

# The Role of Arthroscopy in the Treatment of Gouty Arthritis of the Knee

## Case presentation

MARIUS MOGA<sup>1</sup>, MARK EDWARD POGARASTEANU<sup>1\*</sup>, DUMITRU FERECHEDE<sup>2</sup>, ANTOINE EDU<sup>2</sup>, CHEN FENG IFRIM<sup>2</sup>

<sup>1</sup>Central University Emergency Military Hospital Dr. Carol Davila Bucharest, 134 Calea Plevnei, 010825, Bucharest, Romania

<sup>2</sup>Carol Davila University of Medicine and Pharmacy Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania

*Gout is a metabolic disease involving the impregnation of joints and other tissues with urate crystals. The onset is often brutal, and it manifests itself with pain and inflammation in the affected joint. The treatment usually involves rest, ice, NSAIDs and anti-gout medication. The long-term treatment involves medication and dietary changes. In the joint, urate crystals are deposited in the synovial, in the cartilage and in the menisci. In the arthroscopic practice, the gouty knee is a rare occurrence. We present a relevant case, that of a 57 years old patient without a prior gout diagnosis where we found urate crystal deposits covering the synovium, cartilage and meniscus, and we discuss the current and recent year Pub Med indexed literature in order to evaluate the possibilities for arthroscopic treatment of this pathology. We looked at the number of patients involved, their characteristics, and the surgical techniques used. We also looked at the temporal relation of the arthroscopic intervention to the recent gout attacks, and at the described lesions that were found. Also, we evaluated the papers for joint liquid analysis, gout drug treatment, and description of clinical aspects involved and associated lesions. Finally, we looked at the follow-up, at the functional scores used to monitor the patient's evolution, at the associated medication and at the long-term outcomes, if described. We have found opinions to vary. In the end, we draw conclusions pertaining to the practical short-term and long-term use of knee arthroscopy in the treatment of gout.*

**Keywords:** gout, knee, arthroscopy

Gout is a metabolic disease involving the impregnation of joints and other periarticular tissues with monosodium urate crystals, following an increase in serum levels of uric acid. In Orthopedics, gout is seen as a common inflammatory arthritis, where the inflammation appears in the context of the phagocytosis of monosodium urate (MSU) crystals and the release of inflammatory cytokines within the joint [1]. Most patients with serum hyperuricemia will not have symptomatic gout, nor develop intra or periarticular deposits named tophi (fig. 1) [2]. The tophi seem to appear in periarticular subcutaneous tissues after approximately 5 years of symptomatic gout [3]. In the joints, urate crystals are deposited in the synovial, in the cartilage and in the menisci. The macroscopic aspect of the joint is dominated by the nodular, white, chalk-like appearance of the affected areas [2]. A polarized microscopic examination of a biopsy of the gout affected area will reveal negative birefringent amorphous needle-shaped monosodium urate crystals, which are a key feature for the diagnosis of this pathology [2, 4]. The synovial liquid may rarely show the aspect of a thick, *chalky*, and *milky* white urate laden effusion, in an acute gout episode [5].



Fig. 1. Removed para-articular gouty tophus (knee) in a patient presenting in our clinic with multiple tophi. This image is from the author's personal database

The onset is often brutal, and it manifests itself with pain and inflammation in the affected joint, the most common location being the metatarsophalangeal joint in the big toe, followed by the foot, ankle, midtarsal, knee, wrist, finger, and elbow joints, and also the periarticular tendons and bursae [6]. The evolution of gout is to pass from an acute phase to a chronic condition, over the course of several years, with intermittent irregular episodes and pain-free intercritical periods, causing chronic arthropathy in the joints involved [4].

Imaging of the joints affected by gout may be done with MRI, gadolinium (Gd)-enhanced MRI or CT, as shown by Chen et al in their 1999 article that examined both intra-articular and periarticular tophi [7]. They found that on MRI the aspect is that of low to intermediate signal intensity on both T1- and T2-weighted images, while Gd-enhanced MRI shows characteristic heterogeneous peripheral enhancement [7]. The CT examination demonstrates several degrees of stippled calcifications within the tophi [7]. With better and better computation power [8], the possibilities of visualizing ever smaller urate crystal deposits constitute a favorable probable development.

