



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Vascularized fibular graft as a surgical option for osteosarcoma of distal humerus: A case report



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ARTICLE INFO

Article history:

Received 7 July 2017

Received in revised form 14 August 2017

Accepted 14 August 2017

Available online 23 August 2017

Keywords:

Osteosarcoma

Interpositional elbow arthroplasty

Fibular graft

ABSTRACT

INTRODUCTION: Distal humerus is a very rare predilection site of osteosarcoma. Limb salvage surgery has widely replaced amputation for surgical treatment of most types of malignant bone sarcomas.

PRESENTATION OF CASE: We presented a 42 years old male with rapidly growing osteosarcoma on his right distal humerus. After induction chemotherapy, wide excision and reconstruction using free vascularized fibular graft followed with interpositional elbow arthroplasty technique was done.

DISCUSSION: One of the option for surgical treatment for distal humerus osteosarcoma is limb salvage surgery with free vascularized fibular graft technique. Good functional outcome and no signs of local recurrence were found during 2,5 years follow up.

CONCLUSION: Free vascularized fibular graft with interpositional elbow arthroplasty is a good option for management of bone sarcoma of distal humerus.

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1. Introduction

The most frequent predilection sites of osteosarcoma are metaphyseal regions of the distal femur, proximal tibia and proximal humerus [1]. Osteosarcoma of distal humerus is quite unusual. Nowadays, limb salvage surgery has widely replaced amputation for surgical treatment of most types of malignant neoplasms [2]. However, skeletal reconstruction following tumor resection remains challenging with regard to limb length preservation, cosmetic, and function especially in upper extremity [3]. In reconstructing the defects, beside allograft, autograft and endoprosthesis, free vascularized fibular graft is the most favorable technique [4].

In this report, we presented a case of 42-year-old male who was diagnosed with osteosarcoma of the right distal humerus and was treated by en block resection and reconstruction with free vascularized fibular graft technique. This work has been reported in line with the SCARE criteria and cite the following paper: Agha et al. [5].

2. Presentation of case

A 42 years old male was referred to our institution with rapidly growing mass on his right elbow since 1 year before admission. No history of similar disease in the family. Patient work as a labour, a right hand dominant and has a normal BMI. He was a smoker until

he felt ill. The physical examination revealed a mix cystic and solid mass sizing 15 × 15 × 6 cm. The elbow was fixed in slight flexion, but no neurovascular disturbances were found (Fig. 1). Laboratory findings showed unremarkable result in complete blood count, ESR, and alkaline phosphatase. Lactic dehydrogenase was increased at level of 425 U/L (<220).

Elbow radiograph demonstrated a lytic lesion on the lateral side of the humerus that extended to the lateral condyle (Fig. 2). Magnetic resonance imaging (MRI) was suggestive to malignant bone tumor that extended to the surrounding soft tissue. No metastatic lesion were found on chest radiograph and bone scintigraphy. Histopathological result was consistent with conventional osteosarcoma (Fig. 3).

After 3 cycles of induction chemotherapy, the surgical procedures were performed by the oncologic orthopaedic team led by the author. Patient was placed on supine position without the use of pneumatic tourniquet. A double curved-S-incision was made on the lateral aspect from proximal humerus extending to the posterior elbow across the tumor mass. A careful blunt dissection was performed to separate the tumor mass with the normal tissue. During the dissection, the neurovascular bundle (radial nerve, ulnar nerve and the brachial artery) were located outside the mass, thus was able to be salvaged. Most muscle groups were conserved except for the part of muscles attached to the tumor mass (Fig. 4-A).

After exposing the whole tumor mass, osteotomies were performed outside of the transitional zone for both proximal and distal ends, ensuring a clear margin of the tumor. Distal resection margin was performed on the olecranon and the proximal one was on the proximal shaft of humerus (Fig. 4-B). Wide excision of the

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Fig. 1. Local state of the tumor mass at the right elbow.

