Comparison of Needle Aspiration and Arthrotomy Treatment for Septic Knee Arthritis: A 10-year retrospective study

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Purpose: *There are many methods of treatment for septic arthritis employed nowadays; including serial needle aspiration, arthrotomy and debridement and arthroscopic debridement. However, there is no study of comparison between serial needle aspiration and arthrotomy treatment for septic knee arthritis. The objective of this study was to compare the results of serial needle aspiration with arthrotomy and debridement in septic knee arthritis patients.*

Methods: *Retrospective analysis of 128 cases of septic knee arthritis from January 2003 to December 2012 was performed. The 74 septic knee arthritis patients were divided into 2 groups: group I (44) were treated with serial needle aspiration and group II (30) were treated with arthrotomy and debridement. Both groups were compared by the duration of treatment and clinical results.*

Results: *The etiologies of septic knee arthritis were hematogenous infection 75%, traumatic articular wound 23%, hospital acquired infection 2% and no postoperative knee infection. There were significantly higher uses of parenteral antibiotic therapy in the aspiration group compared with the arthrotomy group ($P<0.04$). There was no significant difference in the number of complete recoveries the length of stay in hospital, the number of readmission cases due to recurrence of infection and the number of changes of management to the arthrotomy between the two groups. However, the number of readmissions and changes of management in the aspiration group were greater than the arthrotomy group (aspiration group 8.10% and 8.10% arthrotomy group 0% and 0% respectively).*

Conclusion: *In the treatment of uncomplicated septic knee arthritis, serial needle aspiration was not statistically different form arthrotomy and debridement.*

Keywords: *Arthrotomy, needle aspiration, septic knee arthritis*

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Introduction

Septic arthritis is the most rapidly destructive joint disease. The most commonly affected joint is the knee, which accounts for approximately 50% of cases, and 5-20% of the mortality rate[1]. Many medical and surgical treatments have been proposed: systemic antibiotic treatment combined with serial needle aspiration, arthrotomy with articular debridement or synovectomy, arthroscopic debridement and arthroscopic debridement with continuous irrigation suction[2]. The indications of these treatments are not well defined[3]. Some authors suggest that aspiration should only be performed in the early stages[4]. Although it has been reported that surgical treatment for septic arthritis was not superior to medical treatment, a comparison of two techniques for septic knee arthritis has not been performed[3,5,6]. The objective of this retrospective study was to compare the results of the serial needle aspiration with arthrotomy and debridment in adult patients at Sawanpracharak Hospital, Nakhon Sawan, Thailand.

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Patients and methods

This study is a retrospective, descriptive study. Medical records for septic knee arthritis ICD-10 [International Classification of Diseases, Tenth Revision] codes M0095 to M0097 from January 2003 to December 2012 were searched. Patients aged over 15 years presenting with septic knee arthritis were included. A knee joint was defined as septic if a culture of the joint fluid was positive, or if purulent material was found in the joint. Group I was initially treated with serial needle aspiration and group II was initially treated with arthrotomy and debridement. The inclusion criteria of both groups were patients who received treatment within 7 days form first clinical symptoms, well controlled diabetes mellitus and hypertension, no associated severe systemic disease and a complete in-patient medical record. Exclusion criteria were osteomyelitis of the distal

femur or proximal tibia, total knee arthroplasty, poorly controlled diabetes mellitus and hypertension, associated severe systemic diseases (rheumatoid arthritis, systemic lupus erythematosus (SLE), human immunodeficiency virus (HIV) infection, steroid used, old cardiovascular disease, chronic kidney disease, chronic liver disease, heart disease or carcinoma) and missing data.

Medical records were reviewed for age, gender, side of knee, pre-existing joint diseases (osteoarthritis, rheumatoid arthritis), preexisting risk factors (diabetes mellitus, hypertension, and systemic disease), etiology of the infection, duration between the first clinical symptoms and starting treatment in the hospital, blood test results [white blood cell count, C-reactive protein (CRP), and erythrocyte sedimentation rate (ESR)], radiological evidence of osteoarthritis, causative organisms, times of repeat procedures, functional status at the time of discharge from the hospital and duration of hospital stay.

