

Original Article

Clinico-Pathological Study of Neck Abscess in Diabetic Patients

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**ABSTRACT**

Introduction: To study about the correlation between clinical and pathological features of neck abscess in diabetic patients.

Methods & Materials: Non-randomized, prospective, cross sectional, observational study was carried out at Department of Otolaryngology of Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh from April, 2018 to September, 2018. Total 50 cases of diabetic patients having neck abscess were selected by purposive sampling. Then history taking, clinical examinations, relevant investigations along with antibiogram were done in all cases. Afterwards data were collected by the preformed data collection sheet. Then data were recorded, compiled, edited and analyzed. **Results:** Out of 50 diabetic patients Dysphagia 33(66%) was the commonest symptom. Other symptoms were fever 24(48%), neck swelling 15(30%), neck pain 15(30%), toothache 10(20%) and

respiratory difficulty 8(16%). On clinical examination commonly 40(80%) patient had neck swelling which was subsequently followed by oropharyngeal swelling 32(64%) and trismus 10(20%). About 23(46%), 16(32%), 8(16%) and 3(6%) developed neck abscess in submandibular space, parapharyngeal space, retropharyngeal space and parotid space respectively. Bacteria isolated from pus culture revealed Peptostreptococcus 4(8%) as common anaerobes followed by Bacteroids 1(2%). Common aerobic organisms include Klebsiella pneumoniae 25(50%) followed by Streptococci viridans 6(12%), Staphylococcus aureus 5(10%) and Pseudomonas 4(8%). **Conclusion:** Neck abscess in diabetic patients occurred commonly in male with lower socio-economic class. Dysphagia and neck swelling were the commonest symptom and sign respectively. In diabetic patients neck abscess

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occurred commonly in submandibular space. *Klebsiella pneumoniae* was the commonest aerobic organism whereas *Peptostreptococcus* was the frequent anaerobe.

Keywords: Neck Abscess, Diabetic Patients, Neck Swelling

INTRODUCTION

The burden of diabetes is now increasing very rapidly and with it the diabetic related complications are also in rise^[1]. Infections in diabetes mellitus are relatively more common and serious. Among them neck abscess is also a common condition^[1]. Diabetic patients run the risk of acute metabolic decompensation during infections, and conversely patients with metabolic decompensation are at higher risk of certain invasive infections. Infections in diabetic patients result in extended hospital stays and additional financial burden. The incidence of deep neck abscesses is higher in the pre-antibiotic era but remains as an important problem in third world countries leading to morbidity and mortality. In that era, 70% was coming from the infection deployment from the pharynx and tonsils whereas today they are mostly caused by dental infections. Although infection were encountered more frequently in that time and were associated with poor oral hygiene, they can still cause significant morbidity and mortality despite the present administration of antibiotics and the improvement of modern dental care. A deep neck abscess can lead into serious fatal complications such as airway obstruction, pneumonia, lung abscess, mediastinitis, pericarditis. Fatal pyothorax, due to secondary involvement of pleura following mediastinitis in a case of massive acute

retropharyngeal abscess, has also been reported^[2]. Complications like cavernous sinus thrombosis have been reported in patients with parapharyngeal abscess^[2]. Further spread of infection into the mediastinum can occur via the carotid sheath (Lincoln Highway)^[3]. If the predisposing factors of complicated deep neck infections are identified, appropriate treatment can be provided as soon as possible in order to prevent the complications. In recent years, several reports have described changing trends in Deep neck space abscess over time. Differences in incidence, age at presentation, sex, anatomical location are commonly noted. Common organisms of neck abscess include *Staphylococcus aureus*, *Streptococcus*, *Klebsiella*, *Pseudomonas*, *E. coli* etc. The most crucial issue is perhaps increasing microbial resistance. To get an effective antibiotic against the patient, it is necessary to do culture and sensitivity of pus. Treatment of all these diabetes associated head and neck infections is quite challenging and many a times patient need long term hospitalisation for anti-microbial therapy and better glycemic control. Such long term hospitalisation incurs greater treatment cost and increased absence from work place which in turn causes huge financial burden to the family. Nevertheless if a prompt diagnosis of a major life threatening infection is made at an earlier stage, one can avoid the onset of

major complication which in turn can reduce overall morbidity and mortality.

