

The Functional and Oncological Results after Scapulectomy for Scapular Tumours - Two to Sixteen Year Results

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ABSTRACT

Twenty-five patients underwent scapulectomy for various tumours between 1989 and 2005. We describe twenty-three patients with scapular tumours who were followed up for a minimum of two years after scapulectomy. The average age was 29 years and two-thirds of the patients were males. Nineteen patients had malignant neoplasms of which Chondrosarcoma was commonest, followed by Ewing's sarcoma. Surgical staging was done using Enneking's system; with stage II B being the commonest. Fifteen patients underwent total scapulectomy and the rest had their glenoid retained. With an average follow-up of 66.7 months (23-202 months), functional and oncological outcomes were evaluated for all patients. Two patients had superficial wound infections requiring antibiotics and one had skin necrosis requiring skin cover. Functional outcome was satisfactory in 13 patients. Cosmetically and emotionally acceptable surgery, scapulectomy made nineteen patients continuously disease free, while four patients died of disease. The 5-year survival of 19 patients with malignant tumours was 75.9%. Retention of the glenohumeral articulation (subtotal) resection gives superior functional results.

KEY WORDS

Scapulectomy; Tumours; Survival; Outcome

INTRODUCTION

Shoulder girdle is the third common site for tumours of bone and soft tissues that occurs in proximal humerus, scapula and clavicle in that order [1]. Most common tumours involving the scapula are round cell tumours, metastatic tumours and chondrosarcoma. There is a high incidence of malignant transformation of an osteochondroma in the shoulder girdle [11].

Forequarter amputation was considered an appropriate treatment for malignant tumours of the scapula and shoulder girdle. But it is associated with significant morbidity in terms of the loss of the whole upper limb, severe cosmetic defect, phantom limb sensation and devastating psychological effects. Scapulectomy al-

lows oncologically acceptable wide margins of resection without the need for amputation. Because functional capacity of the upper limb is mainly centered on the hand, scapulectomy in carefully selected cases has got specific role in the management of the tumours of the scapula.

PATIENTS AND METHODS

Between August 1989 and September 2005, twenty-five patients underwent scapulectomy for various tumours. We describe twenty-three patients with a minimum two years follow-up. Age of the patients ranged from 3 to 65 years. Eighteen patients were males and 5 were females. Patients presented to us with swelling, with or without pain, mostly involving the right scapula. Patients with primary humeral resections as a part of Tikhoff - Linberg [8,10] procedure, shoulder fusion, and who had received some forms of allograft reconstruction or had a follow-up of less than 24 months were excluded from the study. Surgical staging was done using Enneking's [5] system with plain radiographs, Computerised Tomogram (CT Scan) and Magnetic Resonance Imaging (MRI); stage IIB was the commonest encountered. Pre-operative histopathological diagnosis was reached with open biopsies in 10 patients and by closed needle biopsies in 13. Nineteen patients had malignant neoplasms of which chondrosarcoma was the most common, followed by Ewing's sarcoma and cases of plasmacytoma, aggressive fibromatosis, recurrent chondroblastoma, solitary metastasis from adenocarcinoma of lung (primary in remission) and Neurofibroma (Table 1). One patient with large osteochondroma underwent scapulectomy because of the size of the tumour. Two cases were of secondary chondrosarcoma arising from long standing osteochondroma. The patients of aggressive fibromatosis and recurrent chondroblastoma presented to us after local resections done elsewhere.

Scapular resections were performed according to the system described by Malawer [5]. Eight patients underwent subtotal scapulectomy (Type II A) (Figure 1), where neck of the scapula and glenoid were retained and 15 patients underwent total scapulectomy

(Type III A) (Figure 2). In all cases, resections and primary soft tissue reconstruction were carried out as a single procedure. Deltoid and trapezius were sutured together and to acromion process in Type IIA resections. Teres minor and major were attached to the thoracic wall.

Patients with Ewing's sarcoma and Osteosarcoma received neo-adjuvant chemotherapy. The drugs used were Cisplatin, Adriamycin and Ifosfamide with Mesna for Osteosarcoma; Vincristine, Adriamycin, Cyclophosphamide and Actinomycin D for Ewing's sarcoma. One patient underwent additional right upper lobectomy for solitary lung metastasis under cover of chemotherapy.

Patients were encouraged to begin passive motion in the early post-operative period as soon as pain relief was adequate. Patients wore a comfortable sling and were allowed to increase the activity as tolerated. Movements of elbow, forearm and hand were persuaded to maintain normal function.

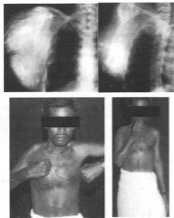


Figure 1: 1(a) Pre-operative anteroposterior shoulder radiographs of a patient with Chondrosarcoma of the right scapula. 1(b) Post operative radiographs of the same patient after Type IIIA resection. 1(c,d) Sixteen years follow-up picture of the patient with good functional results and oncologically continuously disease free.

