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Clinico-pathological study of non-neoplastic lesions in the paediatric age group at a tertiary hospital

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Abstract

Aim / Objective: To analyze various surgical-pathological lesions, especially in the pediatric age group including congenital malformations reported at our institute, Dr. D Y Patil, Navi Mumbai. Pediatric conditions include - Hirschsprung's disease, appendicitis, thyroglossal cyst, osteomyelitis, meningocele, and meningomyelocele. To study epidemiological parameters that is associated with these lesions.

Method and material: In a retrospective study conducted in a tertiary care center for 2 years. A total of 50Non–neoplastic lesion specimens in the pediatric age group were studied grossly and microscopically. Hematoxylin and Eosin (H&E) staining was done.

Result: This study includes 50 non-neoplastic lesions in the Paediatric age group. In which, 76% were male and 24% were females. Age range from 0 to 16 years. Appendicitis was the most frequent lesion (50%) followed by (20%), osteomyelitis (10%), thyroglossal duct cyst (8%), Meningomyelocele, and meningocle collectively 12%.

Conclusion- The collaborative approach of integrating imaging diagnostic techniques with detailed histopathological examinations has proven significant in characterizing and diagnosing diverse pediatric conditions.

Keywords: Histopathology, Paediatric Lesions, Osteomyelitis, Meningocele.

Introduction

Pediatric pathology poses significant challenges for clinicians and pathologists due to fundamental differences between pediatric and adult patients regarding epidemiology, symptoms, laboratory tests, prognosis, and treatment. Children are susceptible to various surgical-pathological conditions, such as Hirschsprung's disease, appendicitis, thyroglossal cysts, osteomyelitis, meningocele, and meningomyelocele. Appendicitis in children is the usual cause of abdominal surgery.[1] It typically manifests as acute abdominal pain, vomiting, and diarrhea necessitating surgical removal of the appendix to prevent complications like rupture and peritonitis.[2,3] Hirschsprung's disease, a congenital colon disorder characterized by the absence of ganglion cells in the lower colon, often presents with chronic constipation and abdominal distension. Its treatment typically requires the removal of the affected colon section.[4] Childhood

osteomyelitis, a rare bone infection usually caused by bacteria such as Staphylococcus aureus, presents with localized pain, swelling, and fever, requiring prompt antibiotic treatment and, in some cases, surgery.[5] Thyroglossal cysts, arising from remnants of the thyroglossal tract, are common cervical cysts (constituting 70% of congenital neck malformations), with less than 1% developing into carcinoma. These cysts connect the root of the tongue with the thyroid.[6,7] Meningomyelocele and meningocele are congenital spinal conditions in children that may present as visible sacs on the back at birth. Meningomyelocele typically requires surgical closure to prevent infection and long-term care to manage neurological issues, while meningocele usually does not involve the spinal cord and needs surgical repair to protect the exposed meninges[8,9]

Materials and Methods

This observational study examines 50 cases of pediatric surgical specimens reported in our institute, Dr. D. Y. Patil, Navi Mumbai, in the Department of Pathology for two and a half years, from January 2021 to June 2023. Paraffin sections were cut, and routine Haematoxylin and Eosin (H & E) staining were performed. Histological evaluations were conducted for all cases, and Immunohistochemistry (IHC) was employed where necessary. The inclusion criteria comprised data from specimens within the pediatric study population reported as non-neoplastic surgical lesions (as indicated by the histopathology report) Exclusion criteria- Neoplastic lesions.

