

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Multimodal depiction of a rare immature gastric teratoma from fetus to infant

Angela J. Beavers, MD^a, Ambereen Khan, MD^b, Naseem Uddin, MD^c,
Devri L. Weakley, MD^b, Sasan Setoodeh, MD^c, Cory M. Pfeifer, MD, MS^{b,*}

^a Department of Radiology, University of Nebraska Medical Center, 42nd and Emile Omaha, NE 68198, USA

^b Department of Radiology, University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd Dallas, TX 75390, USA

^c Department of Pathology, University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd Dallas, TX 75390, USA

ARTICLE INFO

Article history:

Received 16 October 2018

Revised 2 December 2018

Accepted 3 December 2018

Available online 20 December 2018

Keywords:

Fetal MRI

Immature gastric teratoma

ABSTRACT

Immature gastric teratomas are rare gastrointestinal tumors. Presented here are imaging findings of this neoplasm which was first seen via antenatal ultrasound. Subsequent fetal magnetic resonance imaging demonstrated a partially calcified mass that contained areas of diffusion restriction. Meconium pseudocyst was originally entertained as a differential consideration. Follow-up computed tomography and upper gastrointestinal fluoroscopy after delivery revealed a bilobed mass that was at least partially endogastric. Resection was performed, and the diagnosis was uncovered via histologic analysis.

© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Teratomas are germ cell tumors that contain tissue elements derived from ectoderm, endoderm, and mesoderm. While teratomas are commonly encountered in the fetus and neonate, teratomas arising from the gastrointestinal tract are exceedingly rare and represent approximately 1% of childhood germ cell tumors [1]. Even rarer is the immature gastric teratoma,

as most of the gastric teratomas that have been reported have been mature teratomas. As of 2016, only 30 cases of immature gastric teratoma had been reported in the literature [2]. Immature gastric teratomas have malignant potential as opposed to mature gastric teratomas which are considered benign [2]. These tumors are more commonly seen in males and typically present during the first year of life [3].

Gastric teratomas may be endogastric or exogastric. Gastric teratomas with an endogastric component may present

Conflict of interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

* Corresponding author.

E-mail address: Cory.Pfeifer@utsouthwestern.edu (C.M. Pfeifer).

<https://doi.org/10.1016/j.radcr.2018.12.003>

1930-0433/© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

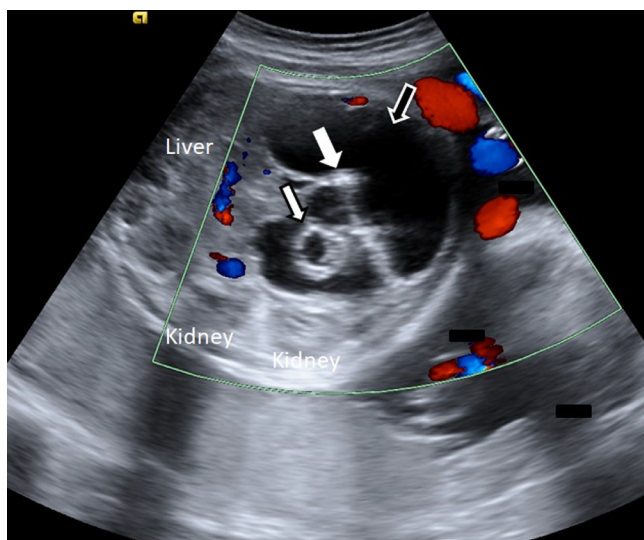


Fig. 1 – Neonatal ultrasound performed at 34 weeks, 4 days demonstrates a cystic mass in the left upper quadrant. The left portion of the mass is internally simple (black arrow with white outline). The right segment (white arrow with black outline) is more complex than the left. A hyperechoic focus in the center (solid white arrow) was interpreted as a calcification.

with gastrointestinal bleeding, obstruction, or as an abdominal mass, whereas those that are exogastric may be asymptomatic and present incidentally [3]. Surgical resection is the treatment of choice in these tumors which may require complete or partial gastrectomy [4]. These tumors rarely metastasize, though long-term follow-up is warranted given that recurrence can occur up to a decade postresection [4].

Case report

A 24-year-old gravida-5-pravida-2 female presented for a third-trimester pregnancy ultrasound at 34 weeks, 4 days for an anatomic survey. An ultrasound performed at 19 weeks was normal. Ultrasound revealed a complex cystic mass in the mid-abdomen with a larger simple cystic component in the left upper quadrant and a more complex cyst right of the midline (Fig. 1). Calcifications were apparent centrally within the cystic mass.

