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Total Humeral Replacement with Biarticular Prosthesis after Chondrosarcoma Wide Excision Functional Aspects of Limb Preservation

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Abstract

Case: A massive proximal humerus high grade chondrosarcoma was diagnosed in a 33-year-old male patient. Diagnosis was confirmed by biopsy and staging was negative. To achieve wide resection and acquire a safe resected margin, total humerus replacement was performed, and the whole humerus was reconstructed. The patient resumed normal activities, with average functional outcome and is very satisfied with the aesthetic result and possibility of limb preservation.

Conclusion: Total humeral replacement is an option for preservation of the limb and allows for very good function of the elbow and full function of the hand. Amputation would not guarantee greater survival.

Introduction

The humerus is commonly affected by primary malignant bone tumors that may require wide surgical "en bloc" excision, when staging is negative [1,2]. When major nerves and vessels are not involved, limb salvage surgery becomes the mainstay treatment [3,4]. Total humerus replacement (THR), with shoulder and elbow arthroplasty, is a rarely performed surgery, but is the only reconstructive solution, providing partial aesthetic and functional preservation, when total humerus resection is required ¬[5-8]. The literature regarding functional and oncological outcomes for this procedure is limited, but published results are overall acceptable [6,9,10]. Compared to ablative surgery, limb preservation provides better functional outcomes with no difference in overall patient survival [11,12].

Statement of Informed Consent

The patient was informed and agreed that data concerning the case would be submitted for publication.

Case Report

A 33-year-old male, with Ollier's disease, complaining of right shoulder pain and swelling for 1 year (Figure 1) worsened in the last 3 months. Exams suggested a massive proximal humerus secondary chondrosarcoma (Figure 2 & 3) with soft tissue invasion and distal canal extension, leaving only 8 centimetres of healthy humerus. Diagnosis was confirmed by biopsy and staging was negative. Main neurovascular bundles were not involved. Since there was not enough remaining distal humerus to anchor shoulder prosthesis, modular prosthetic replacement of the whole humerus with inverted-arthroplasty of the shoulder was the choice (Figure 4-6). No important complications were registered, except for a neuropraxia of the radial nerve that was resolved after two weeks. The anatomopathological study confirmed the preoperative diagnosis and tumor free margins. At 3-months follow-up, the patient presented, as expected, a limitation in shoulder active mobility, regained satisfactory elbow function and presents full wrist and hand function. The functional (MSTS) score was 17/30. With a follow-up of 4 years, the functional score is maintained, and no local recurrence occurred.

Figure 1: Preoperative macroscopic aspect of the shoulder.

Figure 2: Preoperative X-ray.

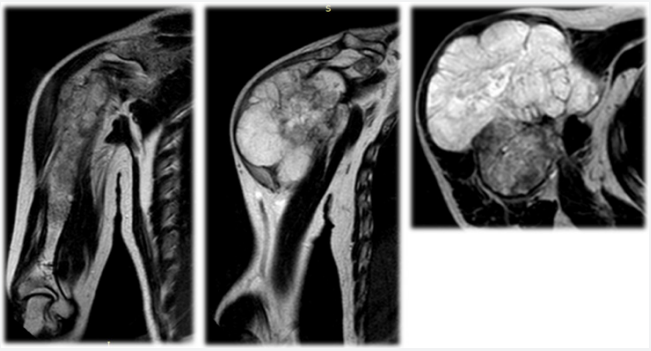

Figure 3: Preoperative MRI.

Figure 4: Exposure of the neurovascular bundle and large bone defect after tumor resection.

Figure 5: Surgical specimen.

Figure 6: Post-Operative X-ray.

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Discussion

After large resections of the humerus, reconstruction still represents a challenge. Total humeral replacement is an option for preservation of the limb and allows for very good function of the elbow and full function of the hand. Despite the short follow-up, our patient's evolution was very favorable, there was no evidence of relapse and the patient, who had been confronted with a possible amputation before MRI, was very satisfied with the functional outcome.

High recurrence and metastization rates present in high grade chondrosarcomas, even when margins are adequate, since the grade is the single most important predictor [13,14]. Surgical management of large bone tumors should focus on complete resection and functional preservation of the limb. The reconstructive option was a considerable success, minimizing the functional impairment, as well as the emotional and aesthetic stress that an amputation would carry. Amputation would not guarantee greater survival.

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