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Case Report

Total shoulder girdle reconstruction after resection of malignant tumor of scapula

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use of spacer, allograft replacement of scapula and use of constrained and unconstrained scapular prosthesis. A case of malignant scapular tumor treated by Tikhoff–Linberg resection Type VI and reconstruction of the girdle by using prosthetic scapula and proximal humerus is described.

Case report

A 56 years old male patient, presented with a history of insidious onset of pain and swelling in left shoulder of 4 months duration. Swelling was rapidly increasing in size, pain continuous, radiating to hand and aggravated on movements. Patient was incapable of using the extremity for any function despite hand and elbow functions being normal with no neurovascular deficits. Local examination showed a large diffuse, ill-defined, firm and non-tender swelling in the shoulder and scapular region with no local lymphadenopathy. Movements of shoulder were markedly restricted with abduction of 0–30° and flexion 0–45°.

On evaluation, left shoulder radiograph revealed a destructive expansile lesion of scapula involving glenoid and body (Fig. 1). CT scan of the part showed an ill-defined expansile, irregularly marginated mass (63 × 59 × 57 mm) in the glenoid, neck and part of scapular body with involvement of rotator cuff and some permeative changes in head of humerus (Fig. 2). CECT chest showed contrast enhancing nodules in both lung fields? Secondaries. Bone scan showed increased tracer uptake in left scapula indicating active disease and no other bony metastasis. FDG-PET scan revealed an active

Introduction

The treatment of malignant tumors of the shoulder girdle is a great challenge to orthopedic oncologists. The common methods of managing these cases were forequarter amputation and shoulder disarticulation. With better understanding of biological behavior of these musculoskeletal tumors, advancement in imaging techniques, the availability of effective adjuvant chemotherapy and with availability of modular tumor prosthesis, 80–90% of these tumors can be safely resected through some limb salvage procedures.¹ The various modalities of treatment presently available are total scapulectomy and suspension of humerus, scapulectomy and

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Fig. 1 – Pre-operative radiograph showing the aggressive scapular tumor around the shoulder girdle.

disease locally around the left shoulder with bilateral pulmonary metastasis. However, patient refused to undergo MRI because of claustrophobia. Needle biopsy of tumor was reported as intermediate spindle cell sarcoma. As the tumor was not amenable to Chemo and Radiotherapy, surgical resection was planned on 15/05/2009. It was planned to resect total scapula and proximal humerus (Tikhoff–Linberg shoulder

girdle resection Type VI), and reconstruct shoulder girdle so that the individual can effectively use the extremity.

Technique

With the patient in right lateral position, a delto-pectoral incision was taken. The periscapular muscles were sequentially identified and divided. The deltoid, trapezius, rhomboids, levator scapulae latissimus dorsi, serratus anterior were preserved for later reconstruction. Clavicle osteotomised at lateral third and the humerus divided at 10 cm from the acromion. Extraarticular resection of entire shoulder girdle with total scapula was done and shoulder girdle was reconstructed using a custom made unconstrained titanium scapular implant 5 mm thickness × 12 mm wide 44 mm Glenoid with UHMWPE liner (Biotek Ahmadabad), and MRS proximal shoulder implant (40 mm head CoCr, 100 mm × 7 mm Titanium stem. Howmedica). Once the humeral component was well seated, shoulder capsule was reconstructed with 20 mm aortic PTFE vascular graft (Gore, USA) (Fig. 3). Joint stability was checked. Deltoid attached to humerus, long head of biceps and conjoined tendon tenodesed to proximal humerus. Wound closed with suction drain in place. Shoulder immobilized with strap and arm sling. Sutures removed after 14 days (Fig. 4).

Post-operatively, patient was pain free and was able to move the upper limb with no neurovascular deficits. He was discharged 3 weeks after the surgery. HPE of specimen reported as pleomorphic sarcoma involving bone and soft tissue with clear tumor margins (B/2656/2009). At 3 months follow-up, patient had minimal pain but was looking after his personal care independently. There was no dislocation of the shoulder and no neurological deficits. The axillary nerve was normal and deltoid contractions were present. However, patient expired at 6 months post-op due to extensive metastatic disease.

Fig. 2 – Pre-operative CT scan (axial) showing the extent and bony architecture of the tumor in the shoulder girdle.

Fig. 3 – Intra operative photograph after complete shoulder girdle reconstruction.

Fig. 4 – Post-operative radiograph after complete shoulder girdle reconstruction.

Discussion

Malignant tumors of scapula are rare and account approximately 0.7–1.6% of all malignant tumors.² Today, about 95% of patients with sarcomas of the shoulder girdle can be treated safely by limb-sparing resection such as the Tikhoff–Linberg resection and its modifications.³ The resection and reconstruction of tumors of the shoulder girdle consists of three components: (I) surgical resection of the tumor following oncologic principles; (II) reconstruction of the skeletal defect (i.e., endoprosthesis replacement); and (III) soft tissue reconstruction using multiple muscle transfers to cover the skeletal reconstruction and provide a functional extremity. The goals of all shoulder girdle reconstructions are to provide a stable shoulder and to preserve normal elbow and hand functions and to prevent pain and traction injury resulting from weight of the extremity.⁴

Earlier procedures after resection lacked reconstruction of shoulder girdle, which involved anchoring of free end of proximal humerus to clavicle/ribs or simply placing the

spacers in intervening gaps. These procedures compromised with the functions of extremity and cosmetic appearance was poor. There was high incidence of complications because of instability. We have used custom made Titanium scapula (Biotek Ahmadabad) and humeral component (MRS Howmedica) and constraint was built into the joint using Gore-tex aortic graft and horizontal and vertical polyester sutures anchored across the joint through the holes provided in prosthesis. Wittig et al., were reconstructing the shoulder girdle with unconstrained prosthesis using Gore-tex aortic graft and they believe that Gore-tex graft did not seem to be an optimal substitute for rotator cuff and glenohumeral capsule because of the elasticity inherent to the material. Also, failure of Gore-tex graft occasionally occurred, resulting in instability.⁴

Presently, the constrained scapular prosthesis (Howmedica-Osteonics, Allendale, NJ) is available in market and has a fixed locking mechanism anchoring scapular with humeral component. So, it provides inherent stability in the prosthesis and adequately compensates for the loss of rotator cuff and shoulder capsule. It also acts as a fixed fulcrum to convert direct upward pull of deltoid into an abduction movement. It also recreates glenohumeral and scapulothoracic mechanism and improves shoulder function and stability. We could not make use of this prosthesis because of its non-availability in India at that time.

Conflicts of interest

All authors have none to declare.

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