Invasive Group A Streptococcal Bacteraemia: A Comparative Study at a Teaching Hospital in Riyadh, Saudi Arabia

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Abstract

The study was conducted to determine the epidemiological characteristics of invasive Group A β haemolytic Streptococcal infection at the King Khalid University Hospital Riyadh between 1995 and 2006. It was also designed to compare it with a prior study undertaken at the hospital between 1982-1993. During the period 30 consecutive patients with group A β haemolytic Streptococcal bacteraemia were recruited. A data form including age, gender, presentation, associated morbidities, blood culture results, throat swab cultures and outcome of the infection were recorded. The study found an incidence of 0.11/1000 admissions as compared with 0.14/1000 admissions in a prior study in the hospital. The subjects were made up of 16 adult and 14 pediatric patients. The mean age and age range of the patients were 52 years (45-73) and 3years (1 month to 11 years) for adult and pediatric patients respectively. Probable source of bactareamia were indentified in 36% of patients. The study found a declining incidence of invasive group A Streptococcal infection at the King Khalid University Hospital Riyadh. However, the predisposing factors and recognized co-morbidities were as in previous studies. In addition the mortality rate of toxic shock syndrome remains the same despite advanced in medical care.

Introduction

The patterns of infections caused by group A Streptococ-cus are variable; ranging from mild to invasive illness. The latter was seen mainly during the pre-antibiotic era, however, latest observation has raised a great concern of increasing incidence and severity. [1,2]. Reports from the Middle East had also concurred with changing pattern of group A Streptococcal bacteraemia. [3,4]. However, despite these reports, the commonest mode of presentations are mainly pharyngitis and impetigo. [5] All group A streptococcal infections have their highest incidence in children younger than 10 years. [6] Other factors predis-posing to infection include overcrowding, climactic factors with seasonal variations. [7] Epidemiological studies had demonstrated outbreaks of severe invasive group A Streptococcal infections occurring in some closed environments, such as military bases, nursing homes, and hospitals. [8,9]

Subjects & Methods

This retrospective study was conducted at King Khalid University Hospital, Riyadh. The hospital with a capacity of 630 beds provides all levels of care for Riyadh City and environs. It also served as a referral centre from all over the Kingdom of Saudi Arabia. The study reviewed all patients consecutively diagnosed to have group A β haemolytic Streptococcal bacteraemia between 1995 and 2006. A data form comprising personal data of patients, clinical

manifestations, co-morbidities, laboratory data and outcome of the infection was used for the study. Group A Streptococcal bacteraemia was considered when the organism is cultured from at least one occasion of blood septic screening procedure. The source of the bacteraemia was correlated from any positive body site. These sites include lesions from erysipelas, wound infec-tions and pharyngitis. Absence of possible site (s) of in-fection rendered the bacteraemia from an unknown source. The study also had an objective to compare pattern of group A Steptococcal infection from an earlier publication of the disease conducted at the same hospital. Our study demonstrated probable sources of invasive infections in 11 patients (36%) with documented two positive cultures from skin and throat. This indicates that the portal of entry can be unapparent. Previous reports also concur with majority of patients without obvious sources of bacteraemia.

Results

During the study period, 30 patients were reviewed after documented bacteraemia with group A β haemolytic Streptococcus. They constituted 16 paediatrics and 14 adult patients with male to female ration of 1:1 in both groups. The range age of the adult patients were 45 to 73 years with a mean of 52 and the children in the study had range of 1 month to 11 years with a mean of 3 years.

Nosocomial infections were documented in 4 patients while 26 episodes of group A were community acquired. Co-morbidities were noted as follows: Diabetes mellitus – 6 patients, cardiac diseases 7, bronchial asthma 3, skin diseases 6, malignancy 3, post splenectomy 1, post-operative period 1, post partum 2 and steroid therapy 1. The skin diseases were chronic ulcers, psoriasis and eczema. (Table 1).

In our series, 24 patients (86%) had underlying diseases predisposing to the disease; of these patients, seven (7) had more than one underlying conditions. This contrast to study by Al-Mazrou, where underlying conditions were recorded in two thirds of the patients reviewed. This might be attributable to improve health care delivery between the two studies. However, the figures concur with other series describing rates from 38 to 93%. [3, 12, 14, 15, 18]

The frequencies of clinical manifestations (Table 2) were most with fever and shortness of breaths. The least frequent manifestations were headache, diarrhoea, abdominal pain, wound infection, osteomyelitis and lymphadenitis. There were 5 episodes of shocks; occurring in 5 pa-tients aged 1 month, 6 years, 11 years, 45 years and 67 years. During the review, 5 patients (16.7%) died from the illness. The breakdown included 2 neonates, who presented with community acquired infection and developed shock. The adult patients who died had underlying co-morbidities which were diabetes mellitus, dilated cardiomyopathy, malignancy and hypothyroidism.

