

Pediatric Deep Neck Space Abscesses: A Prospective Observational Study

Suhail Amin Patigaroo^{1*}, Fozia Amin Patigaroo², Nazia Mehfooz², Nazir A Khan¹, Masood Hassan Kirmani¹ and Shakeel³

¹Department of ENT and HNS, SKIMS MC, Srinagar, Jammu and Kashmir, India

²Peoples Care polyclinic, Sopore, Jammu and Kashmir, India

³Department of Dentistry and Oral & Maxillofacial Surgery, SKIMS MC, Srinagar, Jammu and Kashmir, India

Abstract

Pediatric patients with deep neck space abscesses were prospectively followed from 2009 to 2011 in SKIMS MC and Peoples care polyclinic. Observational data were collected regarding age, location and size of abscess, source of infection, organism, antibiotic susceptibility, treatment plan, and rate of complications. A brief review of the literature is included to compare our patient population to what has previously been reported in the literature.

Introduction

Infections of the deep spaces of the head and neck have been reported since the time of Hippocrates, Galen, and other authors under the names “morbus strangulatorius” “cynanche” (Greek for suffocation), and “angina maligna” [1]. Deep neck abscesses are defined as collections of pus contained within the fascial planes and spaces of the head and neck. Such infections may be of nasal, oral, otitic, or bony origin [2].

Despite the introduction of antibiotics, deep neck infections still occur. 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 [3]. 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 [4]. Other sources of neck infection are sialadenitis, Bezold's abscess, infection of congenital cysts and fistulas and extension of suppuration in deep cervical lymphatics [5]. 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 [1].

These infections 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. Rare cases due to Enterobacter, Enterococcus, Proteus, Propionobacter, Pseudomonas and Candida have also been reported [6]. 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 [7,8].

The clinical presentation of the patient is determined by the inflammatory response on the structures within and bordering the abscess [9]. While adults often have numerous localizing signs and symptoms, 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 [9]. 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 [8,10].

Infection in one space can spread to adjacent spaces, thus involving larger portions of the neck. Paediatric deep neck infections require more intimate management because of their rapidly progressive nature. Management of paediatric deep neck abscesses involves high

dose intravenous antibiotics and surgical drainage of abscess [3]. In the treatment of head and neck space infections in children, empiric antibiotic therapy must cover gram positive organisms, anaerobes, as well as gram negative, and beta-lactamase producing organisms.

While the therapeutic application of needle aspiration has been used in patients, early open surgical drainage remains the definitive treatment for deep neck abscesses. If the size of the abscess is small and there are no imminent complications, a trial of conservative management may be attempted [3]. Securing the airways with tracheostomy or intubation is also necessary when upper airway obstruction occurs, as it is the most likely cause of fatality in this patient group [3].

Material and Methods

This prospective study was done in India in the Department of Ear, Nose and Throat and Head and Neck Surgery of Sheri-Kashmir Institute of Medical Sciences Medical College, which is a tertiary care hospital along with Peoples Polycare Polyclinic clinic, for a period of two years from September 2009 to September 2011. Proper consent was taken from patients but IRB approval was not necessary in this prospective study.

Inclusion Criteria

One hundred paediatric patients up to 15 years of age were enrolled in the study. Patients with Contrast Enhanced Computed Tomography (CECT) criteria of the abscess (well-formed ring enhancement round 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 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.

*Corresponding author: Suhail Amin Patigaroo, Department of ENT and HNS, SKIMS MC, Srinagar, Jammu and Kashmir, India, E-mail: dr_suhail_jnmc@yahoo.co.in

Received January 04, 2012; Accepted April 24, 2012 Published April 26, 2012

Citation: Patigaroo SA, Patigaroo FA, Mehfooz N, Khan NA, Kirmani MH, et al. (2012) Pediatric Deep Neck Space Abscesses: A Prospective Observational Study. Emergency Med 2:117. doi:10.4172/2165-7548.1000117

Copyright: © 2012 Patigaroo SA, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Method

Abscesses were divided into small and large abscesses on the basis of maximum diameter of cavity wall. Abscesses with maximum diameter in any axis less than 1.5 cm were labelled as *small* and diameter greater than 1.5cm were labeled as *large*. 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). All patients were started on empirical antibiotic therapy of clindamycin and ceftriaxone and patients with small abscesses were blindly aspirated while Incision and drainage was done for large abscesses. Patients with associated complications underwent incision and drainage irrespective of the size of abscess. Patients with small abscesses who failed empirical antibiotic therapy and aspiration then underwent Incision and drainage after 48 hours.

