CASE REPORT

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Giant, High-Grade Chondrosarcoma of The Hand: A Rare Case with Exceptional Tumor Size and Review of The Literature

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Chondrosarcoma is a malignant tumor originating from cartilage-producing cells. Although rare in the hand, it is the most common primary malignant bone tumor in this location. We present a case of high-grade chondrosarcoma of the first metacarpal bone in an 85-year-old female, who presented with pain and severe limitation of hand function. Imaging studies initially suggested a giant cell bone tumor, and a tru-cut biopsy did not confirm chondrosarcoma. During the preoperative period, the tumor enlarged from approximately 10x9 cm to 15x11 cm, ultimately necessitating amputation as the treatment of choice. Histopathological evaluation revealed grade 2-3 chondrosarcoma. According to the existing literature, a hand chondrosarcoma of this size has not been previously documented. Hand chondrosarcomas, unlike those in other regions, rarely metastasize; however, despite their low metastatic potential, they may still lead to substantial morbidity. When wide resection and amputation are performed, as in our case, the risk of local recurrence is significantly reduced.

Keywords: Chondrosarcoma, hand, giant, high-grade.

INTRODUCTION

Chondrosarcoma is a malignant tumor originating from cartilage-producing cells of the bone and is the second most common bone malignancy. Its prevalence among all malignant bone tumors ranges from approximately 20-30%[1]. It is most frequently observed in the pelvic bones, followed by the proximal femur, proximal humerus, distal femur, and ribs. While it predominantly appears as a primary tumor, it can also develop from a pre-existing benign cartilage pathology, such as an enchondroma or osteochondroma[2].

Although chondrosarcoma is the most common primary malignant bone tumor of the hand, it accounts for only 4% of malignant tumors in this location and is rare in the hand[3]. The lesion typically appears in the hand after the age of 50[4]. It most commonly affects the proximal phalanx in the hand, and the primary treatment, regardless of localization, is surgical excision[5]. In general, detailed surgical reconstruction is not performed, radical excision or amputation of the affected finger results in low local recurrence rates. Unlike chondrosarcomas in other parts of the body, those in the hand have a low metastasis rate[4,6].

In this study, we present a case of an aggressive chondrosarcoma originating from the metacarpal bone of the first digit of the right hand in an 85-year-old patient. Over approximately one year, the tumor grew rapidly to one of the largest sizes documented in the literature, causing morbidity in the hand. We present this case along with a brief review of the literature.

MATERIALS AND METHODS

An 85-year-old female patient was admitted to our hospital with a nine-month history of swelling and pain in her right hand. The patient had a medical history of primary hypertension, Parkinson's disease, and dementia. On examination, a soft, cystic, subcutaneous mass measuring approximately 8x6 cm was observed at the level of the first metacarpal bone of the right hand. The mass was painful and restricted hand movements, particularly the thumb.

Direct radiography (Figure 1) and contrast-enhanced MRI (Figure 2) were performed. The MRI

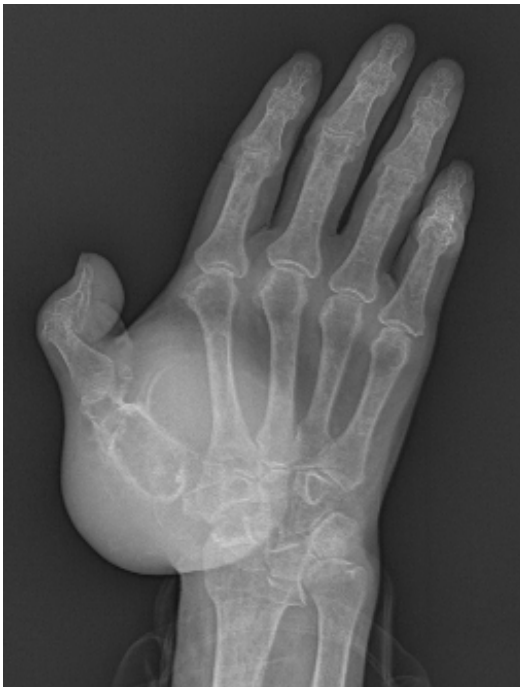

Fig. 1 — Direct X-ray image of the lesion causing destruction in the first metacarpal bone.

