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DEEP SPACE INFECTIONS OF NECK – OUR EXPERIENCE

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ABSTRACT

OBJECTIVE: To study signs and symptoms, etiology, site and outcome of deep neck space infections.

STUDY DESIGN: Cross sectional study.

METHODS: 25 patients admitted with deep neck space infections to govt. Mc Gann teaching hospital, SIMS, Shimoga , Karnataka , India between JAN 2009 – JAN 2014 were included in the study.

RESULTS: The extreme age group, high virulence of organism, underlying conditions, and low socioeconomic groups are vulnerable for above infections. Mortality in 1 case was due to mediastinitis and extended space infection.

INTRODUCTION

Deep neck space infections involve fascial planes and spaces of the head and neck. These infections are relatively common and can result significant morbidity and potential mortality[1,2]. Traditionally, surgical incision and drainage with antibiotics as per culture and sensitivity reports has been the mainstay of treatment. Incision and exploration occasionally risks the patient to potential injury to neurovascular bundle and a cosmetically undesirable scar15. Before knowing the details one should have thorough anatomical knowledge of the deep neck spaces of head and neck as discussed below[3,4].

CERVICAL FASCIA

Fascial planes divide the neck into potential spaces. The two main fascial divisions of the neck are the superficial cervical fascia and deep cervical fascia. Deep cervical fascia is again divided in to an investing layer, pretracheal fascia and prevertebral fascia. The superficial fascia is just beneath the dermis and covers platysma and muscles of the expression.

DEEP FASCIA

Investing (superficial) layer: Superiorly attached to the nuchal bone, over the mastoid process along the entire length of base of mandible. Inferiorly along trapezius and sternocleidomastoid, it is attached to the acromion, clavicle & manubrium sterni, fusing with their periosteum.

Pretracheal fascia: Superiorly attached to the hyoid bone, inferiorly continues into the superior mediastinum along the great vessels and merges with fibrous pericardium. Laterally it merges with the investing layer of deep fascia and carotid sheath.

Prevertebral fascia: It covers the anterior vertebral muscles and extends laterally on scaleneus anterior, scaleneus medius and levator scapulae forming a fascial floor for the posterior triangle of the neck. The prevertebral fascia is particularly prominent in front of the vertebral column, where there may be two distinct layers of fascia. The space created by splitting of the anterior pre vertebral fascia, the danger space is a part of the pre vertebral space. Superiorly it is attached to the base of skull. Inferiorly it descends in front of the longus colli into the superior mediastinum, where it blends with the anterior longitudinal ligament and buccopharyngeal fascia by a loose areolar zone. Anteriorly the prevertebral fascia is separated from the pharynx and its covering the retropharyngeal space.

NECK SPACES

Para pharyngeal space: Also called lateral pharyngeal or pharyngomaxillary space, it is an inverted pyramid with its superior base at the skull base and inferior apex at the junction of the posterior belly of digastric and greater cornu of hyoid bone. The pterygomandibular raphae and medial pterygoid muscles bound the space anteriorly, while the vertebral fascia bounds it posterirly.

Submandibular and sublingual spaces: These spaces functionally comprise a single space. The mucosa of the floor of the mouth forms superior boundary of the submandibular space, and the digastric muscle and hyoid bone form the inferior. Anteriorly the mylohyoid space, with the posterior belly of digastric bound the submandibular space, with the posterior belly of digastric and stylomandibular ligament serving as its posterior borders. The mylohyoid muscle divide the submandibular space into a superior sublingual compartment & inferior submaxillary compartment5.

Retropharyngeal space: It extends from the skull base to mediastinum at the tracheal bifurcation and is a potential space between the middle and deep layers of deep cervical fascia. The space lies anterior to the alar fascia and posterior to the buccopharyngeal fascia of the middle layer, which lines the posterior pharynx and esophagus.