Failure to respond to empirical antibiotic therapy and blind aspiration included those patients who showed: No improvement of neck mobility; Increasing fever or continuing fever; no improvement in physical activity; continuing pain, refilling of aspirated cavity and no improvement in oral intake.

Once culture results were available, antibiotics were modified according to culture results.

Duration of intravenous antibiotic therapy, subsequent duration and type of oral antibiotic therapy, and length of hospital stay were determined by the clinical response of the patient and our clinical judgment.

Results

Eighty two patients were male. Most patients were between the ages of 4-6 (Table 1).The most common symptom was swelling in the neck (85%), followed by pain in neck (78%), fever (69%), and odynophagia (41%). The most common sign was swelling in the neck (88%) followed by oropharyngeal swelling (23%), and trismus (9%) (Table 2). Medial bulge of tonsil was seen in patients with parapharyngeal abscess. (Figure 1). The locations of the abscesses are shown in (Tables 3 and 4). Source of infectious spread was unknown in about 40 patients while among others (23) had a history of upper airway infection, 10 had dental infections, and 7 had a peritonsillar abscess. Parotiditis and boil over neck was seen in 6 and 4 patients respectively. Twelve patients presented with complications.The most common complication was airway obstruction seen in 5 patients followed by sepsis and mediastinitis in 2 patients.Pus was withdrawn and sent for culture and sensitivity before any antibiotics were started. Culture results are shown in (Table 5). Sensitivity of organisms varied with different antibiotics (Table 6). Majority of abscesses were large (67 patients) while 33 abscesses were small. Twelve patients presented with complications were managed by Incision and drainage and empirical therapy. Patients without complications (88) were managed by two different procedures. Thirty patients with small abscesses underwent needle aspiration followed by empirical therapy. Only 6 of those responded while 24 failed to respond which were ultimately treated with incision and drainage. Success rate with blind aspiration was only 20%. Fifty eight patients with large abscesses underwent Incision and drainage (Figure 2). Altogether 94 patients underwent incision and drainage (Table 7). Out of 94 patients where Incision and drainage was performed, 4 patients continued to have high fever, recollection of pus, and pain. Reopening of incision site was done after three days and

Sl.No	Age Group (years)	No: of patients	
		Males	females
1	0-3	20	7
2	4- 6	35	5
3	7- 9	12	3
4	10- 12	9	x
5	13-15	6	3
Total	82	18	

Table 1: Showing Age wise and sex distribution of patients.

Symptom	No. of Patients	Percentage
Sore throat/ Odynophagia/Dysphagia	41	41
Pain in neck	78	78
Swelling in neck	85	85
Fever	69	69
Toothache	7	7
Respiratory difficulty	5	5
Recent tooth extraction	6	6
Torticollis	2	2
Trismus	9	9
Finding		
Swelling in neck	88	88
Oropharyngeal swelling	23	23
Trismus	9	9
Dental abnormality	2	2
Thickening of skin	4	4
Stridor	4	4

Table 2: Clinical Findings.

Location	No of Patients
Submental	25
Para pharyngeal space	18
Submandibular space	16
Retropharyngeal space	11
Parotid space	12
Multispace	11
Pretracheal	2
Prevertebral	2
Carotid space	1
Mediastinum	2

Table 3: Site wise distribution.



Figure 1: Oropharyngeal examination in a patient with parapharyngeal abscess showing medial bulge of tonsil.

