



## Case report

# The patient with megaesophagus due to long-term achalasia combined with squamous cell carcinoma: A case report

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## ABSTRACT

**Introduction:** Achalasia is a rare disease of the esophagus accompanied by progressive development of symptoms such as dysphagia, vomiting, and chest pain, which in case of ineffective treatment leads to the formation of megaesophagus and requires radical surgical treatment. The relationship between the lengthy course of esophageal achalasia and the chance of developing esophageal cancer has been evidenced in the international literature.

**Presentation of case:** This paper presents a case of a patient with long-term (30 years) achalasia, grade 4 dysphagia, and severe concomitant cardiovascular pathology who was diagnosed with megaesophagus and carcinoma of the lower thoracic esophagus after receiving solely symptomatic treatment. The patient underwent a video-assisted thoracoscopic K.C. McKeown esophagectomy, two-field lymphadenectomy, and esophageal gastroplasty. The postoperative period proceeded without complications. Ten months post-surgery there were no signs of recurrence or progression of the disease. The patient also noted a decrease in cardiac symptoms.

**Discussion:** Clinical manifestations of achalasia are characterized by progressive dysphagia, predominant nocturnal regurgitation, aspiration of undigested food, and weight loss. The role of cancer surveillance in achalasia remains controversial. Medical therapy and minimally invasive interventions can be used for both early and late stages of the disease. The use of minimally invasive techniques for the megaesophagus is recognized as ineffective and increases the risk of post-manipulation complications.

**Conclusion:** Since minimally invasive techniques are ineffective, radical surgical treatment, or esophagectomy, appears to be the best choice in case of the development of megaesophagus and the detection of esophageal cancer.

## 1. Introduction

Achalasia is a rare disease accompanied by decreased esophageal motility, the causes of which are not fully understood. Patients with achalasia suffer from severe symptoms such as dysphagia, vomiting, and chest pain. Moreover, chronic incomplete emptying of the esophagus causes chronic inflammation, which is a trigger for carcinogenesis [1].

The incidence of achalasia ranges from 0.3 to 1.63 per 100,000 people, and the incidence of esophageal cancer associated with achalasia is 28 cases per 1000 people [2]. These patients were frequently diagnosed with cancer at a late stage when radical and minimally invasive interventions were no longer possible. The prognosis for patients with achalasia and esophageal cancer remains poor and

unsatisfactory [3].

In this paper, we present a clinical observation of a patient suffering from esophageal achalasia who has developed esophageal squamous cell carcinoma (ESCC), and we would like to discuss the tactics of examination and treatment of such patients.

This work has been reported in line with the SCARE 2020 criteria [4].

## 2. Case presentation

In September 2021, a 63-year-old patient came to our clinic who had been suffering from esophageal achalasia for >30 years while failing to receive regular proton pump inhibitors and antispasmodic therapy. She

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had developed grade 1 dysphagia and chest discomfort three years before applying to the clinic.

Among the comorbidities were coronary heart disease, coronary artery bypass in 2015, coronary stenting in 2021, chronic heart failure NYHA 2, type 2 diabetes, atherosclerosis of the coronary and cerebral arteries, and cardiac arrhythmia; the patient had also been regularly taking Pradaxa. On admission to the hospital: body mass index – 31.6; smoker index – 5; ECOG performance score – 2; ASA physical status classification system – 3; Eckardt score – 3.

At 37 cm from the incisors, esophagogastroduodenoscopy (EGD) revealed an exophytic tumor 1.5 × 2.0 cm in size, covered by fibrin and single hemorrhages; biopsy showed ESCC. Intravenous contrast-enhanced computed tomography (CT) of the chest and abdomen revealed an enlarged, up to 90 mm, S-shaped esophagus and single enlarged paraesophageal lymph nodes (Fig. 1). Spirography revealed no pulmonary ventilation disorders.

According to laboratory blood tests from September 2021: white blood cells  $6.7 \times 10^9/l$ ; hemoglobin 119 g/l; platelets  $316 \times 10^9/l$ ; glucose level 8.8 mmol/l; albumin level 35 g/l.

