

Deep-Neck Space Abscesses

Yousry El-Sayed, FRCS, and Surayie Al Dousary, FRCS

Abstract

Objective: Despite a reduction in the incidence, deep-neck space infections are still seen today with definite potential for significant morbidity and even mortality.

Design: The authors present their experience in the management of 16 patients with 19 deep-neck space abscesses. The distribution of the abscesses were: 5 Ludwig's angina, 4 parapharyngeal abscesses, 3 retropharyngeal abscesses, 3 in the sub-mandibular triangle, 3 in the deep anterior triangle, and 1 in the deep posterior triangle.

Results: The source of infection was odontogenic in six patients, pharyngeal in three, otogenic in one, and could not be identified in the other six patients. Most cases presented with pain and neck swelling. Plain x-ray films, computed tomography, ultrasonography, and magnetic resonance imaging were the main diagnostic procedures. Positive culture was obtained in only nine cases (56.2%). No predominant single organism was identified. Antimicrobial therapy and surgical drainage were the mainstay of treatment. Two cases were complicated by internal jugular-vein thrombophlebitis. All the patients survived without major residual sequelae.

Conclusions: The etiology, presentation, and management of deep-neck space infections are briefly reviewed.

Sommaire

Objectives: Malgré une réduction d'incidence, les infections des espaces profonds du cou sont encore rencontrées de nos jours avec leur potentiel certain pour une morbidité significative et même une mortalité.

Conception: Les auteurs présentent leur expérience de la conduite à tenir face à 19 abcès des espaces profonds du cou chez 16 patients. La distribution de ces abcès étaient comme suit: 5 angines de Ludwig, 4 abcès parapharyngés, 3 abcès rétropharyngés, 3 au triangle sous-maxillaire, 3 au triangle profond antérieur et 1 au triangle profond postérieur.

Résultats: La source de l'infection était odontogénique chez six patients, pharyngée chez trois, otogénique chez un, et n'a pu être identifiée chez les autres six patients. La plupart des cas se sont présentés avec de la douleur et un gonflement au cou. Les rayons X simples, la tomodensitométrie, l'ultrasonographie et l'imagerie par résonance magnétique furent les principales procédures diagnostiques. Une culture positive fut obtenue dans seulement neuf cas (56.2%) Aucun organisme prédominant ne fut identifié. La thérapie antimicrobienne et le drainage chirurgical furent les piliers du traitement. Deux cas se sont compliqués par une thrombophlébite de la veine jugulaire interne. Tous les patients ont survécu sans séquelles résiduelles majeures.

Conclusions: L'étiologie, la présentation et la conduite à tenir face aux infections des espaces profonds du cou sont brièvement revués.

Key words: abscess, bacteriology, neck, radiology, surgery

The substantial decline in the frequency of deep-neck space (DNS) infections during the antibiotic era had made these infections relatively obscure to many practitioners. Accordingly, they are often mismanaged, with a tendency to underestimate the severity and extent of illness that may ensue by such infections. DNS infections pose complicated problems because of the multiple cervical fascia layers, the

numerous portals of entry for infection, and the proximity of vital structures.² Dealing with such infection presents a significant challenge to otolaryngologists today. We present an analysis of 16 patients with DNS infections and a brief review of the pertinent literature.

Patients and Methods

The medical records of 16 patients surgically treated for DNS abscesses at King Abdul Aziz University Hospital from 1989 to 1994 were reviewed. This review did not include patients with cellulitis who recovered with antimicrobial therapy alone. Likewise, patients with peritonsillar abscess, superficial infections (at or above the level of platysma), and infections secondary to penetrating or surgical neck trauma were excluded. The patients' characteristics and presentations, as well

Received 1/4/96. Accepted for publication 4/11/96.

Yousry El-Sayed and Surayie Al Dousary: Otorhinolaryngology Department, King Abdul Aziz University Hospital, Riyadh, Kingdom of Saudi Arabia.

Address reprint requests to: Dr. Y. El-Sayed, ORL Department, King Abdul Aziz University Hospital, P.O. Box 245, Riyadh 11411, Kingdom of Saudi Arabia.

ampicillin (3), clindamycin (4), cefuroxime (3), gentamicin (1), and amikacin (1). Antituberculous treatment was given to a patient with *M. tuberculosis* isolate. Two patients developed generalized nonpitting edema and pre-renal oliguria during treatment by high-dose intravenous penicillin. Changing the antibiotic resulted in resolution.

