

# Descending necrotising mediastinitis

**W J N Vermeulen**  
MB ChB

**P A Scheepers**  
MB ChB

**N Khan**  
MB BS, FCRad (D) SA

Department of Diagnostic Radiology  
Medical University of Southern Africa

A 40-year-old male patient presented to the casualty department with a 3-day history of painful swelling on both sides of his neck, odynophagia and cough with purulent sputum. He was admitted for further investigations.

There was no history of neck trauma, dental problems, sore throat, forceful vomiting or retching or any previous serious illness that needed hospitalisation.

On examination he was found to be pyrexial with a temperature of 39.4°C and a tachycardia of 110/min. He was haemodynamically stable with a blood pressure of 115/79 mmHg. Cardiovascular, respiratory and central nervous system examination did not yield any other important information. The patient had bilateral lower-neck swelling which extended into the infraclavicular area. No area of fluctuation was noted. The overlying skin was normal. No crepitus could be elicited. The upper neck and submental areas were normal. Examination of the oral cavity and throat showed no trismus, no sign of dental

caries or any other infection. Ear, nose and throat examination showed no septic focus. Aspiration of the swelling in the neck was done but no pus was found.

Laboratory examinations showed a white cell count of 15 000/mm, random blood glucose < 6 mmol/l, glycosylated haemoglobin (HbA1c) 4.2% (normal < 6%), and HIV negative. Blood and sputum microscopy, culture and sensitivity (MCS) showed no growth. A provisional diagnosis of cellulitis was made. The patient was put onto intravenous ampicillin, cloxacillin, Flayl and gentamicin and a maxillofacial surgeon was consulted. A chest X-ray (Fig. 1) showed the presence of surgical emphysema and pneumomediastinum; there was no mediastinal widening or suggestion of abscesses with air-fluid levels.

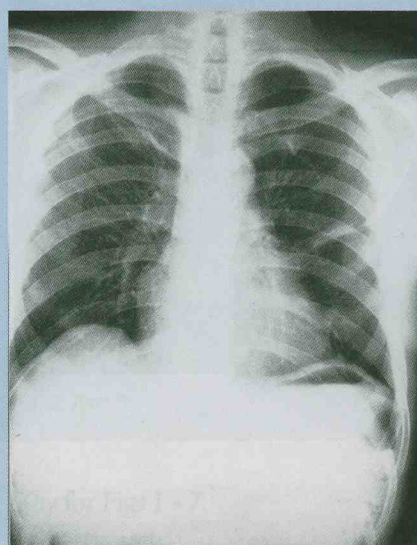


Fig. 1. Frontal chest X-ray showing surgical emphysema but no mediastinal widening or abscesses.

A computed tomography (CT) scan of the neck was requested at this stage to rule out any abscess formation or any other underlying pathology. Pre and post-contrast CT scan of the neck was done using a Toshiba Asteion, Tokyo, Japan multislice scanner. One hundred millilitres of Jopamiron (300 mg) was injected using a Nemoto automatic power injector at a rate of 2.5 ml/sec. The most striking feature was the presence of surgical emphysema (Fig. 2) seen scattered throughout the soft tissue of the neck. There was no sign of abscess formation, jugular vein thrombosis or oesophageal rupture noted on the CT scan. Although from the scan it seemed that the air was extending from the mediastinum and no obvious cause for the surgical emphysema could be found, a CT scan of the chest was not done.

Initially the patient improved, his fever subsided and the neck swelling decreased, but after 5 days his condition deteriorated and a cardiothoracic consultation was requested. A diagnosis of probable acute mediastinitis was made. A repeat chest X-ray was done. Although the presence of surgical emphysema and pneumomedi-

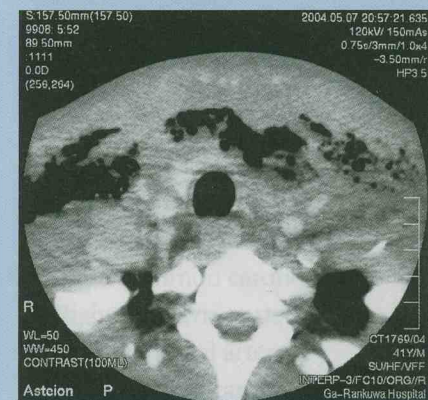


Fig. 2. Axial CT scan of the neck showing presence of surgical emphysema.



astinum could be seen there was no mediastinal widening or abscesses with air-fluid levels present.

