FLOWCHART DISTINGUISHINGBETWEEN SEPTIC ARTHRITIS AND TRANSITORY SYNOVITIS OF THE HIP IN CHILDREN

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ABSTRACT

The distinguishing diagnosis between the septic arthritis and the transitory synovitis of a hip is not easy to be carried through; therefore, there is not a simple, nor sensible and satisfactorily specific examination to differentiate them. Thus, the use of a propedeutic set of examinations becomes necessary to demand greater cost and depend on a bigger infrastructure of the health institution. First of all, the necessity of a multifactorial analysis on a flowchart is evident, so it can rationalize the indication of unnecessary or more invasive procedures as artrocentesis, magnetic resonance and the surgical draining. A revision of literature on the databases of Pubmed and Cochrane until May of 2009 was carried through, and the importance of the clinical examination, laboratorial tests and imaging exams was analyzed. By studies on the data, it was elaborated a flowchart for the diagnosis and the conduction of the management on the patient, between the ages of six months and eighteen years old, with complaint of pain on the hip under suspicion of inflammatory picture. Level of Evidence: Level III, diagnostic studies - investigating a diagnostic test.

Keywords: *Arthritis. Hip. Child. Synovitis.*

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INTRODUCTION

Claudication and pain in the coxofemoral joint are frequent complaints that lead children and adolescents to seek urgent medical care in pediatric orthopedics. These symptoms are common to a diverse range of diseases with a broad spectrum of severity and different treatments. Unfortunately, after extensive investigation and elimination of some hypotheses, it is not always easy to perform the differential diagnosis among the main ailments involved in the diagnostic hypothesis, such as septic arthritis and transitory synovitis of the hip.[1]

Septic arthritis is the articular infection caused by a bacterial agent, which causes joint destruction. It affects four out of every 10,000 children under 13 years of age in the USA and can occur in any joint, yet is more common and also more harmful in the hip, totaling 40% of cases.[2-4]

The diagnosis of septic arthritis of the hip is based on the clinical, laboratory and radiographic findings. In clinical terms there can be general and nonspecific symptoms such as irritability, fever and anorexia, and symptoms related to the joint lesion such as claudication, inability to bear own weight, pain on passive movement of the limb, adoption of Bonnet's antalgic position–flexion, abduction and external rotation of the coxofemoral joint-and, in more advanced cases, stigmas in the skin from the anterior region of the thigh and regional edema.[5-7] It is worth remembering that newborns may present just a profile of anorexia, irritability, lethargy and pseudoparalysis of the affected limb.[8,9]

On the other hand, transitory synovitis is the most important differential diagnosis of septic arthritis. It involves idiopathic and aseptic synovial inflammation and consists of the main cause of pain in the hip joint in childhood, whereas the risk of a child having at least one episode of transitory synovitis of the hip is 3%.[10-12]

The initial clinical profile is very similar to the profile of septic arthritis, yet signs of infection such as leukocytosis, increase in erythrocyte sedimentation rate and of C-reactive protein, are not usually high; neither does imaging, tapping and culturing of the material obtained, reveal positive data for infection. The clinical profile is self-limited and the average duration of the symptoms is 10 days.[11-13]

In view of the problem put forward, the need for performance of the early differential diagnosis between these two diseases is imperative to allow us to both avoid the drastic complications of the neglected treatment of septic arthritis, and the damage of an arthrotomy in patients that have nothing to gain from this procedure. The aim of this study is to prepare a flowchart based

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on the relevant data found in literature, to assist in the practical differential diagnosis suited to our reality, in case of suspected septic arthritis or transitory synovitis of the hip in children.

MATERIAL AND METHOD

There was a review of literature in the databases MeSH do Pubmed and Cochrane until May 2009. The Keywords used were "Synovitis", "Arthritis, Infections" and "Hip Joint". The articles encountered were filtered leaving those that covered only children and adolescents between 6 months and 18 years of age. Moreover, the search was limited to articles written in English, Portuguese and Spanish. Thus, 31 articles were obtained. The articles that proposed methods of clinical, laboratory and imaging differentiation were tabulated and compared to one another, then used as a basis to build a flowchart for diagnosis and management in suspected cases of septic arthritis or transitory synovitis of the hip.

