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Case Report

Gastric Plexiform Fibromyxoma with Two Different Growth Patterns on Histological Images: a Case Report

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ABSTRACT

Plexiform fibromyxoma (PF) of the stomach is a very rare mesenchymal tumor of the gastrointestinal tract. We report the first case of PF with 2 different growth patterns pathologically confirmed after surgical resection. The tumor was characterized microscopically as infiltrative; it demonstrated diffuse growth into the smooth muscle bundles of the muscularis propria and was also multinodular and plexiform within the myxoid stroma. Immunohistochemical analysis revealed that the tumor cells were positive or weakly positive for smooth muscle actin, vimentin, and H-caldesmon and negative for desmin, CD117, CD34, CK-20, Pan-CK, Dog1, S100, ER, PR, and CD10. No mutations of C-kit and platelet-derived growth factor receptor alpha were detected. No genetic disruption of glioma-associated oncogene homolog 1 was detected by fluorescence in situ hybridization. The final diagnosis of PF was mainly based on the morphological and immunohistochemical findings.

Keywords: Plexiform fibromyxoma; Diffuse; Stomach; SMA; Case reports

INTRODUCTION

Plexiform fibromyxoma (PF) of the stomach, also known as plexiform angiomyxoid myofibroblastic tumor, was first reported by Takahashi et al. in 2007 [1]. It was officially recognized as a distinct entity among benign mesenchymal gastric tumors in the 2010 World Health Organization Classification of Tumors of the Digestive System [2]: there were more than 120 cases in the literature as of that time. PF is characterized by a multinodularplexiform infiltration of the gastric wall by bland spindle cells in myxoid and/or fibromyxoidstroma [3]. Here, we present the histologic features of gastric PF with 2 different growth patterns and discuss its differential diagnoses.

CASE REPORT

This is a case of a 65-year-old male who had presented with epigastric pain and discomfort without obvious inducement half a year earlier. A previous physical examination more than 10 years earlier had revealed hepatic cysts.

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Conflict of Interest
No potential conflict of interest relevant to this article was reported.

He was admitted and underwent abdominal computed tomography (CT), which demonstrated multiple cystic space occupation of the liver and a 2.6-cm mass with prominent contrast enhancement at the gastric body. A gastrointestinal stromal tumor (GIST) was suspected (**Fig. 1A-D**). Esophagogastroduodenoscopy revealed multiple gastric polyps and submucosal eminence of the gastric body (**Fig. 1E**).

Laboratory tests revealed elevated platelet large cell ratio (P-LCR, 50.10%, the normal range: 19.10%–47.00%), mean platelet volume (MPV, 13.10 fL, the normal range: 9.40–12.60 fL), platelet distribution width (PDW, 19.00 fL, the normal range: 9.80–16.20 fL), uric acid (433.70 μmol/L, the normal range: 0.00–416.00 μmol/L), β2-microglobulin (3.50 mg/L, the normal range: 1.30–3.00 mg/L), and cystatin C (1.4 mg/L, the normal range: 0.51–1.09 mg/L) and reduced total protein (63.30 g/L, the normal range: 65.00–85.00 g/L) and serum complement C1q (143.90 mg/L, the normal range: 159.00–233.00 mg/L). The tumor biomarkers, such as neuron-specific enolase (NSE, 9.77 ng/mL, the normal range: 0.00–6.00 ng/mL), CA199 (37.26 U/mL, the normal range: 0.00–34.00 U/mL), and CA50 (33.51 IU/mL, the normal range: 0.00–25.00 IU/mL), were slightly elevated.