The treatment usually involves rest, ice, NSAIDs and anti-gout medication. The use of knee arthroscopy in the diagnosis and treatment of gout has long been proposed and used. Kennedy et al, in their 1984 article [9], describe the performing knee arthroscopy on a series of 31 patients with known gout, symptomatic in their metatarsophalangeal joint of the great toe, but asymptomatic in the knee, in order to inspect the joint and procure synovial membrane biopsies. The arthroscopic treatment in gout has been utilized not only for affected knees, but also the first metatarsophalangeal (MTP) joint, reducing the recurrence rate and increasing foot and ankle function, [10] and the ankle, improving the clinical symptoms and ankle function [11].

\* email: mark.pogarasteanu@gmail.com

All authors contributed in equal parts for this article.

The long-term treatment involves medication and dietary changes. In an advanced state of the condition, pain and disability may progress to such an extent that a total joint replacement procedure may be indicated, [2] while the literature suggests that in extreme cases an arthrodesis may be a better choice for selected cases [12].

### Objective

The objective of this article is to present the case of a patient who had an incidental discovery of urate crystal deposits on the synovium, meniscus and cartilage, discovered during a routine arthroscopy, and to discuss the role that knee arthroscopy may play in the treatment of gouty arthritis.

## Experimental part

### Case presentation

We present the case of a 57 years old patient that presented in our clinic complaining of pain on the medial side of his right knee. The patient had a history of chronic low-grade circumferential pain in the right knee and had suffered a minor trauma to the same knee three weeks prior to presenting in our clinic. He had an active lifestyle, and his associated pathologies were limited to an essential hypertension, that was under cardiologic treatment.

Upon examination, the pain was located on the medial side corresponding to the body and posterior horn of the medial meniscus. The ice cube test was positive for intraarticular fluid. There was no associated instability of the knee. The Numeric Pain Intensity Scale was reported at 8. The range of motion was 60 degrees almost pain free, and 96 degrees with significant pain.

A radiological study was performed and found no skeletal trauma, no significant arthrosis and no axis deviation. The patient was programmed for an MRI of the right knee, which was performed and found a large complex lesion to the body and posterior horn of the medial meniscus, as well as intra-articular fluid and synovitis.

An arthroscopy of the right knee was proposed and discussed with the patient, explaining advantages, disadvantages, potential risks and complications. Written consent was obtained for the procedure, which aimed to perform a partial meniscectomy of the internal meniscus, as well as a lavage of the knee.

The procedure was performed with the patient in supine position, under spinal anaesthesia. The leg was exsanguinated using an Esmarch bandage and a tourniquet. During the arthroscopic procedure, a complex medial meniscus lesion was found, involving the body and the posterior horn of the meniscus, and was treated with partial meniscectomy. Also, what appeared to be multiple urate crystal deposits (fig. 2-4) were found covering the synovium, cartilage and meniscus, as well as the cruciate ligaments. These were removed through shaving to the extent possible, and a sample was sent to the Laboratory for analysis. A lavage was performed. The incisions were closed single layer, with drainage.

## Results and discussions

Following the procedure, the patient was put on standard anticoagulant medication (low molecular weight heparin - sodium dalteparine 5000 UI/0.2 mL) for 7 days, preventive antibiotics (ciprofloxacin 500 mg x 2/day, for 3 days) and antiinflammatory / pain medication (etoricoxib 90 mg x 1/day, 5-7 days as needed).

The drain was removed the next day after surgery, and the patient was encouraged to mobilize the knee, using an elastic bandage to help with further drainage, and to apply ice locally. After removal of the drain, the patient started walking with a crutch the same day, with partial weight bearing as pain allows for 7-10 days.

The patient reported significantly less pain compared to the pre-op levels, 3 on the Numeric Pain Intensity Scale, as compared to 8 before the operation. Also, he reports that the posteromedial pain (corresponding to the meniscus area on the joint line) has reduced to 1, and that most of the pain he feels is related to the incision site. The range of motion was 108 degrees.

The Laboratory found the samples we sent during surgery to be urate crystals, as suspected. An Internal Medicine consult confirmed the suspicion of gout and started the patient on anti-gout medication and diet changes, with which he was compliant.

There were no complications, and at the 3 months follow-up the patient reported no pain, and a 118 degrees range of motion.

The particularities of the case were not only the incidental finding of urate crystal deposits in the knee, but also the complete disappearance of the chronic pain. We offer two explanations to this occurrence: either the pain was due to a pre-existing degenerative meniscal lesion, incomplete prior to the trauma event, or it was due to the urate crystal deposits. Considering that the chronic pain was described as circumferential by the patient, we believe it to be related more to the untreated gout and subsequent urate crystal deposits rather than to a pre-existing incomplete lesion of the meniscus, which would have manifested itself as a localized pain on the medial aspect of the knee. It is our belief that in performing the arthroscopic procedure we alleviated both the meniscal symptoms as well as the gout symptoms.

