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Research Paper

# Soft Tissue Chondroma—Result of Surgery in a Local Hospital and Review of the Literature
## 軟組織軟骨瘤: 地區醫院之手術治療成效及文獻回顧

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ABSTRACT

*Background/Purpose:* This was a retrospective case series that aimed to study the clinical features and results of surgery for soft tissue chondroma, which is a benign extraskeletal cartilage tumour.
*Methods:* Ten patients with a histological diagnosis of soft tissue chondroma were recruited between 2001 and 2012. Tumours involved the hand and wrist ($n = 4$), foot ($n = 3$), popliteal fossa ($n = 2$), and deltoid ($n = 1$).
*Results:* The most common complaints were progressive enlargement of the size of the mass (50%) and pain (50%). Radiographs showed calcified soft tissue mass in 90% of cases. Marginal excision was performed. The mean follow-up duration was 27.6 months. There was one suspected recurrence case with a mass over the index finger. Surgical re-excision was performed and the second histological diagnosis was bizarre parosteal osteochondromatous proliferation. At final follow-up, nine out of ten cases were symptom free. One patient had residual finger joint stiffness and deformity.
*Conclusion:* The results of marginal excisions for soft tissue chondroma is satisfactory with low complication and recurrence rates.

中 文 摘 要

本文是一個回顧性的系列病例報告,目的為探討良性軟組織軟骨瘤的臨床表徵和手術的治療成效。我們收集了10宗於2001至2012年間在本醫院處理的軟組織軟骨瘤病例。軟組織軟骨瘤影響的位置包括手和手腕(4病例),足部(3病例),腘窩(2病例) 及三角肌(1病例)。最常見的病徵為腫瘤變大(50%)及疼痛(50%)。90% 的病例於X線片中顯示鈣化軟組織腫塊。所有病人接受了邊緣切除手術,病理診斷為軟組織軟骨瘤。平均隨訪時期為27.6個月。一位病人懷疑手指局部復發並再次接受切除手術,其病理診斷為奇異的骨膜旁骨軟骨性增生。在末次隨訪,該病人有手指關節僵硬和畸形的情況,其餘的人皆沒有徵狀。總結:邊緣切除軟組織軟骨瘤手術的結果是令人滿意的,並發症和復發率不高。

## Introduction

Soft tissue chondroma is a rare disease entity that can demonstrate worrisome radiologic or histologic features confused with malignancy, and therefore may be treated with unnecessary radical surgery. Knowledge of this tumour, with its anatomic predilection and benign clinical course is necessary to provide suitable and reasonable treatment. Soft tissue chondroma, also called extraskeletal chondroma or chondroma of soft tissue parts, generally affects patients in midadult life.[1] It is a benign cartilaginous neoplasm that is found most frequently in hands and feet.[2–4] In this series 10 patients with soft tissue chondroma were retrospectively reviewed. The clinical presentations and results of surgery for this uncommon disease entity are discussed.

## Methods

This is a retrospective case series of patients with a histological diagnosis of soft tissue chondroma with excision done in the Hong Kong East Cluster (Pamela Youde Nethersole Eastern Hospital and Ruttonjee Hospital) from 2001 to 2012. A total of 10 cases fulfilled the following criteria: (1) a cartilaginous proliferation arising

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within or situated in soft tissue identified histologically; (2) no clinical, radiologic, or histologic evidence to support a bony, intra-articular or bursal origin for the process; and (3) patient underwent surgical treatment for the lesion. Follow-up information was obtained by reviewing submitted medical records—records form the Clinical Management System of the Hospital Authority or through written communication with the patients or their clinicians. The clinical and radiological features and result of surgery were reviewed. The average follow up duration was 27.6 months (range, 4–120 months).

