

DESCENDING NECROTIZING MEDIASTINITIS SECONDARY TO RETROPHARYNGEAL ABSCESS

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SUMMARY – Descending necrotizing mediastinitis secondary to a nontraumatic retropharyngeal abscess is very rare. This form of mediastinitis in the era of potent antibiotics often ends up with lethal outcome. It usually occurs in immunocompromised patients and requires intensive multidisciplinary treatment approach. We report a case of nontraumatic retropharyngeal abscess complicated by descending necrotizing mediastinitis in a 70-year-old man with insulin dependent diabetes mellitus. The patient was admitted to our hospital after clinical and radiological diagnosis of retropharyngeal abscess. During treatment for retropharyngeal abscess with antibiotic therapy and transoral incision, the patient showed mild clinical improvement but his condition suddenly aggravated on day 4 of hospital stay. He had high fever, chest pain with tachypnea, tachycardia, hypotension, and showed signs of occasional disorientation. Emergency computed tomography (CT) scan of the neck and thorax showed inflammation in the retropharyngeal space, as well as thickening of the upper posterior mediastinum fascia with the presence of air. Emergency surgery including cervicotomy and drainage of the retropharyngeal space and posterior mediastinum was performed. The patient promptly recovered with improvement of the clinical status and laboratory findings. After 16 days of treatment he was discharged from the hospital in good condition. Descending necrotizing mediastinitis can be a serious and life threatening complication of deep neck infection if the diagnosis is not quickly established. Besides inevitable application of antimicrobial drugs, good drainage of the mediastinum is necessary. We believe that transcervical approach can achieve high-quality drainage of the upper mediastinum, especially if it is done timely as in this case. Its efficacy can be verified by intensive monitoring of the patient clinical condition, by CT scan of the thorax, and by laboratory tests. In the case of inefficacy of this type of drainage, subsequently some other, more aggressive transthoracic methods of drainage can be done.

Key words: *Retropharyngeal abscess; Mediastinitis; Necrosis; Drainage; Case reports*

Introduction

The retropharyngeal space is a sandwich space between the buccopharyngeal fascia and prevertebral fascia. It is divided into two spaces by the alar fascia, which contains loose connective tissue. The anterior section occupies the space of the skull base to

the second thoracic vertebra, while the posterior part extends much deeper, to the diaphragm behind the esophagus¹. The presence of suppurative content in the retropharyngeal space often arises as the result of abscessing inflammation of the lymph nodes in the retropharyngeal space. During the fifth or sixth year of life, the lymph nodes involute, so inflammatory changes of the retropharynx in adults are very rare^{2,3}. Retropharyngeal abscess can lead to rare and fatal complications such as acute upper airway obstruction, aspiration pneumonia, jugular thrombophlebitis, ca-

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rotid artery hemorrhage, and descending necrotizing mediastinitis. Descending necrotizing mediastinitis is one of the most serious forms of mediastinitis⁴⁻⁷. This disease is characterized by nonspecific symptoms in the early phase of mediastinal involvement, which is the main reason for late diagnosis of mediastinitis that may be fatal for patients. Mortality rate of this type of mediastinitis is still high despite the use of modern therapy and it ranges from 14% to 50%⁷. In this paper, we present a rare case of descending necrotizing mediastinitis secondary to a retropharyngeal abscess. We describe our experience in the diagnosis and surgical treatment of this highly fatal infectious condition, along with a review of the literature.

Case Report

A 70-year-old man with insulin dependent diabetes mellitus was admitted to our hospital with high fever, sore throat, associated with odynophagia, stridor, and dysphonia. During examination, active movement of the neck was limited and painful, without any obvious swelling in the neck area. Clinical examination and fiberoptic laryngoscopy showed erythematous bulging of the posterior wall of the oropharynx and edema of the larynx. Labo-

