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A DEMOGRAPHIC ANALYSIS OF DEEP NECK SPACE INFECTIONS IN A TERTIARY CARE CENTRE IN BELAGAVI

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ABSTRACT

Background: Deep neck space infections continue to occur in spite of extensive antibiotic usage. Early diagnosis and treatment is key to prevent fatal complications. **Objective:** To analyse demographics and predisposing factors of deep neck space infections. **Settings:** Medical records of 44 patients with deep neck space infections were reviewed for various parameters. **Results:** Dental infection was the commonest source of infection and diabetes mellitus was the commonest comorbidity found. Submandibular space was most often involved. Anemia was found in more than half cases. Incision and drainage was done in 95.5% cases, with two cases also requiring tracheostomy. No other complications were noted. **Conclusion:** With the advent of newer antibiotics, the incidence of deep neck space infections has substantially declined. Early diagnosis and management are crucial. Airway management is crucial. Dental infections are most often implicated in deep neck space infections, the commonest type being submandibular abscess. Immunocompromised state and anemia are also to be kept in mind.

KEYWORDS: Deep neck space infection, anemia, diabetes.

INTRODUCTION

Deep neck space infections (DNSI) are described as infections of fascial planes and spaces of the neck, culminating in cellulitis and/or abscess formation.

The spaces of the neck are classified into four categories – face (buccal, canine, masticator and parotid spaces), suprahyoid (peritonsillar, submandibular, sublingual and parapharyngeal spaces), infrahyoid (anterior visceral space) and along the length of the neck (carotid, retropharyngeal, alar and danger spaces).

DNSI are associated with lethal complications like upper airway obstruction, cervical necrotizing fasciitis, descending necrotizing mediastinitis, aspiration pneumonia, pleural or pericardial effusion, dural sinus thrombosis, intracranial abscess and septic shock; resulting in mortality in up to 50% of the cases despite aggressive antimicrobial therapy and surgery.[1,2]

OBJECTIVE

The goal of this study is to analyse the demographics and predisposing factors in patients with DNSI.

MATERIALS AND METHODS

A retrospective study was conducted by reviewing medical records of 44 patients who were treated in Department of ENT, Dr.Prabhakar Kore Charitable Hospital and Medical Research Centre, between June 2013 to June 2016. Information was collected about patient demographics and probable source of infection, comorbidities, clinical features, blood and microbiological investigations, treatment methods and complications.

RESULTS

The age of patients studied ranged from 9 months to 75 years. Highest incidence was seen in the age group of 41-50 years (20.45% each). There were 24 male (54.5%) and 20 female (45.5%) patients. The commonest presenting feature was swelling in the neck in 35 cases (79.5%). Probable source of infection was identified as dental infection in 17 patients (38.6%), chronic tonsillitis in 8 patients (18.2%), upper respiratory tract infection and parotitis in 4 patients (9.1%) each. Foreign body in cricopharynx was seen in 1 case (2.3%) and acute cervical lymphadenitis in another case (2.3%). No cause was found in 9 patients (20.5%). The commonest co-morbidity was diabetes mellitus seen in 16 patients (36.4%), followed by hypertension and pregnancy in 3 patients (6.8%) each; renal failure, ischemic heart disease, hyperthyroidism, asthma, systemic fungal infection, tuberculosis, and malignancy of hypopharynx in one case each (2.3%). Twenty-five out of 44 (56.8%)

patients were found to have anemia. Thirty-five patients (79.5%) had leukocytosis, while one patient (2.3%) had leucopenia. One patient (2.3%) was found to be HIV positive. The commonest organism isolated was *Staphylococcus aureus* in 11 patients (25%). No organisms were found in 21 cases (47.7%). The commonest site of involvement was submandibular space in 14 cases (31.8%), followed by parapharyngeal space in 8 cases (18.2%), retropharyngeal space in 6 cases (13.6%), parotid and peritonsillar spaces in 5 cases (11.4%), and masticator space in 1 case (2.3%). Multiple spaces were involved in 5 cases (11.4%). Infection was seen on left side in 12 cases (27.3%), right side in 20 cases (45.5%) and bilaterally in 12 cases (27.3%). Incision and drainage was done in 42 out of 44 patients (95.5%). Tracheostomy was done in addition in 2 cases (4.5%). Two-drug or three-drug antibiotic combinations were used in 41 cases (93.2%), while 3 patients (6.8%) received single drug. One patient (2.3%) developed mediastinitis and septicemia each, 2 other patients (4.5%) developed upper airway obstruction. There were no other complications. Duration of hospital stay ranged from 2 to 28 days, with an average of 10.5 days.