## Results

### *Clinical findings*

A total of 10 cases of soft tissue chondroma that received surgery in the study period were recruited with clinical details listed in Table 1. There were six male and four female patients, ranging in age from 15 years to 80 years (Figure 1). The average age was 50.4 years. The tumours involved the hand and wrist ($n = 4$), foot ($n = 3$), popliteal fossa ($n = 2$), and deltoid ($n = 1$; Figure 2). All cases presented with a mass. Five of them (50%) noticed progression of the size of the mass. Five of them (50%) felt mild pain over the mass. Physical examination showed a well-defined mass in nine cases (90%). One case (10%) had an ill-defined swelling over the extensor surface of the right index finger near the distal interphalangeal joint (DIPJ) level. Mobility of the mass was demonstrated in four cases (40%), while tenderness over the mass was noticed in three cases (30%). General daily function was not affected in any of the cases. The average and median duration of symptoms before consultation was 31 months and 24 months, respectively (range, 2–120 months). Trauma history was noted in two cases (20%). One patient had trauma over the left thumb 2 months prior to clinical attendance with a preoperative diagnosis of an epidermal cyst. Another patient had a left heel mass with a history of ankle sprain injury 2 years prior to clinical attendance. The working diagnosis was an old avulsion fracture from the insertion of Achilles tendon. The other preoperative diagnoses were nonspecific calcified masses in six patients, ganglion in one patient, and a mucous cyst in one patient.

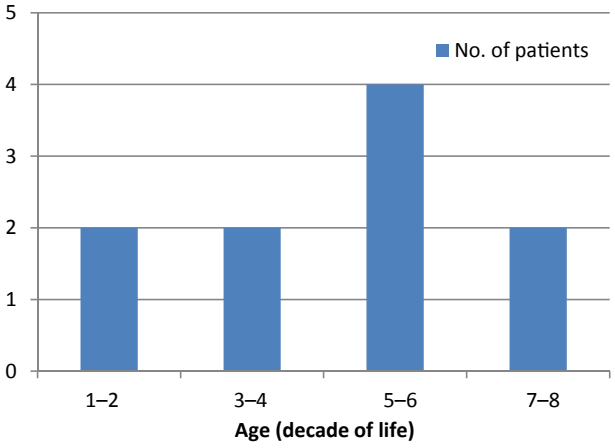


**Figure 1.** Age distribution for soft tissue chondroma ($N = 10$).

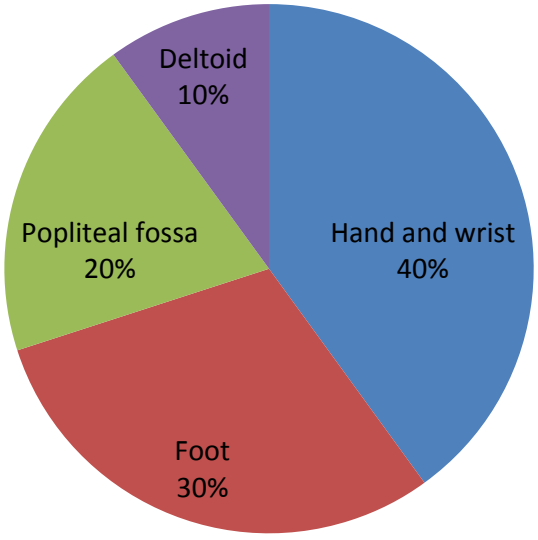


**Figure 2.** Anatomical distribution for soft tissue chondroma ($N = 10$).

### *Radiologic findings*

All of the 10 cases had radiologic studies of the affected site prior to the operation. These consisted of radiographs ($n = 10$), magnetic resonance imaging (MRI; $n = 3$), ultrasound imaging ($n = 2$), and computerised tomography (CT; $n = 1$). X-ray showed the presence of calcified well-defined extraosseous soft tissue masses over the involved parts in nine cases (90%; Figures 3 and 4). Neither bone

