

ENDOSCOPIC BOUGIENAGE OF BENIGN ESOPHAGEAL STRICTURES USING A BOUGIE CAP

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ABSTRACT

Relevance: Esophageal stricture is a narrowing of the lumen of the esophageal tube caused by the proliferation of connective tissue in its wall. This condition can develop against the background of esophagitis, peptic ulcers, chemical burns of the esophagus, and iatrogenic causes. Cicatricial changes of the esophagus occupy the second place among diseases of this organ after esophagitis and are formed in 70-80% of patients with postburn strictures.

The study aimed to analyze the results of endoscopic treatment of benign esophageal stenosis using distal Bougie Cap caps and evaluate the effectiveness of this new device in the short term of use for treatment purposes.

Methods: The authors have retrospectively analyzed the first results of using Bougie Cap distal caps in the endoscopic treatment of benign esophageal stenosis in Kazakhstan. From 2022 to 2023, 81 bougie sessions with steel caps were performed in 55 patients with esophageal stenosis in the endoscopic department of the National Research Oncology Center (Astana, Kazakhstan).

Results: The leading causes of esophageal stenosis were chemical burns (60% of patients), stenosis after radiation therapy (25.4%), and strictures of esophageal anastomosis (14.6%). The stenoses were short, up to 3.0 cm, in 37 patients (67.2%), extended – in 15 patients (27.2%), subtotal – in 2 patients (3.6%), and only one patient (1.8%) had a stenosis of 17 cm. The bougienage outcome was good in all patients with short stenoses, satisfactory – in patients with stenoses up to 9 cm, and unsatisfactory – in patients with subtotal and total stenoses. The number of sessions was 3 to 11. Three patients with total and subtotal stenosis were denied a bougienage due to a tortuous stenosis with a high risk of perforation, and a percutaneous gastrostomy was installed.

Conclusion: Endoscopic bougienage with distal caps of the Bougie Cap is a safe method of bougienage of benign esophageal strictures since the cap is transparent, and an endoscopist visually supervises the bougienage. During the three years of using distal caps to dilate esophageal stenosis, not a single case of perforation was registered in our department. Therefore, we recommend this method as the safest and most predictable method of bougienage, both in outpatient practice and in the hospitals in the Republic.

Keywords: stenosis, stricture, bougienage, dilatation, esophagus.

Introduction: Esophageal stricture is a narrowing of the esophageal tube's lumen due to the proliferation of connective tissue in its wall. This condition can develop against the background of esophagitis, peptic ulcers, chemical burns of the esophagus, and iatrogenic causes. It is accompanied by symptoms such as dysphagia (swallowing problem), belching, sore throat and retrosternal pain, and weight loss. Esophagoscopy and radiography of the esophagus are used to diagnose strictures. Treatment options include balloon dilation of the stricture, bougienage, esophagoplasty, etc. [1, 2]. Cicatricial changes in the esophagus occupy the second place among esophageal diseases after esophagitis and occur in 70-80% of patients with post-burn strictures. The prevalence of such pathologies is gradually increasing, especially among children and young people. In modern abdominal surgery, developing effective methods for treating cicatricial strictures of the esophagus and preventing disruption of normal digestive function remains an urgent problem.

Benign scar strictures can occur after inflammatory diseases of the esophagus, damage to the organ wall with aggressive agents, or surgical interventions on the esophagus, e.g., application of anastomosis [3, 4].

Endoscopic classification of esophageal constrictions by Gallinger:

Degree I – esophageal stenosis up to 9-11 mm;

Degree II – esophageal stenosis up to 6-8 mm;

Degree III – esophageal stenosis up to 3-5 mm;

Degree IV – esophageal stenosis up to 1-2 mm or a complete obliteration [5].

In addition, the patient's medical history, the presence of a causal factor of stenosis, the duration of stenosis, and the degree of dysphagia are clarified during the initial consultation. Violation of the passage of food into the esophagus (dysphagia) is the most common manifestation of the disease. There are four degrees of dysphagia:

Degree I – violation of the passage of solid food through the esophagus;

Degree II – difficulty in semi-fluid food intake;

Degree III – difficulty in fluid intake;

Degree IV – complete esophageal obstruction.

