



E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2024; 10(1): 172-176
© 2024 IJOS
<https://www.orthopaper.com>
Received: 05-12-2023
Accepted: 12-01-2024

Author's name given below the references

Surgical treatment of septic arthritis of the knee at Brazzaville university hospital center

Kevin Parfait Bienvenu Bouhelo-Pam, Affleck Romaric Ledier Angalla, Roger Bertrand Sah Mbou, Regis Perry Massouama, Arnauld Sledje Wilfrid Bilongo-bouyou, Marc Fabrice Nkoua, Moïse Radam Ellah, Zifa Pentèce Zengui, Nevil S Mvili Gampio Ngona, Marius Monka and Armand Moyikoua

DOI: <https://doi.org/10.22271/ortho.2024.v10.i1c.3514>

Abstract

Introduction: Septic arthritis (SMA) of the knee is a serious functional and life-threatening emergency. The objective of our study was to evaluate the surgical treatment of SMA of the knee at the University Hospital of Brazzaville.

Materials and Methods: Our retrospective study, from January 1, 2018 to December 31, 2023, was conducted at the Brazzaville University Hospital, in the Traumatology-Orthopedics department. Local inflammatory and laboratory signs led to the diagnosis of SMA. Thirty-eight patients over 18 years of age, with operated knee septic arthritis, were included. Twenty-six men and 12 women were collected. The mean age was 44.34 years (range 18 to 76 years). Thirteen patients were immunocompromised, four of whom were HIV-positive. The mean time to surgery was 11.32 days (range: 1 to 31 days). Surgical arthrotomy was performed after an internal parapatellar incision. The Gächter stage was used for the assessment of the evolutionary stage. The subjective International Knee Documentation Committee (IKDC) scale was used for functional assessment.

Results: The mean follow-up was 33.4 months (range 3 to 62 months) and the mean length of hospital stay was 31.78 days (range 7 to 47 days). Cure of knee SMA was achieved at the last follow-up in 36 patients (94.74%). The mean subjective IKDC score was 87.36 (range: 72 to 98) with a significantly higher score at the last follow-up when the Gächter stage was lower ($p=0.000007$). Ankylosis of the knee was noted (2.63%) and one death was reported (2.63%).

Conclusion: Surgical treatment of knee SMA, well indicated and well conducted, allows healing without sequelae. The time it takes to take care of patients determines good results.

Keywords: Knee, septic arthritis, infection, surgery

Introduction

Septic arthritis (SMA) of the knee is a serious medical emergency. It involves the functional prognosis of the knee joint but also the vital prognosis due to the associated bacteremia and the risk of septic shock [1]. Diagnosis and management must be rapid for a favorable outcome. It reflects the location of a pathogenic germ in the joint cavity between the thigh and the leg. The incidence of septic arthritis is estimated to be between 1 and 10 per 100,000 inhabitants per year [2]. In Iceland, the adult incidence is estimated at 9.4 per 100,000 inhabitants in the years 1998-2002 [3]. Mortality is estimated to be approximately 10% and approximately 30% in patients over 60 years of age, with polyarticular involvement or comorbidities [4, 5]. Although all joints are affected, the knee joint is the most affected in 40% to 50% [2]. In Congo, the predisposing factors identified were age greater than or equal to 60 years, diabetes, rheumatoid arthritis and immunosuppression [6]. It is the most common osteoarticular infection in 53% of cases, with an estimated annual incidence of 4 to 10 per 100,000 inhabitants [7]. Immunosuppression with human immunodeficiency virus (HIV) was strongly associated [7]. Despite advances in antibiotic therapy and well-conducted therapeutic protocols, functional sequelae are frequent [8]. The objective of this study was to evaluate the surgical treatment of septic arthritis of the knee at the University Hospital of Brazzaville.