Danger space: it is so named because of the potential for rapid inferior spread of infection to the posterior mediastinum through its loose areolar tissue, extends from skull base to the diaphragm. This potential space lies between the retropharyngeal and pre vertebral spaces. The alar layer forms its anterior border; the pre vertebral layer forms its posterior border. Laterally transverse processes of the vertebrae enclose the danger space.

Masticator space: The superficial layers of deep cervical fascia define this space upon splitting at the inferior border of the mandible to cover the medial pterygoid and masseter muscles. The fascia continues superiorly to cover the inferior tendon of temporalis muscle and incorporate with superior temporalis fascia. It contains the mandible and muscles of mastication, third portion of trigeminal nerve, internal maxillary artery and much of the buccal pad of fat.

Peritonsillar space: It contains of loose connective tissue between the capsule of the palatine tonsil and superior constrictor muscle. The anterior and posterior tonsillar pillars contribute its anterior and posterior borders respectively.

Pre-vertebral space: This space is enclosed by pre vertebral fascia, vertebral bodies and transverse processes and it extends from the clivus of the skull base to the coccyx. It is a compact potential space that contains dense areolar tissue and lies posterior to the danger space.

Parotid space: The superficial layer of deep cervical fascia forms the parotid space as it splits to enclose the parotid gland. However the fascia which does not enclose the superomedial aspect of the gland permits communication with the prestyloid compartment of parapharyngeal space.

Carotid space: The carotid or the visceral vascular space is the potential space within the carotid sheath containing the carotid artery, internal jugular vein, vagus nerve and sympathetic plexus.

Anterior visceral space: The visceral division of the middle layer of deep cervical fascia encloses the anterior visceral space or the pretracheal space, which lies immediately anterior to the trachea. It extends from the thyroid cartilage to the superior mediastinum. It contains the pharynx, larynx, trachea, esophagus and thyroid gland

MATERIAL AND METHODS:

Patients who attended to department of ENT govt, Mc Gann teaching hospital SIMS, Shimoga with signs and symptoms as shown in

TABLE -1 were included in the study. Clear cut cases of peritonsilar abscesses and deep neck space infections confined to dentoalveolar space are excluded from study.

It is a cross sectional type of study from Jan 2009 to Jan 2014 which includes 25 patients. Institutional ethical committee clearance is obtained for the study.

X-ray soft tissue neck lateral view showing retro-pharyngeal abscess

Extended neck space abscess

Figure showing parotid abscess

RESULTS:

Of 25 patients, 14 were women and 11 were men. Their ages ranged from 2yrs to 84yrs. Among them 10 patients were less than 10 yrs and above 80yrs as shown in FIGURES 2 and 3. Majority of them are poor and low socioeconomic group10,11. The involved spaces were diagnosed by clinical and radiological methods such as CT scan and USG if required. Submandibular space (Ludwig's angina) involvement was highest with 10 patients (40%) followed by parapharyngeal space abscess with 8 patients (32%) and the remaining results are shown in TABLE – 2.

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The common cause for deep neck space infection in our study was due to odontogenic origin was identified in 8 cases (32%) and tonsilopharyngeal focus 6 cases (24%), unknown causes 7 cases (28%) as shown in FIG-1. However we diagnosed 2 cases of tubercular etiology involving 1 retropharnygeal space and other was with parapharyngeal space. 2 cases of traumatic abscess were noted, and one patient had impacted chicken bone developed tension pneumothorax later on managed by bilateral intercostal drainage by general surgeon colleague. Other case was due to spread of infection secondary to unhygienic beard shaving. 8 patients were diagnosed having underlying systemic diseases. Among them 4 patients with uncontrolled diabetes mellitus type-2 , 3 patients with HIV- 1 & 2 reactive and 1 patient with HbSAg positive12,13. 1 patient had mild respiratory compromise which improved following treatment and didn't require tracheostomy.

The pus collection was sent to bacteriological study, 13 of them didn't show any yield and 12 patients showed the growth.

