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Clinical case. Successful endoscopic treatment of an epiphrenic diverticulum of the esophagus using diverticular per-oral endoscopic myotomy (D-POEM)

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Abstract. Nowadays, technical advances in gastro-intestinal (GI) endoscopy have enabled the rapid introduction of new minimally invasive methods in management of GI diseases in daily practice of endoscopists. Over the last decade, treatment of esophageal achalasia by per-oral endoscopic myotomy (POEM) has become widely used. This technique is characterized by minimal procedural trauma to the mucous membrane of the esophagus. It shows good treatment results and short recovery period. Due to the formation of a submucosal tunnel followed by myotomy of the circular layer directly under the mucosa and final closure of mucosotomy by application of endoscopic clips. Subsequently, a further modification of the above mention technique, diverticular per-oral endoscopic myotomy (D-POEM), appears for treatment of epiphrenic diverticula. This case study presents the first successful endoscopic treatment of an epiphrenic esophageal diverticulum using D-POEM in Ukraine. Preoperative patient's evaluation included video gastroduodenoscopy and contrast chest and abdominal computed tomography (CT). No esophageal manometry study was performed. The patient was electively hospitalized in the surgical department with clinical diagnosis: thoracic epiphrenic esophageal diverticulum. After the surgery, the general condition of the patient improved. In patients with epiphrenic diverticulum, the D-POEM technique may be considered an alternative to laparoscopic or open surgery. Diverticular per-oral endoscopic myotomy minimizes the risk of postoperative complications and reduces postoperative recovery time.

Key words: diverticular per-oral endoscopic myotomy (D-POEM), epiphrenic esophageal diverticulum.

Introduction

Epiphrenic (supraphrenic) diverticulum (ED) is a rare disease characterized by prolapse of the mucosa and submucosal membrane through the muscular layer in the lower third of thoracic esophagus. EDs are typically

localized within 10 cm proximal to cardia on the right posterior wall of the esophagus. Due to the rarity of the disease, its true frequency is unknown. According to the literature, it is approximately 1 case per 500,000 popula-

tion [1]. ED is more often pulsatile in nature due to dysmotility of the esophagus that leads to pressure increase in its lumen [2]. Among all the cases of esophageal achalasia, ED occurs in 3.6–7.4% [3]. Clinical symptoms depend directly on its size. Usually, small diverticula are asymptomatic. However, large diverticula lead to dysphagia and regurgitation. Until the last decade, this disease was treated exclusively by surgery. Thoracotomy/thoracoscopy followed by diverticulectomy or laparoscopic transhiatal supradiaphragmatic diverticulectomy were the main options. Now we can perform diverticular peroral endoscopic myotomy (D-POEM). This technique is a kind of the technique of POEM, which was described in 17 patients with esophageal achalasia in 1980 [4]. Esophageal mucosotomy was performed endoscopically under visual control followed by a myotomy directly at the site of narrowing of the esophageal lumen. In 2008 Japanese authors further improved this technique [5]. These improvements consisted of doing a lift and mucosotomy by 2 cm proximal to the oral margin of the esophageal narrowing, creating submucosal channel, performing a myotomy of the circular muscular layer and, at the end of the procedure, closing mucosotomy with clips. This technique was implemented gradually in the World. As a result, a first major study, included 1,346 patients who underwent POEM, was published in the year 2020. Positive treatment results were achieved in 95.1% of patients in 6 months and in 94.7% in a year after the intervention. Complication rate made up 3.7% [6]. In 2020 another series with treatment results of 100 patients who underwent POEM was published in Australia. Level of positive treatment results and complication rate were 83–100% and 2.7 to 36%, respectively. In this kind of minimally invasive endoscopic treatment, the patients have been continuing to get symptoms regression within 2 years since their interventions [7]. First international experience of treatment of patients with esophageal diverticula using the D-POEM technique was published in 2019. According to this retrospective review, 11 patients with esophageal diverticulum were included in the study (Zenker's diverticulum — 7 patients, diverticulum of the middle third of the esophagus — 1 patient, epiphrenic esophageal diverticulum — 3 patients). The mean size of diverticula was 34.5 mm. The overall technical success rate of D-POEM was 90.8%, and clinical success was observed in all the patients. During an average follow-up time of 145 days after D-POEM, there were no long-term complications [8]. Comparing the statistical data of the D-POEM technique of supradiaphragmat-

ic diverticulectomy with myotomy and fundoplication, the reduction of symptoms in the latter operation was observed in 85–100%. However, complications were observed in 8–23% and mortality rate made up 0–7% [9]. Treatment of patients with esophageal diverticula by the modern endoscopic method of D-POEM, although not radical, is a relatively safe and effective method of treatment for the disease. The first published clinical cases have shown the D-POEM to be a promising treatment for epiphrenic diverticula and may be an alternative to laparoscopic transhiatal supraphrenic diverticulectomy.

