

The Usefulness of Latissimus Dorsi Transfer for Reconstruction for Malignant Fibrous Histiocytoma in the Infrapinatus Muscle Region

A Case Report

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ABSTRACT

Malignant fibrous histiocytoma (MFH) is a type of highly malignant soft tissue sarcoma with a predilection for the extremities of adults. We report a patient with MFH in the infrapinatus muscle for which wide resection including total resection of the infrapinatus muscle was performed, followed by transfer of the latissimus dorsi muscle for shoulder reconstruction in a one-stage operation with good postoperative function.

Keywords: Malignant fibrous histiocytoma, Latissimus dorsi, Infrapinatus muscle, rotator cuff

Utilidad de la Transferencia del Latissimus Dorsi en la Reconstrucción por Histiocitoma Fibroso Maligno en la Región Muscular Infraespinosa

Reporte de un Caso

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RESUMEN

El histiocitoma fibroso maligno (HFM) es un tipo de sarcoma del tejido suave, altamente maligno, con predilección por las extremidades de los adultos. Reportamos el caso de un paciente con HFM en el músculo infraespinoso, al cual se le hizo una amplia resección que incluyó la resección total del músculo infraespinoso, seguida de una transferencia del músculo latissimus dorsi para la reconstrucción del hombro, en una operación de una sola etapa con buena función postoperatoria.

Palabras claves: El histiocitoma fibroso maligno, latissimus dorsi, músculo infraespinoso, manguito rotador

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INTRODUCTION

Malignant fibrous histiocytoma (MFH) is a type of highly malignant soft tissue sarcoma with a predilection for the extremities of adults and it carries a poor-prognosis. The usual surgical treatment was a wide resection but MFH around the shoulder joint has frequently required functional reconstruction postoperatively. We report a patient with MFH in the infrapinatus muscle for which wide resection including total resection of the infrapinatus muscle was performed, followed by transfer of the latissimus dorsi muscle for shoulder reconstruction in a one-stage operation with good postoperative function.

A 28-year old woman noticed swelling on the dorsal aspect of the left scapular bone without any prior medical history in 2002. The swelling gradually progressed but there was no pain. Then in 2003, she reported to our department and it was noted that the spherical tumour, measuring 7 x 7 cm, was elastic-firm on palpation. There was no tenderness or other inflammatory findings. There was no Tinel-like sign. The range of motion in the shoulder joint and gross muscle strength were normal. Her past and family histories were not contributory.

On plain radiographic findings, an increased radio-density of soft tissue in the post-scapular region was noted, with no periosteal reaction, bone or joint abnormalities. On computed tomography (CT) and magnetic resonance imaging (MRI), the tumour mass was located in the infrapinatus muscle. On CT (Fig. 1), the mass was relatively well-demarcated, the density was low and almost identical to that of the normal skeletal muscle tissue and was inhomogeneous. On

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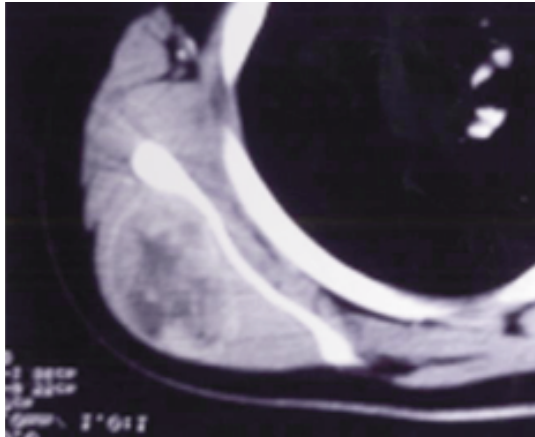


Fig. 1: On computed tomography (CT), the tumour was located in the infraspinatus muscle. The tumour was relatively well-demarcated, the density was low and almost identical to that of the normal skeletal muscle tissue and was inhomogeneous.

