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A study of deep neck spaces infection in present era at tertiary care teaching hospital

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ABSTRACT

Background: Deep neck spaces infection is a common challenging condition for otolaryngologist in day to day practice even after availability of higher antibiotics. It may leads to considerable morbidity and complications. The aim of the study was to find out prevalence, predisposing factors and changing trend of deep neck spaces infection in this broad spectrum antibiotics era.
Methods: This prospective study was carried out at P.D.U. Medical College and Hospital, Rajkot. 120 Patients were studied who came with deep neck space infection.
Results: In this study majority of patient were in the age group of 41-60 year. Odontogenic and oropharyngeal infectionare the most common etiologies. *Staphylococcus aureus, Streptococcus, E. colli, Klebsiella* and anaerobes were the microorganisms commonly isolated in pus culture and sensitivity test.
Conclusions: In spite of availability of broad spectrum antibiotics in present day deep neck spaces infection is the most commonly noticeable condition in developing countries and may lead to considerable morbidity and complications. Inadequate nutritional status, poor oral hygiene and lack of awareness in dental health are common predisposing factors for deep neck spaces infection.

Keywords: Deep neck spaces infection, Odontogenic infection, Incision and drainage

INTRODUCTION

Deep neck spaces infection defined as an infection in the potential spaces and fascial planes of the neck either with cellulitis or abscess formation.[1] There is confusion about the number of neck spaces that varies 13-20. A fascial space is an area of loose connective tissue bounded by dense connective tissue called fascia.[2] These potential spaces are important because they determine the spread of infection. The most important of these are suprahyoid spaces like submandibular, peritonsillar, parapharyngeal, buccal, parotid, masticatorand infrahyoid spaces like retropharyngeal, prevertebral, carotidand pretracheal. Knowledge of the anatomy of the areas in which infection tended spread was important in the pre-antibiotic days from the point of view of routes of spread, complications and surgical drainage but nowadays knowledge of three spaces (submandibular, parapharyngeal, retropharyngeal) will allow management of 90% of patients.[3]

Deep neck spaces infections are bacterial infections that primarily originate from teeth, tonsils and impacted foreign bodies in upper aero digestive tract.

Deep neck spaces infections arising from the dental carries are known as odontogenic infection. Now-a-day it is the commonest cause of deep neck space infection.[4] Previously before the availability of antibiotics tonsillar and peritonsillar infections were the most common cause of deep neck space infection.[5] Nowadays abscess usually occur in the submandibular space, parapharyngeal space

and retropharyngeal space. Infections of submandibular space are known as Ludwig's angina.[5]

Common presenting clinical signs and symptoms were fever, malaise, throat pain, neck swelling, trismus, dysphagia, odynophagia, otalgia, dyspnoea.[6]

The organisms usually isolated in deep neck spaces infection were *Staphylococcus*, *Streptococcus*, *Pneumococcus*, *E coli*, anaerobes.[7,8]

Early recognisation of condition and proper treatment reduces the possible morbidity and complications. However delayed presentation, especially in immunocompromised patients i.e. HIV infection, uncontrolled diabetes, patient on chemotherapy and steroid therapy may lead to fatal complications like airway obstruction, descending mediastinitis, pleural effusion, sepsis, respiratory distress, jugular vein thrombosis, disseminated intravascular coagulation.[3]

Treatment of deep neck spaces infection include removal of primary source of infection particularly in odontogenic infection where root canal treatment or dental extraction is required in addition to broad spectrum antibiotic therapy, airway management, incision and drainage in case of abscess and nonsurgical treatment by appropriate antibiotics in case of cellulitis.[9]

METHODS

We have done prospective study in 120 patients who came with Deep neck spaces infection who were treated in the department of otolaryngology head and neck surgery, P.D.U. Hospital Rajkot, from December 2016 to December 2017. The study has been approved by the institutional ethics committee.

We have included patients of all age group and both gender. Patients with infected secondaries in the neck were excluded in our study.

All patients with deep neck spaces infection admitted in hospital were properly examined and managed accordingly. In patient with abscess formation incision and drainage was done. Drained pus was sent for culture sensitivity and acid fast bacilli examination. All patients with or without abscess formation were also treated by available broad spectrum antibiotics, metronidazole, analgesic and anti inflammatory dugs. Daily or alternate day dressing depending upon pus collection and healing status with beta dine, hydrogen peroxide, metronidazole solution was done depending upon the case. Antibiotics were changed according to pus culture sensitivity report later on.

All the data in term of age, sex, clinical presentation, etiology, investigation, blood investigation, pus culture, treatment, complication and outcome were analysed.

RESULTS

Table 1: Age and sex distribution of patients.

Age (in years)	No. of patient		Percentage (%)
	Male	Female	
1–10	13	09	18.3
11–20	04	03	5.8
21–30	03	02	4.1
31–40	10	06	13
41–50	21	08	24.1
51–60	21	10	25.8
61–70	05	03	6.6
71–80	01	01	1.6
Total	78 (65)	42 (35)	100

Total 120 patients were evaluated in this study. As shown in Table 1, 78 patients (65%) were male and 42 patients (35%) were female. Age groups considered ranged from 1 year to 80years. Most commonly affected age groups were between 41-60 years involving 60 (50%) followed by 22 patients (18.3%) were less than 11years. Majority of them belongs to poor and low socioeconomic condition. Mean of the age is 38.67 years.

