

Usefulness of MRI in Differentiating Between Septic Arthritis and Transient Synovitis in the Hip Joint

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Abstract

Septic arthritis and transient synovitis are the two most common diseases among young patients with acute hip pain. The purpose of this study is to assess the efficacy and diagnostic accuracy of Magnetic Resonance Imaging in differentiating between septic arthritis and transient synovitis. This study included 25 patients; the final diagnosis by culture and sensitivity was 16 septic arthritis and 9 patient was diagnosed as transient synovitis. We found that sensitivity and specificity of post contrast MRI with fat suppression for differentiation between septic arthritis and transient synovitis are 100%.

Introduction

Septic arthritis and transient synovitis are the two most common diseases among young patients with acute hip pain. However, these two diseases have similar early symptoms: spontaneous onset of progressive hip, groin, or thigh pain; limp or inability to bear weight; fever; and irritability. Transient synovitis, a self-limited disease with no known long-term sequelae, is managed with oral analgesics and observation. Septic arthritis of the hip necessitates emergency surgical drainage and concomitant administration of IV antibiotics. Transient synovitis of the hip is common among children but can also develop in adults.

Various clinical, laboratory, and radiographic criteria are used to differentiate septic arthritis from transient synovitis, but no absolute values are sufficient for definitive diagnosis of either condition. MRI has become increasingly important in evaluating musculoskeletal infections in children. MRI should aid in the differential diagnosis of these two diseases. While reviewing the MRI

results of patients with hip pain, we suspected that a hip affected by sepsis had decreased perfusion in the femoral head, whereas a hip affected by transient synovitis did not. Therefore, we performed a retrospective review of hip MRI of patients with proven septic hip and transient synovitis to evaluate the decrease in perfusion of the femoral head and to find radiologic features that differentiate these two diseases

Patients and Methods

This study included 25 patients; 13 males and 12 females. These patients were selected on clinical basis suggesting presence of hip pain. Their age ranged from 1 month to 12 years with mean age 7 years. The patients were enrolled consecutively between November 2010 and october 2015. They were referred to Radiology Department, Sohag University Hospitals from orthopedic surgery, Sohag University Hospital.

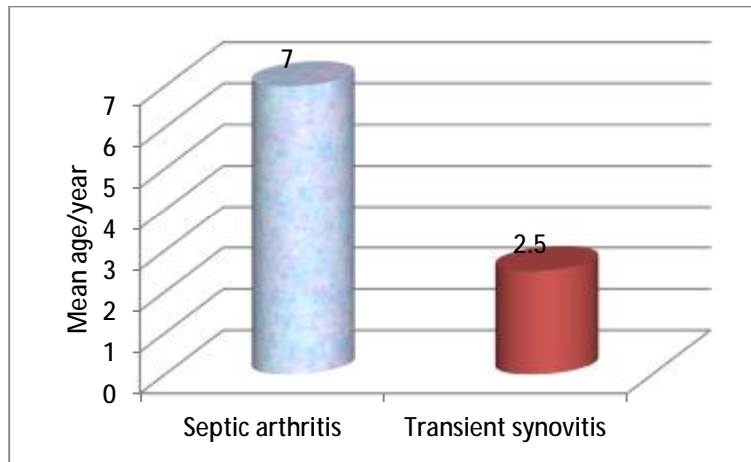
All patients were subjected to clinical assessment, history taking Physical examination and imaging studies including plain x-ray and MRI

RESULTS

This study included 25 patients; 13 males and 12 females. These patients were selected on clinical basis suggesting presence of hip pain. Their age ranged from 1 month to 12 years with mean age 7 years (Table 1, figure 1).

Table(1) Comparison between septic arthritis & Transient synovitis in hip joints according to age and sex:

| Variable | Septic arthritis N=16 | Transient Synovitis N=9 | P value |
|----------------|--------------------------|----------------------------|------------|
| Age/year | | | |
| Mean (SD) | 7.02 (1.57) | 2.5 (0.22) | 0.08 |
| Median (range) | 6.5 (0.1-12) | 1.23 (0.5) | |
| Sex | | | |
| Females | 6 (37.5%) | 6 (66.67%) | 0.17 |
| Males | 10 (62.5%) | 3 (33.33%) | |



Fig(1) Bar chart representing comparison between septic arthritis & transient synovitis according to age.