On the basis of the multidisciplinary oncoconsilium decision, on September 13, 2021 the patient underwent surgery – a video-assisted thoracoscopic K.C. McKeown esophagectomy, two-field lymphadenectomy, esophageal plastic surgery with a gastric tube (Fig. 2). The postoperative period proceeded without complications. On the 5th day after the operation, the patient underwent fluoroscopy with oral contrasting: the evacuation of the contrast agent was adequate, and no leakage or stricture of the anastomosis was detected.

Squamous cell carcinoma of the esophagus pT2N0M0, stage II (TNM Classification of Malignant Tumours, 8th Edition) was discovered during pathomorphological evaluation of the surgical material [5]. The gross specimen is shown in Fig. 3.

Ten months after the surgery, the patient underwent a follow-up examination with the following laboratory blood parameters: white blood cells  $5.5 \times 10^9/l$ ; hemoglobin 138 g/l; platelets  $295 \times 10^9/l$ ; total protein 80 g/l; amylase 37 units/l; total bilirubin  $7.9 \mu\text{mol/l}$ ; glucose 7.7 mmol/l; carcinoembryonic antigen 1.6 ng/ml; carbohydrate antigen 19-9  $< 2 \text{ U/ml}$ ; Tumor-associated glycoprotein 72-4  $8 \text{ U/ml}$ .

EGD – without any macroscopic signs of recurrence of the disease.

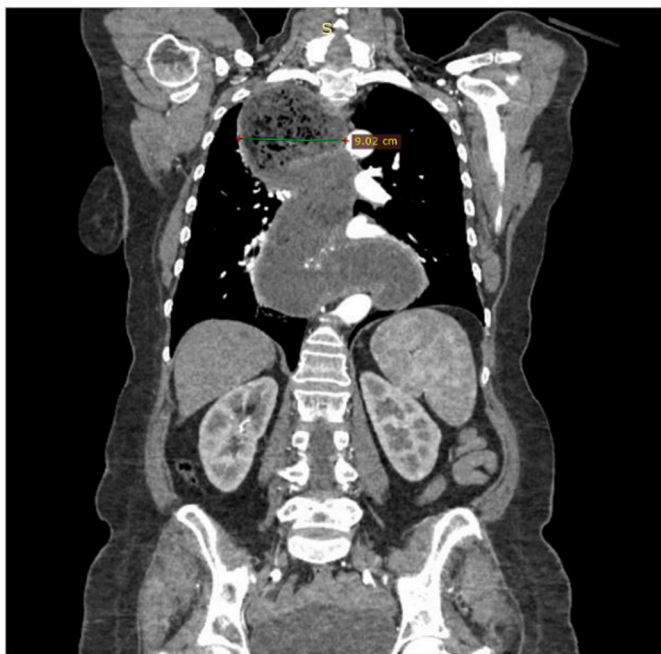


Fig. 1. CT scan of the chest visualizing the S-shaped esophagus expanded to 90 mm.



Fig. 2. Intraoperative view: neoesophagus, formed from the gastric tube.



Fig. 3. Surgical specimen: dilated esophagus. The arrow indicates a tumor.

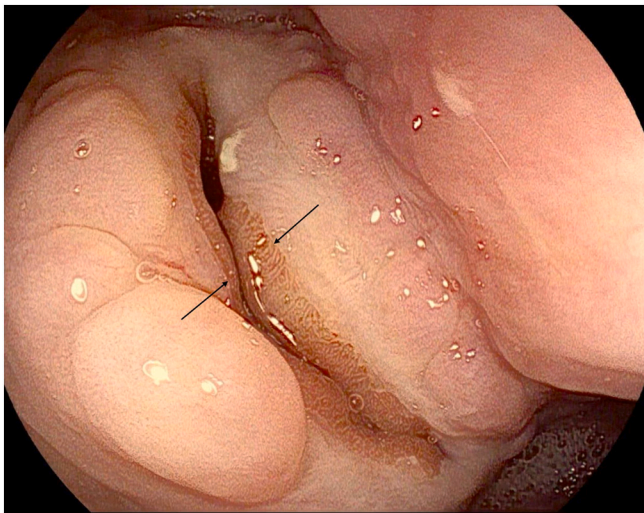
Duodenogastric reflux. Chronic gastritis with moderate atrophy and partial intestinal metaplasia was revealed after histological examination of the biopsy from the antrum of the stomach. The esophagogastroscopy data are shown in Fig. 4.

