Journal of
Medical Case Reports

CASE REPORT Open Access

Gastric teratoma in a 7-month-old infant: a case report and review of the literature

Turyalai Hakimi[1*], Sultan Ahmad Halimi[2] and Mohammad Anwar Jawed[1]

Abstract

Background Gastric teratomas are exceedingly rare neoplasms, predominantly affecting male infants and constituting less than 1% of all teratomas. Prenatally, their rapid growth can lead to fetal distress syndrome. Postnatally, they may manifest as vomiting or gastric outlet obstruction; however, some cases present as a slowly enlarging abdominal mass without gastrointestinal symptoms.

Case presentation We report the case of a 7-month-old Afghan infant with an asymptomatic abdominal mass. At 3 months of age, a small abdominal mass was noted; however, due to financial constraints, the parents delayed seeking specialized diagnostic and treatment services. At 6 months, as the mass enlarged, the patient was admitted to our pediatric surgery department. In addition to the physical examination, routine and biochemical laboratory tests were performed. Ultrasonography and computed tomography had already been conducted, revealing an abdominal mass with mixed solid, calcified, and cystic components. Laboratory results indicated leukocytosis with anemia. The infection and anemia were managed with broad-spectrum antibiotics and hematinics. The entire course of conservative treatment and preoperative preparation lasted 1 month, by which time the patient had reached 7 months of age. A midline incision was made, and the mass, which was adherent to the greater curvature and gastric fundus, was completely and intactly resected. The stomach was repaired in two layers, and the surgery proceeded without complications. Histological examination revealed mature tissues, including teeth, hair, and bone. Serum alpha-fetoprotein level was within normal limits, confirming the lesion's mature nature. The patient was discharged in good health. Follow-up evaluations were conducted at 3 and 6 months postoperatively, during which no complications or concerns were observed.

Conclusion Gastric teratomas are predominantly mature; however, immature variants do occur in clinical practice. In pediatric patients, especially neonates and infants, teratomas should be considered in the differential diagnosis of abdominal masses. Early management, including tumor marker analysis—particularly serum alpha-fetoprotein levels—and regular follow-up, is essential for favorable outcomes.

Keywords Teratoma, Gastric, Mass, Mature, Fundus, Curvature

Introduction

Gastric teratoma (GT) is an uncommon form of teratoma, comprising less than 1% of all pediatric teratomas. These tumors may be either benign or malignant [1]; however, they are the most frequently reported teratomas of the gastrointestinal (GI) tract [2]. The first documented case of GT was reported by Eustermann and Sentry in 1922. Since its initial identification, fewer than 200 cases have been described in the available English

*Correspondence:
Turyalai Hakimi
dr.turyalaihakimi@gmail.com
[1] Department of Pediatric Surgery, Kabul University of Medical Science, Maiwand Teaching Hospital, Kabul, Afghanistan
[2] Department of Pathology, Kabul University of Medical Science, Ali Abad Teaching Hospital, Kabul, Afghanistan

medical literature [3]. In children, they predominantly affect infants and exhibit distinct characteristics, including a strong male predilection and a typical presentation as an abdominal mass. The syndromic associations of GT remain poorly documented. In most cases, these tumors are benign [4]. Given their rarity, there is limited literature on their clinical presentation, progression, and natural history.

Case presentation

A 7-month-old male Afghan infant, weighing 9 kg, was admitted to the Pediatric Surgery Department of our teaching hospital due to an abdominal mass. The family history was unremarkable, with all five siblings in good health.

At 3 months of age, the parents noticed an abdominal lump. However, due to financial constraints and residing in a remote eastern province, they delayed seeking medical attention for more than 3 months. Conservative treatment was completed over a 1-month period, and surgical intervention was performed when the patient was 7 months old.

Upon admission, the patient appeared well, with a mass occupying all four quadrants of the abdomen. Alongside the physical examination, routine and biochemical laboratory analyses were carried out. Ultrasonography (USG) and computed tomography (CT) scans (Fig. 1A and B) had previously been performed, identifying an abdominal mass characterized by mixed solid, calcified, and cystic elements, displacing the bowel to the left upper quadrant. Laboratory tests indicated leukocytosis and anemia. Initial treatment included broad-spectrum antibiotics—ceftriaxone at the dosage of 100 mg/kg intravenously twice daily for 1 week—and a blood transfusion of 15 ml/kg of compatible fresh blood. Persistent leukocytosis necessitated the addition of amikacin at the dosage of 15 mg/kg intravenously twice daily for an additional week, resulting in significant improvement and resolution of infection. Following the completion of antibiotic therapy, anemia treatment required an additional 2 weeks, resulting in a total duration of 1 month for the conservative management.