RESULTS

After evaluating the data focusing on pertinent articles in literature, we obtained the results shown in Table 1.

DISCUSSION

After an evaluation of the studies mentioned here, it is observed that imaging methods can be used in the search for signs of these diseases. Simple hip radiographs can evidence an increase of the joint space and obliteration of the periarticular fat pads.[14] In practice, however, these alterations characterizing capsular distension are common to both ailments, not distinguishing between them.

Ultrasonography detects the presence of joint effusion that although present is very nonspecific, and often detectable in the two disorders.[15] It is also possible to use magnetic nuclear resonance, which is able to detect further details and also the decrease of femoral head perfusion.[16] But it is an exam that requires anesthesia in younger children or sedation, and is not always available, especially in our field.

Bone scanning can also be used, with more restricted use, whereas at the beginning of septic arthritis the image appears with a low standardized uptake value due to the decreased blood flow and, afterwards a "hot" standard, due to the result of the vascular response of blood flow increase. Finally, leukocytes labeled with gallium and indium may be useful in the diagnosis of atypical cases, although they are hard to achieve and only present their results after 48 to 72 hours.[17] Once again, these are items that although practicable in some centers, are of limited availability and not in line with the urgency that early diagnosis lacks, especially in this differential.

In septic arthritis, the most frequent laboratory findings are: serum leukocytosis above 12,000 cells/mm^3 (40-60% of polymorphonuclear leukocytes), erythrocyte sedimentation rate (ESR) above 50mm/h, high C-reactive protein (CRP) >1mg/dL and positive blood culture in 30 to 50% of the cases.[18-20] In transitory synovitis of the hip there is no leukocytosis or alterations in the HSS and CRP values.

In the joint aspiration it is necessary, besides the direct analysis of the material, to evaluate the presence of leukocytes which usually results in a count above 50,000 cells/mm^3 (75% of polymorphonuclear leukocytes), Gram staining method that is positive in 30 to 50% of the cases, synovial protein and glucose dosages below the serum levels, increase of lactate and culture that can be positive in 50 to 80% of cases.[21,22]

Although many supplementary exams can be used to aid the diagnosis of septic arthritis, many studies demonstrate that none of the tests on their own was conclusive for the diagnosis of this disease, except for the Gram staining method and the positive culturing.[21]

The treatment of septic arthritis is based on arthrotomy with direct lavage of the affected joint, followed by early and appropriate antibiotic therapy that is initially performed assuming the most likely etiologic agent, and subsequently modified according to the culture results.[22-25] More recent studies suggest that arthroscopy may be a less invasive alternative for the treatment of this disorder, as it can satisfactorily substitute arthrotomy.[26] And, in our experience, with much less damage to the regional soft parts, which facilitates early functional rehabilitation.

The treatment of transitory synovitis, much less invasive than that described for septic arthritis, consists of clinical observation with thermal curve, relative rest of the limb and administration of a non-steroidal anti-inflammatory drug for a short period of time. Sequelae do not exist in these cases.[10-13]

For the performance of the proposed flowchart it was necessary to adapt some parameters used in the studies found in literature. Fever, for example, was measured by the oral temperature in the studies by Kocher *et al*.[27,28], Falzon *et al*[29] and Caird *et al*.[18], yet this is not evaluated in most orthopedic services in Brazil and, we therefore use the axillary temperature of 37.8 °C.[30] The leukocytosis used in the proposed flowchart (>12000cells/mm^3) is justified by the greater ethnic similarity between the Brazilian population and that of the studies that used the same cut-off point, in comparison to the Korean population that considers a lower value of leukocytosis (11000cells/mm^3). The previous search for medical treatment, stressed as an important predictive factor in several studies,[31] was not taken into consideration in the formulation of our flowchart due to the characteristics of health services in Brazil, in which the initial provision of medical care can be performed directly by the actual specialist by spontaneous demand and search, unlike the population studied by Luhman *et al*.[31] in St. Louis, Missouri, in which the medical visit prior to hospital admission was used as a predictor. Thus we present the proposed flowchart below. (Figure 1)

The need for four predictive factors was the option due to the fact that it is a sort of common denominator in the majority of studies encountered in literature and presents results above 90% of probability of being septic arthritis.