A distal bougienage cap enables visual assessment of the esophageal opening dilation. An endoscopist can observe changes in tissue tension through the transparent wall of the cap and avoid unwanted sprains. In addition, using fewer tools reduces the procedure time. [6,7]. Caps are made in different sizes: 10, 12, 14, and 16 mm for both standard and ultrathin endoscopes (Figure 1). There are three holes in the distal part of the cap. Two of them are designed to suck out air and water, and one central hole is designed to insert guide wires.

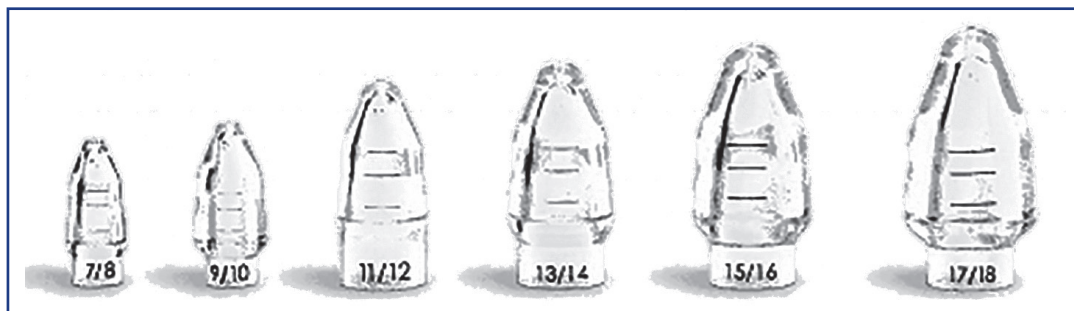


Figure 1 – Types and sizes of endoscope distal caps for bougienage

There was no need for patient sedation during the bougienage. This is because the procedure time is comparable to conventional elective gastroscopy and is accompanied by mild discomfort without pronounced pain. Successful bougienage with a distal may be visually confirmed during the procedure through a transparent distal

cap; therefore, documentary (radiographic) confirmation is unnecessary. For monitoring, it is enough to ask the patient to drink a glass of water, and patients and doctors will recognize the clinical effectiveness of the bougienage procedure based on the feeling of free passage of water from the esophagus into the stomach cavity (Figure 2).

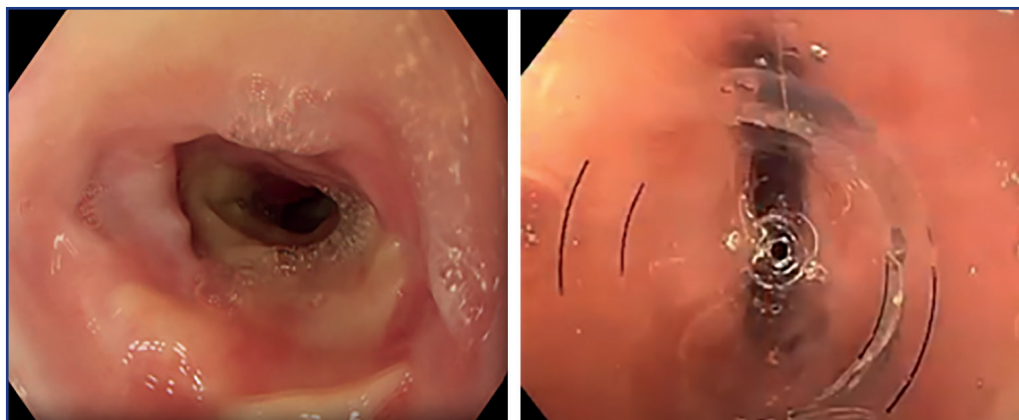


Figure 2 – Endoscopic view of bougienage with a distal cap. Bougienage is visually controlled through a transparent polymer cap.

Since the opening of the endoscopic department of the National Scientific Cancer Center (Astana, Kazakhstan) in 2019, we have been engaged in esophageal dilation on an ongoing basis for both malignant and benign diseases. Patients with benign esophageal stricture usually predominate and comprise the lion's share of stenotic patients. Since 2022, we have primarily used distal Bougie Caps for esophageal dilation and have stopped using polymer bougies along the guide wire.

