Plexiform Fibromyxoma of The Stomach: A Rare Case Report And Review of Literature

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Case Report

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Abstract

Background: Plexiform fibromyxoma (PF) is a very rare mesenchymal tumor of the stomach. Here we report one case of this unusual gastric tumor that was pathologically confirmed after endoscopic resection. Its clinical and pathologic features were observed while the relevant literature was reviewed.

Case presentation: A 1.0 cm round elevated submucosal mass was discovered by gastroscopy in a 44-year-old Chinese woman due to recurrent abdominal pain. The tumor was characterized by a multinodular plexiform pattern, bland-looking oval to spindle cells, and a myxoid stroma with thin arborizing capillaries. Immunohistochemistry analysis revealed that the tumor cells were positive for smooth muscle actin (SMA) and negative for CD117, DOG-1, CD34, Desmin, progesterone receptor (PR), CD10, S100 and SOX10. A diagnosis of PF was rendered.

Conclusion: Gastric PF is a benign tumor without evidence of local recurrence and distant metastasis. This case emphasizes the unique histological appearance and immunophenotype of PF to promote early diagnosis, while endoscopic resection can be used as an alternative treatment for small and superficial PF.

Backgrounds

It is well known that the majority of gastrointestinal mesenchymal tumors are gastrointestinal stromal tumors (GISTs). In contrast, Plexiform fibromyxoma (PF) is an extremely rare tumor of the stomach(1), which was first described as plexiform angiomyxoid myofibroblastic tumor (PAMT) by Takahashi et al. in 2007(2). In 2010, the term 'PF' was added as the diagnostic terminology instead of PAMT in the 4th WHO Classification of the Digestive System Tumors. Nowadays, there have been only 120 reported cases of PF in literature. Here, to better understand this tumor, we report a gastric PF that was pathologically confirmed after endoscopic resection and the relevant literature is briefly reviewed.

Case Presentation

A 44-year-old Chinese woman was admitted because of recurrent abdominal pain for two months and further detection of an antral polyp by endoscopy. The patient had no underlying health problems or abnormal laboratory findings, and the Carbon-14 urea breath test for *Helicobacter pylori* was also negative. Gastroscopy revealed a 1.0 cm round elevated submucosal mass with a distinct border and slight mucosal redness at the gastric antrum (Figure A). Subsequently, endoscopic submucosal dissection was performed to remove this mass. Pathological examination indicated an irregular multinodular plexiform tumor in the gastric submucosa with muscularis mucosa involvement (Figure B). The tumor cells were oval to spindle-shaped without marked nuclear atypia and mitosis separated by a rich intercellular myxoid matrix with scattered thin arborizing capillaries (Figure C, D). Immunohistochemical staining showed that the tumor cells were positive staining for SMA (Figure E) and negative for CD117, DOG-1, CD34, Desmin, PR, CD10, S100 and SOX10. The Ki67 labeling index was

approximately 1% (Figure F). Therefore, a final diagnosis of PF was made. Since the resected margins were histologically free of tumor cells, the patient did not undergo additional surgery. No signs of tumor recurrence or metastasis were observed 3 months after the operation.

Discussion

PF is a rare benign gastric mesenchymal tumor, accounting for 0.2% of all gastrointestinal mesenchymal tumors, with its incidence 150 times lower than that of gastric GIST(1). Although PF is a global disease, East Asia is the most prevalent region. The tumor is widely distributed in various age groups, ranging from 5 to 81, with a median age of 46, and has no gender difference(3). The typical clinical presentations of PF are gastrointestinal symptoms, which are primarily non-specific, such as abdominal pain, abdominal distension, and abdominal discomfort. Almost all PF occurs within the stomach, of which the antrum is the most commonly involved site, followed by the body and fundus, and the size of the mass is between 0.8cm and 17cm with a median maximum diameter of 4cm(3, 4). Extragastic PFs have also been reported, such as the mediastinum, duodenum, jejunum and gallbladder, but are relatively uncommon(3, 5). For gastrointestinal PFs, gastroscopy reveals that the lesions are frequently round, elevated and submucosal tumor-like appearance with a clear boundary as shown in the case we presented above. The CT imaging often suggests a solid or cystic-solid mass with mild enhancement in the arterial phase and reinforced enhancement throughout the venous phase(6, 7). However, compared with other gastrointestinal mesenchymal tumors, those imaging features are non-specific, in which case the final diagnosis is relied on histopathological examination.

