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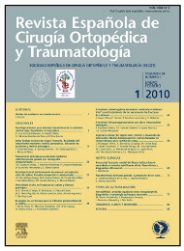

CASE REPORT

The role of scapulectomy in the care of the scapular tumors: a report of 6 cases

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KEYWORDS
Scapula;
Scapulectomy;
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Abstract This retrospective study aims to demonstrate the role of scapulectomy in the treatment of scapular tumours by assessing the results of 6 patients treated for various scapular tumours in the Orthopaedic Department of IBN SINA hospital in Rabat between 1996 and 2009.

The evaluation of these patients by the Enneking system showed, on a functional scale, an excellent score for 4 patients and good one for 2 patients; on the oncology scale, a single case required a total scapulectomy after recurrence with a good evolution.

Since an enlarged scapulectomy leads to functional deficit, the majority of malignant tumours of the shoulder are currently treated conservatively, by performing a simple scapulectomy. Patient selection must be made after appropriate staging, a complete imaging study and a good knowledge of anatomy for a correct surgical indication

PALABRAS CLAVE
Escápula;
Escapulectomía;
Tumor

El papel de la escapulectomía en el tratamiento de los tumores de la escápula: a propósito de 6 casos

Resumen Este estudio retrospectivo tiene como objetivo mostrar el papel de la escapulectomía en el tratamiento de tumores escapulares analizando los resultados en 6 pacientes tratados en el Servicio de Cirugía Ortopédica del Hospital IBN SINA en Rabat por distintos tumores en la escápula entre los años 1996 y 2009.

La evaluación de estos pacientes mediante el sistema de Enneking mostró en el plano funcional excelentes resultados para 4 pacientes y buenos en los otros dos casos. En el aspecto oncológico, sólo un caso requirió la ampliación de la escapulectomía por recidiva tumoral, teniendo este paciente una buena evolución posterior. Ya que la escapulectomía ampliada es una intervención que lleva a un déficit funcional importante, actualmente el

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tratamiento de los tumores malignos de la escápula se realiza con una cirugía conservadora de miembro, realizándose una escapulectomía simple. Ésta debe llevarse a cabo tras una buena estadificación del paciente, para lo que es necesario un estudio de imagen completo y buen conocimiento de la anatomía para una correcta indicación quirúrgica.

Introduction

The scapula is the second most common site of shoulder tumours, the most common being the humerus.[1] Precise assessment via MRI and CAT as well as the arrival of radiation therapy and chemotherapy have expanded the indications for scapulectomy in some tumours for which amputation was once the only surgery contemplated.

When choosing between partial, total, or radical scapulectomy, tumour location, size, and extent must be taken into account. All in all, it is a procedure that requires experience and skill on the part of the surgeon to achieve true oncological results (tumour eradication and prevention of recurrence) as well as real functional results (restoration of good shoulder function).[2] (fig. 1).

Materials and methods

Between March of 1996 and January of 2009, 6 patients underwent different scapulectomy procedures for various types of tumours on the Orthopaedic Surgery Service at Hospital IBN SINA. In this study, we will analyse the clinical course of these patients through follow-up varying from 9 months in the most recent case to 132 months in the oldest case. Our patients ranged in age from 22 to 65 years at the time of surgery. Among the patients were 4 males and 2 females. The histological types were as follows: 2 patients with giant cell tumour (GCT), 2 with chondrosarcoma (fig. 2), 1 with Ewing's sarcoma, and 1 with a desmoid tumour, which represented a recurrence 2 years after partial scapulectomy sparing the glenoid and humeral neck and required that the surgery be expanded to total scapulectomy.

The Enneking tumour classification system[3] based on imaging studies and the anatomical pathology biopsy results was used in designing the therapeutic strategy. The scapula was resected using the technique described by Malawer.[4]

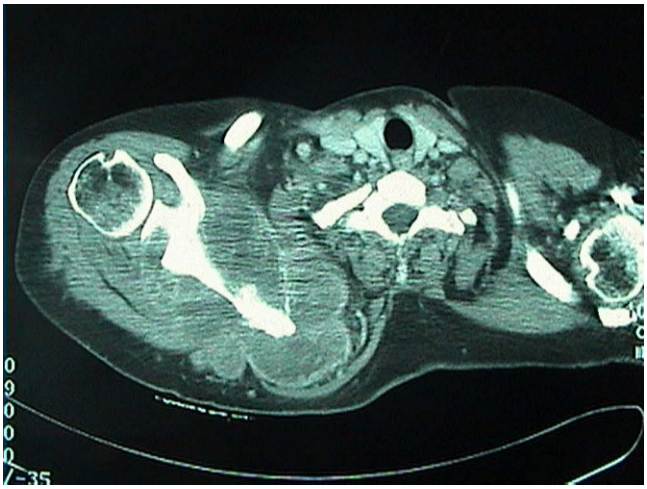

Figure 2 Chondrosarcoma of the left scapula with cortical osteolysis.

Figure 1 Total scapulectomy in a Ewing's sarcoma.

Figure 3 Radical total scapulectomy at 34-month follow-up.

Figure 4 Loss of shoulder circumference following radical total scapulectomy for a GCT of the scapula.

