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Bacteriological Study and Antimicrobial Susceptibility Pattern in Patients with Auricular Perichondritis

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Abstract

A cross-sectional, observational study was carried out in the Department of Otolaryngology & Head-Neck Surgery, Dhaka Medical College Hospital and Department of Clinical Microbiology, ICDDR,B, Dhaka, Bangladesh, from April to September of 2019. to isolate bacteria responsible for auricular perichondritis and their antimicrobial susceptibility pattern. A total of 50 patients with auricular perichondritis were included in this study. Among 50 patients, most were (42%) in 31–45 years age group, followed by 16–30 years age group (26%). Male-female ration was 3:2. 70% of them were hailing from rural areas, while 30% were living in urbal areas. Most of them were from poor families. Among etiology, 24(48%) cases presented following road traffic accident, followed by ear piercing 7(14%), burn 5(10%) and post-surgical 4(8%). All the patients 50(100%) had pain and tenderness, followed by swelling of pinna 32(64%), fever 20(40%), disfigurement of the ear 16(32%), and discharge from ear 6(12%). 12(24%) patients had diabetes mellitus. Pseudomonas species was the commonest organism isolated 18 (36%) as single, and 8(16%) as mixed infection; 3(6%) of culture yielded no growth. The most effective antibiotic was meropenam 37(74%) followed by ceftazidime 33 (66%) and amoxiclav 32(64%). Our data suggests that the most frequently isolated organism in auricular perichondritis is Pseudomonas species, which is mostly susceptible to meropenam.

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Introduction

Perichondritis of the auricle is a complication of the traumatized ear and can lead to residual deformity.[1,2] The term ‘perichondritis’ is itself a misnomer, as the cartilage is almost always involved, with abscess formation and cavitations. Blunt injury with subsequent heamatoma and secondary infection is the commonest cause of perichondritis, although penetrating injuries such as ear-piercing and acupuncture may also introduce infection directly. Suppurative perichondritis has also been described following mastoid surgery and as a complication of a burns injury.[3,4,5] Furunculosis, is also cause of auricular perichondritis.[5] In uncomplicated cases, only a limited portion of the cartilage is usually involved, whereas in burns the cartilage damage is more generalized.[6] The infection usually presents as a dull pain accompanied by redness, warmth and swelling. It usually starts in the helix and anti-helix but may involve the whole cartilage if treatment is withheld. As with otitis externa, the most common microbiological agent implicated is thought to be *Pseudomonas aeruginosa*, which seems to have a special affinity for the damaged cartilage.[7,8] The other organisms commonly found include proteus species, *Staphylococcus aureus* and *Escherichia coli*.[9] Although suppurating perichondritis resembles any surgical abscess, the structure and texture of the pinna makes it difficult to treat.[9] Many different surgical modalities have been described but, if the disease is severe, considerable disfigurement should be anticipated.[10] One of the first surgical methods of treatment was multiple skin incisions over the abscess.[10] However, in more advanced cases, wide

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excision, with a composite resection of the overlying skin, necrotic cartilage and diseased perichondrium but preserving the skin of the contra lateral surface, may be necessary. Evidence suggests a modification of the procedure by excising the necrotic material through a helical incision and by splitting the ear in a bivalve fashion.[11] These procedures require repeated debridement and prolonged treatment, and there is frequently loss of cartilage and a severe residual deformity.[11] Perhaps because of this, other authors have described the insertion of polyethylene tubes inside Penrose drains placed anterior and posterior to the infected cartilage[12], with antibiotic solution irrigated into the infected area daily. A review comparing the effectiveness of excision versus tubal drainage concluded that the aesthetic results of the tubal method were superior to those of methods that excise damaged cartilage.[12] We propsed this study to isolate bacteria responsible for auricular perichondritis and observe their antimicrobial susceptibility pattern. The results of this study will give us information about the common microorganisms that cause auricular perichondritis and their antimicrobial susceptibility, and thus, let us know the effectiveness of different empiric antibiotics on auricular perichondritis, which will ultimately help us reduce complications and enhance treatment outcome.[13]