Given the mass's size, midline incision was performed to access all abdominal quadrants. The lesion, attached to the gastric fundus and greater curvature, was excised intact (Fig. 2A and B), and the stomach was repaired in two layers. A nasogastric tube was positioned into the duodenum. The excised mass weighed 3 kg, and upon dissection, exhibited cystic features with calcified elements such as bone, hair, and teeth (Fig. 2C). The patient tolerated the surgery well. Oral intake commenced on postoperative day 5, progressing to breastfeeding and a soft diet the following day. The antibiotic regimen of ceftriaxone, amikacin, and metronidazole at the dosage of 7.5 mg intravenously three times daily (surgical prophylaxis) was maintained throughout the hospital stay. Histopathological examination confirmed a mature teratoma (Figs. 3A and B, 4A and B), and serum alpha-fetoprotein (AFP) level was normal (5 ng/ml), corroborating the diagnosis.

Discussion and conclusion

Intraabdominal masses are relatively common during the neonatal period, occurring in approximately 1 in every 1000 live births. Among these, germ cell tumors, including teratomas, constitute around 9% of all intraabdominal tumors in children. Teratomas arise from precursor totipotent stem cells and represent the most prevalent

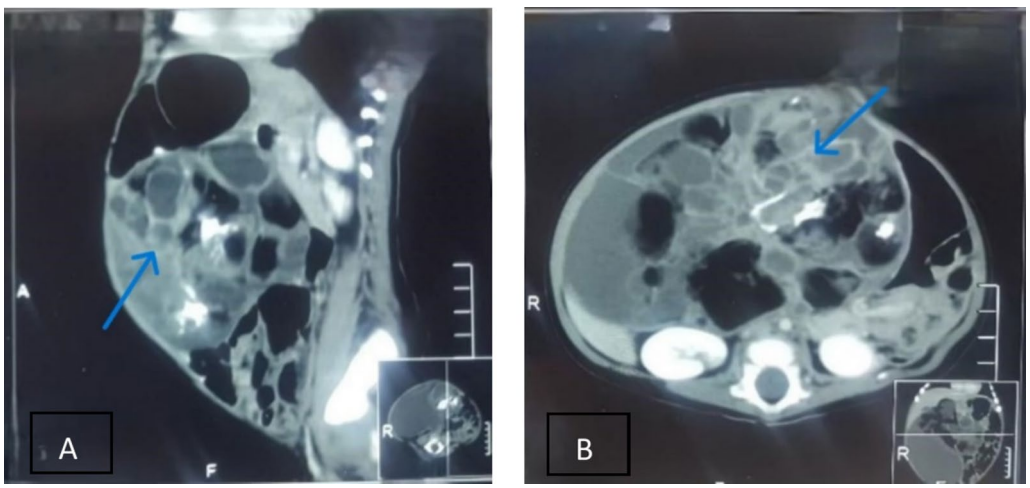

Fig. 1 Lateral (**A**) and axial (**B**) views of a gastric teratoma, illustrating a mass comprising both cystic and solid components (blue arrows)

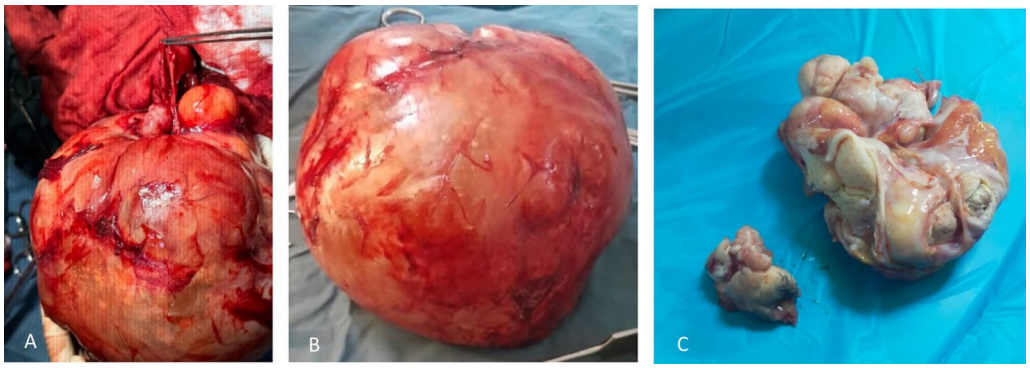

Fig. 2 Surgical excision of gastric teratoma. **A** Intraoperative image. **B** Completely excised mass displays a smooth, glistening external surface, resembling an exophytic growth. **C** Dissection of the mass revealed internal contents, including cystic and solid areas

