Original article

Focal periosteal chondroma of the hand: A review of 24 cases

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A B S T R A C T

Introduction: Periosteal chondroma is a benign cartilaginous tumour that is less common than enchon-
droma and rarely arises at the hand.

Patients and method: We report a retrospective review of 24 patients with focal periosteal chondroma
of the hand and a mean follow-up of seven years and four months. The 13 females and 11 males had a
mean age of 41 years and three months.

Results: Radiographs performed to investigate a hard lump on a finger established the diagnosis in 23
(95.8%) patients, and histological documentation was obtained consistently. The proximal and distal
phalanges were the most common sites of involvement. The tumour recurred in a single patient, a 10-
year-old child, 10 months after surgery.

Conclusion: No other complications were recorded. Tumour excision and curettage of the lesion are the
suggested treatments for periosteal chondroma. Most recurrences occur early after initial surgery.

Level of evidence: Level IV.

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1. Introduction

Chondromas are benign cartilaginous tumours that are com-
mon lesions of the hand [1]. Most chondromas are enchon-
dromas, that is, tumours developed within the bone marrow. Periosteal
chondroma, in contrast, is a less common, slow-growing, sharply
demarcated tumour composed of hyaline cartilage and devel-
oped in contact with the periosteum, either within the periosteal
membrane or between the periosteum and the bone. Periosteal
chondromas may account for 2% of all chondromas [2]. A prelimi-
nary observation by Louis Antoine Ranvier in a 1901 pathology
manual [3] was followed by anecdotal cases reported by McWorter
in 1922, Keiller in 1925, and Mason and Roberts in 1935. The
first full description was written by Lichenstein and Hall in 1952
[4], Jaffe [5] introduced the term ‘juxta-cortical chondroma’ in the
first sizeable case-series study, which included nine patients. The
terms ‘sub-periosteal’, ‘paraosteal’, and ‘juxta-cortical’ were used to
qualify these chondromas in several publications [6–8]. Periosteal
chondroma chiefly arises in the long bones and rarely involves the
hands. A 2005 literature review by Takada et al. [9] identified 183
cases of periosteal chondroma, of which 51 (27%) involved the hand.

Similarly, a 2010 study by Yoshimura et al. [10] found 65 (28%) cases
involving the hand among 228 patients with periosteal chondroma.

Here, we retrospectively describe and analyse 24 cases of periosteal chondroma of the hand.

2. Patients and method

Between 1993 and 2009, 24 patients (13 females and 11 males) had surgery conducted by several different surgeons in one of two surgical centres for periosteal chondroma of the hand. Mean time to re-evaluation was 88.2 months (range, 39–144 months). We recorded the circumstances surrounding the diagnosis (incidental, bothersome swelling, pain, or pathological fracture).

The diagnosis was established by radiographs, magnetic resonance imaging (MRI), or histopathology. The radiographic diagnosis relied on the typical criteria described by deSantos and Spjut [11]: low density of the soft tissues adjacent to the involved diaphy-
seal or metaphyseal bone segment, demarcation by a thin calcified rim, cortical erosions with a sclerotic reaction and overhanging tumour edges, and no medullary cavity involvement (Fig. 1). The MRI criteria used for the diagnosis [12,13] were a juxta-cortical mass generating high-intensity signal on T2 images, with post-
gadolinium enhancement. Finally, the definitive diagnosis was established by operative-specimen histopathology, which showed lobules of mature hyaline cartilage containing foci of calcification or less mature mucoid cartilage (Fig. 2). Another possible feature
was an osteogenic periosteal reaction that tended to surround the cartilaginous tissue.

Surgery was performed under local and regional anaesthesia with a pneumatic tourniquet at the root of the arm to achieve preventive haemostasis. The procedure consisted in excision of the lesion via a direct approach and curettage of the lesion site (Fig. 3). Histopathological examination of the operative specimen was performed routinely.

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4. Discussion

Periosteal chondroma is a benign cartilaginous tumour that is less common than enchondroma [28] [1] and particularly rare at the hand (27% to 28% of all periosteal chondromas) [9,10]. The radiographs provided the diagnosis in 23 of our 24 patients. The typical appearance combines three criteria: cortical bone scalloping without intra-medullary involvement, mass developed within the soft tissues, and calcified rim surrounding the lesion [11]. In a few cases, the radiographic findings are inconclusive [14] and MRI may be useful. The MRI features indicate a benign cartilaginous lesion developed under the periosteum and sparing the bone marrow spaces. T1 sequences show a sharply demarcated lesion that generates a uniform low-intensity signal, whereas on T2 images the signal is uniform but of high intensity. Features indicating a need for MRI are an atypical appearance of the radiographic features and/or tumour location relative to the adjacent anatomic structures.

