

## CLINICAL STUDY

# Is it reasonable to set a time limit for stitching the esophageal perforation?

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**Abstract:** *Aim of the study:* To evaluate the results of surgical therapy of esophageal perforation in relation to the time of onset.

*Methods:* A retrospective study of patients records with a discharge diagnose of esophageal perforation

*Results:* During 12 years, 9 patients with esophageal perforation were treated at our surgical clinic. In 3 cases, the affected part of esophagus was in the neck, in 5 cases in the thorax and in one case in the abdomen. In 5 cases, the perforation was causally related to the foreign particle, in 3 cases it was spontaneous and in one case it developed after an insertion of the Sengstaken tube. All patients were indicated to the surgical therapy. In 7 patients, the perforation was stitched, in one patient, drainage of pleural cavity was performed and in one patient, a derivation above the perforation was done. The lethality was 3/9, in 2 cases with the thoracic part and in one case with the abdominal part of esophagus. In 3 patients, the stitching was healed despite the perforation was present longer then 24 hours.

*Conclusion:* Despite the data from literature and standards recommendations, the stitched esophageal perforation has healed after being present longer then 24 hours in 3 from 4 patients. On contrary, in early surgical therapy in 3 patients, 2 had died. The requirement for a time limit in surgical therapy of esophageal perforation is questionable. The lethality round 30 % persists (Tab. 8, Ref. 11). Full Text (Free, PDF) [www.bmj.sk](http://www.bmj.sk).

Key words: esophageal perforation, therapy, lethality.

This retrospective study on patients records evaluates the results of esophageal perforation therapy at our clinic and compares them to literature. A certain idea came from the study Sanna et al, which stated that esophageal perforation is a catastrophic and frequently life-threatening condition associated with a high mortality. Discrepancies exist considering the optimal therapeutic strategy (1) and also the time of the onset.

## Study group

This study retrospectively evaluates records of patients with esophageal perforation, treated at the Surgical Clinic of Faculty Hospital Trenčín.

From 1996 to 2007, 9 men were treated. Two of them were prisoners. The age of patients ranged from 32 to 78 years, with the mean age of 55 years.

Following is the summary of patients, details (Tab. 1).

## Results

Etiology of perforation is shown on Table 2. The length of history was determined from the time of onset of symptoms to the admission to the surgical clinic.

From 0 hours to 11 days, on average 83.6 hours = 3.5 day (0 hours in 1 patient after insertion of the Sengstaken tube and in 1 patient after extraction of a foreign particle from the stomach).

The length of history from the symptoms onset to the first operation was from 1 hour to 12 days, on average 93 hours = 4 days (causes of delay: myocardial infarction, the prisoner denied operation, late hospitalization).

Conclusively, an “early” operation, i.e. within 24 hours, was done in 4 patients, and delayed in 5 patients.

The anatomical localization of perforation and its size is shown on Table 3.

The technique of perforation visualization is shown on Table 4. In four cases, the endoscopy specialist helped to identify the location of perforation.

Table 5 presents the method of primary treatment. In summary, there were 8 methods in 9 patients.

Table 6 presents the number of early and late stitching and their relation to the death of patients. Two patients were treated without a perforation stitching. It was the patient 4, when the perforation was not found during the primary right-sided thoracotomy due to thorax empyema, and was found later during the contrast examination of thoracic esophagus. In the patient 5, the esophagus perforation was found, but it was treated by an exclusion using a cervical loop esophagostomy above the perforation.

In Table 7, the results of cultivation are shown. Anaerobic flora was not detected in any case despite the proper sampling.

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**Tab. 1. Summary of patients, details.**

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Patient 1: 32 year (neck esophagus)  
 Left side cervicotomy: perforation stitching  
 Length of hospitalization: 11 days

Patient 2: 78 years (abdominal esophagus) laparotomy: perforation stitching + fundoplication + omentoplasty, died on 13. day – MI, autopsy not performed

Patient 3: 48 years (thoracic esophagus)  
 1. operation left side thoracotomy: sutura + omentoplasty + intraluminal drainage + nutritional jejunostomy  
 2. operation in 2 days from cervicotomy the drainage of mediastinum  
 3. operation in 4 days terminal neck esophagostomy + exclusion of esophagus by cardia ligation + retrograde decompressive jejunostomy  
 death on 16. day due to septic bleeding into the left pleural cavity, autopsy was not performed, the length of hospitalization was 18 days