Histopathological findings of the resected mass revealed a submucosal multinodular tumor measuring 1.9×1.4 cm. The tumor demonstrated a microscopically infiltrative growth into the smooth muscle bundles of the muscularis propria; some tumor cells showed epithelioid and diffuse growth (**Fig. 2A-C**). High-powered microscopic fields showed loose myxoid and cellular areas of the tumor admixed with smooth muscle cells (**Fig. 2D**). Immunohistochemical staining showed that the tumor cells were positive for smooth muscle

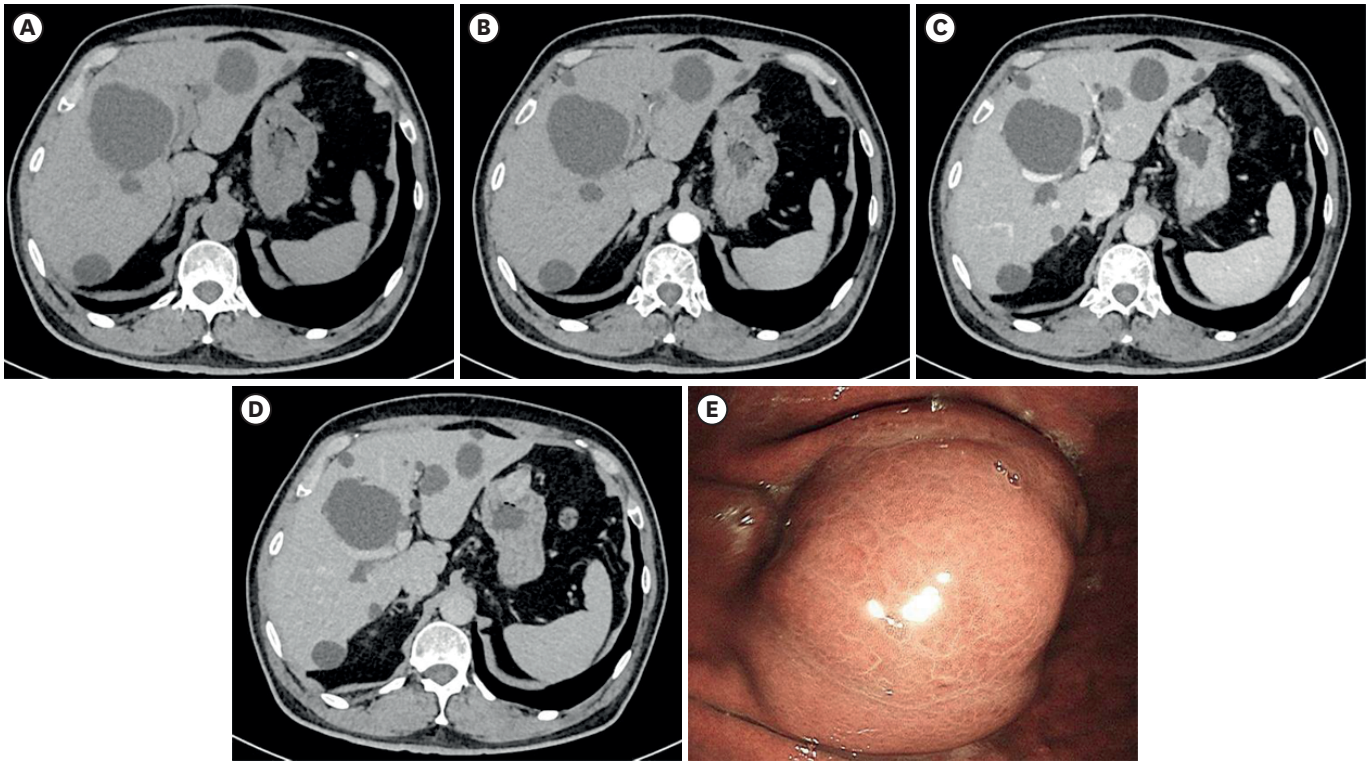

Fig. 1. (A) The lesion demonstrates a uniform density on an axial unenhanced CT image with continuous inhomogeneous enhancement during the (B) artery phase, (C) venous phase, and (D) delayed phase. (E) Esophagogastroduodenoscopy reveals multiple gastric polyps and submucosal eminence of the gastric body.
CT = computed tomography.

