

Management of Descending Mediastinal Infections with an Unusual Cause: A Report of 3 Cases

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Mediastinal infections are a life-threatening and distinctly rare event, especially when they are caused by a dental abscess or by a foreign body that has not perforated the esophagus. We evaluated how best to treat descending mediastinal infections occurring from an unusual cause. We report 3 female patients with mediastinal infections: two aged 45 and 80 years, each with a dental abscess, and one 62 with a foreign-body injury of the retropharyngeal wall. A retropharyngeal abscess and descending necrotizing mediastinitis developed in two of these patients. The mediastinal abscess was detected by computed tomographic scanning. All patients were successfully treated by drainage of their abscesses via cervicotomy or thoracotomy. A mediastinal abscess can be a serious complication. Mediastinitis is associated with a high mortality rate if the diagnosis is not quickly established and adequate therapy is not provided. In this report, we discuss the management and possible pathophysiological mechanisms of descending mediastinal infections that have an unusual cause. Clinicians should be aware of the possibility of descending mediastinal infections in patients with a retropharyngeal abscess or a dental abscess associated with persistent signs, such as fever. Imaging modalities must be used as soon as possible to enable early diagnosis. Aggressive treatment includes surgical drainage, and medical management in an intensive care unit may prevent a catastrophic outcome. (Ann Thorac Cardiovasc Surg 2010; 16: 198–202)

Key words: descending mediastinitis, foreign body, retropharyngeal abscess, dental abscess

Because of the occurrence of descending mediastinal infections (DMIs) such as mediastinitis, a mediastinal abscess, which is associated with a mortality rate as high as 50%, can be a serious and life-threatening complication.¹ Careful clinical examination and radiological evaluation are of great value because aggressive surgical intervention and medical management are required to prevent a poor outcome.

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The most common causes of DMIs are an esophageal perforation and an upper respiratory infection.^{2–4} A retropharyngeal abscess (RA) is a common pathological condition that is caused by an acute infection of the throat or a chronic infection, such as that occurring in patients with a tuberculous cervical spine and/or cervical lymph node.² However, an RA (such as the 2 described here) is rarely caused by a foreign body or a dental abscess.^{3,4}

We present 3 unusual cases of patients with a descending mediastinal infection after an RA caused by a foreign body or a dental abscess. All patients were successfully treated by surgical intervention after early diagnosis via computed tomographic scanning.

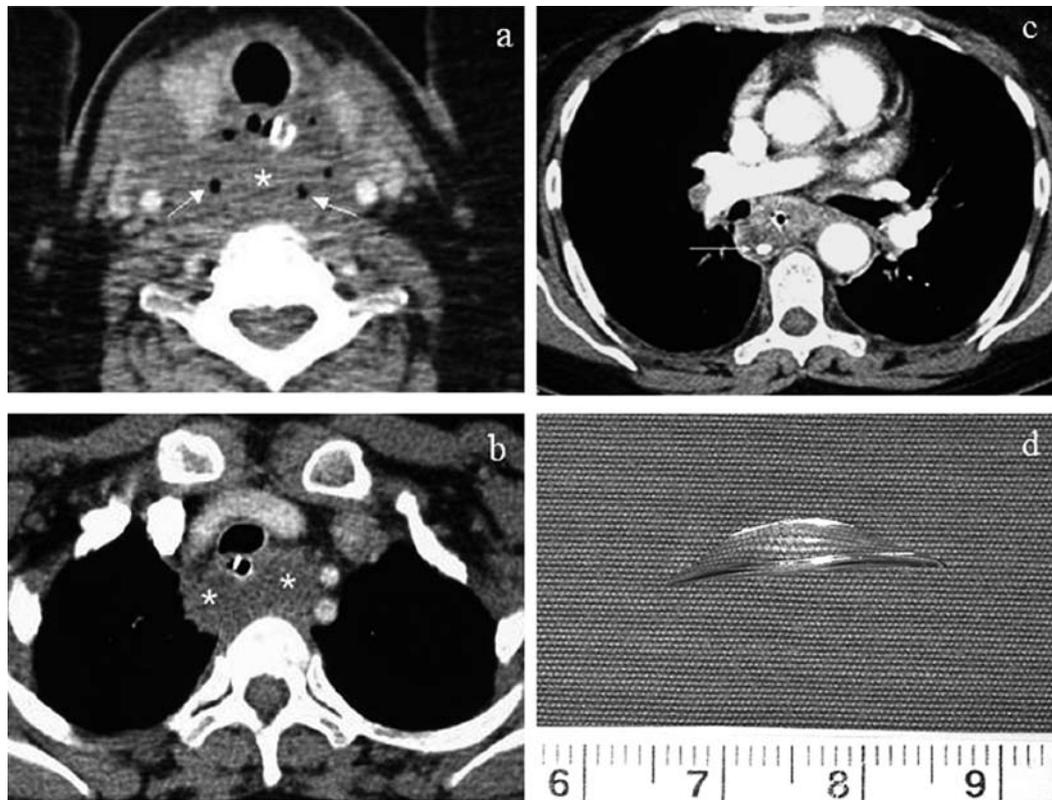


Fig. 1. A contrast-enhanced computed tomographic scan of the chest shows main fluid (white asterisk) collections, which contain gas bubbles (white arrow) extending toward the posterior mediastinal space (b) from the retropharyngeal space via the prevertebral space (a). A contrast-enhanced computed tomographic scan of the chest shows paraesophageal fluid in the posterior mediastinum and a foreign body (white arrow) (c). A foreign body (a piece of glass) with sharp edges is showing (d).

