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Shoulder Septic Arthritis in the Pediatric Age - an Epidemiologic Study

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Abstract **Original Research Article**

Shouder septic arhtirtis in children may be a challenge due to its limited studies and absence of an algorithm. Elevated C-reactive protein (CRP) and pseudoparalysis of the shoulder may be the most preditive indicators. This paper aims to conduct a retrospective epidemiologic analysis of the pediatric shoulder arthritis cases of the last 5 years in our central pediatric hospital. It includes shoulder septic arthritis diagnosed in the last five years in our central pediatric hospital, in a total of twelve patients, treated surgically with aspiration and articular washout, or arthrtomy among other procedures, with patients between 13 days and 6 year-old. The most isolated pathogens where Kingella Kingae and Streptococcus pyogenes.

Keywords: Shoulder septic arthritis; Kingella kingae; Streptococcus pyogenes; pseudo paralysis; joint effusion.

INTRODUCTION

Septic arthritis of the shoulder in young children may be difficult to diagnose. There is not a clear diagnostic algorithm, due to the limited literature.

Danilov *et al*., conducted a study suggesting the most predictive indicators were pseudo paralysis and elevated C-reactive protein (CRP). Increased leucocytes would be adjuvant to the diagnosis, nevertheless, a weak positive predictive factor [1]. Bono *et al*., in his retrospective study in infants younger than 3 years old, apart from the mentioned above, added fever and osteomyelitis changes in radiograph and ultrasound, though fever may not manifest due to the immature immune system [2, 3].

The aim of this paper is to conduct a retrospective epidemiologic analysis of the pediatric shoulder arthritis cases of the last 5 years in our central pediatric hospital, as far as the symptomatology and bacteriology is concerned and to compare it with a brief review on the literature.

MATERIAL AND METHODS

This study is descriptive of all the shoulder septic arthritis diagnosed in the last five years in our central pediatric hospital, in a total of twelve patients, treated surgically with aspiration and articular washout or arthrotomy among other procedures.

The aim is to describe the symptoms, laboratory findings and the most common pathogens among septic arthritis of the shoulder in our center. The antibiotics were chosen according to the hospital's Ortho-Infectious diseases protocol.

All of the microbiology means of pathogen isolation where considered (Blood cultures, liquid aspiration, soft tissue microbiology and oropharyngeal swab polymerase chain reaction for Kingella Kingae. All cases had shoulder joint effusion on sonography.

RESULTS

Table 1

Case	Age	Symptoms		Laboratory findings		Isolated pathogen	Anthibiotics	Observations
		Fever	Pseudo paralysis	Leucocytosis	Elevated RCP			
1	2y	--	X	--	X	--	Cefuroxime	-
2	13d	--	X	X	X	*Escherichia coli*	*ceftriaxone and gentamicine*	Concomitant osteomyelitis Relapse at 20d of age with new articular washout
3	15m	X	X	X	X	*Streptococcus pyogenes*	*peniciline and clindamicine*	-Soft tissue abscesses 4 days after articular washout, debrided - Osteomyelitis abscess with 16x10mm in Magnetic resonance imaging in the 21st day after first intervention, with bone disruption and soft tissue abscesses. Sonography with joint effusion. New surgical intervention: Osteomyelitis abscess decompression + debridement + articular lavage
4	3y	X	X	X	X	*Streptococcus pyogenes*	*Peniciline and clindamicine*	--
5	14m	X	X	X	X	*Streptococcus pneumoniae*	*Ampiciline and cefuroxime*	-Soft tissue abscess associated, drained
6	14m	X	X	--	X	*Kingella kingae*	Cefuroxime	--
7	10m	X	X	X	X	*Kingella kingae*	Cefuroxime	--
8	22m	X	X	X	X	*Kingella kingae*	Cefuroxime	--
9	12m	X	X	-	X	*Kingella kingae*	Cefuroxime	--
10	12m	--	X	X	X	--	*Cefuroxime*	--
11	5y	X	X	--	X	*Streptococcus pyogenes*	*Peniciline and clindamicine*	--
12	6y	x	X	X	X	*Streptococcus pyogenes*	*Peniciline and clindamicine*	-First diagnosis with soft tissue abscesses beyond septic arthritis, with drainage and debridement besides articular lavage - Relapse in the 17th day after surgical interventio, with new articular lavage, and soft tissue abscess drainage and debridement (Figure 1)

