



REJOIN THE SPORTS AFTER PROXIMAL HUMERAL REPLACEMENT IN PATIENTS THROUGH PRIMARY BONE SARCOMA

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ABSTRACT

Back ground: The proximal humerus is the third most common site of primary bone sarcomas. The survival of patients has improved to approximately 70% surgical treatment commonly requires excision of the tumour with wide surgical margins. The aim of the study Rejoin the sports after proximal humeral replacement in patients through primary bone sarcoma. **Methods:** 15 patients (9 females, 6 males) with a mean age of 19.9 years (± 8.4 years, range 7–39 years) at the time of surgery were included. The mean follow-up was 18 years (± 7.8 years, range 6–28 years) were included. The type of sport, frequency, duration of each sport session and based on the UCLA activity score were assessed before surgery, at 1 year, 3 years and at the latest follow up. TESS used for Functional outcome. **Results:** One year after surgery, 60% (9/15) of the patients continued to perform sports (low impact 10/15; medium impact 2/15; high impact 1/15) ($p < 0.05$). Three years after surgery, 87% (13/15) of the patients were regularly participating in sports (low impact 11/15; medium impact 4/15; high impact 3/15) ($p < 0.05$). At latest follow-up all patients (100%) resumed performing sports ($p < 0.05$). **Conclusion:** Enduring survivors with an endoprosthetic reconstruction of the humerus following primary bone sarcoma resection resumed participation in sports on a regular basis. Regarding the low occurrence of periprosthetic infections, surgeons should bear in mind the usage of an artificial mesh for reconstruction to save you soft tissue complications, specifically in energetic patients.

Keywords:- Megaprosthesis, Synthetic mesh, Bone sarcoma.

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INTRODUCTION

The proximal humerus is the third most common site of primary bone sarcomas.¹ The survival of patients has improved to approximately 70% surgical treatment commonly requires excision of the tumour with wide surgical margins.² A universal mode Endoprosthetic reconstruction is to use a modular, megaprosthetic replacement with a proximal humerus replacement.³ Sufficient en bloc resection of the tumor is often accompanied by pronounced loss of soft and bone tissues. Consequently, a loss of function of the involved extremity in during these procedures.⁴ In addition, chemotherapy has a negative impact on metabolic

function and muscle strength, resulting in prolonged rehabilitation. Physical activity has been shown to reduce chemotherapy-related symptoms and to improve the sense of well-being. Regular exercise also positively influences the cardiovascular system, pulmonary function and muscle strength in cancer survivors.⁵

These achievements have subsequently led to an increased interest in patients' postoperative function and return to sports activities and the potential factors associated with a successful return to sports activities—especially considering that mostly young patients are affected by primary bone sarcomas.⁶

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On the other hand, while sports activities in sarcoma patients who have undergone megaprosthesis reconstruction have previously been studied for lower extremity tumours, there is a paucity of studies on upper extremity reconstructions, particularly studies applying homogeneous inclusion criteria and larger patient cohorts⁷. Furthermore, patient- and procedure-related factors associated with outcome are widely unknown. Thus, the aims of the present study were to determine the functional outcome and to evaluate the postoperatively achieved level of sports using standardized scoring systems and to identify the associated favorable and restrictive factors.

METHODS

The study was approved by the local ethics committee and was carried out in accordance with the Chettinad Hospital and Research Institute (CHRI), Kelambakkam. All patients with a primary sarcoma of the proximal humerus and reconstruction by a modular endoprosthesis were included. The minimum follow-up for inclusion was 4 years. A total of 102 patients were identified in the institution's bone and soft tissue tumor registry and 49 patients had died. Of the remaining 53 patients 19 had a subsequent amputation of the affected limb due to infection, local recurrence, failure of the prosthesis or oncological complications. The average time to failure was 4.5 ± 2.3 years (range 0.9–7.2 years). In this study 34 patients with an age between 0 and 65 years at the time of surgery were included, 12 patients were lost to follow-up and 7 patients refused to participate. In total 15 patients (9 females, 6 males) with a mean age of 19.9 years (± 8.4 years, range 7–39 years) at the time of surgery were included. The mean follow-up was 18 years (± 7.8 years, range 6–28 years).

All tumors were verified histologically by a specialized musculoskeletal pathology consultant. Of the patients 11 (73%) had an osteosarcoma and 4 patients (26%) a chondrosarcoma. Chemotherapy was administered according to international standardized protocols to 13 osteosarcoma patients (78%). Patients with chondrosarcoma as well as two patients with a parosteal osteosarcoma were treated by surgery alone.

All patients underwent a planned wide tumour resection with histopathological confirmation of surgical margins. In patients with tumour infiltration of the glenohumeral joint, an extra articular tumour resection was performed. 7 patients (46.6%) had a Malawer type 5 [14] resection and did not have a functional deltoid muscle left postoperatively. Six patients (40%) had a Malawer type 1 resection with postoperative limited axillary nerve function⁸. Two patients (13.3%) underwent deltoid muscle-sparing surgery with a functional axillary nerve.

A proximal humerus endoprosthesis was implanted in 13 patients (86.6%) and a total humerus endoprosthesis in 2 patients (13%). Ten patients received a Howmedica Humerus Modular Replacement System (HHMRS®, FA Stryker Howmedica [Kalamazoo, MI, USA]) endoprosthesis and three patients received a HHMRS-expendable® endoprosthesis. Two patients had reconstruction with a custom-made Salzer Endoprosthesis⁹.

