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Peer Reviewer of World Journal of Orthopedics, Jie Wen, PhD, Assistant Professor, Associate Chief Physician, Department of Pediatric Orthopedics, Hunan Provincial People's Hospital, The First Affiliated Hospital of Hunan Normal University, Changsha 410013, Hunan Province, China. cashwj@qq.com

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CASE REPORT

### Arthroscopic synovectomy for synovial hyperplasia in chronic knee gouty arthritis: A case report

Ghuna A Utoyo, Calvin Calvin

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Ghuna A Utoyo, Department of Orthopaedics and Traumatology, Dr. Hasan Sadikin General Hospital/Universitas Padjadjaran, Bandung 40161, Jawa Barat, Indonesia

Calvin Calvin, Department of Orthopaedics and Traumatology, St. Borromeus Hospital, Bandung 40132, Jawa Barat, Indonesia

Corresponding author: Ghuna A Utoyo, MD, Surgeon, Department of Orthopaedics and Traumatology, Dr. Hasan Sadikin General Hospital, Jalan Pasteur No. 38, Pasteur, Kecamatan Sukajadi, Bandung 40161, Jawa Barat, Indonesia. ghuna@unpad.ac.id

#### Abstract

#### BACKGROUND

Chronic synovitis due to chronic knee gouty arthritis (KGA) resulting in synovial hyperplasia has not been documented in the current literature, and thus the optimal management for this condition remains unclear. This case report discusses a 34-year-old man with a history of chronic KGA who presented with recurrent knee effusion resulting from synovial hyperplasia.

#### CASE SUMMARY

A 34-year-old man presented to our outpatient clinic with a 5-year recurrent knee effusion and a history of chronic KGA. Symptoms persisted despite serial aspiration and urate-lowering medication (febuxostat 80 mg once daily) for 2 months. Diagnostic arthroscopy was performed due to the recalcitrant symptoms. Intraoperatively, tophi deposition and excessive thickening of the synovial membrane were observed. Synovial biopsy and partial synovectomy were performed, revealing chronic synovitis with synovial hyperplasia that was consistent with chronic KGA. At follow-up after 6 months, the patient reported no further episode of knee effusion.

#### CONCLUSION

Arthroscopic synovectomy for synovial hyperplasia in chronic KGA sufficiently eradicates the symptoms of recurrent knee effusion.

Key Words: Chronic knee gouty arthritis; Recurrent knee effusion; Synovial hyperplasia; Arthroscopic synovectomy; Case report

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Core Tip: Recurrent knee effusion in cases of chronic knee gouty arthritis (KGA) that are refractory to conservative treatment should alert surgeons to the possibility of synovial structural alteration, such as synovial hyperplasia. Diagnostic arthroscopy should be considered in these cases to allow a definitive diagnosis. In our case, tophi deposition and excessive synovial membrane thickening were observed intraoperatively. Therefore, partial synovectomy was performed to address the excessive synovial tissue. At six months, no further episode of recurrent knee effusion. These findings suggest that an arthroscopic synovectomy was effective in managing synovial hyperplasia in the case of chronic KGA.

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#### INTRODUCTION

Knee gouty arthritis (KGA) is one of the most prevalent inflammatory arthritis among the adult population. This results from either an abnormally high purine production or an abnormal excretion of uric acid, leading to the deposition of monosodium urate crystals within the joint space [1,2]. The disease can progress to the form of chronic gouty arthritis, often manifesting as a case accompanied by chronic synovitis, bony erosions, cartilage damage, and tophi formation[3]. The chronic form of the disease is often debilitating, as it leads to significant pain, activity limitation, and reduced quality of life[4].