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actin (SMA), vimentin, and H-caldesmon but negative for desmin, CD117, CD34, CK-20, Dog1, S100, Pan-CK, ER, PR, and CD10. In addition, the CD34 stain highlighted a rich capillary network but it was negative in tumor cells. The Ki-67 labeling index was less than 5% (**Fig. 3**). There was another growth pattern in this case. The tumor was characterized microscopically as an infiltrative growth into the smooth muscle bundles of the muscularis propria on one slice and diffuse on another tissue slice (**Fig. 4A-C**) and the myxoid stroma was not as loose. Immunohistochemical staining showed that the tumor cells were positive for SMA, vimentin, and H-caldesmon but negative for desmin, CD117, CD34, CK-20 Dog1, S100, Pan-CK, ER, PR, and CD10, just like in **Fig. 2**. In addition, the CD34 stain highlighted a rich capillary network but it was negative in tumor cells. The ki-67 labeling index was less than 5% (**Fig. 5**). To verify the real component of the tumor cells in a diffusing pattern, we used some molecular pathology methods. The glioma-associated oncogene homolog 1 (GLI1) break-apart probe by fluorescence in situ hybridization (FISH) showed no positive finding in the tumor cells (**Fig. 6A**). No mutations of the C-kit (exons 9, 11, 13,17) or platelet-derived growth factor receptor alpha (PDGFRA; exons 12, 18) gene (**Fig. 6B and C**) were observed. The diagnostic algorithm for this case in our department of pathology has been provided in **Fig. 7**. HE staining showed that the tumor cells and growth pattern looked like a GIST, PF, or gastroblastoma. The tumor cells were negative for Pan-CK and CD10 on immunohistochemistry, and we ruled out gastroblastoma. The tumor cells were also negative for CD117, CD34, and Dog1 on immunohistochemistry and demonstrated no mutation of the C-kit or PDGFRA gene, and we also ruled out GIST. Finally, the tumor cells were positive for SMA, vimentin, and H-caldesmon and negative for desmin, besides the GLI-1 disruption (-), and we settled with a final diagnosis of PF.

