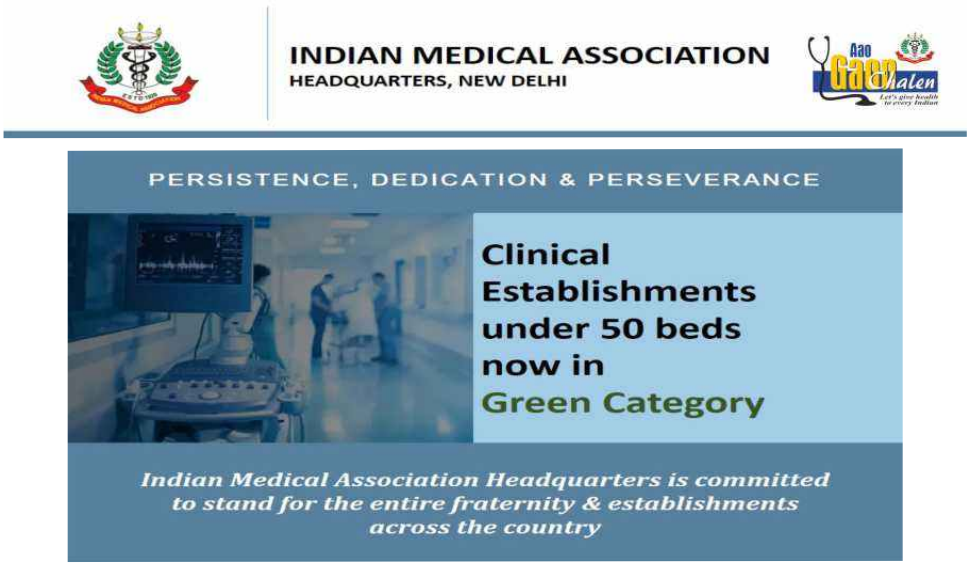
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