

# Outcomes of surgery for gouty tophi in the extremities

## Authors' Contribution:

A – Study Design  
B – Data Collection  
C – Statistical Analysis  
D – Data Interpretation  
E – Manuscript Preparation  
F – Literature Search  
G – Funds Collection

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## ABSTRACT:

**Introduction:** Gouty tophi occur in approx. 50–60% of patients suffering from gout. Their occurrence is related to severity of disease and effectiveness of treatment. They develop more frequently in patients with long lasting and poorly controlled disease.

**Aim:** The aim of the study was to evaluate the results of surgical treatment of gouty tophi of the upper and lower extremities.

**Materials and methods:** The results of surgical treatment of gouty tophi in the extremities in 14 patients, 13 men and 1 woman, at a mean age of 51 years, are presented. Twelve patients had tophi localized in the upper extremities, whereas 3 had tophi in the lower limbs (1 patient had upper and lower extremity involved). The duration of disease to the operation was a mean of 8 years.

**Results:** Seven patients received excision of a single tophus, and the remaining patients had 3–15 operations performed due to multiple tophi over a period from 3 months to 2 years. The treatment outcomes were assessed at a mean of 3 years (range 2–8) after the last operation in a form of phone interview.

**Conclusions:** All patients declared satisfaction from the result of treatment. No case of complication or tumor recurrence was noted. The results confirm usefulness of surgical treatment in this form of gout.

## KEYWORDS:

gouty tophi, operative treatment, treatment outcomes

## INTRODUCTION

Gout (latin: *diathesis uraemica*) is an inflammatory metabolic condition that involves increased production or decreased excretion of uric acid. The sodium salt of uric acid begins to accumulate in the synovial fluid and the periarticular tissues, damaging the capsule, articular cartilage, and the articular parts of the bones. The disease onset is favored by many factors, including genetic predisposition responsible for the polymorphism of SLC2A9. Environmental factors such as improper diet (consumption of high purine foods, especially meat), excessive alcohol consumption, especially beer, use of drugs that increase uric acid levels (e.g., acetylsalicylic acid, diuretics) and dehydration play a large role. Conditions from the so-called metabolic syndrome, i.e., diabetes, hypertension and obesity, also promote uric acid metabolism disorders. Up to 1% of the population in Poland may suffer from gout. Men are affected up to 6 times more often than women.

Gouty tophus (tophi) occurs in about 50–60% of patients suffering from gout. Their occurrence depends on the severity of the underlying disease and the effectiveness of treatment. They are more common in patients with long-term or poorly treated disease. Gout can occur in the vicinity of all joints of the upper and lower extremities, but small joints are more frequently affected than large joints. [1–3]. Typical images of advanced and numerous gouty tophi of the hand are shown in Figs. 1A., B. and 2A., B., in the elbow – Figs. 3A., B., in the wrist – Fig. 4., and in the foot – Fig. 5. Gouty tophi are painless, but cause deformation and limit digit mobility, especially if they are numerous (Figs. 1B., 2B.). Lesion diagnosis is relatively easy because in almost every case the patients have been previously diagnosed with the disease, and also because uric acid deposits located just below the skin are visible as whitish spots.

Unlike rheumatoid nodules, there is a recommendation for hand x-ray because uric acid deposits can damage the articular parts of the bone. Some cases may benefit from an ultrasound that will show the infiltration of tendons and other soft tissues by gout. Deposits in the flexor tendons in the carpal tunnel may cause symptoms of compression on the median nerve [4, 5]. Gouty tophi that become infected require incision, evacuation of deposits, purulent contents, necrotic tissues, and most often open surgery [6].

## Treatment

If gouty tophi are small and do not impair hand function, they can be left untreated. Modification of gout treatment may stabilize and prevent enlargement of existing tumors, although it does not lead to tumor absorption. The first line treatment of gouty nodules is their excision, but it is not easy surgery [1–3, 7]. Gouty tophi have a delicate sac that tears easily, and the powder or white paste contents are released into the surrounding tissues and are difficult to remove. If they involve the joints from all sides, debridement of periarticular tissues requires partial excision of the joint capsule and ligaments, which can easily cause joint instability. The extensor tendons are also usually infiltrated with gout and require cleaning. All these factors make surgery quite difficult and time-consuming, especially if several tumors in one hand are managed surgically. Surgical treatment results are generally good, especially in cases other than very advanced. Excision of large tumors may cause instability of the interphalangeal joints and/or damage to the extensor tendons, which worsens the functional results of treatment. Sometimes it is necessary to temporarily stabilize unstable interphalangeal joints with K wires, and even arthrodesis as a last resort. Large single tumors in the elbow can be completely excised, as shown in Fig. 3B.