Surgical drainage was done through external neck incisions in all patients except in three patients with a retropharyngeal abscess drained by direct incision of the posterior pharyngeal wall. Tooth extraction was carried out simultaneously on two patients. None of the patients needed artificial airway interference.

Two patients with parapharyngeal abscesses developed internal jugular vein thrombophlebitis, which was confirmed by surgical exposure. Both patients recovered by conservative treatment following drainage of the abscess, with no sequelae.

The average period of hospitalization was 8 days, with a range of 4 to 30 days. There was no mortality.

Discussion

The fascial spaces of the neck are potential spaces between the layers of the cervical fasciae. In the normal

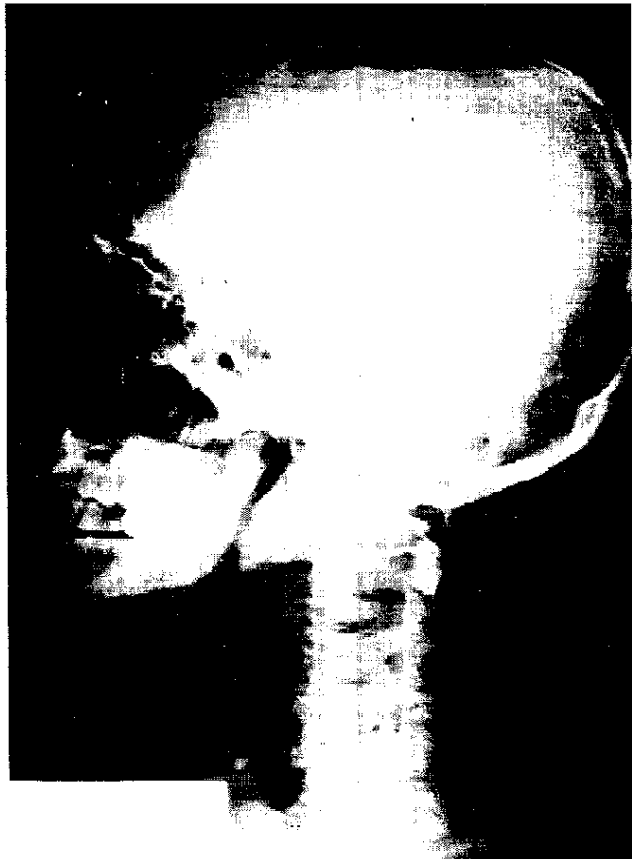


Figure 2 This lateral radiograph of a retropharyngeal abscess shows increased thickness of the prevertebral soft tissue and loss of the cervical spine curvature.



Figure 3 This axial CT scan of a patient with a combination of Ludwig's angina and a parapharyngeal abscess shows bilateral air shadows in the floor of the mouth and a left parapharyngeal soft-tissue swelling causing displacement of the lateral pharyngeal wall.

state, the spaces do not exist but present as loose connective tissue that may be digested and displaced by an infective process.'

A thorough knowledge of the anatomy of these fasciae and spaces is essential to understand the etiology, presentation, and potential complications of a specific space infection. It is also important to ensure proper interpretation of the imaging findings and to institute the most effective treatment. Discussion of the surgical anatomy of the neck fasciae and spaces has been detailed elsewhere.'

Most DNS infections are attributed to dental or pharyngeal infections. Early antibiotic treatment, however, has diminished the role of pharyngeal infection as a leading cause of DNS infection.^{2,5} On the other hand, dental infections are more likely to proceed untreated until extension to an adjacent space develops. Odontogenic infections, therefore, have been reported to be the most common cause of the parapharyngeal abscesses⁶ and of Ludwig's angina.' In this study, six cases (37.5%) were confidently attributed to dental cause. The infection most commonly involves the lower molar teeth, since the mandibular plate is relatively thin at this site.'

Middle-ear infection was the source of infection in one patient in this study. The infection may spread from temporal bone to DNS either through the inner aspect of the mastoid tip forming an abscess deep to the sternocleidomastoid muscle (Bezold's abscess), or through the petrous apex causing infection of the parapharyngeal space (the petrous bone forms the base of the cone-shaped parapharyngeal space).²

tive rods. The antimicrobial drug selection may be influenced by patient tolerance, associated medical problems, previous treatment, and in part by individual preference of the practitioner or the microbiologist.