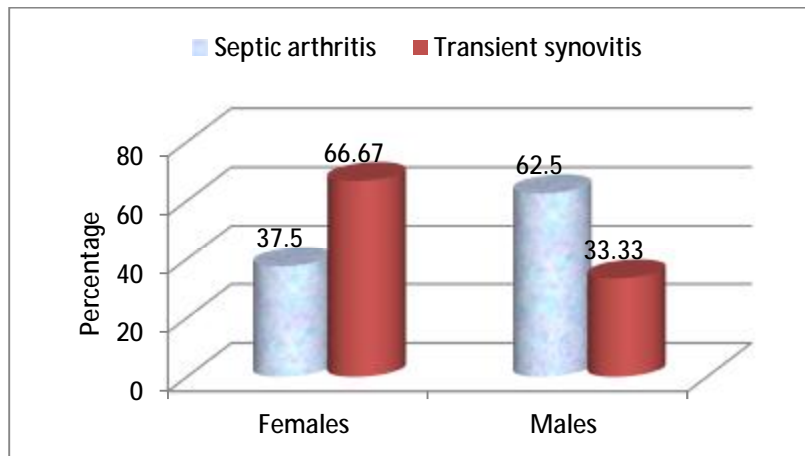


Figure (2) Bar chart representing comparison between septic arthritis & transient synovitis according to sex

Table(2) Comparison between septic arthritis & Transient synovitis in hip joints according to clinical picture

| Variable | Septic arthritis N=16 | Non septic joints (TS) N=9 | P value |
|-----------------------------------|---------------------------|----------------------------------|------------|
| Pain No Yes | 0 16 (100%) | 0 6 (100%) | 1.00 |
| Presence of swelling No Yes | 16 (100%) 0 | 6 (100%) 0 | 0.06 |
| Hotness&redness No Yes | 6 (42.86%) 10 (57.14%) | 6 (100%) 0 | 0.02 |
| Limited movement No Yes | 0 16 (100%) | 0 9 (100%) | 1.00 |

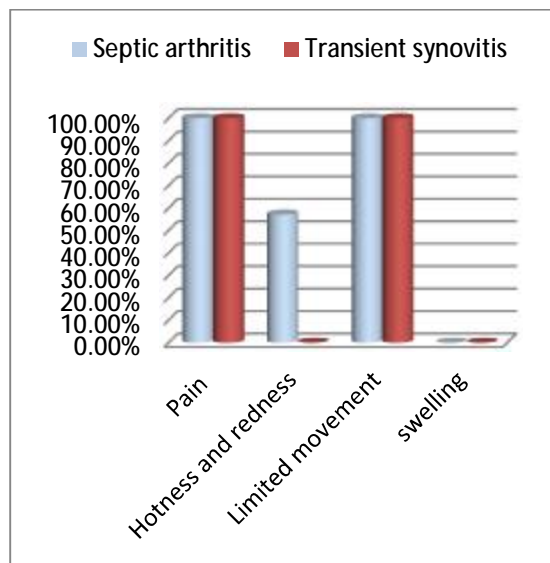


Figure (3) Bar chart representing comparison between septic arthritis & non septic joints according to clinical picture

Table(3) and figure (4): Comparison between septic arthritis & transient synovitis in hip joints according to MRI findings

| Variable | Septic arthritis N=16 | Transient synovitis N=9 | P value |
|------------------------------------|--------------------------|----------------------------|---------|
| Presence of effusion | 16 (100%) | 9 (100%) | 1.00 |
| Synovial thickening | | | |
| No | 4 (25%) | 9(100%) | <0.05 |
| Yes | 12 (75%) | 0 | |
| Bone marrow edema | | | |
| No | 0 | 9 (100%) | <0.05 |
| Yes | 16(100%) | 0 | |
| Soft Tissue edema | | | |
| No | 7 (43.75%) | 9(100%) | 0.02 |
| Yes | 8 (56.25%) | 0 | |
| Post contrast synovial enhancement | | | |
| No | 0 | 9(100%) | <0.05 |
| Yes | 16 (100%) | 0 | |

