

Infection of the neck spaces: a present day complication

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Abstract

Although advances in antibiotic therapy have made adult neck space infections an uncommon event, it is essential to bear them in mind when treating oro-dental and oro-pharyngeal sepsis, as they can often progress with life threatening sequelae.

Three cases of neck space infection as a consequence of dental infection, pharyngitis and peritonsillar abscess are presented. The management of a potentially compromised airway is of paramount importance in the immediate treatment of neck space sepsis.

Introduction

The important, potential fascial spaces of the neck are retropharyngeal, parapharyngeal and submandibular spaces. All intercommunicate with each other around muscles and vessels. Caudally they are contiguous with the mediastinum.

Possible sequelae from infection of these spaces are the involvement of the major vessels of the neck and superior mediastinum (Dodds and Maniglia, 1988; Stage and Bonding, 1988), the posterior mediastinum (Batsakis and Sneige, 1989) and the larynx (Hariri and Duncan, 1989).

The following three case reports identify the diagnostic and therapeutic challenges that retropharyngeal, parapharyngeal and submandibular space infection present.

Case reports

Case 1

A 33-year-old male presented with a 12 hour history of progressive odynophagia, dysphagia and right-sided neck swelling.

Examination revealed a right peritonsillar abscess associated with severe trismus and a tender, indurated swelling over the ipsilateral digastric triangle.

The peritonsillar abscess was incised yielding 5 ml of offensive pus. Broad spectrum I.V. antibiotics were commenced. Over a four hour period, the right neck swelling had progressed and was palpable inferiorly to the level of the lower border of the thyroid lamina. The floor of the mouth became tender, woody and swollen. A PA X-ray of the neck showed an increased right upper cervical soft tissue shadow with laryngeal and upper tracheal deviation to the left.

Within the next half an hour the patient developed rapidly progressive inspiratory stridor and was taken to theatre. Following gaseous induction, several unsuccessful attempts at oral intubation were made. There was complete airway obstruction; the severe trismus and swelling of the soft tissues rendering intubation impossible.

A cricothyroid stab was performed and a 'mini-trach' tube was inserted. With the airway secured, formal paralysis and intubation were undertaken and a tracheostomy was fashioned under general anaesthetic.

Exploration of the submandibular and parapharyngeal spaces revealed cellulitic fluid and oedematous, boggy tissues. Culture of the fluid grew no organisms and that of the throat swab grew *Staphylococcus aureus* sensitive to the antibiotics used. The patient was decannulated one week later and made a rapid and complete recovery without further complications.

Case 2

A 50-year-old edentulous man who had undergone tonsillectomy as a child, was admitted with total dysphagia, odynophagia and mild inspiratory stridor.

On examination, his uvula was oedematous and his pharynx



FIG. 1

Barium swallow showing aspiration of barium and posterior displacement of the oesophagus.

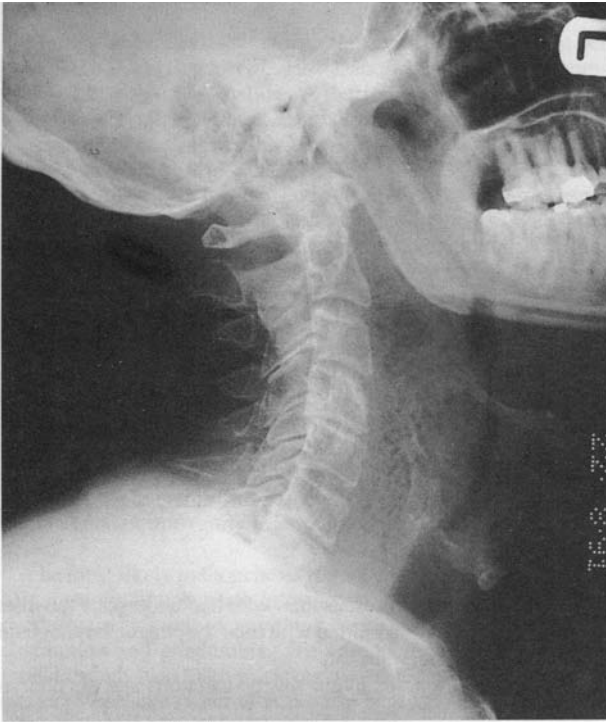


FIG. 2

Lateral X-ray of neck showing retropharyngeal abscess with gas pockets.

congested. There was a swelling pushing the left tonsillar fossa medially. A tender indurated swelling was palpable in the left upper cervical region, extending to the level of the hyoid. Indirect laryngoscopy revealed an oedematous epiglottis with pooling of saliva.