METHODS & MATERIALS

Study design: Non-randomized, prospective, cross sectional, observational study.

Place of study: Department of Otolaryngology, Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh.

Period of study: April, 2018 to September, 2018.

Study population: This study is designed to be conducted among admitted patients of Department of Otolaryngology, Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh.

Sample size: Sample size and statistical basis of it. The sample size determination by the formula $n = Z^2pq/d^2$. Due to time constrain sample size could not be the same as the equation. So, we take 50 patients who were diagnosed and treated for deep neck abscess among diabetic patients in Department of Otolaryngology in Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh. Procedures of preparing and organizing materials: At first the patients were enrolled in the study by purposive sampling. A data collection sheet and a consent form have been prepared. Sample was finalized on the basis of inclusion and exclusion criteria. The data collection sheet was pre-structured, interview based, peer reviewed and continuously changeable throughout the advancement of the study. The patients were stated regarding the study. Informed written consent was taken. The patients were assessed biochemically

due to diabetic conditions. As a result, FBS with 2HABF and HbA_{1c} was done. After proper clinical evaluation like history taking and proper clinical examinations more relevant investigations like CBC, Serum creatinine, local part x-ray was done.

Abscesses due to infection of external neck wounds, and abscesses in relation to mastoid and facial bone fractures were excluded from this study. Only clinically confirmed cases of abscesses were included in the study. Needle aspiration was done in all cases to confirm the abscess, and incision and drainage was done at the earliest stage. Pus was sent for culture and sensitivity analysis prior to the start of antibiotic treatment. Empirical antibiotic was started if considered emergency. The antibiotics were modified, based on culture sensitivity reports or clinical unresponsiveness. Supportive therapy, in the form of intravenous fluids, analgesics, antipyretics, antiemetics, mouthwashes, etc., was given. All patients were kept under observation for impending or manifest respiratory distress. Tracheostomy was done if emergency situation demands. Radiology and dental referrals were sought in appropriate cases. All results were compiled and analyzed by using SPSS 23 and expressed in tables or figures.

Procedures of data analysis and interpretation: All data were checked and edited after collection. Chart by spreadsheet of Windows 7. Frequency distribution and normal distribution of all continuous variables were calculated.

Cross tabulation was prepared and a comparison was made between the respondents from different age, sex, economic and smoking status etc. Chi-square analysis: SPSS version 23. 'P' values <0.05 was considered as statistically significant. CI was 95%.

RESULTS

Table I shows that out of 50 patients the highest 21(42%) belonged to age group 31- 40 years which was subsequently followed by 13(26%) patients in age group 41-50 years. The mean age of the patients was 37.83 ± 7.16 years and age range: 26-68 years. Shows that out of 50 patients 36(72%) and 14(28%) were male and female respectively. The male to female ratio was 2.57:1. Out of 50 patients the highest 31(62%) belonged to lower income class group which was subsequently followed by middle income class group 12(24%).

Table - I: Age Distribution of Patients (inclusive) $n=50$

Age group	Frequency (%)
≤30	6(12)
31 - 40	21(42)
41 - 50	13(26)
51 - 60	4(8)
>60	6(12)
Sex	
Male	36(72)

Female	14(28)
Economic class	
Lower income class	31(62)
Middle income class	12(24)
Higher income class	7(14)

Table II shows that dysphagia 33(66%) is the commonest symptom which was followed by fever 24(48%). Shows that commonly 40(80%) patients had neck swelling discovered by clinical examination which was subsequently followed by oropharyngeal swelling 32(64%).

Table - II: Distribution of Patients According to Symptoms and Clinical Features ($n=50$)

Symptoms	$n(\%)$
Dysphagia	33(66)
Fever	24(48)
Neck pain	15(30)
Neck swelling	15(30)
Toothache	10(20)
Respiratory difficulty	8(16)
Clinical features	
Neck swelling	40(80)
Oropharyngeal swelling	32(64)
Raised temperature	24(48)
Trismus	10(20)
Dental caries	10(20)