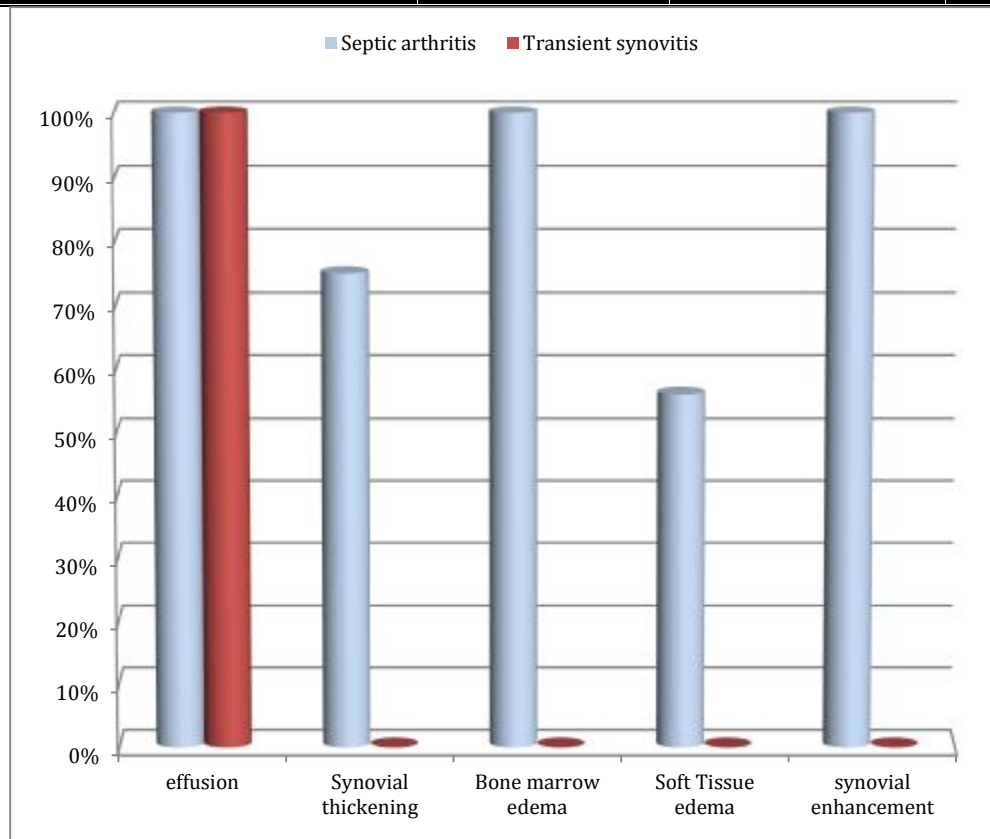


Figure (4) Bar chart of comparison between septic arthritis & transient synovitis according to MRI findings.

Discussion

Various ways have been reported for differentiating septic arthritis and transient synovitis of the hip. Differentiating these two diseases is difficult but important, because the two clinical entities have different treatments and a different potential for negative sequelae. Septic arthritis is treated with operative drainage and antibiotics, whereas transient synovitis is usually self-limited and is treated symptomatically.

Several studies have focused on differentiating septic arthritis from transient synovitis of the hip in children. Kocher et al. used retrospective data to develop a clinical prediction algorithm for differentiating the two conditions. Lee et al. and Jung et al. also reported radiologic findings that differentiated these diseases. Ultrasound is considered the best noninvasive technique for detection and follow-up of hip effusions. Ultrasound-guided aspiration is helpful in identifying effusions suggestive of septic arthritis, which are characterized by turbid or frankly purulent synovial fluid with positive gram stain result. In addition, ultrasound-guided aspiration of the hip reduces excessive intra-articular pressure and thus prevents vascular compromise. However, ultrasound-guided aspiration is an invasive procedure that requires local anesthesia, and complications such as contamination of joint fluid can occur. A "dry tap" may be a problem when a joint effusion is minimal in the anterior recess, a typical site for ultrasound-guided aspiration.

Furthermore, ultrasound does not allow one to rule out osteomyelitis or soft-tissue infections, but MRI can be used for evaluation.

In our study, we found 9 patients out of 25 patients (36%) affected with transient synovitis and 16 patients out of 25 patients (64%) affected with septic arthritis, all of them are difficult to differentiate clinically, and these findings agree with Zamzam (2006) who mentioned that transient synovitis is the most common differential diagnosis of hip septic arthritis as clinical manifestations of septic arthritis and transient synovitis overlap, and agree with Kim et al (2012) who mentioned that septic arthritis and transient synovitis are the two most common diseases among young patients with acute hip pain.

We found that MRI finding in transient synovitis is just only effusion without other MRI finding seen in septic arthritis as synovial thickening, post contrast synovial enhancement, bone marrow and soft tissue edema, and these finding agree with Lee et al who stated that MRI imaging findings in transient synovitis of the hip joint consist of simple effusion without specific changes in bone marrow and also agree with Yang et al who mentioned that synovial thickening and alteration of soft tissue SI more in septic arthritis than transient synovitis & alteration of bone marrow signal intensity only seen in septic arthritis.

Summary and conclusion

We found that; MR imaging play an important role in noninvasive differentiation of septic arthritis from transient synovitis in the pediatric patient with an irritable hip. synovial thickening, post contrast synovial enhancement, bone marrow and soft tissue edema affected hip joint are useful in the differentiation of septic arthritis from transient synovitis.

