Osmangazi Tıp Dergisi
Osmangazi Journal of Medicine 2021;43(1):70 -75

Araştırma Makalesi / Research Article

Clinical Significance of Inlet Patch in Children

Çocuklarda Inlet Patch'in Klinik Önemi

[1]Yusuf Aydemır, [2]Hayrıye Hızarcıoglu Gulsen, [3]Evrım Yılmaz, [4]Zeren Barıs, [5]Zuhal Akcoren, [5]Dıclehan Orhan, [2]Hulya Demır

[1]Eskisehir Osmangazi University Faculty of Medicine Department of Pediatrics Division of Gastroenterology and Hepatology, Eskisehir, Turkey
[2]Hacettepe University Faculty of Medicine Department of Pediatrics Division of Gastroenterology and Hepatology, Ankara, Turkey
[3]Eskisehir Osmangazi University Faculty of Medicine Department of Pathology, Eskisehir, Turkey
[4]Hacettepe University Faculty of Medicine Department of Pediatrics, Ankara, Turkey
[5]Hacettepe University Faculty of Medicine Department of Pathology, Ankara, Turkey

Abstract

Inlet patch (IP) is an area of heterotopic gastric mucosa located in proximal esophagus. Although the majority of IP are asymptomatic, they may be associated with digestive and respiratory symptoms. We aimed to assess prevalence, endoscopic and histopathological findings, clinical significance and outcome of inlet patch in children.The patients with histopathologically proven IP and aged between 0-18 years old were enrolled. Demographic data, clinical symptoms, endoscopic and histopathological findings, treatment modality, and outcomes were collected from medical records. Retrospective review of 2674 esophagogastroduodenoscopy records revealed 11 (0.41%) children. Eight of our patients had a solitary patch whereas others had two (n=1) or three (n=2). Histopathological evaluation revealed that 9 patients had fundic and 2 patients had antral type gastric mucosa. One patient with hematemesis and other with dysphagia had hyperemic patchy areas of which were colonized by H. pylori. Inlet patch was the only pathological endoscopic finding in 4 patients with a single symptom each: heartburn, dysphagia, hematemesis and hoarseness. Symptoms were completely resolved with PPI treatment in 8 children. Helicobacter pylori eradication was achieved in all infected patients. No respiratory symptom was recorded except hoarseness in one patient. No complications like perforation, stenosis or dysplasia that might be related to IP were recorded at follow-up. We suggest that an IP may accompany or may be responsible for digestive symptoms in children and PPI treatment is effective. Endoscopist should be aware of this condition, especially if the patient has dyspeptic symptoms and normal endoscopic findings.

Keywords: Esophagus, esophagogastroduodenoscopy, Helicobacter pylori, heterotopic gastric mucosa, inlet patch

Özet

Inlet patch (IP) heterotopik olarak proksimal özofagusta yerleşen gastrik mukoza alanıdır. Her ne kadar çoğunluğu belirtisiz olsa da, sindirim ve solunum belirtileriyle ilişkili olabilir. Bu çalışmayla çocuklarda IP'nin prevelansı, endoskopik ve histopatolojik bulguları, klinik önemi ve izlem sonuçlarının değerlendirilmesi amaçlanmıştır. Histopatolojik olarak kanıtlanmış IP'i olan 0-18 yaş aralığındaki hastalar çalışmaya alınmıştır. Demografik veriler, klinik belirtiler, endoskopik ve histopatolojik bulgular, uygulanan tedaviler ve izlem sonuçları arşivden kaydedildi. Geriye dönük incelenen özofagogastroduodenoskopi kayıtlarından 11/2674 (0.41%) IP'li hasta saptandı. Hastaların 8'inde tek iken, bir hastada 2, iki hastada ise 3 adet IP vardı. Histopatolojik değerlendirme sonucu 9 hastada fundik and 2 hastada ise antral tip gastrik mukoza olduğu görüldü. Hematemezi olan bir hasta ve disfajisi olan bir hastada IP mukozasının hiperemik ve H. pylori ile kolonize olduğu belirlendi. Yanma, disfaji, hematemez ve ses kısıklığı olan 4 farklı hastada IP, saptanan tek patolojik endoskopik bulguydu. Hastalardan 8'inde proton pompa inhibitörü tedavisi ile belirtiler tamamen kaybolmuştu. Helicobacter pylori eradikasyonu enfekte olan tüm hastalarda sağlandı. Ses kısıklığı olan bir hasta dışında başka solunum belirtisi olan yoktu. İzlemde perforasyon, darlık veya displazi gelişimi gibi bir komplikasyon izlenmedi. Inlet patch çocuklarda sindirim belirtilerine eşlik edebilir veya sorumlu olabilir. Tedavisinde PPI etkilidir. Endoskopist, hastanın dispeptik semptomlarına rağmen normal özofagogastroduodenoskopi bulguları varsa IP açısından özellikle dikkatli olmalıdır.