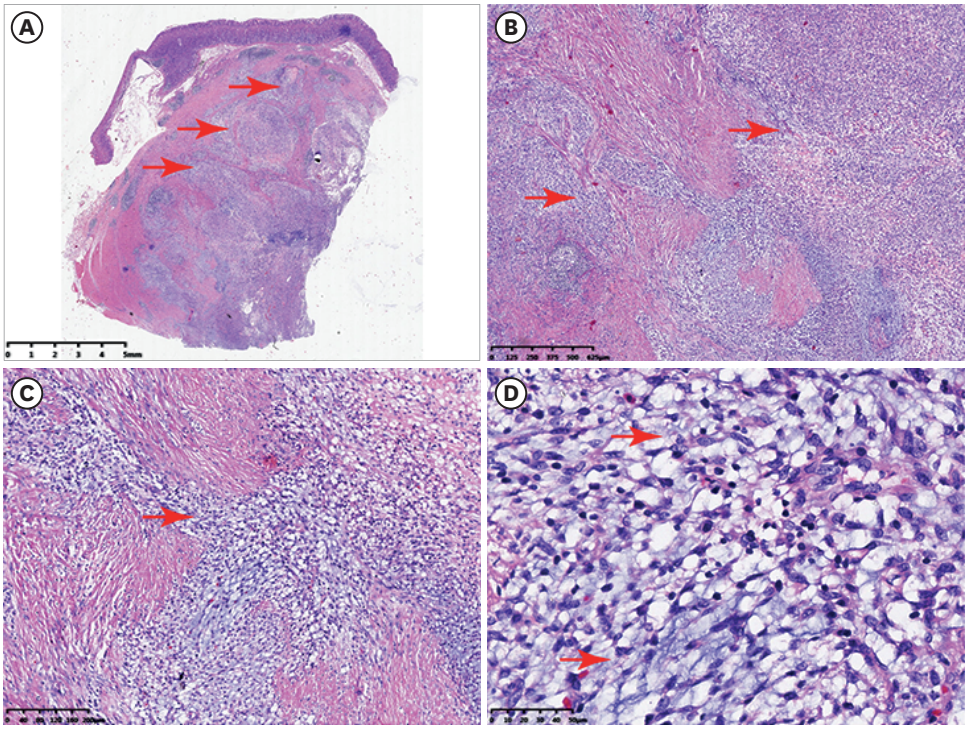

Fig. 2. (A) The tumor is characterized microscopically as an infiltrative multinodular plexiform growth into the smooth muscle bundles of the muscularis propria (×1). (B and C) Infiltrative growth pattern into the smooth muscle bundles of the muscularis propria; some tumor cells show epithelioid and diffuse growth (×100) and (×200). (D) Abundant mucus around the proliferative spindle cells (×400). (The red arrow indicates the multinodular and plexiform background, the infiltrative growth pattern, and the mucus).

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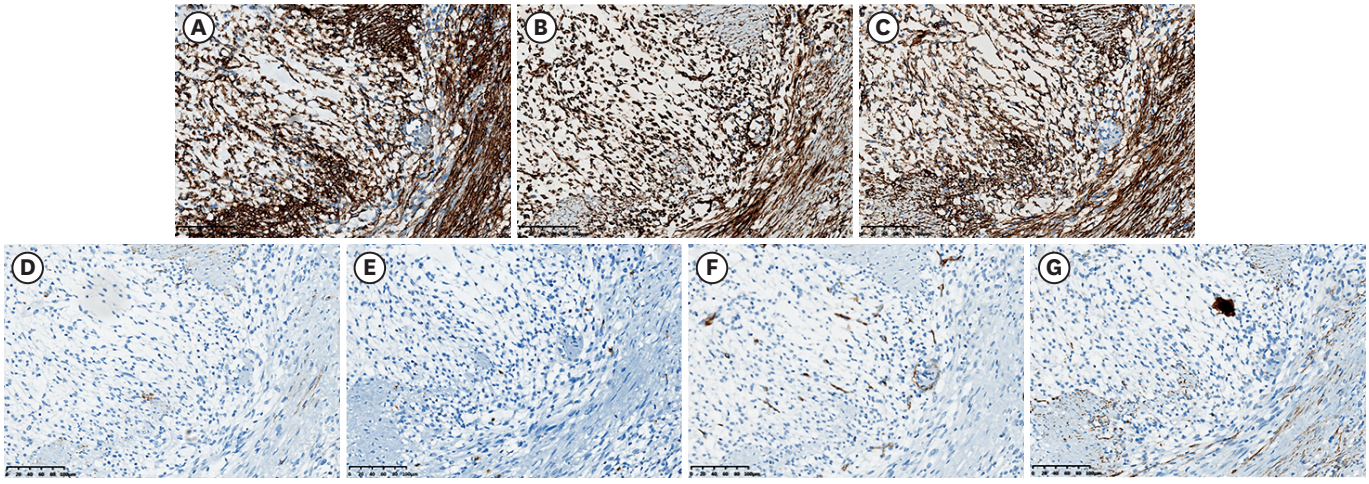

Fig. 3. Immunohistochemical staining shows that the tumor cells are positive for α-SMA (A), vimentin (B), and H-caldesmon (C) and negative for desmin (D), CD117 (E), CD34 (F), and CK-20 (G).
SMA = smooth muscle actin.