ratory blood tests at the time of admission showed high white blood cell count (WBC, 15.4×10^3) and C-reactive protein (CRP, 173 mg/L), while glucose (insulin therapy), red blood count, creatinine, iron, total protein, alanine aminotransferase, and creatine phosphokinase were normal. Computed tomography (CT) of the neck showed complete soft tissue thickening of the retropharyngeal space with a collection of air at some sites, which was in direct contact with vertebral bodies (Fig. 1). Radiography of the thorax did not indicate dissemination of the inflammation to the mediastinum and lungs. The retropharyngeal abscess was treated with antibiotics and surgery. On the first day of hospitalization, we applied dual intravenous antibiotic therapy (cefazolin 4 g/day in four doses and metronidazole 500 mg every 8 h). Incision and abscess content evacuation was performed by transoral approach without local or general anesthesia, also on the same day. Bacteriological swab of the abscess cavity was obtained after evacuation. About 30 mL of pus was collected by suction. Upon edema regression, the posterior pharyngeal wall appeared immediately after the intervention. The patient's condition improved considerably in the next few hours. The purulent fluid culture was positive for β -hemolytic streptococcus and *Peptostreptococ-*

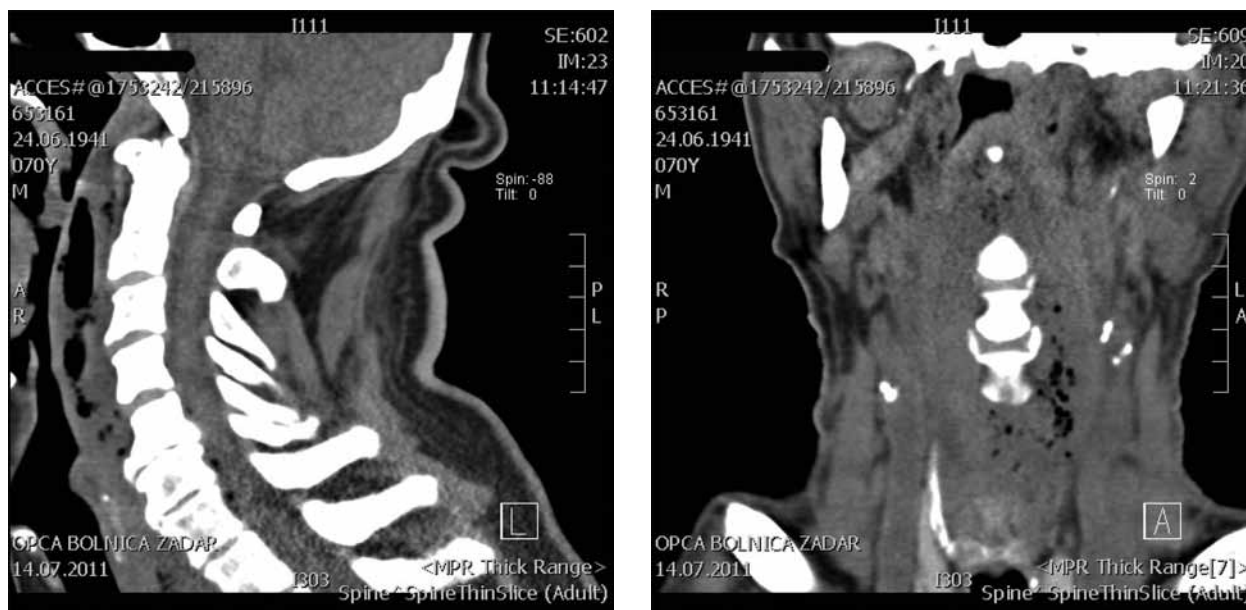


Fig. 1. Computed tomography (CT) on the day of admission revealed thickening of the retropharyngeal space with a collection of air (A, sagittal view; B, frontal view).

