Erciyes Med J 2021; 43(3): 296–9 • DOI: 10.14744/etd.2020.47715
CASE REPORT – OPEN ACCESS

Two Pediatric Cases of Gastric Adenocarcinoma and Review of the Literature

Derya Altay[1], Zehra Filiz Karaman[2], Alper Özcan[3], Kemal Deniz[4], Ekrem Ünal[3], Türkan Patıroğlu[3], Duran Arslan[1]

ABSTRACT

Background: Gastric adenocarcinoma is an extremely rare tumor with a poor prognosis in childhood. Patients are usually diagnosed late, as they present with non–specific symptoms and therefore, patients have low survival rates after diagnosis.

Case Report: Here, we present two cases of gastric adenocarcinoma, one with dysphagia and weight loss, and the other with abdominal pain, leg pain, and weight loss as the presenting complaints with literature review.

Conclusion: Gastric adenocarcinoma patients can be presented with non–specific symptoms such as dysphagia, weight loss, and leg pain.

Keywords: Gastric adenocarcinoma, pediatric, weight loss

Cite this article as:
Altay D, Karaman ZF, Özcan A, Deniz K, Ünal E, Patıroğlu T, et al. Two Pediatric Cases of Gastric Adenocarcinoma and Review of the Literature. Erciyes Med J 2021; 43(3): 296-9.

[1]Department of Pediatric Gastroenterology, Hepatology and Nutrition, Erciyes University Faculty of Medicine, Kayseri, Turkey
[2]Department of Pediatric Radiology, Erciyes University Faculty of Medicine, Kayseri, Turkey
[3]Department of Pediatric Hematology and Oncology, Erciyes University Faculty of Medicine, Kayseri, Turkey
[4]Department of Pathology, Erciyes University Faculty of Medicine, Kayseri, Turkey

Submitted
09.06.2020

Accepted
01.07.2020

Available Online
31.03.2021

Correspondence
Derya Altay,
Erciyes University Faculty of Medicine, Department of Pediatric Gastroenterology, Hepatology and Nutrition, Kayseri, Turkey
Phone: +90 352 207 66 66
e-mail: dr.deryaaltay@gmail.com

INTRODUCTION

Gastric adenocarcinoma is the third most deadly cancer worldwide. Moreover, this type of cancer is extremely rare in childhood. Gastric cancers in childhood constitute 0.05% of all gastrointestinal (GI) cancers (1). The most common symptoms of patients with gastric adenocarcinoma include vomiting, abdominal pain, anemia, and weight loss (2). While various environmental and genetic factors, particularly diet and lifestyle, are risk factors for gastric cancer in adults, a definite cause is still unknown in children (3). The prognosis is poor in patients with metastasis at the time of diagnosis, and the mean survival is approximately 3 months (2). Herein, we report two cases of gastric adenocarcinoma which presented with dysphagia, weight loss, abdominal pain, and leg pain.

CASE 1

A 13–year–old male patient with dysphagia and weight loss of 16 kg for 5 months was admitted to the pediatric gastroenterology outpatient clinic. It was found that he first experienced difficulty in swallowing solid food, and then liquid food. The patient had no family history of cancer. His body weight was 52 kg (0.21 SDS) and his height was 167 cm (1.18 SDS). His vital signs and physical examination results were normal. In the laboratory evaluation, hemoglobin was 11.4 g/dL (N: 12.3–16 g/dL), liver and kidney tests were within normal limits. Upper GI endoscopic examination revealed ulceration and stenosis of the distal esophagus, erosion of the fundus, and gastric hyperemia (Fig. 1). The histopathological report showed erosive esophagitis and *Helicobacter pylori* negative superficial gastritis. Following the pathology result, the patient was treated with proton pump inhibitor and sucralfate. Since oral feeding was insufficient, a nasogastric catheter was inserted, and enteral feeding was provided by nasogastric route. Two weeks later, the patient's complaints did not improve. Control upper GI endoscopy was performed, and the patient's medical treatment was continued as esophagitis was observed. The third upper GI endoscopy was performed approximately 12 days after the second endoscopy, since the complaints did not regress. However, it failed to pass into the stomach due to ulcerated stenosis in the distal esophagus. Abdominal ultrasonography was then performed to rule out a possible external mass at the cardioesophageal junction level. Abdominal ultrasonography showed a 25 mm mass at the level of gastroesophageal junction, leading to wall thickening extending into the gastric cardia and fundus. In addition, abdominal ultrasonography showed nodules, with the largest in the liver measuring 25 mm×16 mm and the largest in lymph nodes in the para–aortic area measuring 24 mm×12 mm. Thorax and abdomen magnetic resonance imaging (MRI) revealed a mass in the cardia, nodules in the liver, and para–aortic lymph nodes supporting ultrasonography (Fig. 2). Biopsy was performed from the largest nodule in the liver due to the difficulty in reaching the mass in the cardia. The histopathology of the patient was found to be metastatic gastric adenocarcinoma (Fig. 3). The patient underwent positron emission tomography (PET), through which metastatic lesions were observed in the left cervical lymph node, left upper paratracheal area, left upper lobe posterior and lower lobe superior segments of the lung, liver, and para–aortic area. At the gas-

