Clinical, Etiologic And Evolutionary Characterization of Osteoarticular Infections in Children Hospitalized in A Referral Tropical Medicine Center

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ABSTRACT

Introduction: Osteoarticular infections (OAI) are an infectious pediatric pathology, generally of bacterial etiology, relatively frequent and potentially severe.

Objective: To determine the clinical, etiological and evolutionary characteristics of osteoarticular infections in hospitalized children in a referral center.

Materials and methods: Observational, retrospective cross-sectional study. We reviewed the medical records of all children from 1 month to 15 years of age hospitalized in the Pediatric Service of the Institute of Tropical Medicine (IMT) from 01/01/2010 to 12/31/2015 with diagnosis of osteomyelitis, Osteoarthritis or Septic Arthritis

Results: A total of 59 children with an OAI diagnosis were hospitalized. 25 (42.4%) diagnosed with septic arthritis, 6 (10.2%) polyarthritis, 21 (35.6%) osteomyelitis and 7 (11.9%) osteoarthritis. The mean age was 8.9 + 3.8 years, 40 (67.8%) were males. Pain and functional impotence were the most frequent symptoms. 47 (79.6%) were located in lower limbs. Staphylococcus aureus methicillin resistant (MRSA) 17 (41.5%), methicillin sensitive Staphylococcus aureus (SAMS) 18 (43.9%), Pseudomonas sp. 2 (4.9%), Klebsiella pneumoniae BLEE 3 (7.3%), another 5 (12.1%). In this series 2 patients diagnosed with septic shock at the joint point (Hip and knee respectively) without germ isolation died.

Conclusion: OAI remains to be pathology of high morbidity in our environment. They affect more often the lower limbs as well as school-age male children. The UAA was the most frequent isolated germ. The mortality rate is low and the sequelae continue to appear.

Key words: MRSA–osteomyelitis–pediatric

1 INTRODUCTION

Osteoarticular infections (OAI). Osteomyelitis (OM), osteoarthritis (OA) and septic arthritis (SA) are an infectious pediatric disease, in general of bacterial etiology, relatively frequent and potentially severe [1, 2].

In developed countries these infections are rare. The annual incidence varies regionally between 10-25 per 100,000, of these, 2/3 constitute OM. The incidence increases in those immune-compromised individuals or carriers of sickle cell anemia [1].

The incidence is very varied, ranging from 1: 20,000 to 1: 1000. Of all cases, 25% occur in children under 2 years of age and 50% in children under 5 years of age. Males have a risk 1.2-3.7 times higher than women [1].

The OAI is importance because the musculoskeletal system in the child is constantly growing, so that an affectation of the growth cartilage or epiphysis can produce an alteration in bone development and the consequent sequelae [1].

The incidence of OAs varies; OM 2.9-75 cases per 100,000 and for AS 5-37 per 100,000. Cases of joint infections appear to be stable, but not the OM that is striking are increasing [3]. The specific data of OAs in developing countries are scarce. Risk factors, such as malnutrition, trauma and inadequate coverage of vaccines, are extensive [1, 4].

The infection is considered acute if the time from the onset of symptoms to the consultation is less than 14 days.
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Children are more affected than girls with relationships that vary between 2:15. Osteomyelitis is the inflammation of the bone tissue accompanied by destruction of it, usually due to a bacterial infection. It is an acute process that if not adequately treated can become chronic and cause sequelae [3]. The objective of this investigation was to determine the clinical, etiological and evolutionary characteristics of osteoarticular infections in children hospitalized in a referral center. [5]

2 METHODOLOGY

2.1 Study design
Observational, retrospective cross-sectional study.

2.2 Population
Children from one month to 15 years, admitted to the Pediatric Service of the Institute of Tropical Medicine (IMT) between January 1, 2010 and December 31, 2015.

2.3 Focused Population
Children from one month to 15 years admitted to the pediatric service of the Institute of Tropical Medicine (IMT) with diagnosis of osteoarticular infections.

2.4 Accessible Population
Patients admitted to the IMT pediatrics service with diagnosis of osteoarticular infection discharge during the period from January 2010 to December 2015.