Microscopically, PF is characterized by oval to spindle-shaped bland tumor cells arranged in multinodular plexiform growth pattern and separated by abundant intercellular myxoid stroma rich in small thin-walled, arborizing blood vessels(8). Cellular atypia and mitosis are absent in the majority of cases. The tumors are usually centered in the submucosa or muscularis propria, and often intrude into the mucosa and/or the serosa with a pushing or infiltrative border(1). Vascular or lymphatic involvement can be seen in a few cases, but distant metastasis has not been reported yet. By immunohistochemistry, almost all tumor cells of PF are positive for SMA according to available data, which implies that they possess a myofibroblastic nature. Variable staining results demonstrated for desmin, caldesmon, PR, CD10 and CD34 reported by others due to use of different antibodies, technical errors or misinterpretation(3, 4). Genetic abnormalities including glioma-associated oncogene homologue 1 (*GLI1*) amplification, metastasis-associated lung adenocarcinoma transcript 1 (*MALAT1*)-*GLI1* oncogenic fusion(9), and Patched 1 (*PTCH1*) deletion(10) have been identified in a subset of PF cases.

In our case, the most essential histologic differential diagnosis is myxoid GIST. It should be noted that the negative immunohistochemical staining of CD117 and DOG-1, and the lack of *c-KIT* and *PDGFRa* gene mutations can distinctively distinguish PF from GIST. Other differential diagnoses should include plexiform schwannoma, plexiform neurofibroma, and inflammatory fibroid polyp (IFP). Both schwannoma and neurofibroma originate from the peripheral nerve sheath and can show plexiform growth pattern(1, 11). However, in contrast to the immunohistochemical findings in PF, these two neural

tumors are both positive for S100 and SOX10. IFP consists of CD34-positive bland spindle cells, which are concentrated around small blood vessels forming an “onion skin”-like appearance, accompanied by a myxoedematous inflammatory stroma often dominated by eosinophils(12). Therefore, PF can be distinguished from IFP by both histological features and immunophenotype.

Because PF often involves the muscularis propria, and it is challenging to exclude GIST clinically, the mainstream treatment for PF reported in the literature is surgical resection(3). However, PF shows a benign biological behavior with neither local recurrence nor distant metastasis have been reported so far. Conservative management, such as endoscopic resection, has been tried to treat PF. Together with our case, 12 patients underwent gastroscopic resection(3, 4, 13, 14). The common features for the twelve cases are that the tumors are located in the superficial layer (mucosa or submucosa) of the gastric wall and are small enough (with a median size of 1.65cm, ranged from 0.8cm to 5cm) to be resected under gastroscopy. Hence, it is important to diagnose and treat PF at an early stage. Follow-up results were obtained in 10/12 patients. Over a median follow-up period of 6 months (range 1-32 months), all the patients were uneventful after endoscopic resection. However, due to the limited follow-up time, the long-term outcome of endoscopic treatment for PF needs to be further studied.

In conclusion, gastric PF is a rare benign mesenchymal tumor with a unique histological appearance and immunophenotype. Endoscopic resection can be used as an alternative treatment for small PF involving only the superficial layer of the gastric wall. The pathogenesis, genetic abnormalities, and long-term clinical follow-up studies remain to be established for the deep comprehension of PF.

Abbreviations

PF	Plexiform fibromyxoma
SMA	Smooth muscle actin
PR	Progesterone receptor
GIST	Gastrointestinal stromal tumors
PAMT	Pexiform angiomyxoid myofibroblastic tumor
GLI1	Glioma-associated oncogene homologue 1
MALAT1	Metastasis-associated lung adenocarcinoma transcript 1
IFP	Inflammatory fibroid polyp

Declarations

Ethical statement:

Written informed consent was obtained from the patient.

Consent for publication:

Written informed consent for publication of clinical details and/or clinical images was obtained from the patient.

Availability of data and materials:

All data generated or analysed during this study are included in this published article.

Competing interests:

No conflicts of interest to disclose.

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Authors' contributions:

X.W. and Q.S. collected the data, followed the patient, reviewed the literature, and contributed to manuscript drafting; Q.L. analyzed and interpreted the imaging findings; H.W. was responsible for immunohistochemical detection; J.C. gave critical comments; Q.S. and AS.D.K. drafted the manuscript and revision. All authors revised and approved the final manuscript.