Fetal magnetic resonance imaging (MRI) was obtained the following day (34 weeks, 5 days) in which the simpler portion of the mass was found to be T2 hyperintense with the more complex portion again showing complex features on fetal MRI (Fig. 2). Differential considerations included an indeterminate abdominal mass and meconium pseudocyst. Of note, a normal distribution of colonic meconium on the T1-weighted images was observed (Fig. 2B).

The child was born at 38 weeks, 6 days. An abdominal radiograph acquired on the first day of life (Fig. 3A) showed scattered calcifications throughout the abdomen in a pattern commonly seen in meconium peritonitis, however, computed

tomography (CT) performed on the sixth day of life revealed a well-defined bilobed mass with internal calcifications (Fig. 3B). The kidneys and adrenal glands were shown to be separate from the mass. An upper gastrointestinal (GI) series was subsequently performed to plan for surgery (Fig. 4). Contrast circumscribed the right lobe of the mass, however, the left lobe of the mass was not outlined by contrast.

The mass was surgically resected (Fig. 5), and histologic analysis revealed an immature teratoma (Fig. 6). No malignant germ cell components were identified, and serum alpha fetoprotein (AFP) was assessed at the time of diagnosis. Subsequent imaging surveillance showed no recurrence, and the patient is being followed with serum AFP assessments and CT scans.

Discussion

This case may be the first published case of immature gastric teratoma demonstrated on fetal MRI. Though other authors have described gastric teratoma misdiagnosed as meconium peritonitis, shown here are findings on fetal MRI that can play an important role in suggesting the correct diagnosis. The ability to differentiate these 2 diagnoses is important because the neonatal management of meconium peritonitis/pseudocyst and gastric teratoma can be vastly different. Additionally, if the diagnosis is suggested preoperatively, a serum AFP level may provide clinical value and can be followed postoperatively to assess for recurrence [2].

Meconium distribution throughout the colon is dependent on gestational age, with T1 hyperintense signal progressively accumulating retrograde from the rectum at 20–22 weeks to the right hemicolon by 25–32 weeks [5]. In meconium peritonitis/meconium pseudocyst, there is often a disruption of the normal T1 hyperintense signal within the colon [5]. In our case, the fetus had a normal distribution of T1 hyperintense signal throughout the colon which suggests that the colon has not perforated to allow extravasation of meconium as commonly occurs with meconium pseudocyst formation.

Diffusion-weighted imaging can also provide clues to the diagnosis of gastric teratoma. As with other teratomas, diffusion restriction is common in highly cellular portions of the tumor. The fetal MRI, in this case, did demonstrate a small area of restricted diffusion within the complex lesion. Though diffusion restriction can be seen with other etiologies including abscess, hematoma, and other tumors, the absence of restricted diffusion may help support an alternative diagnosis such as meconium pseudocyst [6].

In this case, no clear gastric bubble was identified. Lack of a gastric bubble may not help differentiate a gastric teratoma from a meconium pseudocyst given that meconium pseudocysts can demonstrate mass effect on normal fetal structures and theoretically make identification of a gastric bubble difficult on fetal MRI. In the setting of a multicystic complex mass in the left upper quadrant, one should attempt to identify a stomach bubble because these tumors can exhibit endogastric or exogastric growth [3].

Neonatal radiographs interpreted in isolation may not provide sufficient information to distinguish a gastric teratoma