Anahtar Kelimeler: Özofagus, özofagogastroduodenoskopi, Helicobacter pylori, heterotopic gastrik mukoza, inlet patch

Correspondence: Yusuf AYDEMİR- Eskisehir Osmangazi University Faculty of Medicine Department of Pediatrics Division of Gastroenterology and Hepatology, Eskisehir, Turkeye-mail:dryusufaydemir@yahoo.com
Received: 24.08.2020
Accepted: 28.09.2020
Online published: 28.09.2020

Citethisarticle as:
Aydemir Y, Hizarcioglu Gulsen H, Yilmaz E, Baris Z, Akcoren Z, Orhan D, Demir H. Clinical Significance of Inlet Patch in Children, Osmangazi Journal of Medicine, 2021; 43(1):70-75 Doi: 10.20515 / otd.784376

1. Introduction

Esophageal inlet patch (IP) is an area of heterotopic gastric mucosa located in proximal esophagus. It appears as a salmon-colored, flat or slightly raised patch. It is detected during endoscopic examination and the diagnosis is confirmed histopathologically (1). The true prevalence of IP in children is unknown moreover it varies from 0.29% to 13.8% in previous studies (2,3). Although the majority of inlet patches are asymptomatic and incidentally discovered, they may be associated with symptoms such as regurgitation, dysphagia, food impaction, globus, cough, laryngospasm and bleeding (4-7).
We aimed to assess prevalence, endoscopic and histopathological findings, clinical significance and outcome of inlet patch in children.

1. Material and Methods

This retrospective study was conducted at Eskisehir Osmangazi and Hacettepe Universities, Departments of Pediatrics, Divisions of Pediatric Gastroenterology. The study was approved by the Ethics Committee of Eskisehir Osmangazi University. Endoscopic records were screened. The patients with histopathologically proven inlet patch and aged between 0-18 years old were enrolled. Demographic data (age, sex), clinical symptoms (regurgitation, vomiting, dysphagia, food impaction, globus, cough, dyspnea, laryngospasm, hoarseness, halitosis and bleeding), endoscopic findings (color, number, size and location of IP), histopathological findings [(mucosal type, inflammation status, and the presence of Helicobacter pylori (H. pylori)], treatment modality, and outcomes were collected from medical records. Patients without histopathological confirmation were excluded from the study.

Statistical Analyses
Statistical analyses were performed using the SPSS software version 23.0 (SPSS Inc., Chicago, IL, USA). Data were expressed as numbers (n), frequencies (%), means with standard deviations.

2. Results

Retrospective review of 2674 esophagogastroduodenoscopy records between January 2017 and December 2019 showed 20 cases with endoscopic finding suggesting IP. The diagnosis was confirmed histopathologically in 11 (0.41%) children. The male/female ratio was 1.2 (6/5) and the mean age at diagnosis was 14.8±1.9 (11.5-17) years. Nine children had underlying or concomitant disorders. Four of these nine children had gastroesophageal reflux disease (GERD), 2 had esophageal atresia, 1 had asthma, 1 had esophageal stricture secondary to caustic ingestion, and 1 had Familial Mediterranean Fever. Epigastric pain was the most common complaint and noted in 5 children. Other symptoms were heartburn (n=5), nausea and vomiting (n=2), dysphagia (n=2), diarrhea (n=2), hematemesis (n=1), hoarseness (n=1) and recurrent abdominal pain (n=1).

The indications for endoscopic evaluation were dysphagia (n=2), upper gastrointestinal bleeding (n=1), recurrent abdominal pain (n=1), and suspected peptic ulcer disease (n=5) and inflammatory bowel disease (n=2). Eight out of 11 patients had a solitary patch (Figure 1a) whereas others had two (n=1) or three (n=2) lesions. One patient with hematemesis and other with dysphagia had hyperemic patchy areas of which were colonized by H. pylori (Figure 1b-1c). Of the remaining 9 had a salmon-colored, flat or slightly raised patch range between 4 mm to 2 cm in diameter. Histopathological evaluation of the biopsies that were obtained from IP lesions revealed that 9 patients had fundic and 2 patients had antral type gastric mucosa (Figure 2a). Mild to severe chronic inflammation was found in all IP samples (Figure 2b). Helicobacter pylori infection was detected in 5 patients and 3 of them were demonstrated only in gastric mucosa, 1 in both gastric and IP mucosa and the last one only in IP mucosa (Table 1 and Figure 2c).