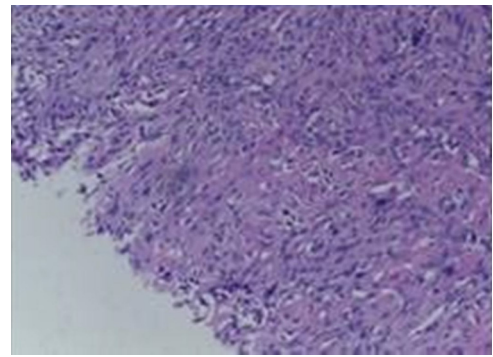


Fig. 3. Histopathological examination demonstrated pleomorphic cells with osteoid matrix (Hematoxylin and Eosin, 100×).

tumor mass was performed (Fig. 4C). Simultaneously, we harvested the ipsilateral vascularized fibular graft with 2 cm of biceps tendon and 2 cm of lateral collateral ligament still attached to fibular head. We implanted the vascularized fibular graft to the humeral defect with the head of the fibula was seated on the distal part and reshape it to articulate with the olecranon. In the proximal humerus region, we fixate the graft with the host bone using two interfragmentary screws. The olecranon was reattached with tension band construct. The articulating surface of the “new” elbow joint was optimized by interposing the biceps tendon and lateral collateral ligament between the fibular head and the olecranon (Fig. 4D).

On the postoperative radiograph (Fig. 5) the graft was well-positioned and stable. No complication nor adverse event occurred after operation. Three cycles of adjuvant chemotherapy were performed after the wound was healed. Patient adherence and

compliance was good showed by never missing a follow up visit and abide by the rule that was informed to the patient.

Six months after surgery, the patient had major functional improvement in his daily activity, showed by the increase of DASH score. The score was 37 point (ranging 0–100, with being 100 means most disable), which means the patient had a mild disability in his daily activities. After one year follow up, union was achieved on the control radiograph with no sign of local recurrence. No signs of metastasis were detected from the chest radiograph as well. The DASH score was improved to 27 point and improved even further (22.5) at 2 years follow up (Figs. 6 & 7). Unfortunately, at 2.5 years follow up, a lung metastasis occurred and created a massive pleural effusion which resulted in patient's death shortly after.

3. Discussion

As mentioned before, osteosarcoma in distal humerus is a rare entity. In this case, not only the predilection but also the age is not usual for osteosarcoma, which may give a false perception about the differential diagnosis during the first glance. But after a series of diagnostic evaluation, pathologic analysis and CPC meeting, the diagnosis of osteosarcoma was confirmed. As mentioned by Wittig et al. [6] multidisciplinary approach is mandatory to diagnose and treat osteosarcoma.

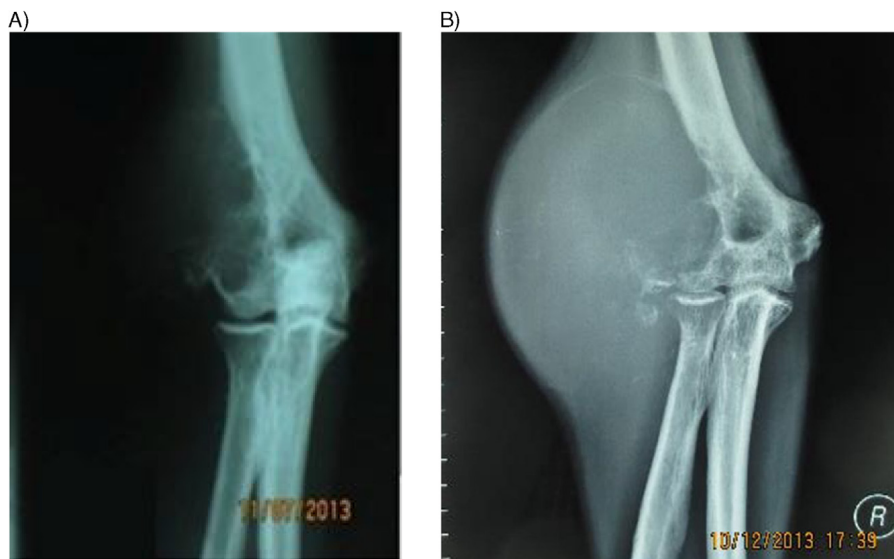


Fig. 2. Elbow radiographs: (A) a destructive lytic lesion on the lateral side of the humerus through the lateral condyle with osteoid matrix formation (before neoadjuvant chemotherapy); (B) After neoadjuvant chemotherapy, the tumor mass became bigger.

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