

# Deep neck infections and abscess: case series and up to date commentary

Ilias Karapantzos<sup>1</sup>, Chrysa Karapantzou<sup>1</sup>, Paul Zarogoulidis<sup>2</sup>, Michail Karanikas<sup>3</sup>, Vasilis Thomaidis<sup>4</sup>, Theodora Tsiouda<sup>5</sup>

<sup>1</sup>Ear, Nose and Throat Department, “Saint Luke” Private Hospital, Panorama, Thessaloniki, Greece; <sup>2</sup>Pulmonary Department-Oncology Unit, “G. Papanikolaou” General Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece; <sup>3</sup>General Surgery Department, “Genisis” Private Clinic, Thessaloniki, Greece; <sup>4</sup>Department of Maxillofacial Surgery, University General Hospital of Alexandroupolis, Alexandroupolis, Greece; <sup>5</sup>Pulmonary Department, “Theageneio” Anticancer Hospital, Thessaloniki, Greece

Correspondence to: Paul Zarogoulidis, MD, PhD. Pulmonary Department-Oncology Unit, “G. Papanikolaou” General Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece. Email: pzarog@hotmail.com.

**Abstract:** Deep neck space infection (DNSI) is defined as infection in the potential spaces and fascial planes of the neck. It has been observed that recognition of DNSI is challenging due to the complex head and neck anatomy. The following five factors are the most important to be considered. Firstly, clinical presentation: management of a compromised airway is the priority. Clinical history and examination. Secondly: laboratory investigations along with computed tomography (CT) imaging in most cases. Thirdly the antibiotics used. Fourthly: treatment in children lacking indications for surgical intervention, therefore a 48-hour trial with of intravenous antibiotics (IV Abx) is firstly commenced. Fifth, surgical intervention: most important indications include signs of airway compromise, no clinical improvement after 48 hours of IV administration. Conservative and surgical approach is viable treatment options and may complement each other.

**Keywords:** Neck infections; neck abscess; neck surgery

Received: 21 January 2017; Accepted: 24 April 2017; Published: 22 June 2017.

doi: 10.21037/arh.2017.05.03

View this article at: <http://dx.doi.org/10.21037/arh.2017.05.03>

## Introduction

Deep neck infections are rapidly progressive, usually bacterial infections abscess of the neck, representing life threatening medical conditions. The disease course is from: (I) localization of the findings; (II) the particular spectrum of pathogens; (III) the age and comorbidities e.g., diabetes mellitus, immunosuppression the patient depends (1,2) (Figure 1).

The greatest risk is by the appearance of accompanying edema of the larynx with acute dyspnea the progression of inflammation inferiorly and favoring a mediastinitis with corresponding mortality and morbidity. Rapidly progressive course of the disease with severe general symptoms (possible risk of necrotizing fasciitis). Mortality neck abscess 2.5% mortality fasciitis 20%. Triggers are often infections of the pharynx (Figures 2-6). Odontogenic infection or abscess

lymphadenitis, as well as traumatic lesions of the mucosa or upper respiratory tract of the esophagus, infections of the salivary glands, thyroid and also of the outer and middle ear (3).

## Major symptoms

- (I) Performance status temperature increase;
- (II) Pain-related posture of the neck;
- (III) Localized pain on pressure, possibly skin redness, warmth;
- (IV) Swallowing, partly, severe dysphagia;
- (V) Lockjaw dyspnea, stridor, hoarseness.

## Diagnosis

- (I) History (often of failed therapeutic trial of oral antibiotics without improvement of symptoms);



**Figure 1** Neck abscess.

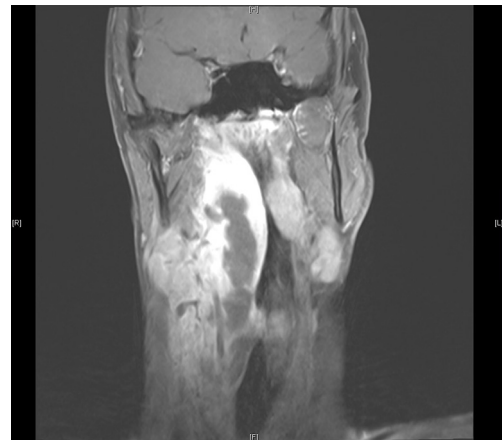


**Figure 2** Right neck abscess.

- (II) Typical symptoms;
- (III) Clinical examination (inspection, Halspalpation, oropharyngeal inspection, laryngoscopy);
- (IV) Laboratory tests [leukocytosis, C-reactive protein (CRP) increase, procalcitonin increase];
- (V) Imaging techniques.
  - (i) Sonography of the neck soft tissues;
  - (ii) Computed tomography (CT) of the neck;
  - (iii) With IV contrast administration;
  - (iv) Magnetic resonance imaging.

