

Revisiting an Old Surgical Approach to the Management of Tophaceous Gout

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Abstract

The management of gouty tophi has generally shifted from surgical excision to conservative therapy due to surgery's traditional association with high wound complication rate. Yet there are still patients who are indicated for surgical excision of gouty tophi, including for functional or cosmetic reasons. We describe our surgical technique and clinical outcomes in patients who underwent gouty tophi excision. This technique includes near complete excision of non-infected gouty tophi with preservation of important soft tissue structures. We have performed 44 elective tophi excision surgery in ten patients with an average follow-up of 29 months. The overall patients' satisfaction rate was 90%. Only one post-operative infection was noted. No recurrence was observed. Our results suggested that this technique is a safe and effective option for a selected group of patients suffering from tophaceous gout.

Keywords

Gout, Tophus, Surgical Procedures

1. Introduction

Surgical management of gouty tophi was first described by Lindsay in 1913, with the earliest case series reported in 1943 [1] [2]. However, it was then observed that surgical excision of gouty tophi was associated with a high complication rate [3] and the trend gradually shifted to a more conservative approach. The current trend is to avoid elective surgery unless there is skin breakage or superimposed infection particularly in view of recent advances in medicine, as newer urate-lowering medications have been reported to be effective in reducing the size of tophi [4]. Nevertheless, since medication takes time to act on the inert gouty tophi, it may

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not be the best treatment for areas with impending skin breakthrough by the tophaceous material or where the gouty tophi affect the function of the involved limb. Surgical excision may prevent further joint destruction from tophaceous material, offer pain relief during the acute phase of gout exacerbation, improve cosmesis and decrease the recurrence at the affected region. This study describes the surgical technique of the removal of gouty tophi and the clinical outcome of this technique.

2. Surgical Technique

2.1. Indication/Contra-Indication

Pre-emptive surgery of tophi excision is indicated for the following conditions:

- 1) Frequent exacerbations of gouty attacks were noted at a focal region causing pain and functional impairment;
- 2) Progressive deformity was noted at a focal region secondary to continuous destruction by tophaceous material;
- 3) Unacceptable cosmesis.

Gouty tophi in the extremities where skin breakthrough or superimposed infection were actively present were contra-indicated to pre-emptive surgical excision.

2.2. Operative Technique

Our preferred approach is a complete or near-complete excision of the gouty tophi. The rationale is based on our experience; we observed that delayed wound healing and wound complications often occur if we only remove a portion of the tophaceous material instead of the entire tophi in a region. We postulate this to be due to disturbance of previously inert portions of tophi during surgery. **Figures 1(a)-(f)** illustrated a case where surgical excision of gouty tophi was performed with our surgical approach (**Figures 1(a)-(f)**), described below.

No routine perioperative colchicine was given for prophylactic purpose. The anaesthesia employed included regional, spinal and general anaesthesia. We used a tourniquet for all patients to create a bloodless surgical field for both upper and lower limbs. While the use of tourniquet in the lower limbs in the presence of arteriosclerotic vascular disease [1] has been advised against, we had not encountered any problem in any of our cases.

We prefer the surgical incision to be longitudinal and made over the most affected area. Because of the mass effects or the infiltration of the tophi, the skin could be stretched out and become extremely thin. Thus, gentle and meticulous handling of soft tissue was essential for all cases and excessive undermining should be avoided as this would further impair the viability of the skin flap.

For areas where a fibrous capsule had been formed between tophaceous material and healthy tissue, the tophi could usually be excised completely by sharp dissection. Where the tophaceous material had infiltrated the adjacent skin, soft tissue or bone, a sharp scalpel was used to excise most of the tophi leaving behind a small cuff of tophaceous material that remained tightly adherent to adjacent