CT of the chest and abdomen revealed no evidence of relapse/progression. Postoperative CT results are shown in Fig. 5.

Currently, the patient is doing well and leading an active lifestyle.

All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and





**Fig. 4.** Esophagogastroscopy 10 months after surgery. The anastomosis is marked with an arrow.

accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

**3. Discussion**

Clinical manifestations of achalasia are characterized by progressive dysphagia, predominant nocturnal regurgitation, aspiration of undigested food, and weight loss. However, in the early stages of the disease, the symptoms may be similar to those of gastroesophageal reflux disease (GERD). Due to the nonspecific symptoms in the initial disease stage, the condition is frequently missed until the disease progresses to the late stage with associated complications such as malnutrition, risk of pneumonia from bronchoaspiration, and esophageal cancer.

The role of cancer surveillance in achalasia remains controversial. This is largely due to a lack of data demonstrating the efficacy of endoscopic surveillance. A Swedish study demonstrated the need for 406 endoscopies in men and 2220 in women to detect one cancer with annual surveillance. However, some studies have suggested reasonable

efficacy with surveillance strategies. A study from the United Kingdom examined a cohort of 36 patients treated from achalasia with a 2-year chromoendoscopic follow-up for a total of 74 patient-years. Two surface ESCCs were found in this cohort. Similarly, a prospective study of 195 treated achalasia patients with 874 cumulative years of annual endoscopic follow-up identified three ESCCs. Early-stage squamous cell carcinoma (stages I and IIa) was found in two cases with a curative outcome. In the latter case, the patient refused further endoscopic follow-up and was presented with symptoms of stage IV esophageal cancer. However, due to the small number of subjects in these studies, it is hard to provide comprehensive recommendations on monitoring achalasia. Some argue for more selective screening for achalasia [6].

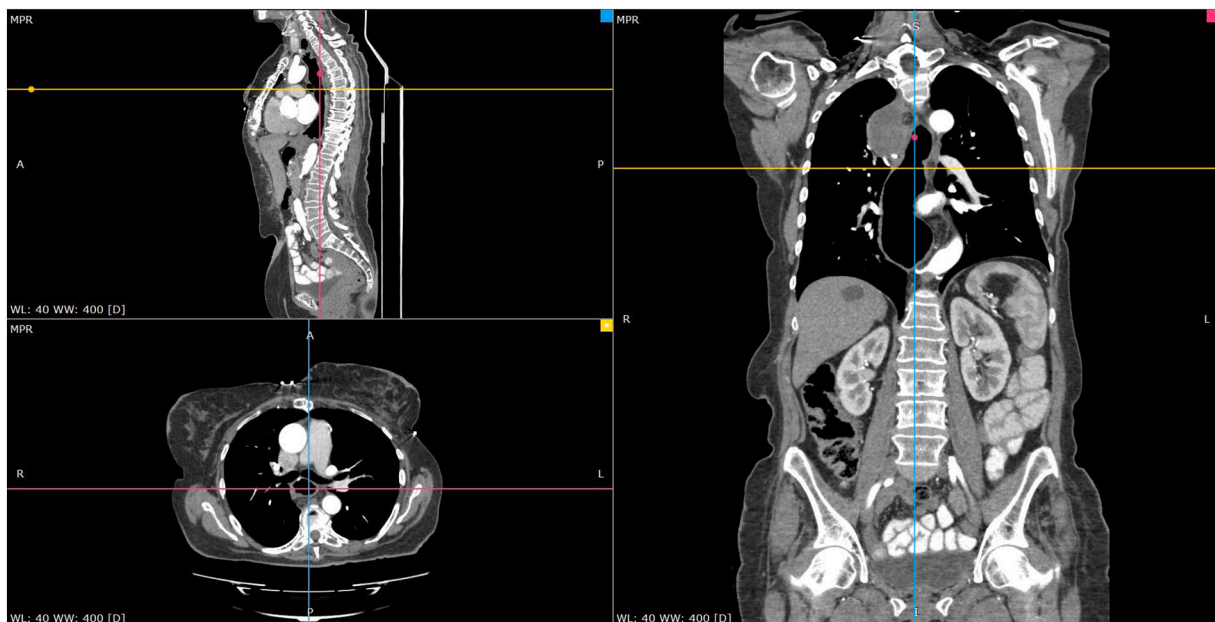
The American College of Gastroenterology guidelines for the diagnosis of achalasia recommend endoscopy to rule out pseudo-achalasia, barium swallow to determine the esophageal emptying and anatomy, and esophageal manometry to confirm the diagnosis. Sometimes, outpatient 24-hour pH monitoring is needed to differentiate between achalasia and GERD [7].

