

Case Report

Epithelioid malignant mesothelioma presenting with features of gastric tumor in a child

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Abstract: Localized malignant mesothelioma is very uncommon and mainly arises in pleura and peritoneum, and preferentially occurs in older adults. In this article, we report a case of a Localized malignant mesothelioma that was developed in the stomach of a 6-year-old boy. This boy was admitted to hospital for anemia. An epigastric mass was palpated through systemic physical examination and MR scanning demonstrated an 8×6 cm-sized, well-defined elliptic mass at gastric corpus. Partial resection of the stomach was performed for this boy and no nodules were found on the liver, peritoneum, and other abdominal sites in surgery. In view of the morphological and immunohistochemical findings, a diagnosis of localized malignant mesothelioma, epithelial type was made. This is the first case report of localized malignant mesothelioma arising in the stomach of a child. Accumulation of more cases of malignant mesothelioma involving gastrointestinal tract and longer follow-up of the patients are necessary to further characterize the features of this rare disease.

Keywords: Localized malignant mesothelioma, stomach, child

Introduction

Malignant epithelioid mesothelioma is most commonly seen as a diffuse neoplasm, but although extremely rare, localized epithelioid mesothelioma (LMM) does occur, generally in pleura and peritoneal cavity with relative elder people [1]. Cases have been reported that primary LMM occasionally develops in solid organs, such as lung, gonads, liver and pancreas [2]. Here we report a case of primary LMM presented with a gastric mass in a 6-year-old boy. To the best of our knowledge, this is the first report of LMM presenting as a stomach tumor.

Case report

A previous healthy 6-year-old boy, who lacked any known history of asbestos exposure, was admitted to our hospital for anemia. An epigastric mass was palpated through systemic physical examination, and this finding was confirmed by a subsequent magnetic resonance (MR) of the abdomen. MR scanning demonstrated an

8×6 cm-sized, well-defined elliptic mass at gastric corpus (**Figure 1**). The laboratory test showed his hemoglobin was 85 g/L, the liver, kidney function tests and tumor markers were within normal limits. Gastroscopic examination found a large well-defined submucosal mass with central ulceration at gastric mucosa. Biopsy was carried out and led to a diagnosis of malignant epithelial tumor. A detailed physical examination and chest CT revealed no other metastatic or primary lesions. Given the clinical concern for a gastric malignancy, partial resection of the stomach was performed. There are no nodules on the liver, peritoneum, and other abdominal sites on gross inspection in surgery.

Surgically resected materials from stomach were obtained as indicated in **Figure 2**. On gross inspection, the stomach contained an 8×6×5 cm well-circumscribed, submucosal mass with a large central ulceration at gastric mucosa (**Figure 2A**). The cross-section of mass was pale-white and solid (**Figure 2B**). Microscopically, infiltrative growth and partly-defined margin were observed (**Figure 3A**), and

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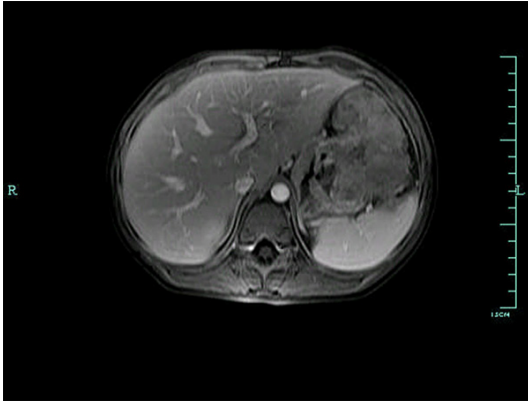


Figure 1. An abdomen MR examination showed a well-defined elliptic tumor arising from the submucosa at gastric corpus with the size of 8*6 cm.

the serosa was not involved. The tumor cells arranged in adenoid, tubulopapillary (**Figure 3B**) and solid pattern (**Figure 3C**). The neoplastic cells contained abundant eosinophilic cytoplasm, coarse nuclei with prominent nucleoli, mitoses and necrosis were frequent (**Figure 3D**). The tumor was evaluated using a panel of immunohistochemical markers at the dilutions enumerated in **Table 1**, and immunohistochemical findings supported the mesothelial cell origination. It was strongly positive for cytokeratin (AE1/AE3) (**Figure 4A**), vimentin and WT-1, focally positive for D2-40 (**Figure 4B**), calretinin (**Figure 4C**), mesothelin (**Figure 4D**), CK5/6 and epithelial membrane antigen (EMA). In contrast, the tumor were consistently negative for C-Kit (CD117), CDX-2, carcinoembryonic antigen (CEA), CD45, S-100, smooth muscle actin (SMA), Desmin, CD34 and alpha-1-fetoprotein (AFP). Combining morphologic and immunohistochemical features a diagnosis of the localized malignant mesothelioma, epithelial type was made.