Methods

This cross-sectional, observational study was conducted in the Department of Otolaryngology & Head-Neck Surgery of Dhaka Medical College Hospital and the Department of Clinical Microbiology of International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) Dhaka, Bangladesh, between April and September of 2019. Patients of any age and both sexes, in the in-patient department who were diagnosed as auricular perichondritis, in the Department of Otolarygology & Head-Neck Surgery Dhaka Medical College Hospital. We included all the patients, irrespective of age and sex who was diagnosed as auricular perichondritis and who consented for the study. Those patients who were supposed to receive treatment by incision and drainage as well as collected pus sent for culture and sensitivity test to the Department of Clinical Microbiology of International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) Dhaka, Bangladesh. However, patients who were treated conservatively with antibiotics for more than 3 days were excluded from the study. Finally, a total of 50 patients were selected (30 male and 20 female). We adopted a convenient, purposive sampling technique. Patient particulars, medical records, clinical examination finding, culture and sensitivity report were recorded in a structured patient data sheet.

Collected data were coded, kept confidential and processed and analyzed using computer software Statistical Package for Social Sciences (SPSS) Version 22.0 for windows. Data was expressed as frequency and percentage. Data was presented in tabulated form.

The study was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka, Bangladesh.

Results

Among 50 patients, most were (42%) in 31–45 years age group, followed by 16–30 years age group (26%). Male-female ration was 1.5:1. 70% of them were hailing from rural areas, while 30% were living in urbal areas. Most of them were from poor families (Table-I). Among etiology, 24(48%) cases presented following road traffic accident, followed by ear

piercing 7(14%), burn 5(10%) and post-surgical 4(8%) (Table-II).

Table-I: Demographic characteristics of the patients (n=50)

Variables	Frequency	Percentage
Age group (in years)		
1–15	5	10
16–30	13	26
31–45	21	42
46–60	7	14
>60	4	8
Gender		
Male	30	60
Female	20	40
Inhabitants		
Rural	35	70
Urban	15	30
Socioeconomic status		
Poor (Up to 15000 BDT/month)	35	70
Middle Class (15000-50000 BDT/month)	12	24
Rich (>50000 BDT/month)	3	6

Table-II: Etiological factors among patients (n=50)

Etiology	Frequency	Percentage
Road traffic accident	24	48
Ear piercing	7	14
Burn	5	10
Post-surgical	4	8
Allergic reaction	3	6
Furunculosis	2	4
Malignant otitis externa	2	4
Others	3	6

All the patients 50(100%) had pain and tenderness, followed by swelling of pinna 32(64%), fever 20(40%), disfigurement of the ear 16(32%), and discharge from ear 6(12%) (Table-III). 12(24%) patients had diabetes mellitus. Pseudomonas species was the commonest organism isolated 18 (36%) as single, and 8(16%) as mixed infection; 3(6%) of culture yielded no growth (Table-IV). The most effective antibiotic was meropenam 37(74%) followed by ceftazidime 33 (66%) and amoxiclav 32(64%) (Table-V).

Table-III: Distribution of patients by presenting symptoms (n=50)

Symptoms	Frequency	Percentage
Pain and tenderness	50	100
Swelling of pinna	32	64
Fever	20	40
Disfigurement of the eart	16	32
Discharge from wound	6	12

Table-IV: Organisms isolated in the study

Strains	Microorganism	Frequency	Percentage
Single	Pseudomonas species	18	36
	Staphylococcus aureus	11	22
	Klebsiella	6	12
	Proteus	2	4
	E. coli	2	4
	Total	18	36
Mixed	Pseudomonas species & Staphylococcus	4	8
	Pseudomonas species & E Coli	2	4
	Pseudomonas species & Klebsiella	2	4
	Total	8	16
No organism		3	6
Total		50	100

Table-V: Microorganism isolated and their antibiotic sensitivity (n=50)