ESCC usually develops 10–15 years after achalasia is diagnosed or 20–25 years after the onset of symptoms of achalasia. Tumours usually originate in a severely dilated esophagus and are large and in an advanced stage when discovered [8].

When considering the pros and cons, it seems beneficial to identify high-risk patients and develop an individualized surveillance program. For example, if patients have other risk factors for ESCC besides achalasia, such as male gender, age >60 years, cigarette smoking, and alcohol use, early extended follow-up may be recommended compared to patients who do not have these risk factors [8].

Medical therapy and minimally invasive interventions such as balloon dilatation, oral endoscopic myotomy, botulinum toxin injection, and Heller myotomy with fundoplication can be used for both early and late stages of the disease. Table 1 shows the long-term results of medical and surgical interventions for esophageal achalasia [9].

The progression of the disease to later stages coupled with the ineffectiveness of minimally invasive endoscopic and surgical methods of treatment, leads to the development of a sigmoid esophagus. At this stage, patients suffer from severe dysphagia, the pain syndrome, with the respiratory and cardiovascular systems also negatively affected, due to the compression of the significantly enlarged esophagus on such mediastinal structures as the lungs and heart, provoking and worsening



**Fig. 5.** Multiplanar CT scan of the chest and abdomen 6 months after surgery.

**Table 1**  
Medical and surgical treatment of achalasia.

	LES pressure decrease	Duration (min)	1 year effectiveness	5 year effectiveness	10 year effectiveness	Limitations
Nifedipine	28–48 %	60	–	–	–	Side effects
Isosorbide dinitrate	64–66 %	60–90	–	–	–	Side effects
Botulinum toxin PD	–	–	30 % 66–90 %	–	– 48 %	Nerve regeneration 2.4 % risk of esophageal perforation. Up to 4 % with subsequent dilations
POEM	57–62 %	–	–	–	–	25 % risk of pneumothorax, 49 % of pleural effusion, 46–50 % of reflux
LHM with Dor	–	–	93 %	77 %	69–80 %	4.8 % risk of esophageal perforation. The risk of Barrett's esophagus is 13.4 %

LES – lower esophageal sphincter; PD – pneumatic dilatation; POEM – peroral endoscopic myotomy; LHM – laparoscopic Heller myotomy.

the course of comorbidities.

In addition to improving the nutritional status of the patient by normalizing the act of eating (swallowing function), radical treatment of the megaesophagus also helps to reduce the severity of the pathology of the cardiovascular and respiratory systems. Together, this significantly improves the quality of life of patients and the prognosis of the course of concomitant diseases, as evidenced by literature and our observations, and it also prevents the development of esophageal cancer. The use of minimally invasive techniques for the megaesophagus is recognized as ineffective and increases the risk of post-manipulation complications [10].

Esophagectomy is associated with a high rate of postoperative respiratory complications, including pneumonia (10 %, 95 % CI: 4–18 %), but the intervention shows relatively low mortality in carefully selected patients treated in highly specialized surgical centers (2 %, 95 % CI: 1–3 %) [10].

Esophagectomy patients should see a gastroenterologist since the incidence and extent of esophagitis and Barrett's esophagus in the esophageal stump has increased over time. These mucosal changes and the development of squamous cell carcinoma (15–34 years post-operatively) and adenocarcinoma (14–22 years post-operatively) are highly associated with a greater risk of duodenogastroesophageal reflux and gradually increasing acid output in the transposed stomach [11].

#### 4. Conclusions

This observation suggests the occurrence of esophageal cancer approximately 27 years after the diagnosis of achalasia in a patient who did not receive specific treatment. The anamnesis and standard examination made it possible to verify the diagnosis and conduct adequate surgical treatment.

In the early stages of achalasia, preference should be given to minimally invasive interventions, focused on disrupting the lower esophageal sphincter and lowering its tone; however, it should be remembered that this can lead to GERD. Esophagectomy is ultimately used as a final option in patients with severe esophageal dilatation and symptoms unresponsive to dilatation and myotomy, or in patients with advanced esophageal cancer.