The patient had an uneventful postoperative course and was discharged in stable condition. He received no adjuvant therapy and remained well and disease-free 6 months after resection of the tumor.

Discussion

Localized malignant mesotheliomas are uncommon sharply circumscribed tumors of the serosal membranes with the microscopic appearance of diffuse malignant mesothelioma but without any evidence of diffuse spread

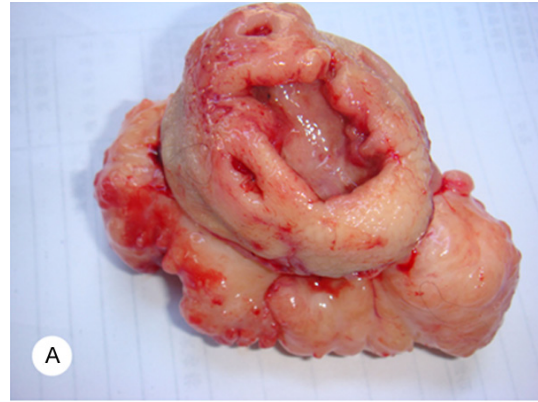


Figure 2. Gross appearance of the resected tumor. A: The tumor was well-defined and arisen from the submucosa with a central ulceration. B: The cut-surface appeared grayish-white and solid.

[3]. Since Crotty et al first described a series of 6 cases in 1994 [4], there are only a few cases reported in English literatures and the largest groups were reported by The United States-Canadian Mesothelioma Reference Panel with 23 cases in 2005 [3]. The prognosis of LMM was better than that of diffuse mesothelioma [3, 5]. The median survival of diffuse mesothelioma was less than 1 year after surgical resection [6], while many localized cases can be cured by surgical excision [3]. Thus it is of great significance to separate LMM from diffuse mesothelioma.

The tumor presented in this report is an example of localized malignant mesothelioma which had some unique clinicopathological features. Firstly, the tumor was localized in stomach, while malignant mesothelioma usually develops in the pleura (88.8%), followed infrequency by the peritoneum (9.6%), the pericardium (0.7%) and tunica vaginalis testis (0.2%) [7]. There are a few reported cases of LMM

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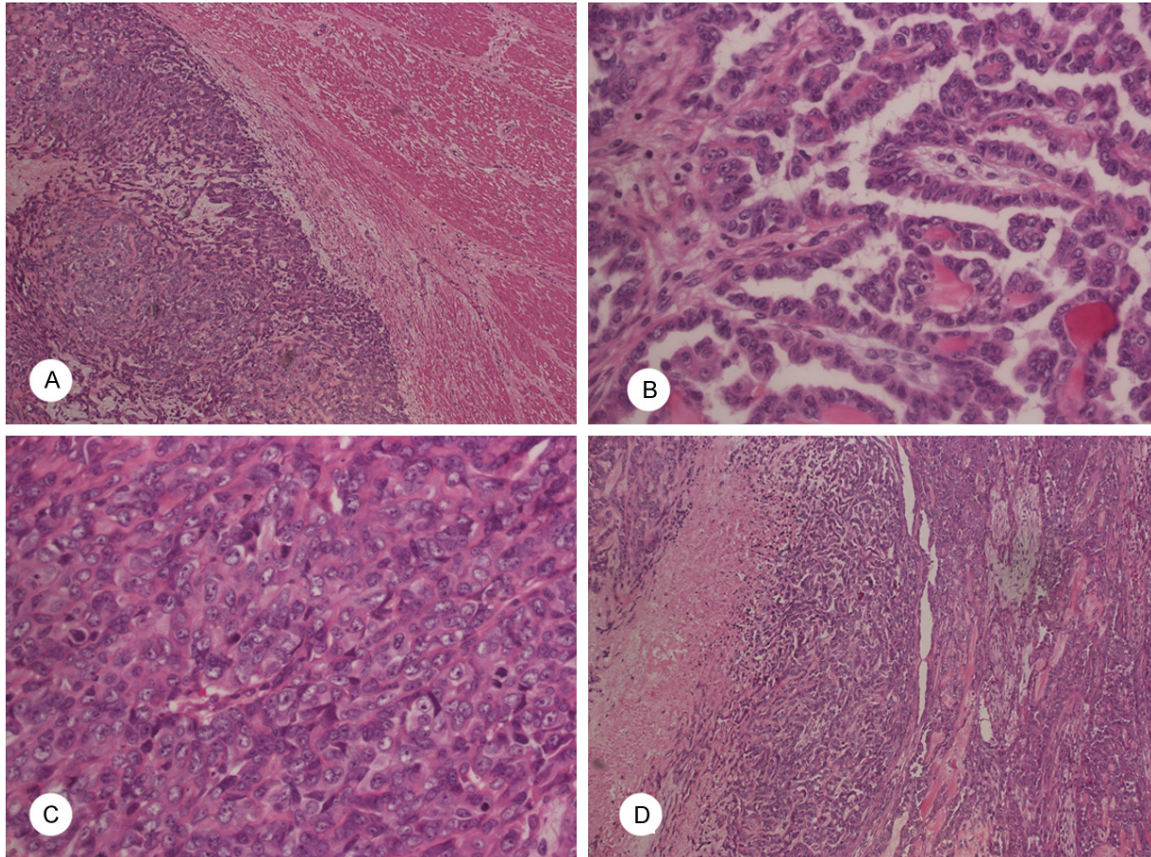