Clinical case

Our patient N., a 50-year-old male complains of relapsing dysphagia, dyspnea, regurgitation of a recently swallowed food in supine position during last 2 years. The patient underwent video gastroduodenoscopy. One epiphrenic diverticulum of 5 cm with its 2 cm orifice was identified. Chest computed tomography (CT) oral contrast swallow confirmed the diagnosis of epiphrenic diverticulum (Fig. 1). We proposed to the patient to be treated with D-POEM and got informed consent from him.

11/23/2021 The patient was electively hospitalized in a surgical department of Clinical Hospital "Feofaniya" for endoscopic intervention mentioned above. On November 24, 2021, the patient underwent D-POEM.

D-POEM technique: The patient was placed in the left lateral decubitus position. The operation was performed under general anesthesia with endotracheal intubation. A flexible high-resolution gastroscope (OLYMPUS GIF-HQ 190) with a distal cap was used. The gastroscope was inserted into the lower third of the esophagus and the diverticulum was examined (Fig. 1).

Then starting 2 cm proximal to the diverticulum, the mucosa was lifted with 0.15% indigo carmine solution using an endoscopic injector. A 1.5 cm long mucosotomy was performed with an endoknife (Finemedix Q-type). The gastroscope was then gradually advanced into the submucosal layer, performing submucosal dissection towards the diverticulum. Thus, the submucosal channel is formed until the moment when the diverticular septum is clearly visualized. Coagrasper endoscopic instrument (Olympus) was used to detect large vessels. Then continued to create one submucosal channel to the bottom of the diverticulum and the other to the esophago-gastric area (Fig. 2), followed by endoscopic septotomy (Finemedix Q-type). Myotomy to the bottom of the diverticulum was performed under visual control. Myotomy was extended proximal to the diverticulum sep-

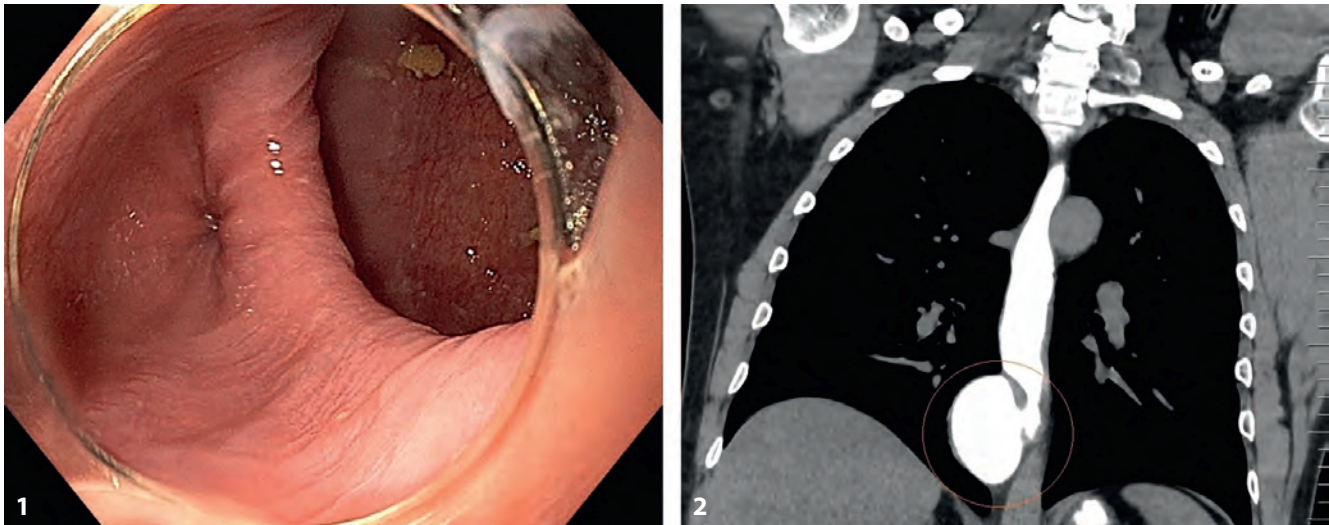


Fig. 1. 1 — visualization of the diverticulum during video gastroduodenoscopy, 2 — Chest CT with per-oral contrast coronal section view of the diverticulum