S.No	Age Group (years)	submt	para	subman	retr	parot	pretrach	prever	caroti	mediast	multisp
1	0-3	9	5	5	6	1				1	
2	4- 6	11	7	4	4	7		1		1	5
3	7- 9	3	2	2	1	2		1	1		3
4	10- 12	2	3			2	1				1
5	13-15		1	5			1				2
Total		25	18	16	11	12	2	2	1	2	11

Table 4: Age group distribution of different abscesses.

Organisms in pus culture	Number	Percentage
Gram Negatives		
Klebsiella pneumonia	20	
Salmonella enteritis	1	
H. Influenza	5	
E.Coli	8	
Gram Positives		
Staphylococcs aureus	12	
MRSA	34	
Streptococcus pyogens	8	
Streptococcus pneumonia	4	
Streptococcus agalactie	1	
Anaerobes		
Peptostreptococcus sp	6	
Bacteroides	8	
Fusobacterium	4	
Actinomyces	1	
Clostridium gp	1	
Acinetobacter	2	

Cultures were positive in 82 patients out of which 20 had poly-microbial cultures

Table 5: Distribution of organisms in Pus culture.

Organisms	Clind	Gent	Vanc	Trime + Sulfam	Amox+clavu	Met	Cipr	Ceftria	linzeolid	cefurox
Klebsella Pneumoniae	R	S	R	R	R	R	S	S	R	R
Salmonella enteritis	R	S	R	R	R	R	S	S	R	R
H.Influenza	R	S	R	S	R	R	S	S	R	S
E.Coli	R	S	R	R	R	R	S	S	R	R
Staph Aureus	S	R	R	R	S	R	R	R	R	S
MRSA	s	s	s	R	R	R	R	R	S	R
Streptococcus pyogens	S	R	R	R	s	R	R	R	S	S
Streptococcus pneumonia	R	R	R	R	s	R	R	R	S	S
Streptococcus agalactie	R	R	R	R	s	R	R	R	S	S
Peptostreptococcus	S	R	R	S	S	S	R	R	R	R
Bacteroides	S	R	R	R	S	S	R	R	S	R
Fusobacterium	S	R	R	R	R	S	R	R	R	R
Actinomyces	S	R	S	R	R	S	R	R	R	R
Clostridium	S	R	S	R	s	S	R	R	S	R
Acinetobacter	R	R	R	R	R	S	R	R	S	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

Table 6: Sensitivity of Organisms to common antibiotics.

all patients responded. There were 7 cases where CECT features were suggestive of abscess while on incision and drainage no abscess was seen. So altogether we analysed 107 cases out of which 7 had no abscess on CECT. The false rates of detection of abscess in our study was 6.5%. Our duration of symptoms ranged from 8 hours to 15 days.

Discussion

The data from our study show predominance of paediatric neck abscesses in males (82%) over females (18%). Other studies also demonstrated this male predominance [3,11,12], while several reports

Total no of patients	Size of abscess on CECT Scan		No of patients managed by surgical I&D
	Small	large	
With complications 12	3		9 12
Without complications 88	30		58 58
	No of patient who responded to needle aspirations and empirical antibiotics	No of patient who failed to respond to needle aspirations and empirical antibiotics	
	6	24	24 Total=94

Table 7: Shows number of patients with different size of abscess on CECT scan and number of patients managed by different techniques.

in the West showed an equal distribution [3]. 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. In our series duration of symptoms ranged from 8 hours to 15 days compared to other studies [13-15]. 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 (85%), pain in neck (78%), fever (69%) and odynophagia (41%) while most common sign was neck swelling (88%) followed by oropharyngeal swelling (23%). A study of paediatric neck abscesses [16] reported most common symptoms as fever, limited motion of neck, and odynophagia. Similar study of paediatric neck abscesses in infants [17] reported neck mass in 92% (n = 23) of patients; fever, 60% (n = 15); and dysphagia and/or poor intake by mouth, 36% (n = 9).