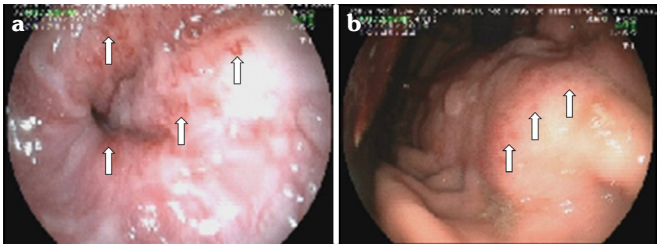

Figure 1. (a) Ulcerated stenosis in the distal esophagus (arrows). (b) Erosion of the fundus (arrows) (Case 1)

troesophageal junction, a mass of 58 mm×48 mm×70 mm extending from the cardia to the fundus was observed on whole body PET scan. The patient with diffused metastases was considered inoperable by pediatric surgery. Enteral feeding of the patient was provided with jejunostomy catheter. FOLFOX regimen (5–fluorouracil 400 mg/m^2, leucovorin 400 mg/m^2, and oxaliplatin 85 mg/m^2) is one of the internationally recognized first–line chemotherapy regimens for gastric cancer was started. Intravenous ondansetron treatment was administered for chemotherapy-induced nausea and vomiting. Fentanyl transdermal was applied by the Algology Department because of the severe pain felt by the patient. The patient underwent three cycles of chemotherapy and 15 days of 45 Gy dose radiotherapy to the tumor bed and regional lymph nodes. There was no decrease in tumor tissue and metastases in the control MRI of the patient who was examined for the success of chemoradiotherapy. Treatment of the patient was not completed, because of the parents of the patient preferred to continue chemotherapy in another oncology center. The whole gene analysis of cancer panel for mismatch repair gene mutations of the patient was normal.

CASE 2

A 16–year–old female patient was admitted to the outpatient clinic with abdominal pain, leg pain, and weight loss approximately 10 kg. Based on their family history, the grandfather of patient has gastric adenocarcinoma and her aunt has endometrial carcinoma. Her father and mother have first degree consanguinity. Her body weight and her height were in the age–appropriate percentiles. During the physical examination, there was low back pain and hip pain with palpitation. Blood count and biochemical evaluation were normal. Lumbosacral and pelvic MRI showed hypointense lytic lesions in the left iliac region and L2–L5 vertebral corpus. Excisional

