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A Case Series On Foregut Duplication Cysts In Children Aged 2–4 Years: Clinical Insight And Surgical Management

Dr. Dhananjay Talaviya[1] (PG Resident), Dr. Shyam Bihari Sharma[2] (Professor), Dr. Shaik Hussain[3] (PG Resident)

Abstract
Background & Methods:
Foregut duplication cysts are rare congenital malformations found in the esophagus, stomach, or duodenum. This prospective study reports four cases of foregut duplication cysts in children aged 2–4 years admitted to the pediatric surgery unit. Each underwent clinical evaluation, imaging, surgical excision, and histopathological analysis.
Results:
Out of four cases, two were esophageal duplication cysts, one was a gastric duplication cyst, and one was a duodenal duplication cyst. All patients underwent complete surgical excision with no postoperative complications. Histopathology confirmed the diagnosis in each case.
Conclusion:
Early diagnosis and surgical intervention result in excellent outcomes. Esophageal cysts appear more common in this age group. Multimodal imaging and histopathological confirmation remain the gold standards for diagnosis.
Keywords: *Foregut, duplication cyst, congenital, pediatric, esophageal, gastric, duodenal.*

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I. Introduction

Foregut duplication cysts are rare developmental anomalies arising from the embryonic foregut. They usually present in early childhood and may cause respiratory or gastrointestinal symptoms depending on their location. The clinical manifestations are often nonspecific, making early diagnosis challenging. Surgical resection is the treatment of choice to prevent complications such as infection, bleeding, or malignant transformation.

II. Aim

To document the clinical presentation, diagnosis, and surgical outcomes of foregut duplication cysts in children aged 2–4 years.

III. Material And Methods

This prospective case series included four pediatric patients aged between 2 and 4 years. Informed written consent was obtained from the guardians. Evaluation included detailed history, physical examination, ultrasound, contrast-enhanced CT/MRI, and surgical excision. Histopathological confirmation followed.

Inclusion Criteria:
- Children aged 2–4 years
- Diagnosed with foregut duplication cyst
- Underwent surgical excision

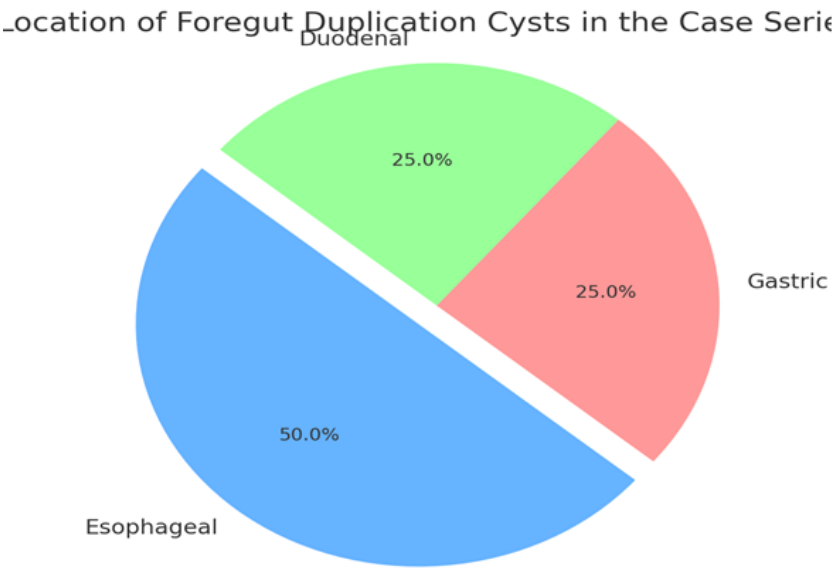
Exclusion Criteria:
- Cystic lesions of non-foregut origin
- Incomplete imaging or surgical data

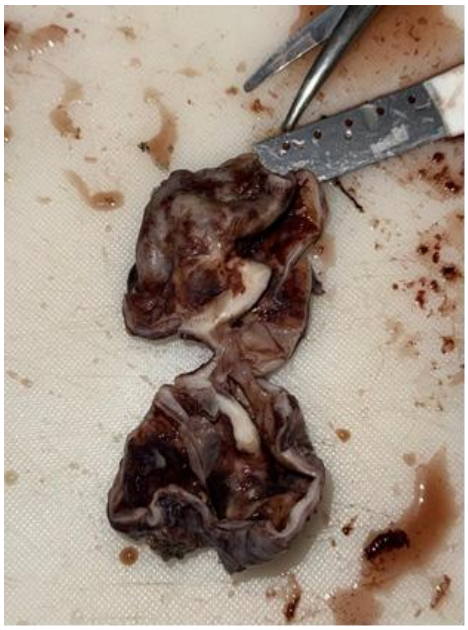
IV. Results

Table 1: Summary of Cases

Case	Age	Gender	Cyst Location	Symptoms	Imaging Modality	Histopathology Finding	Outcome
1	2	Male	Gastric	Vomiting, failure to thrive	CT + Ultrasound	Gastric mucosa-lined cyst	Recovered well
2	3	Female	Esophageal	Chronic cough, wheezing	MRI	Ciliated epithelium lining	Recovered well
3	4	Male	Duodenal	Pain, constipation	Ultrasound + CT	Gastric ectopic mucosa	Recovered well
4	2.5	Female	Esophageal	Dysphagia, weight loss	Endoscopic Ultrasound	Squamous epithelium-lined cyst	Recovered well

Figure 1: Distribution of foregut duplication cyst types in children aged 2–4 years.





