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Case Report

Para-articular extraskeletal chondroma mimicking first metatarsophalangeal synovitis

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ABSTRACT

Extraskeletal chondroma is a rare benign tumor with symptoms that could mimic other common musculoskeletal pathological entities. We present a rare case of an extraskeletal para-articular chondroma of the first metatarsophalangeal joint which was initially misinterpreted as joint synovitis, based on magnetic resonance imaging findings. Histology revealed benign chondroma of the foot, which was finally treated with radical surgical excision. More than 2 years postoperatively, no recurrence of the tumor has been encountered.

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Introduction

Only a few cases of chondromas with rare extraskeletal location have been reported in the literature, including synovial chondromatosis, para-articular and soft-tissue chondromas [1–3]. The extraskeletal chondromas (ESCs)

predominantly occur in the hands and feet of middle-aged adults with equal sex predilection [4]. The principal histological characteristic is the multinodular proliferation of cartilaginous cells, but they may also vary significantly in terms of focal atypia and presence of binucleated chondrocytes [5]. Although recurrence after surgical removal can be observed,

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Fig. 1 – Axial (A, B), sagittal (C), and coronal (D) T1-weighted MR images of the foot, depict a para-articular mass, with a lobulated contour surrounding the first MTPJ and extending into the soft tissues of the dorsal and plantar aspect of the metatarsal head and neck with homogeneous intermediate (similar to muscle) signal intensity (arrows).

ESCs never metastasize [5]. In this article, a rare case of a para-articular ESC at the first metatarsophalangeal joint (MTPJ) of the foot is depicted.

Case report

A 34-year-old male presented with persistent pain and mild effusion of the first MTPJ of his left foot gradually increasing in size during the previous 1 year. The patient did not seek any medical assistance until he has started having difficulties getting into shoes for the last 2 months. He denied a history of foot trauma, gout, or other inflammatory diseases. Clinically, a solid mobile palpable soft tissue mass around the first MTPJ was evident. No pathological findings were detected at his blood tests. X-rays of the foot were normal without bony erosions or calcifications. Based on the clinical findings, the diagnosis of joint synovitis and/or possible extensor hallucis longus tenosynovitis was considered. Nonsteroidal anti-inflammatory drugs medication was administered immediately and he was recommended to restrict any vigorous activities. Physiotherapy regimen was added after a week, as his symptoms persisted. There was a slight improvement in his pain, which lasted only 2 weeks. After this period, the pain reoccurred with the initial intensity. There was no difference regarding the joint effusion all this time. As a 3-month nonoperative treatment failed to achieve symptoms relief, a foot magnetic resonance imaging (MRI) was prescribed. MRI depicted a diffuse periarticular mass, measuring 4 cm in length, with a lobulated contour surrounding the first MTPJ

and extending into the soft tissues of the dorsal and plantar aspect of the metatarsal head and neck. The lesion demonstrated homogeneous intermediate (similar to muscle) signal intensity on T1-weighted images (Fig. 1), intermediate signal intensity (higher than muscle) on T2-weighted scans (Fig. 2), and high signal intensity (lower than water) on short tau inversion recovery sequence (Fig. 3). Neither muscle edema nor osseous involvement was present. A small amount of joint effusion was detected (Fig. 3). Furthermore, there was absence of areas of decreased signal intensity (flow voids) in the lesion, on all pulse sequences, indicative of calcifications or ossifications. Finally, marked diffuse enhancement of the mass was evident after intravenous (iv) administration of gadolinium (Fig. 4). These findings were strongly suggestive for joint synovitis.

A decision for surgical intervention was made and the patient consented for surgical removal of the mass. Under general anesthesia, a dorsal approach of the first MTPJ was performed through a longitudinal incision. A whitish solid mass emerged (Fig. 5), consisted of 4 particles surrounding the joint, with no infiltrations or adhesions to the capsule, the cartilage, or the bones. The dimensions of the 4 particles of the mass were measured to be 15 × 10 mm, 10 × 8 mm, 7 × 5 mm, and 5 × 3 mm (Fig. 6). The preoperative MRI suggestion of joint synovitis was not confirmed. No intra-articular tumor involvement was detected. All the mass particles were referred for histopathological examination. A short ankle foot orthosis brace was applied for 2 weeks. Partial weight bearing was allowed on the third week and full weight bearing on the fourth week.