Table 1 – Table showing site involved

SITE INVOLVED	NUMBER (%)
Submandibular space	14 (31.8%)
Parapharyngeal space	8 (18.2%)
Retropharyngeal space	6 (13.6%)
Parotid space	5 (11.4%)
Peritonsillar space	5 (11.4%)
Masticator space	1 (2.3%)
Multiple spaces	5 (11.4%)

Table 2 – Table showing presenting complaints

PRESENTING COMPLAINT	NUMBER (%)
Swelling in the neck	35 (79.5%)
Fever	12 (27.3%)
Pain	27 (61.4%)
Difficulty in swallowing	15 (34.1%)
Difficulty in breathing	2 (4.5%)
Voice change	1 (2.3%)
Difficulty in mouth opening	1 (2.3%)

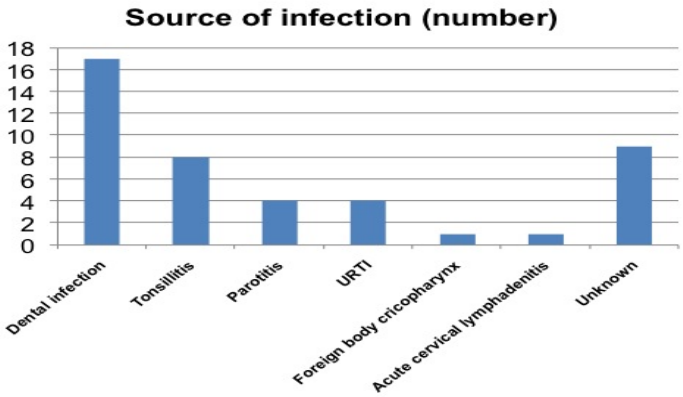

Figure 1 – Graph representing the source of infection (number)

DISCUSSION

Deep neck space infections continue to occur in spite of extensive antibiotic usage. Although incidence has dropped, they are associated with significant morbidity and mortality.[3] In the present study, there were 24 men (54.5%) and 20 women (45.5%), with a sex ratio of 1.2, comparable to previous studies.[4,5,6] Male predominance might suggest that women seek medical help later compared to men as a result of socio-cultural norms. The youngest patient in the study was 9 months old, while the oldest one was 75 years old, average being 42.3 years. Abshirini et al reported a study with average age incidence being 42.8 years.[7] The highest incidence of deep neck space infections was seen in the present study was seen in the age group of 41-50 years (20.45%); similar to previous studies.[8,9]

The commonest clinical presentation was neck swelling in 35 patients (79.5%), whereas studies by Kataria et al and Kamath et al showed neck swelling in 88% and 79% patients respectively.[8,10] Other clinical presentations included pain in 27 cases (61.4%), difficulty in

swallowing in 15 cases (34.1%), fever in 12 cases (27.3%), difficulty in breathing in 2 cases (4.5%) and difficulty in mouth opening and voice change in 1 case (2.3%) each. **(Table 1)** CT scanning of neck was done in 34 cases (77.3%) to confirm diagnosis.

Deep neck infections are odontogenic in origin in adults, while they are due to upper respiratory system infections in children.[11] In our study, 38.6% patients were found to have pre-existing dental infection. This is a result of poor oral hygiene; tobacco chewing and delay in dental treatment.[12] Other plausible sources of infection were chronic tonsillitis (18.2%), upper respiratory tract infection and parotitis (9.1% each), foreign body in cricopharynx and acute cervical lymphadenitis (2.3% each). No cause was found in 9 patients (20.5%).**(Figure 1)** A previous study by Kamath et al showed unknown etiology in 38% cases, followed by dental infection (28%), pharyngeal infection (24%), local trauma (7%) and oesophageal malignancy (3%);[10] and another study by Suwal et al showed odontogenic infection in 21.1%, followed by parotid disease in 13.3% and no cause found in 28.8% cases.[13]