Results

In the present study, 50 cases were analyzed, of which 38 (see Table 1) were males (76%) and 12 (see Table 1) were females (24%). The male-to-female ratio was 3.16:1. In our study, we divided the cases into three distinct age groups – 0 to 5 years, 6 to 10 years, and 11 to 16 years – to gain a comprehensive understanding of the pediatric lesions. Notably, the 11-16 years age group emerged as the most prevalent, representing 25% of the cases, followed by the 0-5 years (19%) and 6-10 years (6%) age groups (see Table 2). Among 50 cases, the gastrointestinal system emerged as the most commonly affected, overall appendicitis (acute and chronic), comprising 50% of the cases (see Table 3 and Figure 1). Hirschsprung's disease (see Figure 2) accounted for 20%, bony lesions, including osteomyelitis (see Figure 3), constituted 10%, congenital thyroid lesions (Thyroglossal duct cyst) comprised 8%, and spinal tube defects (Meningomyelocele and meningocele) collectively represented 12. Among appendectomy specimens, acute appendicitis (21 cases) was more prevalent than chronic conditions (4 cases), with a male predominance and a higher incidence in the 11-16 years age group. 10 cases were diagnosed as Hirschsprung's disease, predominantly affecting males and the 0-5 year's age group. Bone biopsy specimens with a clinical diagnosis of osteomyelitis yielded 2 cases of acute and 3 cases of chronic osteomyelitis. The 11-16 years age group was most commonly affected with this disease, and it also showed a predominance towards the male gender. The 4 cases of Thyroglossal cysts (see Figure 4) showed no gender bias but again 11-16-year-old age group was primarily affected. Lastly, congenital neural tube defects included 3 cases of meningocele (see Figure 5) and 3 cases of meningomyelocele (Figure 6), with the only set of diseases showing a notable predominance in female patients.

Table 1: Distribution of diseases between genders

Diseases Name	Male	Female	Percentage	Total
Appendicitis	23	2	50%	25
Hirschsprung's Disease	8	2	20%	10

Osteomyelitis	3	2	10%	5
Thyroglossal Cyst	2	2	8%	4
Meningocoele	1	2	6%	3
Meningomyelocele	1	2	6%	3
Total	38	12	100%	50

Table 2: Distribution of diseases between age groups

Diseases Name	0 to 5 Years	6 to 10 Years	11 to 16 Years	Total
Appendicitis	2	5	18	25
Hirschsprung's Disease	10	-	-	10
Osteomyelitis	2	-	3	5
Thyroglossal cyst	-	1	3	4
Meningocele	3	-	-	3
Meningomyelocele	3	-	-	3
Total	19	6	25	50

Table 3: Comparison of surgical vs. histopathological diagnosis

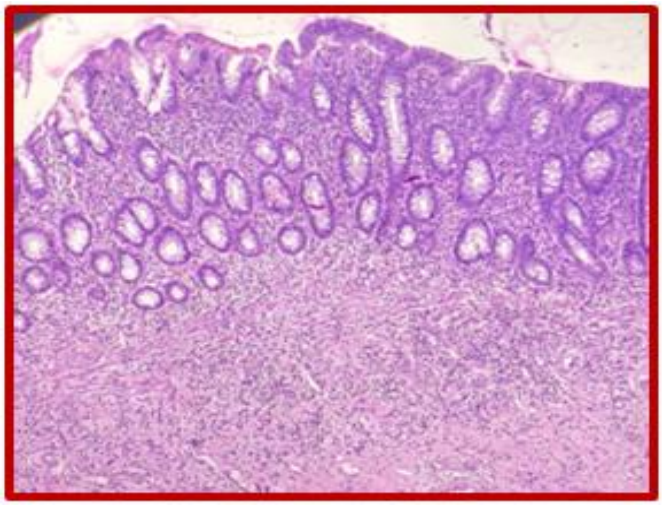
Surgical diagnosis	Histopathological diagnosis
Appendicitis (n=25 cases)	1) Acute appendicitis (n=21) and 2) Chronic appendicitis (n=4)
Hirschsprung's Disease (n=10 cases)	Hirschsprung's Disease (n=10)
Osteomyelitis (n=5 cases)c	Acute (n=2) and Chronic(n= 3)
Thyroglossal cyst (n=4 cases)	Thyroglossal cyst (n=4 cases)
Meningomyelocele (n=3 cases)	Meningomyelocele (n=3 cases)
Meningocele (n=3 cases)	Meningocele (n=3 cases)

Figure 1: Appendicitis

A: Appendix with peri appendiceal fat.

External surface: congested.

