

Study of Deep Space Neck Abscess

¹Dr. Muhammad Mozammel Haque
Registrar, Dept. of ENT & Head
Neck Surgery, Dhaka Medical
College Hospital, Dhaka.

²Dr. A.B.M. Luthful Kabir
Assistant Professor, Dept. of ENT &
Head Neck Surgery, Abdul Malek
Ukil Medical College, Dhaka

³Dr. Mostafa Kamal Arefin
Indoor Medical Officer, Dept. of
ENT & Head Neck Surgery, Dhaka
Medical College Hospital, Dhaka

⁴Dr. Md. Shahriar Islam
Registrar, Dept. of ENT & Head
Neck Surgery, Sir Salimullah
Medical College & Mitford Hospital,
Dhaka

⁵Dr. Rashedul Islam
Medical Officer, National Institute of
ENT, Tejgaon, Dhaka

⁶Md. Azizul Hoque Manik
Indoor Medical Officer, Dept. of
ENT & Head Neck Surgery, Sylhet
MAG Osmani Medical College
Hospital, Dhaka

⁷Dr. Syed Sanaul Islam
Assistant Professor, Dept. of ENT & Head Neck Surgery,
Dhaka Medical College Hospital, Dhaka

⁸Dr. Mohammad Shaharior Arafat Shawrave
Assistant Professor, Dept. of ENT & Head Neck Surgery,
Shahid Ziaur Rahman Medical College & Hospital, Bogura

⁹Dr. Muhammad Nazrul Islam
Associate Professor, Dept. of ENT & Head Neck Surgery,
Diabetic Association Medical College, Faridpur

¹⁰Dr. Shaikh Nurul Fattah Rumi
Professor & Head, Dept. of ENT & Head Neck Surgery,
Dhaka Medical College Hospital, Dhaka.

Abstract:

➤ Objective:

To evaluate the frequency and presentation of different type of deep neck abscess.

➤ Materials and Methods:

This was a cross sectional study which was carried out in the departments of ENT and Head-Neck surgery Dhaka Medical College Hospital during the period of September, 2019 to 29th February, 2020. A Total 72 patients were selected according to selection criteria patient was interviewed, examined and investigated during admission and postoperatively. Pus was collected and examined microbiologically. All the information and data was recorded and analyzed by a standard statistical method.

➤ Results:

Age ranges 6-71 years with a mean age 34.82 ± 14.33 year, 47(65%) male and 25(35%) female. Maximum numbers of patient (47, 65.29%) were within 21 to 50 years age group. 55(76.39%) patients were from rural and 17(23.61%) were from urban community. 38(52.78%) patient were from low socioeconomic groups. The most common presenting symptom was neck swelling (76.39%). Fever was present in 45.83% cases, neck pain 43.06%, dysphagia 25%, dysphonia 23.61%, Odynophagia 19.44% and Trismus 15.27%. The most commonly encountered site was the submandibular space. The common aetiology were Odontogenic infection (48.61%), Cervical tuberculosis (26.39%), pharyngo-tonsillitis (15.29%), URTI (12.5%) and others. Diabetes mellitus was diagnosed in 45.83% of cases, where complications occurred in 93.33%. The major complications of were airway obstruction (13.89%), neck skin loss (20.83%) and generalized septicemia (9.72%).

➤ Conclusion:

Deep neck abscess is more common in patients of poor socioeconomic class and rural habitat. Bad oral hygiene, odontogenic infections and upper respiratory tract infections are important etiological factor. DM may be a precipitating factor in deep neck abscesses. So, Proper dental and oral care, control of diabetes mellitus and early intervention will reduce the morbidity and mortality.

Keywords:- Deep Neck Abscesses, Risk Factor.