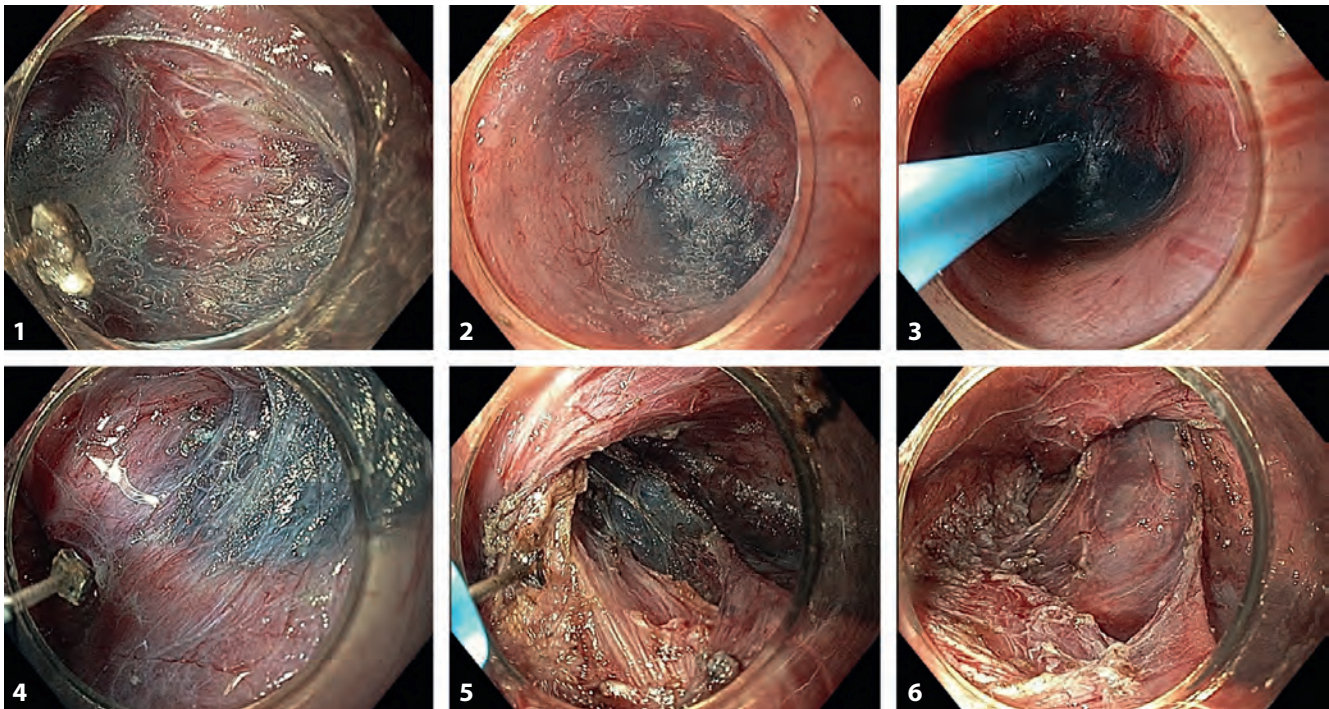


Fig. 2. 1, 2, 3, 4 — formation of a submucosal channel; 5, 6 — septotomy in the area of the epiphrenic diverticulum

tum to prevent incomplete septotomy. Repeated visual assessments were done to control hemostasis and confirm mucosal integrity. 5 clips (Microtech, Lockado Pro 11 mm) were applied to mucosa edges to close mucosotomy (Fig. 3).

After the operation, the patient underwent antibiotic prophylaxis and hemostatic therapy. The patient was discharged from the hospital on 27/11/2021 in satisfactory condition.

Discussion. Having performed a literature search among retrospective studies on the introduction of the new endoscopic method of POEM, we noticed a high level of success and efficiency in patients with esophageal achalasia, which is not inferior to laparoscopic supra-diaphragmatic diverticulectomy with fundoplication. POEM is a stage in the modification of D-POEM. To date, there are few reviews and results about D-POEM in the literature. However, the results indicate the high