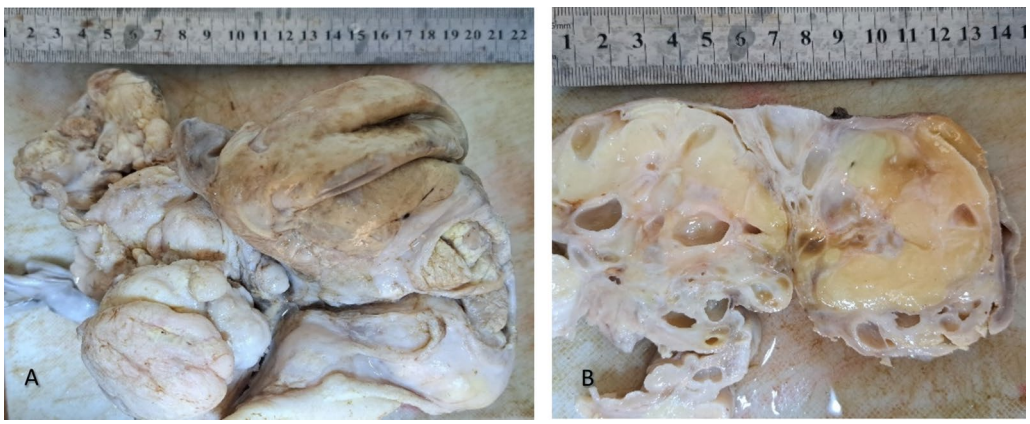

Fig. 3 Mature gastric teratoma. **A** Excised tumor presents an irregular surface. **B** Sectioned surface reveals both solid and cystic components, accompanied by mucinous secretions

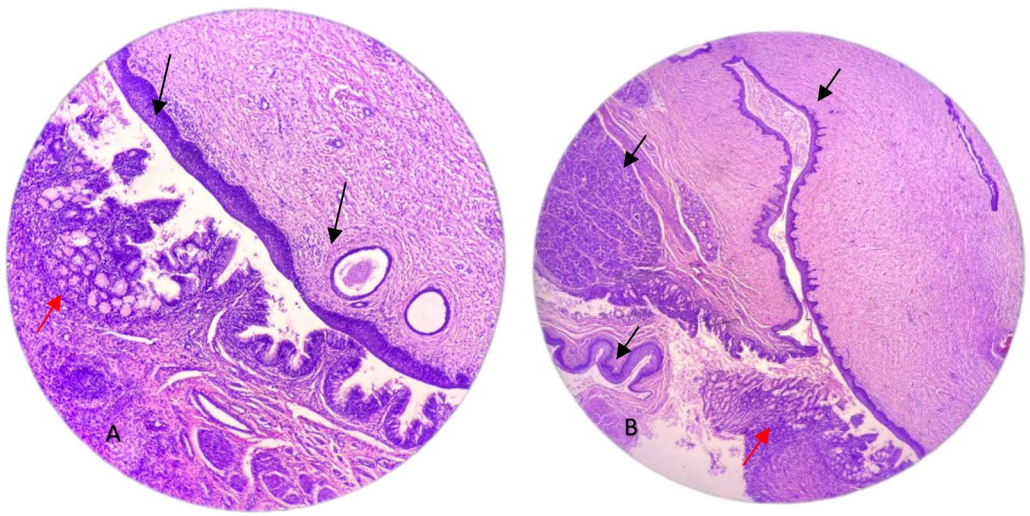

Fig. 4 Low-power histopathological images. **A** Mature gastric teratoma exhibits epidermal-type epithelium with adnexal skin structures (black arrow) and gastric mucosal glandular tissue (red arrow). **B** Tumor displays gastric mucosal lining, with red arrow indicating multiple mucinous glands and epidermal-type lining

type of germ cell tumor in pediatric patients. They may originate from either gonadal or extragonadal tissue, with extragonadal teratomas more frequently observed in younger children and gonadal tumors typically diagnosed in older individuals. The most common sites of extragonadal teratomas include the sacrococcygeal region (60–65%), followed by the mediastinum (5–10%), sacral area (5%), and less commonly, the intracranial, retroperitoneal, cervical, and alimentary regions. These tumors consist of various tissue types foreign to their site of origin and are typically detected during the neonatal period. Teratomas may be benign or malignant, as well as cystic or solid. While traditionally characterized by the presence of tissues derived from all three embryonic germ layers (endoderm, mesoderm, and ectoderm), contemporary classifications also recognize monodermal variants. [5]. GT is a rare extragonadal variant of germ cell tumor, predominantly benign, and accounts for less than 1% of all teratomas in infants and children. These tumors are most commonly observed in infancy, with the majority (94%) occurring during the neonatal period [6].