CONCLUSION

We concluded that the creation and follow-up of a flowchart optimizes not only the diagnosis, but also intra-hospital care,

Table 1. *List of articles and their analytical summaries.*

Citation	Group	Study	Relevant predictors	Results	Limitations
Kocher *et al* (1999) USA. [27]	168 children (82SAand 82TS)	Retrospective diagnostic study	1- T>38.5° 2- Not bear own weight 3- HSS>40mm/h 4- Leukocytosis>12000cells/mm	Individually the variables do not distinguish between SA and TS. In conjunction the probability of having SA: 0- <0.2% 1- 3% 2- 40% 3- 93.1% 4- 99.6%	Absence of CRP
Jung *et al* (2003) Korea. [14]	124 children (27SAand 97TS)	Retrospective diagnostic study	1- T>37°C 2- Leukocytosis>11,000cells/mm 3- HSS>20mm/h 4- CRP>1mg/dL 5- Increase of joint space>2mm (all measurable values)	0- 0.1% 1- 0.3-1.7% 2- 2.7-22.7% 3- 24.3-77.2% 4- 84.8-97.3% 5- 99.1%	Low no. of patients with SA
Kocher *et al* (2004) USA. [28]	162 children (51 SA and 103 TS	Prospective validation study	1- T>38.5° 2- Not bear own weight 3- HSS>40mm/h 4- Leukocytosis>12000cells/mm	0- 2% 1- 9.5% 2- 35% 3- 73% 4- 93%	Absence of CRP
Luhmann *et al* (2004) USA. [31]	165 children (57 SA and 118 TS)	Retrospective diagnostic study	1- T>38.5°C 2- Leukocytes>12000cels/mm 3- Medical visit prior to hospital admission	Presence of the three factors 71% of probability of SA, already with Kocher□s criteria 59%	Absence of CRP
Caird *et al* (2006) USA. [18]	48 children (34SAand 14TS)	Prospective validation study	1- T>38.5°C 2- Leukocytosis>12000cels/mm 3- HSS>40mm/h 4- CRP>2mg/dL 5- Not bear own weight	0- 16.9% 1- 36.7% 2- 62.4% 3- 82.6% 4- 93.1% 5- 97.5%	Small no. of patients
Levine *et al* (2003) USA.[19]	133 children (39 SA and 94 TS)	Retrospective diagnostic study	Comparison between CROand HSS	CRP best independent predictor CRP<1mg/dL probability of NOT having SA 87%	
Li *et al* (2007) USA. [21]	156 adult patients and children (16 SA)	Retrospective diagnostic study	1- Leukocytosis>11,000cells/mm 2- Articular leukocytosis> 50,000cells/mm 3- HSS>20mm/h	Combined sensitivity of 100% Combined specificity of 24% Best articular leukocytosis test E=88% S=50%	Few cases of SA Presence of adults in the study

SA : septic arthritis TS: transitory synovitis ESR: erythrocyte sedimentation rate CRP: C-reactive protein.

standardizing treatment, conduct and therapeutic approach among the different services involved and even inside the same institution. Nonetheless, use of the flowchart should be always accompanied by the common sense of the assessing physician, never substituting a good physical examination and clinical judgment. It is also noteworthy that in atypical cases, in which no clinical or laboratory improvement is observed, we should opt for other diagnostic and therapeutic tools, such as magnetic resonance, Doppler ultrasound, scanning and arthroscopy.