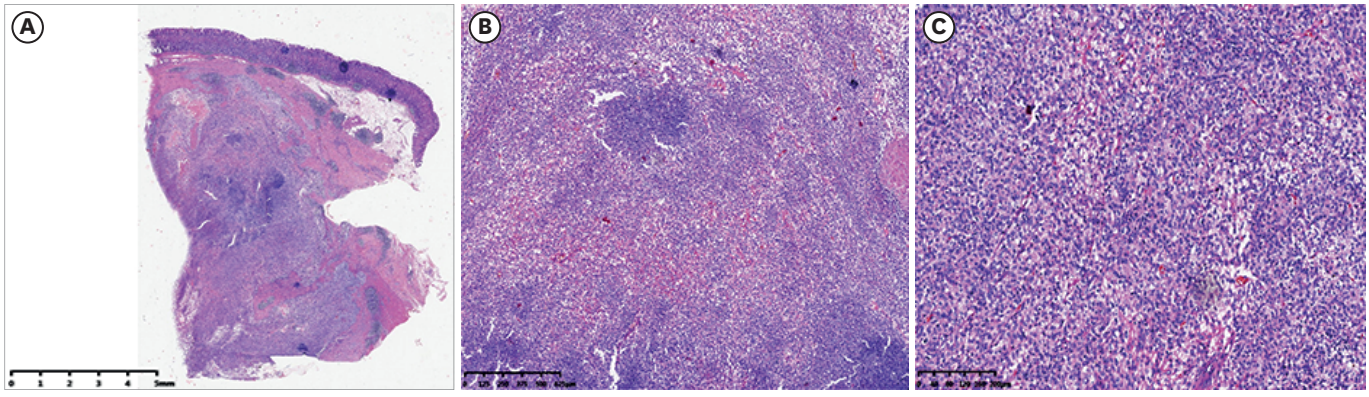

Fig. 4. (A) The tumor is characterized microscopically as an infiltrative growth into the smooth muscle bundles of the muscularis propria (×1). (B and C) Infiltrative growth pattern into the smooth muscle bundles of the muscularis propria (×100) and (×200).

The patient was carefully monitored using endoscopy and CT follow-up, and there was no recurrence or metastasis within the 12 months of follow-up. The patient was educated and updated on the assessments and stages of care every 3 months.

DISCUSSION

Gastric PF is considered benign, and it may be missed. Furthermore, no malignant transformation or metastasis of PF has been reported [4-8]. It is mainly found in the gastric antrum. On immunohistochemistry, the tumor cells of PF are positive for SMA and negative for c-kit, CD34, S-100 protein, epithelial membrane antigen (EMA), and desmin [9]. In our case, the morphology of the tumor cells and growth pattern looked like a GIST, PF, or gastroblastoma. We chose two different tissue slices for immunohistochemistry and molecular pathological methods. Based on the negative outcomes of Pan-CK and CD10 for tumor cells on immunohistochemistry, we ruled out the diagnosis of gastroblastoma. Given the negative immunohistochemistry results for CD117, CD34, and Dog1 and the unmutated C-kit or PDGFRA gene, we ruled out GIST. The tumor cells were positive for SMA, vimentin, and H-caldesmon and negative for desmin, besides the GLI-1 disruption (-), and we arrived