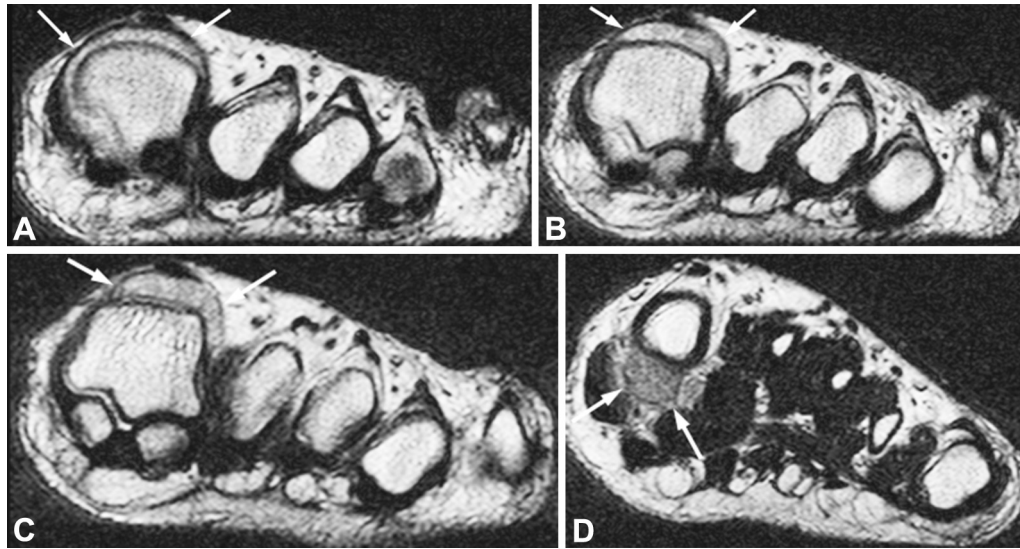


Fig. 2 – Consecutive axial T2-weighted MR views from the periphery to the center of the foot (A-D) demonstrate a diffuse para-articular mass with intermediate signal intensity (higher than muscle) surrounding the first MTPJ and extending into the soft tissues of the dorsal and plantar aspect of the metatarsal head and neck (arrows).

The microscopic examination revealed that the tumor was composed of various sized lobules, separated by broad bands of a cellular, amorphous substance. The lobules contained rounded groups of chondrocytes with bland nuclear features, embedded in a more basophilic, thin textured ground substance. There was no nuclear atypia or any mitotic activity. Neither calcifications nor ossifications were detected. Finally, the lesion was not covered by any synovial cells. The histological features of the lesion, in total, were characteristic for a benign para-articular chondroma (Fig. 7).

The foot pain and swelling were completely resolved at the early postoperative period, within 1 month. Two years postoperatively, no recurrence of symptoms has been detected, while the patient still remains under follow-up.

Discussion

ESCs are rare [6] and are classified into synovial chondromatosis, para-articular and soft-tissue chondromas [7].

