

A primary gastric synovial sarcoma

A case report and literature review

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Abstract

Rationale: When a gastric spindle cell tumor is observed, the possibility of synovial carcinoma, besides common mesenchymal tumor, should also be considered.

Presenting concerns of the patient: The patient is a 51-year-old American woman who underwent medical check-up at a general hospital. Upper endoscopy showed a 2-cm sized mass covered with intact mucosa, and a central depression located on the posterior wall of the mid body. Biopsy of the mass showed focal atypical cells proliferation in mucosa on hematoxylin & eosin (H&E) staining. Endoscopic ultrasound showed a 17-mm homogenously hypoechoic mass within the submucosal layer.

Interventions: After diagnostic endoscopic submucosal dissection was performed, H&E and immunohistochemical staining showed synovial sarcoma (SS). To confirm the diagnosis, reverse transcriptase-polymerase chain reaction was performed, revealing a chimeric transcript of the *SYT-SSX1* fusion gene. The diagnosis of primary gastric SS was confirmed because no evidence of possible primary lesions or metastatic lesions was observed. Therefore, the patient underwent distal gastrectomy.

Outcomes: After surgery, the surgical specimen demonstrated no residual tumor cells. The patient received no adjuvant therapy, and there has been no evidence of local recurrence or distant metastasis for 2 months after the operation.

Lessons: When gastric subepithelial tumor is suspicious, we should also consider gastric SS.

Abbreviations: ESD = endoscopic submucosal dissection, RT-PCR = reverse transcriptase-polymerase chain reaction, SS = synovial sarcoma.

Keywords: endoscopy, gastric neoplasm, synovial sarcoma

1. Introduction

Synovial sarcoma (SS) is a rare mesenchymal malignant tumor, accounting for about 10% of soft tissue sarcomas.^[1] It is the fourth most common type of soft tissue sarcomas, following malignant fibrous histiocytoma, liposarcoma, and rhabdomyosarcoma.^[2] The most common sites are the extremities, which account for more than 80% of new cases; the knee is the most affected joint and SS usually occurs in children and young adults.^[3,4] Other unusual sites of SS are the head, neck, skin, lungs, kidneys, abdomen, digestive tract, mediastinum, retroperitoneum, and oral cavity.^[5]

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Informed consent was obtained from the patient.

The authors have no conflict of interest.

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Primary gastric SS is an extremely rare disease. To date, only 15 gastric SS cases have been reported in the English literature. Here, we report a case of primary gastric SS and review the related literature.

2. Case report

A 51-year-old American woman underwent a medical check-up at a general hospital. She had undergone surgery for thyroid cancer 20 years previously, and had received hypothyroidism and hypertension medication. All her laboratory data were within the normal ranges. Endoscopic examination showed multiple small and sessile hyperplastic polyps scattered at the diffuse body. A 2-cm sized tumor covered with intact mucosa and a central depression-like subepithelial tumor located at the posterior wall of the mid body were observed, and mucosal biopsy was performed (Fig. 1). Endoscopic biopsy revealed focal atypical cell proliferation in the mucosa. Endoscopic ultrasound showed a 17-mm homogenously hypoechoic mass within the submucosal layer (Fig. 2). Owing to the diagnosis uncertainty of a subepithelial tumor, diagnostic endoscopic submucosal dissection (ESD) was performed.

The endoscopically removed specimen showed a tumor, 0.9 cm × 0.9 cm × 0.4 cm in size (Fig. 3). Microscopically, the subepithelial tumor showed atypical cell proliferation in the lesion with spindle cell feature and a few mitoses, which invaded the submucosal layer (Fig. 4). The depth of tumor invasion was 0.2 cm (submucosal invasion only). The radial margin was invaded by the tumor, while the deep margin was free of the

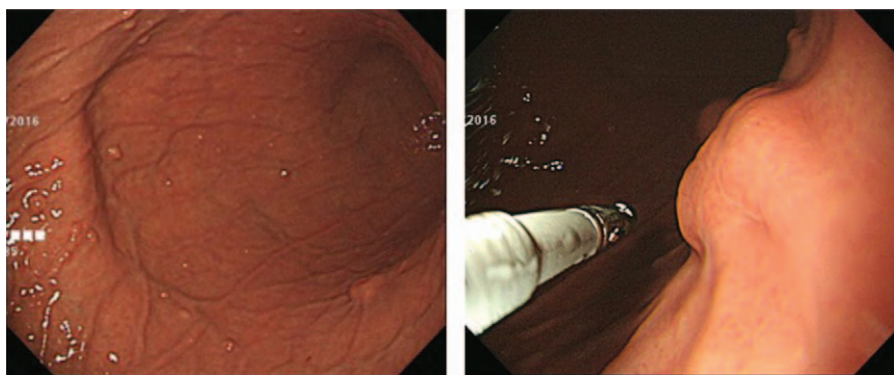


Figure 1. Upper endoscopy showed a mass covered with intact mucosa at the posterior wall of the mid body.

