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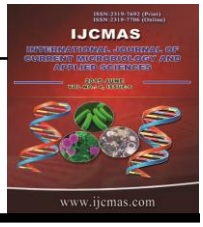

Original Research Article

Deep neck space abscesses in children and Methicillin Resistant *Staphylococcus aureus* (MRSA) as an emerging pathogen – A clinical study

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Keywords

MRSA, neck abscesses, chidden , emerging pathogen

A B S T R A C T

Deep neck abscesses are defined as collections of pus contained within the fiscal planes and spaces of the head and neck. The most common signs and symptoms are a neck mass or swelling,fever, poor oral intake, and prior symptoms of an upper respiratory infection. The increasing isolation of community-acquired Methicillin-Resistant Staphyloccoal Aureus (MRSA) in paediatrics head and neck abscesses has been a major focus of the current literature. This is a observational prospective study done in the Department of ENT and Head and Neck surgery of Government Medical College. Fifty patients up to 16 years of age with neck abscess were enrolled in the study. Data was analyzed for age /sex, locations of the abscesses, organisms in culture and sensitivity pattern. Males were commonly involved. The most common symptom was swelling in the neck .The most common sign was swelling in the neck. Submental abscess was the most common .MRSA was the most common bacteria isolated and was seen in 50% of culture positive patients and 40% in overall patients. Pediatric deep neck abscesses are polymicrobial in good number of cases. Our data support the notion that MRSA infections are on the rise and due consideration should be given to it when approaching a pediatric patient with a head and neck abscess. Empirical antibiotics should cover gram positives especially MRSA**,** gram negatives and anaerobes.

Introduction

Deep neck abscesses are defined as collections of pus contained within the fiscal planes and spaces of the head and neck. Such infections may be of nasal, oral, otitic, or bony origin[(1)]. It remains an important condition as it may potentially lead to life-threatening complications, this is especially so when there is a delay in diagnosis and treatment in immunocompromised patients.

In pediatric patients, acute tonsillitis with involvement of the peritonsillar space is the most common cause of deep neck infections. The second most common source is dental. Other sources of neck infection are sialadenitis, Bezold's abscess, infection of congenital cysts and fistulas and extension of suppuration in deep cervical lymphatics[(2)]. Intravenous drug abuse and

causes, such as central venous catheter placement, may lead to infection within the carotid sheath or other spaces. Deep neck space infections may also arise secondary to anatomic connections with abscesses in the mediastinum[3] . These infections are usually of mixed microbiologic flora. The increasing isolation of community-acquired Methicillin-Resistant *Staphylococcus aureus* (MRSA) in paediatrics head and neck abscesses has been a major focus of the current literature[4,5].

In comparison to adults children with deep neck space infections tend to have a more subtle presentation in that they are seldom able to verbalize their symptoms or cooperate with the physical examination . The most common signs and symptoms are a neck mass or swelling, fever, poor oral intake, and prior symptoms of an upper respiratory infection such as rhinorrhoea or cough. Other symptoms include neck pain, irritability, decreased neck mobility, sore throat, upper airway obstructive symptoms and febrile seizures . Infection in one space can spread to adjacent spaces, thus involving larger portions of the neck [6] . Paediatric deep neck infections require more intimate management because of their rapidly progressive nature. Management of pediatric deep neck abscesses involves high dose intravenous antibiotics and surgical drainage of abscess .

We in our study present our clinical experience of deep neck space abscesses and highlight the important role of MRSA in such abscesses.

Materials and Methods

This prospective study was done in India in the Postgraduate Department of Ear, Nose and Throat and Head and Neck Surgery of Government Medical College, Srinagar, J&k for a period of two years from Jan2013 to Jan 2015.Proper consent was taken from patients but IRB approval was not necessary in this prospective study.

Inclusion criteria

Fifty patients up to 16 years of age were enrolled in the study. Patients with Contrast Enhanced Computed Tomography (CECT) criteria of the abscess (well-formed ring enhancement around a non enhancing density consistent with fluid), and clinical signs and Symptoms of deep neck abscess were enrolled in the study

Exclusion criteria

All patients who had CECT evidence of abscess but which failed to show presence of abscess at the time of aspiration and/or incision and drainage were excluded from the study.

The submental space is a part of large submandibular space .We evaluated submental space infections separately from the rest of submandibular space.

Method

The locations of the abscesses were determined based on radiographic and surgical findings. Before any definitive intervention was done about 0.2ml of pus was aspirated under sterile conditions and sent for culture and sensitivity.

If greater than (85 %) of organisms in a specific group were sensitive to a specific drug, they were defined as sensitive (S) or were otherwise considered resistant (R).

Data for all patients were recorded and analyzed.

Results and Discussion

Thirty seven patients were male (74%). Most patients were between the ages of 5-8 years (Table1).

The most common symptom was swelling in the neck (86%), followed by pain in neck (75%), fever (60%), and odynophagia (40%). The most common sign was swelling in the neck (88%) followed by oropharyngeal swelling (24%), and trismus (10%) (Table 2).