2.5 Sample
No probabilistic, consecutive, for convenience. Out of a total of 59 inpatients, the medical records of patients diagnosed with osteoarticular infection at discharge during the period between January 1, 2010 and December 31, 2015 were reviewed.

2.6 Operational definition
2.6.1 Confirmed infection
When germ of blood culture, osteoarticular tissue or both were isolated.

2.6.2 Probable infection
Clinical and compatible images, obtaining purulent secretion by bone or joint puncture or both but no germ was isolated.

2.7 Inclusion criteria
- Patients admitted to the IMT Pediatric Service aged between 1 month and 15 years with diagnoses of confirmed or probable osteoarticular infection (according to the established definition and according to the ICD-10) during the period from January 2010 to December 2015.

2.8 Ethical issues
The work was carried out under the rules of the Declaration of Helsinki. No clinical experimentation is performed, the names of the patients analyzed are kept secret.

2.9 Process
We reviewed the medical records of all children from one month to 15 years of age hospitalized in the Pediatrics service of the Institute of Tropical Medicine (IMT) between January 1, 2010 and December 31, 2015 with diagnosis after discharge. Osteomyelitis, Osteoarthritis and Septic Arthritis.

The signs and symptoms compatible with the disease were analyzed: Fever, Pain, Swelling and Functional Impotence. Bacterial isolates were recorded in blood culture, joint fluid and/or bone tissue.

A confirmed case was defined when germ was isolated in blood culture, joint fluid and/or bone tissue. Probable case when the clinic was compatible or there was pus in the bone and/or joint puncture but without germ. [6]

The cultures, identification of the isolated germ and the susceptibility study were carried out in the IMT Microbiology Laboratory by means of usual microbiological techniques. The susceptibility of the UAA was determined by diffusion disc and MIC. For strains susceptible to Clindamycin it was determined by effect D.

The cases were analyzed by sex, age, topography of the infection, etiology and susceptibility.

Treatment, duration of hospital stay, need for surgical procedure, complications and sequelae were compared.

The characteristics of the patients were analyzed with descriptive statistics, the continuous variables were expressed with terms of average and DE. The tabulation of the findings was made by using Excel® software. [7, 8]

3 Results
During the study period, 59 children diagnosed with OAI were hospitalized. In 25 (42.4%) the diagnosis at discharge was septic arthritis, in 6 (10.2%) polyarthritis, in 21 (35.6%) osteomyelitis and in 7 (11.9%) osteoarthritis. The annual distribution of cases was 5 in 2010, 17 in 2011, 6 in 2012, 11 in 2013, 12 in 2014 and 8 in 2015.

The mean of the ages was 8.9 ± 3.8 years, 40 (67.8%) were male. The demographic, laboratory and etiological characteristics of the patients are shown in Table 1.

The symptoms present in the majority of the patients were pain and functional impotence whereas approximately half reported the existence of previous trauma (Table 2).

Of the total infections, 47 (79.6%) were located in the lower limbs, 8 (13.5%) in the upper limbs and 4 (6.77%) affected the upper and lower limbs (Figure 1).

They met the criteria of confirmed case 41 (69.5%) and suspected case 18 children (30.5%). [9]

The sterile medium with the highest bacterial isolation was the blood culture, which yielded positive results in 26 samples (44%), followed by the joint and...
Table 1. Demographic, laboratory and etiological characteristics of OAI in hospitalized children, 2010 - 2015

Table 2. Clinical characteristics of osteoarticular infections in children hospitalized in a reference center, 2010 - 2015

Figure 1. Anatomical sites compromised in the OAI. 2010-2015

Figure 2. Germ isolation of osteoarticular infections in children hospitalized in a reference center, 2010–2015

All Staphylococcus aureus isolates were sensitive to clindamycin and trimethoprim / sulfamethoxazole, it should be noted that none showed resistance induced clindamycin.