In order to better understand this somewhat rare occurrence, we aim to discuss the current and recent literature involving the last 18 years indexed in a widely recognized medical hub (Pub Med) in order to evaluate the possibilities for arthroscopic treatment of this pathology. We aim to see if the role played by arthroscopy in the treatment of symptomatic gouty knees justifies the surgical and anesthesiological risks associated with the procedure.

We accessed Pub Med, used the MeSH Database and searched for articles dealing with arthroscopy as the surgical treatment of gout in the knee, free full text or abstract, published after Jan. 2000, relating to the following associations: *gout + knee arthroscopy*, *gout + arthroscopy* and *gout + knee*.

We excluded registry based studies, cost effectiveness studies, studies that dealt with arthroscopy for gout in other locations, such as the ankle and studies that dealt with



Fig. 2-4. Urate crystal deposits discovered during a routine knee arthroscopy in our clinic. These images are from the author's personal database

only diagnostics. We defined arthroscopic procedures as involving lavage, cartilage lesion repair/stabilization, meniscus repair/excision, synovectomy, plicae excision, loose body removal etc, thus we excluded studies that dealt with experimental or novel treatments of other pathologies of the knee.

Where the data was available, we aimed to note the following criteria: number of patients, age of patients, gender of patients, period since diagnosis of gout, period since localization of MSU deposits in the knee, whether the patients were undergoing treatment for gout, clinical aspects of gout, serum uric acid levels, associated lesions, whether the arthroscopic procedure was performed during an acute gout episode, what were the arthroscopic findings, what actions were performed arthroscopically, whether a joint liquid analysis was performed and what were the results, what was the post-op evolution, medication and follow-up, what was the degree of patient satisfaction, what were the functional scores used to monitor the patient's evolution and what was the patients' long term evolution.

We have found opinions to vary. In a study involving 41 cases from 2000 to 2009 (all male), 5 of which were bilateral, Pan et al [13] found that arthroscopic debridement of the knee joint, together with anti-gout agents and diet control postoperatively, are effective at cleaning up uric acid crystals, reducing inflammation, improving joint mobility and speeding the recovery process, although he found a high number of reoccurrences (14 knees), but with reduced symptoms. The average Lysholm knee score was found to improve from 63.2 +/- 11.7 preoperatively to 96.8 +/- 5.8 at 15 months postoperatively, as did the average range of motion, from 87.79 +/- 35.19 degrees to 126.86 +/- 16.33 degrees [13].

Choi, Sungwook [14] describes in his 2015 article the case of a 35 year old man, with multiple tophy on both hands, feet, elbows, knees and ankles. The patient had bilateral contractures of the knee joints, with a range of motion of 40 to 90 degrees. Arthroscopic surgery of the knee was performed bilaterally, showing urate crystals covering the cartilage and synovium extensively, that were removed almost completely by shaving and the joints were thoroughly washed with sterile serum. After surgery, full range of motion was achieved, with favorable local evolution.

In his 2006 article [15], Li describes a particular case of gouty tophi that presents as an intra-articular synovial tumor of the knee, causing blocking. He describes the MRI appearance, and reports that after arthroscopic excision the patient was relieved of his symptoms.

Kijkunasathian et al [16], in 2009, report the case of a 29 year old male with gouty tophy that limited knee joint motion; an arthroscopic evaluation showed white toothpaste-like chalky urate crystals in the joint synovium and cartilage. The initial diagnosis was made after a sports injury and it was misinterpreted as a meniscus injury; the arthroscopic intervention established the correct diagnosis and provided a valid treatment.

Kuang-Hui in his 2003 article [17] reports the case of a patient who was diagnosed with gout, but had no subcutaneous manifestations. An arthroscopic intervention in his knee for posterior cruciate ligament reconstruction revealed the presence of urate tophy as whitish intraarticular deposits, as early manifestation of gout in previously unaffected joints.

In 2013, Garcia-Juarez [18] describes a 39 year old male patient with medical history of left knee trauma (rotation and forced valgus), initially treated orthopedically with

immobilization. Clinically, the knee was painful, with an increased volume and limited flexion to 0-40 degrees. The pain did not subside, so X-rays and an MRI scan were performed. The MRI showed a lesion of the medial meniscus and an chondral lesion of the medial condyle. Upon intervening arthroscopically, crystal deposits were found at the level of the cartilage, including the chondral lesion, and also on the synovia and anterior cruciate ligament. Mechanical removal of the deposits and lavage together with a repair of the meniscus and a coherent gout treatment resulted in a favorable outcome for the patient, returning to work in 4 weeks.