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 [18]. Multiple space involvement was seen in 11% of our patients. Submental space involvement was most common in our study seen in 25% of cases followed by parapharyngeal (18%), submandibular (16%) 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 12% of patients while one study [10] reported it only in 1% of patients. Ryan C. Cmejrek et al. [17] 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].

Retropharyngeal space infection was seen more commonly in age group of 0-6 years. Out of 11 retropharyngeal abscesses, 10 were seen in this age group. Our findings are similar to Yeoh et al. [19], who reported 16 cases of retropharyngeal abscess and all of them were younger than 6 years. Dodds and Maniglia [20] reported a mean age of 26.3 months in 9 patients with retropharyngeal abscess. Lymph

glands lie in the retropharyngeal space. These nodes give rise to abscess formation. As seen in our study and other studies retropharyngeal space infection is seen commonly below 6 years of age as these lymph nodes are prominent in young children but involutes by the age of 4 or 5 years of life, although some suggest that this occurs around puberty [21]. Out of 25 patients with submental abscess and parapharyngeal abscess maximum (11) and (7) respectively were found in the age group 4-6 years. In a study by Cotchilla et al. [10] retropharyngeal or parapharyngeal involvement was more common in one-year-old children, or older, whereas submandibular or submental involvement was more common in children younger than one year. A study on 11 patients of parapharyngeal abscess by Marques et al. [16] found average age of presentation as 3.3 years.

In our study the cause of infection remained unknown in maximum number of patients 40%, probably because deep neck space infections followed the inciting infection by a week or so, which is similar to reported studies who have found that the cause may be unknown in 42.7% and 50% of patients respectively [3,5]. The most common known causative factor was upper airway infection (tonsillitis, pharyngitis) in 23 patients followed by odontogenic focus in 10 patients. Ungkonont [22] reviewed 117 cases of deep neck abscesses in children and found -peritonsillar infections (49%) as the most common followed by, retropharyngeal infections (22%), submandibular infections (14%), buccal infections (11%), parapharyngeal infections (2%), canine space infections (2%). In addition to classic origins, deep neck space infections are also seen in intravenous drug abusers but we found none as IV drug abuser due to our traditional conservative society.

Despite the widespread use of antibiotics, life-threatening complications can still result from deep neck abscesses as seen in our study. The exact incidence of complications in children with deep neck space abscesses is unknown. Overall the complication rate in our study was 12%. This is similar to the findings recently published where the complication rates were about 9.4% [23,24]. Complications of pediatric deep neck space infections can be severe. Such complications include mediastinitis, internal jugular vein thrombosis, carotid artery aneurysm or rupture, and airway obstruction, necrotizing fasciitis, multiorgan failure and cardiogenic shock, meningitis, [23,6]. The most common complication in our study was airway obstruction seen in 5 patients followed by sepsis and mediastinitis in 2 patients each. Internal jugular vein thrombosis was seen in 1 patient while Cristina M. Baldassari et al. [23] in a study on paediatric neck abscesses found the most common complication (n = 9) as mediastinitis followed by airway obstruction necessitating intubation (n = 8), persistent disease requiring repeat drainage (n = 1), and jugular vein thrombosis (n = 1). Shah et al. [25] reported on a series of 4 children with deep neck space infections who developed mediastinitis. Mediastinitis is one of the main causes of mortality in deep neck space infections. Pneumonia was seen in one patient. One of the patients with mediastinitis and sepsis died in the hospital. The mortality rate in our study was 2%.



Figure 2: Incision and drainage of submental abscess.

Common pathogens

Contemporary reports from different countries or areas may reveal different common pathogens [26]. Most studies have determined the predominance of *streptococcus* and *Staphylococcus aureus* as a causative organism although often infections are polymicrobial [26]. On the other hand, the presence of anaerobes may be underestimated because of the difficulty in culturing them [26]. Cultures of 100 patients grew bacteria only in 82. This may be due to the fact that most 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 59 patients. Gram negatives were seen in 34 patients. MRSA was the most common organism cultured overall in 34 of patients followed by *Klebsiella* (24 of patients) which was also the most common gram negative cultured.