### Broad spectrum of pathogens

- (I) Bacterial infections (37% staphylococci, streptococci 29%, anaerobes, toxoplasmosis, brucellosis);
- (II) Tuberculosis;



**Figure 3** Neck MRI right neck abscess.



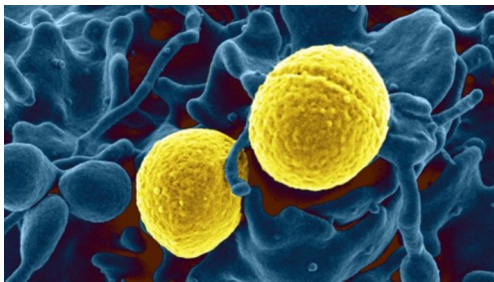
**Figure 4** CT of neck, right abscess. CT, computed tomography.

- (III) Mycoses;
- (IV) Viruses (for example, CMV, HIV);
- (V) Inflammatory diseases (sarcoidosis, Kawasaki disease);
- (VI) Parasites and other.

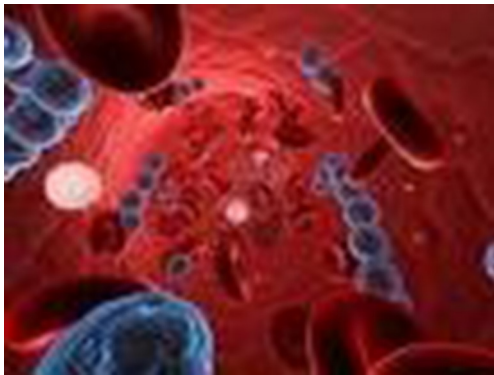
### Therapy recommendations

#### Drugs

- (I) High-dose systemic broad-spectrum antibiotics;
- (II) Aminopenicillins + beta-lactamase inhibitor;
- (III) Cephalosporins 2nd + 3rd generation;
- (IV) Metronidazole, clindamycin;



**Figure 5** Staphylococcus.



**Figure 6** Streptococcus.

- (V) In immunosuppressive underlying illness imipenem or meropenem.

#### **Interventional therapy**

- (I) Immediate surgical reconstruction (including possibly TE) with generous opening of sternocleidomastoid (possibly combined transoral + from the outside) intraoperative swab collection;
- (II) Insertion of drains (Redon, Penrose, rubber flap), postoperative wound daily rinses with local disinfection solutions;
- (III) Postoperative intensive monitoring in pronounced edema hypopharyngeal or laryngeal in case of difficult extubation (4,5);
- (IV) Primary or secondary transient tracheostomy for airway.

#### **Complications**

- (I) Edema laryngeal or hypopharyngeal;
- (II) Mediastinitis;



**Figure 7** After neck surgery for abscess.

- (III) Emphysema;
- (IV) Fistula;
- (V) Thrombophlebitis of the internal jugular vein (Lemierre's syndrome);
- (VI) Sepsis;
- (VII) Endocarditis;
- (VIII) Meningitis;
- (IX) Arthritis;
- (X) Intracranial complications.

#### **Case 1**

A 52-year-old patient with neck pain since 3 days with progressive swelling in the left side of the neck. Skin redness, warmth, moderate trismus, no fever. CRP elevation: 179.6 mg/L. CT-neck with KM = lymph node conglomerate below the M. scm., In the rear cervical space left (level HWK 3/4), central melting down as a sign of a possible initial inflammation (*Figures 7-9*).

Neck exploration left in ITN Insert a Penrose drain which was medial to the M. placed sternocleidomastoideus and was fixed by suture. Postoperative wound daily rinses with e.g., Braunol solution. Intravenous antibiotics (IV Abx) coverage with ampicillin/sulbactam + metronidazole. Smear result: streptococcus pyogenes. No complications were observed upon follow up.

#### **Case 2**

A 60-year-old patient with a 2-day acute swelling of the



**Figure 8** Upon admission.



**Figure 9** Neck swelling.

left sternocleidomastoid region. Inflammatory laboratory findings of CRP: 125 mg/L, no leukocytosis, afternoon recording initially no dyspnea, laryngoscopically normal. Sonographically no melting. He was hospitalized for IV Abx antiinflammatory therapy and monitoring. Overnight progressive clinical deterioration I.P. with a pronounced swelling and redness of the entire left side of the neck down to the jugular region. Moreover, hoarseness and dyspnea. Laryngoscopically: substantial edematous swelling of the left wall of the pharynx with relocation of paraglottic space and infiltration of the left vallecula (*Figure 10*).