tumor. Immunohistochemically, the tumor cells were focally positive for cytokeratin (AE1/AE3), CD99, vimentin, and TEL-1 (Fig. 5). The cells were negative for chromogranin, synaptophysin, CD119, desmin, S-100, and HMB-45.

Gastric SS was confirmed by reverse transcriptase-polymerase chain reaction (RT-PCR) that revealed a chimeric transcript of *SYT-SSX1* fusion gene. Abdominal and chest computed tomography did not reveal any other tumor lesions. There was no clinical evidence of tumors at other possible primary sites. Through the pathological examination and molecular analysis, a diagnosis of primary gastric SS was confirmed.

The patient underwent laparoscopy-assisted distal gastrectomy with Billroth II anastomosis. Microscopically, the surgical specimen demonstrated no residual tumor cells. The patient received no adjuvant therapy, and there has been no evidence of local recurrence or distant metastasis for 2 months after the operation.

3. Discussion

Primary gastric SS is an extremely rare disease. To the best of our knowledge, this is the first report of a Korean case of primary gastric SS, although the patient is an American woman. In 2000,

Billings et al^[6] first reported 2 cases of primary gastric SS. The latest published case was reported by Torres Rivas et al^[7] in 2014. A clinicopathological feature summary of the 16 cases of primary gastric SS, including our case, is summarized in Table 1.^[8-10]

Pathologically SS is classified into 3 types, as follows: first, the monophasic type, which consists of mostly spindle-shaped cells; second, the biphasic type, which consists of both epithelial cells and spindle shaped cells; and third, the poorly differentiated type, which typically shows sheets of darkly stained ovoid or rounded cells similar to those seen in other small round cell tumors.^[11] In our case, small proliferated spindle-shaped cells were observed, indicating monophasic SS.

Monophasic SS, composed of spindle cell in the gastric wall, needs to be differentiated from other mesenchymal tumors, such as gastrointestinal stromal tumors, leiomyoma, leiomyosarcoma and schwannoma, sarcomatoid carcinoma, and solitary fibrous tumors. For the differential diagnosis of monophasic SS, immunohistochemical staining and confirmatory molecular studies are required. SS has characteristic immunohistochemical features, which include AE1/AE3, CK7, and EMA positivity, as well as CD117, CD34, desmin, and S100 protein negativity.^[7]

Molecular analysis is essential for confirming a diagnosis of SS. Most SS cases have a reciprocal translocation between the short arm of chromosome X and the long arm of chromosome 18. This translocation fuses the *SSX1* or *SSX2* genes from chromosome X and the *SYT* gene from chromosome 18 to form *SYT-SSX*

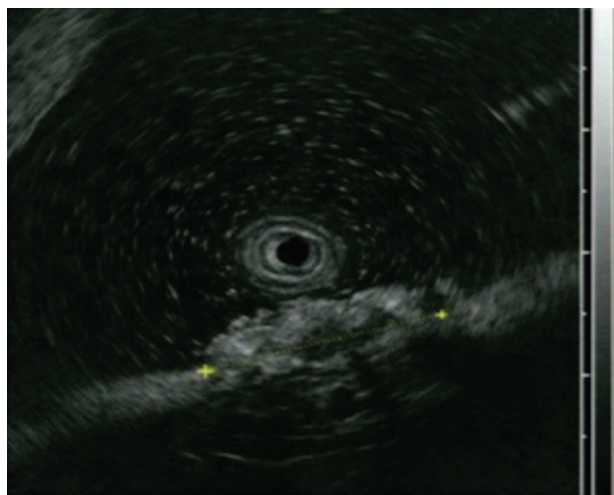


Figure 2. Endoscopic ultrasound showed a homogeneously hypoechoic mass within the submucosal layer.