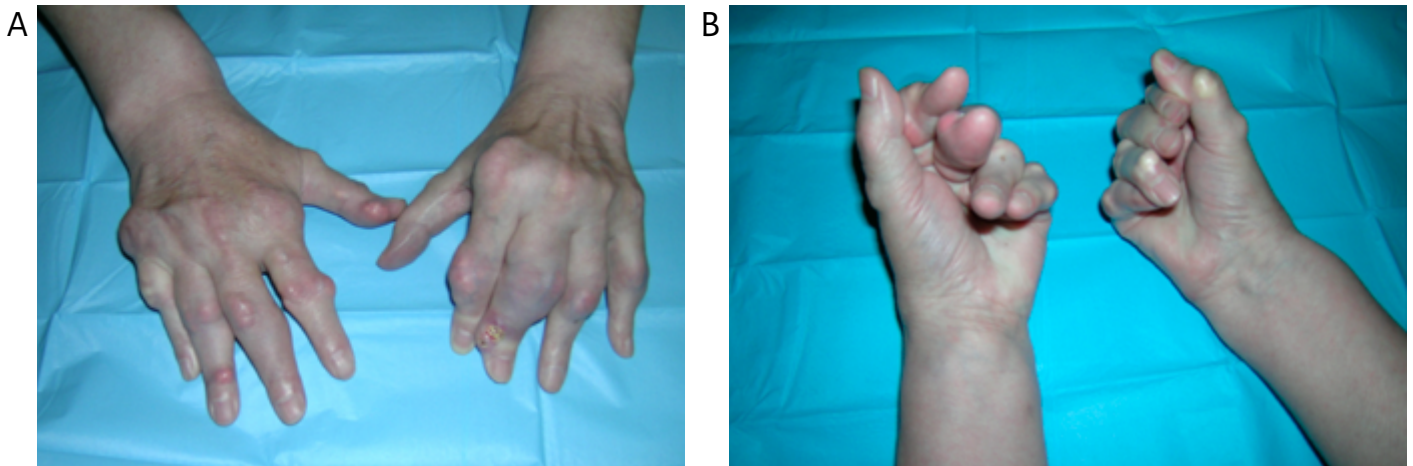


Fig. 1. (A) Numerous tophi involving the digits of both hands; (B) Limited finger flexion in the patient with involvement of all digits.

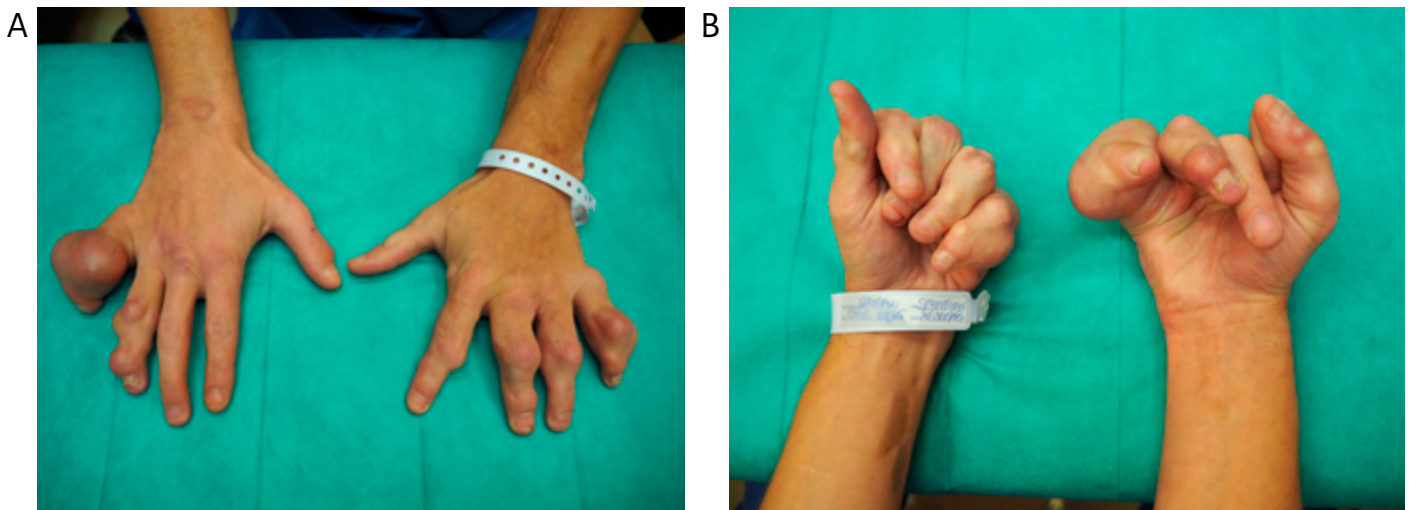


Fig. 2. (A) Numerous tophi involving most of the fingers of both hands; (B) Limited finger flexion in the right hand in the patient from Fig. 2A.