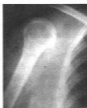


Figure 2: 2(a) Pre-operative anteroposterior shoulder radiograph of patient with metastasis in the scapula. 2(b) Coronal T1-weighted MRI images of the shoulder showing the metastatic deposit involving the scapula. 2(c) Post-operative anteroposterior shoulder radiograph of the same patient after Type IIIA resection. 2(d) Post operative follow-up picture taken at one year follow-up. Note drooping of the shoulder. The patient died of disease at 23 months after surgery due to pulmonary metastasis.

RESULTS

The patients were followed-up monthly for the first six months and six monthly thereafter. With an average follow up of 66.7 months (Range, 23–202 months), the patients were evaluated for complications, functional and oncological outcomes.

Complications

There were no intra-operative complications. Two patients developed superficial wound infection, which

settled with a course of antibiotics. One patient developed skin necrosis necessitating skin cover.

Functional outcome

Functional outcome was evaluated using Enneking's modified system of functional evaluation of surgical management of musculoskeletal tumours [6]. This system rates combined range of movement at the shoulder, pain, stability, deformity, strength, functional activity and emotional acceptance. Four patients died during the follow-up period and the functional results were recorded as on their last follow-up visit. Cosmetically all patients had loss of shoulder contour. Patients with Type III A resections (total scapulectomy) had drooping of shoulder. Restriction of shoulder abduction was the major functional limitation but they had normal hand and wrist functions. Excellent functional rates were achieved in 5 patients, good in 8 patients, fair in 7 patients and poor in 3 patients (Table 2).

Oncological outcome

Three patients died of pulmonary metastasis. One patient died of local recurrence and multiple metastasis. Nineteen patients were continuously disease free at the time of latest follow-up (Table 2). The 5-year Kaplan Meier survival rates of nineteen patients with malignant tumour was 75.9% (Figure 1).

DISCUSSION

First mention about a scapular resection in the literature is of a partial scapulectomy performed by Lister [9], for an aneurysmal lesion of the subscapular artery. Syme in his monogram described scapulectomy for tumours of this region. But scapulectomy fell into disrepute when De Nancrede [3] reported high local recurrence in his review of 65 scapulectomies for primary malignant tumours.

Various surgical options for scapular tumours have been described. Total scapular prosthesis after resection of scapular tumours have been used, but the long term results are not known [16]. Similarly various allografts have been described [2,12,13] in the literature, but are associated with problems like graft fracture and collapse. Scapula can be considered as a sophisticated sesamoid bone in the muscles of the shoulder girdle [4]. Hence after scapulectomy, if muscle envelope can be reconstructed and glenoid fossa undisturbed, useful shoulder function may be expected. Functional outcome depends on retaining the glenoid and reconstruction of muscles around the shoulder

namely deltoid and trapezius

Papaloannou and Francis [14] classified scapulectomies as partial, subtotal, near total, total and radical. They reported on 26 scapulectomies and opined that subtotal scapulectomy with retention of glenohumeral joint resulted in better function. Samilson [15] in 1968 reviewed 37 cases and agreed with them.

We used the surgical technique described by Malawer [11] which is based on the anatomic structure removed during operation. According to this system, scapular resections are classified into six types. Each type is further subdivided into two according to status of the abductor mechanism: A, intact and B, partial or complete resection. Loss of abductor mechanism usually results in some form of functional disability [11].

Even after total scapulectomy useful function of the upper limb can be retained as the function of the upper limb is centered mainly in the elbow and hand. Retention of glenohumeral articulation is important for the function of shoulder joint after scapulectomy [7]. Gibbons et al [7] reported function after scapulectomy for neoplasms of bone and soft tissues. In their series of 14 cases, they noted that resection of 80% of scapula had only modest effect on the function. They also noted that subtotal scapulectomy gives an excellent functional result if all or part of the glenohumeral joint can be preserved.

Results fell into two main groups in our study: with Type IIA resections showing superior shoulder function compared to Type IIIA resections. Retention of glenohumeral joint alone was significant, as the amount of other part of the scapula resected had no significant effect on the shoulder function. All 8 patients with Type II A resection had excellent to good functional results as compared to only 5 patients (33%) with Type IIIA resections.

Most of the patients were functionally and emotionally satisfied with the results. These patients had difficulty in abduction and flexion that rarely affected day-to-day activities. The reduced range of movement occurred because of loss of muscle bulk and bony leverage for muscle actions. The loss of abduction was not a major problem as they learnt to compensate with the opposite arm.

Scapulectomy is a more realistic limb salvage option for bone and soft tissue tumours around shoulder girdle. It is emotionally and cosmetically acceptable in most patients. Our study confirms that retention of the glenohumeral articulation (subtotal) resection gives superior functional results.

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