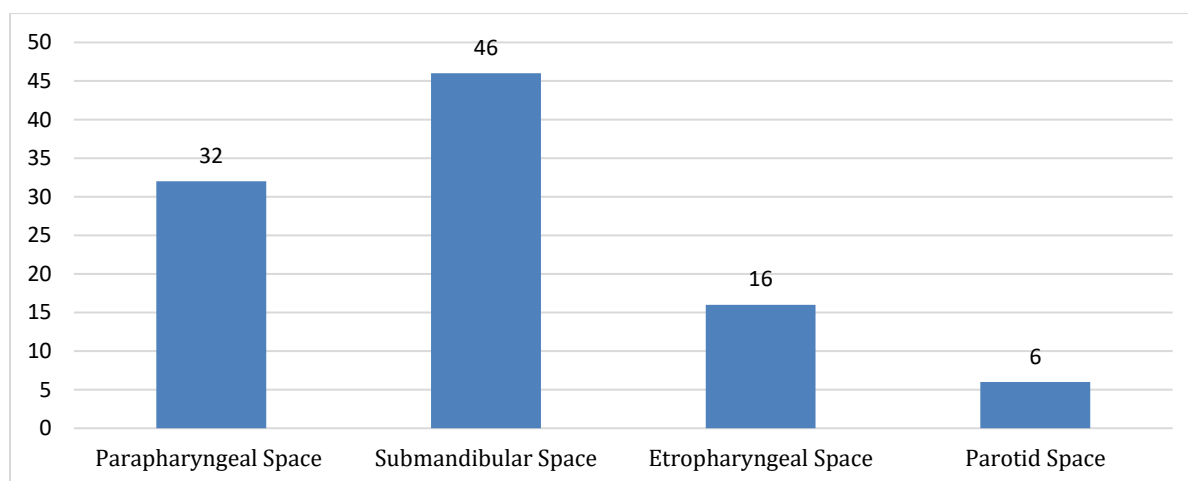


Figure - 1: Distribution of Patients According to Anatomical Location of Abscess (n=50)

Figure 1 shows that out of 50 patients most commonly 23(46%) patients developed neck abscess in submandibular space. Then it was followed by 16(32%) patients in parapharyngeal space.

Table III shows that among the 50 cases most common aerobe was Klebsiella pneumoniae 25(50%) and common anaerobe was Peptostreptococcus 4(8%) in neck abscess of submandibular space.

Table - III: Distribution of Patients According to Isolated Bacteria from Pus Culture in Submandibular Space (n=50)

Bacteria isolated	Frequency n(%)
Aerobes	
Klebsiella pneumoniae	25(50)
Streptococci viridans	6(12)
Staphylococcus aureus	5(10)
Pseudomonas	4(8)
Enterococcus	2(4)
β-hemolytic streptococci	1(2)
Streptococcus pneumoniae	1(2)
Escherichia coli	1(2)
Anaerobes	
Peptostreptococcus	4(8)
Bacteroides	1(2)

Table IV shows that among the 50 cases most common aerobe was Klebsiella pneumoniae 26(52%) and common anaerobe was Peptostreptococcus 5(10%) in neck abscess of retropharyngeal space.

Table – IV: Distribution of Patients According to Isolated Bacteria from Pus Culture in Retropharyngeal Space (n=50)

Bacteria isolated	Frequency n(%)
Aerobes	
Klebsiella pneumoniae	26(52)
Pseudomonas	5(10)
Streptococci viridans	5(10)
Staphylococcus aureus	4(8)
β-hemolytic streptococci	1(2)
Streptococcus pneumoniae	1(2)
Escherichia coli	1(2)
Enterococcus	1(2)
Anaerobes	-
Peptostreptococcus	5(10)
Bacteroides	1(2)

Table V shows that among the 50 cases most common aerobe was Klebsiella pneumoniae 24(48%) and common

anaerobe was Peptostreptococcus 3(6%) in neck abscess of parapharyngeal space.

Table – V: Distribution of Patients According to Isolated Bacteria from Pus Culture in Parapharyngeal Space (n=50)

Bacteria isolated	Frequency n(%)
Aerobes	
Klebsiella pneumoniae	24(48)
Streptococci viridans	7(14)
Staphylococcus aureus	6(12)
Enterococcus	3(4)
Pseudomonas	3(6)
β-hemolytic streptococci	1(2)
Streptococcus pneumoniae	1(2)
Escherichia coli	1(2)
Anaerobes	-
Peptostreptococcus	3(6)
Bacteroides	1(2)

Table VI shows that among the 50 cases most common aerobe was Klebsiella pneumoniae 25(50%) and common

anaerobe was Peptostreptococcus 4(8%) in neck abscess of parotid space.