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References

1. Miettinen M, Makhoulf HR, Sobin LH, Lasota J. Plexiform fibromyxoma: a distinctive benign gastric antral neoplasm not to be confused with a myxoid GIST. *Am J Surg Pathol.* 2009;33(11):1624–32.
2. Takahashi Y, Shimizu S, Ishida T, Aita K, Toida S, Fukusato T, et al. Plexiform angiomyxoid myofibroblastic tumor of the stomach. *Am J Surg Pathol.* 2007;31(5):724–8.
3. Su HA, Yen HH, Chen CJ. An Update on Clinicopathological and Molecular Features of Plexiform Fibromyxoma. *Can J Gastroenterol Hepatol.* 2019;2019:3960920.
4. Hu G, Chen H, Liu Q, Wei J, Feng Y, Fu W, et al. Plexiform fibromyxoma of the stomach: a clinicopathological study of 10 cases. *Int J Clin Exp Pathol.* 2017;10(11):10926–33.
5. Takahashi Y, Suzuki M, Fukusato T. Plexiform angiomyxoid myofibroblastic tumor of the stomach. *World J Gastroenterol.* 2010;16(23):2835–40.

6. Perry L, McCann C, Schwartz J, Gott M, Senatore P, Slotman G. Plexiform Angiomyxoid Myofibroblastic Tumor of the Stomach. *Am Surg*. 2020;3134820951487.
7. Akai H, Kiryu S, Shinozaki M, Ohta Y, Nakano Y, Yasaka K, et al. Computed tomography and magnetic resonance imaging of a plexiform angiomyxoid myofibroblastic tumor: a case report. *BMC Med Imaging*. 2017;17(1):7.
8. Mustafa T, Suarez Y, Damani T. Plexiform Angiomyxoid Myofibroblastic Tumor (PAMT) of the Stomach: an Extremely Rare Mesenchymal Tumor Masquerading as Gastrointestinal Stromal Tumor or Leiomyoma. *J Gastrointest Surg*. 2021.
9. Spans L, Fletcher CD, Antonescu CR, Rouquette A, Coindre JM, Sciot R, et al. Recurrent MALAT1-GLI1 oncogenic fusion and GLI1 up-regulation define a subset of plexiform fibromyxoma. *J Pathol*. 2016;239(3):335–43.
10. Banerjee S, Corless CL, Miettinen MM, Noh S, Ustoy R, Davis JL, et al. Loss of the PTCH1 tumor suppressor defines a new subset of plexiform fibromyxoma. *J Transl Med*. 2019;17(1):246.
11. Kudose S, Kyriakos M, Awad MM. Gastric plexiform schwannoma in association with neurofibromatosis type 2. *Clin J Gastroenterol*. 2016;9(6):352–7.
12. Garmpis N, Damaskos C, Garmpi A, Georgakopoulou VE, Sakellariou S, Liakea A, et al. Inflammatory Fibroid Polyp of the Gastrointestinal Tract: A Systematic Review for a Benign Tumor. *In Vivo*. 2021;35(1):81–93.
13. Kobori I, Katayama Y, Hayashi K, Fujimoto Y, Kaneko M, Kitahama A, et al. Uninodular Fibromyxomatous Gastric Tumor Resected by Endoscopic Submucosal Dissection. *Intern Med*. 2019;58(14):2015–8.
14. Wu JD, Chen YX, Luo C, Xu FH, Zhang L, Hou XH, et al. Plexiform angiomyxoid myofibroblastic tumor treated by endoscopic submucosal dissection: A case report and review of the literature. *World J Gastroenterol*. 2021;27(31):5288–96.

Figures

Figure 1

Figure A. Gastroscopy revealed a round elevated submucosal lesion in the gastric antrum. Figure B. A plexiform submucosal tumor involving the muscularis mucosa. (H&E, magnification, ×20). Figure C. Multiple tumor nodules with myxoid stroma and scattered thin arborizing capillaries. (H&E, magnification, ×100). Figure D. Tumor cells possess ovoid to spindle nuclei and mildly eosinophilic cytoplasm with indistinct borders. (H&E, magnification, ×400). Figure E. Immunohistochemistry showed that the tumor cells were positive for SMA. (EnVision, magnification, ×400). Figure F. The Ki67 labeling index was approximately 1%. (EnVision, magnification, ×100).