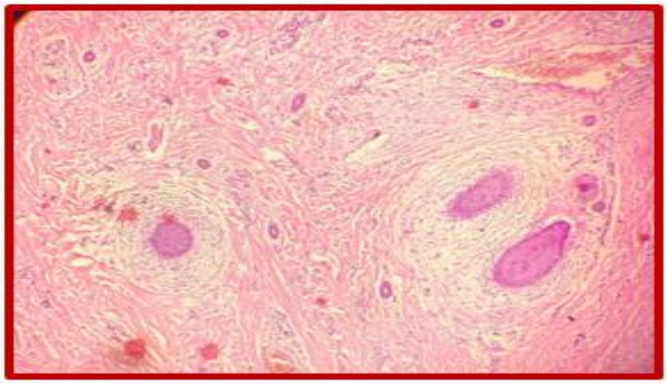
Cut surface: lumen identified.



B: All layers of appendix show dense mixed inflammatory infiltrate (H&E10x).

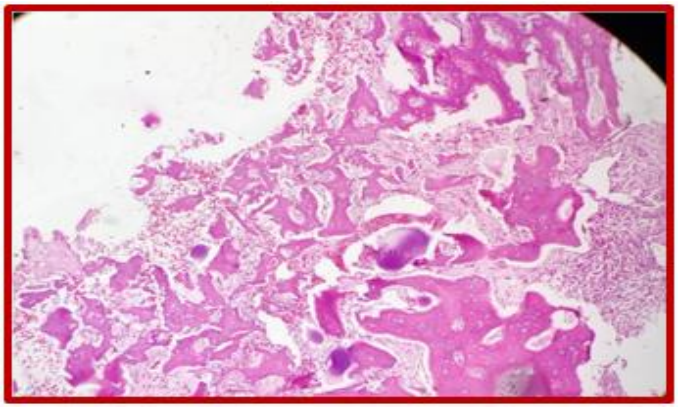
Figure 2: Hirsphsprung's Disease

A: Single, mucosa covered bowel segment measuring 27 cm and dilated at one end.



B: Distal segment of intestine shows absence of ganglion cells in nerve bundle (aganglionic segment) (H&E 10x).

Figure 3: Osteomyelitis



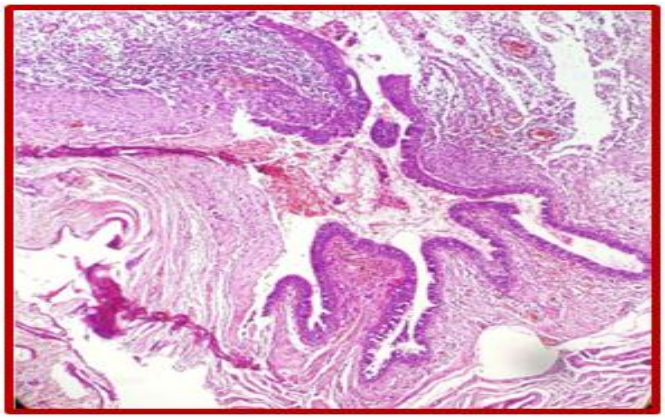
Necrotic and viable bony trabeculae with inter-trabeculae spaces shows dense inflammatory cell (H&E 10x).

Figure 4: Thyroglossal Cyst

A: Single, grey-brown tissue with attached cyst wall.

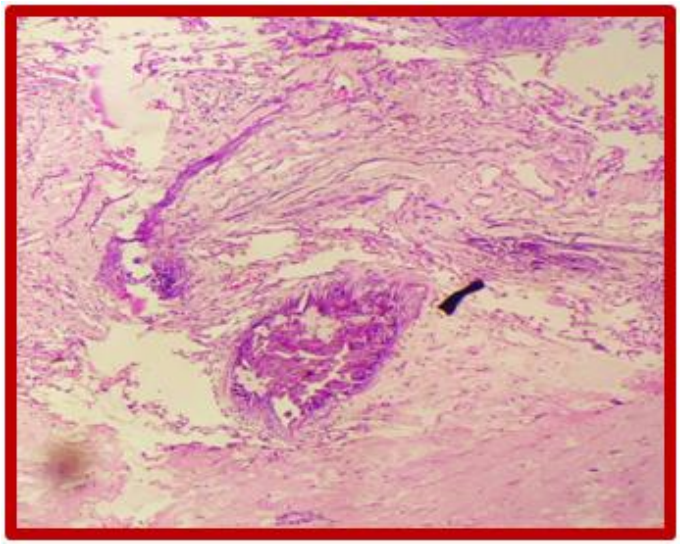
Maximum wall thickness: 0.3 cm.

