

# Iatrogenic perforation of hypopharynx as a cause of severe descending necrotizing mediastinitis: A case report

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## Abstract

The authors present a case report of severe descending necrotizing mediastinitis (DNM) etiologically of unrecognized traumatic endotracheal intubation with hypopharynx-esophageal junction perforation. Patient was treated inadequately for seven days in local hospital what was the cause of sepsis progression into the septic shock with multiorgan dysfunction syndrome. Patient was transferred to specialized hospital and was immediately operated in general anaesthesia – combined transcervical approach and lateral thoracotomy was used for mediastinal drainage and debridement. Combination of appropriate conventional and surgical therapy led to reversing of the unfavorable situation.

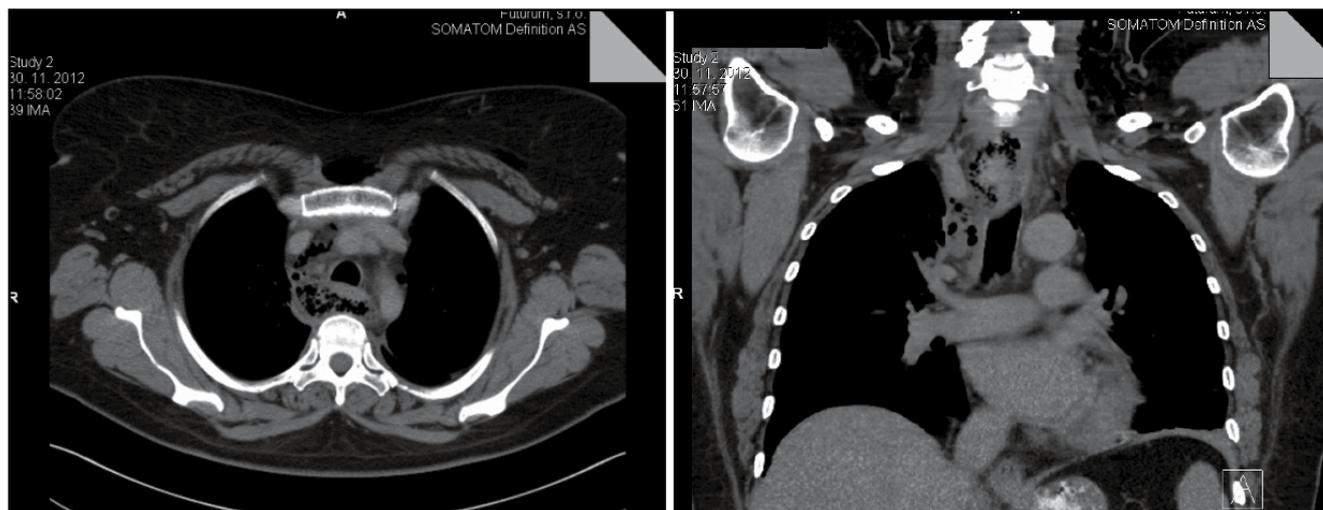
## INTRODUCTION

Descending necrotizing mediastinitis (DNM) is a severe infection of connective tissue spreading from oral or cervical region to the mediastinal space. Quick spreading of the infection from these regions is supported by the gravity, respiration and negative intrathoracic pressure (Ewing & Hardy, 1991). Except primary infections or abscesses in oral or cervical region, the second most frequent cause of DNM are iatrogenic injuries. The mortality rate of DNM is rising with late recognizing of iatrogenic perforation and not seldom can be fatal. For successful management is

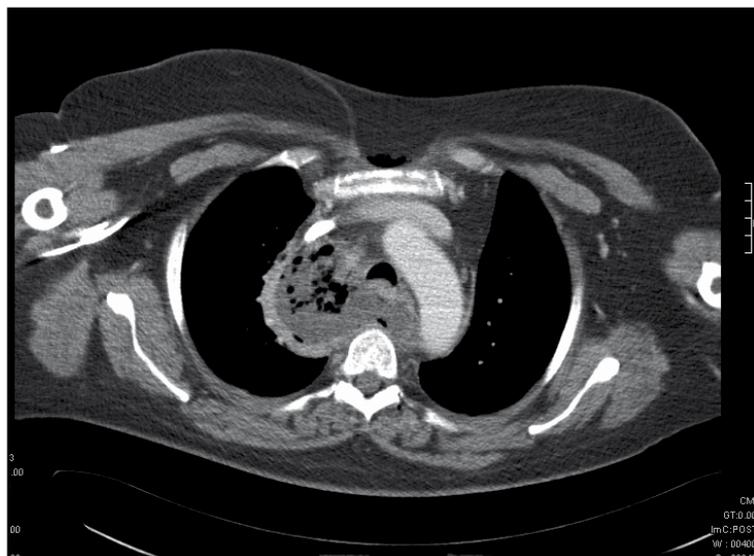
crucial early detection of iatrogenic complication and immediate therapy by appropriate specialist.