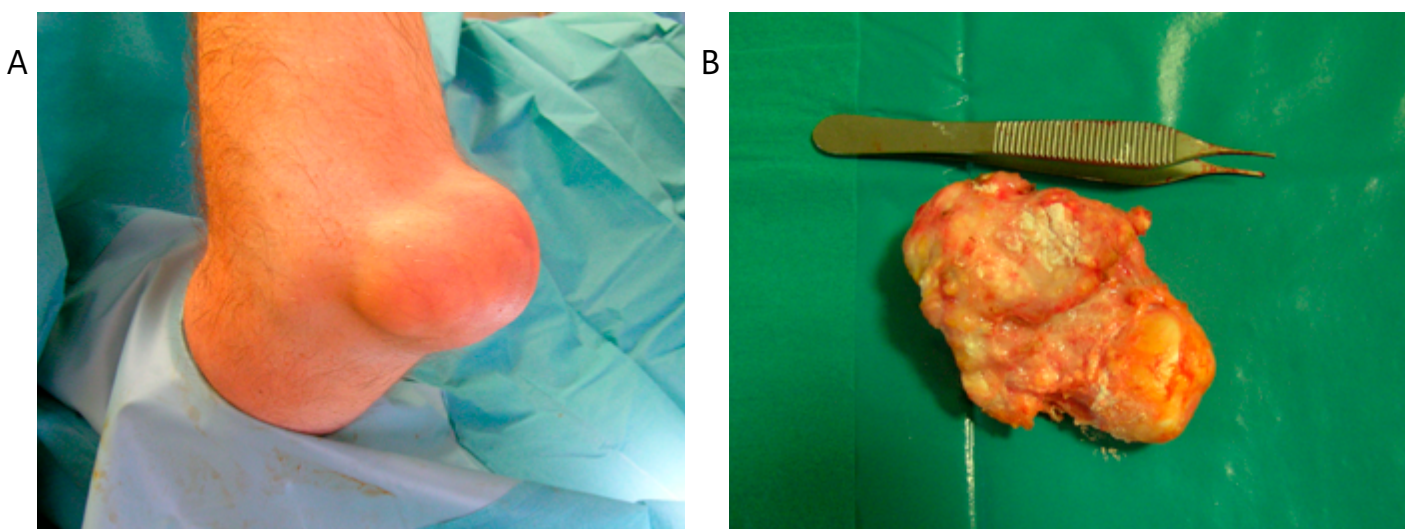


Fig. 3. (A) Big gouty tophus localized at the elbow; (B) The tumor from Fig. 3A. excised *in toto*.

## AIM

The aim of the study was to evaluate the results of surgical treatment of gouty tophi of the upper and lower extremities.

## MATERIAL AND METHODS

In the years 2015–2018, the clinic managed by the author treated 14 patients, 13 men and a woman aged 51 years (range 43–64),



with gouty tophi: 12 on the upper limbs and 3 on the lower limbs (1 patient had tumors on the upper and lower limbs). In 9 patients the tumors were located on the fingers and the metacarpus, in 1 on the wrist, in 3 around the elbow, and 3 patients had gouty tophi on the feet. One patient had a resected single gouty tophus in the superficial flexor tendon of the middle digit (Fig. 4A., B.). Seven patients (50%) had single tumors on the digits (n = 2), wrist (n = 1), elbow (n = 3) and foot (n = 1). The remaining patients had a few or even a dozen tumors on both limbs. Thirteen patients had gouty tophi arise in the course of an already diagnosed, long-term condition, while 1 patient who had not previously suffered from gout had gouty tophi discovered accidentally during surgery. The duration of illness until surgery was on average 8 years (range 4–14). In most cases, the changes in the upper limbs did not cause any discomfort in the patients, but only impaired the hand function (Figs. 1B., 2B.), while lesions of the lower limbs made it difficult to put on shoes and walk. One patient had very neglected feet, with ulcerations over the gouty tophus, which caused spontaneous secretion of deposits (Fig. 5.). All patients underwent surgery. Tumors on the upper limb were excised under brachial plexus block anesthesia and limb ischemia, while on the lower limb under spinal anesthesia. Treatment results were assessed after an average of 3 years (range 2–8) from the last surgery in a form of phone interview. In a telephone conversation, the patients were asked about recurrence or new manifestation of tumors, relief of symptoms, improvement in hand function and improvement in gait.