Excised specimen from one of the patient

V. Discussion

Fore gut duplication cysts represent an uncommon subset of gastrointestinal tract duplications arising from aberrant development of the primitive fore gut during embryo-genesis. These cysts exhibit distinctive embryological, anatomical, histopathological, and clinicoradiological characteristics that make them a subject of interest to both surgeons and pathologists.[1,2] The earliest reports of fore gut cysts date back to the 18th century, emphasizing their longstanding recognition in medical literature.[3]

Foregut duplication cysts can occur anywhere along the foregut derivatives, including the esophagus, stomach, duodenum, and occasionally respiratory tract structures due to shared embryological origin.[4,5] Histologically, these cysts are defined by the presence of a lining epithelium derived from the foregut—commonly respiratory or gastric epithelium—surrounded by a well-developed smooth muscle layer mirroring the native gastrointestinal wall.[6,7] This histological architecture is critical for diagnosis and distinguishes these cysts from other mediastinal or abdominal cystic lesions.

Clinically, these cysts are most frequently diagnosed in infancy or early childhood but may remain asymptomatic until adulthood, when they can present as incidental masses or cause symptoms related to mass effect or complications.[8,9] Symptomatology is variable and largely dependent on the cyst's size and anatomical location. Common presentations include dysphagia, respiratory distress due to compression of the trachea or bronchi, chest pain, or abdominal discomfort if located more distally.[10] Complications such as infection, hemorrhage, rupture, or even malignant transformation, though rare, have been documented and warrant prompt surgical intervention.[11,12]

Radiological imaging plays a pivotal role in diagnosis. Ultrasonography typically reveals an anechoic or hypoechoic cystic lesion with characteristic wall layering, often described as a "gut signature" due to the visible mucosal and muscular layers.[13] Computed tomography (CT) and magnetic resonance imaging (MRI) further aid in anatomical localization and assessment of relationships with adjacent structures, which is essential for surgical planning.[14] Prenatal ultrasonography has improved early detection rates, allowing for timely management strategies in neonates and infants.[15]

Management of foregut duplication cysts primarily involves complete surgical excision to alleviate symptoms and prevent complications. In asymptomatic patients, especially when cysts are discovered incidentally, the decision for surgery is individualized, balancing risks of intervention against potential future complications.[16] Intraoperative findings often reveal that these cysts share a common blood supply and wall with the adjacent alimentary tract, necessitating careful dissection to avoid damage to native structures.[17]

The prognosis following surgical removal is generally excellent, with low recurrence rates reported.[18] Differential diagnoses include bronchogenic cysts, neuroenteric cysts, and other mediastinal cystic lesions, which can be distinguished based on location, epithelial lining, and associated clinical features.[19] Histopathological examination remains the gold standard for definitive diagnosis.

In conclusion, foregut duplication cysts, though rare, should be considered in the differential diagnosis of cystic lesions in the mediastinum and upper abdomen, particularly in pediatric patients presenting with respiratory or gastrointestinal symptoms. Early recognition and surgical management are critical for preventing complications and ensuring favorable outcomes.

VI. Conclusion

Fore gut duplication cysts are rare congenital anomalies that arise due to aberrant embryological development of the primitive fore gut. They can occur anywhere along the fore gut-derived structures—most commonly in the esophagus and stomach—and are typically identified in early childhood. Their clinical presentation is highly variable and often depends on the cyst's size, location, mucosal lining, and whether it exerts a mass effect on adjacent organs. Symptoms may range from asymptomatic incidental findings to respiratory distress, gastrointestinal obstruction, vomiting, dysphagia, or recurrent infections.

Given their nonspecific presentation, a high degree of clinical suspicion is crucial, especially in young children with unexplained respiratory or gastrointestinal symptoms. Imaging modalities such as ultrasonography, contrast-enhanced CT, MRI, and endoscopic ultrasound are invaluable in characterizing these lesions, assessing their relationship to surrounding structures, and aiding surgical planning.

Histopathologically, these cysts are typically lined with fore gut-type epithelium, and may contain ectopic tissue such as gastric or pancreatic mucosa, which can lead to complications including ulceration, bleeding, or even perforation.

Early and accurate diagnosis, followed by complete surgical excision, is the gold standard of treatment and results in excellent outcomes. The surgical approach should be individualized based on the anatomical complexity and proximity to vital structures. Minimally invasive techniques, when feasible, can reduce recovery time and postoperative morbidity.

In summary, fore gut duplication cysts, though uncommon, should be considered in the differential diagnosis of pediatric patients with persistent or unexplained thoracoabdominal symptoms. Multidisciplinary

evaluation and timely intervention are critical for ensuring optimal patient outcomes and preventing serious complications.

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