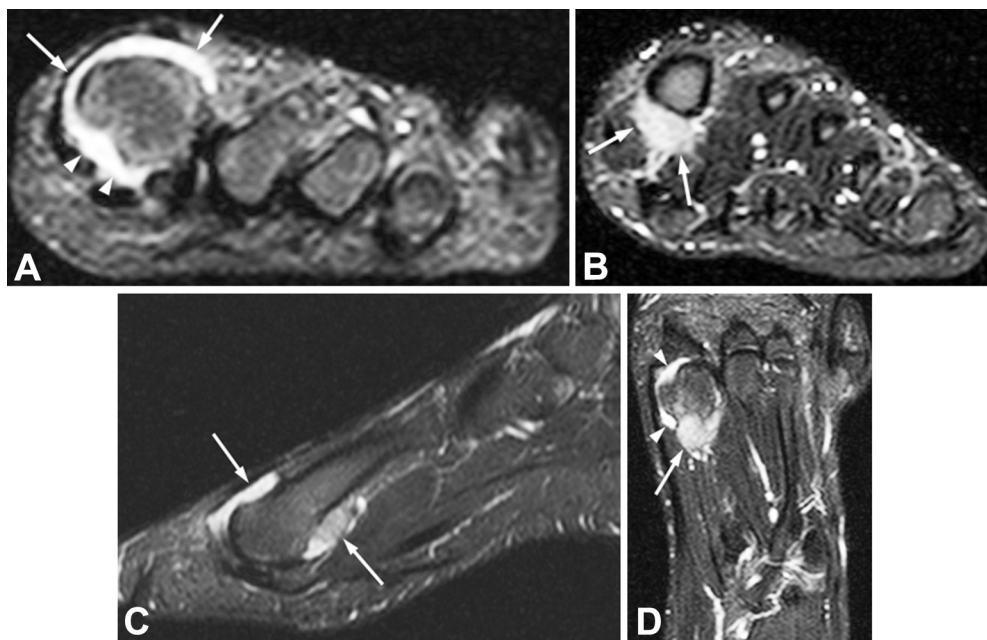


Fig. 3 – Axial (A, B), sagittal (C), and coronal (D) short tau inversion recovery (STIR) MR images of the foot, corresponding to Figure 1, show a diffuse, lobulated, para-articular mass with high signal intensity (lower than water), surrounding the first MTPJ and extending into the soft tissues of the dorsal and plantar aspect of the metatarsal head and neck (arrows). A small amount of joint effusion is depicted (arrowheads).

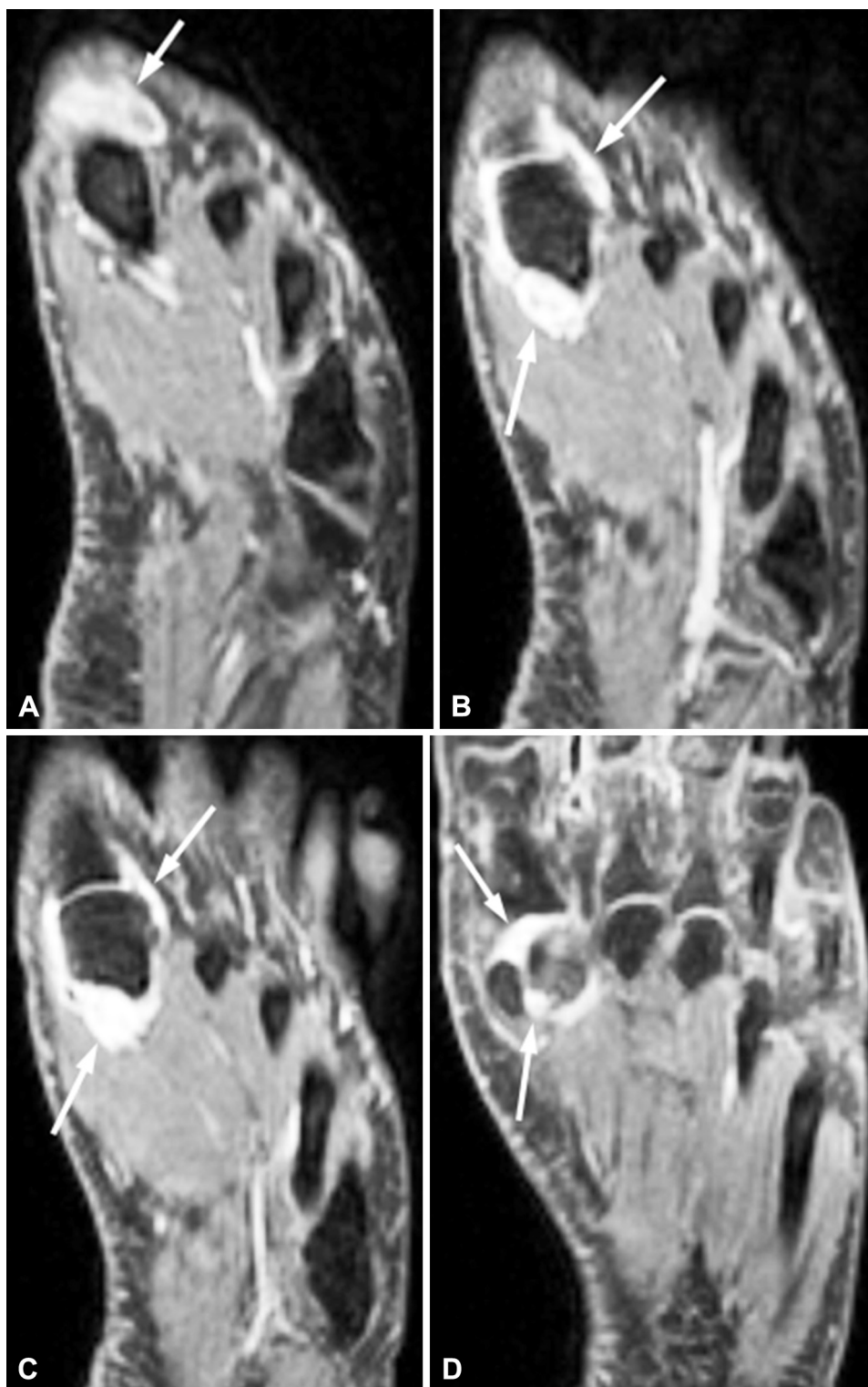


Fig. 4 – Consecutive coronal T1-weighted MR images of the foot with fat saturation (FS), after iv administration of gadolinium (A-D), demonstrate marked diffuse enhancement of the para-articular mass surrounding the first MTPJ (arrows).