I. INTRODUCTION

Deep neck abscesses are defined as collections of pus contained within the fascial planes and spaces of the head and neck. The common deep neck abscesses are submandibular abscess, retropharyngeal abscess, parapharyngeal abscess, peritonsillar abscess, Ludwig's angina, parotid abscess and tubercular abscess (cold abscess).^{1,2,3,4} Deep neck infections are less frequent today than in the past⁵. With improved diagnostic techniques, widespread availability of antibiotics and early surgical intervention today, the mortality rate has decreased significantly.^{1,3} Improved dental care has also played a significant role.⁵ Delays in diagnosis and treatment as well as immunosuppression may lead to life-threatening complications.^{1,6} Large deep neck abscess could press on the others structures in the neck, such as the throat, larynx and trachea, lead to problems in swallowing and breathing. Inappropriate use of antibiotics may change the clinical presentation and course of these infections, making them more elusive and less predictable.¹

Most of the deep neck abscesses are caused by odontogenic and upper airway infections.^{1,3} Other common causes are acute tonsillitis, pharyngitis, salivary gland infection, foreign body in digestive tract, surgical

procedures in aerodigestive tract, cervical lymphadenitis, infected thyroglossal cyst & brachial cyst, skin furuncle and necrotizing fasciitis.^{1,3,4} Today, tonsillitis remains the most etiology in children, but in adults the oral hygiene and drugs abuses are the main contributing factors.⁷ Low socioeconomic condition is also a leading factor for deep neck abscess.⁸ Usually deep neck abscesses are present with neck swelling, fever and neck pain.^{1,3} Other presentations are dysphonia, odynophagia, trismus and pain in the tongue base.⁴

Despite their lower frequency, deep neck infections are associated with significant morbidity and mortality rates as well as serious potential complications, such as airway obstruction, jugular vein thrombosis, carotid artery aneurysm or rupture, descending necrotizing mediastinitis and sepsis.^{1,9} Infection of the ears, nose, or throat may spread to deep neck spaces by direct continuity or by lymphatic drainage to lymph nodes in these spaces. The facial layers of the neck and natural defense mechanisms help to prevent spread of these infections.¹⁰ However, if the infection is not adequately treated, a severe lymphadenitis in the lymph nodes draining the primary infection site or cellulitis in the soft tissues may progress to a purulent fluid collection called abscess. Abscesses of the neck may involve many spaces simultaneously through the potential facial pathways of the neck.⁶ In cases of tubercular neck abscess, discharging sinus may occur.

For centuries, the diagnosis and treatment of deep neck space infections have challenged physicians and surgeons. The complexity and the deep location of this region make diagnosis and treatment of infections in this area difficult, many clinicians are unfamiliar with these conditions.¹⁰ These infections remain an important health problem with significant risks of morbidity and mortality.⁶

There is no accurate estimate of the frequency of deep neck space infections in this country or worldwide presently exists. However, to assume that the incidence of infection in our country is significantly higher than that of countries in which patients do benefit from early medical intervention is reasonable. Deep neck abscess is not uncommon in our country due to bad housing, poor oral hygiene, malnutrition, lack of health education and treatment. But in developing countries particularly in south-east Asia, tuberculosis is a major public health problem.¹¹

To evaluate the frequency and presentation of different type of deep neck abscess, this cross sectional observation type of study will be conducted among the patient with various neck abscesses in different hospitals of Dhaka within limited period.

➤ Objectives

General objective: To evaluate the frequency and presentation of different type of deep neck abscess.

Specific objectives:

- To see the frequency of different deep neck abscess among the risk group.
- To observe the management of different deep neck abscess.

➤ Methods and Study design:

Study type: Cross sectional study

Study place: Dhaka Medical College Hospital (DMCH).

Study duration: 06 Months from 1st September, 2019 to 29th February, 2020.

Study population: All patients with neck abscess.

Study sample: After fulfilling certain inclusion criteria all the patient with different

Types of deep neck abscesses admitted in the department of

ENT and Head-Neck surgery of DMCH at Dhaka.

Sample size: Samples were collected within 6 months study period. For better statistical analysis maximum number of samples tried been taken.

Sampling method: Purposive.

➤ Inclusion criteria:

- All patients with various types of deep neck abscess.
- Both the Sex.
- All age patient.

➤ Exclusion criteria:

- Patient who refused to include in this study.
- Superficial neck abscess e.g. subcutaneous abscesses.
- Patient who had neck swelling other than abscess, e.g. haematoma, Oedema, necrotizing metastatic neck mass.