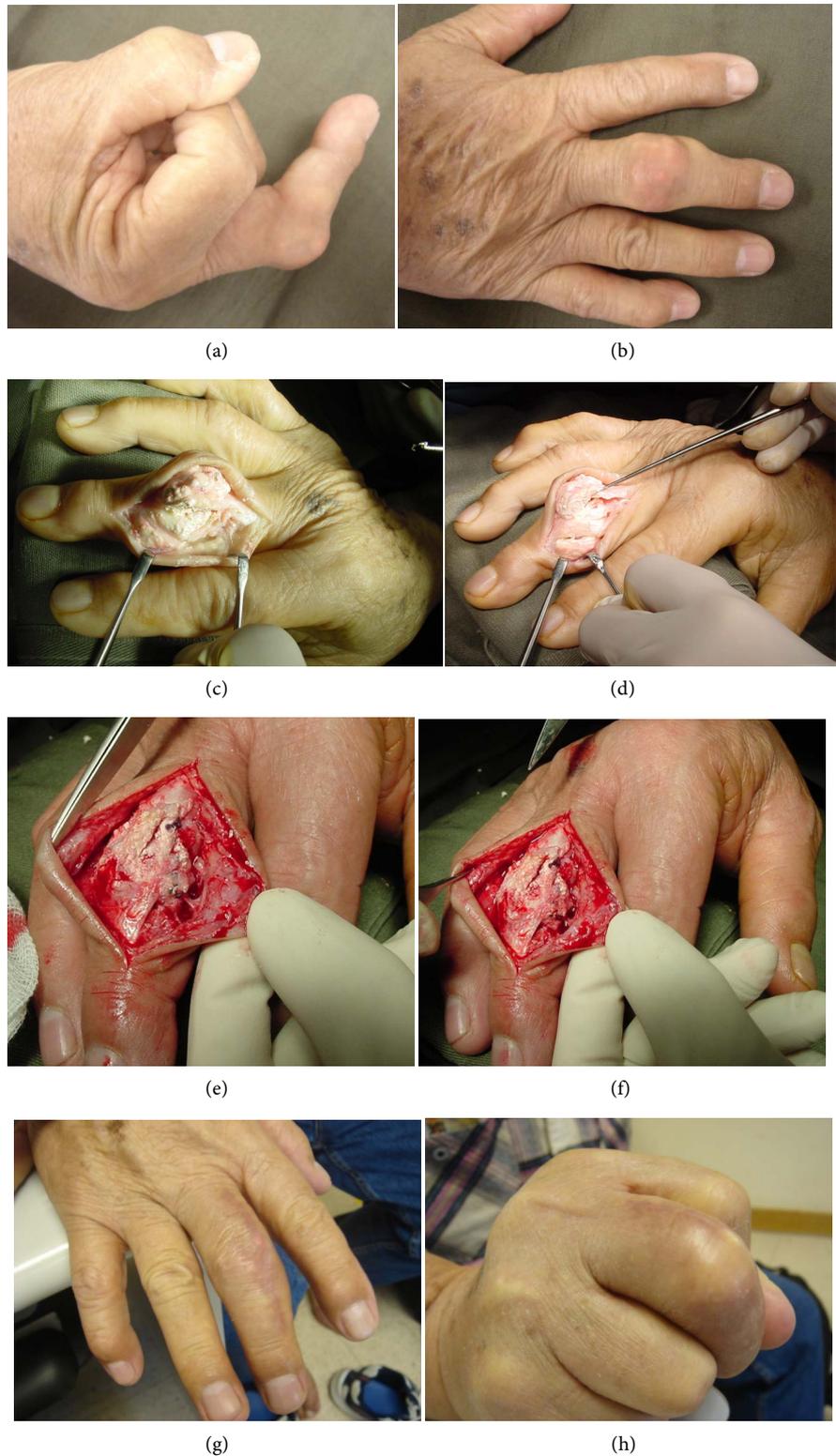


Figure 1. (a) and (b) Photo of a patient having gouty tophi at the left middle finger proximal-phalangeal joint pre-operatively; (c) (d) (e) and (f) Intra-operative photo of gouty tophi infiltrating into the extensor tendon of the left middle finger and intra-operative photo showing the status of the tendon post-excision of tophi; (g) and (h) Photo showing the post-operative result at 1 year.

tissues. We then utilized small curettes to curettage the remaining, infiltrative tophaceous material from the normal tissue while irrigating the area with a continuous flow of sterilized water. This was because we had observed that tophaceous material dissolved in water, making the removal of the remaining material easier. In some instances, it might be difficult to excise all the tophaceous material especially if they had infiltrated into the entire segment of the tendon or were tightly adherent to the neurovascular bundles. In such circumstances, we first identified the tendon or the neurovascular bundles in an unaffected area and traced them into the affected zone. Then, we removed the tophaceous material preserving as much as possible the now clearly identified tendon and the neurovascular bundles. For areas where the joint was involved, the joint capsule and collateral ligaments were usually damaged by the infiltrating tophaceous material. This could be addressed after the debridement by making use of the remaining soft tissue to create a pseudo-joint capsule in order to place the joint in an acceptable alignment. Kirchner wire pinning might then be used to further stabilize the joint.

