

การวินิจฉัยแยกโรคทางคลินิกระหว่างข้อตะโพกอักเสบเป็นหนอง กับกล้ามเนื้อ Psoas อักเสบเป็นหนอง

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Differentiating between Septic Arthritis and Primary Psoas Abscesses: The Clinical Diagnosis.

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Background: A child who has an acutely irritable hip can pose a diagnostic challenge. The purposes of this study were to determine the diagnostic value of presenting variables for differentiating between septic arthritis and primary psoas abscesses in children who present with hip pain.

Purpose: This study was to determine the diagnostic value of the clinical presentations in children for differentiating between septic arthritis of the hip joint and psoas abscess. **Methods:** The cases of children evaluated for an acutely irritable hip at a university hospital between 1984 and 2001 were reviewed retrospectively. Diagnoses of septic arthritis of the hip joint and psoas abscess were defined by the presence of pus in the hip joint or in the psoas muscles, results of cultures of the joint fluid, blood and pus, and the clinical course. The clinical presentations were used to differentiate between septic arthritis and psoas abscesses; univariate and multiple logistic regression analyses were used to assess their statistical significance.

Study design: Case-control study

Setting: Department of Orthopedics, Faculty of Medicine, Khon Kaen University

Results: Thirty-seven patients, 13 girls and 24 boys, had septic arthritis of the hip joint and ten, 4 girls and 6 boys, had a psoas abscess. The mean age of the septic hip and psoas abscess groups were 9.7 ± 3.6 years (range, 4 to 14 years) and 8.3 ± 4.2 years (range, 5 months to 14 years) respectively. The left hip joint was affected in 21 cases, the left psoas muscle in 7. *Staphylococcus aureus* was the causative pathogen in 25 cases of the septic hip group and 6 of the psoas abscess group. Most of the psoas

วัตถุประสงค์: เพื่อต้องการวิเคราะห์แยกโรคข้อตะโพกอักเสบเป็นหนองออกจากกล้ามเนื้อ psoas อักเสบเป็นหนองโดยอาศัยลักษณะทางคลินิก

วิธีการ: โดยศึกษาจากทะเบียนของผู้ป่วยเด็กที่ได้รับการวินิจฉัยว่าเป็นข้อตะโพกอักเสบเป็นหนองหรือกล้ามเนื้อ psoas อักเสบเป็นหนองที่มารับการรักษาที่โรงพยาบาลศรีนครินทร์ในช่วงปี พ.ศ. 2527-2544 การวินิจฉัยโดยทั้งสองอาศัยประวัติการตรวจพบหนองในข้อตะโพกหรือในกล้ามเนื้อ psoas ผลการเพาะดีงเชื้อ ย้อมพมเพื่อจากน้ำไขข้อ จากเลือด จากหนอง ร่วมกับการดำเนินของโรค ลักษณะทางคลินิกของผู้ป่วยทั้งหมดจะได้รับการบันทึกเพื่อใช้ในการวิเคราะห์แยกโรคทั้งสองโดยวิธี univariate and multiple logistic regression analyses

รูปแบบของงานวิจัย: Case-control study

สถานที่ทำการศึกษา: ภาควิชาออร์โธปิดิกส์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

ผลการศึกษา: มีผู้ป่วยที่เป็นข้อตะโพกอักเสบเป็นหนอง 37 คน เป็นเด็กหญิง 13 คน เด็กผู้ชาย 24 คนและมีเด็กที่เป็นกล้ามเนื้อ psoas อักเสบเป็นหนอง 10 คน เป็นเด็กหญิง 4 คน และเด็กชาย 6 คน อายุเฉลี่ยของเด็กที่เป็นข้อตะโพกอักเสบเป็นหนอง 9.7 ± 3.6 ปี (4-14 ปี) และเด็กที่เป็นกล้ามเนื้อ psoas อักเสบเป็นหนองมีอายุเฉลี่ย 8.3 ± 4.2 ปี (5 เดือน - 14 ปี) เป็นข้อตะโพกด้านซ้าย 21 คน และเป็นกล้ามเนื้อ psoas ซ้าย 7 คน เชื้อ *Staphylococcus aureus* เป็นเชื้อที่เป็นสาเหตุของโรคข้อตะโพกอักเสบเป็นหนอง 25 คน และเป็นกล้ามเนื้อ psoas อักเสบเป็นหนอง 6 คน ร้อยละ 90 (9/10 คน) ของกล้ามเนื้อ psoas อักเสบเป็นหนองมีพยาธิตัวตืดเรื่องมีก้อนที่ห้องน้อยขณะที่ไม่พบในกลุ่มข้อตะโพกอักเสบเป็นหนอง ($p < 0.001$) ผู้ป่วยทุกคนในกลุ่มกล้ามเนื้อ psoas อักเสบเป็นหนองมีพยาธิตัวตืดเรื่องปวดท้องซึ่งไม่พบในกลุ่มข้อตะโพกอักเสบเป็นหนอง ($p < 0.001$). ผู้ป่วยในกลุ่มข้อตะโพกอักเสบเป็นหนอง