The study aimed to analyze the results of endoscopic treatment of benign esophageal stenosis using distal Bougie Cap caps and evaluate the effectiveness of this new device in the short term of use for treatment purposes.

Materials and methods: From 2019 to 2022, the NSCC endoscopy department, for benign strictures of the esophagus, used polymer bougies for bougienage along the guide wire. After purchasing new distal Bougie Caps for the first time, polymer bougies were no longer used since bougienage with polymer bougies along the guide wire did not allow direct visual endoscopic control during the stricture bougienage process, which carries excellent risks of esophageal perforation or creating a false passage in the esophageal wall. While using polymer

bougies along the guide wire, two cases of unintentional esophageal perforation were reported by the NSCC department and subsequently managed by emergency surgery. Later, we stopped using polymer bougies. From 2022 to 2023, the NSCC endoscopy department only performed 81 bougienage sessions with distal caps in 55 esophageal stenotic patients. The persistent clinical effect of bougienage with distal caps was achieved on average for 7-8 sessions, and no further bougienage was required. Subsequently, during the dynamic monitoring, 1-2-3 months after the last bougienage session, the esophageal lumen retained a width of 10-14 mm, which caused no dysphagia in patients. The presented review describes a retrospective analysis of the first and most successful Kazakh experience of endoscopic treatment of benign esophageal strictures using a new device. While using distal caps, our department reported no cases of esophageal perforation, which indicates the safety of this device compared to bougienage with polymer bougies.

According to Table 1, men accounted for 70.9%, and only 29.1% of patients were women. By age, 43.6% of patients were 18-44 years old (Group 1), 41.9% were 45-59 years old (Group 2), and 14.5% were of other ages.

Table 1 – Distribution of patients by gender and age

| Пол пациентов | Возраст пациентов, абс. (%) | | | | |
|---------------|-----------------------------|-----------|---------|---------|-----|
| | 18-44 | 45-59 | 60-74 | 75-90 | 90+ |
| Мужчины | 15 (27.3) | 19 (34.6) | 3 (5.4) | 2 (3.6) | 0 |
| Женщины | 9 (16.3) | 4 (7.3) | 2 (3.6) | 1 (1.8) | 0 |

Results: Before bougienage, all patients underwent a contrast-enhanced X-ray examination of the esophagus to determine the narrowing zone, the severity of stenosis, the extent of stenosis, the shape of the stenosed lumen of the esophagus, and the degree of stenosis according to Gallinger (1999) [5].

Most often, patients came with the 3rd or 4th degree of esophageal stenosis and with the 3rd degree of dysphagia. In patients with short stenoses, bougienage sessions were performed on an outpatient basis, mostly

without sedation, since bougienage corresponds to a routine gastroscopy procedure in time and severity of discomfort. In patients with prolonged, subtotal, and total stenosis, the first bougienage sessions were conducted on an inpatient basis and under general sedation due to the high risk of esophageal perforation. Further, if the first bougienage sessions are thriving and there is no perforation, repeated sessions were performed on an outpatient basis and under sedation at the patient's request.

Table 2 – Characteristics of stenosis in patients

| Cause of stenosis | Extent of stenosis | | | |
|------------------------|--------------------|-------------------|---------------------|----------------|
| | Short (<3.0 cm) | Extended (4-9 cm) | Subtotal (10-15 cm) | Total (>16 cm) |
| Post-burn stenosis | 18 | 12 | 2 | 1 |
| Postradiation stenosis | 11 | 3 | | |
| Anastomotic strictures | 8 | | | |

According to Table 2, the main causes of esophageal stenosis were chemical burns – in 33 patients (60% of the total number of patients), post-radiation stenosis – in 14 patients (25.4%), and strictures of esophageal anastomosis – in 8 patients (14.6%). Most stenoses were short, extending up to 3.0 cm in 37 patients (67.2%). Extended stenoses were found in 15 patients (27.2%), subtotal stenosis up to 15 cm – in 2 patients (3.6%), and only one patient (1.8%) had a 17 cm stenosis.