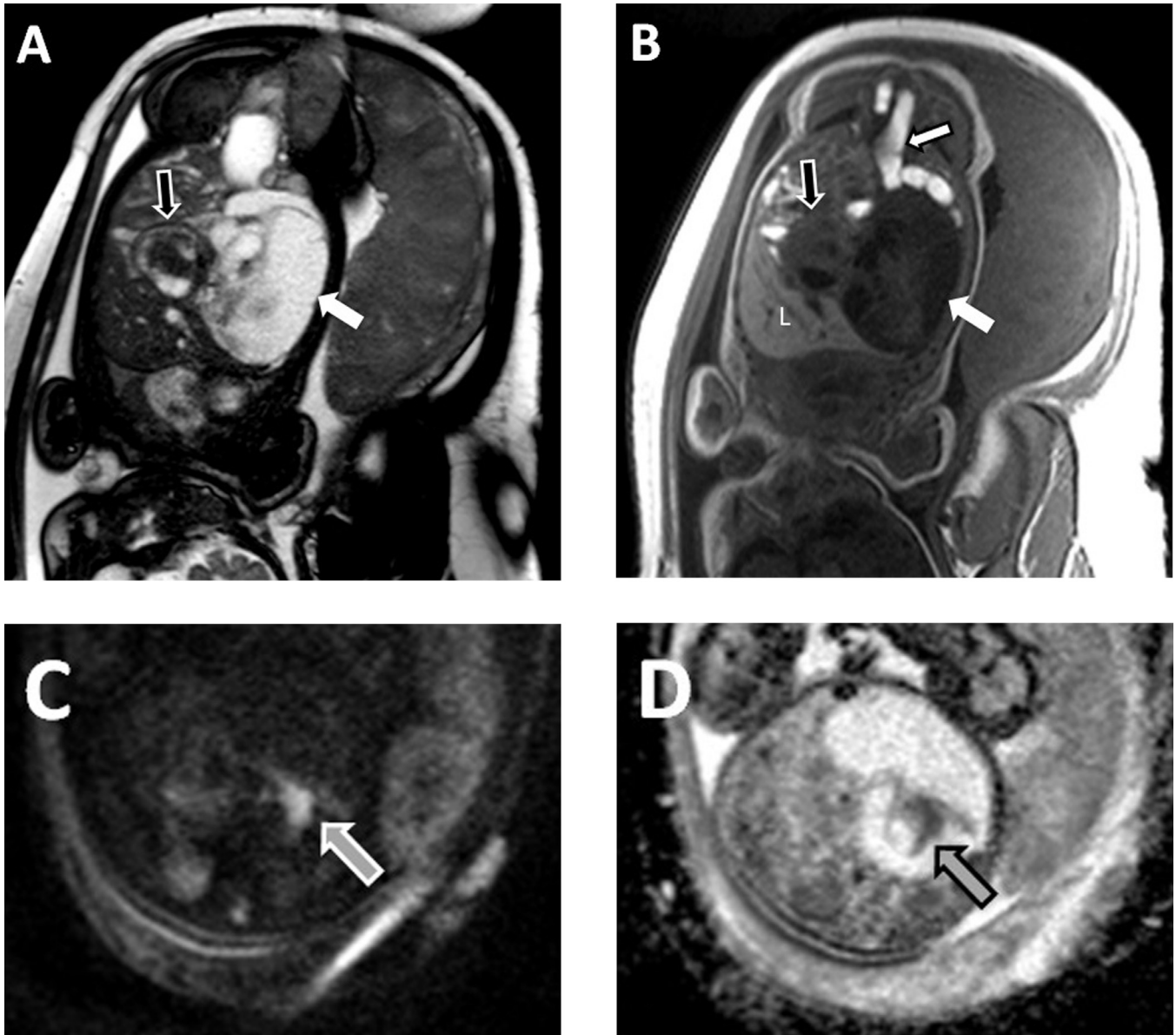


Fig. 2 – True FISP (A) and T1-weighted images (B) obtained in the fetal coronal plane depict the cystic portion of the mass in the left upper quadrant of the fetus (solid white arrow) and the more complex portion right of the midline (black arrow with white outline). A normal distribution of intracolonic T1 hyperintense meconium is visible in the sigmoid colon (white arrow with black outline). Diffusion-weighted imaging (C) and apparent diffusion coefficient (ADC) map (D) acquired in the fetal axial plane show diffusion bright signal within the mass (gray arrow with white outline) and associated hypointensity on ADC (gray arrow with black outline).

from meconium pseudocyst, as both can demonstrate scattered abdominal calcifications. CT images of the neonate may be of benefit in identifying an organ of origin as well as macroscopic fat. The presence of macroscopic fat may favor gastric teratoma over neuroblastic tumor, which would be a differential consideration for a calcified neonatal abdominal mass [2].

In conclusion, gastric teratoma is a rare tumor of the fetus, and MRI characteristics may assist in making the diagno-

sis and streamline neonatal care. If the diagnosis is suggested on fetal MRI, early CT of the neonatal abdomen can be suggested to assess for macroscopic fat, and tumor markers may be obtained preoperatively. The imaging appearance of gastric teratoma can mimic a meconium pseudocyst. Close attention on fetal MRI regarding meconium distribution and restricted diffusion within the mass may therefore help to differentiate between these 2 diagnoses.