Corresponding Author:
Kevin Parfait Bienvenu Bouhelo-Pam

¹ Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

Materials and Methods

Patient Selection and Criteria

Our study was retrospective, extending from January 1st 2018 to December 31, 2023, i.e. six years. It included 38 septic monoarthritis of the native knee of 38 patients over 18 years of age, operated in the Traumatology-Orthopaedics department of the Brazzaville University Hospital. Twenty-six patients were male and 12 patients were female, for a sex ratio of 2.17. The mean age was 44.34 years (range 18 to 76 years). Homozygous SS sickle cell terrain was associated in six cases (15.79%). Thirteen patients (34.21%) had risk factors for immunosuppression (diabetes mellitus: 2, corticosteroid therapy: 7, HIV infection: 4). The diagnosis of knee SMA was suggested.

- Clinically, by local inflammatory signs of the knee (pain, increased local heat, joint effusion, stiffness), and signs of infection (Gateway, fever, chills, deterioration in general condition).
- Biologically, by the existence of a biological inflammatory syndrome consisting of neutrophil polynuclear leukocytosis greater than 10000 white blood cells per cubic millimeter of blood, an acceleration of the sedimentation rate greater than 20 millimeters in the first hour and an elevation of C-reactive protein (CRP) greater than 6 milligrams per litre.

All patients were admitted for knee pain with total functional impotence of the affected pelvic limb. Fever was noted in 14 patients (36.84%). General condition was impaired in 10 patients (26.31%). Joint stiffness was noted in 27 patients (71.05%). A gateway was noted in 5 patients (13.16%). It was cutaneous in four cases (10.52%), oropharyngeal in one case (2.63%). Neutrophil polyleukocytosis was found in 32 patients (84.21%). Sedimentation rate was accelerated in 36 patients (94.74%). The mean CRP was 78.49 mg/L (range 14 to 245 mg/L). All patients underwent joint puncture (Figure 1). On macroscopy, the fluid was purulent in 28 cases (73.68%) and cloudy in 10 cases (26.32%). Systematic bacteriological analysis of the joint fluid prior to surgery, which revealed a pathogenic germ, confirmed the suspected diagnosis. A germ was isolated in 17 cases (44.74%). *Staphylococcus aureus* was 16 cases (42.1%) and one case was *Salmonella* (2.63%). Tuberculin intradermal reaction was positive in two patients (5.26%). Standard X-rays of the knee from the front and side were ordered in all patients (Figure 1). Pinch of the joint space was found in 20 patients (52.63%), bone demineralization in six patients (15.79%), subchondral bone geodes in four patients (10.52%), bone erosions in five patients (13.15%) and softbore thickening in 11 patients (28.95%). Joint ultrasound was performed in 18 patients (47.37%). Intra-articular effusion was found in all 18 patients (47.37%).

The mean time to surgery was 11.32 days (range: 1 to 31 days) after symptom onset.

Surgical technique

Patients were operated on in an emergency room or septic surgery room. They were given spinal anesthesia. They were placed supine on an ordinary operating table. The surgical incision was internal parapatellar (Figure 2). After internal arthrotomy, the joint fluid (Figure 3) was collected and sent to the laboratory for microbiological analysis, and then completely evacuated. A near-total synovectomy with a monopolar electric scalpel was performed to reduce bacterial inoculum. Synovial and sometimes bone samples (Gächter

stage IV) were systematically sent for anato-pathological analysis. An abundant lavage of the joint cavity was done with physiological saline allowing the evacuation of fibrin deposits and false membranes until the clearing of the joint fluid. Bone curettage was combined in one case (2.63%) and sequestrectomy in one case (2.63%). A suction drain was systematically placed in the joint cavity before closure. The suture was made in three planes: capsular, subcutaneous and cutaneous by separate stitches. A knee brace was put in place for 21 days.

Aftercare

The Gächter classification^[9] was used for the assessment of the life stage (Table 1). CRP was performed regularly every two weeks for the first two months and then monthly for biological monitoring of inflammation. Cure was declared when local inflammatory and infectious signs disappeared, and CRP normalized. Pain assessment at last follow-up was based on the Numeric Rating Scale (NES)^[10]. The subjective International Knee Documentation Committee (IKDC) scale^[11] was used for the functional assessment of treatment. Walking was allowed after surgery with axillary crutches until functional recovery with pain-free walking. Functional rehabilitation focused on the recovery of range of motion was performed after skin healing and removal of sutures after 21 days and for three months. Microbiological analysis of joint fluid collected during surgery found: *Staphylococcus aureus* in 18 cases (42.1%), *Salmonella* in two cases (2.63%) and *Pseudomonas aeruginosa* in two cases (2.63%). Histopathological examination of the surgical specimen noted non-specific inflammation in 29 cases (76.32%), tuberculosis-specific epithelioid granuloma in two cases (5.26%). No pathological findings were available in seven patients (18.42%).