The best outcomes are achieved in centers that use a multidisciplinary approach, with radiologists, gastroenterologists, and surgeons working together to ensure the best and most sustainable results.

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Ethical approval

The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the Helsinki Declaration (as revised in 2013).

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#### Author contribution

Tatyana Khorobrykh, Ivan Ivashov, Alexey Spartak performed the surgery, did the conception and design of the work, the data collection, and the data analysis and interpretation. Vadim Agadzhanov and Rashad Salikhov did the critical revision of the article. Nataliya Dorina translated the manuscript and did the final approval of the version to be published.

#### Guarantor

Ivan Ivashov and Alexey Spartak.

#### Registration of research studies

Not applicable.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

#### Declaration of competing interest

The authors have no conflicts of interest to declare.

#### References

- [1] H. Sato, S. Terai, Y. Shimamura, S. Tanaka, H. Shiwaku, H. Minami, C. Sato, R. Ogawa, H. Yokomichi, H. Inoue, Achalasia and esophageal cancer: a large database analysis in Japan, *J. Gastroenterol.* 56 (2021) 360–370, <https://doi.org/10.1007/s00535-021-01763-6>.
- [2] S.R. Markar, T. Wiggins, H. MacKenzie, O. Faiz, G. Zaninotto, G.B. Hanna, Incidence and risk factors for esophageal cancer following achalasia treatment: national population-based case-control study, *Dis. Esophagus* 32 (2019) 1–7, <https://doi.org/10.1093/dote/doy106>.
- [3] I. Leeuwenburgh, P. Scholten, J. Alderliesten, H.W. Tilanus, C.W.N. Looman, E. W. Steijgerberg, E.J. Kuipers, Long-term esophageal cancer risk in patients with primary achalasia: a prospective study, *Am. J. Gastroenterol.* 105 (2010) 2144–2149, <https://doi.org/10.1038/ajg.2010.263>.

- [4] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, S.C.A.R.E. The, Guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230, <https://doi.org/10.1016/j.ijssu.2020.10.034>.
- [5] J.D. Brierley, M.K. Gospodarowicz, C. Wittekind, *TNM classification of malignant tumours*, Wiley, 2016 [https://books.google.ru/books?id=%5C\\_JaDDQAAQBAJ](https://books.google.ru/books?id=%5C_JaDDQAAQBAJ).
- [6] K. Ravi, D.M. Geno, D.A. Katzka, Esophageal cancer screening in achalasia: is there a consensus? *Dis. Esophagus* 28 (2015) 299–304, <https://doi.org/10.1111/dote.12196>.
- [7] F. Schlottmann, M.G. Patti, Esophageal achalasia: current diagnosis and treatment, *Expert Rev. Gastroenterol. Hepatol.* 12 (2018) 711–721, <https://doi.org/10.1080/17474124.2018.1481748>.
- [8] M. Torres-Aguilera, J.M. Remes Troche, Achalasia and esophageal cancer: risks and links, *Clin. Exp. Gastroenterol.* 11 (2018) 309–316, <https://doi.org/10.2147/CEG.S141642>.
- [9] A. Dobrowolsky, P.M. Fisichella, The management of esophageal achalasia: from diagnosis to surgical treatment, *Updat. Surg.* 66 (2014) 23–29, <https://doi.org/10.1007/s13304-013-0224-1>.
- [10] M.F. Vaezi, J.E. Pandolfino, R.H. Yadlapati, K.B. Greer, R.T. Kavitt, ACG clinical guidelines: diagnosis and management of achalasia, *Am. J. Gastroenterol.* 115 (2020) 1393–1411, <https://doi.org/10.14309/ajg.0000000000000731>.
- [11] J.R.M. Da Rocha, U. Ribeiro, R.A.A. Sallum, S. Szachnowicz, I. Ceconello, Barrett's Esophagus (BE) and carcinoma in the Esophageal Stump (ES) after esophagectomy with gastric pull-up in achalasia patients: a study based on 10 years follow-up, *Ann. Surg. Oncol.* 15 (2008) 2903–2909, <https://doi.org/10.1245/s10434-008-0057-1>.