Figure 3. Histopathology of localized malignant mesothelioma. A: Infiltrative growth was discovered and the margin was relative defined (HE*100); B: The tumor cells arranged in tubulopapillary pattern (HE*400); C: The tumor cells arranged in solid patten (HE*400); D: Necrosis was noted within the tumor(HE*100).

Table 1. Immunohistochemical stains used in case evaluation

Markers	Dilution	Maufacturer
cytokeratin (AE1/AE3)	1:400	DAKO
vimentin	1:3000	DAKO
carcinoembryonic antigen (CEA)	1:200	DAKO
epithelial membrane antigen (EMA)	1:200	DAKO
CK5/6	1:80	DAKO
mesothelin	1:80	DAKO
calretinin	1:60	DAKO
WT-1	1:80	DAKO
D2-40	1:50	DAKO
C-Kit (CD117)	1:200	DAKO
CDX-2	1:80	DAKO
CD45	1:200	DAKO
S-100	1:3000	DAKO
smooth muscle actin (SMA)	1:400	DAKO
Desmin	1:60	DAKO
CD34	1:200	DAKO
alpha-1-fetoprotein (AFP)	1:1000	DAKO

occurred in other sites. Khalil reported a case of LMM arose from the wall of esophagus in a 72-year-old woman [1]. R. Espinal-Witter [8] reported a case of LMM that developed in the pancreas of a young woman. The patient received no adjuvant therapy and remained well and disease-free 32 months after the operation. Motoko Sasaki [9] described a primary localized malignant mesothelioma of biphasic type arising in the liver in a 66-year-old man with a history of asbestos exposure. Kishio Kuroda [10] reported a case of localized malignant mesothelioma inside the mesentery, no relapse of the disease had been found in the 8 months' follow-up radiologically. The differential diagnosis of this case includes gastric stromal tumor, primary or metastatic gastric cancer and diffuse malignant epithelioid mesothelioma metastatic to stomach. The pathological image of this case dis-