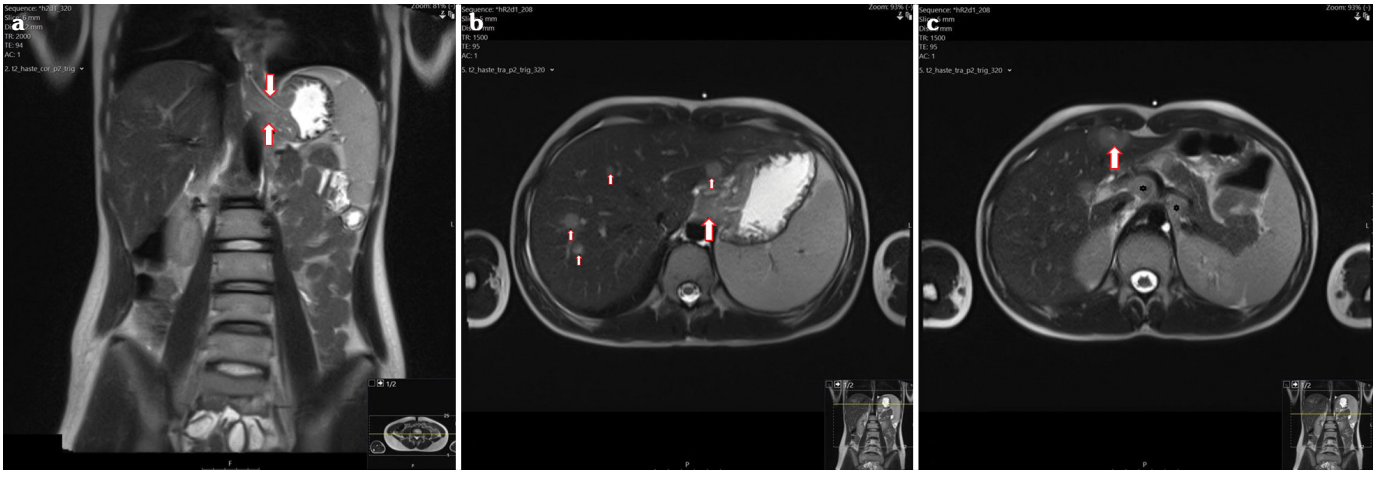

Figure 2. (a) Coronal T2A image, concentric wall thickness extending from gastric cardia to the fundus (thick arrow). Nasogastric catheter is seen as linear hyperintense structure (thin arrow). (b) Axial T2A image, concentric wall thickness extending from gastric cardia to the fundus (thick arrow). Liver metastasis is seen (thin arrow). (c) Axial T2A image, para–aortic lymphadenopathies (stars), and liver metastasis (arrow) are seen (Case 1)

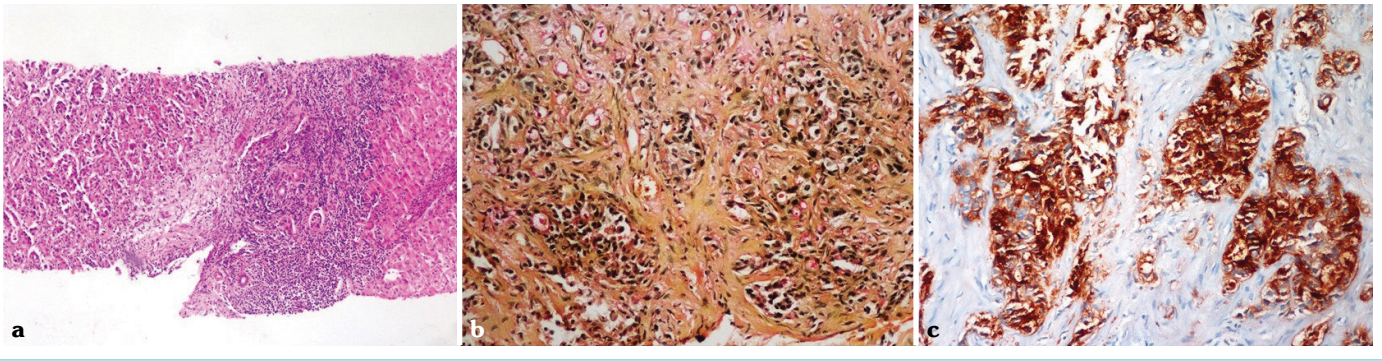

Figure 3. (a) Malignant gland structures compatible with adenocarcinoma infiltrating the liver (Hematoxylin eosin, ×100). (b) Mucin positivity in these atypical cells (×200). (c) Immunohistochemical CEA positivity (×200) (Case 1)

biopsy was performed from the left iliac region, and the pathology was reported to be metastasis of adenocarcinoma. PET evaluation showed intense hypermetabolic activity in brain, skeletal system, para–aortic, ileocecal lymph nodes, gastric antrum, and fundus.

GI endoscopy was performed, and gastric biopsy specimen showed gastric adenocarcinoma. The patient, who was on Stage 4, was considered inoperable. FOLFOX regimen (5–fluorouracil 400 mg/m^2, leucovorin 400 mg/m^2, and oxaliplatin 100 mg/m^2) for gastric cancer was started. No serious side effects were observed during the chemotherapy periods. The patient died because of progressive disease despite eight cycles of chemotherapy. Radiological and pathological data of the patient could not be obtained. The whole gene analysis of cancer panel of the patient was not performed.