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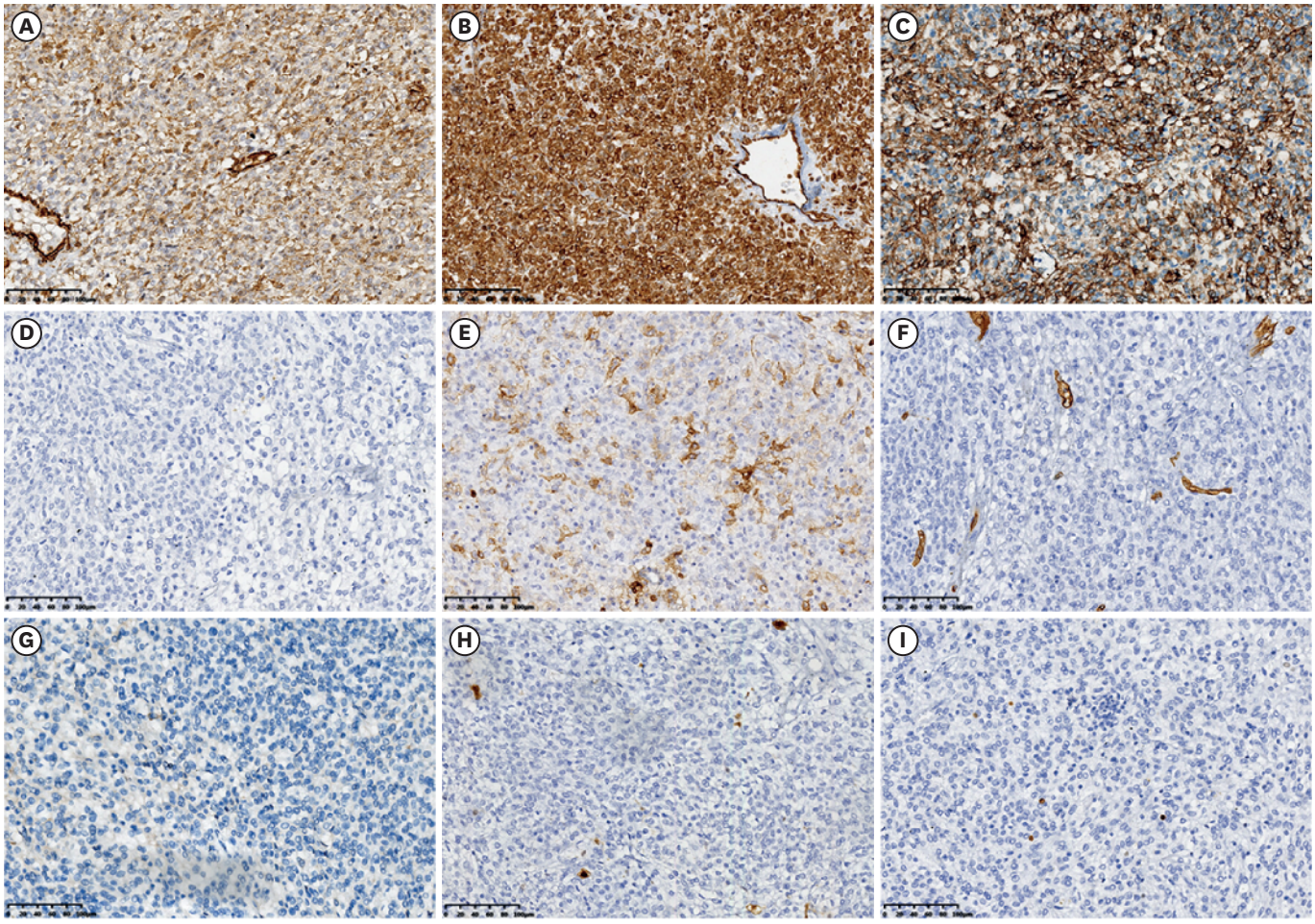

Fig. 5. Immunohistochemical staining shows that the tumor cells are positive for α-SMA (A), vimentin (B), and H-caldesmon (C) and negative for desmin (D), CD117 (E), CD34 (F), CK-20 (G), S100 (H), and ki-67 (I).
SMA = smooth muscle actin.