## CASE DESCRIPTION

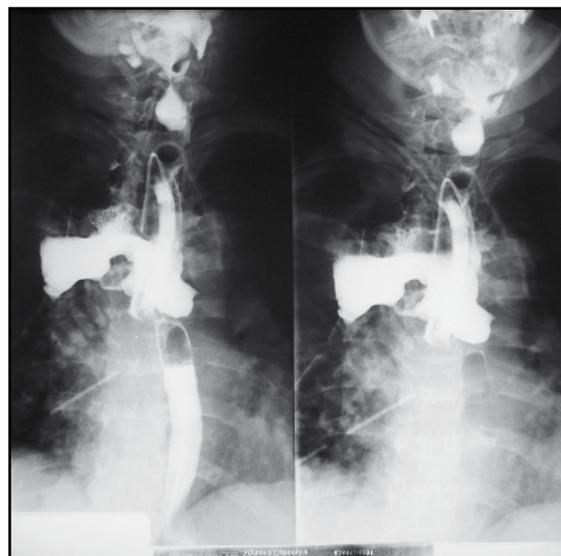
The middle age patient, 50-years old women, without chronic diseases, after repeated curettage of the uterus was presented in septic shock to surgical department with late recognized mediastinitis, after seven days of inappropriate treatment in local hospital. Before being admitted to Clinic of Thoracic Surgery University hospital in Martin, she was hospitalized in gynecology for elective hysterectomy due to enlarged myomatous uterus. Prob-



**Fig. 1.** CT scan 3 days after surgery: pneumomediastinum, fluid collection around the gas bubbles in the mediastinum – highly suspected mediastinitis.



**Fig. 2.** CT-scan 7 days after surgery: progressive descending necrotizing mediastinitis.



**Fig. 3.** Contrast X-ray (oral route) 10 days after mediastinal drainage – persisting leak of contrast solution.

lems started already at the beginning of anaesthesia during intubation of the patient. Finally the anaesthesiologist contraindicated the surgery due to impossibility of intubation and prescribe antibiotic therapy (Cefuroxime 750 mg per day), single dose of Dexamethasone phosphate 2mg/kg of body weight and daily otolaryngology (ENT) examination. The next day after the procedure patient started to be subfebrile, there was swelling of the neck and right cheek, hematoma of pharyngeal arches and uvula, subcutaneous emphysema of the neck and under the right mandible. Pharyngoscopy showed swelling of the base of the tongue, fibrin coatings and saliva stasis in hypopharynx. Despite all this symptoms was patient allowed to eat. No imaging method was used for examination. Two days after the procedure ENT doctor indicated chest X-ray, which

showed widened mediastinum to the right, pneumomediastinum and subcutaneous emphysema of the neck. According to this X-ray, CT-scan which was performed on 3<sup>th</sup> day after surgery was indicated. There were signs of pneumomediastinum (suspected intubation damage of hypopharynx-esophageal junction), the fluid collection around the gas bubbles in the mediastinum – signs of mediastinitis (Figure 1). Patient was still hospitalized in Department of Gynecology (local hospital), antibiotic therapy was extended by Metronidazole 3×500 mg intravenously per day, hitherto no surgeon was consulted. The patient's condition was day per day worse, on the 7<sup>th</sup> day signs of severe sepsis with septic fever, metabolic imbalance, high inflammatory response (C-reactive protein (CRP) was 256 mg/l, procalcitonine (PCT) 85.28 ng/ml) appeared. Control CT-scan

confirmed progression finding in the mediastinum – increased volume of fluid collection to 24×5.5×4 cm and massive retropharyngeal gas (Figure 2).

Patient with rapidly deteriorating health condition, with CT confirmed severe mediastinitis, was finally transported to our specialized department one week after injury. She was admitted to thoracic surgery intensive care unit (ICU) with signs of incipient septic shock. Antibiotic and antifungal therapy (Meropenem, Fluconazole) was initiated immediately and an urgent surgical intervention was indicated. Due to volume and location of fluid collections we realized typical mediastinal drainage using transcervical approach and right lateral thoracotomy for evacuation of residual content and mediastinal revision. From both approaches we evacuated a large amount of putrid, smelling pus. We inserted two drains (F32) into the mediastinum. Suprasternal wound was left to secondary healing. Microbial cultivation revealed Gram positive and negative anaerobic bacterias (resistant to Metronidazole, Clindamycin and Erythromycin). Aerobic bacterial strains confirmed *Streptococcus specii* and *Streptococcus microaerofili*. Despite new antibiotic therapy and intensive anesthetic care, the patient's condition was very critical in the first 24 hours after the surgery. Due to signs of multiorgan dysfunction syndrome (MODS) and need for vasoactive drug support the patient was transferred to Department of Anesthesiology and Intensive Medicine. Tracheostomy was performed. Multidrug-resistant *Enterococcus faecium* from blood culture was detected during the stay in the Department of Anaesthesiology and Intensive Care Medicine. Antibiotic therapy was modified to Vancomycin. Progressively, the patient's clinical condition was significantly improved, patient was afebrile, without vasoactive drug support, spontaneously breathing, drains were conducting seropurulent content, CRP 75 mg/l, PCT 3.25 ng/ml. Patient was transported back to thoracic surgery ICU. Despite the customized parenteral nutrition the patient was losing the body weight and laboratory showed poor nutritional status. Therefore, 10 days after mediastinal drainage, we performed puncture jejunostomy for enteral nutritional support which was proved very effective. Two weeks after the last surgery iodine-containing contrast X-ray examination, which showed persisting leak of contrast solution in retropharyngeal, posterior mediastinal space and right pleural cavity was performed (Figure 3).