II. METHODS

Consecutive all admitted patient with neck abscess in the department of ENT and Head-Neck surgery in the selected tertiary hospital, i.e. Dhaka Medical College Hospital in Dhaka within the study period of 6 months were selected. With proper ethical consideration after taking an informed consent all the selected patient were interviewed, examined and investigated during admission and postoperatively. Pus were collected and examined microbiologically. All the information and data were recorded and compiled in a structured data sheet. All the data were analyzed by a slandered statistical methods and computer software (SPSS, Sigma Stat-3.2).

➤ Data Processing and Statistical Analysis

Collected data were coded, kept confidential and processed and analyzed using computer software SPSS. The test statistics used for analysis of data were Z-test (for comparison of data presented in quantitative scale) and Chi-square Test or Fisher's Exact Test (for comparison of data presented in categorical scale). For analytical test the level of significance was considered when the p-value of statistical test < 0.05.

III. OBSERVATION AND RESULTS

Age(Years)	Male	%	Female	%	Total	%
<10	2	4.26	1	4	3	4.17
10-20	5	10.64	4	16	9	12.50
21-30	7	14.89	8	32	15	20.83
31-40	10	21.28	6	24	16	22.22
41-50	12	25.53	4	16	16	22.22
>50	11	23.40	2	8	13	18.06
Total	47	100	25	100	72	100
Mean Age	37.43± 14.69		29.92 ± 12.47		34.82 ± 14.33	

Table 1:- Age and Sex Distribution of the patient (n=72)

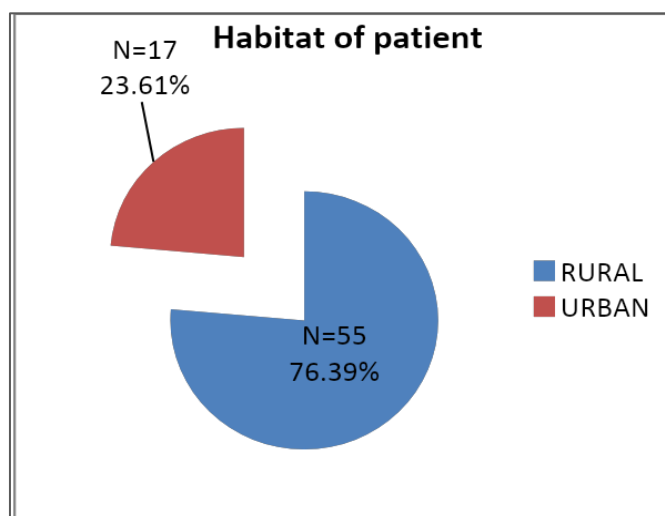


Fig 1:- Habitation of the patient with deep neck abscesses.

Socioeconomic class	Male	%	Female	%	Total	%
Lower	26	55.32	12	48	38	52.78
Middle	13	27.66	9	36	22	30.56
Upper class	8	17.02	4	16	12	16.67
Total	47	100	25	100	72	100

Table 2:- Distribution of Socioeconomic classes of the patient (n=72)

Most of patients (52.78%) were belonged to lower socioeconomic class which is not significant.(p = 0.761).

Abscess	Male	%	Female	%	Total	%
Retropharyngeal abscess	7	9.72	3	4.17	10	13.89
Peritonsillar abscess	3	4.17	3	4.17	6	8.33
Parapharyngeal abscess	2	2.78	3	4.17	5	6.94
Submandibular abscess	22	30.55	6	8.33	28	38.89
Parotid abscess	2	2.78	2	2.78	4	5.55
Tubercular abscess	11	15.27	8	11.11	19	26.39
Total	47	65.28	25	34.72	72	100

Table 3:- Distribution of different type of Neck Abscess (n=72)

Submandibular abscess were most common type of neck abscess (38.89%) followed by Tubercular neck abscess (26.39%).

