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Original Article

Antibiotic Sensitivity Pattern in Neck Space infection

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Abstract

Background: *Infection caused by microorganisms are common and may be serious and life threatening, requires immediate attention and management to get best outcome. The purpose of this study is to assess the anatomical spaces and causative microorganisms responsible for neck infections and evaluate the sensitivity pattern of the isolated microorganisms to antimicrobial agents.*

Materials and methods: *This study was carried out in the Department of Otolaryngology-Head and Neck Surgery, Chittagong Medical College Hospital, from January to December 2018. A total of 70 cases were selected consecutively. All underwent surgical incision & drainage. Pus sample was obtained either by aspiration or by swab stick from the involved spaces and culture and sensitivity tests were performed.*

Results: *The most common neck space infection were submandibular abscess 27 (38.57%) followed by Ludwig's angina 20 (28.57%). Out of 70 cases, 51(72.86%) cases yielded positive growth and 19(27.14%) cases showed no growth. Predominant microorganisms were Staphylococcus aureus, Streptococcuspyogenes, klebsiellaspecies and E coli. Staphylococcus aureus showed sensitivity to vancomycin, clindamycin, gentamycin. Streptococcus pyogenes showed sensitivity to cefuroxime, ceftriaxone and klebsiella species showed sensitivity to amikacin.*

Conclusion: *Bacteriological examination and culture help to identify the causative microorganisms in neck abscess. It helps to isolate even the rarest of the organism and by knowing there sensitivity pattern, we can direct specific therapy against them. It thus helps in a more effective treatment and fast recovery of patients.*

Key words: Neck abscess; Culture and sensitivity; Microorganism antimicrobial agent.

INTRODUCTION

Neck infection is defined as infection in the potential space and fascial planes of the neck[1]. Neck abscess are less common today than in the past. The impact of antibiotic treatment and improved dental care are the most likely reasons for this change. In spite of widespread use of antibiotics, neck infections do not disappear and remain one of the difficulte mergencies encountered in daily clinical practice[2]. Neck abscess can be categorized into retropharyngeal, peritonsillar, masseteric, pterygopalatine, maxillary, parapharyngeal, submandibular, parotid and floor of mouth abscess[3]. Once an abscess occupies one of the neck space, the infection can spread across the spaces or damage the adjacent vital neural or vascular structures. The extend and severity of the illness could become life threatening. In addition to the systemic toxicity and localized respiratory and digestive tract disturbance, more serious complications, including air-way obstruction, pneumonia, lung abscess, mediastinitis, pericarditis, internal jugular vein thrombosis and carotid artery erosion may result[4]. It is necessary

to investigate risk factors such as infections, foreign bodies, trauma, immuno suppression and addiction to intravenous drugs. Concomitant disease such as congenital cysts and fistulas, TB, diabetes mellitus, HIV, tumors, deficiency states and so on should also be taken into consideration[5]. Besides adequate drainage of the abscess, antibiotics therapy is essential to successful treatment. To administer effectively antimicrobial agents to a patient, microbiologic data on the abscess must be obtained. However, it usually takes several days or longer to get the necessary data and consequently empiric antimicrobial therapy is frequently launched before the definite culture result is available[2].

The study was aimed with the objective to demonstrate the causative micro-organisms, in neck space infection and to study the sensitivity pattern of the isolated microorganisms to antimicrobial agents.

MATERIALS AND METHODS

This cross sectional descriptive study was carried out in the Otolaryngology- Head and Neck Surgery Department, Chittagong Medical College Hospital, Chattogram (CMCH). Study period was one year starting from January to December 2018. Total 70 patients were evaluated by non probability convenience sampling. Data was collected in a pretested proforma meeting the objective of the study.

Inclusion criteria:

i) Both male and female patients presenting with neck space infection and giving consent.

Exclusion criteria:

i) Patient presenting with superficial skin infection
ii) Cases due to tubercular origin.

All patients in this study underwent surgical incision and drainage. Pus samples were collected either by sterile 18/22 gauze needle with 2 or 5ml syringes or it was directly collected by swab stick from the drainage site and send for culture and sensitivity.

Patients characteristics reviewed were gender, age, space involved, microorganism identified and antibiotic resistance from culture and sensitivity. Descriptive statistics for example frequency and percentage were used.

RESULTS

The age range of 70 patients was 13-70 years (Mean age was 36.38 years, SD± 14.15) which is shown in Table I.

Table I: Age Distribution (n=70).