**Table 1**
Clinical findings for 10 cases of soft tissue chondroma

| Case no. | Patient sex/age (y) | Location | Preoperative diagnosis | Histology | Size (mm) | Follow-up (mo) | Recurrence |
|---|---|---|---|---|---|---|---|
| 1 | M/22 | Lt foot dorsum | Ganglion | Soft tissue chondroma | Multiple fragments. Largest piece 4 mm | 4 | No |
| 2 | M/50 | Pulp of Lt thumb | Epidermal cyst | Soft tissue chondroma | 16 × 14 × 10 | 6 | No |
| 3 | F/59 | Rt deltoid | Nonspecific calcified mass | Soft tissue chondroma | 25 × 20 × 10 | 6 | No |
| 4 | F/61 | Rt sole | Nonspecific calcified mass | Soft tissue chondroma | 45 × 40 × 25 | 8 | No |
| 5 | M/43 | Rt popliteal fossa | Nonspecific calcified mass | Soft tissue chondroma | 50 × 30 × 20 | 12 | No |
| 6 | M/35 | Rt heel | Avulsion fracture of os calcis | Soft tissue chondroma | 15 × 15 × 5 | 18 | No |
| 7 | F/67 | Ulnar side of Rt wrist | Nonspecific calcified mass | Soft tissue chondroma | 35 × 27 × 30 | 30 | No |
| 8 | M/15 | Lt popliteal fossa | Nonspecific calcified mass | Soft tissue chondroma | 50 × 60 × 40 | 36 | No |
| 9 | M/80 | Rt hand dorsum near first metacarpal base | Nonspecific calcified mass | Soft tissue chondroma | 20 × 15 × 7 | 36 | No |
| 10 | F/72 | Extensor surface of Rt index finger (DIPJ level) | Mucous cyst | First: soft tissue chondroma Second: bizarre parosteal osteochondromatous proliferation (Nora's lesion) | Multiple fragments. Largest piece 10 × 8 × 3 | 120 | Suspected recurrence with re-excision done. Histology reviewed a different disease entity |

DIPJ = distal interphalangeal joint; F = female; Lt = left; M = male; Rt = right.