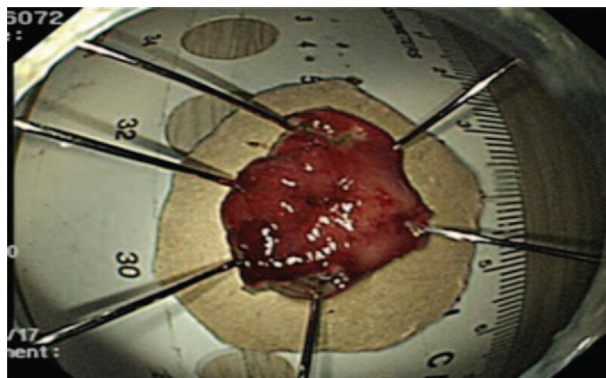


Figure 3. The gross specimen of the synovial sarcoma obtained by endoscopic submucosal dissection.

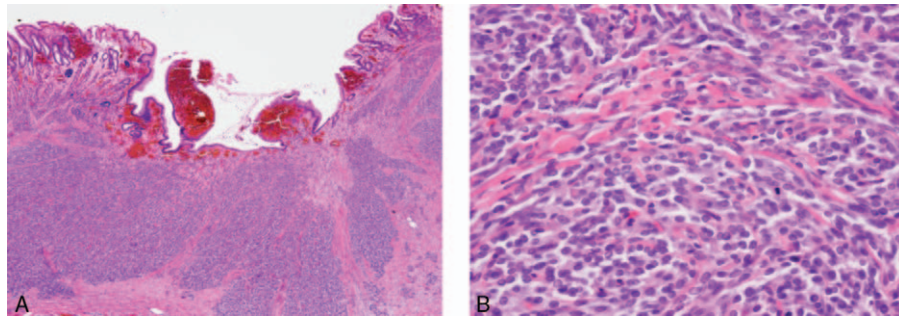


Figure 4. (A) The tumor cell invaded the submucosa layer (H&E $\times 40$). (B) The lesion showed atypical cell proliferation with spindle cell feature and a few mitoses (H&E $\times 400$).

chimera gene.^[12,13] In our case, SS was suspected on the basis of the histological and immunohistochemical findings. We could confirm the diagnosis of SS by detecting the *SYT-SSX1* chimera gene on RT-PCR. Thirteen of the 15 cases reported in the literature showed a positive result for X:18 translocation and *SYT-SSX* chimera gene. The diagnostic performance of this test for SS shows a sensitivity and specificity higher than 95%.^[14] The *SSX* gene involved in SS is related to the histologic subtype and biological nature of the tumor. *SYT-SSX1* rearrangement is more common in the biphasic subtype that is characterized by higher proliferative cell activity, entailing a higher risk of distant metastases. The specific *SYT-SSX2* translocation is related to the monophasic subtype, with a more benign clinical course than other subtypes.^[15,16]

The mainstay of treatment for gastric SS is surgery, such as total or partial gastrectomy and wedge resection. All the reported cases, including our case, have undergone surgical resection. Four of the cases have received postoperative chemotherapy using an ifosfamide-based regimen after local recurrence or distant metastases; however, none of them have received radiotherapy.^[6–10] Our patient underwent partial gastrectomy after ESD was performed. After surgery, we did not administer chemother-

apy or radiotherapy because no evidence of residual tumor was observed.

The prognosis of gastric SS is unclear because the number of cases is small; this poses limitations in clarifying the clinical outcome. The clinical outcome of patients with SS in soft tissue is significantly related to the tumor size and local invasion status, that is, a larger tumor size (>5 cm) and invasion of the bone, nerves, or vessels are correlated with a worse prognosis.^[17] Similarly, in primary gastric SS, 4 out of 6 patients with tumors larger than 5 cm in diameter showed recurrence or died (Table 1). This shows that the tumor size of the gastric SS is also an important prognostic factor.

4. Conclusion

Primary gastric SS is rare and difficult to diagnose. When a gastric spindle cell tumor is observed, we should also consider the possibility of SS, besides common mesenchymal tumors. Immunohistochemical staining and molecular analysis using RT-PCR are useful diagnostic tools for the differential diagnosis of gastric SS from other malignant spindle cell tumors. Few cases of gastric SS exist to study the diagnosis, treatment, and prognosis