Submental abscess was the most common followed by submandibular (Tables 3) MRSA was the most common bacteria isolated and was seen in 50% of culture positive patients and 40% in overall patients .Culture results are shown in (Table4). Sensitivity of organisms varied with different antibiotics (Table 5).

This study is an observational study .The data from our study show predominance of paediatric neck abscesses in males (74%) over females (26 %). Other studies also demonstrated this male predominance [7,8,9] while several reports in the West showed an equal distribution [7].

We believe this male predominance is because of our traditional society where males are more fortunate than females in reaching Tertiary hospital for specialized management. Parents sometimes don't take efforts in taking female patients to tertiary setup which is usually far from villages.

According to Coticchia [10] , younger children have uncharacteristic presentations of deep neck abscesses that closely mimic signs and symptoms of viral upper respiratory tract such as agitation, cough, lethargy, and rhinorrhea, increasing the difficulty of establishing an accurate diagnosis. Medial displacement of the lateral pharyngeal wall and tonsil is a hallmark of a parapharyngeal space infection.

We found the most common symptoms to be swelling in neck (86%), pain in neck (75%), fever (60%) and odynophagia (41%) while most common sign was neck swelling (88%) followed by oropharyngeal swelling (24%) . A Study of paediatric neck abscesses in infants [11] reported neck mass in 92% (n = 23) of patients; fever, 60% (n = 15); and dysphagia and/or poor intake by mouth, 36% (n = 9).Another study of paediatric neck abscesses [12] reported most common symptoms as fever, limited motion of neck, and odynophagia.

Multiple space involvement was seen in six patients (12%) of our patients. It is well known that an untreated deep neck space infection spreads within a few days to the surrounding neck spaces. A submandibular neck infection spreads with relative ease to the parapharyngeal space; hence it may spread to the retropharyngeal space. A peritonsillar space infection can also take the same route to the retropharyngeal space. A parapharyngeal abscess can track down into the mediastinum via the "Lincoln's highway", but mediastinal involvement is commoner in a retropharyngeal abscess with its direct access to the superior mediastinum [13]

Submental space involvement was most common in our study seen in 24% of cases followed by submandibular (22%) which is in contrast to a study reported by Coticchia et al· [10] , where the most commonly encountered sites of abscesses in the head and neck region of paediatric patients were retropharyngeal or parapharyngeal spaces followed by anterior or posterior triangle and submandibular or submental regions, respectively. Parotid space abscesses was seen in our study in 8% of patients while one study [10] reported it only in 1% of

patients. Ryan C. Cmejrek et al. [11] in a study on 25 paediatric patients found that the more superficial anterior and posterior triangle abscesses (11/25) tend to be more common than those in the parapharyngeal (5/25) or retropharyngeal (3/25) spaces**.** However, there are different results, in different studies, in the literature regarding the distribution of abscesses among the spaces of the neck [10] .

Table.1 Showing Age wise and sex distribution of patients

S.No	Age groups	No of Patients	
		Males	Females
1	0-4	10	2
2	5-8	16	4
3	9-12	6	2
4	13-16	5	5
Total		37	13

Table.2 Clinical findings

SYMPTOMS	**No of patients**	**Percentage**
Swelling in neck	43	86
Pain in neck	39	75
Fever	34	60
Sore throat/ Odynophagia/Dysphagia	20	40
Recent tooth extraction	5	10
Toothache	4	8
Trismus	4	8
Respiratory difficulty	3	6
Torticollosis	1	2
SIGNS		
Swelling in neck	44	88
Oropharyngeal swelling	12	24
Trismus	5	10
Thickening of skin	2	4
Stridor	2	4

Table.3 Site wise distribution

Location	**No of Patients**	Percentage
Submental	**12**	**24**
Submandibular space	**11**	**22**
Retropharyngeal space	**8**	**16**
Para pharyngeal space	**6**	**12**
Parotid space	**4**	**8**
Multispace	**6**	**12**
Pretracheal	**1**	**2**
Prevertebral	**x**	
Carotid space	**2**	**4**
Mediastinum	**x**	

Table.4 Distribution of organisms in Pus culture

Organisms in pus culture	**Number**
GRAM POSITIVES	**20**
MRSA	
Staphylococcs aureus	**6**
Streptococcus pyogens	**4**
Streptococcus pneumonia	**2**
Streptococcus agalactie	**1**
GRAM NEGATIVES	**9**
Klebsiella pneumonia	
E.Coli	**5**
H. Influenza	**3**
ANAEROBES	**4**
Bacteroides	
Peptostreptococcus sp	**3**
Fusobacterium	**2**
Actinomyces	**1**
Clostridium gp	**2**
Acinetobacter	**1**

Cultures were positive in 41 patients out of which 10 had polymicrobial infection