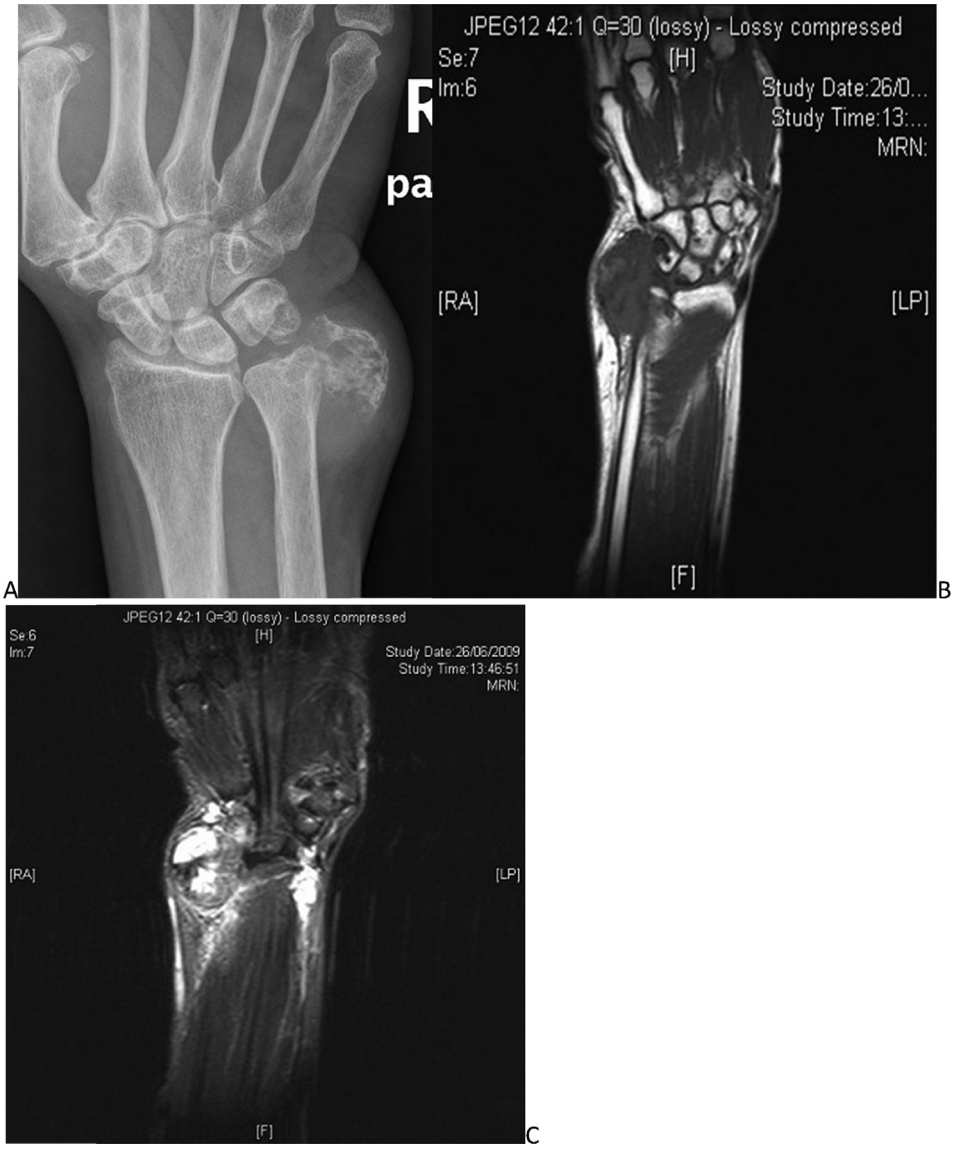


**Figure 3.** Soft tissue chondroma over the ulnar side of the wrist. (A) X-ray shows a calcified soft tissue mass. (B, C) Magnetic resonance imaging shows a well-defined soft tissue mass with predominant T1 hypointensity and T2 hyperintensity.

erosion nor periosteal reaction was noticed. Variable calcification patterns were noticed.

MRI films and reports could be traced in three cases and the findings were variable (Figure 3). Two cases were reported to be predominantly T1 isointense and one case was reported to be predominantly T1 hypointense. There were inconsistent findings for T2 imaging. One case was predominantly T2 hyperintense, one case was predominantly T2 hypointense, and one case was mixed T2 hyperintense and isointense in nature.

CT was performed in one case of a calcified soft tissue mass over the right wrist joint. It showed ossific density in the soft tissue lesion without gross bony erosion.

*Treatment and follow-up*

Marginal excision of the lesion was performed in all cases (Figure 4). The histological diagnosis was soft tissue chondroma. The average follow-up duration was 27.6 months (range, 4–120 months). Two cases reported numbness over the surgical sites after surgery, which eventually subsided by the subsequent follow-up.

Local recurrence was suspected in one case after surgery. A 72-year-old woman had a mass over the extensor surface of her right index finger at DIPJ level with a histological diagnosis of soft tissue chondroma. Recurrence of a slow growing mass over the same site was noticed 1 year after surgery. The patient sought medical advice 9 years after initial operation because of pain over the mass and finger DIPJ stiffness. A second excision was then performed 9 years after the initial surgery. There was a bony outgrowth connected with the dorsal bone cortex at the DIPJ noticed intraoperatively during the re-excision. A different histological diagnosis of bizarre parosteal osteochondromatous proliferation (Nora's lesion) was made and, therefore, this should not be counted as a recurrence case. After the second surgery, there was no reported recurrence with a total follow-up of 120 months. However, there was residual corresponding finger joint stiffness and deformity. Progressive degenerative changes and osteophytes over the DIPJ were noticed from serial