They are slow-growing, well-defined solitary multiple nodules of hyaline cartilage lesions, smaller than 3 cm in diameter [8,9], arising from the joint synovium, the peri-articular tissues or the tenosynovium and not from the periosteum [8]. Kransdorf and Meis [10] in a study of 18.771 cases reported that the rate of ESCs was 1.5% of all

benign soft-tissue tumors. They could form either due to migration of cartilaginous cells to the adjacent to the joints connective tissue, or they may be attributable to synovial cells metaplasia or even conversion of pre-cartilaginous tissue located at the bone attachment of the ligaments [11].

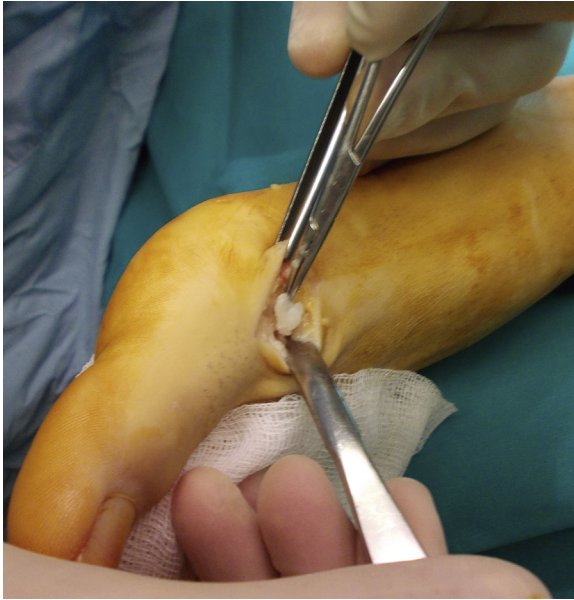


Fig. 5 – After the retraction of the 2 capsular flaps, the tumor emerges as a whitish solid mass.

In our case, the benign cartilaginous tumor was located periarticularly at the first MTPJ of the foot. Chung and Enzinger [12] in a study of 104 ESCs found that 64% of them were located at the small joints of the hand and 20% at the feet. More specifically, they found that 49% were located at the fingers, 15% at the hands, 11% at the toes, 10% at the feet, 4% at the forearms, and 11% at other sites. ESCs have also been described in the popliteal region [13], Hoffa's infrapatellar fat [14,15], wrist [16], elbow joint [17], while some more rare locations can be the gluteal region [18], diaphragm [19], anterior abdominal wall [20], axilla [21], scalp [22], preauricular region [4], dura [23], larynx [24], pharynx [25], neck [26], oral cavity [27], skin [28], fallopian tube [29], and parotid gland [30].

In the case of our article, the patient complained about persistent pain and mild effusion of the first MTPJ gradually increasing in size during the previous year. To the best of our knowledge, this is the second reported implication of the first MTPJ [31]. Clinically, in most cases of ESCs, patients present



Fig. 6 – Excision of the tumor into 4 particles, because of the inability to be removed as a whole unit.

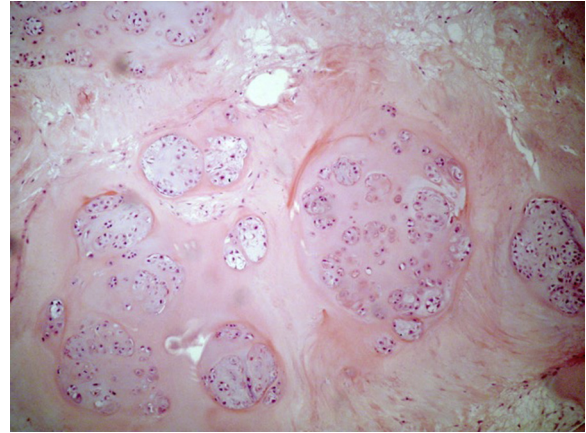


Fig. 7 – Microscopically, the tumor is composed of various sized lobules, separated by broad bands of acellular, amorphous substance. The lobules contain rounded groups of chondrocytes with bland nuclear features, embedded in a more basophilic, thin textured ground substance. There is no nuclear atypia or any mitotic activity. The histological features of the lesion, in total, are quite characteristic for a benign chondroma.

with pain, edema and limitation of the range of movement, warmth or erythema of the adjacent joint [32]. Physical examination can be totally normal or a mobile mass can be palpated [32]. Symptoms are generally not specific and this makes the diagnosis more difficult.