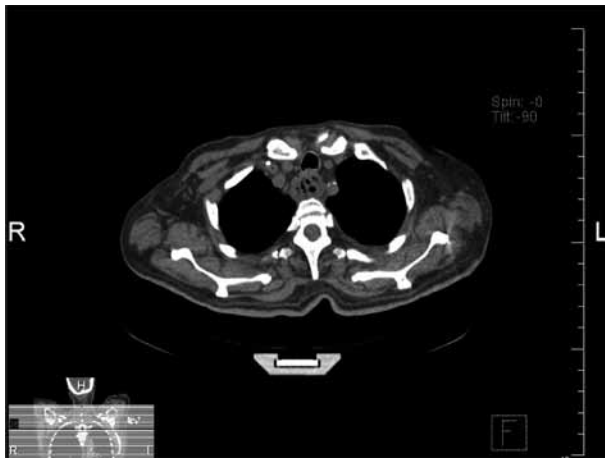
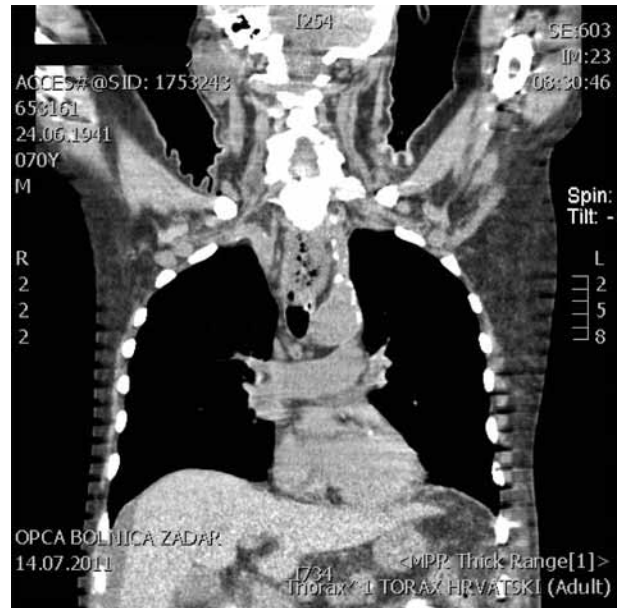


Fig. 2. Computed tomography (CT) on hospital day 4 revealed thickening of the posterior upper mediastinum tissues, between the esophagus and vertebral bodies, with a collection of air (A, transverse view; B, frontal view).

cus spp. with proven sensitivity to antibiotics already applied. On postoperative day 4, the patient's condition deteriorated with signs of high fever and chest pain with tachypnea. Repeated laboratory blood tests showed an increase of leukocytes (WBC, 17.2×10^3) and CRP (470 mg/L). Emergency CT scan of the neck and thorax showed continuing inflammation in the retropharyngeal space but also thickening of the soft tissue with collection of air in the upper posterior



mediastinum to the level of tracheal bifurcation (Fig. 2). We performed cervicomediastinal and retropharyngeal drainage through the cervical skin incision. Smelly pus with admixture of gas was detected in the retropharyngeal space and upper mediastinum, along the esophagus and vertebral bodies.

Tube drainage of the retropharyngeal space and upper mediastinum was performed immediately by irrigation with saline, which was done several times *per*

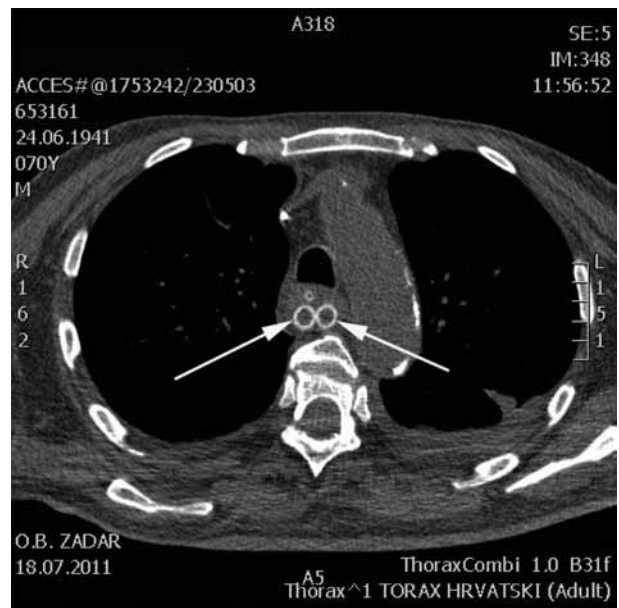


Fig. 3. Drainage tubes were placed in the mediastinum and retropharyngeal space after cervical incision (A); computed tomography (CT) scan shows (arrows) two parallel drains in the posterior space of the mediastinum and the nasogastric tube (A, transverse view; B, frontal view).

day (Fig. 3). The patient's condition rapidly improved, body temperature stabilized, and clinical findings were better daily. Antimicrobial therapy was not changed due to negative bacteriological mediastinum swab culture. Drainage tubes were gradually removed, and the last one was removed from the upper mediastinum seven days after cervicomediastinal drainage. The patient was discharged on day 16 with normal clinical and laboratory findings. During two-year follow up, no symptoms of upper respiratory tract inflammation were observed on repeated examinations.

