

Reconstruction with Composite Cement-Autoclaved Autograft after a Near-Total Excision of the Humerus for Osteosarcoma: A Case Report

KL Pan, FRCS, A Zolqarnain*, MS Ortho, GB Ong**, MRCP

Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kuching, Malaysia

*Department of Orthopaedics, Sarawak General Hospital, Kuching, Malaysia

**Department of Paediatric Oncology, Sarawak General Hospital, Kuching, Malaysia

ABSTRACT

Osteosarcoma occurring in the humerus is often confined to the proximal part, in which case, reconstruction after excision is less daunting. When the tumour spreads down the medullary cavity distally, a total humeral replacement is often required. This is costly and beyond the means of the average patient in a developing country. An amputation is often the procedure of first resort. We report a 13-year-old boy with osteosarcoma originating from the left proximal humerus, with involvement of the marrow reaching down to the distal diaphyseal-metaphyseal junction, leaving only 6 cm of the distal humerus intact after wide resection. Reconstruction of the defect was done with a composite cement-autoclaved autograft fixed to the remaining humerus with a plate. At 40 months of follow-up, the patient is well with normal function of the elbow, wrist and hand. Salvaging the limb despite near total involvement of the humerus by high grade osteosarcoma is possible using material available in the average orthopaedic operating room.

INTRODUCTION

Osteosarcomas commonly occur at the proximal humerus. When it spreads down the medullary cavity distally, a total or near-total excision of the humerus is required, leaving only a short distal end. This necessitates a total humeral replacement or a tumour prosthesis with a short stem secured by cross pins to prevent aseptic loosening. Both are costly and technically difficult to do. We report a case where reconstruction was performed with a composite cement-autoclaved autograft. To the best of our knowledge, this method of reconstruction has not been previously reported.

CASE REPORT

A 13-year-old boy was first seen at the Orthopaedic clinic with pain and swelling over the left shoulder of one month's duration. Examination revealed a 12 by 15 cm swelling over

the shoulder and proximal part of the arm. Classical features of an osteosarcoma of the proximal humerus were seen on plain x-rays. An MRI showed that the tumour had extended down the marrow cavity to the level of the distal quarter of the humerus (Fig 1).

A biopsy confirmed the growth as a classical osteosarcoma. The chest radiograph, CT thorax and bone scan did not show any evidence of metastasis. Neoadjuvant chemotherapy with doxorubicin and cisplatin was started. Two weeks after the third cycle, the patient underwent a wide excision of the tumour. During surgery, the tumour mass was removed with a cuff of normal muscle together with the biopsy scar. This included the deltoid, and parts of the pectoralis major, biceps and rotator cuff muscles. The axillary nerve was sacrificed. The musculocutaneous nerve and the rest of the major neuromuscular bundle were identified and preserved. The humerus was osteotomised 3 cm distal to the intramedullary extent of the tumour as shown on the MRI. This left a 6 cm remnant of the distal end of the humerus (4 cm from the lateral epicondyle). The excised specimen was stripped of the covering soft tissue and gross tumour. The humeral head and adjacent metaphysis which had been destroyed by the tumour were also discarded. The remaining diaphysis was sent for autoclaving at 121 degrees centigrade for 10 minutes, killing all tumour and bone cells but leaving the gross structure intact. Utilising a rush rod cut to length, bone cement moulded in the shape of a humeral head and neck was mounted onto the "proximal end". The distal end was then passed through the autoclaved "tumour" bone and the whole composite fixed onto the remaining distal humerus with a limited contact dynamic compression plate (Fig 2). The construct was covered with intact muscles and the skin closed. The postoperative recovery period was uneventful. The subsequent histopathological examination of the excised tumour showed more than 90% necrosis; the patient proceeded to complete six cycles of the same chemotherapeutic agents.