Patient 4: 38 years (thoracic esophagus)  
 Right side thoracotomy: drainage of the pleural cavity  
 In 8 days drainage of two abscesses in mediastinum under CT control  
 Length of hospitalization: 47 days

Patient 5: 52 years (thoracic esophagus)  
 1. operation: percutaneous drainage of the right pleural cavity + drainage of the posterior mediastinum from the cervicotomy  
 2. operation in 1 day from the cervicotomy: extraction of the foreign particle + loop esophagostomy + intraluminal drainage + laparotomy  
 nutritional jejunostomy  
 3. operation 9. day right sided parasternal mediastinotomy due to a 500 ml abscess  
 4. operation 11. day revision of mediastinotomy due to bleeding  
 5. operation 16. day revision of esophagostomy and peri-operational fibroscopy without further perforation; right thoracotomy due to empyema with drainage. Nutrition via jejunostomy and discharge on 43rd day.  
 In 16 months closure of the cervical esophagostomy by excision of fistula and sutura of the esophageal gap.

Patient 6: 46 years (neck esophagus)  
 Left side cervicotomy: esophagus stitching in one layer + drainage of posterior mediastinum. A fistula from stitching to the wound healed conservatively. The length of hospitalization was 37 days.

Patient 7: 78 years (neck esophagus)  
 Left side cervicotomy: esophagus stitching. Discharged on the 10th day.

Patient 8: 72 year (neck esophagus)  
 1. operation left side thoracotomy: esophagus stitching  
 2. operation in 19 day laparotomy: cholecystectomy and anteponition of sigma on 20th day death due to cardiac failure in IHD (autopsy proved)

Patient 9: 51 year (thoracic esophagus)  
 1. operation laparotomy + phrenotomy: thoracic esophagus stitching + fundoplication according to Thal. Left side thoracotomy: decortication of lungs + drainage.  
 2. operation in 8 days re-thoracotomy: pleural cavity treatment + drainage  
 On 31th day discharged

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**Tab. 2. Etiology of perforation.**

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- ingestion of a foreign particle 5x
  - 2x self harm (mesh, metal plates)
  - 1x bone
  - 1x meat
  - 1x toothpick
- spontaneous rupture after vomiting 3x
- Sengstaken tube (due to Mallory Weiss syndrom) 1x

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**Tab. 3. Localization of perforation.**

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Neck esophagus	3x
Thoracic esophagus	5x
Abdominal esophagus	1x

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Length of perforation from 7 mm to 100 mm, average 32 mm

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In three patients with an obvious purulent process, no bacteria were detected.

### **Discussion**

This group of patients was characteristic with pathologically unchanged esophagus before the perforation. Among 9 patients, perforation was caused by a foreign particle or in relation to its extraction in 5 cases. In literature, presented perforation developed mainly on a pathologically changed esophagus due to a primary disease or re-canal procedures (2). In the neck localization, there were no problems with its identification neither with treatment. Patients have healed after a single intervention. A different situation was in case of thoracic or abdominal perforation. In the localization in the thorax, the operation was indicated 5 times in one patient due to various localized abscesses either in mediastinum or in pleural cavity, in another patient operation was indicated 3 times and in another one 2 times. Generally

**Tab. 4. Visualization of perforation.**

Directly peri-operatively	3x
Instillation of the air peri-operatively	1x
Endoscopically before operation	1x
Endoscopically peri-operatively	3x
peri-operatively not visualized, only post-operatively via contrast CT	1x

**Tab. 5. Summary — primary treatment.**

1. cervicotomy: esophagus stitching	2x	Pts 1 and 7
2. laparotomy: esophagus stitching + fundoplication + omentoplasty	1x	Pt 2 – died
3. left sided thoracotomy: esophagus stitching + omentoplasty + intraluminal drainage + nutritional jejunostomy	1x	Pt 3 – died
4. right sided thoracotomy: drainage of pleural cavity	1x	Pt 4
5. cervicotomy: loop esophagostomy + drainage of mediastinum. Percutaneous drainage of the right pleural cavity, laparotomy: nutritional jejunostomy	1x	Pt 5
6. cervicotomy: esophagus stitching in one layer + drainage of mediastinum	1x	Pt 6
7. left sided thoracotomy: esophagus stitching	1x	Pt 8 – died
8. laparotomy + phrenotomy: thoracic esophagus stitching + fundoplication according to Thal; left sided thoracotomy: treatment of pleural cavity + decortication of lung + drainage	1x	Pt 9