In the course we proceeded conservatively. Interim microbiological results detected *Klebsiella pneumoniae* I-ESBL, *Enterococcus faecium*, *Candida Torulopsis*. In antimicrobial therapy Amikacin, Linezolid and Fluconazole as antifungal therapy were sequentially used. One week later we retook the oral route contrast X-ray, which was finally negative, so we started with combined nutrition – oral, enteral and parenteral with gradual transformation to pure oral. Patient was back in anabolic nutritional state, septic markers were negative.

Drains were progressively removed because of minimal production. On the 37<sup>th</sup> postoperative day (44 after the first procedure in local hospital) the patient was discharged from the hospital. The patient refused further gynecological operation.

## DISCUSSION

Traumatic endotracheal intubation doesn't belong among the common causes of DNM. It represents only about 7% of all causes (Harar *et al.* 2002). Exactly the rarity of this condition often leads to late recognition of the disease, which can increase morbidity and mortality. It may be explained also by the delay of clinical presentation, which allows the infection to continue spreading along the cervical soft tissue. Cardinal early signs and symptoms of pharyngo-esophageal perforation include neck pain, cervical crepitation, fever, dysphagia, cervical swelling, pneumothorax, pneumo-mediastinum (Domino *et al.* 1999).

The infection in DNM is in most cases polymicrobial. Both neck and mediastinum infectious processes include mixed aerobic (Gram-positive cocci, commonly streptococci) and anaerobic (*Bacteroides* spp., *Prevotella*, and *Peptostreptococcus* spp.) pathogens in up to 80% of cases (Farmahan *et al.* 2014). In patients with immunodeficiency mycotic infections is very often presented as well. In our case the patient had in first days antibiotic treatment only against aerobic microbes and, as microbial results later showed, dominant component of microbial spectre were anaerobic strains.

Crucial in diagnosis of DNM is imaging. The main finding from chest X-ray is pneumomediastinum with an air-fluid level, which is best viewed in lateral projection. Widening of the mediastinal shadow, pleural and pericardial effusions and lung abscess also may be found (Akman *et al.* 2004). Cervicothoracic CT scan is a diagnostic method of choice which can identify DNM in its early course. CT usually shows varying degrees of tissue necrosis, soft tissue infiltration, localized collections, subcutaneous emphysema and gas bands. CT scans make it possible to assess the spread of the infection and decide on the best surgical approach. The importance of CT scan in the perioperative follow-up is in the assessment of surgical drainages' results, drainage duration, and in the timing of possible reoperation (Balkan *et al.* 2001). An appropriate treatment of DNM includes intravenous antibacterial therapy and rapid extensive surgical drainage of the affected regions. The first choice for descending mediastinitis are broad-spectrum antibiotics and good coverage against anaerobes. No oral feeding is obvious. The indication of tracheostomy in the management of the main airway is still controversial, but very often used (Cirino *et al.* 2006).

The surgical approach to the mediastinum is crucial for the adequate drainage. Most often used transcervical approach for the drainage of the upper mediastinum is according to some authors inadequate for

complet drainage. They prefer thoracotomy (Corsten *et al.* 1997). Thoracotomy offers good approach to the mediastinum, what is crucial for radical debridement, however on the other side, it is opening the way for contamination and infection of pleural cavity (Casanova *et al.* 1997). Less frequent approaches for surgical treatment of DNM are medial sternotomy, clamshell thoracotomy, posterior mediastinotomy, thoracoscopic methods or minithoracotomy (Dzian *et al.* 2013). In patients with poststernotomy mediastinitis is increasingly used vacuum-assisted treatment using negative pressure wound therapy (NPWT) with encouraging results (Deniz *et al.* 2012). Each method of surgical treatment has its advantages and disadvantages. For choosing the correct modality we must thoroughly know the morphology of mediastinum and the range of affected tissue. In every suspicion for mediastinitis is consultation of surgeon vital for the early adequate therapy and the best possible outcome of surgery.

## CONCLUSION

In order to identify pharyngoesophageal perforation in its early stage, the anesthetist must suspect this injury when the patient was difficult to intubate and has developed its cardinal signs and symptoms. Immediate consultation of the surgeon will facilitate prompt recognition and early management, whether operative or nonoperative, decreasing the likelihood of the injury progressing into the later stages. In this case inadequate initial antibiotic therapy, delayed cooperation with surgical team and incorrect management in first week in local hospital was almost fatal for the patient.

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