MICROBIOLOGY OF PAEDIATRIC DEEP NECK SPACE INFECTIONS

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A RESEARCH REPORT SUBMITTED TO THE UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MEDICINE, 2019.

DECLARATION

I, Sheetal Mungul hereby declare that this research is of my own work. I am submitting this research report for the degree Master of Medicine (in the submissible format with my protocol and extended literature review) in the branch of Otorhinolaryngology Head and Neck Surgery at the University of the Witwatersrand, Johannesburg. This research report has not been submitted before for any degree or examination at this or any other university.

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.....day of 2019

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ABSTRACT

Background

Paediatric deep neck space infection is an important entity that often requires hospitalisation for antimicrobial therapy. The spectrum of pathogens in paediatric deep neck space infections has to our knowledge, never been investigated in South Africa before. Resource limitations necessitate appropriate antimicrobial use as resistance patterns are higher and have a greater socioeconomic impact relative to higher income countries.

Objectives

To study the organisms and resistance profiles in the paediatric population of patients with deep neck space infection in a developing nation so as to aid in determining relevent, appropriate and effective antimicrobial empiric treatment. To describe the socioeconomic demographics of pediatric patients affected and the predominant age-related subtypes of deep neck space infections in an African population compared to those affected worldwide.

Methods

A retrospective review of patients aged younger than 16 years of age, with deep neck space infections over a 5,5-year period was conducted at a tertiary hospital in Johannesburg, South Africa. Diagnosis of deep neck space infection was determined by clinical, radiographic and laboratory findings. All patients received abscess drainage via either needle aspiration or surgical drainage using a sterile technique. Aerobic and anaerobic bacterial cultures and cultures for Mycobacterium tuberculosis were performed. Duration of hospitalization was used as an indicator of treatment response. Results were recorded, and statistical analysis was performed.

Results

A total of 107 children with deep neck space infection were included in the study, with 121 pus specimens retrieved. The male: female ratio was 1.14:1, with a total of 57 males and 50 females, demonstrating a slight male predominance. Mean age was 5.8 years (range 2months – 15years). There was no significant difference in duration of hospitalization in children less than 2 years and children older than 2 years of age. The submandibular space was the most common affected site (73.9%). Analysis of the 121 pus specimens demonstrated an

identifiable organism in 71% (n=86) of cases, with no bacterial growth in 29% (n=35) of specimens. *Staphylococcus aureus* was the most predominant organism cultured, with a prevalence of 65% of positive pus cultures. 100% of these organisms were sensitive to cloxacillin, and 100% were resistant to penicillin / ampicillin. With respect to positive pus cultures, there was an overall organism sensitivity to cloxacillin of 67% and overall resistance to penicillin / ampicillin of 76%. MRSA, TB and anaerobic bacterial infection have a much lower incidence than aerobic bacterial infection. Risk factors identified in our study include anemia and HIV.

Conclusion

Children across all age groups are affected by deep neck space infection in a low socioeconomic environment. Risk factors identified include anaemia and HIV infection. The incidence of TB and anaerobic infection is lower than expected. There is a high level of antimicrobial resistance to penicillin seen in our study, predominantly due to *Staphylococcus aureus* infection. These organisms are however sensitive to Cloxacillin, which is a cost-effective beta-lactam antibiotic. We therefore recommend empiric treatment with cloxacillin and metronidazole to cover for anaerobic bacterial infection and de-escalation if necessary once culture results are available.

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ABBREVIATIONS

CMJAH:	Charlotte Maxeke Johannesburg Academic Hospital
CRP:	C-reactive protein
CT:	Computerized Tomography
DNSI:	Deep neck space infection
HIV:	Human Immunodeficiency Virus
ICU:	Intensive Care Unit
MRI:	Magnetic Resonance Imaging
MRSA:	Methicillin-resistant *Staphylococcus aureus*
TB:	Tuberculosis
WHO:	World Health Organisation