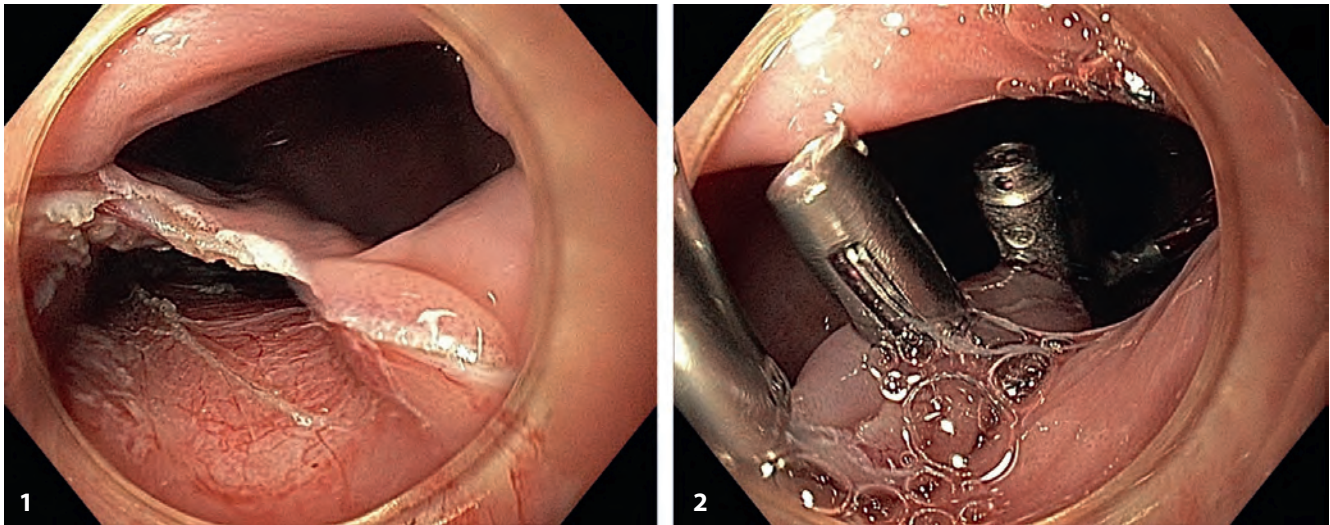


Fig. 3. 1 — submucosal channel, 2 — submucosa closed after applying endoscopic clips

efficiency of this technique. Although D-POEM does not belong to radical surgical interventions, given its effectiveness and minimization of the risks of postoperative complications, it can become an alternative to laparoscopic supradiaphragmatic diverticulectomy.

Conclusions

Epiphrenic diverticula remain a fairly rare pathology, which, in most cases, are asymptomatic and are diagnosed accidentally during videogastroscopy or radiological examination. Until the last decade, patients with ED underwent radical open surgical interventions. Taking into account evolving technologies in the field of endoscopy of the GI tract, the modern technique of D-POEM has appeared. This clinical case is the first successful experience of diverticular per-oral endoscopic myotomy (D-POEM) in Ukraine. In the future, we will observe the appearance of new studies on this technique, which will certainly confirm its effectiveness and contribute to its introduction into the everyday practice of endoscopists.

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Клінічний випадок. Успішне ендоскопічне лікування епіфренального дивертикулу стравоходу шляхом проведення пероральної ендоскопічної дивертикулотомії (D-РОЕМ)

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Клінічний випадок. Успішне ендоскопічне лікування епіфренального дивертикулу стравоходу шляхом проведення пероральної ендоскопічної дивертикулотомії (D-РОЕМ).

Резюме. На сьогоднішній день завдяки технічному розвитку в ендоскопічній сфері з'являється можливість впроваджувати нові малоінвазивні ендоскопічні методики лікування різних патологій шлунково-кишкового тракту у повсякденну практику ендоскопістів. Протягом останнього десятиліття широке використання здобула сучасна методика лікування ахалазії стравоходу — пероральна ендоскопічна міотомія (РОЕМ). Дана методика характеризується мінімальною травматизацією слизової оболонки стравоходу, високим рівнем ефективності, коротким терміном реабілітації за рахунок формування підслизового тунелю з проведенням міотомії циркулярного шару безпосередньо під слизовою оболонкою та наступним накладанням ендоскопічних кліпс в ділянці мукозотомії. Через певний проміжок часу з'явилась нова варіація вищевказаної методики у пацієнтів з наявністю епіфренальних дивертикулів, що отримала назву — пероральна ендоскопічна дивертикулотомія (D-РОЕМ). У даній публікації представлено перший в Україні клінічний випадок успішного ендоскопічного лікування епіфренального дивертикулу стравоходу шляхом проведення пероральної ендоскопічної дивертикулотомії (D-РОЕМ). Попередньо пацієнту було проведено відеогастродуоденоскопію з подальшим проведенням комп'ютерної томографії органів грудної порожнини з контрастуванням. Пацієнта було госпіталізовано у хірургічне відділення Клінічної лікарні "Феофанія" у плановому порядку з клінічним діагнозом: епіфренальний дивертикул стравоходу. Проведено малоінвазивне ендоскопічне втручання в обсязі D-РОЕМ. Після проведеного оперативного лікування загальний стан пацієнта покращився. У пацієнтів з епіфренальними дивертикулами можна розглядати дану методику як альтернативу лапароскопічній або відкритій хірургічній операції, оскільки пероральна ендоскопічна дивертикулотомія мінімізує ризики післяопераційних ускладнень та зменшує період реабілітації. При неможливості провести вищевказану методику або її неефективності подальше лікування є виключно хірургічним.

Ключові слова: пероральна ендоскопічна дивертикулотомія (D-РОЕМ), епіфренальний дивертикул стравоходу, відеогастродуоденоскопія.