Table.5 Sensitivity of Organisms to common antibiotics

Organisms in pus culture	Lin	Gent	Clin	Vanc	Metr	Cipr	Ceftr	Amox + Clavu	Trim + sulfa
GRAM POSITIVES									
MRSA	**S**	**S**	**S**	**S**	**R**	**R**	**R**	**R**	**R**
Staphylococcus aureus	**R**	**R**	**S**	**R**	**R**	**R**	**R**	**S**	**R**
Streptococcus pyogens	**S**	**R**	**S**	**R**	**R**	**R**	**R**	**S**	**R**
Streptococcus pneumonia	**S**	**R**	**R**	**R**	**R**	**R**	**R**	**S**	**R**
Streptococcus agalactie	**S**		**S**	**R**	**R**	**R**	**R**	**R**	**R**
GRAM NEGATIVES									
Klebsiella pneumonia	**R**	**S**	**R**	**R**	**R**	**S**	**S**	**R**	**R**
E.Coli	**R**	**S**	**R**	**R**	**R**	**S**	**S**	**R**	**R**
H. Influenza	**R**	**S**	**R**	**R**	**R**	**S**	**S**	**R**	**S**
ANAEROBES Bacteroides	**S**	**R**	**S**	**R**	**S**	**R**	**R**	**S**	**R**
Peptostreptococcus sp	**R**	**R**	**S**	**R**	**S**	**R**	**R**	**S**	**S**
Fusobacterium	**R**	**R**	**S**	**R**	**S**	**R**	**R**	**R**	**R**
Actinomyces	**R**	**R**	**S**	**R**	**S**	**R**	**R**	**R**	**R**
Clostridium gp	**S**	**R**	**S**	**R**	**S**	**R**	**R**	**S**	**R**
Acinetobacter	**S**	**R**	**R**	**R**	**S**	**R**	**R**	**R**	**R**

If greater than 85 % of organisms in a specific group were sensitive to a specific drug we labelled them with Sensitive(S) in the above table

Contemporary reports from different countries or areas may reveal different common pathogens [14] . Most studies have determined the predominance of *streptococcus* and *Staphylococcus aureus* as a causative organism although often infections are polymicrobial [14] . On the other hand, the presence of anaerobes may be underestimated because of the difficulty in culturing them [14] .Cultures of 50 patients grew bacteria only in 41 .This may due to the fact that many of our patients had received at least one course of antibiotics prescribed by their general practitioners before presenting to our hospital.

Gram positives were seen in 33 patients. Gram negatives were seen in 17 patients. MRSA was the most common organism cultured in 20 of patients followed by Klebsiella (9of patients) which was also the most common gram negative cultured .In a study [3] on 117 children's treated for head and neck space infections beta haemolytic streptococci(18%) and staph aureus(18%) were most prevalent. Another study found that mixed anaerobic bacteria (n = 37) were the most frequently cultured organism in their study followed by *S aureus* [23]. In contrast to what we have found A. Bülent Cengiz et al. [15] found no anaerobic bacteria. It has been reported that no anaerobes were detected in the deep neck infections in children which are expected to host a mixture of both aerobic and anaerobic bacteria [15] . Brook [16] suggested that neck abscesses in children were polymicrobial in nature .We are also of the opinion that some paediatric neck abscesses are polymicrobial in nature as our 10 patients had

polymicrobial cultures. Gianoli et al. [17] reported polymicrobial infection in 75% of retropharyngeal abscesses cultured in their series while one study [18] showed absence of polymicrobial infection.

Recently, concern has emerged regarding the increasing incidence of CA-MRSA infections presenting in the pediatric population [4] .We also found MRSA in high number of patients (20 patients out of 41positive cultures) .The rising incidence of MRSA in pediatric neck abscesses has been linked to increasing morbidity [19].

MRSA in our study was sensitive to clindamycin, gentamycin, vancomycin, linzeolid similar to study by Kathryn Ossowski et al. [4] and resistant to Trimethoprim- Sulfamethoxazole .Contrary to what we have seen Trimethoprim-Sulfamethoxazole has been recommended by the Committee on Infectious Diseases of the American Academy of Pediatrics as useful therapy for mild skin and soft-tissue infections caused by CA-MRSA [20] and in study by kathyrn Osswoski et al. [4] all MRSA isolates were sensitive to Trimethoprim- Sulfamethoxazole

Pediatric deep neck abscesses occur despite the advent of antibiotics. It remains an important condition as it may potentially lead to life-threatening complications especially so when there is a delay in diagnosis and treatment, and immunosuppression. These abscesses usually present as fever and neck mass. These infections are polymicrobial in good number of cases. Our data support the notion that MRSA infections are on the rise and due consideration should be given to it when approaching a pediatric patient with a head and neck abscess. It is important to consider the rising incidence of MRSA when choosing empirical antibiotic. Cultures are critical to determine the organism and its possible resistance patterns. Empirical antibiotics should cover gram positives especially MRSA**,** gram negatives and anaerobes. The choice of empirical antibiotic depends on the local sensitivity pattern.

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