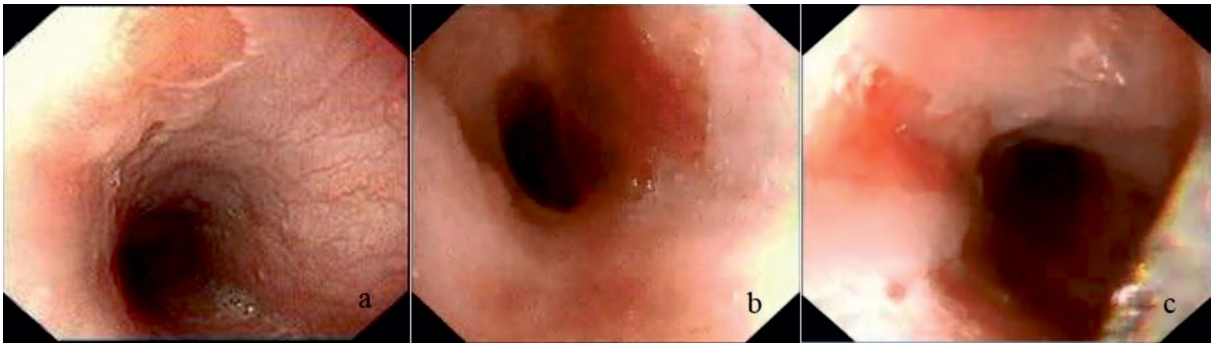

Figure 1. Endoscopic view of inlet patches; a: salmon-colored, b: hyperemic and, c: multiple and hyperemic

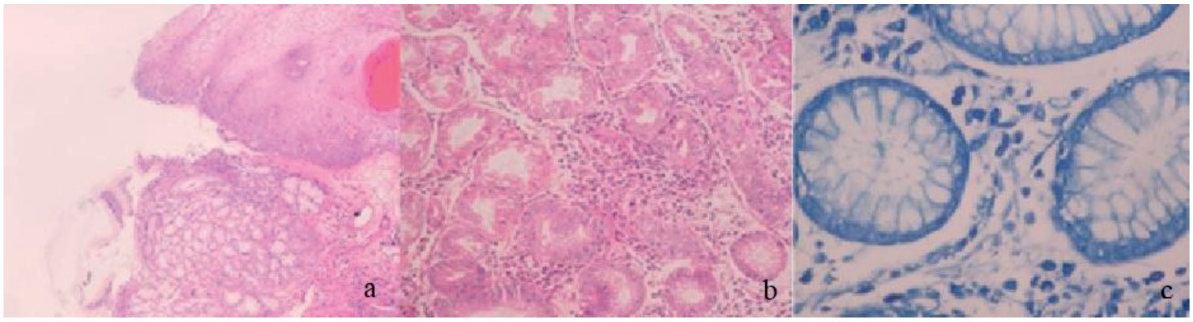

Figure 2. Histopathological view of inlet patches;
a: squamous and columnar epithelium, b: inflammation at lamina propria, and c: H. pylori at the gland lumen

In our series, 4 of 5 patients with heartburn diagnosed with GERD, one of 2 patients with dysphagia diagnosed with eosinophilic esophagitis, one of 2 patients present with hematemesis diagnosed with erosive gastritis, and one patient presents with hoarseness with normal results of pH monitorization and laryngeal examination. Inlet patch was the only pathological endoscopic finding in 4 patients with a single symptom each: heartburn, dysphagia, hematemesis and hoarseness. All the patients except patient 2 received proton pump inhibitor (PPI) treatment. Five patients with H. pylori infection were treated with amoxicillin, clarithromycin and PPI regimen (Table 1). The mean follow-up duration was 13.4±4.8 months. Symptoms were completely resolved with PPI treatment in 5 children with epigastric pain. Helicobacter pylori eradication was achieved in all infected patients. Of the remaining 5 patients, two children with dysphagia, one child with hematemesis and two children with vomiting were effectively treated with PPI treatment. No respiratory symptom was recorded except hoarseness in patient 8. No other symptoms or complications like perforation, stenosis or dysplasia that might be related to IP were recorded at follow-up.