Case Reports

Case 1

A 62-year-old diabetic woman with a sore throat, neck pain, dysphasia, high fever (39.7°C), and right-sided chest pain was admitted to our institution. Physical examination revealed posterior pharyngeal edema and cervical adenopathy. There were no abnormal dental findings. The results of routine laboratory evaluations showed a white blood cell count of 14,000/mm³ and an erythrocyte sedimentation rate of 81 mm/h. The patient, whose type II diabetes mellitus was treated with crystallizing insulin, was found to have an elevated plasma glucose concentration (231 g/dL). A chest radiograph revealed no abnormal findings. A computed tomographic scan of the neck showed an RA, which was drained. The results of culture of the purulent fluid inside the abscess were positive for *Klebsiella pneumoniae* and *Citrobacter freundii*. The patient was treated with an intravenously administered antibiotic (ampicillin-

subactam 4 g/d) for 3 days; however, the fever remained elevated. A computed tomographic scan of the chest showed a retropharyngeal posterior mediastinal abscess (MA) (4 × 6 cm) that was caused by a foreign body resting on the esophagus (Figs. 1a–c). MA drainage and foreign body removal were performed via a right-sided posterolateral thoracotomy. During the operation, the foreign body (a piece of glass approximately 2 cm in diameter) was found in the MA near the right inferior pulmonary vein (Fig. 1d). After the operation, the patient's condition rapidly improved, and her fever resolved. Subsequent information revealed that the inadvertently ingested piece of glass was a fragment from a chipped salad bowl. The patient's post-operative course was uneventful, and she was discharged from the hospital 6 days after surgery. She was found to be well at a follow-up examination 26 months later.

Case 2

A 45-year-old woman was referred to our hospital for

Table 1. Clinical characteristics of the subjects

Patient No.	Age (y)	Sex	Cause of RA	Clinical Presentation	Treatment Approaches	Microorganism(s)	Risk Factors for Mediastinal Infection	Follow-up (mo)
1	62	F	Foreign body injury (a piece of glass)	RA and MA	PLT	<i>Klebsiella pneumoniae</i> , <i>Citrobacter freundii</i>	DM	26 Alive
2	45	F	Dental abscess	DNM and MA	PLT and C	<i>Candida albicans</i> , <i>Staphylococcus aureus</i> , <i>Actinomyces israelii</i> S <i>aureus</i>	None	29 Alive
3	80	F	Dental abscess	DNM, RA, and MA	PLT and C	<i>A israelii</i> , <i>Acinetobacter baumannii</i>	DM	17 Alive

RA, Retropharyngeal abscess; F, female; MA, mediastinal abscess; PLT, posterolateral thoracotomy; DM, descending mediastinitis; DNM, descending necrotizing mediastinitis; C, cervicotomy.

emergency treatment of a lung abscess and severe dyspnea. Tachycardia (170/bpm), hypotension (70/40 mmHg), and a high fever (38.8°C) suggested septic shock. Physical examination revealed cervical subcutaneous crackling. A computed tomographic scan of the neck and thorax showed multiple abscesses in the fascial planes and the anterior mediastinum as well as bilateral infiltration in the lung parenchyma. The patient had undergone the extraction of a molar 10 days before she was hospitalized. However, she had no risk factors such as diabetes or a chronic disease that could cause immunodeficiency and a subsequent widespread infection. The abscesses of the neck and anterior mediastinum were drained via cervical mediastinotomy, and a tracheotomy was performed at the time of surgery. The patient's tachycardia and hypotension improved dramatically. The abscesses of the neck and the mediastinum had already been drained via cervicotomy and tube thoracostomy, necrotic tissue was removed, and decortication was performed via a right-sided posterolateral thoracotomy. *Candida albicans*, *Staphylococcus aureus*, and *Actinomyces israelii* were detected in the mediastinal and pleural purulent fluid. Daily mediastinal and pleural flushing was performed until the results of a culture of the pleural effusion were negative. The chest tubes were removed on the 25th postoperative day, and the patient was discharged from the hospital in a healthy condition 40 days after the operation. At the time of her follow-up examination 29 months after surgery, she indicated that her postoperative course had been uneventful.