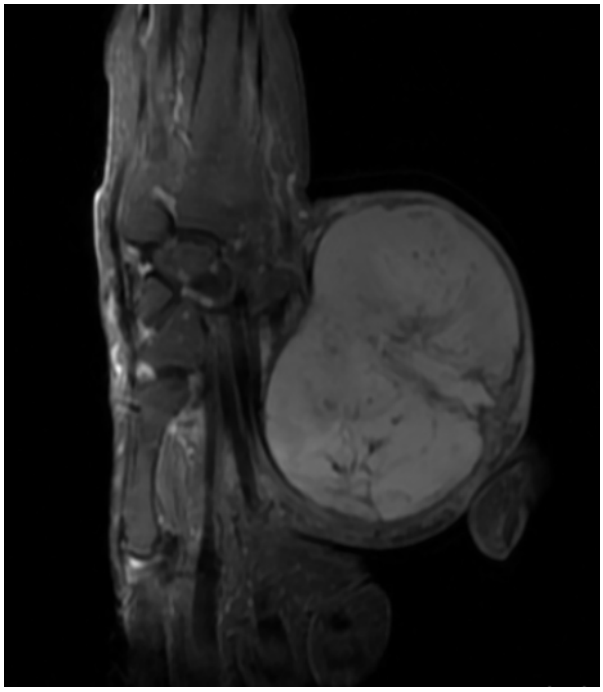

Fig. 2 — T2-sequence MRI image of the lesion.

showed a mass lesion with multiloculated cystic areas, measuring 10x9 cm, infiltrating the first metacarpal and flexor tendon and extending dorsally to the first and second extensor compartments. The lesion was initially diagnosed by the radiologist as a giant cell bone tumor based on MRI findings, with the absence of a central osteoid or chondroid matrix ruling out osteosarcoma or chondrosarcoma. Despite these preliminary diagnoses, positron emission tomography (PET) and ultrasound were performed due to the tumor's malignant potential for metastatic evaluation. PET imaging showed a hypometabolic central area with increased FDG uptake in the peripheral regions (SUVmax: 9.49), suggesting a primary malignant tumor. No systemic metastasis or regional lymph node metastasis was detected on axillary ultrasound. A tru-cut biopsy performed by interventional radiology revealed necrotic tissue and fibrohyaline soft tissue.

Due to the patient's age, comorbid conditions like senile dementia, the tumor's aggressive nature, and surrounding tissue damage, an amputation of the finger was decided upon with the patient's and her family's consent. During intraoperative exploration, an aggressive-appearing mass, approximately 15x10x9 cm, originating from the first metacarpal bone was identified. It extended proximally to the trapezium and distally to the IP joint, destroying the first and second metacarpal bones (Figure 3). The mass had expanded to the common digital nerves of the first and second fingers, the superficial branch of the radial nerve, and the EPL, EPB, EIP, and EDC tendons of the second and third fingers (Figure 4). Amputation was performed at the first digit's trapezium level and at the second digit's MCP joint. The skin defect was repaired using volar skin tissue (Figure 5). No postoperative complications were encountered in wound healing or movement of the remaining fingers.

RESULTS

The pathological analysis revealed atypical cells with round, polygonal, or spindle-shaped vesicular nuclei scattered within a myxoid matrix. Immunohistochemically, tumor cells were positive for S100 and SOX9. The lesion was diagnosed as grade 2-3 chondrosarcoma with negative surgical margins. The patient was evaluated for chemotherapy and radiotherapy, but these were deemed unsuitable. No signs of recurrence or metastasis were detected at the 6-month postoperative follow-up, and the patient remains under active surveillance.