abscess group (90 percent, 9/10 cases) presented with a lower abdominal mass whereas none were found in the septic hip group ($p < .001$). All of patients in the psoas abscess group experienced abdominal pain, while none in the septic hip group did ($p < .001$). None of the patients in the septic hip group was able to walk but all of the psoas abscess group was able to do so ($p < .001$). All cases in both groups presented with fever and hip flexion contracture except one in the septic hip group. Results of other laboratory investigations were similar for both groups, except that ultrasound of abdomen revealed abscesses inside affected psoas muscles. The mean duration of symptoms was 9.5 ± 8.8 days and 31.6 ± 35.2 days in the septic hip and psoas abscess groups, respectively ($p < .001$). The multiple logistic regression indicated that lower abdominal mass and pain, and ability to bear weight were significant variables only in the psoas abscess group.

Conclusions: Pyogenic psoas abscess is the most likely diagnosis in children who present with fever, hip pain and flexion contracture of the hip joint, but can bear weight, and have clinical findings that include lower abdominal masses and pain.

ทุกคน ไม่สามารถเดินลงน้ำหนักขาด้านที่มีข้ออักเสบเป็นหนอง แต่เด็กที่เป็นกล้ามเนื้อ Psoas อักเสบเป็นหนองสามารถเดินลงน้ำหนักได้ การตรวจทางห้องปฏิบัติการของผู้ป่วยทั้งสองกลุ่มไม่มีความแตกต่างกันยกเว้นผลการตรวจ ultrasound ซึ่งให้ผลบวกในผู้ป่วยทุกรายในกลุ่มกล้ามเนื้อ psoas อักเสบเป็นหนอง ระยะเวลาการมีอาการก่อนมาขึ้นการรักษาพบว่าในกลุ่มกล้ามเนื้อ psoas อักเสบเป็นหนอง (31.6 ± 35.2 วัน) มีระยะเวลานานกว่ากลุ่มข้อตะโพกอักเสบเป็นหนอง (9.5 ± 8.8 วัน) อย่างมีนัยสำคัญ ($p < 0.001$) จากการวิเคราะห์ multiple logistic regression พบว่า การปวดและคลำได้ก่อนที่ห้องน้อยร่วมกับผู้ป่วยสามารถเดินลงน้ำหนักของขาด้านที่เป็นโรคได้จะช่วยวินิจฉัยภาวะกล้ามเนื้อ psoas อักเสบเป็นหนอง

สรุป: เด็กที่มีประวัติเป็นไข้ เจ็บข้อตะโพกร่วมกับมีอาการข้อตะโพกติดช่องด้ามป่วยสามารถเดินลงน้ำหนักของขาด้านที่เป็นได้ให้เนื้อถึงภาวะกล้ามเนื้อ psoas อักเสบเป็นหนอง และด้ามขวา ร่างกายต่อจะพบก่อนที่ห้องน้อยด้านที่เป็นและมีอาการปวดที่ก่อนที่มา: อาการเจ็บที่ข้อตะโพกและมีไข้ในเด็กนั้นควรนัดถึงการติดเชื้อที่ข้อตะโพกและกล้ามเนื้อ psoas อักเสบเป็นหนองทั้งสองโรคนี้ พบได้บ่อยกว่าโรคอื่นซึ่งมีความจำเป็นที่ต้องแยกโรคทั้งสองออก หากกันโดยอาศัยอาการ อาการแสดงและผลการตรวจทางห้องปฏิบัติการ

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Introduction

In a child, the initial presentation of a painful-flexion contracture of the hip joint with fever can pose a diagnostic challenge to the orthopedic surgeon, pediatrician, emergency-room physician, and primary-care physician. The differential diagnosis commonly includes septic arthritis of the hip joint and psoas abscess. Psoas abscess is rarely seen in the temperate climates so diagnosis is difficult or delayed because an abscess of the psoas muscle is not suspected. Moreover, the psoas muscle is deep and symptoms often resemble those of septic arthritis of the hip joint¹.