**Figure 10** Redon after neck surgery for abscess.

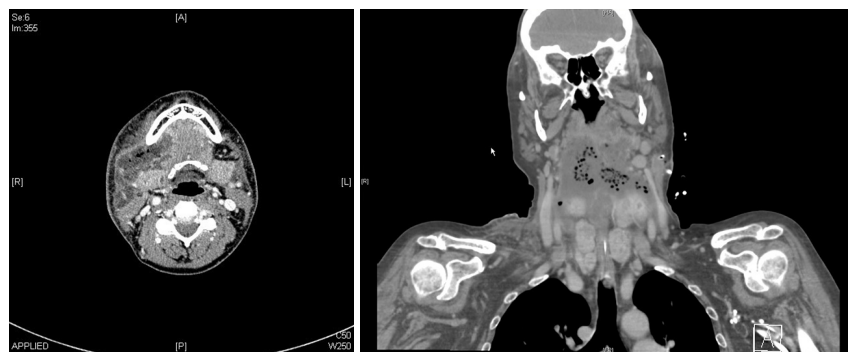


**Figure 11** Sternocleidomastoid swelling.

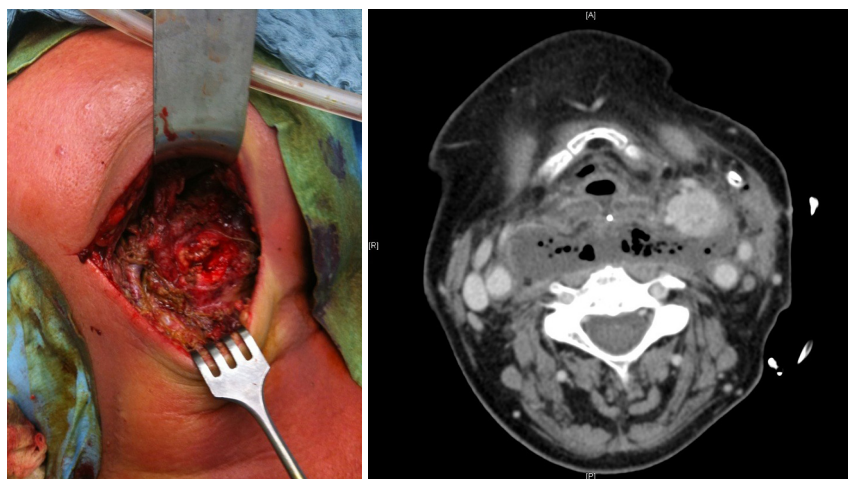
### Case 3

A 49-year-old patient with pre-existing MRSA colonization after paranasal sinus surgery. Since 3 days due to a right-sided neck swelling with dual antiinflammatory medical treatment oral antibiotic treatment with amoxicillin (1 g). Lockjaw, extensive swelling, redness of the right side of the neck, in partnership with Regio gland and submandibular right were observed. No fever, no dyspnoea leukocytosis:  $14.9 \times 10^9/\mu\text{L}$ , procalcitonin to 0.2 g/L (normal range  $\leq 0.06 \mu\text{g/L}$ ) (*Figure 11*).

In CT-neck with KM inflammation of the entire right side of Halskompartimente the skull base to the jugular



**Figure 12** CT of the neck. CT, computed tomography.



**Figure 13** During surgery.

reaching with the transition to the left side and the anterior floor of the mouth to the left, starting from a tonsillopharyngeal abscess right (*Figures 11-13*).

### Surgical exploration

Deep neck exploration right neck area, insert multiple cervical Penrose drains in extensive necrotizing area. Intravenous tazobactam was administered. Intensive care monitoring and daily wound rinses were performed. Degree of 12 days postoperatively only moderately decreased, so that a consecutive tracheotomy in dyspnea was required with renewed neck revision.

### Case 4

A 56-year-old patient with acute dyspnea, fever. Endoscopic

prominent swelling in the entire left rear wall of the pharynx with increased CRP, no leukocytosis no derailment of known diabetes mellitus (ketoacidotic coma), thyrotoxic crisis, hypertensive derailment, warfarin therapy in arrhythmia. Stabilization of the general condition, ICU administration. In CT pronounced left stressed phlegmonous inflammation with air pockets until after retropharyngeal (*Figures 12,13*).

### Therapy

- (I) Pharyngoscopy in ITN, neck exploration left, with insert several Redon drainages;
- (II) Primary tracheotomy;
- (III) Cover with anaerobic effective IV Abx-clindamycin + tazobac;
- (IV) In smear *Streptococcus constellatus* detection.

