

## Original Article

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# Complications and Management of Neck Space Infection

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### Abstract:

**Background:** Neck Space Infections are serious and common diseases that involve several spaces in the neck. Deep neck space infections can be life threatening in diabetic, immunocompromised and elderly patients and special attention should therefore be given to these groups.

**Objectives:** This study was conducted to assess complications of deep neck space infections and its management, etiology, risk factors, presentation, spaces affected and complications among patients admitted in Department of ENT and Head- Neck Surgery in Dhaka Medical College & Hospital.

**Methods:** This was a Cross Sectional Study conducted in the ENT and Head- Neck Surgery Department, Dhaka Medical College & Hospital from January 2016 to June 2016. A total of 150 patients were included who fulfill the selection criteria. Purposive sampling was used to collect data. Statistical analysis was done by SPSS version 21.

**Results:** More than half of the patients (53.30%) came from middle class. Diabetes Mellitus was the most common risk factor (74.5%). Almost all patients presented with neck pain followed by neck swelling, dysphagia, fever and trismus. Organism isolated from drainage fluid was polymicrobial. Streptococcus (51.34%) and staphylococcus (18.60%) were most common organisms isolated. Airway was secured first and then high doses of antibiotics, immediate surgical drainage under local anesthesia were done in 130 (86%) patients. Commonly used antibiotics were ceftriaxone 132(82%), Metronidazole 113(75%) and flucloxacillin 98(65%). Complications were recorded in 55 patients. Most common was airway complication 40(73%). Tracheostomy was done in 17(11.33%) patients. Mortality occurred in 17(11.33%) patients.

**Conclusion:** Early diagnosis and management is essential to prevent complications. Odontogenic infections, poor oral hygiene, lack of nutrition, smoking and tobacco chewing, DM were associated with neck space infection and we can prevent & control those factors.

**Keywords:** Neck space infection, complications of deep neck space infection

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### Introduction:

Infections in the fascial planes and the potential spaces of neck, which may culminate in cellulitis or abscess formation, are termed as Neck Space Infections (NSI).<sup>1</sup> Although frequency and prevalence of these has decreased significantly over the years in this antibiotic-era, NSI used to be fairly common in the population previously.<sup>2</sup> Even after the introduction of antibiotics, they still constitute a major cause of mortality and morbidity. A significant portion of NSI cases develop life-threatening complications, the potentiality of which has been reported to be 10-20% according recent studies.<sup>3,4</sup>

70% of NSI cases used to originate from tonsillar and peritonsillar infections, before antibiotics became mainstream in medical practice.<sup>5</sup> At present the commonest source is considered the dental infections.<sup>6</sup> Intravenous drug abuse and foreign bodies can also cause NSI.<sup>6,7</sup> Patients usually present with neck pain, neck swelling, odynophagia, airway obstruction (specially in Ludwig's Angina) and constitutional symptoms such as fever, malaise and fatigue.<sup>8</sup>

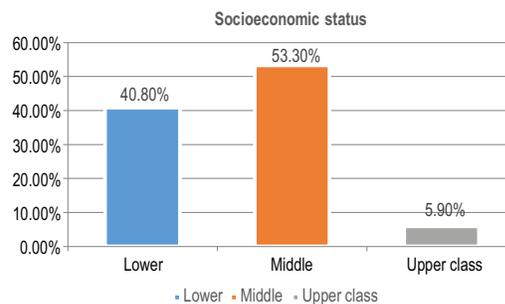
NSI are usually polymicrobial; Streptococci, Peptostreptococcus spp., S. aureus and Anaerobes being the most common causative organisms.<sup>9,10</sup> Among the most common complications respiratory obstruction, mediastinitis, jugular vein thrombosis, pleural empyema, cavernous sinus thrombosis, pericarditis and septic shock are mentionable.<sup>10</sup>

The mainstay of management in case of abscess is surgical drainage followed by antibiotics, whereas the use of appropriate antibiotics may suffice in case of cellulitis.<sup>11</sup> Proper diagnosis and prompt management can effectively overcome the

disease and reduce the severity and rate of development of complication. Clinicians must have knowledge about the presentation, common sites of infection, etiology, proper diagnostic workups and employment of appropriate medical and/or surgical management. The main purpose of our study was to share our experience, particularly in common sites involved, complications and management.