Espejo-Baena [19] describes in 2006 another case of an intraarticular gouty tophus attached to the anterior horn of the lateral meniscus, causing locking symptoms during extension, treated arthroscopically with a favorable result.

The 7 articles we found encompassed a total of 47 cases, but these were distributed unequally: 41 came from a single study [13], while the other 6 were single cases from articles that were case presentations. Still, all reported cases were male, in their 3<sup>rd</sup> and 4<sup>th</sup> decade of life. In the articles that reported it, the time elapsed from the diagnosis of gout varied from 3 to 15 years (in the case presentations) and from 2 months to 20 years with an average of 6 years and 2 months in the study [13]; none of the articles reported the time elapsed from the confirmation of the gout locating in the patient's knee. Only one article [14] referred to the preoperative gout treatment, stating that the patient was noncompliant with it. The serum uric acid levels were reported in 3 articles; two reported elevated levels compared to the expected values and one article reported levels in the upper normal values. In five of the seven articles a limitation in the range of motion in the affected knee was described; there was also associated pain, effusion and gait disturbance in one article, while two articles described previous trauma to the affected knee, which posed diagnostic difficulties, especially since one article describes associated meniscus and cartilage lesions, and another describes a torn posterior cruciate ligament PCL. Two of the articles describe associated tophi, one of which appeared as a synovial tumor of the knee on MRI, until disproved intraoperatively. No articles reported performing the arthroscopic procedure in an acute setting (i.e. a *gout attack*). Four of the seven articles describe intraarticular chalky white deposits involving the synovium, cartilage, meniscus and anterior cruciate ligament (ACL). In all cases arthroscopic debridement/ excision of the deposits and lavage was performed, as well as repair of any co-existent lesions. None of the articles report an analysis of the synovial fluid. Four articles describe explicitly the postoperative evolution, with a remission of symptoms and an improvement in swelling, pain and range of motion. Postoperatively two of the articles report a modification in the anti-gout medicine and one article mentions a change in diet. Two articles mention a mid-term follow-up: one reports an improvement in the range of motion and another reports a rapid return to work. Only one article [13] report the use of a score (the Lysholm score [20]) to monitor pre-op and post-op evolution and no articles deal with patient satisfaction and long-term follow-up.

There seems to be a predominance of case presentations when it comes to arthroscopy performed for the gouty knee, but with improvements in computation power [21] and an ever-increasing blending of medicine and engineering [22], in arthroscopy as well as in trauma, endoprosthetics and exoprosthetics [23] we hope to see an earlier diagnosis of the pathology and thus a more widespread use of arthroscopic debridement and lavage in the earlier stages.

## Conclusions

Both in the literature as well as in the day to day arthroscopic practice, the gouty knee is a rare occurrence. In itself, arthroscopy of the knee affected by gout is rarely performed; mechanical removal of the urate crystals from the surface of the intra-articular structures (cartilage, synovial, meniscus) and lavage leads to a favorable clinical result, if followed by anti-gout medication and diet changes.

*Acknowledgments: The authors would like to thank the Military Hospital's staff for the support in writing this article.*