Age Range	Frequency	Percentage (%)
≤ 20 Yrs	10	14.29
21-30 Yrs	20	28.57
31-40 Yrs	16	22.86
41-50 Yrs	10	14.29
51-60 Yrs	12	17.14
61-70 Yrs	02	2.85
Total	70	100

Out of 70 patients 43(61.43%) were male and 27(38.57%) were female which is shown in Figure 1.

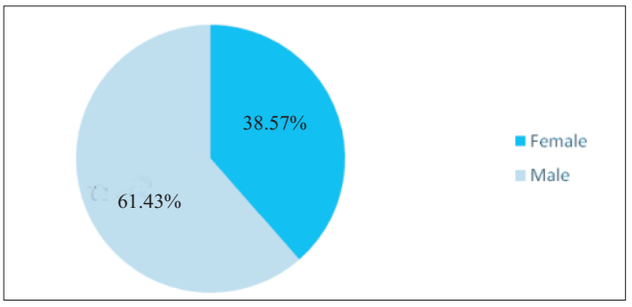

Figure 1: Distribution of respondents according to sex.

Out of 70 patients, all presented with single space involvement. The site commonly involved was submandibular space 27 (38.57%) followed by Ludwig's angina 20 (28.57%) which is shown in Table II.

Table II: Distribution of neck space infection according to locations (n=70).

Locations	Frequency	Percentage (%)
Submandibular	27	38.57
Parapharyngeal	2	2.86
Retropharyngeal	5	7.14
Parotid	5	7.14
Ludwig's Angina	20	28.57
Peritonsillar	11	15.72
Total	70	100

Results of bacterial cultures were available in all 70 patients. Of these, 51(72.86%) showed positive bacterial growth and 19 (27.14%) cases showed no bacterial growth. Out of 51 positive cultures, gram positive organisms were isolated in 29 (56.86%) cases and gram negative organisms were 22 (43.14%) cases.

The predominant organisms were Staphylococcus aureus 20 (39.21%) Streptococcus pyogenes 7 (13.73%) Klebsiella species 8(15.69%) and E coli 7(13.73%) which is shown in Table III.

Table III: Results of bacterial culture (n=51).

Microorganism isolated	Frequency	Percentage (%)
Staphylococcus aureus	20	39.21
Streptococcus Pyogenes	7	13.73
Enterococcus Spp.	2	3.92
Klebsiella Spp.	8	15.69
Pseudomonas Spp.	3	5.88
Proteus Spp.	4	7.84
Ecoli	7	13.73
Total	51	100

Staphylococcus aureus showed highest sensitivity to vancomycin, clindamycin, gentamycin and resistant to azithromycin, amoxicillin-clavulanicacid, ciprofloxacin.

Streptococcus pyogenes showed sensitivity to cefuroxime, ceftriaxone, amoxicillin-clavulanic acid & resistant to azithromycin, amikacin.

Enterococcus showed sensitivity to doxycycline and resistant to vancomycin, ciprofloxacin. Above finding is given details in Table-IV.

Table IV: Antibiotic sensitivity and resistance pattern of gram positive organisms (n=29).

Antibiotics	Staphylococcus aureus n=20		Streptococcus pyogenes n=7		Enterococcus n=2	
	S	R	S	R	S	R
Amoxicillin-Clavulanic Acid	2 (10%)	18 (90%)	7 (100%)	0	-	-
Azithromycin	8 (40%)	12 (60%)	0	7(100%)	-	-
Amikacin	-	-	0	7(100%)	-	-
Vancomycin	20 (100%)	0	-	-	0	2(100%)
Clindamycin	12 (60%)	8 (40%)	-	-	-	-
Gentamycin	16 (80%)	4 (20%)	2 (28.57%)	5 (71.43%)	-	-
Ciprofloxacin	5 (25%)	15 (75%)	3(42.86%)	4(57.14%)	0	2(100%)
Chloramphenicol	-	-	1 (14.29%)	6 (85.71%)	-	-
Doxycycline	-	-	-	-	2(100%)	0
Ceftriaxone	-	-	7(100%)	0	-	-
Cefuroxime	11 (55%)	9 (45%)	7(100%)	0	-	-

Klebsiella species showed highest sensitivity to amikacin, ciprofloxacin and resistant to chloramphenicol, amoxicillin-clavulanic acid.

Pseudomonas showed highest sensitivity to ciprofloxacin & resistant to doxycycline, amikacin, chloramphenicol.

E coli showed highest sensitivity to gentamycin followed by ciprofloxacin, ceftriaxone and resistant to chloramphenicol, doxycycline.

Proteus shows highest sensitivity to ciprofloxacin, gentamycin and resistant to doxycycline, chloramphenicol. Above finding is given details in Table-V.