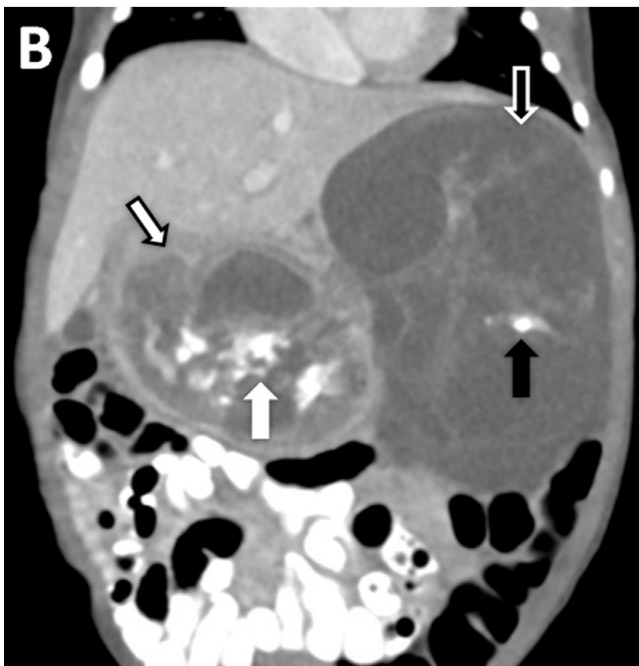
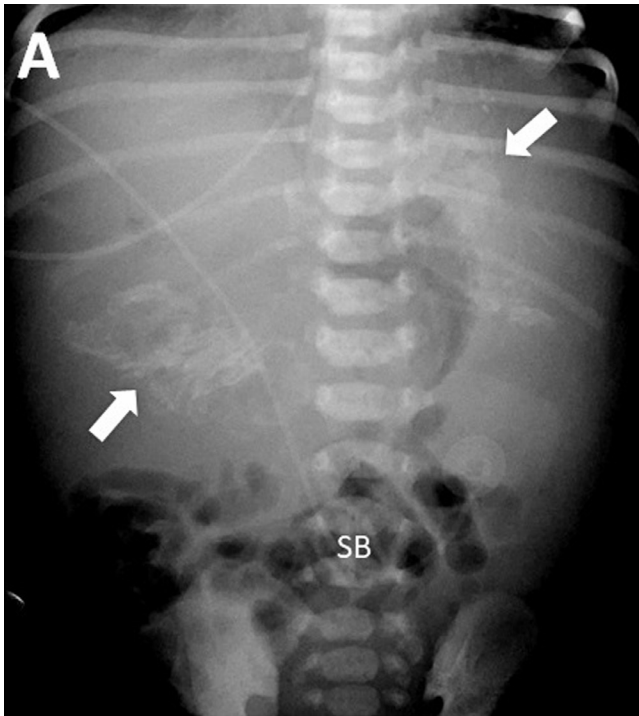


Fig. 3 – A supine abdominal radiograph of the abdomen (A) shows calcifications in the left upper quadrant and right abdomen (white arrows) with inferiorly displaced small bowel (SB) loops. Coronal reformatted image of a CT of the abdomen and pelvis (B) reveals the bilobed mass with a more solid component in the right abdomen (white arrow with black outline) and a predominantly cystic component in the left abdomen (black arrow with white outline). Calcifications (white arrow) are more extensive in the right aspect of the mass. The solid black arrow indicates a nasogastric tube.

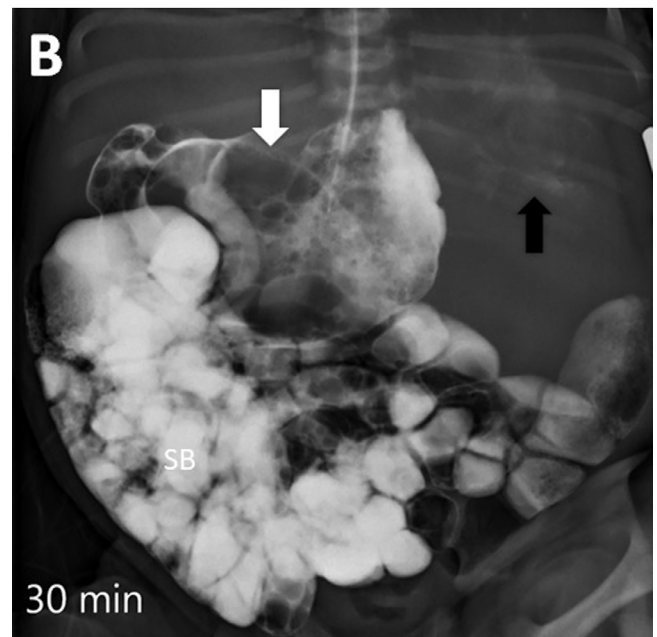
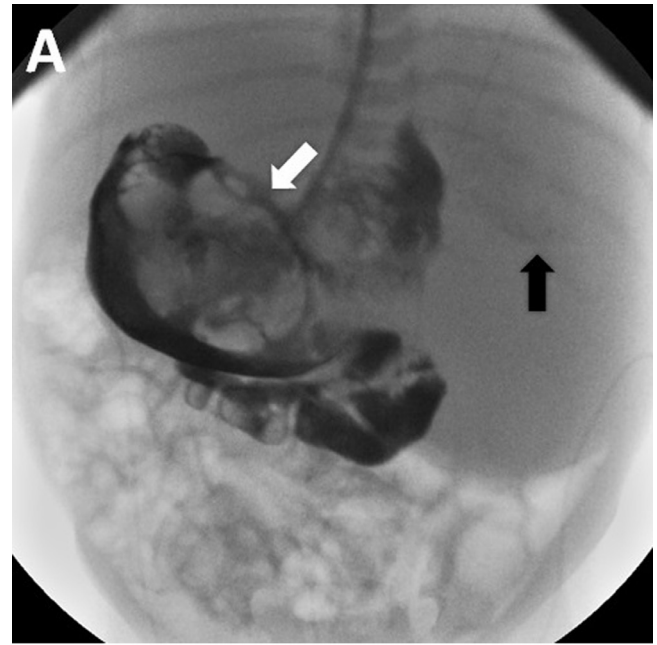