FIG. 3(a)

Axial CT scan of neck showing retropharyngeal and parapharyngeal abscess formation.

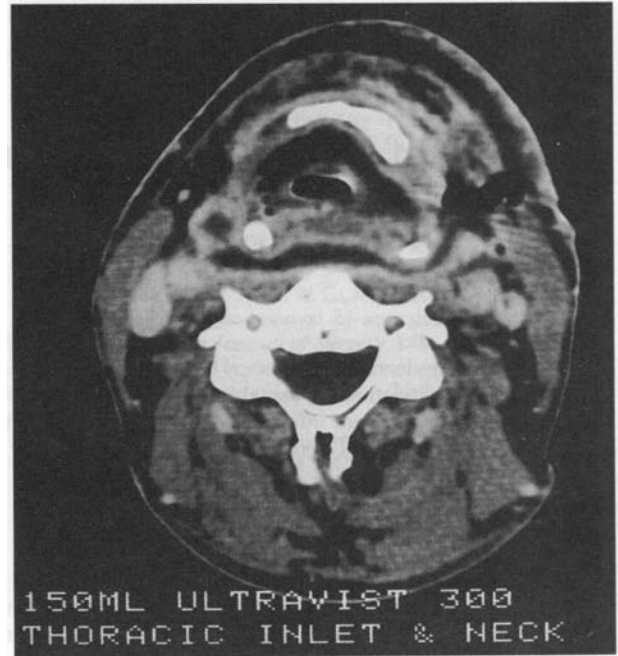


FIG. 3(b)

Axial CT scan of neck showing retropharyngeal and parapharyngeal abscess formation with extension around the trachea.

An X-ray of the neck showed an increase in the soft tissue shadow on the left side of the neck and oedema of the epiglottis.

A diagnosis of pharyngitis with parapharyngeal abscess was made and broad spectrum I.V. antibiotics commenced.

The patient's stridor progressed over the next two hours and so a tracheostomy under local anaesthesia was performed. Following general anaesthesia, endoscopy caused spontaneous rupture of the parapharyngeal abscess into the oro-pharynx.

Throat swab and pus culture grew *Streptococcus milleri* sensitive to the antibiotics used. The patient was decannulated a week later and thereafter made a full, uneventful recovery.

Case 3

A 60-year-old patient presented with a several weeks history of progressive painful dysphagia, low grade intermittent fever, mild hoarseness and a progressively increasing swelling on the left side of his neck passing anterior to his larynx and upper trachea.

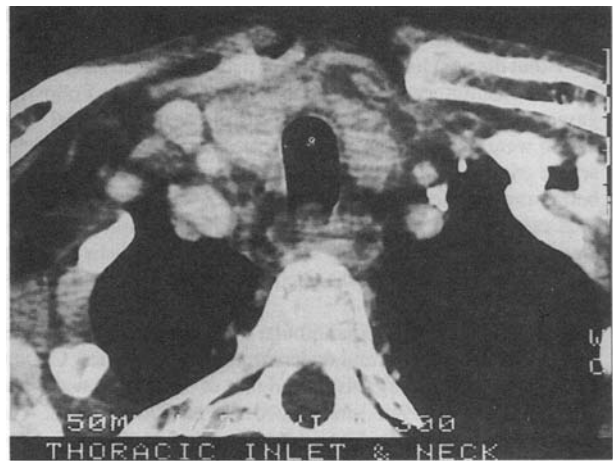


FIG. 3(c)

Axial CT scan through superior mediastinum showing paratracheal and retro-oesophageal abscess.

On examination, the patient was dehydrated, febrile and had dental caries of the left lower molars. He had a tender indurated, non-fluctuant swelling predominantly over the middle third of the left sternomastoid muscle and extending anteriorly over the larynx and upper trachea. Indirect laryngoscopy showed a fullness of the left pyriform fossa. On plain X-ray of his neck, there was an increase in the soft tissue shadow anterior to the larynx and upper trachea. A barium swallow examination showed aspiration of barium and an anterior extrinsic mass displacing the oesophagus posteriorly (Fig. 1). Despite broad spectrum I.V. antibiotics, over the next three days the neck swelling increased in size, the left tonsil was pushed medially. The patient developed a left retropharyngeal swelling. A repeat lateral X-ray of the neck revealed the development of a retropharyngeal abscess with gas pockets, extending below to the level of the cervico-dorsal junction of the vertebral column. The cervical spine was normal (Fig. 2). CT scan confirmed an extensive inflammatory mass in the neck involving the retropharyngeal and parapharyngeal spaces extending around the trachea, anterior to the thyroid, with an associated superior mediastinitis (Fig. 3a,b,c). After an uneventful orotracheal intubation, the abscess was opened by an external approach and pus was evacuated. The left jugular vein was thrombosed and left carotid pulsations were absent. Anticipating respiratory problems, the patient was kept intubated for 24 hours post-operatively.