Urgent CT scans of the chest and upper abdomen were requested.

The pre-contrast scan showed multiple loculated fluid collections throughout the mediastinum (Fig. 3). Fluid measured 23 Hounsfield units and was surrounded by thick-walled capsules. There was marked enhancement of capsules on post-contrast scan. Abscesses were shown to be present in the anterior, middle and posterior mediastinum, surrounding the trachea, oesophagus, aorta and other structures of the mediastinum. No pericardial effusion could be seen and no sign of thrombosis of any of the mediastinal veins. There was no sign of pleural effusion but there were areas of consolidation in the basal part of the left upper lung lobe and left lower lung lobe (Fig. 4). There was also a pneumomediastinum present especially in the anterior mediastinum.

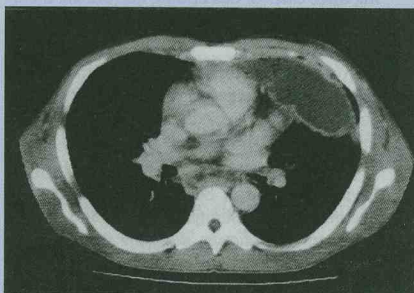


Fig. 3. Axial CT scan of the chest post-contrast, soft-tissue window, showing ring-enhancing lesions (abscesses).

A barium swallow using Gastrografin was also done to rule out the possibility of oesophageal rupture, but this was normal. At this stage a diagnosis of acute mediastinitis with multiple abscesses was made. The patient was rushed to theatre where an oesophagoscopy was done, which was

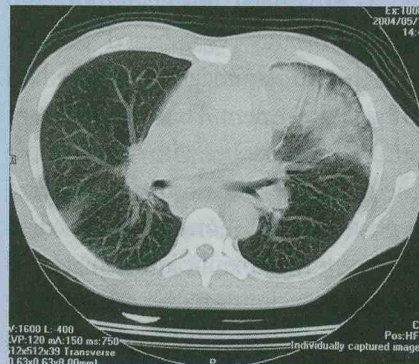


Fig. 4. Axial CT scan of the chest, lung window, showing lung infiltrates of the left lung.

normal, and a bronchoscopy showing the presence of purulent secretions in the left lower lobe bronchus. A left anterolateral thoracotomy was done immediately and large amounts of pus were drained from the mediastinum. Extensive debridement of necrotic tissue was done and two drains were left *in situ*. A right postero-lateral thoracotomy with drainage of pus from the posterior mediastinum was also done. Post operatively the patient was sedated and ventilated and given intravenous Flayl, gentamicin and Augmentin. On day 6 the patient was extubated without complications. The drains were removed on day 8 and the patient was moved from the intensive care unit to the ward and put on oral antibiotics.

At this stage a maxillofacial consultation was requested again. A panoramic roentgenogram of the mandible and maxilla was done that showed a radiolucency around root 3/6 (Fig. 5). Clinically there was also an abscess on the gingiva overlying root number 3/6. The root was removed and the abscess was drained. A follow-up CT scan of the chest on day 10 postoperatively showed no abscesses and only a small pneumo-

mediastinum and fluid collection with no post-contrast enhancement. The patient was discharged on day 12 postoperatively.

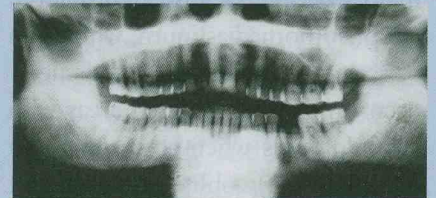


Fig. 5. Panoramic roentgenogram of the mandible and maxilla showing radiolucency around root 3/6.