Though both conditions are treated with operative drainage, the surgical approaches and complications are different. For example, septic arthritis, it's complications including osteonecrosis, growth arrest and osteomyelitis¹. However, that is not the case for psoas abscesses since there is no joint complications. The differentiation between septic arthritis of the hip joint and psoas abscess is crucial because the two clinical entities

require different investigations and treatments, and have different negative sequelae. This study aimed to present the similar and different presentation of patients in both septic arthritis of the hip joint and psoas abscess.

Materials and Methods

Between 1984-2001, the patients were identified from the hospital admission database for in-patients, the hospital emergency, and the hospital operating rooms databases using the International Classification of Diseases, Ninth Revision (septic arthritis [code 7110], psoas abscess [code 0150 and 7304]) and the Tenth Revision (septic arthritis [code M0095] and psoas abscess or infective myositis or tropical pyomyositis [code M600]). The records of identified patients were cross-tabulated with the medical database for the history and physical examination records, clinical laboratory database for complete blood count, erythrocyte sedimentation rate (ESR), microbiological study, and the radiological database for plane films of the hip joint, lumbosacral spines and abdominal ultrasonograph.

There were 54 cases of infective myositis or tropical pyomyositis, in which only 11 cases were diagnosed as primary psoas abscess. We had the operative and ultrasounography records of all cases but one, reducing to ten the number with verifiable psoas abscess (table I). Over the same period, 104 children with septic arthritis were admitted to the same hospital: 61 with septic arthritis of the hip joints. Twenty-four of these were excluded because: 1) no culture grew in the synovial fluid of 15 cases, 2) chronic septic arthritis with osteomyelitis of the proximal femur occurred in 4, and 3) transient synovitis of the hip joint occurred in 5. Finally, 37 children diagnosed with septic arthritis of the hip joint were selected for analytical comparison with children with psoas abscess at a ratio 4 to 1. Three patients in the septic hip group could not be matched by age with anyone in the psoas abscess group (Table II).

The diagnosis of true septic arthritis (37 children) was explicitly assigned when patient had positive finding in culture of joint fluid or a white blood-cell count in the joint fluid of at least 50,000 cells per cubic millimeter with positive findings on blood culture. The true diagnosis of primary psoas abscess (10 children) was explicitly assigned when the patients had pus in the psoas muscles confirmed by open drainage and positive finding in the culture of fluid in the psoas muscles. These children, also, had negative

finding in the plane films of lumbosacral spines.

Data obtained from all of the patients included: age, gender, date of presentation, duration of symptoms, history of fever, ability to bear weight (figure I), flexion deformity of the hip joint, temperature, ESR, serum white blood cell count and differential, hematocrit, results of culture from the pus or fluid, gram-staining. Ability to bear weight was determined on the basis of the clinical presentation on admission. Flexion deformity was defined by Thomas' test. The resulting abdominal radiograph was also recorded.

Univariate analysis was performed using the two-sample Student t test for continuous variables and Fisher's exact test for categorical variables. Comparison was made between the septic hip and the psoas abscess groups. Stepwise multiple logistic regression with backward selection was performed to identify independent clinical predictors, with the same group comparisons were performed for the univariate analysis. Variables with a p value of less than 0.20 in the univariate were chosen as candidates for the multivariate model, with significance determined with use of likelihood ratio chi-square test. Statistic analysis was performed with SPSS (version 8.0; SPSS, Chicago, Illinois). This study was approved by the ethics committee in human research of Khon Kaen University (HE 460631).

Table I. Clinical data on admission to the hospital for the ten cases that had psoas abscess.

Case	Age (years)	Sex	Duration (days)	Ability to bear weight	Flexion contracture	Abdopain	Abdomass	Temp (C°)	Pus culture
1	14	Male	28	Yes	Yes	Yes	Yes	39.0	Staph
2	4	Male	14	Yes	Yes	Yes	Yes	37.2	Staph
3	13	Female	60	Yes	Yes	Yes	Yes	38.2	E.coli
4	12	Male	14	Yes	Yes	Yes	Yes	37.3	Staph
5	12	Female	6	Yes	Yes	Yes	Yes	39.0	Strep
6	7	Male	7	Yes	Yes	Yes	Yes	37.6	E.coli
7	10	Female	7	Yes	Yes	Yes	Yes	37.8	Staph
8	10	Female	120	Yes	Yes	Yes	Yes	38.6	Staph
9	4	Male	30	Yes	Yes	Yes	Yes	38.0	Staph
10	11	Male	30	Yes	yes	yes	No	38.6	TB

Abdo.pain=Abdominal pain, Abdo.mass= abdominal mass, Staph=Staphylococcus aureus, Strep= β Streptococcus gr., E.coli=Escherichia coli, Klebs.=Klebsiella species.