Aetiology	No	%
Odontogenic infection	35	48.61
Pharyngitis Tonsillitis	11	15.29
URTI	9	12.5
Mastoid & ear infection	3	4.17
Parotid infection	4	5.56
Oral & pharyngeal surgery	3	4.17
FB impaction	5	6.94
Congenital neck diseases	1	1.39
Cervical tuberculosis	19	26.39
Unknown	10	13.89

Table 4:- Different aetiology of Deep Neck Abscess (n=72)

Most common causes are odontogenic infection, cervical tuberculosis, pharyngotonsillitis, upper respiratory tract infection, foreign body etc.

Risk factors	No	%
Diabetes mellitus	33	45.83
Renal diseases	4	5.56
Malnutrition	8	11.11
Steroid & Cytotoxic drugs	3	4.17
Radiotherapy	4	5.56
Head-Neck neoplasia	5	6.94
Others	3	4.17

Table 5:- Different Risk factors of Neck Abscess (n=72)

The most common risk factor which may contribute the deep neck abscess was Diabetes mellitus (45.83%).

Presentation	No	%
Fever	33	45.83
Neck pain	31	43.06
Odynophagia	14	19.44
Dysphagia	18	25
Neck Swelling	55	76.39
Dysphonia	17	23.61
Sialorrhoea	9	12.5
Tongue base pain	8	11.11
Trismus	11	15.27
Others	9	12.5

Table 6:- Presentation of Deep Neck Abscess (n=72)

The common presenting features of the neck abscess were Neck swelling (76.39%), fever (45.83%), neck pain (43.06%).

Complication	No	%
Airway obstruction	10	13.89
Neck skin loss	15	20.83
Sepsis	7	9.72
Mediastinitis	4	5.56
Pneumonia	6	8.33
Osteomyelitis	5	6.94
Acute MI	2	2.78

Table 7:- Complications of Deep Neck Abscess (n=72)

The common presenting complications were the skin loss(20.83%) and Airway obstruction (13.89%),

	No	%	Complications	%
Diabetes	33	45.83	31	93.93
No-diabetic	39	54.17	15	38.46
Total	72	100	46	63.89

Table 8:- Relation between Diabetic and Non diabetic Patient with complication (n=72)

Complication of neck abscess was significantly related with diabetes. ($p = 0.011$)

IV. DISCUSSION

Seventy two patients of deep neck abscess were included in this study. All cases were attending in otolaryngology and head-neck surgery department of DMCH & BSMMU for six months (1st September 2011 to 29th February 2012). The result of this study is likely to be a reflection of certain facts regarding deep neck abscess in our country and abroad.

In this study male patients were dominant. Among 72 patients 47(65%) male and 25(35%) female (M:F:1.88:1). In different study in this country and abroad regarding different neck infections and abscess also shown the male dominancy, e.g. in Singapore among 131 patients of neck abscess 64.9% were male & 35.1% female¹, in Malaysia among 36 patients, 61% were male and 39% were female.² 72% patients were male in a study (2008) on Dhaka¹² but in Sweden, male & female were equally (50%) affected.⁴ In maximum series male were dominant because of poor personal & dental hygiene, smoking and occupational factor.

The patients of this series were of different age group. The age range of the patients was 7 years to 61 years. The average age is 34.82 years. Mean age of male were 37.43 ± 14.69 and female were 29.92 ± 12.47 . Maximum numbers of patient (47, 65.29%) were within 21 to 50 years age group. The average age was nearly consistent with a study in Malaysia on 2006 was also 34 years.³ Study (2004) in Sweden on 72 patients and had an average age of 45 years.⁴

Majority of patients 38(52.78%) were from low socioeconomic groups. Study in India (2009) also showed deep neck infection were predominant in low socioeconomic conditions⁸. 55(76.39%) patients were from rural and 22(30.56%) were from urban community. These were many due to be the fact that most people of our country live in rural area and their socioeconomic condition, oral hygiene and nutritional status was not good. They did not seek proper medical care in the early stage of disease due to poverty and facilities especially specialist services are lacking in rural area.