GT is categorized into three types: mature, immature, and teratomas with malignant transformation. Mature teratomas are considered benign and classified as grade 0, characterized by well-differentiated tissues derived from all three germinal layers. In contrast, immature teratomas contain embryonic or immature-appearing neuroglial and neuroepithelial components, with varying degrees of immature fetal tissues. These tumors are graded from 1 to 3 on the basis of the proportion of immature tissue, primarily neural elements, and mitotic activity, as per the Norris grading system. In grade 1, immature neuroectodermal tissue is limited to a single site on a slide. In grade 2, it is present in fewer than four fields per slide, whereas in grade 3, it is found in more than four fields per slide. Due to the malignant potential of immature teratomas, histopathological evaluation is crucial to identify microfoci of yolk sac tumor. In the absence of such findings, only close monitoring is recommended. Malignant teratomas contain at least one malignant germ cell component, with the term "malignant teratoma" specifically referring to cases involving yolk sac tumor or choriocarcinoma [7].

GT commonly presents with symptoms such as an abdominal mass, distension, and vomiting. However, cases involving intramural extension have been documented, leading to GI bleeding and gastric perforation [8]. Approximately 75% of cases present with a palpable abdominal mass, whereas abdominal distension is observed in about 56% of cases [9]. Less frequently, complications such as peritonitis due to gastric perforation or tumor rupture may occur [10]. GT commonly arises from the greater curvature [8]; however, the cardiac orifice, fundus, lesser curvature, antrum, prepyloric region, anterior wall, and on rare occasions, the entire stomach, may be involved [11]. In terms of growth patterns, gastric teratomas (GTs) exhibit an exogastric presentation in 65% of cases, an endogastric growth pattern in 9%, and a combined endogastric-exogastric growth in 26% of reported cases [12].

The preoperative diagnosis of GTs remains challenging, as no single imaging modality serves as the gold standard. These tumors are most commonly identified through abdominal CT scans and, in some cases, USG. Additionally, reports indicate the use of X-rays and magnetic resonance imaging (MRI) as part of the diagnostic evaluation [13]. Extensive multiseptated cystic lesions featuring coarse calcifications and regions of fat attenuation originating from the stomach can serve as valuable radiological indicators, similar to those observed in other teratomas. Contrast-enhanced computed tomography (CECT) will further add to the accuracy of the diagnosis by, revealing the extent, origin, and relationship of the lesion with the great vessels [11].

Clinico-radiologically, GT presents with several potential differential diagnoses, including nephroblastoma, neuroblastoma, gastrointestinal stromal tumor (GIST), rhabdomyosarcoma, and liposarcoma [14]. Determining the levels of AFP and beta-human chorionic gonadotropin (β-hCG) is crucial for postoperative identification of the possible presence of residual tumor or recurrence of the disease. In the cases of immature teratomas, scheduled follow-up with abdominal USG and AFP analysis is advisable [15].

Surgical resection is the primary treatment for GT, while chemotherapy is reserved for cases involving additional malignant germ cell components. Given the predominantly exophytic nature of these tumors, the standard surgical approach typically involves excision with a small gastric wedge resection. However, literature also reports cases managed with more extensive procedures, such as subtotal or total gastrectomy. There is no established consensus on the minimum surgical margin required, though it is generally accepted that achieving negative margins in postoperative histopathological evaluation is sufficient. This perspective is supported by other authors who emphasize the importance of complete resection with negative margins [16].

The present case involved an otherwise healthy child with an asymptomatic abdominal mass localized to the greater curvature of the stomach, consistent with findings in the literature [8]. The tumor exhibited a completely exophytic growth pattern, necessitating complete excision followed by gastroplasty. The AFP level was within the normal range, which guided the treatment plan and eliminated the need for further surveillance,

considering the predominantly benign nature of GT [6]. The patient came from a remote northeastern province, where limited access to healthcare facilities and the family's low economic status contributed to delays in seeking specialized pediatric surgical care, allowing the lesion to grow unexpectedly. Additionally, the absence of upper or lower GI symptoms may have further contributed to the delayed hospital admission.

Abbreviations

GT	Gastric teratoma
GTs	Gastric teratomas
GI	Gastrointestinal
USG	Ultrasonography
CT	Computed tomography
AFP	Alpha-fetoprotein
β-hCG	Beta human chorionic gonadotropin
CECT	Contrast-enhanced computed tomography

Acknowledgements
Our surgical team would like to express their sincere gratitude to the entire pediatric surgery team for their collaborative efforts in ensuring optimal patient management.

Author contributions
TH conceptualized the manuscript, reviewed the literature, and wrote the original draft. SAH conducted pathological analysis. TH and MAJ performed the surgical procedure (laparotomy/excision). TH edited the manuscript, checked the validity, and supervised the entire study process. All the authors have read and approved the final manuscript.

Funding
This study was not supported by any sponsor or funder.

Availability of data and materials
The datasets used in the current article are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
No ethical concerns. Written consent was obtained from the patient's father.

Consent for publication
Written informed consent was obtained from the patient's legal guardian for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests
The authors declare that they have no competing interests.

Received: 2 April 2025 Accepted: 8 August 2025
Published online: 13 October 2025

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