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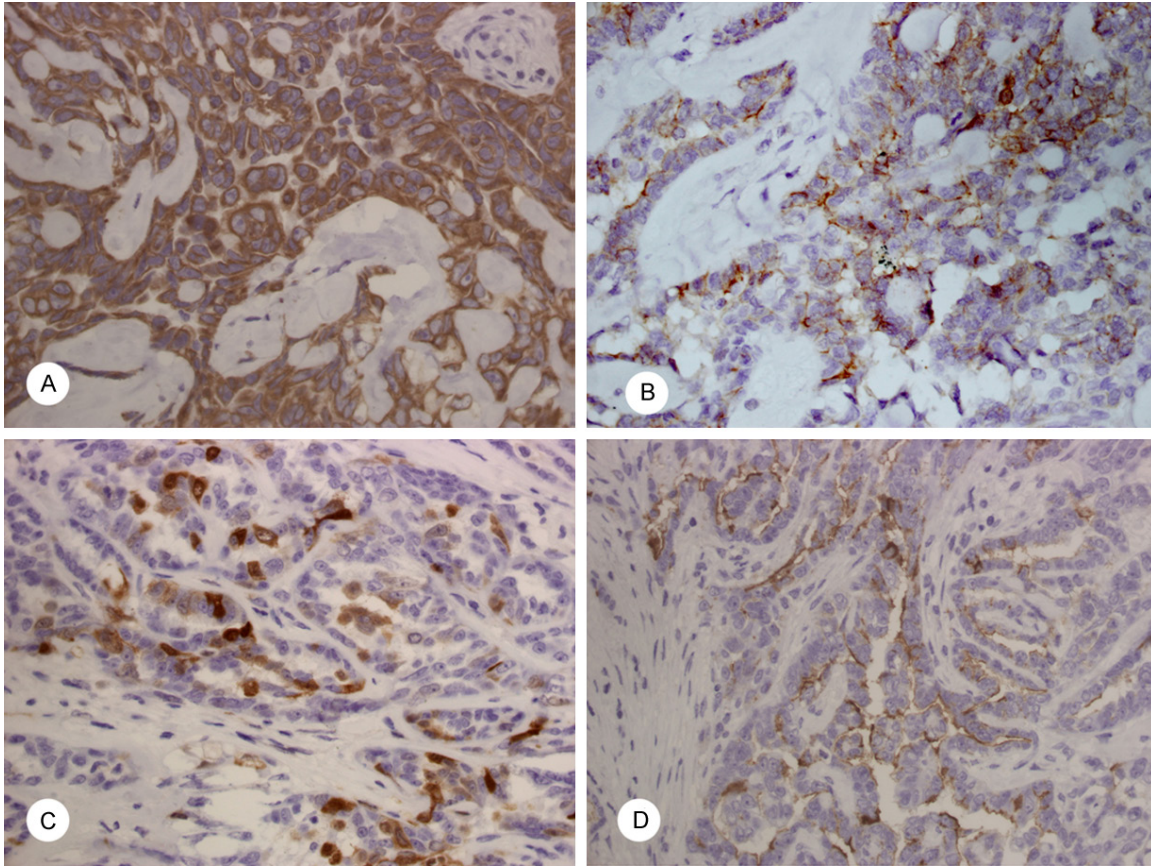


Figure 4. Immunohistochemical features of the tumor. A: The stain for cytokeratin was strongly positive; B: The stain for D2-40 was positive; C: The stain for calretinin was focally positive; D: The stain for mesothelin was focally positive.

played a combination of solid, tubular and papillary cellular growth patterns characteristic of mesothelioma and the immunohistochemical stains for keratin, vimentin, EMA, D2-40, CK5/6, calretinin, mesothelin and WT-1 were positive. Immunohistochemical stain is useful in differentiating mesothelioma from adenocarcinoma and gastric stromal tumor. Keratin, calretinin and vimentin are recommended as good markers for mesothelioma [11]. A positive reaction for these antibodies and negative staining for CEA, C-Kit (CD117), CDX-2 and AFP suggests a mesothelial cell origin for the tumor and excludes the diagnosis of gastric cancer and gastric stromal tumor. The imaging scan and surgical exploration did not find any evidence of diffuse malignant epithelioid mesothelioma, so the diagnosis of primary localized malignant mesothelioma, epithelial type, was finally made. Learning from this case, when the origin of the tumor is undetermined morphologically, we suggest that at least one marker for meso-

thelioma should be included in a routine base, such as calretinin, CK5/6, WT-1.

Secondly, the patient reported herein is only 6 years old, and reported no asbestos exposure. Although malignant mesothelioma may affect patients of different ages, over half of the known cases have involved patients between 55 and 75 years of age [4, 5]. Localized malignant mesothelioma happened in childhood is extremely rare. The only known risk factor of malignant mesothelioma is exposure to asbestos, observed in 30-40% of cases [5, 6]. However, our patient did not have any possible exposure to this substance, and the long latent period of asbestos-induced mesothelioma in the adult would not exist in children. Some reports proposed that exposures need not be occupational, ample opportunity exists for children to encounter asbestos in the environment, so whether or not such non-occupational exposures account for this case is unknown [12,

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13]. It should be mentioned that the parents of this boy are both radiologists. Fraire [14] reported that radiation exposure intake by the mother during pregnancy is a possible predisposing factor for pediatric mesothelioma. It is likely that childhood mesothelioma might have a multifactorial etiology, such as radiation, pre-natal medications, viruses, and genetic factors [14].

In summary, we presented for the first time a LMM arising in the stomach in a 6-year-old boy. Because of unusual localization of the tumor, a very careful histological and immunohistochemical examination was required to reach the final diagnosis in the present case. Accumulation of more cases of malignant mesothelioma involving gastrointestinal tract and longer follow-up of the patients are necessary to further characterize the features of this rare disease.

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Disclosure of conflict of interest

None declared.

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