**Tab. 6. Relation of the perforation onset, number of esophagus**

Stitching within 24 h from the perforation onset	
Performed in 3 patients	2 patients died (pt 3 – thoracic esophagus) (pt 8 – thoracic esophagus)
Stitching later than 24 h from the perforation onset	
Performed in 4 patients	1 patient died (patient 2 – abdominal esophagus)

accepted recommendation of a primary stitching only in perforation present within 24 hours (3) was performed in 3 patients. Among them 2 had died, one patient due to a cardiac failure, proven by autopsy, but another due to a septic bleeding after disintegration of stitching. On contrary, esophagus was stitched 4 times even after 24 hours, in patient 9 even after 2 weeks! Among these patients, only one had died due to a myocardial infarction. In three patients the stitching was primary healed.

**Tab. 7. Bacteriology.**

Enterococcus species	2x
Acinetobacter Baumannii	3x
Corynebacterium species	1x
Staphylococcus epidermidis	3x
Streptococcus species	1x
Staphylococcus aureus	2x
Enterobacter cloacae	1x
Klebsiella pneumoniae	1x
Candida albicans	2x
none	3 pts

**Tab. 8. Therapeutic options in the esophageal perforation according to Wu (10).**

Drainage only
Esophagectomy
immediate reconstruction
delayed reconstruction
Exclusion and diversion
Mini-invasive procedure
stenting
endoclip
VATS
Non-operational therapy
Primary closure
Primary closure with its securing
pleural flap
pericardial flap
diaphragmatic flap
omental flap
flap from m. rhomboideus
flap from m. latissimus dorsi
flap from m. inntercostalis
Drainage via T-drain

A primary stitching was indicated if vital endings of perforation were available after a possible excision. This approach is in accord with the publication of Dosios et al (4), where he stated in the discussion: “a primary closure of mucosa in thoracic esophagus perforation with limited necrosis without regarding the interval from the moment of perforation”. A similar attitude presented also Chao et al (5). On contrary, Pafko warned from a primary stitching of perforation which was present longer than 18 hours and recommended an esophagus resection (6). None of our patients had a pathologically changed esophagus therefore we did not consider its extirpation, but tried to maximally preserve it even in case of the exclusion. Purulent abscesses in mediastinum or in pleural cavity were treated with drainage. At our clinic, we did not have the ability of removable polyflex stents, what it the latest trend (7). We operated on all patients with a suspected esophageal perforation. Thus, a conservative therapy was not used (antibiotics, aspiration of the content of the digestive tract, parenteral or enteral nutrition by jejunostomy) (8).

When choosing the conservative or operational approach, it is possible to proceed according to the criteria by Murphy and Roufail (9), which include the type of perforation, its localization, extend, presence of previous esophageal pathology, time interval between perforation onset and its diagnosis and a possible sepsis. The therapy should be targeted at the elimination of a septic focus, insertion of drainage, support of the defensive mechanisms by antibiotics and sufficient nutrition [10]. The main determinants of a successive therapy are general status and physiological reservoirs of patient, and other esophageal pathology. Wu et al (10) summarized the present therapeutic options in Table 8, and they are detailed in the associated algorithms.

Pafko (6) considered the status of patient, interval from perforation onset to the final therapy, localization of perforation, disorders of normal or pathologically changed esophagus and experience of the clinic with this condition.

### Conclusions

– The cause of perforation in this group of patients was not a diagnostic endoscopy but mainly foreign particles and associated therapeutic endoscopy or spontaneous ruptures.

– The endoscopy specialist helps a lot in the localization of perforation (4/9).

– The therapy consisted mostly of combination of interventions and drainages (intraluminal, pleural and mediastinal).

– Therapy of pleural cavity should be done, the best choice is during the thoracotomy.

– It may be not valid that the primary stitching should be done within 24 hours from perforation onset (4 times esophageal stitching was done in history longer than 24 h and 1 patient had died).

– Nutrition should be secured via jejunostomy (in 1 patient for 16 months).

– Cultivation may not be successful despite an advanced inflammatory changes (mainly anaerobes).

– Group lethality was 3/9 i.e. = 30 % which is in the range of 3–67 % stated by Huber-Lang et al from 2006 (11).

– Questioning the 24-hour recommendation should be proved on the larger groups of patients based on EBM.

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