In a study [1] 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. [14] 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 [14]. Brook [27] 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 twenty patients had polymicrobial cultures. Gianoli et al. [28] reported polymicrobial infection in 75% of retropharyngeal abscesses cultured in their series while one study [29] showed absence of polymicrobial infection.

Recently, concern has emerged regarding the increasing incidence of CA-MRSA infections presenting in the pediatric population [30]. We also found MRSA in high number of patients (34 patients out of 82 cultures). The rising incidence of MRSA in pediatric neck abscesses has been linked to increasing morbidity [23].

Antibiotic management

MRSA in our study was sensitive to clindamycin, gentamycin, vancomycin, linzeolid similar to study by Kathryn Ossowski et al. [30] 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 [31] and in study by kathyrn Ossowski et al. [30] all MRSA isolates were sensitive to Trimethoprim- Sulfamethoxazole and cefuroxime.

Complications

We found a high incidence of MRSA infection in patients who had complications. Out of 12 patients with complications 8 patients had MRSA infection. Both of our patients who had mediastinitis had MRSA and 4 patients out of 5 patients with upper airway obstruction had MRSA, one patient with sepsis had MRSA. Patient with IJV thrombosis had MRSA. In a retrospective review of pediatric neck abscesses, Thomason et al. [8] found 3 cases of mediastinitis associated with MRSA deep neck space infections. Shah et al. [25] reported that out of 4 paediatric patients with deep neck space infection with mediastinitis two had MRSA isolated. Wright et al. [32] reported that 75% (6/8) of children with positive MRSA cultures from retropharyngeal abscesses developed mediastinitis. Wright et al. [32] concluded that MRSA is a more invasive pathogen with greater potential for complications compared to other bacterial isolates. We are also of the same opinion because about 67% (8 out of 12) of patients with complications had MRSA infection. We would like to add that MRSA is not commonly suspected and empirical antibiotics are not directed against MRSA which in turn leads to untreated MRSA infection leading to complications. Imaging physical examinations have sensitivity and specificity of 33 % and 81% respectively in detecting presence of an abscess [1]. In recent years, CT is the most widely used imaging procedure. Intra-venous contrast may help identify an abscess as a "rim-enhancing lesion" with a low-density center [1]. Cellulitis is defined as soft tissue swelling with obliteration of regional fat planes. Although CT is helpful both in determining the presence and location of neck infections in children, it is less helpful in differentiating abscess from lymphadenitis and cellulitis. We found false positive rates as 6.5% while Publications have reported false-positive rates of up to 25% when CT scans are used to diagnose paediatrics neck abscesses [33]. On the other hand, use of MRI gives improved soft tissue definition without the use of radiation but its use is limited due to the lack of availability and cost. US also seems more effective than CT in identifying abscess versus cellulitis and can be helpful to avoid incision and drainage in cellulitis [28]. USG has a sensitivity of 95% and specificity of 75 % [1].

Treatment options

Less commonly accepted management of deep neck space infections include CT guided aspiration and ultrasound guided needle aspiration. The first two cases of CT-guided drainage of a neck abscess were reported by Cole et al. in 1984. Poe et al. in 1996 reported the successful CT guided aspiration of deep neck abscesses in four patients. Brodsky et al. [34] has recommended needle aspiration in children with small superficial neck abscess. We found very disappointing results with blind aspiration and empirical therapy. Out of 30 small abscesses which were treated with blind aspiration and empirical therapy only 6 responded. Success rate was 20% while failure rate was 80%. In Ryan C. Cmejrek et al. [17] series 5 patients went aspiration but none responded with 100% failure rate. While in contrary other reports claim that use of closed drainage by aspiration produces rates of resolution around 80% [16]. Needle aspiration has theoretical advantages over open drainage procedures including that it requires no general aesthetic, is readily available, hospitalization time is shorter, cosmetic result is better and in some centers is more cost effective. Surgery carries its own inherent risks and potential complications.