Pus culture grew anaerobic cocci and coliform organism sensitive to the antibiotics used. Tuberculosis was excluded. Histology of the abscess wall showed chronic inflammatory cells.

The patient made good recovery and was referred for a dental opinion.

Discussion

The submandibular space is divided into the sublingual and submaxillary spaces which communicate with each other around the mylohyoid muscle (Patterson *et al.*, 1982). The floor of the parapharyngeal space is related to the fascia enclosing the submandibular salivary gland. Posterior to the pharynx, the parapharyngeal space communicates with the retropharyngeal space, being separated from it only by the carotid sheath and its contents. The retropharyngeal space extends from the skull base to the retro-oesophageal space in the posterior mediastinum, the lower limit being at the level of the sixth thoracic vertebrae where it is closed off by connective tissue about the tracheal bifurcation (Wong and Novotny, 1978; Batsakis and Sneige, 1989). Hence the anatomical features of these spaces facilitate the spread of infection from one space to the other (Maran *et al.*, 1984; Batsakis and Sneige, 1989).

The three cases described illustrate the intimate relationship of the neck spaces. In case 1, parapharyngeal and submandibular space infection occurred secondary to a peritonsillar abscess. In case 2, severe pharyngitis caused supraglottic oedema with an associated parapharyngeal abscess. In case 3, dental caries of the mandibular molars led to the progression of infection to the parapharyngeal and retropharyngeal spaces and thence to the superior mediastinum.

Neck space infections are a well recognized sequela to tonsillitis, peritonsillar abscess, pharyngitis, dental infections or trauma (Batsakis and Sneige, 1989). Parapharyngeal abscess may rarely follow mastoiditis. It has been postulated that parapharyngeal space infection secondary to peritonsillar abscess or pharyngitis occurs through preformed holes in the superior constrictor muscle or by the rupture of efferent lymphatic channels (Maran, MacKenzie and Murray, 1984). The commonest dental source is from the periapical infection of the mandibular molars, usually the second or third, as the roots of these teeth extend inferior to the mandibular insertion of the mylohyoid muscle, immediately adjacent to the submandibular and parapharyngeal spaces (Patterson *et al.*, 1982).

Involvement of the neck spaces may lead to serious complica-

tions including respiratory obstruction, thrombophlebitis of the internal jugular vein, erosion of the carotid vessels, septicemia with metastatic abscesses, mediastinitis and pericarditis (Stage and Bonding, 1988).

In this series, respiratory obstruction was observed in the first two cases and both needed tracheostomy. Case 3 had thrombophlebitis of the internal jugular vein and superior mediastinitis despite which the patient made an uneventful recovery.

Hence, neck space infections should be anticipated and treated rigorously. Of prime importance in the management is maintenance of airway and broad-spectrum antibiotics in high doses. Exploration of the involved space is necessary in those who fail to respond to 24 hours of antibiotic therapy. High doses of intravenous antibiotics early in the course of the disease is often curative, obviating the need for surgery, namely, incision and drainage. Antibiotics may also help in localizing the infection which thus facilitates surgical drainage (Batsakis and Sneige, 1989).

In this series, despite the use of broad-spectrum I.V. antibiotics, the infection continued to spread.

Frequent monitoring of the patient's respiratory status is mandatory as progressive soft tissue oedema compromises the airway insidiously and total obstruction or laryngospasm secondary to aspiration, can be abrupt. Dyspnoea, stridor and cyanosis are late signs (Patterson *et al.*, 1982).

Though endotracheal intubation is preferable to tracheostomy in the management of airway obstruction, trismus, secretions, distortion within the oral cavity, supraglottic oedema and laryngospasm may make intubation difficult and dangerous, resulting in a sudden loss of airway as was experienced in case 1. Although fibre-optic laryngoscopic intubation has been successfully performed in such situations, the authors advocate planned tracheostomy under local anaesthesia for two reasons. Rapidly advancing cellulitis or abscess formation renders airway obstruction imminent and a tracheostomy prevents aspiration of pus in the event of spontaneous rupture of the abscess. In cases which are successfully intubated prior to surgical drainage, it may be necessary to maintain intubation until an adequate airway can be anticipated.

Neck space collections are usually drained via an external approach, although trans-oral decompression of a submandibular or retropharyngeal abscess is equally effective. Some surgeons advocate a combined trans-oral-external approach.

The authors have found the external approach to give better exposure and facilitate drainage, especially if multiple neck spaces are involved.

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