

# Mediastinitis

## What is mediastinitis?<sup>[1]</sup>

Mediastinitis is a rare but severe infection, defined as an inflammation of the connective tissues and structures within the mediastinum. Due to its proximity to vital structures, mediastinitis is associated with a high risk of mortality. In most cases mediastinitis requires treatment in intensive care, with urgent surgical and medical intervention. Mediastinitis may be due to:

- Deep sternal wound infection following sternotomy.
- Oesophageal perforation.
- Descending necrotising mediastinitis, which is often secondary to an oropharyngeal abscess.
- A rare cause of acute mediastinitis is primary mediastinitis caused by haematogenous spread from a remote infection.
- Fibrous mediastinitis is a rare disease characterised by invasive proliferation of fibrous tissue in the mediastinum. The pathogenesis is not clear but is thought to involve immune-mediated hypersensitivity, mainly related to histoplasmosis, mycobacteria and certain fungal microorganisms, and sarcoidosis.<sup>[2]</sup>

# How common is mediastinitis? (Epidemiology)

[1]

- Deep sternal wound infection affects between 0.5% and 2.2% of patients undergoing cardiac surgery and is associated with a mortality rate of 14%. Mortality rates of elective cardiac surgery patients are five times higher if post-operative mediastinitis occurs.
  - Risk factors include old age, obesity, elevated pre-operative creatinine, peripheral vascular disease, diabetes mellitus, pre-operative colonisation with *Staphylococcus aureus*, chronic obstructive pulmonary disease, smoking, heart failure and female gender.
  - Procedure-related risk factors include the use of a ventricular assist device, transplant surgery, the use of bilateral internal mammary artery grafts, prolonged length of surgery, the use of aortic cross clamping, re-do surgery and on-pump perfusion.
  - Tracheostomy is also considered as a risk factor, with early percutaneous tracheostomy being at higher risk.
- As the oesophagus is colonised by both commensal and hospital-acquired microorganisms, any loss in the integrity of the oesophageal wall may result in mediastinitis. Iatrogenic perforation during endoscopy is responsible for 60% of all oesophageal perforations.
- Descending necrotising mediastinitis is caused by odontogenic (36-47%), pharyngeal (33-45%) or cervical (15%) infections. In 6% of cases, the source of infection is unknown. The main risk factors include impaired immune function, diabetes, the use of oral glucocorticoids, and reduced tissue oxygenation caused by heart failure, respiratory insufficiency and peripheral arterial disease.

## Causative conditions [1]

### Mediastinitis originating from structures within the mediastinum

- Oesophageal rupture is the most common cause of mediastinitis. This may be due to:
  - Foreign body ingestion.
  - Spontaneous oesophageal rupture.
  - Local neoplastic spread.
  - Iatrogenic causes including:
    - Endotracheal intubation.
    - Bronchoscopy.
    - Cardiothoracic surgery (most cases of mediastinitis in the developed world follow cardiothoracic surgery).
    - Upper gastrointestinal (GI) endoscopy.
- Blunt trauma to the chest/abdomen can cause mediastinitis.
- There may be direct spread of infection into the mediastinum from:
  - Pulmonary infection.
  - Osteomyelitis of the sternoclavicular junction.
- Granulomatous disease (including tuberculosis) in the mediastinal lymph nodes.

### **Descending necrotising mediastinitis**

This may originate from:

- Pharyngitis.
- Tonsillitis, peritonsillar abscess and parapharyngeal abscess. [3] [4] [5]
- Otitis media.
- Sinusitis.
- Dental abscess. [3]

- Sialadenitis.
- Infection after head and neck surgery.

## Causative organisms<sup>[1]</sup>

There is usually a polymicrobial infection with organisms such as *Staphylococcus* spp., *Streptococcus* spp., *Bacteroides* spp., *Fusobacterium* spp., *Peptostreptococcus* spp. and *Pseudomonas aeruginosa*. Methicillin-resistant *S. aureus* (MRSA) may be implicated when mediastinitis occurs after cardiothoracic surgery. Mediastinitis may also be caused by tuberculosis and fungal infections.

## Symptoms of mediastinitis (presentation)<sup>[1]</sup>

Onset can be insidious and patients may have been unwell for a few days before presentation to their GP or emergency department. There may be a history of:

- Recent cardiothoracic surgery or instrumentation.
- Upper GI endoscopy.
- Bronchoscopy.
- Recent dental or oropharyngeal infection.
- Upper respiratory tract infection.
- Ingestion of a foreign body (particularly button batteries by young children, which may cause oesophageal rupture).