### Materials and Methods:

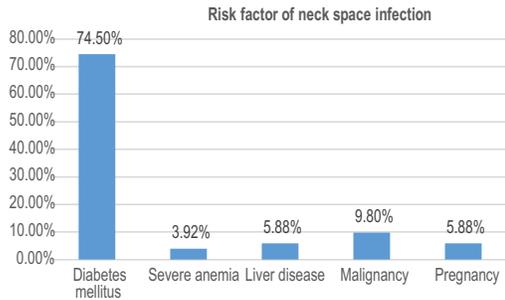
This is a observational cross-sectional study which was conducted in the Department of ENT and Head Neck Surgery, Dhaka Medical College Hospital, Dhaka with a sample size of 100 from January'2016 to June'2016. All patients clinically diagnosed as neck space infection and admitted into DMCH, Dept of ENT and Head-Neck Surgery were included in the study. Patients were randomly enrolled matching the inclusion and exclusion criteria.



**Figure 1: Socioeconomic status of the patients (n=150)**

### Results:

Figure shows, socioeconomic status of the patients. More than half of the patients (53.30%) came from middle class followed by lower class 40.80% and upper class 5.90%.



**Figure 2:** Bar chart showing Risk factors of neck space infections (n=51)

**Table I:**

*Etiology of neck space infections (n=150)*

Etiology	Frequency	Percentage
Odontogenic infection	78	52.0
Upper airway infection	28	18.6
Tonsillar infection	9	6.0
Tubercular lymphadenitis	5	3.3
Parotitis	8	5.3
Sialoadenitis	6	4.0
Foreign body	2	1.3
Unknown	14	9.5

**Table II:**

*Presentation of neck space infections (n=150)*

Presentation	Frequency	Percentage
Pain	150	100.0
Neck swelling	145	96.0
Fever	145	96.0
Dysphagia	140	93.0
Odynophagia	95	63.0
Sore throat	95	63.0
Salivation	98	65.0
Trismus	70	46.0
Dental caries	78	56.0
Swelling of tongue	88	58.0
Respiratory distress	45	30.0

**Table III:**

*Culture and isolation of the microorganisms of patients pus (n=150)*

Microorganism	Frequency	Percentage
Streptococcus	78	51.34
Staphylococcus	28	18.60
Pseudomonas	12	8.06
Klebsiella	15	9.68
Others	5	3.33
Multiorganism	12	7.48

**Table IV:**

*Antibiotics used in neck space infections (n=150)*

Antibiotics	Frequency	Percentage
Ceftriaxone	123	82.0
Cefuroxime	27	18.0
Metronidazole	113	75.0
Ciprofloxacin	11	7.3
Meropenam	3	2.0
Flucloxacillin	98	65.0
Others	8	5.3

**Table V:**

*Management of neck space infections (n=150)*

Antibiotics	Frequency	Percentage
Antibiotics	150	100.0
Incision & drainage	130	86.0
Tracheostomy	17	25.0
Skin grafting	7	4.7

**Table VI:**

*Complications of neck space infections (n=55)*

Complications	Frequency	Percentage
Airway compromise	40	73.0
Skin defect	5	9.09
Necrotizing fasciitis	4	7.27
Mediastinitis	2	3.64
Marginal mandibular nerve palsy	2	3.64
Septicaemia	1	1.82
Osteomyelitis	1	1.82

**Discussion:**

Neck Space Infection describes the infection developing within or spreading into the deep cervical spaces. Though widespread use of antibiotics has decreased the incidence of DNSI, but it remains a fairly common problem. In our study, 150 patients were included and all were admitted to the hospital for treatment. These infections remain an important health problem with significant risks of morbidity and mortality.