Although chronic synovitis has been found to be correlated with chronic KGA, its impact and consequences have not been thoroughly discussed in the literature [5,6]. This is mainly because most cases of chronic synovitis will resolve itself after being adequately managed with urate-lowering medication[7]. So far, the presentation of chronic synovitis resulting in synovial hyperplasia has never been documented in a case of chronic KGA. In this case report, we present an unusual case of a 34-year-old male with a 5-year history of recurrent knee effusion and chronic KGA. This patient was revealed to have synovial hyperplasia, which was related to chronic KGA, and successfully treated with arthroscopic synovectomy.

#### CASE PRESENTATION

#### Chief complaints

A 34-year-old man presented at our outpatient clinic with symptoms and a history of recurrent left knee effusion that occurred approximately five years ago.

#### History of present illness

The recurrent knee effusion was accompanied by pain and limitation of knee extension and flexion. The patient describes mild-to-moderate difficulty in performing daily activities. There was no history of recent or previous trauma.

#### History of past illness

The symptoms began approximately 5 years prior to consult at our department, during which the patient regularly visited the internal medicine outpatient clinic once a month for allopurinol therapy. However, despite treatment from the internal medicine physicians, the patient still experienced recurrent of knee effusion. A familial history of hyperuricemia was noted, but none of the patient's family member experienced the same symptoms.

#### Personal and family history

No relevant family history has been identified.

#### Physical examination

Upon examination, left knee effusion was detected. Active and passive movement of the left knee was complete, but the patient experienced mild pain at full flexion. The Lachman test, anterior drawer test, posterior drawer test, varus stress test, valgus stress test, and McMurray test yielded negative results.

#### Laboratory examinations

An initial laboratory examination at our outpatient clinic revealed a uric acid level of 684.08 µmol/L, and this had a history of reaching as high as 999.35  $\mu$ mol/L. Meanwhile, leukocyte and C-reactive protein levels were 14.43  $\times$  10<sup>9</sup>/L and 14 mg/L, respectively. A subsequent laboratory examination was performed two months later after the initial conservative treatment. A uric acid level of 553.21 µmol/L was observed. Quantitative rheumatoid factor was ordered due to the chronicity of the patient's symptoms, which tested negative. Synovial fluid aspiration was performed, yielding approximately 42 mL of fluid, cloudy and yellowish in color, but all parameters were within normal limits. Culture studies of



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Figure 1 Plain radiography of the left knee revealed no abnormalities.



Figure 2 Preoperative magnetic resonance imaging revealed a large knee effusion in combination with synovitis. A: Sagittal T2-weighted view; B: Axial T2-weighted view.

synovial fluid were negative for microorganism growth.

#### Imaging examinations

A plain left knee radiograph revealed no abnormalities (Figure 1). Magnetic resonance imaging revealed synovitis and supra- and infra-patellar recess effusion (Figure 2).

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Figure 3 Diagnostic arthroscopy findings of chronic knee gouty arthritis. A: Floating tophi were observed after the insertion of the viewing portal; B: Deposition of tophi on the cartilage surface of the femoral condyle; C: Deposition of tophi on the cartilage surface of the tibial plateau; D: Deposition of tophi on the anterior cruciate ligament surface.

#### **FINAL DIAGNOSIS**

Several differential diagnoses for this unusual symptom other than gouty arthritis were considered, including septic arthritis, tuberculous synovitis, rheumatoid arthritis (RA), pigmented villonodular synovitis (PVNS), and synovial chondromatosis. Based on diagnostic arthroscopy and confirmation from synovial biopsy, the final diagnosis was synovial hyperplasia related to chronic KGA.

#### TREATMENT

The patient was initially managed conservatively for 2 months with serial synovial aspiration (once every 2 weeks) and urate-lowering medication (febuxostat 80 mg once daily), but the recurrent knee effusion persisted. Due to the failure of conservative treatment, diagnostic arthroscopy was planned for this patient.