We had complications among them 2 patients had skin loss due to necrosis of overlying skin , 1 case of dental sinus and 1 patient with Toxemia who died after 3 days of admission due to multiple organ dysfunction syndrome.

Signs and symptoms	**No.of patients**	**Percentage**
Pain and swelling in the neck	25	100%
Fever	25	100%
Dysphagia and odynophagia	23	92%
Toothache and extraction if any	8	32%
Trismus	4	16%
Double tongue sign and mouth floor swelling	4	16%
Loss of skin tissue due to necrosis	2	8%
Stridor	1	4%
Toxemia and systemic presentation	1	4%

Table 1—Signs and Symptoms

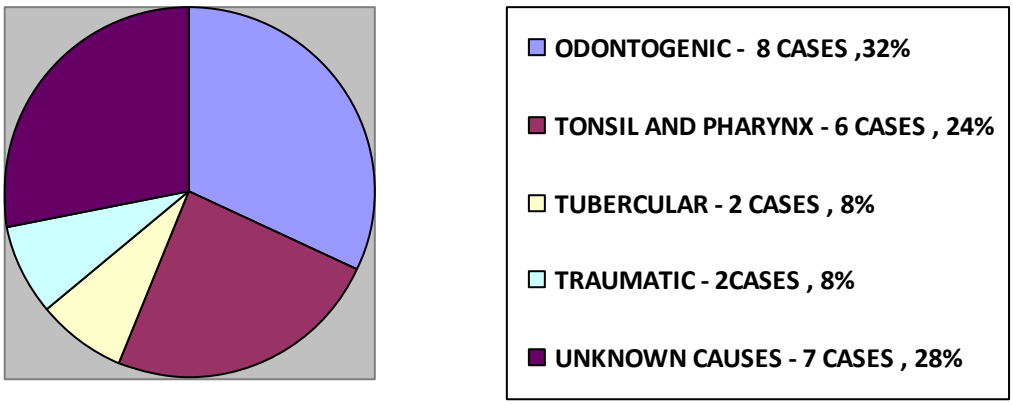

Figure 1—Etiology of neck space abscess

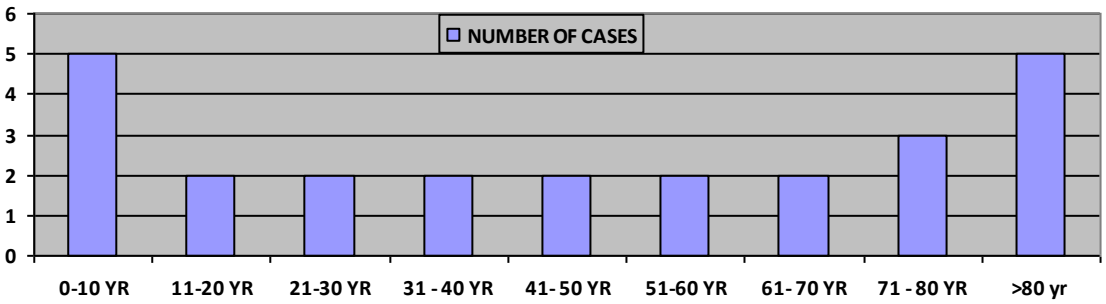

Figure 2 Age distribution

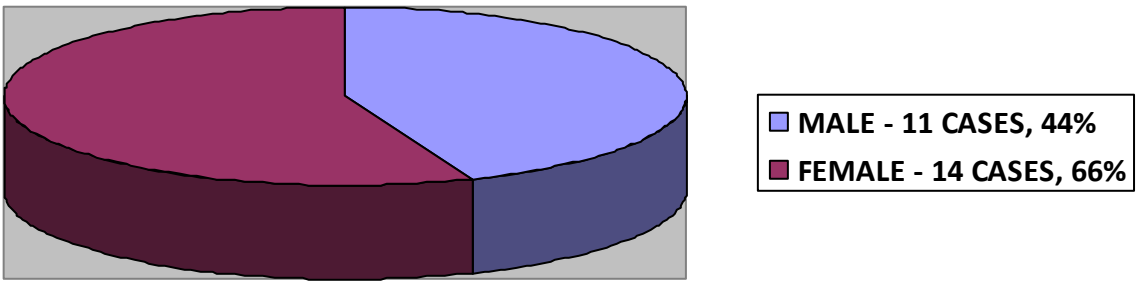

Figure 3—Sex distribution

SPACE	NUMBER	PERCENTAGE
Submandibular space	10	40%
Parapharyngeal space	8	32%
Retropharyngeal space	2	8%
Parotid space	2	8%
Mediastinum space	1	4%
Branchial cyst abscess	1	4%
Extended spaces infection (2 or more spaces concurrently involved)	1	4%

Table 2—Site of involvement of deep neck space

DISCUSSION

Deep neck space infections call for early diagnosis and prompt management. “Pus in the neck calls for the surgeon’s best judgment, his best skill and often for all his courage”- Mosher (1929). In the preantibiotic era majority of deep neck space infections resulted from pharyngeal and tonsillar infection. In the post antibiotic era an increasing incidence is observed from odontogenic origin.

The other causes include upper respiratory tract infection, trauma, foreign body impaction (fish bone, chicken bone, etc), tuberculosis and rarely, congenital lesions like branchial cyst. Many a times the cause of infection remains obscure perhaps because the infectious foci had been resolved at the time of presentation[6]

In our study we had 7 cases (28%), the cause of which is not detected. Infection due to dental cause is highest in our study. This is in consistent with Parhiscar. et.al[7] .The second most common space involved is parapharyngeal space abscess, 8 cases (32%) followed by parotid and retropharyngeal space abscess, 2cases each (8%). And in 1 patient(4%) multiple spaces abscesses (extended space infection) is noted.