Discussion

Group A Streptococcal infection is an uncommon cause of bacteraemia. The incidence previously estimated in a study in this hospital from 1982-1993 was 0.14/1000 admissions. [4] The current study found an incidence of 0.11 per 1000 admissions. The low incidence compared to pre-vious could be ascribed to advance in medical care and accessibility to medical facilities. Higher incidences were, however, reported from series emanating from population with high proportions of intravenous drug users. [10, 11] In spite of this, the incidence rates of various studies are similar irrespective of location as confirmed by reports from USA and Canada with average incidence of 0.18 episodes per 1000 admissions. [12,13]

Our study demonstrated probable sources of invasive infections in 11 patients (36%) with documented two positive cultures from skin and throat. This indicates that the portal of entry can be unapparent. Previous reports also concur with majority of patients without obvious sources of bacteraemia.[3,12,14,15] However, as was classically described previously, the study showed varicella infection as an important risk factor in invasive disease as seen in two (2) patients sequel to breakdown of the skin barrier. The proportion of varicella infection comprising only 6.7% was not statistically different from 8% recorded by Al-Mazrou [4]. The rates, however, were different from other series of 15-27% reported in paediatric age groups. [16,17].

This study significantly recorded seven (7) patients with underlying cardiac diseases raising an interest regarding the association between cardiac disease and invasive infection. [19] Consequently, further study especially multi-centered is required to evaluate the association of this disease with rheumatic heart disease.

Low levels of protective anti-streptococcal antibodies in plasma had been earlier documented to predispose to invasive group A infection. Holm et al suggested that absence of specific antibodies to the M protein may predispose to invasive and fatal infections [20].

We suggest also here that an altered immune status of the host in 36.6% of our patients was also likely the predisposing factor for invasive disease. These conditions included: diabetes mellitus 6, malignancy 3, post splenectomy 1, and steroid therapy 1.

Streptococcal toxic shock-like syndrome was noted in 16.7% of patients. Our study recorded a mortality rate of 16.7% corresponding to previous population-based studies. [1, 21, 22] These patients were 3 children and 2 adults with underlying diseases. This contrast with the studies of Hoge et al [23] and Davies et al [24] where they characterized that the syndrome usually develops in young and previously healthy patients.

Nosocomial group A Streptococcal bacteraemia is usually an uncommon occurrence. In this study, we recorded only 13.3% of cases from nosocomial mode of transmission which was lower than 24% recorded by Al Mazrou previ-ously in this hospital. [4] However, the rate is closer to other series which recorded rate of less than 10%. [3, 25, 26]

There were similarities regarding the observed clinical presentation with other studies. In contrast with the other studies, 4 patients (13.3%) in our series were noted with soft tissue infection. The low frequency was similar to the previously observed low level of intravenous drug abuse. Compared to the previous study in this hospital, none of the patients in this series developed either scarlatini-form rash or desquamation as were noted in some reports. [14, 27]

The overall mortality in this study was 16.7% which is lower than the previous recorded 21% mortality in a simi-lar study in this hospital. This figure is however similar to mortality rates reported in other series. [3,10, 12,26]

Table 1: Underlying conditions in 30 patients with Group A β haemolytic bacteraemia

Underlying conditions	No of Patients (%)
Diabetes mellitus	6 (20.0%)
Rheumatic Heart disease	7 (23.3%)
Bronchial Asthma	3 (10.0%)
Skin diseases	5 (16.7%)
Malignancy	3 (10.0%)
Prior Varicella infection	2 (6.7%)
Others	6 (20.0%)
None	6 (20.0%)

Table 2: Composite Clinical features in 30 patients with Group A β haemolytic bacteraemia

Feature	No of patients (%)
Fever	24 (80.0%)
Chills	2 (6.7%)

Shock	5 (16.7%)
Vomiting	7 (23.3%)
Pharyngitis	2 (6.7%)
Cough	3 (10.0%)
Dyspnoea	9 (30.0%)
Cellulitis	3 (10.0%)
Skin Rash	5 (16.7%)
Septic arthritis	4 (13.3%)
Urinary symptoms	2 (6.7%)

In conclusion, invasive group A β haemolytic Streptococcal bacteraemia is still an uncommon disease. The condition may present in any age group including neonates. It is occasionally accompanied by rapid fatal course.

The natural history is still unclear and it is difficult to predict the outcome of the disease as the interplay between host and the organism does not appear to contribute to its evolution. Healthy people can acquire the disease but highest risk appear to be related to chronic illness like cardiac diseases, diabetes mellitus, skin diseases and underlying malignancies.

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