## References

1. RODDY E, ZHANG W, DOHERTY M., Are joints affected by gout also affected by osteoarthritis?, *Ann Rheum Dis*, 66(10), 2007, p. 1374-7.
2. MITTL G.S., ZUCKERMAN J.D., The Unique Macroscopic Appearance of Gouty Arthritis of the Knee, *Bulletin of the Hospital for Joint Diseases*, 73(3), 2015, p. 210-2.
3. RICHELLE P, BARDIN T., Gout, *Lancet*, 375(9711), 2010, p.318-28.
4. MASSEUD D, ROTT K, LIU-BRYAN R, AGUDELO C., Overview of hyperuricaemia and gout, *Curr Pharm Des*, 11, 2005, p. 4117-24.
5. FAM AG, REIS MD, SZALAI JP., Acute gouty synovitis associated with urate milk, *J Rheumatol*, 24(12), 1997, p. 2389-93.
6. GRASSI W, DE ANGELIS R., Clinical features of gout, *Reumatismo*, 63(4), 2012, p. 238-45.
7. CHEN CK, YEH LR, PAN HB, YANG CF, LU YC, WANG JS, RESNICK D., Intra-articular gouty tophi of the knee: CT and MR imaging in 12 patients, *Skeletal Radiol*, 28(2), 1999, p. 75-80.
8. OLTU, O.; V, VOICULESCU; GIBSON, G.; MILEA, L.; BARBILIAN, A., New Approach on Power Efficiency of a RISC Processor, *Proceedings Of The 8th International Conference On Applied Informatics And Communications, Pts I And II: New Aspects Of Applied Informatics And Communications, Book Series: Recent Advances in Computer Engineering*, 2008, p. 494-498.
9. KENNEDY T.D., HIGGINS C.S., WOODROW D.F., SCOTT J.T., Crystal deposition in the knee and great toe joints, *Journal of the Royal Society of Medicine*, 77, 1984, p. 747- 750
10. WANG CC, LIEN SB, HUANG GS, PAN RY, SHEN HC, KUO CL, SHEN PH, LEE CH. . Arthroscopic elimination of monosodium urate deposition of the first metatarsophalangeal joint reduces the recurrence of gout, *Arthroscopy*, 25(2), 2009, p.153-8.
11. LI HL, LI SY, LI CB, QUI W, QU F, GUO Q, SHEN XZ, LU X, LIU YJ, WEI M., Clinical observation of arthroscopic debridement for acute gouty arthritis of the ankle, *Zhongguo Gu Shang*, 29(3), 2016, p. 258-60.
12. VOPAT BG, RITTERMAN SA, KAYIAROS S, RUBIN LE. , Primary knee arthrodesis for severe crystalline arthropathy, *Am J Orthop (Belle Mead NJ)*, 42(10), 2013, p. 91-3.
13. PAN F, LI Q, TANG X, XUE J, LI J., . Method and effectiveness of arthroscopic debridement for treating gouty arthritis of the knee, *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi*, 25(8), 2011, p. 937-40.
14. CHOI, SUNGWOOK, LEE, JAECHUN, ROH, YOUNG-HO, KIM, JINSEOK, Surgical Treatment of Knee and Ankle Joint Contractures Resulting From Chronic Tophaceous Gout JCR: *Journal of Clinical Rheumatology*, 21, 2015, p. 281-282.
15. LI TJ, LUE KH, LIN ZI, LU KH. , Arthroscopic treatment for gouty tophi mimicking an intra-articular synovial tumor of the knee, *Arthroscopy*, 22(8), 2006, p.910.e1-3.
16. KIJKUNASATHIAN C, WORATANARAT P, SAENGPETCH N., Gouty tophi caused limited knee range of motion: a case report, *J Med Assoc Thai*, 92(6), 2009, p.S264-7.
17. YU, KUANG-HUI, Intraarticular tophi in a joint without a previous gouty attack, *The Journal of Rheumatology*, 30(8), 2003, p. 1868-1870.
18. GARCIA-JUAREZ JD, CUELLAR-AVAROMA A, TOHEN-BIENVENU A, MÉNDEZ-TOMPSON M, GARCÍA-ROSAS MS., Monoarthritis gotosa de rodilla una vista artroscopica. Reporte de un caso clinico, *Acta Ortopedica Mexicana*, 27(5), 2013; p. 331-334.
19. ESPEJO-BAENA A, CORETTI SM, FERNANDEZ JM, GARCIA-HERRERA JM, DEL PINO JR. ,Knee locking due to a single gouty tophus, *J Rheumatol*, 33(1), 2006, p. 193-5.
20. BRIGGS KK1, LYSHOLM J, TEGNER Y, RODKEY WG, KOCHER MS, STEADMAN JR., The reliability, validity, and responsiveness of the Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee: 25 years later, *Am J Sports Med*, 37(5), 2009, p. 890-7.
21. OLTU, O.; VOICULESCU, V.; POPESCU, V.; DASCALU, M.; BARBILIAN, A. : Advanced power monitoring of an ARM processor, *Computational Engineering In Systems Applications, Book Series: Mathematics and Computers in Science and Engineering*, 2008, p. 243-246.
22. MILEA, PL., DASCALU, M., OPRIS, C.O., FRANTI, E., DUMITRACHE, M., STOICA, C.I., Using pressure sensors for motion detection and actuation of remote manipulation devices, *ROMANIAN JOURNAL OF INFORMATION SCIENCE AND TECHNOLOGY*, 19(4), 2016, p. 321-30.
23. MILEA PL, DASCALU M, FRANTI ED, BARBILIAN A, STOICA IC.:Tactile Feedback Experiments for Forearm Prosthesis with Myoelectric Control, *Romanian Journal Of Information Science And Technology*, 20(2),2017, p. 101-14.

Manuscript received: 15.07.2018