In all patients with short stenoses, good results of bougienage were reported; patients with extended stenoses up to 9 cm had satisfactory results, and patients with subtotal and total stenoses had unsatisfactory results. The number of sessions varied from 3 to 11. Three patients with total and subtotal stenosis were burred from bougienage due to the presence of a tortuous course of stenosis, which is accompanied by a high risk of perforation, and they underwent percutaneous gastrostomy placement.

Discussion: The Bougie Cap is a relatively new device for treating esophageal and gastric stenoses. The first international publication on the use of this device dates back to 2018, and the first video on the use of this distal cap for bougienage dates back to 2017. A few publications on the experience of using this device are probably because the caps for bougienage are designed for single use and are pretty expensive, making the procedure more expensive than reusable polymer bougies. The foreign literature describes the experience of using caps for bougienage of post-radiation stricture, eosinophilic esophagitis, and cicatricial stricture of the esophagus. In contrast, no case describes the experience of using bougienage with this

device in malignant stricture [8, 9]. As for Kazakhstan, the NSCC endoscopy department was one of the first in the country to use this device in 2022. The device has already been used for benign esophageal stricture and malignant esophageal stenosis [10]. In such a short time, the experience of using this cap for bougienage has already been accumulated. The safety of this device is achieved due to the possibility of visual inspection through its transparent wall directly during the bougienage process. The endoscopist visually monitors the direct pointing of the cone-shaped part of the cap at the mouth of the stricture and controls the stretching of scar tissue. Most importantly, the bougienage is not carried out blindly, and there is no risk of false passage. Our experience using the distal cap for bougienage suggests its clinical effectiveness in treating esophageal strictures.

Conclusion: Endoscopic bougienage with distal caps is a safe method for benign esophageal strictures since the cap is transparent and bougienage is performed under the visual supervision of an endoscopist. During the three years of using distal caps to expand esophageal stenosis, our department reported no cases of perforation; therefore, we recommend this method as the safest and most predictable option of bougienage in outpatient practice and hospitals of the republic.

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АНДАТПА

BOUGIE CAP КӨМЕГІМЕН ӨҢЕШТІҢ ҚАТЕРСІЗ СТРИКТУРАЛАРЫН ЭНДОСКОПИЯЛЫҚ СҮМБІЛЕУ

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Өзектілігі: Өңештің стриктурасы – өңеш түтігінің қабырғасындағы дәнекер тіннің көбеюінен болатын саңылаудың тарылуы. Өңештегі цикатриялық өзгерістер осы органның аурулары арасында эзофагиттен кейін екінші орынды алады және күйіктен кейінгі стриктурасы бар науқастардың 70-80% құрайды.

Зерттеудің мақсаты – дистальды Bougie Caps көмегімен өңештің қатерсіз стеноздарын эндоскопиялық емдеу нәтижелерін талдау және осы жаңа құрылғыны емдік мақсатта пайдаланудың қысқа мерзімдегі тиімділігін бағалау.

Әдістері: Қазақстанда өңештің қатерсіз стриктурасын эндоскопиялық емдеуде дистальды Буги қақпағын алғаш рет қолдану тәжірибесінің деректеріне ретроспективті талдау жасалды. 2022-2023 жылдар аралығында Ұлттық ғылыми онкология орталығының (Астана, Қазақстан) эндоскопиялық бөлімшесінде өңеш стенозы бар 55 науқасқа дистальды қалпақшалармен бугиенаждың 81 сеансы өткізілді.

