

## **Constrained Endo-Prosthetic Reconstruction after Scapulectomy – Series from Chennai, India.**

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### **Introduction:**

Scapula provides stability and forms the base for movements of the upper limb. It is held onto the chest wall mainly by the muscular attachments. Scapulectomy and Teikoff-linberg procedures are useful in treating patients with high grade scapular and periscapular sarcomas.

The goals of these resections are a) Good oncological control, b) restoring of stability the shoulder girdle, c) preservation of hand and elbow function, d) prevention of traction neuropraxia of the flail upper limb.

Scapular resections with glenoid preservation showed better functional outcome than with total scapulectomy<sup>1</sup>. Until last decade most of the reconstructions after scapulectomy were done by static suspension of the remaining humerus onto the clavicle without much movements at the shoulder. We are presenting here early reports of a short series of 3 patients who underwent scapulectomy for scapular and periscapular sarcomas and reconstructed with custom made constrained scapular prosthesis.

### **Materials and methods:**

Between May 2010 and Sept 2014, 9 patients with Scapular and periscapular tumors were treated at Cancer Institute (WIA) Adyar, Chennai, India. The patients characteristics were listed below. All patients were evaluated and using CXR, CT chest, MRI of local part, and Bone scan and then Biopsy was done to confirm the histology and then received appropriate chemotherapy. At the end of 3-4 cycles of chemotherapy, the underwent surgical resection and reconstruction using custom made constrained scapular prosthesis (MIDHANI, Hyderabad). 2 patients (one each with ABC and Chondrosarcoma) did not receive any chemotherapy. The elbow and finger movements were started on Day 1 and the Shoulder exercises were started from day 28.

#### Patient Characteristics

Age Range -13 – 50 years, Median Age -29 years

Male : female 4 : 5

#### Histology

Osteocarcinoma – 4

Ewings Sarcoma – 2

Chondrosarcoma 1

Periscapular soft tissue sarcoma -1

ABC – 1

#### Location

Scapular tumor 7

Proximal humerus – 1

Periscapular soft tissue 1

The functional results were compared with 6 patients who underwent proximal humerus / Teikoff-linberg resections with reconstruction using humerus suspension onto the clavicle between 2007- 2011.

The functional outcomes were assessed using the Musculoskeletal tumor society function evaluation system for upperlimb<sup>5</sup>.

### **Surgical technique:**

The patients were carefully selected such that all patients had a neurologically intact deltoid after resection and every attempt was made to preserve as much of other periscapular muscles without compromising oncological safety.

The acromio-clavicular joint was preserved whenever possible in order to a) Preserve attachment of deltoid for better function, b) prevent antero-superior migration of prosthesis due to the drag by the upper limb and attachment of muscles and c) Prevent exposure of prosthesis superiorly. Latissimus dorsi muscle was used all who had tumors in the body of the scapula to cover the prosthesis as most of the muscles were resected for oncological clearance.

### **Movements and Functional assessment:**

All 9 patients had a stable painless shoulder with good range of movements at the elbow and wrist.

The active shoulder movements were as follows

Abduction ( extended arm) 25 - 70°

Short lever 35 - 90°

Flexion 20 – 40 °

Extension 15 - 25°

The active abduction and flexion at shoulder was only 10 – 20 degrees for patients with humeral suspension.

Functional assessment was done using the MSTS functional assessment score for upper extremity<sup>3</sup>. The categories assessed were Pain, Function, Emotional acceptance, Hand positioning, Dexterity and Lifting ability. The functional scores of 3 patients with constrained scapular prosthesis were compared with 6 patients who underwent humeral suspension procedure for scapular and periscapular tumors between 2007- 2011 at our Institute. The functional scores were between 23 –25 (76- 83%) for patients who underwent constrained scapular prosthesis and the mean functional score for 6 patients who underwent humeral suspension was 18 ( 60%).

### **Conclusion:**

Constrained endoprosthetic reconstruction of scapula after total scapulectomy provides better cosmetic and functional outcome when compared to humeral suspension in patients with scapular and periscapular sarcomas. A good innervated deltoid and other periscapular muscles are required to achieve these functional results.

Preservation of the acromio-clavicular joint provides a good functioning deltoid and also prevents superior migration of the prosthesis.

Lattisimus dorsi muscle provides excellent cover in patients with tumors arising from the body of the scapula after wide resection.