Table – VI: Distribution of Patients According to Isolated Bacteria from Pus Culture in Parotid Space (n=50)

Bacteria isolated	Frequency n(%)
Aerobes	
Klebsiella pneumoniae	25(50)
Streptococci viridans	6(12)
Staphylococcus aureus	5(10)
Pseudomonas	4(8)
Enterococcus	2(4)
β-hemolytic streptococci	1(2)
Streptococcus pneumoniae	1(2)
Escherichia coli	1(2)
Anaerobes	-
Peptostreptococcus	4(8)
Bacteroides	1(2)

Table VII shows that among the 50 cases in an average most common isolated bacteria from pus culture in

submandibular space was Klebsiella pneumoniae 25(50%) in neck abscess of diabetic patients.

Table – VII: Correlation of Different Neck Abscess in Diabetic Patients with Isolated Bacteria from Pus Culture (n=50)

Type of Abscess	Common Bacteria isolated	Frequency n(%)
1. Submandibular	Klebsiella pneumoniae	25(50)
	Streptococci viridans	6(12)
	Staphylococcus aureus	5(10)
2. Parapharyngeal	Klebsiella pneumoniae	24(48)
	Streptococci viridans	7(14)
	Staphylococcus aureus	6(12)
3. Retropharyngeal	Klebsiella pneumoniae	28(56)
	Pseudomonas	5(10)
	Streptococci viridans	5(10)
4. Parotid	Klebsiella pneumoniae	25(50)
	Streptococci viridans	6(12)
	Staphylococcus aureus	5(10)

DISCUSSION

Neck abscess in diabetic patients are relatively more common and serious [1]. Diabetic patients run the risk of acute

metabolic decompensation during infections, and conversely patients with metabolic decompensation are at higher risk of certain invasive infections^[4].

There is a changing trend in deep neck space abscess over time specially in microbiologic pattern^[5]. So isolation and identification of common organisms responsible for neck abscess in such patients can help in selection of proper antibiotics and better treatment. Neck abscess occurs in a wide spectrum of age group. In previous study of Sultana F et al [6] revealed that highest percentage 28(38%) patients were between 31-40 years, 9(12%) between 51-60 years and mean age of the patients was 35 years. Our study (Table I) also closely correlate with these studies. Neck abscess is commonly evident in male patients. In a previous Bangladeshi study 49(67.12%) were male and 24(32.87%) were female out of 73 respondents [6]. Men seem more susceptible than women to the consequences of indolence and obesity as a result of differences in insulin sensitivity and regional fat deposition^[6]. This study was very similar to our study findings. Regarding economic class, in the study of *Razib SF et al.* revealed that 20(66.6%) patients were from poor class and 7(23.3%) patients were from middle class^[7]. Many possible factors may explain the associations of economic class with diabetic neck abscess including poorer overall health, increased number of comorbid conditions, lack of access to or underuse of health care services, and psychological factors. Psychological factors including depression, anxiety, or emotional problems may influence overall health^[7]. Our study has also been very closely related with that previous study. In earlier studies of *Kamath PM et al.* showed that dysphagia 19(66%) was the commonest symptom which was

followed by neck swelling 17(59%), neck pain 17(59%)^[8], fever 14(48%). On clinical examination 23(79%) patient had neck swelling which was subsequently followed by oropharyngeal swelling 18(62%) and trismus 6(21%)^[8]. In this study, neck swelling usually occurred in relation to the space involved. In submandibular space infection, there was typically gross edema of the floor of the mouth and of the anterior tongue such that the tongue became grossly swollen, protuberant, immobile in some of the cases. In retropharyngeal abscess, bulge in posterior pharyngeal wall was seen, usually unilateral in some patients. In parapharyngeal space infections, swelling usually found in respective side of lateral wall of oropharynx and also behind the angle of mandible in few cases^[9]. Regarding parotid space infection, swelling found on respective parotid area of those cases^[9]. In all cases, pain is located over the swelling which is usually moderate to severe in nature, constant throbbing or dull aching, usually aggravated by movement of the adjacent area or taking food and somehow relieved by taking analgesics^[10]. Fever was seen in these cases ranges from low grade to high grade and has no diurnal variation and usually relieved spontaneously or taking antipyretics^[10]. This previous study supports our study results. In the study of Afshin and Gady when they reviewed 210 cases of deep neck abscess found that the most common space involved in the neck abscess were the submandibular space which constituted 90(43%) of their cases^[11]. It was followed by 63(30%) patients in