The UCLA activity score, type of sports, frequency per week, and duration of each training session were assessed. Sport activities were categorized in low, medium and high-impact sports, based on the study by Montet al¹⁰. The Toronto Extremity Salvage Score (TESS) was used to evaluate the functional outcome and quality of life at the latest follow-up. All data were recorded retrospectively during an interview at the latest follow-up appointment. Data were assessed for the time before diagnosis (–1), the first year after surgery (+1), 3 years after surgery (+3) and 5 years after surgery and/or time of last follow-up.

In all patients active range of motion (ROM) of the operated shoulder (abduction, flexion and external/internal rotation) was assessed. Complications were classified according to the International Society of Limb Salvage (ISOLS) classification a) soft tissue failure, b) Aseptic loosening, c) structural failure, d) infection, e) Tumor progression.

RESULTS

The mean UCLA activity score decreased from a mean preoperative score of 8.0 (± 1.3 , range 5–9) to 5.2 (± 1.7 , range 3–8) ($p < 0.05$) 1 year postoperatively. After 3 years, the UCLA activity score increased to 5.1 (± 1.75 , range 3–8) and at last follow-up it further increased to 7 ± 1.8 (range 4–10) ($p < 0.05$). Patients who were more active prior to surgery, were more active at the latest follow-up ($r_s = 0.711$, $p < 0.05$).

Prior to surgical operation all patients (a hundred percent) had been often participating in sports activities. Four patients had been performing fencing, volleyball, or table tennis at tournament stage. Three sufferers had been playing soccer and one finished judo. The remaining patients had been acting sports activities, together with swimming, walking or training at a gymnasium as recreational sports.

One year after surgery, 60% (9/15) of the patients continued to perform sports (low impact 10/15; medium impact 2/15; high impact 1/15) ($p < 0.05$). Three years after surgery, 87% (13/15) of the patients were regularly participating in sports (low impact 11/15; medium impact 4/15; high impact 3/15) ($p < 0.05$). At latest follow-up all patients (100%) resumed performing sports ($p < 0.05$).

Out of the three patients acting sports activities at a event degree, one affected person, who underwent

tumor resection on the nondominant arm, resumed playing table tennis at a leisure level. One patient was playing football on weekends and one patient (tumor resection on the nondominant arm) commenced with downhill mountain cycling 4 years after surgery and is taking part in downhill mountain motorbike races on a normal foundation. The patients who had preoperatively participated in fencing and volleyball on a match degree, had been postoperatively no longer capable of carry out those sports activities.

Patients changed from sports involving the upper extremities to sports involving the lower extremities. In patients with tumor resection on the dominant arm, overhead activities were not performed anymore. More than 73 % (11/15) of the patients had limited ROM with an ante flexion and abduction of less than 30°.

Patients treated with a artificial mesh showed much less complications of this failure type ($p < 0.05$). The UCLA pastime rating turned into lower in patients who suffered a problem at 1-yr and three-yr observe-up ($p < 0.05$). Higher preoperative sports tiers were associated with postoperative tender tissue complications. Infections took place in two patients treated with out a artificial mesh. Patients underwent a two stage revision. Periprosthetic fracture, dislocation or loosening was now not found.

One affected person (6%) had an oncological hardship. He evolved lung metastases 1. Five years after primary tumor resection, underwent metastasis resection and changed into tumor-free and taking part regularly in sports at the final follow-up.

DISCUSSION

Usually, Limb salvage surgical operation is the treatment choice for primary malignant bone tumors of the proximal humerus. These tumors frequently affect younger and similar to equal-aged healthy humans, sports activities play a vital function in their each day lifestyles.¹² Data of the present day take a look at reveal that all sufferers resumed participation in sports activities; however, they modified to lower-impact sports related to the lower extremities. These findings would possibly assist surgeons in counseling patients concerning their sports activities.

Current study confirmed that physical activity of patients undergoing proximal humerus resection decreased remarkably within the first year which is correlated with Lang NW, Hobusch GM et al.¹³ This might be associated with the catabolic impact of predominant

surgical treatment accompanied by means of adjuvant chemotherapy; but, with growing postoperative time, patients resumed participation in sports, and at remaining observe-up all patients were appearing once more at the least a low-effect sports.

In the assessment to tumor patients following reconstruction of the decreased extremities, sufferers with a modular endoprosthetic reconstruction of the proximal humerus had a better UCLA hobby rating. Moreover, resection length and reconstruction with a proximal or general humerus replacement had no impact on the UCLA hobby score. This might be defined by using a transfer from overhead sports to activities involving the decreased extremities and those activities are associated with better UCLA interest scores.¹⁴ The essential key issue for the functional outcome of the affected extremity nonetheless stays the upkeep of the axillary nerve.

The difficulty price of the current look at changed into just like earlier reports of van de Sande MA, et al.¹⁵ It becomes observed that patients who were preoperatively more lively, had been much more likely to increase tender tissue complications. Occurrence of a difficulty entailed a restoration of sports hobby within the first three postoperative years. An affect of positive sports on unique complications become now not observed. Henderson et al. Stated an overall infection charge in patients with proximal humerus replacement of 6.3% which is not correlated with present study. Tang et al.¹⁶ Mentioned decrease smooth tissue complications and better purposeful outcome in sufferers with tender tissue reconstruction using a synthetic mesh. In the current series similar findings were located as patients undergoing initial gentle tissue reconstruction with a synthetic mesh had a lower rate of soft tissue headaches and infection.

CONCLUSION

Enduring survivors with an endoprosthetic reconstruction of the humerus following primary bone sarcoma resection resumed participation in sports on a regular basis. An exchange to decrease effect sporting sports related to the lower extremities turned into determined. Some patients perform excessive-level sports, which includes Downhill Mountain cycling or soccer. Regarding the low occurrence of periprosthetic infections, surgeons should bear in mind the usage of an artificial mesh for reconstruction to save you soft tissue complications, specifically in energetic patients.

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