We preferred not to excise skin until the very end of surgical excision. We observed that after excision of abundant tophaceous material we usually had excessive skin left behind as a result of the chronic stretching of skin by the tophi. Hence, our approach was to take down the tourniquet and then observe the circulation of the skin flap. We could then excise the areas of skin where the circulation was unsatisfactory or marginal without the problems of inadequate wound coverage. In some instances, additional skin graft might still be required to achieve satisfactory wound coverage.

Postoperatively, a plaster was given for 2 to 3 weeks in order to immobilize the affected joints temporarily after excision of tophi. Stitches were taken off at 3 weeks post-operatively to avoid early wound breakdown. For lower limb surgery, we advised patients to avoid excessive walking in order to avoid excessive tension to the wound. Again, we did not routinely prescribe colchicine in the peri-operative period for prophylactic purpose.

3. Results

This study was approved by Institutional Review Board for ethical clearance. Ten patients with a mean age of 61 years old (range, 49 - 81 years old) were studied between 2007 and 2013 based on the above mentioned surgical indications. Of the ten patients, eight were male and two were female. 44 surgical sites including both upper limbs and lower limbs involvement were operated (**Figure 2**). For this study, we developed a severity grading of tophi for classifying gouty tophi based on structures involved by the tophi and applied it to our cohort (**Table 1** and **Figure 3**). The mean follow-up was 29 months (14 - 72 months).

All the surgical sites could be closed primarily without tension. No skin graft or flap was needed. No Kirchner wire was needed to stabilize the joint.

Figure 1(g) to **Figure 1(h)** illustrated the clinical outcome of the same patient

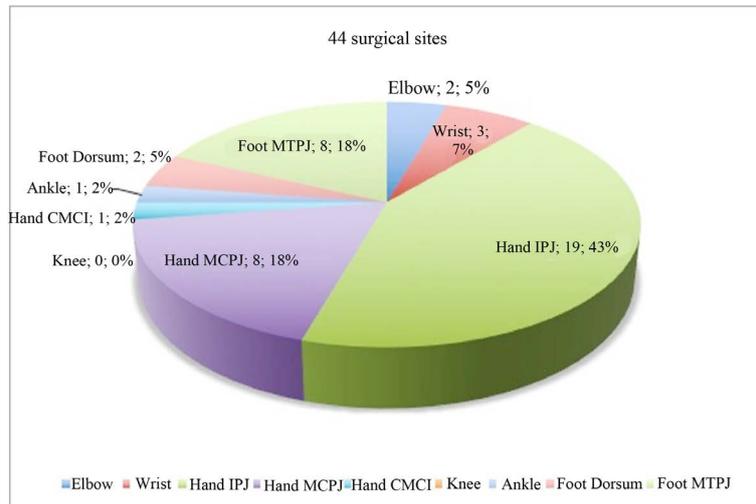


Figure 2. Distribution of the tophi (IPJ: interphalangeal joint, MCPJ: meta-carpophalangeal joint, CMCJ: carpometacarpal joint).

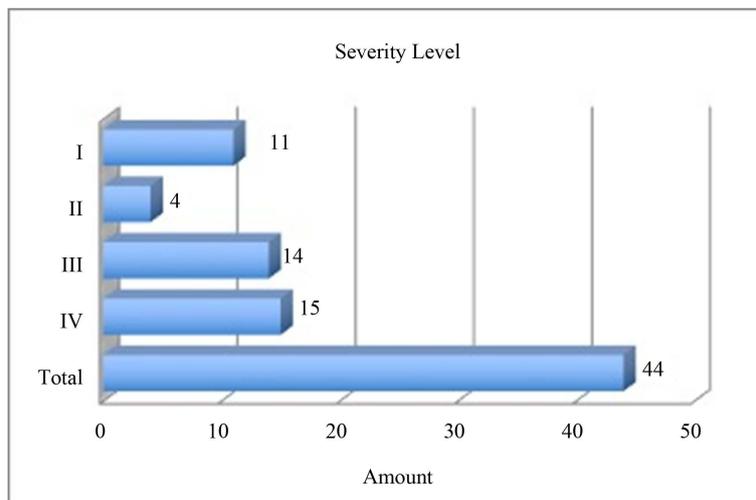


Figure 3. Distribution of severity grading of gouty tophi in this study.

Table 1. Severity grading of gouty tophi.