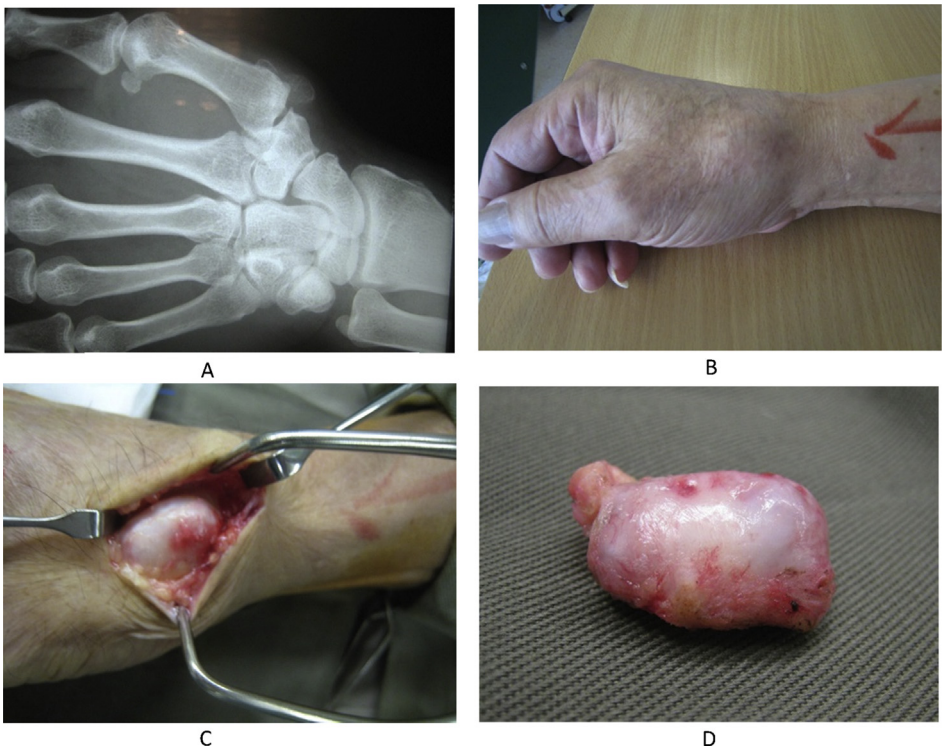


**Figure 4.** Soft tissue chondroma over the base of the thumb with marginal excision performed. (A) X-ray showing calcified thumb base lesion. (B) Preoperative clinical photo of the hand swelling. (C) Intraoperative photograph during marginal excision. (D) Surgical specimen.

X-rays taken at interval medical consultations. It was believed that the symptoms were mainly due to the natural course of osteoarthritis. All other cases were symptom-free at the final follow-up.

*Pathologic findings*

There were 10 cases with a histological diagnosis of soft tissue chondroma: two of them had surgical specimens in multiple fragments and the other eight cases had masses removed in one whole piece. Specimen size ranged from 10 mm × 8 mm × 3 mm (smallest) to 50 mm × 60 mm × 40 mm (largest). Common microscopic features for soft tissue chondroma in the current series included well-differentiated hyaline cartilage arranged in lobules with mild to moderate cellularity arising from the periarticular soft tissue and focal or central enchondral ossification. There was one suspected recurrence case of mass over index finger with re-excision performed. The second histological diagnosis was bizarre parosteal osteochondromatous proliferation (Nora's lesion), which is another disease entity different from soft tissue chondroma.

## Discussion

Extraskeletal cartilage tumour comprises soft tissue chondroma, tenosynovial chondromatosis, and synovial chondromatosis. Although the three disease entities share the common feature of cartilaginous proliferation from soft tissue origin, each of them have their individual clinical presentations differentiating themselves from other subtypes.