The evolution, complications and sequelae of children with OAI (SAMS, MRSA, other germs, polymicrobials and unknown germs) are shown in Table 3. There was no significant difference between the requirement for drainage of OAI to SAMS vs MRSA. Only 17% of children with OAI to an unknown germ required a surgical procedure. Although the hospital stay of children with OAI at MRSA was longer, it did not have a statistically significant value. [10, 11]

The initial empirical treatment of 45 patients (76.3%) included clindamycin, while 14 (23.7%) received vancomycin and in 6 (10.1%) patients received as initial therapy clindamycin plus vancomycin. [12]

In this series, 2 patients died with a diagnosis of septic shock at the point of departure (hip and knee respectively), of which no germ was isolated. [13, 14]

4 DISCUSSION

OAI are diseases of relative frequency in children. They constitute a potentially serious pathology that can leave sequels and even cause death.

In Paraguay, there are few reports on the prevalence of these infections in the MRSA era. [15]

As was published internationally, the majority of cases occurred in males and the most frequent location was in the lower limbs [1, 9, 11, 12].

The diagnosis of this type of infection requires a high clinical suspicion that must be complemented with laboratory and imaging studies. However, diagnostic confirmation...
requires the isolation of germ in blood culture, bone and/or articular tissue. [16]

The study of etiology was confirmed in almost two thirds of the cases, data that coincide with other international publications. Bone or joint puncture is not performed in all patients, so it is necessary to insist on performing this procedure in all suspected cases of OAI in order to increase, even more, the isolation of the causative agent. [17, 18]

As in most international publications, the most frequently isolated germ was the UAA. It is striking that K. pneumoniae BLEE was the second most highly isolated seed and Pseudomonas sp. the third.

Notably, as described in other series, the absence of isolation of Haemophilus influenzae type b and Streptococcus pneumoniae, attributable to high vaccination coverage against these germs. [19]

Several published series cite Kingella kingae as the second causative agent in the OAI, especially in children under 5 years of age. In the series published here, no germ was isolated in any of the samples obtained; this is due to the lack of the necessary tool (RT-PCR), which increases the finding of this germ. [20]

The emergence of MRSA as the main etiologic agent is highlighted, similar to that published in Uruguay and Argentina, so it is necessary to continue epidemiological surveillance, with the aim of evaluating the recommendations regarding the initial empirical treatment.

Compared with the other etiologies, patients with UAA infections had a more severe clinical presentation, although the two deaths occurred in patients without isolated germ. [21]

The initial empirical treatment, in this series, reflects the adequacy of the Institution to local epidemiology. Since it is one of the reference centers in Infectious Pathology, the recommendation to adopt new schemes of initial empirical treatment of OAI arises. [22]

Unlike that described in other regions [1, 12, 23] in our series, no inducible resistance to clindamycin was described, which is a comforting phenomenon in order to continue using this drug as an initial treatment, but at the same time it is necessary to continue the study of phenomenon D described in some strains of MRSA.

It is possible that the poor evolution of patients infected by UAA is linked to the presence of germ virulence factors (PVP), which were not studied due to lack of means, as well as the high late consultation rate observed.

This clinical experience has multiple limitations. We do not have sophisticated imaging studies (ultrasound, MRI or CT) routinely, so not all patients with a suspected diagnosis had such an evaluation. At discharge, not all patients had a record of the VSG value or PCR.

Thus, the suggestion of a prospective follow-up and protocolizing the images and bacteriological studies to optimize the diagnosis of certainty.

Our results suggest that initial empirical treatment should include drugs that include coverage against MRSA.

It is necessary to perform multicentric, prospective and randomized studies that ensure a correct follow-up in order to compare the time of conventional initial EV treatment versus the abbreviated scheme that some authors suggest in order to evaluate the possible prognostic factors that produce the therapeutic failures.

5 CONCLUSIONS

The OAI remain pathology of high morbidity in our environment. They affect more frequently the lower limbs as well as male children of school age.

The UAA, both SAMR and SAMS, was by far the causal agent responsible for most infections. It is probable that the initial empirical treatment in our environment should always incorporate an effective drug against MRSA.

The mortality rate is low and the sequelae, despite being avoidable, continue to appear.

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