One patient with GCT and another with desmoid tumour underwent total scapulectomy. The 2 patients with chondrosarcoma underwent subtotal scapulectomy sparing the glenoid and humeral neck. The other patient with GCT and the patient with Ewing's sarcoma were treated with a Tikhoff-Linberg-type radical total scapulectomy (fig. 3). It should be pointed out that the patient with GCT had undergone tumour embolization prior to the surgery. The reconstruction consisted of reanchoring the trapezius and deltoid to the acromion. The pectoralis major and minor were reanchored to the chest wall. The patient with Ewing's sarcoma received neoadjuvant chemotherapy with cisplatin, adriamycin, and I-phosphamide. Following surgery, our patients progressed to doing rehabilitation exercises, starting with passive mobilization with pendular movements, according to the degree of pain tolerance.

Results

The patients were followed monthly during the first 6 months and then every 6 months for 2 years. The mean patient follow-up period was 26 months, the shortest being 9 months and the longest 132 months. During follow-up, functional results were assessed and patients were monitored for a possible recurrence, based on a well systematized physical examination and simple x-rays.

Complications

Pain control was achieved with analgesics, there were no intra-operative complications, and none of the patients required admission to ICU. There were no infections and no post-operative bleeding problems.

Functional results

Functional results were assessed according to the Enneking system, which was designed to analyse functional results following surgery for bone and soft tissue tumours.[5] This scale is based on the objective assessment of mobility, pain, stability, strength, and deformity; it takes into account patient satisfaction in all these aspects. Only one of the patients did not complete the follow-up, and his assessment is the one recorded at the last visit.

In terms of aesthetic aspects, all patients showed a loss of shoulder circumference (fig. 4); patients who underwent total or radical scapulectomy had a completely dropped shoulder. Abduction was impaired in all patients but less so for those with the glenoid spared (fig. 5). All patients retained good elbow, wrist, and hand function, however, and adapted remarkably well to manoeuvres of daily living. Results were classified as excellent for 4 patients and as good for 2 patients.

Oncological results

Only one patient had to be reoperated for a desmoid tumour for which she had undergone partial scapulectomy 2 years earlier. She underwent total scapulectomy with subsequent favourable clinical course.

Discussion

Scapulectomy was first described in the literature in 1820 by Liston,[6] who performed this procedure for an aneurysm of the subscapular artery. In 1856, Syme succeeded in performing a partial scapulectomy with clavicular resection for a tumour. Despite these attempts at the operation during the nineteenth century, scapulectomy remained a subject of debate for a long time until, in 1909, Nancred[7] published the results of scapulectomies on 65 patients for primary tumours.

Currently, the approach in the majority of malignant primary tumours of the scapula is a limb-sparing surgical strategy. This requires correct staging of the patient through imaging studies and anatomical pathology, the axillary bundle and chest wall being the key points when it comes to resecting a tumour with adequate margins.

Amputation of the upper extremity is still the best option, however, when the tumour is quite extensive or in

Figure 5 Abduction limited to 50º following total scapulectomy at the 11-year follow-up.

the event of tumour infection. Depending on the extent and type of tumour, there are various scapulectomy techniques described. Malawer's technique includes 6 distinct types, each of them divided into A or B according to the abductor musculature situation (A: intact, B: partial or total resection). It is even possible to preserve some upper extremity functions following a total scapulectomy with good reconstruction of the surrounding musculature. Concentrated in the elbow and hand, these functions are most effective when the glenohumeral joint is preserved. In a series of 14 cases of scapulectomy for tumours, Gibbons et al[8] showed that resection of up to 80%of the scapula has a moderate impact on upper extremity function. They also demonstrated that subtotal scapulectomy gives excellent results if the glenohumeral joint is preserved. Vahanan[9] reached the same conclusion after reviewing the functional results in 25 patients with a mean follow-up period of 66 months. Another determining factor is preservation of the abductor musculature—primarily the deltoid and, secondarily, the rotator cuff. In a 7-patient series, Kaiwei Zhang[10] published functional results that were better in the 4 patients whose rotator cuff was reconstructed than in the other 3 patients whose rotator cuff had to be resected. Gibbons affirms that it is possible to resect the cuff if the deltoid can be spared, even partially. In fact, even when the deltoid is resected, potentiation of the other muscles (cuff and pectoralis major and minor) is sufficient to maintain good shoulder function. Markhede et al[11] published a series of 5 patients who had a mild functional deficit, with passive mobility preserved following total deltoidectomy.

Various reconstructive procedures following scapulectomy have been described over the last 30 years, mainly total prosthesis and allografts. Total prosthesis has proven to be a reliable method of scapula reconstruction; Wilde[12] and Pritsch[13] published an acceptable shoulder function with good aesthetic using this method. However, the drawbacks of the procedure—poor reconstruction of the soft tissues, loss of the proximal portion of the humerus, and elevation of the shoulder—make it impossible to judge the real effectiveness of these implants.

Reconstruction with acetabular and scapular allografts has been described, and in studies published by Lee[14] and Mnaymneh,[15] this procedure offers satisfactory functional and aesthetic results.

Conclusion

The great variety in size, location, and type of scapular lesions calls for a variety of surgical techniques. A thorough pre-operative assessment must be completed, and the procedure must be planned as precisely as possible, given that it may have to be changed during surgery, which often involves improvisation on the part of the surgeon. It is in those situations that the surgeon's experience, skill, and imagination are invaluable.

Level of evidence

Level of evidence IV.

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