Periosteal chondroma is usually a solitary unilateral lesion affecting a single finger. The only exception to this rule is a case in a 12-year-old reported by Yoshimura et al. [10]. This patient had a bifocal lesion with involvement of the proximal and intermediate phalanges of the ring finger. The most common sites of involvement in our study were the proximal and distal phalanges (83.3%), and a single patient had a lesion affecting the third ray. However, previously published data do not seem to confirm these topographic findings [5,6,15]. Carpal bone involvement revealed by carpal tunnel syndrome has been reported [16].

Age at diagnosis was usually the third, fourth, or fifth decade, in keeping with previous studies [5,6,15]. However, periosteal chondroma can affect children and elderly individuals.

The structure of the cortex is largely spared, explaining the absence of bone frailty and pathological fractures. Savornin and Foulc reported the only case with a pathological fracture [17], which involved the fifth metacarpal. The patient presented with a hard and tender but non-painful lump and no other abnormalities. Santanelli et al. [18] described a case of digital-nerve and flexor-tendon compression by a large periosteal chondroma developed on the proximal phalanx of the left middle finger.

The histopathological examination confirms the diagnosis and rules out differential diagnoses. The main differential diagnosis is Nora’s lesion, also known as bizarre parosteal osteochondromatous proliferation [19]. The two lesions cannot be readily differentiated based on the clinical, radiographic, or MRI features [20,21]. Nevertheless, Dhondt et al. [22] reported that an imaging study review by experienced musculoskeletal radiologists ensured the correct diagnosis in 83.3% of cases. Recurrences raised greater diagnostic challenges. The definitive diagnosis requires a histological examination, which shows numerous osteoblasts and large binucleate chondrocytes (bizarre chondrocytes) in Nora’s lesion [19–21].

Less common histological diagnoses that can be ruled out by routinely examining the operative specimen include highly differentiated grade 1 periosteal chondrosarcoma [22,23]; calcified superiosteal haematoma [17]; and other tumours that are exceedingly rare at the hand such as periosteal osteosarcoma [23], peripheral chondrosarcoma [24], and osteochondroma [25].

Surgical excision should be offered to patients with periosteal chondroma. The recurrence rate was 15% in a study by Takada et al. of periosteal chondroma of the hand [9], compared to an estimated recurrence rate of 1.2% at other sites. Takada et al. ascribed the high recurrence rate to incomplete excision and advocated combined excision and curettage of the underlying cortical bone. In addition to this explanation, Nosanchuck and Kaufer [26] suggested tumour re-growth from adjacent periosteal lesions. The only patient 1/24 (4.1%) with a recurrence in our study was a 10-year-old with a high potential of periosteal growth. The recurrence developed within the first year. Both hypotheses were plausible. However, the long

Fig. 4. Topographic distribution of periosteal chondromas.

The charts were reviewed for evidence of healing disturbances (adhesions, pain, dystrophy), finger curling, complications, and clinical or radiological recurrence. Radiographs of both hands were obtained routinely to look for other foci in the same hand or contralateral hand.

3. Results

The lesion was first noticed at a mean age of 41 years and three months (range, 6–78 years). A lump on a finger was consistently found at the first visit and was the reason for the visit in 21 (87.5%) patients. The lump was tender in six (25%) patients and was discovered fortuitously in three (12.5%) patients. None of the patients had a pathological fracture and none had multifocal or bilateral involvement. The distal and proximal phalanges were predominantly affected (Fig. 4), and the middle finger was involved in a single case.

The anteroposterior and lateral radiographs of the relevant ray suggested the diagnosis by showing the above-described criteria in 23 of the 24 patients. In the remaining patient, the radiological findings were not considered characteristic, as distal bony spicules rimmed the tuft of the distal phalanx; however, the histopathological findings confirmed the diagnosis. MRI was performed as a complementary investigation in four patients to assess the relationships of the tumour with the adjacent anatomic structures (tumours located at the palmar aspect of the neck of the proximal phalanx). The histopathological features confirmed the diagnosis in all 24 patients.

No patients experienced healing disturbances or finger curling related to the lesion, and none had post-operative complications.

A single recurrence was recorded, in a 10-year-old with a lesion on the neck of the fourth metacarpal. The time from surgery to recurrence was only 10 months. Repeat surgery consisted in excision and curettage. At follow-up 100 months after the second procedure, there was no evidence of recurrence.

All three children in our case-series had metaphyseal lesions. Surgical excision did not impair phalangeal or metacarpal growth.

The functional outcomes were favourable in every case, with the patients reporting having ‘forgotten’ the procedure at last follow-up.

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follow-up in our study (seven years and four months) establishes the absence of delayed recurrences. None of the children with open physes at surgery experienced growth disorders as a result of the procedure.

5. Conclusion

A hard, painless, slow-growing lump on a single finger should suggest periosteal chondroma. Plain radiographs usually establish the diagnosis, which is confirmed by the histopathological examination of the operative specimen. Tumour excision and curettage of the lesion are the suggested treatments. When recurrences occur, they develop shortly after the initial excision.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


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