parapharyngeal space, 32(15%) patients in retropharyngeal space and 13(6%) patients in parotid space. **Scaglione M et al.** describe retrospectively that submandibular space was the most common 27(85.9%) involved space followed by 3(8%) patients in parapharyngeal space^[12], 2(6%) patients in retropharyngeal space. These study results are also consistent with our study. Infections of neck abscess in diabetic patients are usually of mixed microbiologic flora including alpha and beta Streptococci, Staphylococcus, Peptostreptococcus, Fusobacterium nucleatum, Bacteroides melanogenicus, Bacteroides oralis, Violonella, Actinomyces, Spirochaetes, Micrococcus and Eikenella corrodens^[13]. Rare cases due to Enterobacter, Enterococcus, Proteus, Propionobacter, Pseudomonas and Candida have also been reported^[14]. In the study of **Sultana F et al.** both aerobic and anaerobic micro-organisms were identified in submandibular space^[6]. Here aerobic organisms-responsible abscess showed clear domination of Klebsiella pneumoniae 24(32.1%) followed by staphylococcus aureus 11(14.8%), E.coli 7(9.88%), Pseudomonas 4(4.9%) and as most common anaerobic bacteria was Peptostreptococcus 3(4%). It correlates with our study. Regarding retropharyngeal space, in the study of **Haque MM.** it was found that 46(46%) bacteria was Klebsiella pneumoniae followed by Pseudomonas 15(15%)^[15], staphylococcus aureus 12(12%). In this study common anaerobe was Bacteroids 6(6%). This study results has also similar pattern with our study (Table VI). In the study of **Kamath PM et al.** has been

found that in parapharyngeal space Klebsiella pneumoniae was found in 8 in 29 (28%) patients followed by Streptococcus viridans 5(16%), Enterococcus 3(8%), pseudomonas 2(6%)^[7]. Here Peptostreptococcus was found in 15 in 29 (51%) patients as anaerobe. These study findings also correlate with our study results (Table VII). Regarding parotid space, in the study of **Razib F et al.**, it was found that as aerobic organism 9(30%) was Streptococcus viridans^[7], 7(23.3%) was Staphylococcus aureus and 7(23.3%) was Klebsiella pneumoniae. As anaerobic organism Peptostreptococcus was found in 1(3.3%) of cases. This study also correlates with our study results. Correlation between clinical and pathological features of neck abscess in diabetic patients comparing with the standard international study reveals that submandibular space 90(43%) was the common involved space in which Klebsiella pneumoniae 24(32.1%) was found as commonly involved aerobic bacteria^[6,11]. It is followed by parapharyngeal space 63(30%) in which Klebsiella pneumoniae 29(28%) was also found commonly with Streptococci viridans 5(16%)^[7,11]. It is then succeeded by retropharyngeal space 32(15%) and parotid space 13(6%) where frequently involved bacteria were Klebsiella pneumoniae 46(46%), Pseudomonas 15(15%) and Streptococcus aureus 12(12%)^[11,15]. These previous studies are closely correlated with our study.

Limitations of the study

- It was a cross-sectional study.
- This is single blinded, single centered study.

- Duration is short.
- Sample size is small.
- Does not proclaim the scenario of whole country

Conclusion

Neck abscess in diabetic patients occurred commonly in male with lower socio-economic class. Dysphagia and neck swelling were the commonest symptom and sign respectively. In diabetic patients neck abscess occurred commonly in submandibular space. *Klebsiella pneumoniae* was the commonest aerobic organism whereas *Peptostreptococcus* was the frequent anaerobe. For further recommendation a multicentered study for longer duration in the divisional/ tertiary hospitals of whole Bangladesh can reveal the real picture of clinico-pathological study of neck abscess in diabetic patients.

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Conflict of Interest

The authors declare no conflict of interest.

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