Regarding type of deep neck abscess submandibular abscess were in 28 (38.89%), tubercular neck abscess were in 19 (26.39%), retropharyngeal abscess 10 (13.89%), peritonsillar abscess 6(8.33%), parapharyngeal abscess in 5(6.94%) and parotid abscess were in 4 (5.55%). In different study regarding different neck infections and abscess also shown the similar space involvement, the

parapharyngeal space (23.7%), submandibular space (19.1%) spaces were mostly involved in Singapore.¹ Study in Taiwan (2004) was showed submandibular space involvement 48.3%, parapharyngeal space 21.1%, other sites were carotid, retropharyngeal, anterior cervical, posterior cervical, parotid, prevertebral, masticatory, and pretracheal space.¹³ Odontogenic infections were the most common cause which spread to submandibular and parapharyngeal space, upper airway infection also responsible for parapharyngeal space involvement¹. In south-east Asia tuberculosis is a major public health problem and cervical neck abscess usually found in anterior and posterior triangle.

Clinical presentations of the patients were variable. Most patients presented with multiple complaints. Neck swelling (76.39%), fever (45.83%) and neck pain (43.06%) were the commonest presentations. Next the common was dysphagia (25%), dysphonia (23.61%), Odynophagia (19.44%), trismus (15.27%) and tongue base pain (11.11%). A study² in USA (2002) showed neck abscesses were presented with neck mass 92%; fever 60%; and dysphagia or poor intake by mouth 36%. Study in Malaysia³ (2006) and in Sweden⁴ (2004); both showed the commonest symptoms were pain, swelling, fever and trismus. It's simple that an abscess can present with swelling, fever and pain following an inflammatory condition. Anatomy of neck is very close to upper aerodigestive region, so any neck abscess may compress surrounding structure and odynophagia, dysphonia, trismus and airway compromise are also common presenting symptoms.

The common aetiology of neck abscess was odontogenic infection (48.61%), cervical tuberculosis (26.39%), pharyngotonsillitis (15.29%), upper airway infections (12.50%) and others. Study in Singapore (2011) showed Odontogenic infections accounted for 75.0%¹, in Taiwan¹³ (2004) it was 52.2% but a study in Malaysia³ (2005) found 69% unknown cause, in Turkey (2011)⁶ showed first cause was pharyngo-tonsillitis and second was dental origin. Study in Sweden (2004) found leading cause were dental origin (49%) and sialoadenitis/sialothiasis (21%).⁴ Poor dental hygiene is the main cause of this infection and it is the main responsible for submandibular abscess(Ludwig's angina). Tuberculosis is also common in south east Asia¹² as well in this country that may cause tubercular neck abscess. Upper respiratory tract infections, nose and ear infections, tonsillitis have lymphatic spread to the neck also causes neck abscess.⁶

There were wide range of risk factors associated with the deep neck abscess, e.g. diabetes mellitus (45.83%), malnutrition(11.11%), head-neck neoplasia (6.94%), renal diseases and radiotherapy (5.56%) and other immuno compromised condition 6(8.33%). In Singapore (2011), 45.0% had underlying systemic disease or were on immunosuppressive therapy and the most common systemic disease was diabetes mellitus (91.5%).¹ In Taiwan (2004), 88.9% systemic disease was diabetes mellitus, 9.5% with uremia or chronic renal insufficiency¹³. in Sweden⁴ (2004) the risk factors were hepatitis, DM, steroid & cytotoxic drugs, alcoholism, renal failure and head neck neoplasm. DM is the most common associated systemic disease; the same was found in Malaysia (2006) was 33%. The diabetic patients tended to be older and a higher risk of developing complications.¹

The presenting complications of those patients were airway obstruction (13.89%), neck skin loss (20.83%), generalized septicemia (9.72%), pneumonia (8.33%), osteomyelitis (6.94%) and mediastinitis (5.56%). The same was found in Singapore¹ (2011) were airway obstruction 14.2%, skin defect 6.1%, sepsis 5.3%, IJV thrombosis 5.3%, facial palsy 1.5% and in Taiwan¹³ were airway obstruction 10.3%, mediastinitis 2.7%, sepsis 2.2%, pneumonia 1.6%, skin defect 1.1%. In Turkey⁷ (2011) and in Saudi Arabia¹⁰ (1996) both of these study showed same complications such as airway obstruction, jugular vein thrombosis, mediastinitis, pncarditis, empyema, sepsis, carotid artery rupture. Deep neck abscesses are serious and potentially life threatening infection. The frequency of complication of neck abscess were more common among the diabetic patient (93.93%) than non diabetic patient (38.46%). Early diagnosis, parental antibiotics and surgical intervention will reduce the complications.