Table 1. Demographic, Clinical, Endoscopic and Histopathological Findings, and Outcomes of the Patients

Patient number	Age (years)/sex	Symptoms	Endoscopic findings	Histopathological findings	Treatment	Outcome
1	17/F	Epigastric pain, heartburn	Solitary lesion, 7 mm in diameter, salmon-colored, flat	Fundic type gastric mucosa, H. pylori	H. pylori eradication, PPI	Symptoms disappeared
2	16/M	Recurrent abdominal pain	Solitary lesion, 4 mm in diameter, salmon-colored, flat	Fundic type gastric mucosa	No treatment	Recurrent abdominal pain persisted
3	15/F	Nause, vomiting, hematemesis	Three lesions; 0.5, 1 and 1 cm in diameter, two of them salmon-colored and flat, and other was hyperemic	Antral type gastric mucosa	PPI	Symptoms disappeared
4	15/M	Epigastric pain	Solitary lesion, 2 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	H. pylori eradication, PPI	Symptom disappeared
5	13/M	Epigastric pain, bloating	Two lesions, 0.5 and 1 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	H. pylori eradication, PPI	Symptoms disappeared
6	15/F	Epigastric pain, heartburn	Solitary lesion, 0.7 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	H. pylori eradication, PPI	Symptoms disappeared
7	17/M	Bloody diarrhea, heartburn	Solitary lesion, 2 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	PPI	Symptoms disappeared
8	16/M	Dysphagia, heartburn, hoarseness	Three lesions; 0.5, 1.2, 2 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	PPI	Dysphagia improved, other symptoms resolved
9	11.5/M	Recurrent aphtous stomatitis, diarrhea	Solitary lesion, 2 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	PPI	Symptoms disappeared
10	12/F	Nause, vomiting, heartburn	Solitary lesion, 0.5 cm in diameter, salmon-colored, flat	Fundic type gastric mucosa	PPI	Symptoms disappeared
11	15.5/F	Dysphagia, epigastric pain, heartburn	Solitary lesion, 1.5 cm in diameter, hyperemic, flat	Antral type gastric mucosa	H. pylori eradication, PPI	Dysphagia improved, other symptoms resolved

3. Discussion

Heterotopic gastric mucosa has been reported throughout the gastrointestinal tract, including mouth, esophagus, small intestine, pancreas, gall bladder, and Meckel diverticulum (8-13). Esophageal IP is mostly located in the post cricoid part of the esophagus nearly at the level of upper esophageal sphincter (14). The most common accepted mechanism of IP formation is that it is congenital disorder as a result of deficient transformation of columnar mucosa to squamous mucosa (14,15). Other theories suggest metaplastic transformation of the squamous cells to columnar cells from chronic acid injury as seen in

Barrett's esophagus as well as rupture of retention cystic glands of the proximal esophagus (14,16,17). It can also be associated with other congenital malformations such as esophageal atresia. Inlet patch frequency has been reported as 34% children with a history of esophageal atresia (18). In our cohort there were two (18%) children with history of esophageal atresia.

The true prevalence of IP in children is unknown. Prospective studies regarding adults showed a IP prevalence between 0.3-10% (4). A recent pediatric multicenter retrospective study has reported its estimated prevalence of 0.03 to 0.05% (4). However, two pediatric postmortem studies reported the frequency of IP as 21% and 34% (18-19). In necropsy studies, incidence is very high as the histological examination includes the entire esophagus and can detect small lesions. Other factors might be associated with endoscopist's awareness and adequate sedation. It has been reported that detection of IP is influenced by the endoscopist's awareness of this entity (20). Retrospective review of the last 3 years' endoscopy records in our centers revealed 20 cases with IP, 11 of which confirmed histopathologically. Inlet patch prevalence was 0.41% in our study. The low prevalence may indicate the under recognition of this pathology. Pediatric endoscopist must be aware of the IP during endoscopy in children and move the scope slowly with moderate inflation while passing the upper portion of the esophagus, and use adequate sedation.