Discussion and Conclusion

Retropharyngeal abscess is infection in one of the deep spaces of the neck. It is a rare disorder usually seen in children as the result of upper respiratory tract infection. In adults, retropharyngeal abscess mostly arises primarily as the result of contamination by a sharp foreign body or surgical instrument, traumatic rupture of the pharyngeal mucous membrane and muscle. Nontraumatic retropharyngeal abscess in adult is extremely rare and generally occurs in immunocompromised patients^{2,3}. Like other deep neck infections, retropharyngeal abscess is a serious infection and can endanger patient lives. Death of patients usually occurs as a result of sepsis with multiorgan failure. One of other complications of retropharyngeal abscess, which can be life threatening, is descending necrotizing mediastinitis⁴. Reports describing retropharyngeal abscess and mediastinitis in an adult are very rare and only a few cases have been described in the literature⁵. This type of mediastinitis has poor prognosis and any delay in diagnosis contributes to increased opportunities of fatal outcome of the disease. Clinical diagnosis of descending necrotizing mediastinitis can be difficult because clinical symptoms are variable and nonspecific. In any case of deep neck infection, it is necessary to think about the possibility of its occurrence, especially in immunocompromised individuals. Descending necrotizing mediastinitis must be detected as early as possible. The best method for this is certainly CT of the thorax. It gives us confidence in the detection of inflammation, reveals its scale and scope, as well as a possible way of spreading. Some authors suggest the use of CT of the thorax in all deep inflammations of the neck that are located below the

level of hyoid to predict the possibility of its spread⁸. We did not follow this valuable advice even though the patient showed spread of the retropharyngeal abscess significantly below the level of hyoid bone. We performed just plain chest radiograph, which is not sensitive and specific enough for inflammatory processes in the mediastinum.

Retropharyngeal abscess can spread to the mediastinum fascia areas between the buccopharyngeal and alar fascia or along the prevertebral fascia. In our case, the alar fascia was probably ruptured at the level of second thoracic vertebra because the inflammation spread to the space between the esophagus and thoracic spine at the level of tracheal bifurcation. In this situation, any delay in diagnosis or surgical intervention would result in spread of infection up to the diaphragm.

In all cases of descending necrotizing mediastinitis, treatment includes systemic antibiotic therapy, high-quality drainage of the inflamed area, and supportive medical care in intensive care unit.

Bacteriological analysis of 36 previously reported cases of descending necrotizing mediastinitis reported by Wheatley *et al.*⁹ shows a high percentage (83%) of mixed aerobic and anaerobic organisms, while β -hemolytic streptococcus as the sole agent was isolated in 14% of cases. Many authors recommend a combination of two or three antibiotics, as monotherapy may be insufficient. Therefore, we used two intravenous antibiotics, cefazolin and metronidazole, which we did not change during the course of treatment. The choice of antibiotics proved very efficacious during early treatment of our patients with deep neck infections. Isolated microorganisms in this case showed great sensitivity to them. An additional reason for the continuous application of antibiotic therapy is the popular notion that identical organisms cause retropharyngeal abscess and its complications, mediastinitis, although in this case we did not confirm it.

The mainstay of treatment for patients with descending necrotizing mediastinitis is definitely a quality surgical drainage. In choosing the type of mediastinal drainage, there are different approaches. Brunelli *et al.*¹⁰ believe that cervicomediastinal drainage could be effective for mediastinal infection if the lower limit of the spread of infection is tracheal bifurcation. Wheatley *et al.*⁹ and Marty-Ane *et al.*¹¹ report

that cervicomedial drainage is insufficient to treat any form of descending necrotizing mediastinitis and suggest a significantly more aggressive transthoracic drainage regardless of the level of infection spread in the mediastinum. Freeman *et al.*¹² successfully treated all patients with this difficult disease with combined cervicomedial and transthoracic drainage.

Unlike them, Nakamori *et al.*¹³ and Sumi *et al.*¹⁴ suggest that extensive surgical debridement of the mediastinum is significantly limited because of important anatomical structures in the area, and they insist on the less aggressive percutaneous catheter drainage. They achieved a very good result in curing descending necrotizing mediastinitis with a low percentage of mortality of 3.1%. We believe that cervicomedial drainage can be successful in cases where inflammation is limited in the retropharyngeal space and posterior mediastinum and should be done first without hesitation. Besides being technically less demanding, its other advantages over transthoracic approach is less possibility of secondary hospital infections, due to less surface area of open wounds, less need for analgesics, and reduced loss of electrolytes and proteins.