Based on the results of our study we do not recommend blind aspiration and empirical therapy in the treatment of deep neck abscesses even if the abscess is small. We believe once abscess is formed whatever be the size it should be drained by surgical incision and drainage. Our belief is similar to what Kathryn Ossowski et al. [30] believe. They also

tend to approach all abscesses with incision and drainage because this seems to minimize time in the hospital and accelerates resolution.

Deep neck abscesses most commonly occur as a result of some infective focus in the pharynx, oral cavity or teeth. After the abscess has been treated the infective focus should be looked for and treated so that recurrences can be prevented. However, it is important to note that each child with a neck infection should be treated individually and that the type of treatment to use in each case is always the decision of the treating surgeon.

Conclusion

Pediatric deep neck infections and subsequent formation of 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. The cause is unknown in most of the patients followed by upper airway infection (tonsillitis, pharyngitis) and odontogenic infection. These infections are polymicrobial in good number of cases while most commonly caused by MRSA and klebsiella. 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. We in our set up start with clindamycin and ceftriaxone, this regimen covers Gram positives, negatives and anaerobes. Vancomycin should be reserved only for severe cases with systemic manifestations and when the organism is clindamycin resistant. Antibiotics should be modified once culture results are available. Once abscess is suspected by CECT and clinical findings we believe it should be drained by proper surgical.