Case 3

An 80-year-old woman with a sore throat, neck pain, dysphasia, a high fever (39.7°C), and right-sided chest

pain was admitted to our institution. Physical examination revealed posterior pharyngeal edema and cervical adenopathy. Abnormal dental findings, such as a dental abscess on an inferior molar, were noted. The results of routine laboratory analysis showed a white blood cell count of 18,000/mm³. The patient had insulin-dependent (type II) diabetes and an elevated plasma glucose concentration of 180 g/dL. A computed tomographic scan of the neck showed an RA, which was drained of purulent fluid that when cultured yielded *S. aureus*, *A. israelii*, and *Acinetobacter baumannii*. The patient received antibiotic therapy for 10 days; however, her fever remained elevated. A computed tomographic scan of the chest and neck revealed a cervical and mediastinal abscess (4 × 6 cm). Mediastinal, cervical, and retrosternal drainage was performed via a right-sided posterolateral thoracotomy. Washing and draining of the cervical tissues were performed daily. A tracheostomy was performed on the 11th day after the operation because the patient demonstrated severe respiratory incapacity. The patient's fever subsequently resolved, and she was discharged from the hospital 25 days after surgery. She was found to be well at her follow-up examination 17 months later.

Discussion

In patients with a DMI, a severe infection of the connective tissue of the neck spreads downward and can develop into a highly lethal complication.¹⁾ DMIs caused by trauma from a foreign body are rare in adults but are slightly more common in children.³⁾ Either a retropharyngeal infection or an RA can cause mediastinitis, an infection that has in the past conferred a very poor prognosis. Mediastinitis can spread to the parapharyngeal area or the

posterior mediastinal area, both of which communicate with the retropharyngeal space. This space, which consists of loose connective tissue between the buccopharyngeal fascia and the prevertebral fascia, is divided into 2 areas: the anterior space, which extends down to the level of the second thoracic vertebra, and the posterior space (i.e., the prevertebral space), which extends down to the diaphragm and behind the esophagus in the posterior mediastinum.^{5,6)} In the patient described in case report 1, the RA probably spread and the foreign body quite likely migrated via a posterior space. The rapidity of the spread was attributed to a combination of the dependent drainage from the retropharyngeal area into the mediastinum, negative intrathoracic pressure, and synergistic necrotizing bacterial growth. In that patient, the descending abscess is shown in sequential computed tomographic imaging in Fig. 1.

Isaacs and colleagues have reported fatal RAs and DMIs.⁷⁾ In their study, a DMI appeared to have been caused by an injury inflicted on the posterior wall of the pharynx by an ingested foreign body. The most common cause of a DMI is esophageal perforation. Makeieff and colleagues reported only 1 patient with a foreign body infection and 3 with a peritonsillar abscess in 20 of their patients.¹⁾

Clinical signs such as fever, chest pain, leukocytosis, and a high blood sedimentation rate are important clues for DMI, but are not specific. Plain chest radiographs do not enable accurate diagnosis because they lack sensitivity as well as specificity. A DMI such as a mediastinal abscess must be detected as soon as possible by computed tomographic scanning so that neither widespread mediastinitis nor empyema develops.⁸⁾ Ojiri and colleagues suggested that cross-sectional imaging is valuable in evaluating deep neck abscesses and predicting the pathway of the spread of infection.⁶⁾

Our report supports the hypothesis that a DMI can be caused by an RA. Case 1, which is unusual, describes the migration of a foreign body via the retropharyngeal spaces that communicate directly with the posterior mediastinum. Diabetes mellitus may have facilitated the spread of infection in this patient. The patient described in case 3 was in poor condition because of older age and diabetes mellitus, both of which are risk factors for clinical deterioration.

DMI is still associated with a mortality rate of 50%, and of all DMIs, descending necrotizing mediastinitis is the most lethal.¹⁾ We suggest that this high mortality rate has several causes: the excessive delay between the onset of the primary infection and the date of hospitalization, the extent and aggressiveness of the infection, and the

preexisting clinical status of the patient. Diagnosis was delayed in the patients described in case reports 2 and 3. Immediate diagnosis significantly reduces the mortality rate.

The mainstay of treatment for patients with DMI is surgical drainage, and medical management includes appropriate antibiotic therapy and supportive medical care in an intensive care unit. Some authors have shown that percutaneous catheter drainage is less invasive than surgical drainage and controls the infection effectively.⁹⁾ However, other investigators have claimed that cervical drainage alone is sufficient for patients with cervical phlegmon or mediastinal involvement that is limited to a single superior mediastinal space and that thoracotomy and the drainage of mediastinal collections are necessary if mediastinal sepsis is more extensive.¹⁾ Corsten and colleagues concluded that the mediastinum cannot be adequately drained by a limited approach via subxiphoid or anterior mediastinotomy, and they suggested the early use of thoracotomy to enable the best control of mediastinal sepsis.¹⁰⁾

All patients in our study received aggressive surgical treatment, and multiple approaches, including cervicotomy and thoracotomy, were used to control the widespread infection in patients that was described in cases 1 and 2. Makeieff and colleagues concluded that prompt surgical drainage with supportive management in an intensive care unit significantly reduced the mortality rate in patients with a DMI to less than 20%.¹⁾

In conclusion, clinicians must be aware of the possibility of a DMI in patients with an RA or a banal oropharyngeal abscess that is associated with persistent fever. Clinically suspected DMIs should be evaluated, after which emergency cervical and mediastinal abscess drainage and irrigation via a thoracic approach can protect the patient from catastrophic results.

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