Table 2: Symptoms of deep neck spaces infection.

Symptoms	No of patient	Percentage (%)
Pain	117	97.5
Neck swelling	116	96.6
Fever	98	81.6
Trismus	78	65
Toothache	63	52.5
Odynophagia	37	30.8
Dysphagia	18	15
Airway difficulty	05	12.5

Almost all patients were presented with chief complain of pain in neck (97.6%) and neck swelling (96.5%). Others symptoms were fever (81.65%), trismus (65%), toothache (52.5%), odynophagia (30.8%), dysphagia (15%) and airway difficulty (12.5%).

Table 3: Aetiology.

Aetiology	No of patients			%
	Male	Female	Total	
Odontogenic	43	20	63	52.5
Tonsillitis	15	07	22	18.3
Salivary gland infection	11	06	17	14.1
Infected lymph nodes	04	08	12	10
Foreign body	03	00	03	2.2
Infected cyst	02	01	03	2.5

The most common cause of deep neck abscess in our study was Odontogenic (52.5%), followed by tonsillitis

(18.3%). Out of 22 patients with tonsillitis, 17 patients developed peritonsillar abscess. Salivary gland infection was seen in 17(14.1%) cases. Amongst them parotid gland abscess was found in 12 patients and submandibular abscess was found in 5 patients. Infected lymph nodes were the cause in 12 (10%) patients where 7 patients have cold abscess (Koch's abscess) and all of them were under the age of ten years. Less common causes include foreign body (meat bone impaction) in posterior pharyngeal wall in 3(2.5%) patientswho developed retropharyngeal abscess and infected cyst (2.5%).

Table 4: Site of involvement.

Location	No of patient	Percentage (%)
Submandibular space	69	57.5
Para pharyngeal space	21	17.5
Parotid space	12	10
Retropharyngeal space	03	2.5
Anterior/Posterior triangle of neck	12	10
2or more spaces involved	03	2.5

Involvement of neck spaces was diagnosed by clinical examination and radiological investigations like X-ray neck, ultrasonography, CT scan. Involvement of submandibular space was in 69 patients (57.5%), followed by parapharyngeal space (17.5%), parotid space (10%), retropharyngeal space (2.5%), anterior/posterior triangle of neck (12%), two or more spaces involved (2.5%) as shown in table 5.

Out of 120 patients 104 patients were treated with incision and drainage, aspiration or both along with broad spectrum antibiotics and dressing. Drained pus of every patients was sent for culture and sensitivity test. Later on antibiotics and antitubercullar drugs were changed and added depending upon culture and sensitivity report whenever required. All patients with dental carries were sent to the dentist.

Table 5: Organism isolated.

Organisms	No. of patient	Percentage (%)
***Streptococcus* species**	40	33.3
Anaerobes	17	14.1
Staphylococcus aureus	13	10.8
Klebsiella	05	4.1
Tubercular bacillus	06	5
Pseudomonas aeruginosa	04	3.3
No growth of pathogen	35	29.1

The most common organism isolated were *Streptococcus* (33.3%) followed by anaerobes (14.1%), *Staphylococcus* (10.8%), *Klebsiella* (4.1%) and *Pseudomonas* (3.3%). *M. tuberculosis* was found in 6(5%) cases. No organisms were isolated in 35 (29.1%) cases.

Table 6: Co morbid conditions.

Co morbid conditions	No of patient	Percentage (%)
Anaemia	50	41.6
Diabetes mellitus	25	20.8
Renal failure	05	4.1
PLHA	02	1.6

Figure 1: Submental abscess.

Figure 2: Left submandibular abscess.

82 patients have associated co morbid conditions like anaemia 50 (41.6%), diabetes mellitus 25 (20.8%), renal failure 5 (4.1%), PLHA 2 (1.6%). These co morbid conditions were also treated accordingly. 7 patients had airway obstruction required tracheostomy and1 patient had skin necrosis. Overall most of patients were required 7-10 days stay in hospital. 2 patients died due to septicaemia and air way obstruction.

Figure 3: Ludwig's angina.