Inlet patch appears as a salmon-colored, flat or slightly raised, well-defined patch during endoscopy. It is commonly detected as solitary lesion but it can be multiple (1). In a pediatric multicenter retrospective study, 12 of 15 patients had solitary IP (4). Eight of our patients had a solitary patch while one had double and 2 had triple. The most common histological type is fundic type mucosa followed by antral mucosa (4,14). Histopathological evaluation of the endoscopic biopsy samples of our patients revealed that 9 patients had fundic and 2 patients had antral type mucosa, which is compatible with the literature. Depending on the mucosa type, IP can produce acid as the gastric mucosa (21) and acid overproduction results in chronic inflammation of the esophagus (14). Inflammatory infiltration of IP is commonly encountered. However, atrophy, metaplasia, dysplasia or adenocarcinoma of the heterotrophic mucosa are rare (14). One patient who presented with hematemesis showed hyperemia on IP and histopathological evaluation revealed antral type mucosa. Prevalence of H. pylori on IP mucosa have been reported as high as 82% in large adult series (22,23). The higher gastric HP load, the higher prevalence of HP colonization in the IP (14). One pediatric multicenter study demonstrated H. pylori on inlet patch mucosa of 2/15 patients (4). Similarly, we detected H. pylori on inlet patch mucosa of two out of 11 patients.

Although the majority of inlet patches are asymptomatic and incidentally discovered, they have been associated with symptoms such as regurgitation, dysphagia, food impaction, globus, cough, throat clearing, laryngospasm and complications such as stricture formation, ulceration, bleeding, perforation, fistula formation, polyp and malignant transformation as a result of acid or mucus production of the IP (3-6,14,22,24-28). Laryngopharyngeal reflux is the main reason underlying the symptoms. Compared to adults, respiratory symptoms, dysphagia and food impaction were reported to be higher with IP in childhood before eosinophilic esophagitis were well defined (14).

On the other hand, in one study, the incidence of upper esophageal or laryngopharyngeal symptoms did not differ between case and control groups (29). In four of our patients IP was the only pathologic endoscopic finding that can explain the symptoms. No respiratory symptom other than hoarseness was recorded.

There is no standardized treatment for IP. While asymptomatic patients with IP do not need a medication, proton pump inhibitor is the main treatment especially for the ones with acid related symptoms (30). In our cohort, all symptomatic patients recovered after PPI treatment. Argon plasma coagulation treatment has also been reported in adults and children for symptomatic IP with resolution of symptoms in all patients and no significant adverse event (31,32). Such interventional treatment may be considered in case of unresponsiveness to PPI. Endoscopic submucosal resection or dissection (for dysplasia or adenocarcinoma of IP) and radiofrequency ablation (with symptoms of globus/sore throat) are rarely reported interventions (14).

4. Conclusions

In conclusion, we suggest that an IP may accompany or may be responsible for digestive symptoms in children and PPI treatment is effective. Endoscopist should be aware of this condition and carefully assess the proximal esophagus during endoscopy, especially if the patient has dyspeptic symptoms and normal esophagogastroduodenoscopic findings.

KAYNAKLAR

1. Chong VH. Clinical significance of heterotopic gastric mucosal patch of the proximal esophagus. World J Gastroenterol. 2013;19:331-8.

2. Maconi G, Pace F, Vago L, et al. Prevalence and clinical features of heterotopic gastric mucosa in the upper oesophagus (inlet patch). Eur J Gastroenterol Hepatol. 2000;12:745-9.

3. Ohara M. Incidence of heteroptopic gastric mucosa in the upper esophagus in first time narrow banding image endoscopy of consecutive 900 patients. Gastrointest Endosc. 2010;71:316-7.

4. Georges A, Coopman S, Rebeuh J, et al. Inlet patch:-clinical presentation and outcome in children. J Pediatr-Gastroenterol Nutr. 2011;52:419-23.

5. Karnak I, Senocak ME, Akçören Z, et al. Ectopic gastric mucosa causing dysphagia due to strictures in a boy. Eur J Pediatr Surg. 1999;9:413-5.

6. Macha S, Reddy S, Rabah R, et al. Inlet patch: heterotopic gastric mucosa another contributor to supraesophageal symptoms? J Pediatr. 2005;147:379-82.

7. di Palmo E, Cazzato S, Tursini S, et al. A rare association of inlet patch with laryngospasm: a report of two children and literature review. Pediatr Pulmonol 2011;46:934-8.

8. Devereaux CE, Devereaux RG. Heterotopic gastric mucosa of the rectum with a review of the literature. J Clin Gastroenterol. 1994;19:41-5.

9. Kalman PG, Stone RM, Phillips MJ. Heterotopic gastric tissue of the bile duct. Surgery. 1981;89:384-6.

10. Lamont N, Winthrop AL, Cole FM, et al. Heterotopic gastric mucosa in the gallbladder: a cause of chronic abdominal pain in a child. J Pediatr Surg. 1991;26:1293-5.