DISCUSSION

Chondrosarcoma in the hand is very rare, and the primary treatment for such cases is surgical excision. However, treatment options have recently been debated in the literature. Some authors advocate for

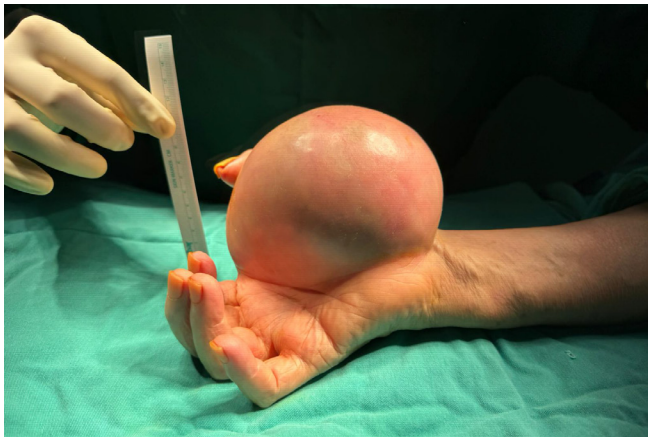

Fig. 3 — Preoperative image of the lesion.

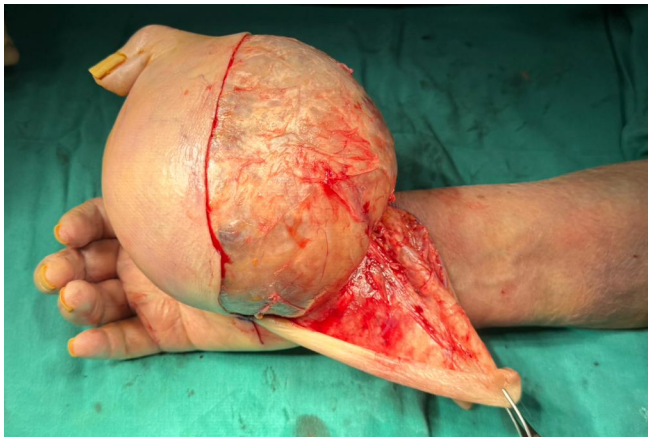

Fig. 4 — Intraoperative image of the lesion.

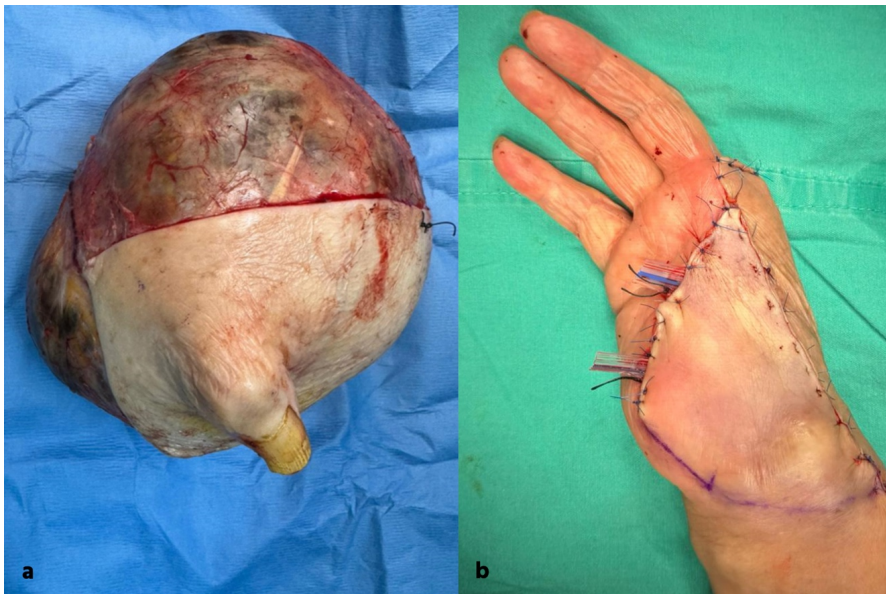

Fig. 5 — a. Image of the specimen after excision. b. Postoperative image of the hand after lesion excision and amputation.