DISCUSSION

Now a day's with the advent of higher antibiotics, the incidence of deep neck spaces infection have reduced but not obsolete. The diagnosis and management of deep neck spaces infection is still a challenge for otolaryngologist. Deep neck spaces infections are severe in cases with co morbid condition like poor nutrition, anaemia, diabetes, renal failure immune compromised condition, etc. Evaluation of this life threatening conditions is very important. In this study, 120 patients with deep neck spaces infection were studied and data was analysed. The study reveals affection of all age group patients commonly affected age group being 1-10 and 41-60 years. Maximum numbers of cases were found in the age group of 41-60 years. Mean age of affected patients was 38.67 and is similar to other studies were mean age varied from 36 to57 years.[10,11] Men (65%) were affected more than women (35%). In study done by Kataria et al and Sharma et al 55.26% males and 44.74% females and 71.11% males and 28.89% females affected respectively which is similar to our study.[12,13] Out of 120 cases of deep neck spaces infection sixty three (52.5%) were Odontogenic in origin. This is followed by tonsillitis (18.3%), salivary gland infection (14.1%), infected lymphadenopathy (10%), infected cyst (2.5%) and foreign body (2.2%). In studies done by Huang et al, Parhiscar et al, Thimappa et al, Tschiassny et al, Eftekhartin et al 42%, 43%, 32%, 70%, and 49% of deep neck spaces infections were odontogenic in origin.[8,10,14-16] This variation is because of different geography. Among these 63 patients, 42 were males and 20 were females. Which is comparable with Parhiscar et al, Kataria et al, Sethi et al, Mumtaz et al.[10,12,17,18] This may indicate that men pay less attention to oral hygiene as well as having habit of smoking and pan masala in our region.

Most of patients presented with neck pain (97.5%), swelling (96.6%), fever (81.6%), trismus (65%) and toothache (52.5%) along with odynophagia (30.8%), dysphagia (15%) and airway difficulty (12.5%). This is comparable with study done by Thimappa et al.[14]

Commonest presentation in our study of deep neck spaces infection was submandibular abscess (57.5%) followed by parapharyngeal abscess (17.5%), parotid abscess (10%), anterior/ posterior triangle of neck (10%), and retropharyngeal abscess (2.5%). Submandibular abscess is the most common presentation in studies done by Parhiscar et al, Zamiri et al, Meher et al with 28%, 32% and 37% involvement respectively.[10,19,20]

The diagnosis of deep neck spaces infections is through clinical examination. It is supplemented by ultrasonography, x-ray and FNAC. CT-scan was done in cases of airway obstruction and huge swelling.

Intravenous antibiotics in cellulitis and surgical drainage of abscess cavity are the mainstay of deep neck spaces infection management.[1,16,21] Broad spectrum antibiotics and anti anaerobic metronidazole along with anti inflammatory and analgesic were used to reduce oedema, pain and associated symptoms. In this study one hundred two patients (85%) required surgical intervention which correlates with the studies of Parhiscar et al, Eftekharian et al, Mumtaz et al, Har-El et al requiring surgical intervention in 100%, 79%, 78% and 90% respectively.[10,16,18,22] Surgical drainage of abscess and daily dressing with antiseptic solution and saline is equally important to clean pus and slough from abscess cavity for faster healing. Maintenance of hydration, haemoglobin level and nutritional status of patient and control of diabetes is also important. In this study we found 50 patients (41.6%) with anaemia and out of these 10 patients (8.3%) required blood transfusion.

Pus drained from abscess was sent for culture and sensitivity test in every patients. Later antibiotics were modified according to sensitivity report. In this study organisms isolated are *Streptococcus* 40 (33.3%), Anaerobes 17 (14.1%), *Staphylococcus aureus* 13(10.8%), *M. tuberculosis* 6 (5%), *Klebsiella* 5 (4.1%) and *Pseudomonas aeruginosa* 4 (3.3%). Organism could not be isolated in 35 patients (29.2%). This may be due to liberal use of antibiotic before surgical drainage of the abscess. In studies done by Parhiscar et al and Kataria et al the most common organism isolated was *Streptococcus* being 39% and 23.8%.[10,12]

Management of airway obstruction in deep neck spaces infection is challenging. In this study we noticed 7 patients (5.8%) with airway obstruction who required tracheostomy. This correlates with study of Eftekharian et al requiring tracheostomy in 8.5% cases.[16] Because of trismus, laryngeal oedema and possibility of distortion of air way anatomy rigid laryngoscopy and intubation is difficult or it may even worsen the condition.[23] There is risk of bursting of retropharyngeal abscess and aspiration, always consider tracheostomy first in patient with sign and symptoms of air way obstruction.

CONCLUSION

In spite of availability of higher antibiotics in present era management of deep neck abscess is still a challenge for otorhinolaryngologist. Deep neck spaces infection is most common in 41–60 years of age mainly in males. Odontogenic and tonsillitis are the most common etiology. The most common is submandibular abscess. Diabetes, elderly age and poor dental hygiene are the precipitating factor for deep neck spaces infection. In developing countries lack of nutrition, lack of awareness, poor oral hygiene, smoking, tobacco and beetle nut chewing increase the prevalence of odontogenic and periodontal diseases that may lead to deep neck spaces infection. Early surgical intervention is required in case of deep neck abscess along with broad spectrum antibiotics according to sensitivity along with control of co morbid conditions remains the mainstay of treatment. Special attention is required in cases of airway obstruction. Tracheostomy is advisable in patients with air way obstruction. CT scan is useful tool in patients with airway obstruction and huge abscesses. This condition can be prevented by creating awareness of oral and dental hygiene, smoking and tobacco chewing prevention along with regular dental check-ups.

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