11. Shim YT, Kim SY. Heterotopic gastric mucosa and pancreatic tissue in the skin of the abdominal wall. J Pediatr Surg. 1992;27:1539-40.

12. Wolff M, Rankow RM. Heterotopic gastric epithelium in the head and neck region. Ann Plast Surg. 1980;4:53-64.

13. Xeropotamos N, Skopelitou AS, Batsis C, et al. Heterotopic gastric mucosa together with intestinal metaplasia and moderate dysplasia in the gall bladder: report of two clinically unusual cases with literature review. Gut. 2001;48:719-23.

14. Rusu R, Ishaq S, Wong T, et al. Cervical inlet patch: new insights into diagnosis and endoscopic therapy. Frontline Gastroenterol. 2018;9:214-20.

15. von Rahden BH, Stein HJ, Becker K, et al. Heterotopic gastric mucosa of the esophagus: literature-review and proposal of a clinicopathologic classification. Am J Gastroenterol. 2004;99:543-51.

16. Avidan B, Sonnenberg A, Chejfec G, et al. Is there a link between cervical inlet patch and Barrett's esophagus? Gastrointest Endosc. 2001; 53:717-21.

17. Meining A, Bajbouj M. Erupted cysts in the cervical esophagus result in gastric inlet patches. Gastrointest Endosc. 2010;72: 603-5.

18. Emery JL, Haddadin AJ. Gastric-type epithelium in the upper esophageal pouch in children with tracheo-esophageal fistula. J Pediatr Surg. 1971;6:449-53.

19. Variend S, Howat AJ. Upper oesophageal gastric heterotopia: a prospective necropsy study in children. J Clin Pathol. 1988;41:742-5.

20. Azar C, Jamali F, Tamim H, et al. Prevalence of Endoscopically Identified Heterotopic Gastric Mucosa in the Proximal Esophagus Endoscopist Dependent? J Clin Gastroenterol. 2007;41:468-71.

21. Galan AR, Katzka DA, Castell DO. Acid secretion from an esophageal inlet patch demonstrated by ambulatory pH monitoring. Gastroenterology. 1998;115:1574-6.

22. Weickert U, Wolf A, Schröder C, et al. Frequency, histopathological findings, and clinical significance of cervical heterotopic gastric mucosa (gastric inlet patch): a prospective study in 300 patients. Dis Esophagus. 2011;24:63-8.

23. Gutierrez O, Akamatsu T, Cardona H, et al. Helicobacter pylori and hetertopic gastric mucosa in the upper esophagus (the inlet patch). Am J Gastroenterol. 2003; 98:1266-70.

24. Von Rahden BH, Stein HJ, Becker K, et al. Heterotopic gastric mucosa of the esophagus:literature-review and proposal of a clinicopathologic classification.Am J Gastroenterol. 2004;99:543-51.

25. Bataller R, Bordas JM, Ordi J, et al. Upper gastrointestinal bleeding: a complication of "inletpatch mucosa" in the upper esophagus. Endoscopy. 1995; 27:282.

26. Righini CA, Faure C, Karkas A, et al. Spontaneous-perforation in the upper oesophagus resulting fromulcer in heterotopic gastric mucosa. Rev Laryngol Otol Rhinol2007;128:197-200.

27. Daher P, Francis E, Raffoul L, et al. Ectopic gastric mucosain the cervical esophagus presenting as a recurrent neckabscess: a case report. J Pediatr Surg. 2010; 45: e15-e17.

28. Rana SS, Panda N, Sinha SK, et al.Heterotopic gastric mucosa in the upper esophagus manifestingas a polypoidal mass causing dysphagia. GastrointestEndosc. 2006;63:185-7.
29. Akbayir N, Alkim C, Erdem L, et al. Heterotopic gastric mucosa in the cervical esophagus (inlet patch): endoscopic prevalence, histologicaland clinical characteristics. J Gastroenterol Hepatol. 2004;19:891-6.
30. Poyrazoglu OK, Bahcecioglu IH, Dagli AF, et al. Heterotopic gastricmucosa (inlet patch): endoscopic prevalence, histopathological, demographicaland clinical characteristics. Int J Clin Pract. 2009;63:287-91.
31. Bajbouj M, Becker V, Eckel F, et al. Argon plasma coagulation of cervical heterotopic gastric mucosa as an alternative treatment for globus sensations. Gastroenterology. 2009;137:440-4.
32. Alberty JB, Chanis R, Khoshoo V. Symptomatic gastric inlet patches in children treated with argon plasma coagulation: a case series. J Interv Gastroenterol. 2012;2:91-3.