Successful treatment was defined as complete resolution of the inflammatory symptoms: pain and swollen knee had subsided, absence of fever, decrease of ESR and CRP and partial weight bearing with walking aids. Unsuccessful treatment was defined as dead, readmission and change of management from repeated needle aspiration to arthrotomy. The indication to switch form aspiration to arthrotomy was no improvement of clinical signs: fever is high 48 hours after aspiration and no decrease in white blood cell count in the last synovial fluid examination. All patients were followed for a minimal period of 3-6 months.

The data were analyzed by descriptive statistical analysis; discrete data were present in frequency and percentage and continuous data were present in mean and standard deviation. The base line characteristics and the results of treatment between groups were compared by Chi square test and Fisher's exact test for discrete data and Student's *t*-test for continuous data with a statistic significance at $P<0.05$.

Results

There were 319 septic arthritis patients treated in Sawanpracharak hospital from January 2003 to December 2012 and 238 (75%) patients had complete data and medical records. One hundred and twenty eight (54%) had septic knee arthritis and 110 patients (46%) had septic arthritis of other joints. Of the 128 included patients, 74 were compatible with inclusion criteria, 52 were compatible with exclusion criteria and 2 died before any procedure was performed. The demographic data of cases are shown in Table 1. The etiologies of the septic knee arthritis were hematogenous infection 75%, traumatic articular wound 23 %, hospital acquired infection 2% and no postoperative knee infection.

There was no statistically significant difference in age, sex, side of knee, preexisting diseases, white blood cell count in synovial fluid and bacterial isolates. The comparison between the two groups revealed that the mean symptom duration times before treatment (days) was significantly shorter in the aspiration group than in the arthrotomy group ($P<0.048$) but the use of parenteral antibiotic therapy was significantly higher in the aspiration group compared to the arthrotomy group ($P<0.04$). Mean ESR levels and mean CRP levels could not been shown because of incomplete data.

The outcome of patients with septic knee arthritis based on treatment is shown in table 2. There were no statistically signicant differences in complete recovery time and the length of stay in hospital in both groups. For the readmission due to the recurrence of infection and change of management to arthrotomy, there was no statistically significant difference between both groups. However, the number of readmissions and changes of management to arthrotomy in aspiration group tend to be greater than those in arthrotomy group (aspiration group 8.10% and 8.10% arthrotomy group 0% and 0%, respectively).

Discussion

Successful treatment of a septic arthritis is the removal of purulent material form the joint either surgically or by serial needle aspiration. There is still controversy over which mode of drainage should be performed[6]. If initially treated with needle aspiration the vast majority of the purulent fluid can be removed if a joint infection is easily accessible[7], and repeated needle aspiration for recurrent joint effusions has been used with success during the first 7 days of treatment[8]. Therefore, this study set an inclusion criterion timing of seven days.

The infection staging by Gächter was most commonly used[8]. Stage I–III infections should be treated with arthroscopic joint decompression with irrigation and debridement, for stage IV infections, arthrotomy is suggested[9,10,11]. This study did not identify the infection staging because most cases were treated under emergency conditions where the arthroscopic setting is not available. The choice of treatment was influenced by the overall health of the patients including comorbidities. The present study excluded cases with comorbidities for the comparative homogenous group of patients.

In the previous studies on the outcomes of the treatment of septic knee arthritis[3,4,12], patients were heterogenous and immediate results at the time of discharge (length of stay and functional score) and long term results (osteoarthritis) were usually reported. This study sets exclusion criteria for homogenous of the patients and evaluated both immediate and intermediate outcomes (readmission).

The results of the previous study, which directly compared the outcome of native joint septic arthritis in patients treated by arthrotomy and serial needle aspiration showed no significant difference[4,5]. The results of the present study, of only septic knee arthritis, also showed no statistically significant difference in length of stay, the number of complete recoveries and the number of deaths, but when compared with the number of readmissions and the number of changes form aspiration to arthrotomy between two groups, the aspiration group was more likely to have a poor outcome. Nevertheless, these differences did not reach statistical significance.