## Discussion

Descending necrotising mediastinitis (DNM) is an uncommon condition. The source of infection is usually from a retropharyngeal, peritonsillar or odontogenic abscess, parotitis, thyroiditis, oesophageal injury or posttraumatic intubation and there is even one case described after intravenous drug misuse. The criteria to diagnose DNM are as follows: (i) clinical manifestations of severe infection; (ii) characteristic radiological features of mediastinitis; (iii) documentation of necrotising mediastinal infection; and (iv) relationship of oropharyngeal or cervical infection with the development of necrotising mediastinal process.

In the majority of cases the bacteriology consists of a mixture of aerobic and anaerobic organisms. It was found that in 94% of patients anaerobes were present, with 52% showing mixed organisms and 38% aerobic polymicrobial infections. The most common anaerobic organisms were *Streptococcus*, *Anaerobius*, *Bacteroides* and *Fusobacterium*. Other studies showed that *Bacteroides fragilis* was the most common anaerobic organ-



ism in infections.

Radiological findings of acute mediastinitis include the following plain X-ray features: (i) widening of the mediastinum caused by inflammatory swelling or abscess formation; (ii) pneumomediastinum, which can be scattered through the soft tissue or occur in discrete localised areas with air-fluid levels when abscesses begin forming; (iii) obliteration of fat planes; (iv) localised fluid collections; (v) abscess formation; (vi) pleural effusions in one or both pleural cavities; and (vii) occasional left lower lobe lung consolidations.

CT features include all of the above findings and also jugular vein thrombosis, pericardial effusions and sometimes hypopharynx or oesophageal rupture as cause of the mediastinitis. Post-contrast enhancement of areas of abscess formation can be seen.

Clinicians usually request a barium swallow to exclude pharyngeal or oesophageal trauma as cause of infection. It is important to remember that Gastrografin and not barium should be used to prevent a chemical mediastinitis that could be caused by leaking barium.

A CT scan of the chest is also important postoperatively to monitor the progress of the patient and exclude new abscess formation. Aggressive surgical management is mandatory. Cervical drainage alone is not acceptable, with a 70 - 80% failure rate resulting in multiple re-operations,

prolonged hospitalisation and 40% mortality. Combined cervical and thoracic drainage is the standard surgical treatment. There are different surgical approaches with regard to the mediastinum, the most popular being a posterolateral thoracotomy, median sternotomy, subxiphoid drainage and thorascopic drainage. A study done by the Department of Traumatology, Osaka University Medical School compared the clinical usefulness of percutaneous catheter drainage with conventional surgical drainage for cervical necrotising fasciitis and descending necrotising mediastinitis. Thirty patients were included in the study. Nineteen patients were treated by means of percutaneous catheter drainage, with the catheters introduced into the infected space under sonography and X-ray fluoroscopy. The patients were compared with 11 patients treated by surgical drainage. In the catheter group no patients needed further surgical treatment. Secondary infection was less in the catheter group and they started oral feeding significantly earlier. The use of analgesia was also much lower in the catheter group. Mortality was 0% in both groups. The conclusion of this study was that percutaneous catheter drainage for cervical necrotising fasciitis and descending necrotising mediastinitis was less invasive than conventional surgical drainage but produced a similar outcome.

## Conclusion

Descending necrotising mediastinitis is a rare but life-threatening infection that occurs when infection spreads from the deep spaces of the neck, propagating within the soft tissue into the mediastinal space. The disease has a high mortality rate (30 - 50%) due to frequent delay in diagnosis and treatment. Successful treatment depends on a high index of suspicion and early diagnosis. Cervicothoracic CT scanning is important in making the diagnosis, determining the level of infection and showing the presence and extent of fluid collection and diffuse soft-tissue infiltration of the mediastinal fat. It also helps in indicating the best surgical approach and progress of treatment. Urgent, aggressive surgical drainage and debridement, with use of long-term broad-spectrum antibiotics still forms the basis of successful treatment.

## Bibliography

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