V. CONCLUSION

From this study it can be concluded that -

- Male are more affected by deep neck abscess;
- Most of the patients are poor socioeconomic class and rural habitat;
- Bad oral hygiene, odontogenic infections and upper respiratory tract infections are important etiological factor;
- The high prevalence rate of DM indicates that DM may be a precipitating factor in deep neck abscesses;
- Majority of patient presented with neck swelling, fever, neck pain and upper airway compromise;
- Proper dental and oral care, control of diabetes mellitus and early intervention can reduce the morbidity and mortality.

REFERENCES

- [1]. Lee Y.Q, Kanagalingam J. 2011. Deep neck abscesses: the Singapore experience. *Eur Arch Otorhinolaryngol.*268:609–614
- [2]. Cmejrek, R.C., Coticchia, J.M., Arnold, J.E. 2002. Presentation, Diagnosis, and Management of Deep-Neck Abscesses in Infants. *Arch Otolaryngol Head Neck Surg.* 128:1361-1364
- [3]. Mazita, A., Hazim, M.Y.S., Shiraz, M.A.R., Putra, S.H.A.P. 2006. Neck Abscess: Five Year Retrospective Review of Hospital University Kebangsaan Malaysia Experience. *Med J Malaysia.* Vol 61 No 2
- [4]. Stalfors J, Adielsson A, Ebenfelt A, Nethander G, Westin T. 2004. Deep neck space infections remain a surgical challenge. A study of 72 patients. *Acta Otolaryngol,* 124:1191-1196
- [5]. Bottin, R., Marioni, G., Rinaldi, R., Boninsegna, M., Salvadori, L., Staffieri, A. 2003. Deep neck infection: a present-day complication. A retrospective review of 83 cases (1998-2001). *Eur Arch Otorhinolaryngol.* 260(10):576-9
- [6]. Songu, M., Demiray, U., Adibelli, Z.H., Adibelli, H. 2011. Bilateral deep neck space infection in the paediatric age group: a case report and review of the literature. *ACTA otorhinolaryngologica italic.* 31:11
- [7]. Nikakhlagh S, Rahim F, Saki G, Khosrav A, Rekabi, H, Saki, N. 2010. Deep Neck Infections: A Case Study of 12-Year. *Asian Journal of Biological Sciences.*3:128-133.
- [8]. Agarwal A K, Sethi A, Sethi D, Mrig S, Chopra S, 2007. Role of socioeconomic factors in deep neck abscess: A prospective study of 120 patients. *Br J Oral Maxillofac Surg.* 45(7):553-5.
- [9]. Foroulis CN, Sileli MN 2011. Descending Necrotizing Mediastinitis: Review of the Literature and Controversies in Management. *The Open Surgery Journal.* 5,12-18
- [10]. Sayed Y E, Dousary S A, 1996. Deep-Neck Space Abscesses. *The Journal of Otolaryngology.* Volume 25, Number 4.
- [11]. Pahwa R, Hedau S, Jain S, Jain N, Arora VM, Kumar N, Das BC. 2005. Assessment of possible tuberculous lymphadenopathy by PCR compared to non-molecular methods. *Journal of Medical Microbiology.* 54,873-878.
- [12]. Fakir, M, A, Y., et all. 2008. Ludwig's Angina: a study of 50 cases. *Bangladesh J of Otorhinolaryngology ;* 14(2) : 51-56
- [13]. Huang TT, Liu TC, Chen PR, Tseng FY, Yeh TH, Chen YS. 2004. Deep neck infection: analysis of 185 cases. Published online in Wiley InterScience (www.interscience.wiley.com).