Cut surface: tract inked.



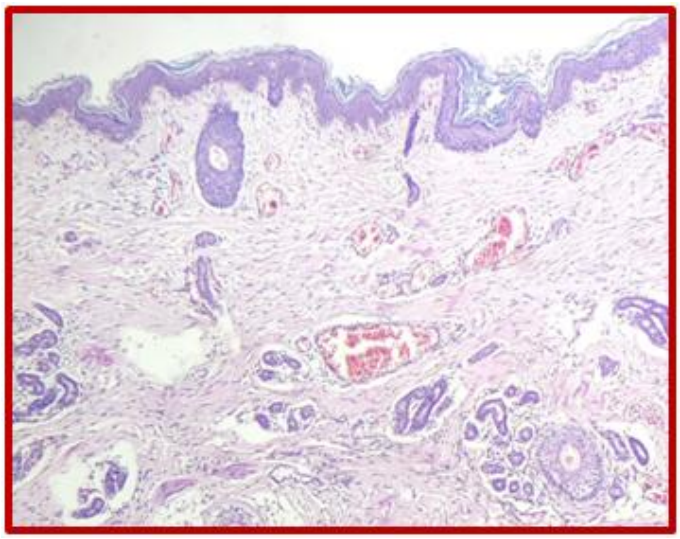
B: Cyst wall lined focally by ciliated pseudo stratified columnar epithelium and also by inflammatory granulation tissue resting on fibrous stroma (H&E 10x).

Figure 5: Meningocele



Meninges are seen. Thick fibrous dura mater with vascular arachnoid and pia mater (H&E 10x).

Figure 6: Meningomyelocele



Underlying area shows neutral tissue along with inflammatory granulation tissue (H&E 10x).

Discussion

In this study, we observed several noteworthy patterns and outcomes that shed light on the surgical-pathological aspects of pediatric conditions. Our findings revealed that males were more affected (76%) than females (24%). Acute appendicitis (21 cases) emerged as the most prevalent lesion in pediatric patients presenting with acute abdominal pain. Hirschsprung's disease (10 cases)

followed closely, with definitive diagnoses achieved in 10 cases. We identified four cases of Thyroglossal duct cysts, primarily presenting as midline neck swelling. Differential diagnosis of Thyroglossal cyst is a branchial cyst where histopathology plays an important role in definitive diagnosis, although good diagnostic imaging techniques like MRI are available.Five cases were diagnosed with osteomyelitis, emphasizing the importance of histopathological examination. Notably, two cases showed positive growth for Staphylococcus aureus and Pseudomonas sp. on pus culture, underlining the infectious nature of these pediatric bone conditions. Meningomyelocele (3 cases) and meningocele (3 cases), congenital neural tube defects, manifested in our study with distinct clinical presentations. Predominance among female patients is observed.

In a clinicopathological study of 443 cases done by KonukuVenkata et al [4]analyzed major specimens of appendicitis (372 cases) followed by Hirschsprung's disease (31 cases) specimens. In our study, Appendicitis (25 cases, 50%) and Hirschsprung's (10 cases, 10%).

Shah R. et al[10] identified out of 34 cases, a higher incidence of thyroglossal cysts in females (22 cases, 71%) and males (9 cases, 29%) whereas in our study equal predominance was found in both males (2 cases) and females (2 cases).

Karbagli et al [9]studied 34 cases of meningomyelocele and 9 cases of meningocele, of which 20 were males and 24 were females (females to male ratio is 1.2 to 1). Similarly, in our study females were more commonly affected than males.

Conclusion

In conclusion, our observational study has provided knowledge of the spectrum of lesions encountered in the pediatric age group at our institute. The collaborative approach of integrating imaging diagnostic techniques with detailed histopathological examinations has proven significant in characterizing and diagnosing diverse pediatric conditions. In conclusion, we want to state that our study population is smaller and the analysis of more cases provides in-depth knowledge on a spectrum of those lesions.

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