Table II. Clinical data on admission to the hospital for the thirty-seven cases that had septic arthritis of the hip joint.

Case	Age (years)	Sex	Duration (days)	Ability to walk	Flexion contracture	Abdopain	Abdomass	Temp (C°)	Pus culture
1	12	Male	3	No	Yes	No	No	38.0	NG
2	10	Male	2	No	Yes	No	No	37.0	Staph
3	0.9	Male	1	No	Yes	No	No	38.0	Staph
4	8	Male	6	No	Yes	No	No	38.0	NG
5	8	Male	7	No	Yes	No	No	38.0	Staph
6	7	Male	7	No	Yes	No	No	38.6	Staph
7	14	Male	4	No	Yes	No	No	39.6	Staph
8	12	Male	1	No	Yes	No	No	40.0	Staph
9	12	Male	7	No	Yes	No	No	39.0	Staph
10	2.4	Female	3	No	Yes	No	No	38.4	Staph
11	11	Female	10	No	Yes	No	No	38.0	Staph
12	10	Male	21	No	Yes	No	No	37.0	Staph
13	13	Male	2	No	Yes	No	No	38.0	Staph
14	10	Male	30	No	Yes	No	No	37.8	Staph
15	12	Female	10	No	Yes	No	No	39.4	Staph
16	11	Female	3	No	Yes	No	No	39.6	Staph
17	5	Male	2	No	Yes	No	No	37.0	NG
18	12	Female	14	No	No	No	No	38.0	Staph
19	11	Male	15	No	Yes	No	No	38.0	Staph
20	8	Female	7	No	Yes	No	No	39.4	Staph
21	12	Male	15	No	Yes	No	No	38.0	NG
22	0.5	Female	7	No	Yes	No	No	37.8	Strep
23	12	Male	14	No	Yes	No	No	39.0	NG
24	9	Female	14	No	Yes	No	No	38.0	Staph
25	6	Male	30	No	Yes	No	No	39.0	NG
26	0.5	Male	1	No	Yes	No	No	36.0	Klebs.
27	12	Male	5	No	Yes	No	No	40.0	Staph
28	1.4	Female	2	No	Yes	No	No	37.6	NG
29	13	Male	4	No	Yes	No	No	40.0	Staph
30	12	Male	14	No	Yes	No	No	39.0	Staph
31	12	Male	7	No	Yes	No	No	38.8	Staph
32	2	Male	10	No	Yes	No	No	38.0	NG
33	1	Female	7	No	Yes	No	No	38.0	E.coli
34	9	Male	30	No	Yes	No	No	37.8	NG
35	8	Female	30	No	Yes	No	No	37.2	Staph
36	6	Female	4	No	Yes	No	No	39.4	Staph
37	3	Female	1	No	Yes	No	No	38.2	Staph

Abdo.pain = Abdominal pain, Abdo.mass = abdominal mass, Staph = *Staphylococcus aureus*, Strep = β Streptococcus gr., E.coli = *Escherichia coli*, Klebs. = *Klebsiella* species.

Results

Descriptive data

Arthrocentesis was performed in the outpatient department or operating room. All cases in the septic hip group were operated by arthrotomies, and all but 9 cases had positive joint-fluid culture and 89% (25 patients out of 28) were *Staphylococcus aureus*. Of the nine cases with a negative joint-fluid culture, all had positive *Staphylococcus aureus* in the blood culture. Among those with a positive joint-fluid culture, 25 (89 percent) had a positive gram stain; while five (55.5 percent) of those with negative cultures had positive gram stains of the joint fluid.

All cases in the psoas abscess were positive as verified by ultrasonography: these were operated by extraperitoneal drainage. All but one case had positive results as judged by pus culture. The children who had positive pus culture also had positive gram stain of the pus. The one patient, who had a negative culture result, had caseous-like material and positive acid fast bacilli (AFB) staining. Organisms isolated from culture included: *Staphylococcus aureus* (6 patients), *E. Coli* (2 patients) and Group A β *Streptococcus* (1 patient). No bony lesions were found in the spines of the patients in the Psoas Abscess Group, except the obliteration of the psoas shadow on the affected side. After treatment all children with psoas abscesses were returned home within 7 days (range, 3 to 7 days) without any complications.

Univariate Analysis

The ten cases who had psoas abscess significant difference ($p < 0.009$) from the 37 of septic arthritis with regard to: 1) the duration of symptoms (31.6 ± 35.15 versus 9.46 ± 8.76 days), 2) abdominal mass (9 patients versus none), 3) abdominal pain (10 patients versus none), 4) walking ability (10 patients versus none), 5) serum white blood-cell count ($21,450 \pm 14,659$ versus $16,845 \pm 5,936$ cells/L) and eosinophils (6.70 ± 6.53 versus 1.54 ± 2.75 percent), and 6) erythrocyte sedimentation rate (60.00 ± 2.24 versus 42.82 ± 21.99).