Consents were obtained from the parents of the both patients for this study.

DISCUSSION

Gastric adenocarcinoma, which has an extremely poor prognosis, is unfortunately also seen in children. Gastric adenocarcinoma can be seen de novo as well as part of hereditary polyposis syndromes or after gastric lymphoma treatment in children (2). Pediatric gastric adenocarcinomas are not considered primarily in differential diagnosis because they are very rare diseases. In Japan, where gastric cancers are common, approximately 46,000 people die annually from gastric cancer, and even there, pediatric gastric adenocarcinomas are rare.4 Patients' admission findings are mostly nonspecific, and cases with vomiting, hematemesis, abdominal pain, anemia, weight loss, pulmonary hypertension, thrombotic microangiopathy, and massive ascites have been reported (2, 4–6). Patiroglu et al. (7) reported that they diagnosed gastric signet ring cell carcinoma in an 18–year–old patient with ataxia telangiectasia and Hashimoto thyroiditis. Ataxia telangiectasia is a primary immunodeficiency disease whose susceptibility to cancer is increasing. Since the patients with gastric adenocarcinoma present with nonspecific findings, they are mostly diagnosed in the late period, resulting in poor prognosis due to their metastases. As can be seen from the case reports, the common finding among the patients is weight loss. It is emphasized that the etiology in patients with adult gastric adenocarcinoma is multifactorial due to lifestyle, dietary, and infectious factors. However, the reason for the development of gastric adenocarcinoma in children has not yet been elucidated (2). While *H. pylori* is the main cause of gastric cancer in adults, the relationship to gastric cancer in children is not fully known. *H. pylori* is mostly associated with antral adenocarcinomas, but not with adenocarcinomas localized in the cardia (8). In the first case, *H. pylori* was not detected. Okuda et al. (9) suggested that genetic abnormalities may be associated with the development of pediatric gastric cancer or may be related to the presence of *H. pylori* in addition to genetic abnormality. In hereditary diffuse gastric cancer cases, E–Cadherin (CDH1) germ–line mutation has also been reported. Moreover, young people at risk of hereditary diffuse gastric cancer may benefit from prophylactic gastrectomy (10). The whole gene analysis of cancer panel of the first patient was normal. Unfortunately, genetic testing of the second case could not be performed.

In a study conducted using the United States National Cancer Database, 0.1% of gastric adenocarcinoma cases were pediatric cases and pediatric cases were more advanced and poorly differentiated than those of adults. It was also stated that young adults were appreciably more likely to present with bone metastases as compared to older patients (11). In the study of Subbiah et al. (2) they presented five pediatric gastric adenocarcinoma patients with a median age was 17 years (range 8–17 years). The cases mostly presented with diffuse metastatic disease, and only one patient without metastasis survived. The disease progressed 4 months on the average, and after progress, the mean time to death from initial progression was 2.8 months. In the same study, it was stated that three of the five patients also had signet ring cell carcinoma. Signet ring cell carcinoma is a condition that reduces response to treatment (12). Signet ring cell carcinoma was not observed in both of our cases.

In the diagnosis of the disease, upper GI endoscopy and histopathological examination of endoscopic biopsies are very useful for diagnosis. Unfortunately, gastric adenocarcinoma was not diagnosed with repeated endoscopic evaluations in the first case, but clinical preliminary information, about the disease was obtained by radiological imaging methods such as ultrasonography, computed tomography, and MRI.

Wen et al. (13) reported that 11.3% of patients with gastric cancer had bone metastasis, and median overall survival time was 6.5 months. Zheng et al. (14) reported that a patient with gastric adenocarcinoma with liver and left supraclavicular lymph node metastasis underwent palliative tumor resection, but the patient died 3 months after diagnosis. The second case of our report was admitted to the hospital with leg pain due to bone metastasis and she died in a short time due to diffused metastasis.

The chance of long–term survival in patients with gastric adenocarcinoma is only possible with total surgical resection of the tumor, but patients do not always have a chance of surgery because of their widespread metastases during diagnosis. Palliative chemotherapy (FOLFOX) is administered in the first–line treatment of Stage 4, inoperable gastric adenocarcinoma cases, as well as indication of palliative radiation therapy in the presence of significant pain and obstruction (2) Surgical resection could not be performed because of common metastases of both cases and the patients underwent palliative chemoradiotherapy. Due to the incomplete treatment of the first patient, success of the treatment could not be evaluated, and the other patient died despite the treatment.