Fig. 4 – Initial upper GI fluoroscopic image capture (A) and 30-minute follow-through abdominal radiograph (B) depict intraluminal filling of the distal stomach around the complex right lobe (solid white arrow) of the mass, while the stomach fundus is not opacified. Calcifications within the left lobe of the mass remain apparent (solid black arrow). There is normal transit of contrast into the small bowel (SB).



Fig. 5 – Photograph of the mass following surgical resection. The mass is oriented in the same way as shown in Fig. 3B.

REFERENCES

- [1] Parvin S, Sengupta M, Mishra PK, Chatterjee U, Banerjee S, Chaudhuri MK. Gastric teratoma: a series of 7 cases. *J Ped Surg* 2016;51:1072–7.
- [2] Junhasavasdikul T, Ruangwattanapisarn N, Molagool S, Lertudomphonwanit C, Sirachainan N, Larbcharoensub N. Immature gastric teratoma in an infant: a case report and review of the literatures. *Clin Case Rep* 2016;4:962–7.
- [3] Singh S, Rawat J, Ahmed I. Immature extragastric teratoma of infancy: a rare tumour with review of the literature. *BMJ Case Rep* 2011;2011 bcr1220103674.
- [4] Saleem M, Mirza B, Talat N, Sharif M. Gastric teratoma: our 17 year experience. *J Pediatr Surg* 2018;53:234–6.
- [5] Furey EA, Bailey AA, Twickler DM. Fetal MR imaging of gastrointestinal abnormalities. *Radiographics* 2016;36:904–17.
- [6] Wong A, Toh C, Lien R, Chao AS, Wong HF, Ng KK. Prenatal MR imaging of a meconium pseudocyst extending to the right subphrenic space with right lung compression. *Pediatr Radiol* 2006;36:1208–11.

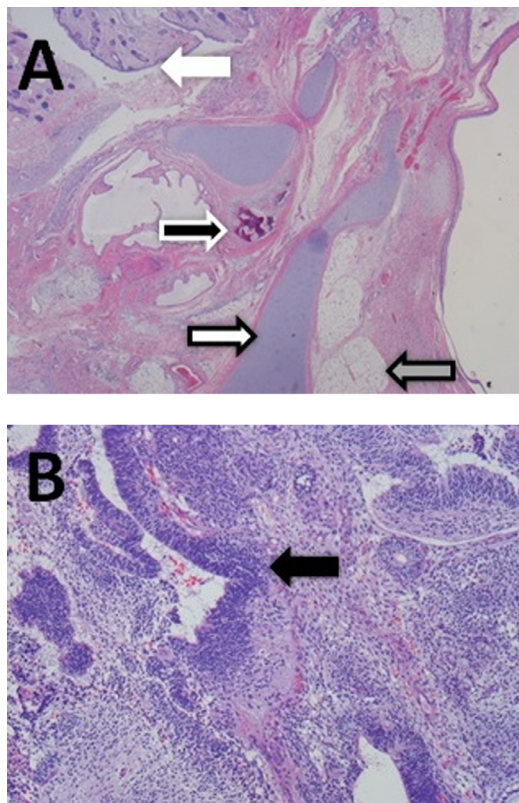


Fig. 6 – Low- and high-power (A: 20x, B: 200x) photomicrographs of the tumor. The low-power image (A) depicts skin (solid white arrow), cartilage (white arrow with black outline), fat (gray arrow with black outline), and bone (black arrow with white outline). Immature neuroepithelial elements with large hyperchromatic nuclei are indicated by the solid black arrow in (B).