Systematic, double, bactericidal antibiotic therapy, administered parenterally and then orally, with good joint and bone diffusion was started after surgical sampling, adapted according to microbiological analysis and maintained until normalization of CRP for at least 45 days.

Statistical analysis

Data were collected from medical records. Treated patients were seen in consultation and contacted by telephone when they were absent for follow-up. After obtaining informed consent from patients, the data was recorded on an Excel spreadsheet. SPSS 19.0 software was used for data processing. The exact Fisher test for was used for qualitative data, the Mann-Whitney test was used for quantitative data. For the matched data, the Wilcoxon test was used. A level (p) of less than 0.05 was selected as the level of statistical significance.

Results

Patients were followed with a mean follow-up of 33.4 months (range 3 to 62 months). The mean length of hospital stay was 31.78 days (range: 7 to 47 days). Cure of knee SMA was achieved at the last follow-up in 36 patients (94.74%) regardless of Gächter's stage (p=0.00006). Ankylosis of the knee was noted (2.63%) and one death was reported (2.63%). Complete functional recovery at the last follow-up was achieved in 27 patients (71.05%) and partial recovery with flexion from 0 to 90° was achieved in 10 patients (26.32%). No revision surgery was required. Age, sex, presence of comorbidity, time between onset of signs and surgery, and identified germ were not factors in the success or failure of

surgery. At the last follow-up, the mean NEA score was 2.23 (range: 0 to 4) and the mean subjective IKDC score was 87.36 (range: 72 to 98). There was no significant difference between the EEN and the Gächter stage. On the other hand, the less advanced the Gächter stage, the higher the subjective IKDC score at the last decline ($p=0.000007$). The mean CRP value at last follow-up was 3.2 mg/L (range 1 to 6). There was a correlation between the Gächter stage and the CRP value at last setback ($p=0.0003$).

Discussion

Surgical arthrotomy resulted in a significant cure in our series (94.74%). No revision surgery was required. The surgical procedure was performed by the same team. The operating protocol was the same for all patients. Our department opted for this surgical technique because of the simplicity and speed of execution allowing a complete joint lavage, an almost total synovectomy, especially for advanced SMAs (Stages II to IV of Gächter). It can be used to remove synovial abscesses and valves, which contain a large amount of germs [12]. Although considered a stiffening surgery, stiffness is related to the pathology rather than the surgical procedure [12]. Tissue sampling of the synovial membrane or bone in sufficient quantity for pathological analysis is better in open arthrotomy than in arthroscopy. In the series of Vincent *et al.* [13], cure had been achieved in 84%. It involved patients over 60 years of age over a 10-year period with about 19% of deaths from bacteremia. Arthroscopic treatment has not been performed here due to lack of equipment. It resulted in a cure of 93% of cases in the series of Aïm *et al.* [14] but iterative arthroscopies were necessary to obtain a good result. This would reflect the inadequacy of synovectomy and excision of infected tissues. Open arthrotomy is best recommended for health centers in low-income countries where the practice of the surgical procedure is difficult due to its cost. It is difficult for patients to perform multiple surgical procedures. No revision surgery was required in our series. It is a therapeutic alternative indicated in cases of arthroscopy failure and in advanced stages such as osteoarthritis [15]. The time it took for us to take care of the surgery was long. This was due to the difficulties related to the cost of the surgery being fully insured by the patient and his family. The lack of social security coverage explains the delay in treatment. Most authors [16-18] consider the delay in management and the advanced stage of SMA as factors of poor prognosis. An HIV-immunocompromised terrain was often found in the different series [7, 8]. Blanche *et al.* [19] in Rwanda found HIV immunosuppression in 24 patients with SMA in 79% of cases. Bileckot *et al.* [20] in 171 patients in Congo had 23% HIV positive serologies. It would therefore be important to do an HIV serology in case of SMA. Four patients were noted with us and were specifically treated. Corticosteroid immunosuppression was more common in our series. These patients were using long-term topical corticosteroids to self-medicate for skin lightening. Functional recovery has been generally favorable for our patients. This could be explained by the precocity of functional rehabilitation as soon as the skin heals and the reduction of inflammatory signs. Less advanced stages of SMA and early treatment led to better functional recovery ($p=0.000007$). The germ isolated was mainly *Staphylococcus aureus* in us as well as in Aïm [14]. The latter recommends starting oral antibiotic therapy after sterilization of drainage fluids, to avoid the risk of acquiring resistance, especially during *Staphylococcus aureus* infections. Some authors [21, 22] believe that *Staphylococcus aureus* SMA is a factor in poor