Antibiotics	Sensitivity pattern of isolates (of microorganism)							
	Pseudo (18)	**Staph. (11)**	**Kleb (6)**	**Proteus (2)**	**E. coli (2)**	**Mixed (8)**	**No organism (3)**	**Total 50 (100%)**
Amikacin	4	4	3	1	1		-	13 (26%)
Amoxiclav	14	7	4	0	1	6	-	32 (64%)
Ampicillin	5	3	2	0	0	0	-	10 (20%)
Azithromycin	0	4	0	0	1	0	-	5 (10%)
Cefixime	7	3	3	0	0	4	-	17 (34%)
Ceftazidime	14	8	4	1	1	5	-	33 (66%)
Ceftriaxone	7	6	3	0	0	4	-	20 (40%)
Cefoprazone	11	5	3	0	0	3	-	22 (44%)
Cefuroxim	8	4	4	1	1	4	-	22 (44%)
Ciprofloxacin	11	6	5	0	2	4	-	28 (56%)
Cotrimazole	6	5	2	1	1	4	-	19 (38%)
Doxycycline	8	3	2	0	0	2	-	15 (30%)
Gentamicin	11	2	3	0	1	2	-	19 (38%)
Levofloxacin	6	3	2	0	0	1	-	12 (24%)
Imipenam	12	8	3	1	0	4	-	28 (56%)
Meropenam	15	9	5	2	2	6	-	37 (74%)
Nalidixic acid	10	6	4	2	0	4	-	26 (54%)

Discussion

Perichondritis is an inflammation of the perichondrium, the connective tissue surrounding cartilage. The auricle is particularly vulnerable to perichondritis following trauma, surgery, burns, or infections from procedures like ear piercing, especially when aseptic precautions are not followed.[1,2,13,14] In this study, out of 50 patients, over a six-month period, the age group most commonly affected was 16–45 years (68%), followed by 46–60 years (14%). Males were more affected than females, with a male-to female ratio of 1.5:1. A large proportion of patients came from poor socioeconomic backgrounds, hailing from rural areas of Bangladesh Table-IV, similar to findings in previous epidemiological observation.[14] Trauma was the leading cause in our series, often due to road traffic accidents (48%), followed by ear piercing, burn and post-surgical injuries. Evidence showed the rising trend of “high” ear piercing among teenagers, often performed by unqualified personnel, which is significantly contributing to the incidence of auricular perichondritis.[15] Such piercings create a moist environment conducive to bacterial growth, increasing susceptibility to infection.[15,16] Clinically, all 50 patients presented with severe pain; 70% had tenderness, 40% had erythema and fever, 32% developed disfigurement of the pinna, and 12% had discharge; the findings are consistent with the findings of some previous studies.[16-18] After surgical drainage, pus specimens were sent for culture and sensitivity testing. The most frequently isolated pathogen was *Pseudomonas aeruginosa* (52%), which has a known affinity for cartilage and is frequently implicated in

Perichondritis.[19-21] Other microorganisms included *Staphylococcus aureus*, *Klebsiella spp*., *E. coli*, and *Proteus spp*., as corroborating with prevuious microbiological studies.[17,18] In this study, intravenous ciprofloxacin was used empirically for all patients, followed by targeted therapy based on culture reports. Meropenem (74%) was the most effective antibiotic, followed by ceftazidime (66%) and amoxiclav (64%); this result aligns with findings that recommend empirical anti-pseudomonal therapy in suspected cases of perichondritis.[20,21] With multidrug resistant cases, a rising global concern prevails as it limits the effectiveness of commonly used antibiotics in community settings.[22] However, the results of this study signify the ongoing need for increasing awareness and protocol development for management of infections in resource-poor countries.

Despite significant outcome of the study, we had some limitations. Firsly, this study is conducted among a small number of cases within a short time frame in a single-center. The result of this study may not reflect the total scenario of the country. Secondly, patients with auricular perichondritis, who were treated conservatively with antibiotic for more than 3 days, were not included in this study. Finally, the convenient, purposive sampling technique may cause bias.

Conclusion

We present a large series of perichondritis of the auricle, with diverse apparent etiology, some of which have not been reported before. In Auricular perichondritis, Pseudomonus species is the commonest pathogen both as single and mixed isolates. Meropenam followed by Ceftazidime and Co-amoxiclav are the most sensitive antibiotic. From this study, it can be concluded that early diagnosis and immediate treatment with proper antibiotic which helping outpatient empiric treatment with cost benefit and decreasing course of disease.

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