One week postoperatively occurred despite improvement of AZ and regression of infection parameters in clinically acute prominence and redness supraclavicular right (contralateral). In the CT control just yet Verhalt ipsilateral retropharyngeal or paravertebral. Renewed exploration neck bilaterally with drainage of paravertebral and retropharyngeal spaces necessary (6-9).

## Conclusions

It is known that deep neck infections are considered a medical and surgical emergency. The clinical symptoms and condition severity of DCA vary according to different age groups, the location of the infection and a higher incidence of comorbidity in adults. DCA in adults usually has multi-space involvement, leads to complications and it is usually more serious than that in children. Deep neck space infection (DNSI) still remains a common and challenging disease for clinicians, and is considered an emergency. Special attention should be given to high-risk groups such as elderly, diabetics and patients with underlying systemic diseases (10). Upon admission, intravenous administration of empirical antibiotic therapy should be initiated and should be updated later according to the culture and sensitivity report (11-15). Recommendations indicate that all patients with a significant abscess on the CT scan should have surgical intervention. It has been observed that in developing countries, tobacco chewing, poor oral hygiene, lack of adequate nutrition and smoking has led to an increased prevalence of dental and periodontal diseases. Moreover, it has been observed that prevention of DNSI can be achieved by making the population aware of dental and oral hygiene.

## Acknowledgements

None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Informed Consent:* Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

## References

1. Kataria G, Saxena A, Bhagat S, et al. Deep Neck Space Infections: A Study of 76 Cases. *Iran J Otorhinolaryngol* 2015;27:293-9.
2. Lawrence R, Bateman N. Controversies in the management of deep neck space infection (dnsi) in children: an evidence-based review. *Clin Otolaryngol* 2017;42:156-63.
3. Brito TP, Hazboun IM, Fernandes FL, et al. Deep neck abscesses: study of 101 cases. *Braz J Otorhinolaryngol* 2017;83:341-8.
4. Lakshmi Narayana M, Azeem Mohiyuddin SM, Mohammadi K, et al. Parotid abscess in children - A tertiary rural hospital experience. *Int J Pediatr Otorhinolaryngol* 2015;79:1988-90.
5. Shah A, Ahmed I, Hassan S, et al. Evaluation of ultrasonography as a diagnostic tool in the management of head and neck facial space infections: A clinical study. *Natl J Maxillofac Surg* 2015;6:55-61.
6. Huang CM, Huang FL, Chien YL, et al. Deep neck infections in children. *J Microbiol Immunol Infect* 2015. [Epub ahead of print].
7. Metin Ö, Öz FN, Tanır G, et al. Deep neck infections in children: experience in a tertiary care center in Turkey. *Turk J Pediatr* 2014;56:272-9.
8. Raffaldi I, Le Serre D, Garazzino S, et al. Diagnosis and management of deep neck infections in children: the experience of an Italian paediatric centre. *J Infect Chemother* 2015;21:110-3.
9. Cheng J, Elden L. Children with deep space neck infections: our experience with 178 children. *Otolaryngol Head Neck Surg* 2013;148:1037-42.
10. Keppel KL, Dorrington A. Diagnostic Considerations of Ultrasound versus Computed Tomography for Pediatric Inflammatory Neck Infections. *ORL Head Neck Nurs* 2015;33:15-8.
11. Fating NS, Saikrishna D, Vijay Kumar GS, et al. Detection of Bacterial Flora in Orofacial Space Infections and Their Antibiotic Sensitivity Profile. *J Maxillofac Oral Surg* 2014;13:525-32.
12. Yusuf E, Halewyck S, Wybo I, et al. *Fusobacterium necrophorum* and other *Fusobacterium* spp. isolated from head and neck infections: A 10-year epidemiology study in an academic hospital. *Anaerobe* 2015;34:120-4.
13. Celakovsky P, Kalfert D, Smatanova K, et al. Bacteriology of deep neck infections: analysis of 634 patients. *Aust Dent*

- J 2015;60:212-5.
14. Brook I. Fusobacterial head and neck infections in children. *Int J Pediatr Otorhinolaryngol* 2015;79:953-8.
  15. Huang L, Jiang B, Cai X, et al. Multi-Space Infections in

the Head and Neck: Do Underlying Systemic Diseases Have a Predictive Role in Life-Threatening Complications? *J Oral Maxillofac Surg* 2015;73:1320.e1-10.

doi: 10.21037/arh.2017.05.03

**Cite this article as:** Karapantzos I, Karapantzou C, Zarogoulidis P, Karanikas M, Thomaidis V, Tsiouda T. Deep neck infections and abscess: case series and up to date commentary. *Ann Res Hosp* 2017;1:27.