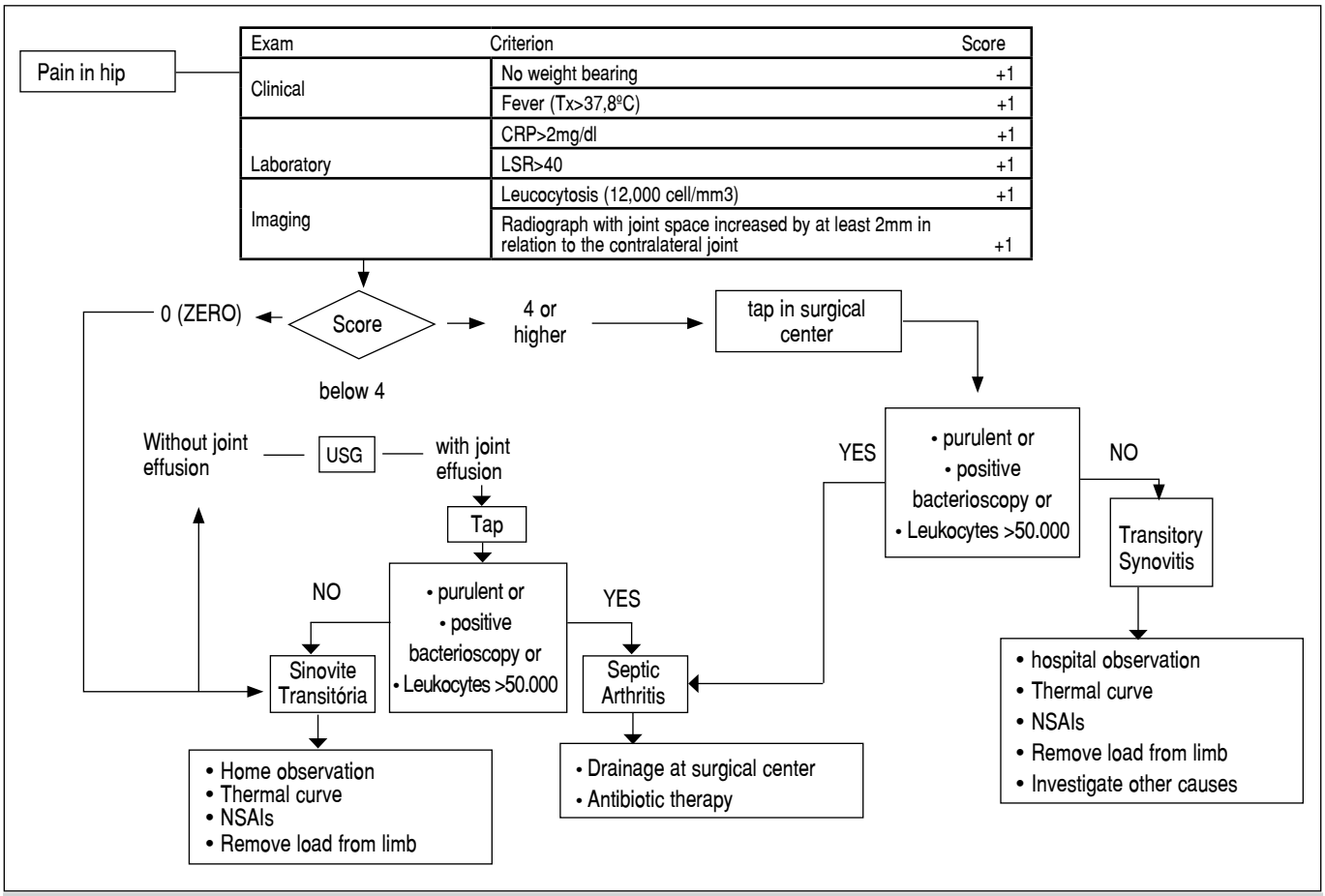

Figure 1. *Flowchart for differentiation between Septic Arthritis and Transitory Synovitis of the hip in the child of 6 months to 18 years of age.*

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