wide resection as the only reasonable treatment due to the metastatic potential of these tumors, while others suggest intralesional curettage for low-grade chondrosarcomas with benign characteristics, which may reduce morbidity and functional loss. In a study by Bovée et al., 28 phalangeal chondrosarcomas were followed postoperatively for 8 to 432 months for recurrence and metastasis. Ten of the fifteen tumors treated with local curettage recurred, while none of the thirteen chondrosarcomas treated with radical surgery recurred[7]. Thus, the generally recommended treatment approach is radical excision and amputation of the affected finger[4].

Chondrosarcomas are classified into three main histological grades: low (Grade 1), intermediate (Grade 2), and high (Grade 3). Most lesions are classified within the low-grade category and generally grow slowly, with growth behavior largely influenced by their degree of differentiation[1]. The most common symptom of hand chondrosarcomas is a palpable mass and pain[4]. In neglected cases, they can cause morbidity and mortality.

The prognosis of chondrosarcoma cases is generally related to the histological grade and location of the lesion. However, this principle is not applicable to hand chondrosarcomas, as they rarely metastasize regardless of histological grade[2,8]. They present as local recurrences following surgery[6]. Chondrosarcomas are considered resistant to radiotherapy and chemotherapy; therefore, these treatments have limited efficacy. However, in high-grade or mesenchymal chondrosarcomas, adjuvant or neoadjuvant chemotherapy may be used alongside surgical excision[4].

In our case, the tumor grew from approximately 10x9 cm to 15x11 cm in size in the few months between the patient's first presentation and surgery, indicating an aggressive nature. The potential for rapid growth and local tissue destruction, as seen in our high-grade chondrosarcoma case, should not be underestimated.

In the literature, reports of hand chondrosarcomas describe relatively small tumors compared with the present case. Ogose et al., in a Mayo Clinic series of 111 hand and foot chondrosarcomas, reported tumor sizes ranging from 8 to 100 mm, with a mean diameter of 29 mm, and identified only three Grade 3 lesions, most of which were treated with curettage, resection, or amputation[9]. Similarly, David et al. analyzed 30 cases and recorded tumor sizes between 20 and 120 mm, including three Grade 3 tumors, concluding that total resection or amputation yielded better oncologic control than curettage or subtotal excision[10]. Roberts et al., in a series of 19 hand chondrosarcomas, reported a maximum tumor size of 100 mm[11], while Patil et al. identified the largest lesion -measuring 70 mm- among 23 cases, with the highest grades being Grade 2–3 and treated with similar surgical approaches[12]. In another study, Bovée et al. reported tumor sizes ranging from 10 to 80 mm in 35 patients[7]. Collectively, these studies demonstrate that hand chondrosarcomas rarely exceed 10 cm, and none approach the dimensions observed in our patient's lesion, which measured 15 × 11 cm, making it among the largest hand chondrosarcomas documented to date.

We believe that achieving a wide resection with tumor-free surgical margins, as in our case, likely contributed positively to the course of the disease.

CONCLUSION

Chondrosarcoma of the hand is an exceptionally rare tumor with distinct characteristics compared to chondrosarcomas in other anatomical regions. Notably, the metastatic potential of hand chondrosarcomas is significantly lower; however, their propensity for local recurrence necessitates aggressive treatment strategies. Radical surgical excision involving amputation remains the cornerstone of treatment to ensure tumor-free margins and minimize the risk of recurrence.

Ethics Statement: Written informed consent was obtained from the patient for the publication of the case details and images. According to our institutional regulations, ethical approval was not required for single case reports.

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