prognosis due to the possibility of proliferation of resistant methicillin strains. One patient died in the context of an associated poor general condition. There was no surgical arthrodesis from the outset in our study, in order to preserve the joint surfaces for as long as possible.

The limitations of our study were the single-center nature, the small follow-up and the retrospective nature of the study, which did not allow us to assess overall survival. Barriers to patient recruitment were the high cost of treatment that was entirely out-of-pocket and the lack of social security coverage. Multiple bacteriological samples taken after surgery, including drainage fluid, could not be taken. The kinetics of CRP could not be established on a regular basis.

Table 1: Assessment of patients according to Gächter stage

	Number of employees (N)	Percentage (%)
Stade I	7	18,42
Stage II	17	44,74
Stage III	8	21,05
Stage IV	6	15,79



Fig 1: X-ray images of osteoarthritis of the knee



Fig 2: Internal parapatellar surgical incision of the knee



Fig 3: Purulent joint fluid



Fig 4: Functional recovery three months after surgery in a 46-year-old patient

Conclusion

Surgical treatment gives favorable results on the evolution of SMA. Open arthrotomy is a fast, simple and effective technique, allowing a significant excision of infected tissue, considerably reducing bacterial inoculum. Functional outcomes were favorable in our series, particularly for the early stages of the disease and for early management delays. High cure rates are due to early and well-conducted treatment. The risk of mortality and functional sequelae justifies the early initiation of surgical treatment as soon as the indication is set.

Conflict of Interest

Not available.

Financial Support

Not available.