We subjected all cases to CT scan, X-ray chest PA view, X-ray neck (retropharyngeal abscess) and blood tests to evaluate diabetes, uremia, chronic liver and renal failure and malignancies [7,9]. Patients with these conditions are more vulnerable to undergo complications like septicemia, descending necrotizing mediastinitis8 (“Lincoln’s highway” Mosher- 1929), jugular vein thrombosis, venous septic emboli, carotid artery rupture , disseminated intravascular coagulation and adult respiratory distress syndrome [14].

Aggressive intravenous antibiotic administration is the cornerstone of therapy. Anaerobic cover with metronidazole should be provided followed by hydration correction, analgesics and antipyretics. 2 cases (4%) of parotid abscesses were successfully managed.

Surgical drainage is indicated as early as possible. Various neck incision have been described for different abscesses 15 thus preventing the need for tracheostomy and airway management. The incision should be wide to access the abscess cavity with good control of adjacent neurovascular structures. Blunt dissection should be done to avoid injury to pharyngeal wall. Regular toileting of the wound and dressing should be done.

The pus usually yielded mixed microbiological flora including streptococci , staphylococci, peptostreptococci, bacteroids oralis. 52% did not grow any culture results maybe due to liberal use of high dose of antibiotics before surgical drainage of the abscess.

CONCLUSION

The current study enabled us to conclude the following:

1. Deep neck space infection is still a challenging disease in otorhinolaryngology

2. Odontogenic and tonsillar causes are the most common;

3. Submandibular and parapharyngeal spaces are most frequently involved;

4. Patients with diabetes mellitus, elderly age group, immunological derangement, highly virulent organisms are the precipitating factors;

5. Early surgical drainage remains the main method of treating deep neck abscesses and conservative medical treatment are effective in selective cases that have minimal cellulitis formation and are stable.

6. In the extended space abscess, retropharyngeal space abscess and Ludwig's angina, we should consider for airway management as well.

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