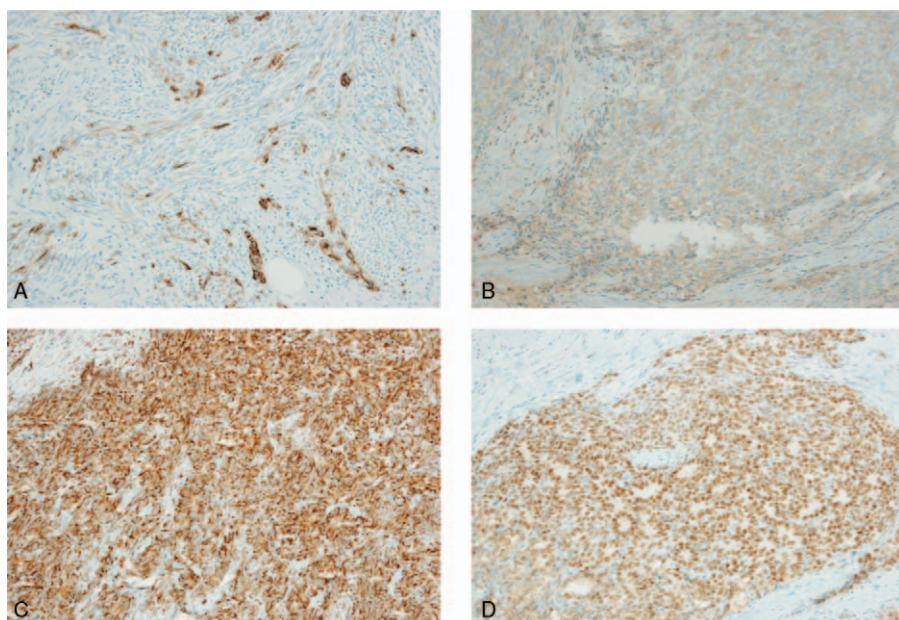


Figure 5. Immunohistochemistry showed focal positivity for cytokeratin (AE1/AE3) (A), CD99 (B), vimentin (C), and TEL-1 (D).

Table 1**Clinical features and outcomes of gastric synovial sarcoma.**

| Case | Age/sex | Size, cm | Location | Subtype | Type of surgery | Adjuvant treatment | Outcome |
|------|---------|----------|---------------------------|------------|---|--------------------|--|
| 1 | 67/F | 0.8 | Body-antrum junction | Monophasic | Partial gastrectomy | No | ANED, 12 mo |
| 2 | 49/M | 2 | Body | Monophasic | Segmental/wedge resection | No | Omental metastasis, DOD, 29 mo |
| 3 | 68/F | 2 | Body | Monophasic | Wedge resection | No | ANED, 29 mo |
| 4 | 29/M | 2.8 | Body | Monophasic | Partial gastrectomy | No | ANED, 224 mo |
| 5 | 54/F | 3 | Antrum | Monophasic | Antrectomy/ Gastroduodenal resection | No | Follow-up case |
| 6 | 58/F | 3 | Lesser curvature/body | Monophasic | Wedge resection | No | ANED, 21 mo |
| 7 | 37/F | 4 | Fundus | Monophasic | Partial gastrectomy | No | Local recurrence, DOO, 48 mo |
| 8 | 50/M | 6 | Distal fundus | Monophasic | Tumor resection | Chemotherapy | Recurrence, 6 mo |
| 9 | 66/F | 15 | Fundus | Monophasic | Gastrectomy/ partial esophagectomy | No | Lost to follow-up |
| 10 | 42/M | 8 | Great curvature/body | Biphasic | Partial gastrectomy | Chemotherapy | DOD, 25 mo |
| 11 | 47/M | 5.2 | Gastroesophageal junction | Biphasic | Partial gastrectomy | No | ANED, 21 mo |
| 12 | 55/F | 16 | Antrum | Monophasic | Hemogastrectomy | No | Liver metastasis, DOD, 6 mo |
| 13 | 38/F | 7.5 | Body | Monophasic | Tumor resection | Chemotherapy | Omental/hepatic metastasis, Recurrence in the liver, 6 mo |
| 14 | 44/M | 15 | Lesser curvature | Monophasic | Total gastrectomy | No | ANED, 18 mo |
| 15 | 42/M | 11.5 | Posterior gastric wall | Biphasic | Tumor resection | chemotherapy | Mesenteric metastasis, DOD, 24 mo |
| 16 | 51/F | 1.7 | Body | Monophasic | Partial gastrectomy | No | Current case |

Case 1–10^[8]; 11–12^[6]; 13^[9]; 14^[7]; 15.^[10]

ANED=alive with no evidence of disease, DOD=died of disease.

of the disease. In order to define the nature of disease, continuous research with further accumulation of cases is required.

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