Diabetes mellitus was the commonest co-morbidity seen in 16 patients (36.4%). A study conducted by Huang et al showed 30.3% patients with diabetes mellitus.[14] Another study by Akhthar et al also reveals similar findings.[15] DNSI in diabetics has a more severe clinical course with poorer prognosis; requiring close observation with appropriate sugar control and early detection and management of complications.[16] Three patients (6.8%) were pregnant. Odontogenic infection in pregnancy necessitates utmost attention given the physiologic changes of pregnancy, contributing to increased risk of complications.[17] Other co-morbidities in the present study were hypertension (6.8%), hepatitis B (4.5%); renal failure, ischemic heart disease, hyperthyroidism, asthma (2.3%). Systemic fungal infection, tuberculosis, and malignancy of hypopharynx were seen in 2.3% patients each, leading to an immunocompromised state. Twenty-five out of 44 (56.8%) patients were found to have anemia, as per WHO guidelines.[18] A study by Sakarya et al found 31.2% patients to be anemic.[9] This contrast could be due to malnutrition and lack of health awareness in the Indian rural population. Correction of anemia with blood transfusions in DNSI patients and early detection and management of anemia in general population can drastically reduce incidence.[19] Thirty-five patients (79.5%) in the present study had leukocytosis (>10000), while one patient (2.3%) had leucopenia (<4000). The absence of leukopenia was found to be a positive prognostic factor for the development of complications.[9] One patient (2.3%) was found to be HIV positive.

The commonest organism isolated was *Staphylococcus aureus* in 11 patients (25%), followed by *Streptococcus agalactiae* and *Klebsiella pneumoniae* in 3 cases (6.8%) each, *Streptococcus bovis* in 2 cases (4.5%); Pseudomonas species, *Escherichia coli*, Enterococcus species, Methicillin-Resistant *Staphylococcus aureus* and Candida species in one case (2.3%) each. No organisms were found in 21 cases (47.7%), possibly due to the use of antibiotics when the culture was sent. A study by Huang et al, showed culture positive rate of 61.3% with the commonest organism being *Staphylococcus aureus* (19.4%)[14], similar to our study findings; while studies by Brito et al and Myla et al revealed *Streptococcus pyogenes* as the commonest organism (23.3% and 70% respectively).[5,20]

The commonest deep neck space involved was submandibular space in 14 cases (31.8%), followed by parapharyngeal space in 8 cases (18.2%), retropharyngeal space in 6 cases (13.6%), parotid and peritonsillar spaces in 5 cases each (11.4%), masticator space in 1 case (2.3%). Multiple spaces were involved in 5 cases (11.4%). **(Table 2)** Similar findings were seen in a study by Myla et al and Yang et al.[20,21] A study by Zamiri et al showed submandibular space involvement in 32% patients,[22] however another study by Huang et al showed parapharyngeal involvement in most of the cases (42.3%).[14] Submandibular space involvement was found to be a positive prognostic factor for the development of complications and duration of hospitalization.[9] The involvement of multiple spaces adds to morbidity.

Antibiotic cover was provided to all patients aimed at gram-positive and gram-negative organisms, as well as anaerobic organisms. The commonest antibiotic used was Clindamycin in 54.5% cases, closely followed by Metronidazole in 52.3% cases. Clindamycin is potent against streptococci, pneumococci, penicillin-resistant staphylococci and anaerobes prevalent in chronic tonsillitis and deep neck abscess of dental or oral origin.[21] Incision and drainage was done for 42 out of 44 patients (95.5%). External incision and drainage was performed in 33 cases (75%), endoscopic drainage in 5 cases (11.4%) and internal incision and drainage in 4 cases (9.1%). Two patients (4.5%) were treated conservatively. In a study by Parhiscar et al incision and drainage was done in 100% cases.[23] In another study, 55% patients underwent external incision and drainage, 27.5% underwent intraoral incision and drainage, whereas 17.5% were treated conservatively.[20] Airway management is a difficult task in DNSI. In our study, tracheostomy was done for the same in 2 cases (4.5%). Eftekharian et al in their study, performed tracheostomy in 8.8% cases.[24] Duration of hospital stay ranged from 2 to 28 days, with an average of 10.54 days. It is an index of the gravity of infection, dependent on parameters like blood sugar level, hemoglobin level, total leukocyte count and oral hygiene.[9]

CONCLUSION

With the advent of newer antibiotics, the incidence of deep neck space infections has substantially declined.

Nevertheless, early diagnosis and treatment is key to prevent fatal complications. Airway management is crucial. Dental infections are most often implicated in deep neck space infections, the commonest type being submandibular abscess. Immunocompromised state and anemia are also to be kept in mind.

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