References

1. Bennett OM, Namnyak SS. Acute septic arthritis of the hip joint in infancy and childhood. *Clin Orthop Relat Res* 1992 ; 123-132
2. Bennett OM, Namnyak SS. Acute septic arthritis of the hip joint in infancy and childhood. *Clin Orthop Relat Res* 1992; 123-132
3. Caird MS, Flynn JM, Leung YL, Millman JE, D'Italia JG, Dormans JP. Factors distinguishing septic arthritis from transient synovitis of the hip in children: a prospective study. *J Bone Joint Surg Am* 2006; 88:1251-1257
21. Klein DM, Barbera C, Gray ST, Spero CR, Perrier G, Teicher JL. Sensitivity of objective parameters in the diagnosis of pediatric septic hips. *Clin Orthop Relat Res* 1997; 153-159
4. Del Beccaro MA, Champoux AN, Bockers T, Mendelman PM. Septic arthritis versus transient synovitis of the hip: the value of screening laboratory tests. *Ann Emerg Med* 1992; 21:1418-1422
5. Del Beccaro MA, Champoux AN, Bockers T, Mendelman PM. Septic arthritis versus transient synovitis of the hip: the value of screening laboratory tests. *Ann Emerg Med* 1992; 21:1418-1422
6. Do TT. Transient synovitis as a cause of painful limps in children. *Curr Opin Pediatr* 2000; 12:48-51
7. Dzioba RB, Barrington TW. Transient monoarticular synovitis of the hip joint in adults. *Clin Orthop Relat Res* 1977 : 190-192
8. Hopkins KL, Li KC, Bergman G. Gadolinium-DTPA-enhanced magnetic resonance imaging of musculoskeletal infectious processes. *Skeletal Radiol* 1995; 24:325-330
9. Jung ST, Rowe SM, Moon ES, Song EK, Yoon TR, Seo HY. Significance of laboratory and radiologic findings for differentiating between septic arthritis and transient synovitis of the hip. *J Pediatr Orthop* 2003; 23:368-372
10. Jung ST, Rowe SM, Moon ES, Song EK, Yoon TR, Seo HY. Significance of laboratory and radiologic findings for differentiating between septic arthritis and transient synovitis of the hip. *J Pediatr Orthop* 2003; 23:368-372
11. Kesteris U, Wingstrand H, Forsberg L, Egund N. The effect of arthrocentesis in transient synovitis of the hip in the child: a longitudinal sonographic study. *J Pediatr Orthop* 1996; 16:24
12. Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. *J Bone Joint Surg Am* 1999; 81:1662-1670
13. Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. *J Bone Joint Surg Am* 1999; 81:1662-1670
14. Lee SK, Suh KJ, Kim YW, et al. Septic arthritis versus transient synovitis at MR imaging: preliminary assessment with signal intensity alterations in bone marrow. *Radiology* 1999; 211:459-465
15. Lee SK, Suh KJ, Kim YW, et al. Septic arthritis versus transient synovitis at MR imaging: preliminary assessment with signal intensity alterations in bone marrow. *Radiology* 1999; 211:459-465
16. Luhmann SJ, Jones A, Schootman M, Gordon JE, Schoenecker PL, Luhmann JD. Differentiation between septic arthritis and transient synovitis of the hip in children with clinical prediction algorithms. *J Bone Joint Surg Am* 2004; 86:956-962

17. Luhmann SJ, Jones A, Schootman M, Gordon JE, Schoenecker PL, Luhmann JD. Differentiation between septic arthritis and transient synovitis of the hip in children with clinical prediction algorithms. *J Bone Joint Surg Am* 2004; 86-A:956–962
18. Morrey BF, Bianco AJ, Rhodes KH. Suppurative arthritis of the hip in children. *J Bone Joint Surg Am* 1976; 58:388-392
19. Morrey BF, Bianco AJ, Rhodes KH. Suppurative arthritis of the hip in children. *J Bone Joint Surg Am* 1976; 58:388–392
20. Quintos-Macasa AM, Serebro L, Menon Y. Transient synovitis of the hip in an adult. *South Med J* 2006; 99:184-185
21. Quintos-Macasa AM, Serebro L, Menon Y. Transient synovitis of the hip in an adult. *South Med J* 2006; 99:184–185
22. Yang; WJ, Im; SA, Lim; GY, Chun; HJ, Jung; NY, Sung; MS, Choi; BG.: MR imaging of transient synovitis: differentiation from septic arthritis. *Pediatric Radiology*, November 2006, Volume36, Issue 11, pp 1154–1158.