Table V: Antibiotic sensitivity and resistance pattern of gram negative organisms (n=22).

Antibiotics	Klebsiella n=8		Ecoli n=7		Proteus n=4		Pseudomonas n=3	
	S	R	S	R	S	R	S	R
Amoxicillin-Clavulanic Acid	0	8(100%)	-	-	-	-	-	-
Azithromycin	4 (50%)	4 (50%)	-	-	-	-	-	-
Amikacin	8(100%)	0	-	-	-	-	0	3(100%)
Vancomycin	-	-	-	-	-	-	-	-
Clindamycin	-	-	-	-	-	-	-	-
Gentamycin	4 (50%)	4 (50%)	6 (85.71%)	1 (14.29%)	4(100%)	0	2 (66.67%)	1 (33.33%)
Ciprofloxacin	8(100%)	0	5 (71.43%)	2 (28.57%)	4(100%)	0	3(100%)	0
Chloramphenicol	1 (12.50%)	7 (87.50%)	1 (14.29%)	6 (85.71%)	0	4(100%)	0	3(100%)
Doxycycline	4 (50%)	4 (50%)	2 (28.57%)	5 (71.43%)	0	4(100%)	0	3(100%)
Ceftriaxone	5 (62.50%)	3 (37.50%)	4 (57.14%)	3 (42.86%)	3 (75%)	1 (25%)	1 (33.33%)	2 (66.67%)
Cefuroxime	2 (25%)	6 (75%)	-	-	-	-	-	-

DISCUSSION

Age range of the study patients was 13-70 years, mean age was 36.38 years. It was similar to study done by Ann et al where mean age was 35.1 years[6]. Study done by Santos Gorjon P et al where mean age was 37.2 years which is nearer to our study[7].

In this study, most common space involved was submandlibular space 27 (38.57%) followed by Ludwig's angina 20 (28.57%). Study done by Shih-wei yang et al showed submandibular space involvement was 35% and study down by Prakash BG, Sowmya D, Rajendra PJ showed Ludwig's angina involvement was 22% which is nearer to our study[2,5].

In our study 51 samples showed positive growth and 19 samples showed no bacterial growth. No bacterial growth was due to prior antibiotic uptake and faulty technique of sample collection and also delayed sending of sample. Out of 51 positive bacterial growth 29 (56.86%) were gram positive organisms and 22 (43.14%) were gram negative. Study done by Beka Detal showed similar study[8].

Most common organisms were gram positive Staphylococcus aureus 20 (39.21%) followed by gram positive Streptococcus pyogenes 7 (13.73%). Most common gram negative organisms were Klebsiella species 8(15.69%) followed by E coli 7(13.73). Study done by Beka D et al, walia IS et al, Anthony J et al showed similar study[8,9,10]. Study done by Cengiz AB et al showed growth of staphylococcus aureus was 50% and study done by Anwar MM and Hossain MA showed growth of staphylococcus was 41% which is nearer to our study[11,12].

In the present study antibiotic sensitivity to staphylococcus aureus was vancomycin, clindamycin, gentamycin and maximum resistant to amoxicillin-clavulanic acid. Study done by Anthony J et al showed similar result[10]. Streptococcus pyogenes showed sensitivity to cefuroxime, ceftriaxone and resistant to azithromycin. Study done by walia IS et al and Anthony J et al showed similar result[9, 10].

Klebsiella species showed highest sensitivity to amikacin and resistant to chloramphenical. Study done by walia IS et al and study done by Shah A et al showed similar result where they showed amikacin was 100% sensitive to Klebsiella species[9,4].

LIMITATIONS

There are several limitations in this study. Never the less, 51 abscess with cultures grew organisms, so the results would not be expected to change drastically with inclusion of more centers. Several patients were an antibiotics before their abscesses were drained, which could alter the flora.

The number of patients with neck abscess was to small to analyze separately, and antibiotic resistance may change based on the severity of the infection.

CONCLUSIONS

Neck space infections represents a medical and surgical emergency, they are still common and can develop serious complications. To conclude antimicrobial sensitivity for all the head and neck infections is a must and has to be done for all the neck abscess cases. It will help in directing a more effective treatment against the respective causative organisms and will help in achieving a faster cure rate. It will help us to detect even the rare causative organism and by knowing their sensitivity pattern we can direct an effective treatment against them. It will also help in preventing the dreaded complications of the neck abscess by treating the infection at an earlier stage and preventing its further spread.

DISCLOSURE

All the authors declared no competing interest.

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