Multivariate Analysis

After comparing the Septic Hip Group with the Psoas Abscess Group, only four variables were statistically significant, namely: abdominal mass, abdominal pain, ability to bear weight and duration of symptoms. The odds ratios of the first three variables could not be calculated because there were zero cases in the Septic Hip Group.

The values for sensitivity, specificity and positive predictive value of all three variables were 100 percents. The prevalence rate of Psoas abscess of this study was 21.3 percent (10 patients out of 47 total patients).

Discussion

Many conditions should be included in the differential diagnosis of a child with acute hip pain and fever, including: septic arthritis, psoas abscess, and osteomyelitis of the proximal femur, juvenile rheumatoid arthritis and Legg-Perthes disease.¹⁻⁶ However, the more commonly diagnosed are septic arthritis and psoas abscess.^{2,4,7} They are two conditions, which require different treatments and have variable morbidities. The delay in the diagnosis of septic arthritis of the hip is associated with a poor outcome⁷ but there has not been any previous comparative study of psoas abscess and septic arthritis.

We found several significant differences ($p < 0.05$) in the Univariate analysis between the Septic Hip and Psoas Abscess Group. The multivariate analysis, however,



Figure 1 Presentation of the two boys with psoas abscess,

Table III. Univariate analysis: Psoas abscess compared with septic arthritis

Variables	Psoas abscess (N=10)**	Septic arthritis (N=37)**	p value
Age (yrs)	9.7 \pm 3.56	8.34 \pm 4.24	0.35
Male gender (no.)	6(60%)	24(64.86%)	0.53
Duration of symptom (days)	31.6 \pm 35.15	9.46 \pm 8.76	0.000*
Temperature (degrees Celsius)	38.13 \pm 0.65	38.34 \pm 0.93	0.22
Flexion contracture (no.)	10(100%)	36(97.29%)	0.78
Abdominal mass (no.)	9(90%)	0	0.000*
Walking ability (no.)	10(100%)	0	0.000*
Abdominal pain (no.)	10(100%)	0	0.000*
Hematocrit (percent)	31.50 \pm 7.92	31.51 \pm 5.63	0.32
White blood cell count (cell per L)	21,450 \pm 14,659.86	16,844.59 \pm 5,935.85	0.009*
Neutrophils (percent differential)	69.80 \pm 13.55	71.27 \pm 13.48	0.62
Lymphocytes (percent differential)	18.90 \pm 9.72	21.11 \pm 11.94	0.29
Monocytes (percent differential)	4.40 \pm 3.41	5.73 \pm 8.98	0.55
Eosinophils (percent differential)	6.70 \pm 6.53	1.54 \pm 2.75	0.000*
Erythrocyte sedimentation rate (mm per hr.)	60.00 \pm 22.24	42.82 \pm 21.99	0.004*
Urine white blood-cell count	1.30 \pm 1.64	1.86 \pm 3.63	0.47

** The values are given as the mean and the standard deviation for continuous variables and as the number of patients, with the percentage in the parentheses, for categorical variables.

* A significant difference between groups.

yielded only four statistically significant variables. The mean duration of symptoms in the Psoas Abscess Group was 31.6 \pm 35.15 days, which was longer than for the Septic Hip Group comparing to Peckett et al.² and Rabii et al.⁹ All of our patients in the Septic Hip Group could not bear weight co-incident to what Kocher et al³ found. A painful and palpable mass in the lower abdomen of the affected side was mentioned in two studies^{6,9}, but not in the one studied by Malhotra et al.⁴ However, the ability to bear weight was a significant finding for the Psoas Abscess Group unlike the Septic Hip Group and this finding has not been reported before. It is natural that in the Septic Hip Group the tissue damage is far beyond the normal weight bearing capacity.

The most common organism of Psoas abscess in our study was *Staphylococcus aureus* and the treatment of choice was the antibiotic (cloxacillin) and surgical

drainage.¹⁻¹¹ Our patients received on intravenous antibiotics for three to seven days followed by oral antibiotics for two weeks. The diagnostic value of these clinical presentations in the Psoas Abscess Group had a sensitivity, specificity and positive predictive value of 100 percent.

Our findings substantiate that similar presentations of both conditions were fever, hip pain, and hip flexion contracture of the affected side, however, the different ones were ability to bear weight bearing on the affected side, a lower abdominal mass or pain.

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