Нәтижелері: Өңеш стенозының негізгі себептері химиялық күйік (пациенттердің 60%), сәулелік терапиядан кейінгі стеноз (25,4%) және өңеш анатомозының тарылуы (14,6%) болды. 37 науқаста (67,2%) қысқа стеноздар 3,0 см-ге дейін, 15 науқаста (27,2%) ұзартылған стеноздар, 2 науқаста (3,6%) – ұзындығы 15 см-ге дейінгі субтотальды стеноздар, бір науқаста (1,8%), стеноз 17 см-ді құрады, қысқа стенозы бар науқастардың барлығында бугиенаждың жақсы нәтижелері, 9 см-ге дейінгі стенозы бар науқастарда қанағаттанарлықсыз нәтижелер, субтотальды және жалты стенозы бар науқастарда байқалды. Сеанстардың саны 3-тен 11-ге дейін болды. Толық және субтотальды стенозы бар үш науқас перфорация қаупі жоғары стеноздың бұралмалы ағымының болуына байланысты бугиенаждан бас тартылды және перкутандық гастростомия орнатылды.

Қорытынды: Bougie Cap дистальды қақпақтарымен эндоскопиялық сүмбілеу өңештің қатерсіз стриктураларын сүмбілеудің қауіпсіз әдісі болып табылады, өйткені қақпақ мөлдір және сүмбілеу эндоскопистің көзбен бақылауымен жүзеге асырылады. Өңеш стенозын кеңейту үшін дистальды қақпақтарды қолданудың үш жылдық кезеңінде біздің бөлімшеде перфорацияның бірде-бір жағдайы тіркелген жоқ, сондықтан біз бұл әдісті амбулаториялық тәжірибеде де, Республиканың стационарларында да сүмбілеудің ең қауіпсіз және болжамды әдісі ретінде ұсынамыз.

Түйінді сөздер: стеноз, стриктура, сүмбілеу, өңештің кеңеюі.

АННОТАЦИЯ

ENDOSCOPIC BOUGIENAGE OF BENIGN ESOPHAGEAL STRICTURES USING A BOUGIE CAP

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Актуальность: Стриктура пищевода представляет собой сужение просвета пищеводной трубки, вызванное разрастанием соединительной ткани в ее стенке. Рубцовые изменения пищевода занимают второе место среди заболеваний данного органа после эзофагита и формируются у 70-80% пациентов с постожоговыми стриктурами.

Цель исследования – проанализировать результаты эндоскопического лечения доброкачественных стенозов пищевода с использованием дистальных колпачков Bougie Cap и оценить эффективность этого нового девайса в краткосрочном периоде использования в лечебных целях.

Методы: Проведен ретроспективный анализ данных опыта первого применения дистальных колпачков Bougie Cap в эндоскопическом лечении доброкачественных стриктур пищевода в Казахстане. С 2022 по 2023 год в эндоскопическом отделении Национального научного онкологического центра (Астана, Казахстан) проведен 81 сеанс бужирования дистальными колпачками 55 пациентам со стенозом пищевода.

Результаты: Основной причиной стеноза пищевода послужили химические ожоги (60% пациентов), стеноз после лучевой терапии (25,4%) и стриктуры пищевода анастомоза (14,6%). У 37 пациентов (67,2%) стенозы были короткими – до 3,0 см, у 15 паци-

ентов (27,2%) установлены протяженные стенозы, у 2 (3,6%) – субтотальный стеноз длиной до 15 см, и у одного пациента (1,8%) стеноз составлял 17 см. Хорошие результаты бужирования зафиксированы у всех пациентов с короткими стенозами, удовлетворительные – у пациентов со стенозами до 9 см, неудовлетворительные – у пациентов с субтотальными и тотальными стенозами. Количество сеансов – от 3 до 11. Трех пациентам с тотальным и субтотальным стенозом было отказано в бужировании из-за наличия извитого хода стеноза с высоким риском перфорации, и была установлена перкутанная гастростома.

Заключение: Эндоскопическое бужирование дистальными колпачками Bougie Cap является безопасным методом бужирования доброкачественных стриктур пищевода, поскольку колпачок прозрачный, а бужирование проводится под визуальным наблюдением эндоскописта. За трехлетний период использования дистальных колпачков для расширения стеноза пищевода в нашем отделении не было зарегистрировано ни одного случая перфорации, поэтому мы рекомендуем этот метод как самый безопасный и предсказуемый метод бужирования как в амбулаторной практике, так и в стационарах республики.

Ключевые слова: стеноз, стриктура, бужирование, дилатация пищевода.

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