The weakness of this study is that it is not a non-randomized controlled trial study and it has some limitations (a small number of cases, incomplete data for evaluated outcome by Bussiere functional score, or Lysholm scoring system)[13]. A prospective randomized controlled trial will be needed for further studies.

Table 1 Demographic data of septic knee arthritis patients

Characteristics	Aspiration (n=44)	Arthrotomy (n=30)	*P*-value
Age (years), mean (SD)	63.3 (11.8)	56.9 (15.9)	0.085
Sex: Male (%)	25 (56.8%)	15 (50.0%)	0.320
Female (%)	19 (43.2%)	15 (50.0%)	
Symptom duration before treatment (days)	3.9 (2.9)	5.4 (2.7)	0.048*
Side : Right	20	14	0.34
Left	18	14	
Both	8	2	
Preexisting disease			0.075
None	8	6	
Osteoarthritis	17	11	
Hypertension	12	3	
Diabetes	4	2	
Others: urinary tract infection, peptic ulcer, dyslipidemia, asthma, gouty arthritis, chronic obstructive pulmonary disease, glucose-6-phosphate dehydrogenase deficiency	10	10	
White blood cell count in synovial fluid, mean (SD)	67,149.69 (25,269.5)	62,568.5 (30,498.6)	0.537
Bacterial isolates (%)			0.20
Staphylococcus aureus sensitive to methicillin	13 (29.5%)	10 (33.3%)	
Staphylococcus aureus resistance to methicillin	3 (0.06%)	1 (3.3%)	
Streptococcus	5 (11.4%)	4 (13.3%)	
Gram negative pathogens	2 (0.05%)	3 (10.0%)	
Mixed bacterial infection	5 (11.4%)	2 (6.6%)	
No bacterial growth	16 (47.6%)	10 (33.3%)	
Antibiotic therapy : 1st regimen (cefazolin or ceftriaxone)	31	24	0.04*
2nd regimen (combine two antibiotics)	13	6	

Table 2 Outcome of septic knee arthritis patients based on treatment

Outcome	Aspiration (n=44)	Arthrotomy (n=30)	*P*-value
Length of stay, mean (SD)	10.5 (5.8)	12.5 (7.6)	0.62
Complete recovery (%)	32 (43.2%)	27 (36.5%)	0.084
Readmission (%)	6 (8.1%)	(0%)	0.075
Change form aspiration to arthrotomy (%)	6 (8.1%)	(0%)	0.075
Death (%)	5 (6.8%)	3(4.1%)	0.584

Conclusion

By comparing serial needle aspiration and arthrotomy and debridement in the treatment of septic knee arthritis in uncomplicated patients, there was no significant difference in the number of complete recoveries, the length of stay in hospital, number of readmissions, number of changes of treatment and mortality rate.

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ผลการรักษาโรคข้อเข่าอักเสบติดเชื้อโดยการเจาะดูดจากข้อเปรียบเทียบกับการผ่าตัดเปิดล้างข้อ: การศึกษาย้อนหลัง 10 ปี

โชติ ภาวศุทธิกุล, พบ

วัตถุประสงค์: *การรักษาโรคข้ออักเสบติดเชื้อมีหลายวิธี วิธีที่นิยมปฏิบัติได้แก่ การเจาะดูดจากข้อ การผ่าตัดเจาะข้อ การผ่าตัดเปิดล้างข้อ ที่ผ่านมายังไม่มีการศึกษาผลการรักษาโรคข้ออักเสบติดเชื้อเฉพาะข้อเข่าโดยการเจาะดูดจากข้อเปรียบเทียบกับการผ่าตัดเปิดล้างข้อ วัตถุประสงค์ของการศึกษานี้เพื่อเปรียบเทียบ ผลการรักษาข้อเข่าอักเสบติดเชื้อ โดยการเจาะดูดจากข้อกับการผ่าตัดเปิดล้างข้อ*