Our cases presented with non–specific symptoms such as dysphagia, weight loss, and leg pain, and they had multiple metastases at the time of diagnosis. Due to this article, it was emphasized that gastric adenocarcinoma should be included in the differential diagnosis in pediatric patients with dysphagia, weight loss, and leg pain.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – DA; Design – DA; Supervision – DA; Resource – DA, ZFK, AÖ; Materials – DA, ZFK, AÖ, KD; Data Collection and/or Processing – DA; Analysis and/or Interpretation – DA, ZFK, AÖ; Literature Search – DA, AÖ; Writing – DA; Critical Reviews – EÜ, TP, DAr.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Harting MT, Blakely ML, Herzog CE, Lally KP, Ajani JA, Andrassy RJ. Treatment issues in pediatric gastric adenocarcinoma. J Pediatr Surg 2004; 39(8): e8–10. [CrossRef]
2. Subbiah V, Varadhachary G, Herzog CE, Huh WW. Gastric adenocarcinoma in children and adolescents. Pediatr Blood Cancer 2011; 57(3): 524–7. [CrossRef]
3. Yusefi AR, Lankarani KB, Bastani P, Radinmanesh M, Kavosi Z. Risk factors for gastric cancer: A systematic review. Asian Pac J Cancer Prev 2018; 19(3): 591–603.
4. Rizzo D, Arlotta A, Maurizi P, Ruggiero A, Attina G, Riccardi R. Gastric adenocarcinoma presenting as thrombotic microangiopathy in a 14-year-old girl. J Pediatr Hematol Oncol 2011; 33(5): e213–5.
5. Carbonell FR, Cochran T, Zapata F. Gastric adenocarcinoma: A rare cause of abdominal pain and anemia in a 14-year-old patient. J Pediatr Gastroenterol Nutr 2020; 70(1): e18.
6. Lin CH, Lin WC, Lai IH, Wu SF, Wu KH, Chen AC. Pediatric gastric cancer presenting with massive ascites. World J Gastroenterol 2015; 21(11): 3409–13. [CrossRef]
7. Patiroglu T, Gungor HE, Arslan D, Deniz K, Unal E, Coskun A. Gastric signet ring carcinoma in a patient with ataxia-telangiectasia: A case report and review of the literature. J Pediatr Hematol Oncol 2013; 35(8): e341–3.
8. Ishaq S, Nunn L. *Helicobacter pylori* and gastric cancer: A state of the art review. Gastroenterol Hepatol Bed Bench. 2015; 8(Suppl 1): S6–S14.
9. Okuda M, Nomura K, Kato M, Lin Y, Mabe K, Miyamoto R, et al. Gastric cancer in children and adolescents in Japan. Pediatr Int 2019; 61(1): 80–6. [CrossRef]
10. Hunstman DG, Carneiro F, Lewis FR, MacLeod PM, Hayashi A, Monaghan KG, et al. Early gastric cancer in young, asymptomatic carriers of germ-line E-cadherin mutations. N Engl J Med 2001; 344(25): 1904–9. [CrossRef]
11. Tessler RA, Dellinger M, Richards MK, Goldin AB, Beierle EA, Doski JJ, et al. Pediatric gastric adenocarcinoma: A national cancer data base review. J Pediatr Surg 2019; 54(5): 1029–34. [CrossRef]
12. Pernot S, Voron T, Perkins G, Lagorce-Pages C, Berger A, Taieb J. Signet-ring cell carcinoma of the stomach: Impact on prognosis and spesific therapeutic challenge. World J Gastroenterol 2015; 21(40): 11428–38. [CrossRef]
13. Wen L, Li YZ, Zhang J, Zhou C, Yang HN, Chen XZ, et al. Clinical analysis of bone metastasis of gastric cancer: Incidence, clinicopathological features and survival. Future Oncol 2019; 15(19): 2241–9. [CrossRef]
14. Zheng N, Xiao XM, Dong KR, Chen L, Ma YY, Li K. Primary gastric tumors in infants and children: 15 cases of 20-year report. J Cancer Res Clin Oncol 2016; 142(5): 1061–7. [CrossRef]