Severity grading	Condition
I	Infiltration of tendon and ligaments
II	Infiltration of joints
III	Erosion of bones
IV	Adhesion to skin surface

described in the previous section “Operative Technique” (Figure 1(g) to Figure 1(h)). We were able to achieve good pain relief in all patients. The overall patients’ satisfaction rate was 90% since one patient developed post-operative infection. No recurrence of gouty attack was noted at the operative sites at the final follow-up.

One patient developed wound infection over his left 1st metatarsal-phalangeal joint 2 weeks post-excision of bilateral 1st meta-tarsal phalangeal joint tophi. Poor hygiene was noted at the foot dressing together with early excessive mobilization. Wound debridement was subsequently performed and healed with no further complication.

Tips and tricks:

Meticulous handling of skin and soft tissue is essential during the surgery. It is important to identify and preserve vital structures, to manage bone and joint erosion and to have continuous irrigation during the excision of tophi. We use tourniquets in both upper and lower limbs, setting the maximum limit to 180 min, without any observed complication. However, we emphasize the need of tourniquet release before the closure of skin and subcutaneous tissue to assess the viability of the tissue. With meticulous handling of skin and soft tissue, we did not find the need for skin grafting in any of our cases.

After the incident of the wound infection, which was likely to be related to early mobilization, we recommend a relatively long period of immobilization of the surgical sites, especially for surgeries in the foot region.

If needed, the excision of multiple gouty tophi in one operation can be done, especially if they were present in the same limb, in order to minimize the rehabilitation period.

4. Discussion

The prevalence of gout has increased in recent years in developed countries in association with the change in diet and the advances in medicine [5] [6].

While the current main stay of treatment encompasses medication and dietary control, there is a role for surgical intervention for the management of gouty tophi.

Surgical indications for the excision of gouty tophi advocated by Larmon [2] and Straub [7] include:

- 1) to reduce pain;
- 2) to control drainage and infection;
- 3) to decompress nerves compressed by tophaceous material;
- 4) to decrease total body urate load;
- 5) to improve function including facilitating wearing of clothes and gloves;
- 6) to improve cosmesis.

Many different techniques have been described for the excision of gouty tophi in the literature [2] [8] [9]. Larmon [2] in 1970 described his technique in detail, including the use of tourniquet, the configuration of incisions, preservation of important structures especially in the hands, the management of open bone defect and the closure techniques. Low recurrence rate was noted [10]. Subsequently, the shaving procedure which advocated a more minimally invasive technique has gained popularity [8] [9]. The short incision at neighboring uninvolved skin and the gentle curettage of tophaceous material reduced the risk of infections,

skin necrosis and delay in wound healing. However, the disadvantages included high risk of recurrence, minimum improvement of cosmesis and range of motion and possible damage of adjacent tendons and neurovascular bundles involved by the tophaceous substance. In fact, Tripoli [8] showed that three out of seven of their patients who underwent shaving technique opted for a more formal debridement later.

Our proposed technique was similar to Larmon's technique [2] in terms of the choice of incision, the preservation of vital structures, the management of bone and joint erosion and the continuous irrigation during the excision of tophi. We have been using tourniquets in both upper and lower limbs during surgery, setting the maximum limit to 180 min, without any observed complication. We emphasized the need of tourniquet release before the closure of skin and subcutaneous tissue to assess the viability of the tissue. With meticulous handling of skin and soft tissue, we did not find the need for skin grafting in any of our cases.

We had a relatively low complication rate at 3% as compared with other studies [3] [9]. The only one post-operative complication was a wound infection at the big toe which was related to early mobilization. We thus suggest a relatively long period of immobilization of the surgical sites, especially for surgeries in the foot region.

Our technique has several limitations. Firstly, our approach requires meticulous soft-tissue-handling; otherwise, the circulation of the skin flap may be compromised. Secondly, this technique is applicable only to gouty tophi that are not infected. Infected soft tissue behaves differently and poor healing may result from use of our technique. Finally, our technique demands radical excision of gouty tophi in order to minimize the wound healing complication. In cases where the neuromuscular bundle is embedded within the gouty tophi, it is technically difficult to excise all tophi. There is thus a relatively higher risk of developing wound healing problem.

A retrospective study by Kumar *et al.* [3] published in 2002 revealed that the complication rate for patients who underwent excision of non-infected gouty tophi was up to 36% with the main complication being delayed wound healing. This study demonstrated that our proposed technique for elective surgical excision of gouty tophi can be a safe and effective option for a selected group of patients. A low complication rate of 3% is noted.

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