วิธีการศึกษา: *ศึกษาย้อนหลังแบบพรรณนาในผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาลสวรรค์ประชารักษ์ ด้วยโรคข้อเข่าอักเสบติดเชื้อตั้งแต่วันที่ 1 มกราคม 2546 ถึง วันที่ 31 ธันวาคม 2555 เกณฑ์ในการคัดเลือกผู้ป่วยเข้าศึกษา ได้แก่ ผู้ป่วยที่เข้ารับการรักษาภายใน 7 วันหลังจากเริ่มมีอาการ มีโรคเบาหวาน หรือโรคความดันโลหิตสูงร่วมด้วยแต่ควบคุมได้ดี ไม่มีโรคเรื้อรังที่รุนแรง และ มีข้อมูลในเวชระเบียนครบถ้วนสมบูรณ์ เกณฑ์ในการคัดเลือกผู้ป่วยออก ได้แก่ การติดเชื้อที่กระดูกร่วมด้วย การผ่าตัดใส่ข้อเข่าเทียม โรคเบาหวานและโรคความดันโลหิตสูงที่ควบคุมไม่ได้ โรคเรื้อรังที่มีอาการรุนแรงต่างๆร่วมด้วย ได้แก่ โรคข้ออักเสบรูมาตอยด์ โรคเอสแอลอี โรคภูมิคุ้มกันบกพร่อง การใช้ยาเสตียรอยด์ โรคหลอดเลือดสมอง โรคไตวายเรื้อรัง โรคตับเรื้อรัง โรคหัวใจ โรคมะเร็ง เป็นต้น รวมทั้งผู้ป่วยที่มีข้อมูลไม่ครบถ้วน โดยรวบรวมผู้ป่วยที่เข้าได้กับข้อบ่งชี้ทั้งหมด 74 ราย จากผู้ป่วยข้อเข่าอักเสบติดเชื้อทั้งหมด 128 ราย กลุ่มที่ 1 รักษาด้วยการเจาะดูดหนองในข้อ 44 ราย กลุ่มที่ 2 รักษาด้วยการผ่าตัดเปิดล้างข้อ 30 ราย เปรียบเทียบการรักษาระหว่าง 2 กลุ่ม ในเรื่องระยะเวลานอนในโรงพยาบาล และผลการรักษา*

ผลการศึกษา: *พบสาเหตุของข้อเข่าอักเสบติดเชื้อจากการติดเชื้อในกระแสเลือดร้อยละ 75 การบาดเจ็บที่ข้อเข่าร้อยละ 23 การติดเชื้อภายในโรงพยาบาลร้อยละ 2 การใช้ยาปฏิชีวนะในกลุ่มเจาะดูดหนองมากกว่าในกลุ่มผ่าตัดเปิดล้างข้ออย่างมีนัยสำคัญทางสถิติ ในขณะที่ระยะเวลานอนโรงพยาบาล และจำนวนผู้ป่วยที่หายเป็นปกติ จำนวนผู้ป่วยที่เสียชีวิตของทั้งสองกลุ่มไม่แตกต่างกัน สำหรับจำนวนผู้ป่วยที่ติดเชื้อซ้ำจนต้องเข้ารับการรักษาใหม่ และจำนวนผู้ป่วยที่ต้องเปลี่ยนการรักษาจากการเจาะดูดหนองไปเป็นการผ่าตัดเปิดล้างข้อเข่า ในกลุ่มที่ 1 มีแนวโน้มสูงกว่ากลุ่มที่ 2 แต่เมื่อวิเคราะห์ทางสถิติแล้วพบว่าไม่มีความแตกต่างกัน*

สรุป: *การรักษาผู้ป่วยโรคข้อเข่าอักเสบติดเชื้อที่ไม่ซับซ้อน โดยการเจาะดูดหนองในข้อเข่าเปรียบเทียบกับการผ่าตัดเปิดล้างข้อให้ผลการรักษาไม่แตกต่างกัน ทั้งในเรื่องระยะเวลานอนในโรงพยาบาล จำนวนผู้ป่วยที่หายเป็นปกติ จำนวนผู้ป่วยที่ติดเชื้อซ้ำจนต้องเข้ารับการรักษาใหม่ จำนวนผู้ป่วยที่ต้องเปลี่ยนแปลงการรักษาจากการเจาะดูดหนองไปเป็นการผ่าตัดล้างข้อเข่า และจำนวนผู้ป่วยที่เสียชีวิต*