Some DNS infections that present while still in the cellulitis stage may be controlled with antibiotic therapy alone. Most cases of Ludwig's angina will respond to early and aggressive use of appropriate antibiotics.⁷ On the other hand, only 10 to 15% of the parapharyngeal infections⁶ and of the retropharyngeal cellulitis⁹ have been reported to resolve with appropriate medical treatment.

Surgical incision and drainage should be performed without delay for cases not responding to medical treatment or if there is any evidence of abscess formation. The surgical approach is contingent on the location of the abscess as determined clinically and radiologically. Drainage of Ludwig's angina consists of a wide surgical decompression of the suprahyoid region through an external approach with exposure and division of the mylohyoid muscle.⁷ Retropharyngeal abscesses can be drained by direct incision of the posterior pharyngeal wall. In some cases, however, the abscess is best drained by an anterior cervical approach.⁷ There are multiple approaches to the parapharyngeal space: intraoral, extraoral, and a combination.⁶ Most authors consider the external approach to be the safest, because it provides good visualization and control of the major vessels.^{2,3,6} The intraoral approach is contraindicated when there has been prior hemorrhage, no matter how slight.

Nonsurgical approaches for selected cases of deep cervical abscesses have been described by some authors. Thompson et al.¹⁰ reviewed 65 pediatric patients with the diagnosis of retropharyngeal abscess and noticed that 25% of the patients were treated medically and required no surgical drainage. Incision and drainage should not be withheld without clear evidence of improvement.

Computed-tomography-guided aspiration has also been described to treat some patients with deep cervical abscesses. This includes cooperative patients with well-localized abscesses without airway compromise, who are poor general-anesthetic risks.¹¹ The reported advantages over the traditional surgical treatment include improved cosmetic results, decreased costs for non-operating-room procedures, improved accuracy in reaching the involved site, decreased morbidity, and a reliable culturing technique.

Deep-neck space infections may result in life-threatening complications. Airway obstruction with asphyxiation may be caused by spreading inflammatory edema or by the compressive effect of the abscess. Also, pneumonia or a lung abscess can occur as a result of aspiration of pus due to spontaneous rupture of retropharyngeal abscess. DNS infections, especially of the retropharyngeal and visceral spaces, have relatively unimpeded entry into the thorax and may cause mediastinitis, pericarditis,

and empyema. Once mediastinal involvement is apparent (by widening, mediastinal empyema, mediastinal crunch, pericardial rub), vigorous incision and drainage of the affected areas are required.⁷

Spread of the infection to the great vessels of the neck gives rise to vascular complications. There have been recent reports of jugular thrombophlebitis,^{2,15} cavernous sinus thrombophlebitis,²² and carotid artery erosion¹⁶ resulting from DNS infections. Suppurative thrombosis of the internal jugular is commonly associated with *Fusobacterium necrophorum* and multiple metastatic infections. This is known as Lemierre's syndrome or postanginal septicemia.^{8,15,22} Unilateral neck pain and swelling, persistent bacteremia, and embolic phenomena are consistent with its diagnosis, which can be confirmed by ultrasonography, CT, MRI, or angiography. Prolonged antibiotic therapy seems to be necessary for eradication of this complication. Resection or ligation of the vein may be necessary.⁷ Arterial vascular complications of DNS infection are rare events in the antibiotic era. Stevens¹⁸ found only 18 cases reported in the English literature from 1944 to 1989. He stressed the following features as warning of arterial erosion: recurrent bleeding from ear, nose, throat or neck wound; cranial nerve neuropathies or Horner's syndrome; protracted course and failure to improve after incision and drainage; and the presence of hematoma as evidenced by tense, brawny, and plum-coloured mucosa. Ligation of the involved artery (as outlined by angiography) is indicated to prevent fatal rupture.

In conclusion, deep cervical abscesses still occur in the antibiotic era and may cause life-threatening complications. Clinical diagnosis should be supplemented by the appropriate imaging procedure including plain x-ray films, ultrasonography, CT, and MRI. Needle aspiration should be performed whenever possible to confirm the diagnosis and to obtain material for Gram staining and culture. The mainstays of treatment are maintenance of the airway, intravenous antibiotics, and timely adequate surgical drainage.

Acknowledgements

The authors thank Dr. P. Mirza for giving one of his cases and Dr. Jihad Al Watban for his help in reporting the imaging of these cases. We also thank Connie Unisa for typing this manuscript.

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