Radiologically, ESCs may appear ring-like or curvilinear calcifications [33]. Ossifications within the matrix of the tumor and remodeling of adjacent bones are detected less frequently [10,12,34]. However, in our case, x-rays were normal without the presence of calcifications or bony erosions.

Computed tomography (CT) may reveal an iso- or hyperdense soft-tissue mass without involvement of the underlying bone. Calcifications detected in radiographs may be better demonstrated with CT in 33%–70% cases [10]. In the present case, as no calcifications were detected in the preoperative radiographs, no CT examination was prescribed.

MRI is the most accurate examination for the delineation of the lesion. The MR appearance of the mass was most consistent with para-articular chondroma [10,35]. MRI, in most cases, depicts a well-demarcated lobulated mass with low- to intermediate signal intensity relative to muscle on T1-weighted images, high signal intensity on T2-weighted images, and various patterns of enhancement after iv administration of contrast medium [35]. Nevertheless, the MR characteristics of our patient are quite atypical and this may explain its misinterpretation as joint synovitis. First of all, the mass demonstrates uniform intermediate signal intensity, similar to muscle on T1-weighted images, intermediate signal intensity on T2-weighted scans, and high signal intensity on short tau inversion recovery sequence, which may be attributable to the high water concentration of the cartilage nodules [36,37]. Secondly, the lesion did not demonstrate regions of signal loss/blooming artifact corresponding with calcifications. Furthermore, contrast enhancement was uniform, which differs significantly from the peripheral or septal

enhancement seen in most cases of ESCs [10,35,38]. Finally, the para-articular chondroma in our patient seems to extend into the MTPJ, which is a very unusual finding.

Diagnosis can be quite difficult in many cases. In our case, the patient was misdiagnosed at the beginning and he was treated as joint synovitis with possible tendinitis of extensor hallucis longus. To avoid para-articular chondroma misdiagnosis, Reith et al defined three diagnostic criteria which include: radiologic or clinical single lesion detection, bone and cartilaginous histologic composition, and presentation as an extra-synovial lesion [7]. Synovial bursitis, arthritis, giant cell tumors of the tendon sheath, calcifying aponeurotic fibroma, nodular chondrometaplasia, myxomas, and chondrosarcomas are considered in the differential diagnosis [9,12,34,39]. Especially for the first MTPJ region, a differential diagnosis from gout, which very commonly affects this joint, has to be made [40].

The microscopic features of an ESC comprise various sized lobules with sharp borders and mild to moderate hypercellularity, consisted of mature hyaline chondrocytes with different degree of calcification as well as metaplastic ossification [9,34,39]. However, no calcifications or ossifications were observed in the histological specimen of our case. Any cellular pleomorphism with binucleated chondrocytes and myxoid changes could indicate malignancy and extraskeletal myxoid chondrosarcomas [9,12]. Coverage of the pathologic specimen by synovial cells and an intra-articular location (loose body) are indicative of synovial chondromatosis. Histological characteristics of the specimen/lesions are insufficient to differentiate between articular, para-articular, and soft tissue ESCs [41].

The treatment of choice in all ESCs is surgical excision [9]. The recurrence rate is reported to be 15%-20% [9,12]. Recurrent tumors are re-excised [9,42]. In our case, the patient was totally relieved by his symptoms immediately after the tumor excision and no recurrence was detected 24 months postoperatively.

In conclusion, ESCs are rare pathologic entities that can be easily misdiagnosed because of their nonspecific clinical symptoms. The physicians should have a high degree of suspicion judging from the age of the patient and the location of the lesion. Differential diagnosis should be made from a wide variety of other pathologic conditions, with the role of MRI being fundamental in the diagnosis and surgical planning. However, in isolated cases, such as the one presented, the MR findings may be misleading. In these cases, the final diagnosis can only be established with histological criteria. Radical excision of the tumor is the treatment of choice with less possibility of recurrence.

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