After draping the patient in a sterile fashion, an arthroscopic trochar was inserted to collect the synovial fluid for culture analysis, then, diagnostic arthroscopy was performed. After inserting the viewing portal, floating tophi, characterized as a white chalky substance was observed (Figure 3A). Deposition of this tophi was also observed over the femoral condyle (Figure 3B), tibial plateau, and meniscus (Figure 3C), as well as on the surface of the anterior cruciate ligament (ACL) (Figure 3D). Hook probes were used to carefully release the tophi from the cartilage surface. A shaver



Figure 4 Arthroscopic synovectomy for synovial hyperplasia in chronic knee gouty arthritis. A: Excessive synovial tissue was observed; B: Partial synovectomy was performed through the anteromedial portal; C: Partial synovectomy was also performed through the anterolateral portal; D: Radiofrequency was applied to the synovial surface after the thorough partial synovectomy.

was used to debride tophi from the ACL surface. An extensive thickening synovium membrane was observed (Figure 4A). Afterward, partial synovectomy was performed through an anterolateral (Figure 4B) and anteromedial (Figure 4C) portal, then, a radiofrequency was applied to the synovium surface (Figure 4D). The synovium was sampled for biopsy using an arthroscopic punch. This procedure aimed to identify pathological change in the synovium and exclude any synovial malignancy resulting in productive synovial fluid.

#### **OUTCOME AND FOLLOW-UP**

Follow-up appointments were scheduled for 1 and 2 weeks, 1, 2, and 6 months postoperatively. Following the procedure, febuxostat was started at a dose of 80 mg daily for two months. A week after the initial procedure, the synovial biopsy results came out, revealing chronic synovitis with synovial hyperplasia. This feature was consistent with chronic KGA. No pathological change of cells within the synovium or granulomatous inflammation was observed. Hence, synovial tumor (PVNS and synovial chondromatosis) and tuberculous synovitis were ruled out. Two weeks postoperatively, knee

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#### Utoyo GA et al. Arthroscopic synovectomy for KGA

Table 1 Case timeline				
Date	Event			
2018 to November, 2023	History of recurrent left knee effusion and chronic knee gouty arthritis			
	History of allopurinol therapy from the internal medicine department for five years			
November 17, 2023	Patient consulted at our outpatient clinic for recurrent left knee effusion			
	Plain left knee radiograph revealed no abnormalities			
	Leukocyte count: $14.43 \times 10^9$ /L, C-reactive protein: 14 mg/L, and uric acid: 684.08 µmol/L			
	Synovial fluid aspiration was performed			
	Conservative management: Serial synovial fluid aspiration and febuxostat 80 mg/day			
January 26, 2024	The symptom of recurrent left knee effusion persisted			
	Uric acid: 553.21 µmol/L, and rheumatoid factor: Negative			
	Synovial fluid culture: no growth of microorganisms			
	MRI: Synovitis and large knee effusion			
	Arthroscopic procedures were planned for diagnostic confirmation. Several differential diagnoses other than gouty arthritis, including: Septic arthritis, tuberculous synovitis, pigmented villonodular synovitis, and synovial chondromatosis			
	Pre-operative IKDC score: 72.41			
January 31, 2024	Patient underwent an arthroscopic procedure			
	Sterile synovial fluid was obtained for culture analysis			
	Intraoperative findings revealed synovial thickening and tophi deposition			
	Synovial biopsy and synovectomy were performed			
February 7, 2024 (one weeks	Synovial biopsy: chronic synovitis with synovial hyperplasia that was consistent with chronic knee gouty arthritis			
postoperatively)	Culture of sterile synovial fluid: No growth of microorganisms			
August 23, 2024 (six months	Patient reported no further episodes of knee effusion			
postoperatively)	IKDC score: 96.66			

IKDC: International Knee Documentation Committee; MRI: Magnetic resonance imaging.

effusion was observed, but synovial fluid aspiration was not performed. Knee flexion and extension were limited 30° and 10°, respectively, thus prompting referral to the rehabilitation unit for range of motion exercises. One month postoperatively, a slight knee effusion of approximately 12 mL was observed, but this is considered a normal occurrence postarthroscopic surgery. Knee flexion improved to 90°, but knee extension was still limited to 10°. Two months postoperatively, the patient achieved knee flexion and extension of 130° and 0°, respectively. Laboratory tests revealed a uric acid level of 333.12 µmol/L. Subsequently, the patient reported no episodes of knee effusion. Six months postoperatively, the patient reported no further episodes of knee effusion, with only slight discomfort at the portal scar when squatting or kneeling. Outcomes were assessed using the International Knee Documentation Committee score, which improved from 72.41 preoperatively to 96.66 postoperatively at 6 months. Table 1 outlines the timeline of the patient's symptoms and treatment.