References

1. Robert F. Yellon Head and Neck Space infections. (4th Edn) A text book of Pediatric otolaryngology by Charles D. Bluestone.
2. Poe LB, Petro GR, Matta I (1996) Percutaneous CT-guided aspiration of deep neck abscesses. *AJNR Am J Neuroradiol* 17: 1359-1363.
3. Lee YQ, Kanagalingam J (2011) Deep neck abscesses: the Singapore experience. *Eur Arch Otorhinolaryngol* 268: 609-614.
4. Lt Col AK Das, Lt Col MD Venkatesh, Lt Col SC Gupta, Gp Capt RC Kashyap (2003) Recurrent Deep Neck Space Infections. *MJAFI* 59: 349-350.
5. Shumrick KA, Sheft SA (1991) Deep Neck Infections. (3rd Edn) Paparella Otolaryngology. W. B. Saunders Company.
6. Kamath MP, Shetty AB, Hegde MC, Sreedharan S, Bhojwani K, et al. (2003) Presentation and management of deep neck space abscess. *Indian J Otolaryngol* 55: 270-275.
7. Ossowski K, Chun RH, Suskind D, Baroody FM (2006) Increased isolation of methicillin-resistant *Staphylococcus aureus* in pediatric head and neck abscesses. *Arch Otolaryngol Head Neck Surg* 132: 1176-1181.
8. Thomason TS, Brenski A, McClay J, Ehmer D (2007) The rising incidence of methicillin-resistant *Staphylococcus aureus* in pediatric neck abscesses. *Otolaryngol Head Neck Surg* 137: 459-464.
9. Barratt GE, Koopmann CF, Coulthard SW (1984) Retropharyngeal abscess—a ten-year experience. *Laryngoscope* 94: 455-63.
10. Coticchia JM, Getnick GS, Yun RD, Arnold JE (2004) Age-, site-, and time-specific differences in pediatric deep neck abscesses. *Arch Otolaryngol Head Neck Surg* 130: 201-207.
11. Wang LF, Kuo WR, Tsai SM, Huang KJ (2003) Characterizations of life-threatening deep cervical space infections: a review of one hundred ninety-six cases. *Am J Otolaryngol* 24: 111-117.
12. Eftekharian A, Roozbahany NA, Vaezaefshar R, Narimani N (2009) Deep neck infections: a retrospective review of 112 cases. *Eur Arch Otorhinolaryngol* 266: 273-277.
13. Cengiz BA, Kara A, Kanra G, Seçmeer G, Ceyhan M, et al. (2004) Acute neck infections in children. *Turk J Pediatr* 46: 153-158.
14. Dajani AS, Garcia RE, Wolinsky E (1963) Etiology of cervical lymphadenitis in children. *N Engl J Med* 268: 1329-1333.
15. Wright NL (1967) Cervical infections. *Am J Surg* 113: 379-386.
16. Marques PM, Spratley JE, Leal LM, Cardoso E, Santos M (2009) Parapharyngeal abscess in children - five year retrospective study. *Braz J Otorhinolaryngol* 75: 826-830.
17. Cmejrek RC, Coticchia JM, Arnold JE (2002) Presentation, diagnosis, and management of deep-neck abscesses in infants. *Arch Otolaryngol Head Neck Surg* 128: 1361-1364.
18. Scott BA, Stienberg CM, Driscoll BP (1998) Deep Neck space Infections. In: Byron J. Bailey Head and Neck Surgery – Otolaryngology. (2nd Edn) Lippincott-Raven publisher.
19. Yeoh LH, Singh SD, Rogers JH (1985) Retropharyngeal abscesses in a children's hospital. *J Laryngol Otol* 99: 555-566.
20. Dodds B, Maniglia AJ (1988) Peritonsillar and neck abscesses in the pediatric age group. *Laryngoscope* 98: 956-959.
21. Ijaduola TG (1986) Patterns of retropharyngeal abscess in Nigerian child. *J Natl Med Assoc* 78: 71-73.
22. Ungkanont K, Yellon RF, Weissman JL, Casselbrant ML, Gonzalez-Valdepena H, et al. (1995) Head and neck space infections in infants and children. *Otolaryngol Head Neck Surg* 112: 375-382.
23. Baldassari CM, Howell R, Amorn M, Budacki R, Choi S, et al. (2011) Complications in pediatric deep neck space abscesses. *Otolaryngol Head and Neck Surgery* 144: 592-595.
24. Elsherif AM, Park AH, Alder SC, Smith ME, Muntz HR, et al. (2010) Indicators of a more complicated clinical course for pediatric patients with retropharyngeal abscess. *Int J Pediatr Otorhinolaryngol* 74: 198-201.
25. Shah RK, Chun R, Choi SS (2009) Mediastinitis in infants from deep neck space infections. *Otolaryngol Head Neck Surg* 140: 936-938.
26. Songu M, Demiray U, Adibelli ZH, Adibelli H (2011) Bilateral deep neck space infection in the paediatric age group: a case report and review of the literature. *Acta Otorhinolaryngol Ital* 31: 190-193.
27. Brook I (1987) Microbiology of abscesses of the head and neck in children. *Ann Otol Rhinol Laryngol* 96: 429-433.
28. Gianoli GJ, Espinola TE, Guarisco JL, Miller RH (1991) Retropharyngeal space infection: changing trends. *Otolaryngol Head Neck Surg* 105: 92-100.
29. Panda NK, Mann SBS, Sharma SC (2000) Mediastinitis following deep neck infections: A therapeutic challenge. *Indian J Otolaryngol Head Neck Surg* 52: 391-395.
30. Ossowski K, Chun RH, Suskind D, Baroody FM (2006) Increased isolation of methicillin-resistant *Staphylococcus aureus* in pediatric head and neck abscesses. *Arch Otolaryngol Head Neck Surg* 132: 1176-1181.
31. Baker CJ, Frenck RW (2004) Guidelines for management of skin and soft tissue infections. *AAP News* 25: 110-117.
32. Wright CT, Stocks RM, Armstrong DL, Arnold SR, Gould HJ (2008) Pediatric mediastinitis as a complication of methicillin-resistant *Staphylococcus aureus* retropharyngeal abscess. *Arch Otolaryngol Head Neck Surg* 134: 408-413.
33. McClay JE, Murray AD, Booth T (2003) Intravenous antibiotic therapy for deep neck abscesses defined by computed tomography. *Arch Otolaryngol Head Neck Surg* 129: 1207-1212.
34. Brodsky L, Belles W, Brody A, Squire R, Stanievich J, et al. (1992) Needle aspiration of neck abscesses in children. *Clin Pediatr* 31: 71-76.