## RESULTS

Most tumors were excised in fragments because they did not have a developed capsule and the mass of uric acid had to be excised. Next, their remnants were 'gouged out' from the tissues. The lesions in the elbow were encapsulated and their extraction as a whole was possible (Fig. 3B.), similarly as the tumor removed from the flexor tendon (Fig. 4.). Seven patients had tumors excised from the interphalangeal and metacarpophalangeal joints, which required partial excision of the joint capsule and ligaments, infiltrated by urate deposits. This in no way made these joints unstable. Four patients had deposits infiltrating the extensor tendons of the fingers, which required "scraping" during surgery. Two patients underwent amputation of the fingers, which were completely occupied by gouty tophi (Fig. 2A. – small finger of the right hand); toe amputation was performed in 1 patient. Seven patients had only one single tumor excision, and the remaining patients underwent from 3 to 15 surgeries in a period from 3 months to 2 years. One patient with a neglected disease was operated on 15 times over a 2-year period, with tumors excised from both hands and feet (Fig. 5.). Despite relatively extensive surgeries, the wounds healed uneventfully in most cases, and the skin did not undergo necrosis after excision of sometimes large tumors.

In the final follow-up assessment all patients declared satisfaction with the treatment results. Patients with tumors on their hands experienced a marked improvement at the completion of the treatment, and those with tumors on the lower limbs reported better walking comfort. There were no complications or cases of recurrence at the previously operated site. On the other hand, 8 patients had tumors located in other digits, which were not excised during the first operation.

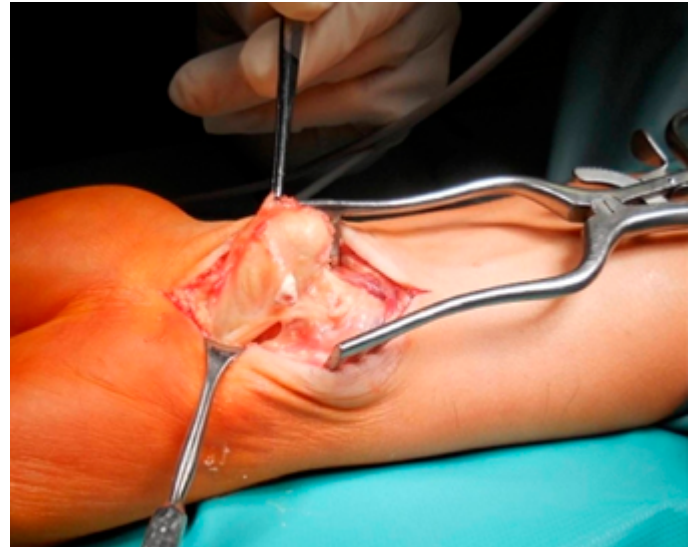


Fig. 4. Detaching of the nodule from the tendon. Note leakage of white gouty drop from the nodule.



Fig. 5. Neglected, big gouty tophus involving the foot.

Four years after the tumor had been removed from the foot, one patient had a second tumor elsewhere in the same foot (a new disease manifestation). The patient with the most neglected disease before surgery was unable to put on a shoe on one foot due to a disintegrating large tumor (Fig. 5.) and limited hand dexterity. After a total of 15 operations, he walked normally and regained full finger mobility. Nevertheless, an amputation of the great toe was necessary in this patient.

## DISCUSSION

The study results show a generally good effect after excision of gouty tophi on the hands and feet, even when the tophi were numerous and in very neglected cases. This confirms the need for surgical treatment of this form of gout. There were no major postoperative complications, which the operators found surprising, especially in cases of high exposure of soft tissues and the necessity to excise periarticular tissues. There was also no perioperative infection.

## Literature review

Most of the literature on the results of surgical treatment of urate tumors are case reports [4, 5, 7–11]. In a meta-analysis of the literature, Kasper et al. found 7 papers presenting data on 317 patients operated on for gout. The most common surgeries were tumor excision and arthroscopy of the affected joints, mainly knee and shoulder joints. The results were generally good in functional and cosmetic terms [1]. The authors presented indications for the surgical treatment of gouty tophi that cause:

- pain and/or impaired finger function;
- joint instability;
- problems with daily activities – dressing, putting on shoes and walking.

In the only study in Polish literature, Słowińska et al. presented the results of treatment of 12 patients, 11 men and 1 woman with gouty tophi in the limbs. The most common surgery was excision of tophi from the interphalangeal joints of the digits – 9 cases. Four patients had surgery of toe tumors, and four in the calcaneus. Four patients required several surgeries (2 to 5) due to multiple tumors of various locations. The treatment outcomes were good and improved the appearance and function of the hands and/or feet [2].

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