#### DISCUSSION

Several unusual presentations of chronic KGA have been previously documented, including tophi mimicking a soft tissue mass[8], knee locking resembling meniscal tears[9], and tophi causing spontaneous ACL rupture[10,11]. In this case report, we present a rare occurrence of synovial hyperplasia in chronic KGA resulting in recurrent knee effusion for over five years, which has never been described in previous literature. Our case highlights the debilitating nature of chronic KGA and its significant impact on the patient's quality of life. This case also emphasizes the utility of arthroscopic procedures in managing the chronic form of KGA.

The arthroscopic management of KGA has been described in several reports, particularly the washout procedure. This procedure is mainly reserved for chronic cases, such as those with a symptomatic intra-articular tophaceous mass or KGA with concomitant septic arthritis. Gong *et al*[12] reported the uses of arthroscopic washout procedure in several conditions, including refractory gout, acute gouty arthritis not relieved by colchicine and non-steroidal anti-inflammatory drugs, and chronic gouty arthritis with severe joint pain. The combination of arthroscopic washout procedure and

febuxostat was found effectively reduced uric acid levels and the number of acute flares.

Conversely, arthroscopic synovectomy alone has rarely been performed in the case of KGA. The use of this procedure is most well-known for recalcitrant chronic synovitis among RA patients [13,14]. In the study of Roch-Bras et al [15], approximately 70.7% of patients with RA had good clinical outcomes after being managed with arthroscopic synovectomy, with a mean follow-up of 8.9 years. This procedure resulted in decreased pain and recurrent effusion episodes, as well as improved knee range of motion. Based on those results, we hypothesized that the same principle also applies for the management of synovial hyperplasia among patients with chronic KGA.

Structural changes within the synovial membrane among patients with chronic articular inflammation might cause increased synovial fluid production within the joint cavity. Therefore, the presence of effusion can be a sensitive indicator for any synovial pathology [15]. In the present case, the excess synovial tissue seen on arthroscopy prompted us to perform a biopsy and partial synovectomy. Radical synovectomy was avoided, as the synovial hyperplasia was mostly less aggressive compared to cases of RA[16].

Although the form of synovitis in a case of chronic KGA has been reported in the ultrasonography study by Zheng et al [5], to our knowledge, no studies and reports have ever documented synovial structural alteration directly through diagnostic arthroscopy or biopsy. In our case, after the follow-up period, partial synovectomy was found to successfully eliminated the recurrent knee effusion symptoms related to synovial hyperplasia. Nevertheless, our report had a limited follow-up duration. Further studies should include a longer follow-up to determine the long-term outcomes of arthroscopic partial synovectomy for synovial hyperplasia in chronic KGA.

#### CONCLUSION

We reported an unusual case of chronic KGA in which the patient complained of recurrent knee effusion related to synovial hyperplasia. The symptoms persisted despite adequate conservative treatment. Arthroscopic synovectomy successfully addressed the patient's symptoms. This report suggests that synovial hyperplasia should be considered as a cause of recalcitrant knee effusion among patients with chronic KGA. Arthroscopic procedure should be offered as a definitive diagnostic procedure and definitive treatment for synovial hyperplasia.

#### FOOTNOTES

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Country of origin: Indonesia

ORCID number: Ghuna A Utoyo 0000-0002-2449-2690; Calvin Calvin 0009-0008-3066-0284.

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