DNSI originated from a variety of sites in head and neck. Etiology were identified in 134(90.5%) out of 150(100%) patients. Among them 78(52%) patients were due to odontogenic which was consistent followed by upper airway infection 28(18.6%).<sup>10,14-16</sup> Others were tonsillar infection 9(6%), tubercular lymphadenitis 5(3.3%), parotitis 8(5.3%). About 14(9.5%) cases found no clear etiology and in future another depth study can be conducted to find out these unknown causative agents which was consistent with the study.<sup>12</sup>

Patients came with co morbid condition like diabetes about 38 cases which was found quite low percentage 10.52%.<sup>10,12,13</sup> In diabetic patients literature suggests that polymorphonuclear leukocyte function is reduced, increase ability of microorganism to adhere cell, decrease host's immune function, increase vascular complication. Other systemic diseases were anemia 3.92%, liver diseases 5.88%, malignancy 9.80% and pregnancy 5.88%.<sup>10,14</sup>

Common symptoms were pain 100%, neck swelling 96%, fever 96%, dysphagia 93%, trismus 46%. Although the frequency of dyspnea is not common than other symptoms, the presence of dyspnea may be a sign of serious complications.<sup>12,13</sup>

In our study duration of hospital stay ranged from 1 to 59 days with a mean stay 13±6.7

days . The patient with DM, complications, tracheostomies tented to have a longer hospital stay.<sup>10,12</sup>

In our study submandibular space 41.30% was commonly affected. Ludwig's angina was found

among 18.66% patients. Differ from the study Pretracheal space was the most important space and this space was affected by infection among 13.3% patients. Together these three spaces submandibular, Ludwig's angina and pretracheal space covered about 74% of neck space infections.<sup>10,13</sup>

In our study fifty five patients had complications and some individual patients had multiple complications. This was similar with the study in which 42 patients developed complications among 131 patients.<sup>14</sup> Forty patients out of 55 patients had upper airway complications. Of them 17 patient received tracheostomies. Other complications include skin defect 9.09%, necrotizing fasciitis 7.27%, mediastinitis 3.64%, marginal mandibular nerve palsy 3.64%, septicemia 1.82%, and osteomyelitis 1.82%. These result nearly consistent with the study.<sup>10</sup> This study showed 19 patients developed upper airway obstruction, 18 received tracheostomies out of 30 complications.<sup>10</sup> Another study showed 7 patients develop complications, among them 6 patients develop upper airway distress. All 6 patients underwent a temporary tracheostomy. These were consistent with our study.<sup>14</sup>

In Our study 67.33% patients were recovered followed by died 11.3%, received tracheostomy 11.3%, disfiguration of face 7.90%, skin grafting 4.7% and not recovered 2% due to malignancy and DM. Mortality rate was consistent with the study. The most common organism cultured was streptococcus 51.34% followed by Staphylococcus 18.60%, Klebsiella 9.68%,

Multi organism 7.48%, and *Pseudomonas* 8.06%. This result showed consistence with the result.<sup>10,12,13</sup>

The treatment of deep neck space infection consists of securing airway, using antibiotic, tooth extraction & surgical drainage of the abscesses. It is evidence that control of DM is important for control of infection.<sup>10,12,13</sup> In our study we have done surgical drainage in 130(86%) patients and tooth extraction in 78(525) patients. Antibiotics used in 100% patients as empirical therapy which was consistent with the study.<sup>12,13</sup> Antibiotics changes according to culture and sensitivity report. In addition to antibiotics supportive medical treatment was provided in the form of intravenous fluid, antipyretics, analgesics and mouth wash. Even intravenous steroids were used in some of patient having dyspnea. DM with neck abscess treated with anti diabetic drugs.

Special attention was given to airway management when patients presenting with trismus or signs of upper airway obstruction, particularly in Ludwig's angina. A tracheal intubation with rigid laryngoscopy may be difficult in these patients due to possibility of distortion in the airway anatomy, tissue rigidity, and a limited access to the mouth. Tracheostomy must always be considered as gold standard when there is respiratory difficulty. Sometimes attempting intubation can worsen an already damaged airway.

#### Conclusion:

To find out the "Complications of Neck Space Infection and its management" within a short period of time, 150 neck space infections were enrolled in the study with male predominant. Out of 150 patients 55 had different complications and among them 40 had airway complications. About 11.33% patients died and 11.33% patients needed tracheostomy. Odontogenic infection was the most common

cause and DM was the most common risk factor. Submandibular space most commonly affected space. Most of them due to dental caries. Most of Ludwig's angina cause life threatening complication. So Proper diagnosis and prompt management can effectively overcome the disease and reduce the severity and rate of development of complication. Clinicians must have knowledge about the presentation, common sites of infection, etiology, proper diagnostic workups and employment of appropriate medical and/or surgical management. The main purpose of our study was to share our experience, particularly in common sites involved, complications and management.

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