## Symptoms

- Fever and/or rigors can occur.
- Shortness of breath may be present.
- Retrosternal chest pain, usually described as pleuritic, may radiate to the neck or back.
- There may be a sensation of soreness or congestion in the neck if the condition is due to descending infection.
- The patient may notice that their neck is swollen.

- Confusion or disorientation may be present due to the onset of systemic sepsis.
- There may be evidence of sternal wound infection and sternal instability post-cardiothoracic surgery.

## Signs

- The patient can be systemically unwell and shocked.
- Fever may be evident.
- Oedema and/or erythema of the neck and face may be found.
- There may be crepitus of the skin of the chest and neck due to surgical emphysema.
- The mouth should be examined for evidence of pharyngeal infection or foreign bodies.
- Localised or diffuse swelling of the neck may be seen.
- Cranial nerve deficits may occur.
- Auscultation of the heart may reveal a crunching sound.

## Differential diagnosis

- Pulmonary embolism.
- Myocardial infarction.
- Spontaneous pneumomediastinum.<sup>[6]</sup>
- Mediastinal tumour and/or [superior vena cava syndrome](#).
- Cellulitis of the neck.
- Necrotising fasciitis affecting the neck.
- Pneumonia ± empyema or lung abscess.
- [Mediastinal tuberculosis](#).

## Investigations<sup>[1]</sup>

- Although laboratory findings are non-specific, an elevated leucocyte count, C-reactive protein (CRP) and procalcitonin level are often found. Additionally, a progressive thrombocytopenia may reflect worsening sepsis. Evidence of disseminated intravascular coagulation may also be present.
- **Blood cultures** should be taken.
- Swabs of any obvious sources of sepsis in the mouth or neck tissues should be taken.
- X-ray of the neck and chest may show widening of the pre-cervical, retropharyngeal and paratracheal soft tissues. Pneumomediastinum and air-fluid levels may be seen on CXR. Mediastinal widening may be seen but is not a reliable sign.
- CXR may also show lower lobe consolidation and/or pleural effusions.
- When mediastinitis is suspected, contrast-enhanced computed tomography (CT) of the neck and chest is the imaging modality of choice to confirm the diagnosis. It is highly sensitive for identifying the underlying cause of the mediastinitis, and the extent of the infectious process, which is vital in planning potential surgical interventions.

## Management of mediastinitis<sup>[1]</sup>

- Patients with mediastinitis can be critically ill. Initial management should focus on resuscitation, including protecting the airway, maintaining adequate oxygenation with supplementary oxygen, ensuring adequate ventilation and nutrition, and vigorous intravenous fluid resuscitation.
- Patients are often severely ill and require management within intensive care.
- Where the patient has significant and worsening hypoxia, intubation and artificial ventilation may be required.

- Intubation is likely to be difficult to achieve so experienced anaesthetic input may be needed; emergency cricothyroidotomy/[tracheostomy](#) may be necessary.
- The patient's respiratory status must be stabilised before sending for investigations such as CT/MRI scan.
- Antibiotics:
  - High-dose broad-spectrum intravenous antibiotics should be started as soon as possible. Broad-spectrum therapy is indicated initially.
  - Microbiological advice will be necessary as to the most appropriate antimicrobial agent(s), due to the polymicrobial nature of the infection.
  - Antibiotic regimes will be to be altered in line with results of culture results when available.
- Surgery:
  - Surgical referral is an urgent priority. Transfer to a cardiothoracic surgical centre is likely to be needed with advice from ENT surgery in cases of descending infection.
  - Extensive and aggressive debridement of necrotic tissues with exploration of all mediastinal fascial spaces may be required.
  - Surgery usually consists of urgent thoracotomy or access via a cervical approach.<sup>[7]</sup> Drainage of pus and necrotic material with tissue debridement is carried out as well as closure of any oesophageal rupture, or drainage of any cervical infective focus.<sup>[3]</sup>

## Complications of mediastinitis<sup>[1]</sup>

- Overwhelming [sepsis](#) leading to multi-organ failure and death.
- [Adult respiratory distress syndrome](#).
- [Respiratory failure](#) leading to death.

- Pericarditis.
- Secondary pneumonia.
- [Pleural effusions](#) and empyema.
- Pneumomediastinum, pneumoperitoneum and pneumothorax.

## Prognosis

- Mediastinitis has a high mortality. Figures vary according to the cause and nature of the infection, the treatment centre and patient factors such as age and comorbidities. <sup>[1]</sup>

## References

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