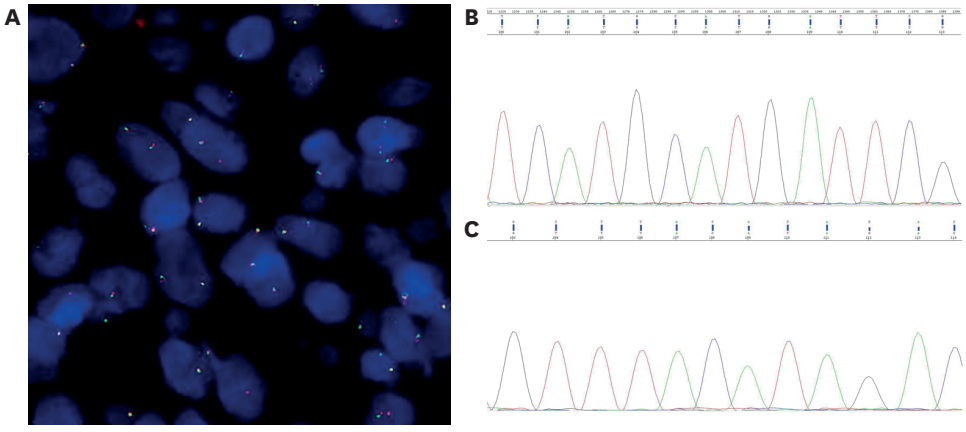

Fig. 6. (A) No positive findings for the disruption of the GLI1 in the tumor cells on FISH. (B and C) The tumor cells did not show a mutation of the C-kit (exons 9, 11, 13,17) or PDGFRA (exons 12, 18).
GLI1 = glioma-associated oncogene homolog 1; FISH = fluorescence in situ hybridization; PDGFRA = platelet-derived growth factor receptor alpha.

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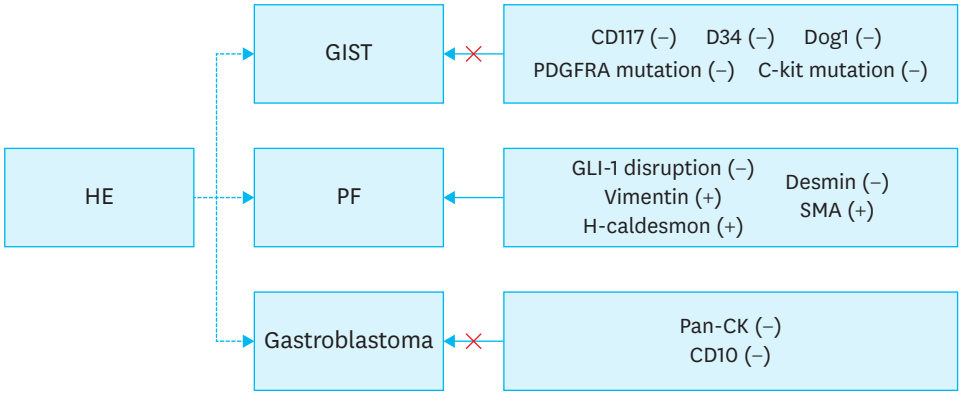

Fig. 7. The diagnostic process of this case in our department of pathology.
HE = hematoxylin and eosin; GIST = gastrointestinal stromal tumor; PDGFRA = platelet-derived growth factor receptor alpha; PF = plexiform fibromyxoma; GLI1 = glioma-associated oncogene homolog 1; SMA = smooth muscle actin.

at a final diagnosis of PF. The immunological outcomes were similar to those reported in previous studies [1,3,5,7,8]. Recent research has found that the translocation of the GLI1 gene is present in a subgroup of PFs, but not all of them. However, a 5-year-old male was diagnosed with PF without a broken GLI1 [2,10]. We did not observe the breaking apart of the GLI1 gene for our case. C-kit or PDGFRA mutations have been identified in GIST but not yet in PF [11-13]. Finally, the diagnosis of PF is mainly based on morphological, immunohistochemical, and molecular and pathological outcomes.

It has been reported that the histology of gastric PF demonstrated multiple intramural and subserosal nodules with characteristic plexiform growths, featuring bland spindle cells situated in an abundant myxoid stroma [3,5,7,8,10,12]. In our case, the tumor cells demonstrated two different growth patterns: infiltrative multinodular and plexiform growth within the myxoid stroma, and diffuse growth without nodosity, which was different from the previous one. Therefore, we used various immunohistochemical and FISH measures to rule out the diagnosis of GIST and gastroblastoma.

In the current literature, surgical resection or partial gastrectomy is the major treatment for PF in the stomach [14,15]. There have also been reports of endoscopic resection for small tumors [16]. Due to its rarity, more cases and findings from follow-up are needed.

In summary, we present an unusual and rare case of PF characterized by tumor cells with two different growth patterns. PF has distinct histological and immunohistochemical features; however, awareness is important for its diagnosis. Apart from the known infiltrative multinodular and plexiform growth pattern within the myxoid stroma, PF can also grow diffusely and become large.

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