Figure 1: Relapse of Case 12

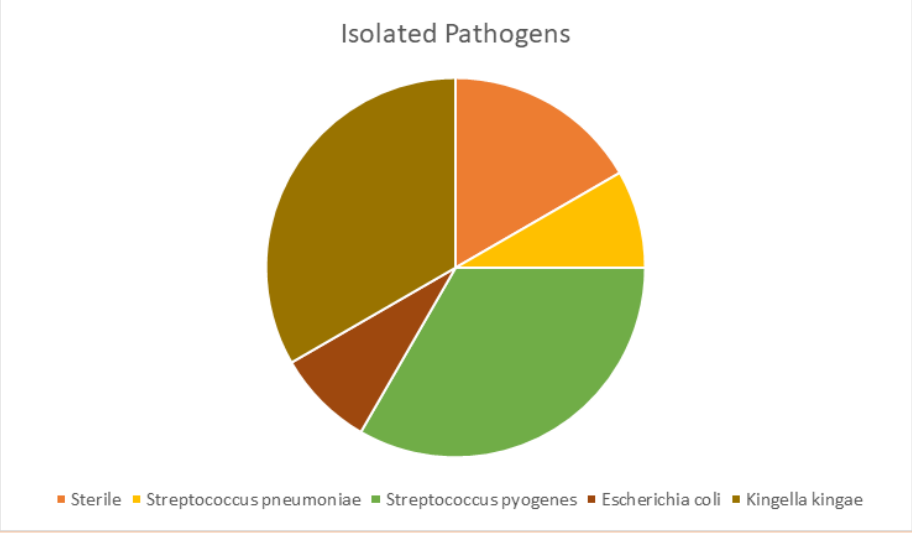

Figure 2: Distribution of isolated pathogens

Septic arthritis cases have a follow-up in Ortho-Infectious diseases consult team through the 1st year after the episode. Except for Case 11, who lived abroad and the follow-up was lost, all cases recovered shoulder mobility and so far there was no infection relapse.

As far as the pathogens are concerned, in two cases there was no isolation. In case 11, the infant was already under antibiotics due to an otitis, which could have been the reason why the cultures where negative. As for case 1, there is also no laboratory evidence it was a septic arthritis rather than a non septic arthritis.

The 2 most isolated pathogens were Streptococcus pyogenes and Kingella Kingae, making up 30% of cases each one.

As far as Kingella Kingae is concerned, Cases 6 and 7 had both liquid cultures and oropharyngeal swab polymerase chain reaction positive for the pathogen. However, in Case 8 and 9, Kingella Kingae was only detected in oropharyngeal swab polymerase chain reaction.

As for Streptococcus pyogenes, in cases 3,4,11 it was positive in the articular fluid and in Case 12 it was isolated from infected subacromial soft tissue. Cases 3 and 4 had varicella.

Escherichia coli was found in one neonate, in which it was detected in the articular fluid. Regarding to Streptococcus pneumoniae, positivity was found on blood cultures.

Concomitant osteomyelitis was found in two cases. Though, only an MRI could have excluded its abscense in all the other cases with a normal X-ray, given the similar therapeutic scheme and clinical resolution.

As for the surgical management, cases 5,6, 11 and 12 were the only ones on which arthrotomy was made in the first approach. In the other cases, a minimally invasive whashout with punctioning was made.

DISCUSSION

In regard to clinical examination and laboratory findings, pseudo paralysis and elevated RCP where the only parameters present in all cases, consistent with Danilov *et al*., research as the most predictive indicators of this pathology [1].

Septic arthritis is usually treated with adequate drainage and antibiotics. Though, the studies are limited on whether the best drainage or washout method for septic arthritis of the shoulder in children is. Arthrotomy has the benefit of a comprehensive joint visualization and debridement, nevertheless, it is more invasive and increases potential complications such as joint stifness. In contrast, minimally invasive washout is less invasive and can offer a quicker recovery, though it is arguable its limitations in complex infections. Arthroscopy could give a good joint overview with the perk of a more extensive washout. Thus, it is technically more demanding [4]. Among these cases, the relapsed cases 2 and 3 would have benefited from a more aggressive intervention from the beginning.

Regarding to the concomitant osteomyelitis proportion of patients, it differs from the literature probably because only an MRI could have excluded its absence in all the other cases with a normal X-ray, given the similar therapeutic scheme and clinical resolution. There are reported rates of 75% by Montgomery *et al*., 67% by Belthur *et al.*, and 56% by Schmidt *et al*., [5-7].

As for the isolated pathogens, Escherichia coli is more common in neonates than in the rest of pediatric population [8]. It is a naturally living bacteria in the birth canal.

Concerning Streptococcus pneumoniae, presenting in one case, according to an European study from 2021, it consistis in 6.5% of pediatric osteoarticular infections [8].

Regarding *Kingella Kingae*, one of the most isolated pathogens in this study, it is consistent with high prevalence in literature among infants between 6 and 48 months [9]

As far as Streptococcus pyogenes is concerned, it is a common pathogen in the pediatric population and traditionally causes severe invasive infections [10], consistent with the fact that 2 out of the 4 cases with this pathogen needed more than one surgical intervention.

Staphylococcus aureus is the most common agent in septic arthritis among native joints [11, 12]. However, it was not isolated in any of the reported cases. Pediatric septic arthritis is much more prevalent in the lower extremity, so statistical prevalence of Staphylococcus aureus may be biased as far as the upper extremity is concerned.

CONCLUSION

The number of cases of this study is short and includes infants with different ages and different propension to some pathogens, like Kingella Kingae. However, all of the following ages (13 days to 6 years) would be susceptible to Staphylococcus Aureus, the most common pathogen in septic arthritis in literature. Pediatric septic arthritis is much more prevalent in the lower extremity, so statistical prevalence of Staphylococcus aureus may be biased as far as the upper extremity is concerned.

There are no specific studies in literature regarding to the epidemiology of specific shoulder septic arthritis agents. The dimension of this study is insufficient to take any conclusions, however, further studies with more cases would be something to invest on.

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