Synvovial chondromatosis usually present with painful joint swelling with functional impairment. It tends to have multiple intra-articular involvements affecting the large joints, e.g., knee, hip, and shoulder. It is a male-predominant condition usually affecting adults aged around 30–50 years. Surgery is recommended to prevent malignant sarcomatous transformation and metastasis that have been reported in rare forms of the tumour.[1,5,6] Recurrences have been reported in up to 60% of patients and in such cases a repeat synovectomy is indicated.[1,7,8]

Tenosynovial chondromatosis is an extra-articular lesion arising in the synovial lining of a tendon sheath,[9] most commonly affecting hands and feet in midadult age.[9,10] It is usually asymptomatic or present with a slow-growing, nonpainful mass. A series of 37 cases of tenosynovial chondromatosis reported a recurrence rate as high as 87.5%.[9]

Soft tissue chondroma is believed to originate from synovial tissue in tendon sheaths or joints. Tissue metaplasia has also been suggested as the aetiology.[11–13] It is found most frequently in hands and feet with up to 80% occurring in fingers, particularly on the flexor aspect.[13–16] Less frequent sites involved that have been described include the trunk, head, neck, and larger joints.[2–4] They generally occur between the ages of 30 years and 60 years, with both sexes equally affected.[1] Clinically, soft tissue chondromas usually present as slowly enlarging masses that has been present for variable lengths of time.[3] They are sometimes symptomatic causing pain and tenderness in 19% of cases[14] and can result in functional impairment. The mass tends to be mobile, well demarcated, and firm to palpation.[11,17]

In the current study, 70% of the soft tissue chondromas occurred over the hands and feet. The average age of the patients was 50.4 years with six male and four female patients being affected. The average duration of presence of the mass before medical consultation was 31 months. This shows similar epidemiological finding as quoted in the literature.

Common radiographic appearance of a soft tissue chondroma is an extraosseous soft tissue mass with well-defined borders in close proximity to a joint. Calcification within the tumour occurs in

33–70% of cases, as reported in the literature.[1] Bony changes are infrequent, but in chronic cases the tumour can cause pressure erosion on adjacent bones.[2,11,13,17] In one reported case, bony erosions caused extensive bony destruction.[3] By comparison, the current study shows that 90% of cases had calcification on radiography and none had bony erosion.

The reported common MRI pattern for soft tissue chondroma was intermediate T1 signal intensity and high T2 signal intensity. It is related to the high water content of the mucopolysaccharide component of myxoid changes in the tumour. The presence of dense calcification will reduce T2 signal intensity and, therefore, MRI may show variable patterns due to the variation in amount and pattern of calcification.[18]

In the present series, none of our cases had a correct preoperative diagnosis of soft tissue chondroma. This is because it is a rare disease entity with a nonspecific radiographic calcification pattern. There are many possible differential diagnoses when calcification in soft tissue is encountered, e.g., tumoural calcinosis, gout, chondrocalcinosis, myositis ossificans, periosteral chondroma, synovial chondromatosis, chondrosarcoma, etc. Clinical history and examination is still the mainstay for diagnosis and CT/MRI can be considered as useful adjuncts. For example, tumoural calcinosis is usually multiple and close to the skin with ulceration, sometimes with underlying inflammatory disease; gout has a typical clinical history involving multiple sites; myositis ossifications show progression in pattern of calcification or ossification in X-ray, with pain and joint stiffness; synovial chondromatosis usually has intra-articular involvement; exostosis and periosteal chondroma are immobile with connection to bone; low grade chondrosarcoma has a less well-defined border and surrounding infiltration may be shown in MRI.

Treatment for soft tissue chondroma is by surgical excision. Complications are not common. Soft-tissue chondromas usually occur singly, as lobulated, well-encapsulated rubbery tumours, easily enucleated at surgery. Malignant transformation has not been reported. Recurrences occur in approximately 20% of cases.[2,11,14] When there is a recurrence, repeat excision is usually indicated.

## Conclusion

Soft tissue chondroma is an uncommon disease entity with predilection in hands and feet in middle-aged patients. It usually presents with a slow-growing mass sometimes causing pain and functional impairment. Calcification is noted on X-ray in most of the cases. Soft tissue chondroma should be included as a differential diagnosis when an extra-articular calcified soft tissue mass close to the joint is encountered. Surgical outcome of marginal excision is satisfactory with a low complication and recurrence rate.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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