Follow up CT scan of the neck and thorax after 24-48 hours and monitoring of clinical signs of the general condition can evaluate the success of cervicomedial drainage. In case when this approach to mediastinal drainage shows signs of failure, it is always possible to do one of the more aggressive drainage transthoracic approaches. The main prerequisite for success of cervicomedial drainage is early diagnosis of descending necrotizing mediastinitis, and every delay makes it insufficient.

The use of CT scan of the thorax in patients with retropharyngeal abscess or other deep inflammation of the neck, after general condition deterioration, can detect early mediastinitis. Then, successful drainage of the mediastinum can be performed through transcervical approach¹⁵⁻¹⁹.

It is concluded that nontraumatic retropharyngeal abscess with descending necrotizing mediastinitis is extremely rare. This type of mediastinitis is very aggressive and has a high mortality rate. The success of treatment of this condition depends on the accuracy and speed of diagnosis, effective drainage of the mediastinum, and administration of systemic antibiotics which cover aerobic and anaerobic organisms. We

believe that cervicomedial drainage can be successful in curing descending necrotizing mediastinitis. Its efficiency could be tested with thorax CT and monitoring clinical parameters and laboratory tests. In the case of inefficiency of this type of drainage, subsequently some other, much aggressive transthoracic methods of drainage could be done.

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Sažetak

DESCENDENTNI NEKROTIČNI MEDIJASTINITIS KAO POSLJEDICA RETROFARINGEALNOG APSCESA

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Descendentni nekrotični medijastinitis uzrokovan netraumatskim retrofaringealnim apscesom je jako rijedak. Ovaj tip medijastinitisa i u eri jakih antimikrobnih lijekova često završava smrtnim ishodom. Obično se javlja kod imunokompromitiranih bolesnika i zahtijeva intenzivni multidisciplinarni pristup liječenja. Prikazuje se slučaj netraumatskog retrofaringealnog apscesa i njegove komplikacije, descendentnog nekrotičnog medijastinitisa, u 70-godišnjeg muškarca s dijabetesom ovisnim o inzulinu. Bolesnik je primljen na bolničko liječenje nakon klinički i radiografski postavljene dijagnoze retrofaringealnog apscesa. Tijekom liječenja retrofaringealnog apscesa antimikrobnim lijekovima i transoralnom incizijom, uz kratkotrajno kliničko poboljšanje, četvrtog dana liječenja nastupilo je pogoršanje općeg stanja bolesnika. Postao je opet visoko febrilan, tahipneičan s bolovima u prsima, tahikardičan uz hipotenziju te je pokazivao znakove dezo-rijentiranosti. Kompjutorska tomografija (CT) vrata i toraksa pokazala je i dalje prisutnu upalu retrofaringealnog prostora uz zadebljanje fascijalnih prostora gornjega stražnjeg medijastinuma uz prisutnost zraka. Napravljen je hitan kirurški zahvat u smislu cervikotomije i drenaže retrofaringealnog prostora i medijastinuma. Stanje bolesnika se ubrzo popravilo u kliničkom smislu i laboratorijskim nalazima te je 16. dana liječenja otpušten na kućnu njegu u dobrom općem stanju. Descendentni nekrotični medijastinitis je ozbiljna komplikacija dubokih upala vrata i predstavlja opasnost za život bolesnika, naročito ako se dijagnoza ne postavi rano. Uz primjenu antimikrobnih lijekova osobito je važna visoko kvalitetna drenaža medijastinuma, pogotovo ako je napravljena pravodobno, kao u ovom slučaju. Njenu učinkovitost se može procijeniti pojačanim praćenjem kliničkog stanja bolesnika, primjenom CT toraksa i laboratorijskim testovima. U slučaju kad ovaj tip drenaže nije učinkovit moguće je uvijek napraviti mnogo agresivnije transtorakalne metode drenaže.

Ključne riječi: *Retrofaringealni apsces; Medijastinitis; Nekroza; Drenaža; Prikazi slučaja*