References

- Weston VC, Jones AC, Bradbury N, Fawthrop F, Doherty M. Clinical features and outcome of septic arthritis in a single UK Health District 1982-1991. *Ann Rheum Dis.* 1999;58(4):214-219.
- Dubost JJ, Tournadre A, Soubrier M, Ristori JM. Pyogene-to-septic arthritis in adults. *EMC - Musculoskeletal System*; c2010. p. 1-17. [Article 14-180-A-10].
- Geirsson AJ, Statkevicius S, Vikingsson A. Septic arthritis in Iceland 1990-2002: Increasing incidence due to iatrogenic infections. *Ann. Rheum Dis.* 2008;67(5):638-643.
- Broy SB, Schmid FR. A comparison of medical drainage (needle aspiration) and surgical drainage (arthrotomy or arthroscopy) in the initial treatment of infected joints. *Clin. Rheum Dis.* 1986;12(2):501-522.
- Travers V, Koechlin P, Apoil A, Bonnet JC. Treatment of acute pyogenic arthritis of major joints of the limbs. *Rev Chir. Orthop. Reparatrice Appar. Mot.* 1985;71:235-240.
- Bileckot R, Koumbemba G, Nkoua JL. Etiologies of oligoarthritis in equatorial Africa. Retrospective study of 80 cases in Congo. *Rev Med Int.* 1999;20:408-411.
- Ntsiba H, Bazebissa R, Lamini N, Yala F. One hundred cases of septic arthritis of the knee in the tropics. *Bull Soc. Pathol. Exot*; c2003. p. 244-246.
- Angalla ARL, Lamini N, Bouelo Pam K, Bileckot R, Ntsiba H. Septic arthritis in Brazzaville (Congo): A study of 12 cases. *Health Sci. Dis.* 2021;22(5):1-6.
- Stutz G, Kuster MS, Kleinstück F, Gächter A. Arthroscopic management of septic arthritis: Stages of infection and results. *Knee Surg. Sports Traumatol. Arthrosc.* 2000;8(5):270-274.
- Williamson A, Hoggart B. Pain: A review of three commonly used pain rating scales. *Journal of Clinical Nursing.* Août. 2005;14(7):798-804.
- Hefti E, Müller W, Jakob RP, Stäubli HU. Evaluation of knee ligament injuries with the IKDC form. *Knee Surg., Sports traumatol, Arthroscopy.* 1993;1(3-4):226-234.
- Wirtz D, Marth M, Miltner O, Schneider U, Zilkens K. Septic arthritis of the knee in adults: Treatment by arthroscopy or arthrotomy. *International Orthopaedics (SICOT).* Août. 2001;25(4):239-241.
- Vincent GM, Amirault JD. Septic arthritis in the elderly. *Clin. Orthop. Relat Res.* 1990;251:241-245.
- Aïm F, Delambre J, Bauer T, Hardy P. Efficacy of arthroscopic treatment for resolving infection in septic arthritis of native joints. *Orthopaedics & Traumatology: Surgery & Research.* 2015;101(1):61-64.
- Ho G. How best to drain an infected joint. Will we ever know for certain? *J Rheumatol.* Déc. 1993;20(12):2001-2003.
- Vispo Seara JL, Barthel T, Schmitz H, Eulert J. Arthroscopic treatment of septic joints: Prognostic factors. *Arch Orthop. Trauma Surg.* 2002;122(4):204-211.
- Jenny J-Y, Lortat-Jacob A, Boisrenoult P, Zerkak D, Pujol N, Ziza J-M, *et al.* Knee septic arthritis. *Rev Chir Orthop Reparatrice Appar Mot.* 2006;92(8):S46-54.
- Balabaud L, Gaudias J, Boeri C, Jenny J-Y, Kehr P. Results of treatment of septic knee arthritis: A retrospective series of 40 cases. *Knee Surg. Sports Traumatol. Arthrosc.* 2007;15(4):387-392.
- Mody GM. Joint manifestations associated with acquired immunodeficiency virus infection. *Journal of Rheumatism.* 2003;70(2):132-136.
- Bileckot R, Mouaya A, Makuwa M. Prevalence and clinical presentations of arthritis in HIV-positive patients seen at a rheumatology department in Congo-Brazzaville. *Rev Rhum Engl Ed. Oct.* 1998;65(10):549-554.
- Travers V, Koechlin P, Apoil A, Bonnet JC. [Treatment of acute pyogenic arthritis of major joints of the limbs]. *Rev. Chir. Orthop. Reparatrice Appar. Mot.* 1985;71(4):235-240.
- Bussièrre F, Beaufile P. [Role of arthroscopy in the

treatment of pyogenic arthritis of the knee in adults. Report of 16 cases]. Rev Chir. Orthop. Reparatrice Appar. Mot. Déc. 1999;85(8):803-810.

Kevin Parfait Bienvenu Bouhelo-Pam

¹ Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

Affleck Romaric Ledier Angalla

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

³ Department of Rheumatology, Brazzaville University Hospital Center, Republic of Congo

Roger Bertrand Sah Mbou

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Regis Perry Massouama

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Arnauld Sledje Wilfrid Bilongo-bouyou

¹ Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

Marc Fabrice Nkoua

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Moïse Radam Ellah

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Zifa Pentèce Zengui

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Nevil S Mvili Gampio Ngona

Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

Marius Monka

¹ Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

Armand Moyikoua

¹ Department of Orthopaedic and Traumatological Surgery, Brazzaville University Hospital, Republic of Congo

² Faculty of Health Sciences, Marien Ngouabi University, Brazzaville, Republic of Congo

Creative Commons (CC) License

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to Cite This Article

Bouhelo-Pam KPB, Angalla ARL, Mbou RBS, Massouama RP, Bilongo-bouyou ASW, Nkoua MF, *et al.* Surgical treatment of septic arthritis of the knee at Brazzaville University Hospital Center. International Journal of Orthopaedics Sciences. 2024;10(1):172-176.