MRI (Fig. 2), the tumour showed iso-signal to slightly high-signal intensity to skeletal muscle on T1-weighted images

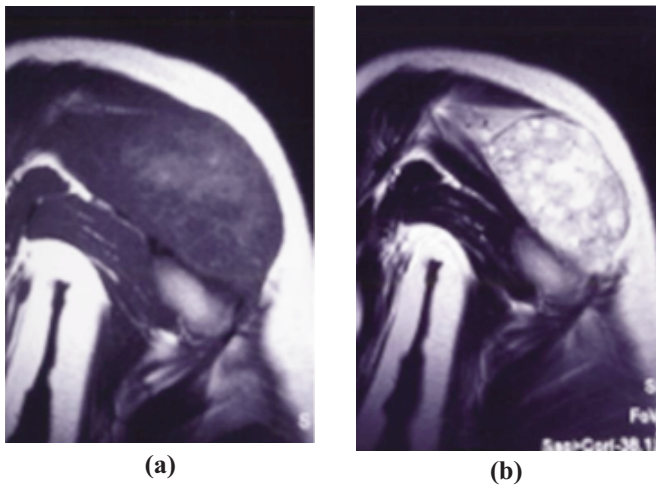


Fig. 2: On MR imaging, the tumour showed iso-signal to slightly high-signal intensity to skeletal muscle on T1-weighted images (a) and high-signal intensity relatively well-demarcated and inhomogeneous on T2-weighted images (b).

and high-signal intensity with relatively well-demarcated and inhomogeneous mass on T2-weighted images. With contrast medium (Gd-DTPA, Fig. 3), there was marked enhancement of the tumour but no obvious signal change was noted in the surrounding tissue. From these radiological findings, the soft tissue mass was suspected to be malignant.

To make a histological diagnosis, open biopsy was performed. The pathological diagnosis was grade 3 spindle cell sarcoma. No diagnostic imaging technique demonstrated evidence of metastasis, and the tumour was classified as malignant tumour of AJCC/UJCC stage III and Enneking's Surgical Staging System IIA. Angiography and embolization were performed, followed by surgery.

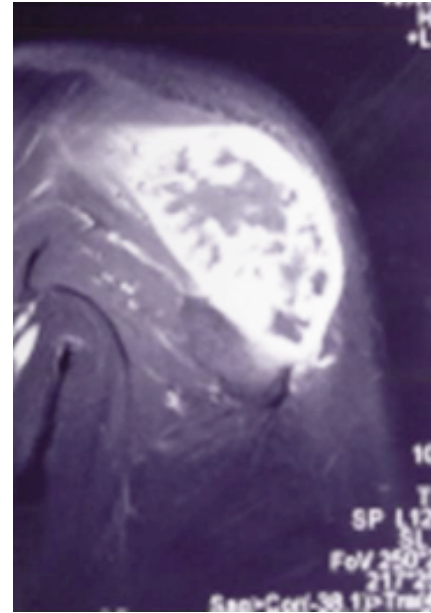


Fig. 3: With contrast medium (Gd-DTPA), the tumour showed marked enhancement, but no obvious signal change was noted in the surrounding tissue.

Based on the pre-operative imaging diagnosis, wide resection of the tumour *en bloc* was performed, involving the entire infraspinatus muscle, part of the teres minor and teres major muscles, and almost all of the scapular periosteum, with a 3-cm-wide margin (Fig. 4). In addition, to achieve

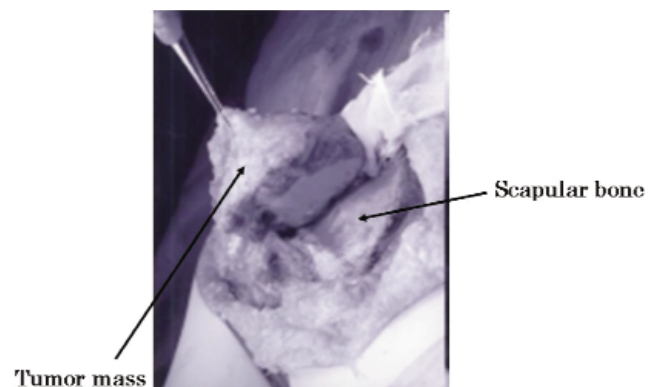


Fig. 4: Based on the preoperative imaging diagnosis, wide resection of the tumour *en bloc* was performed, involving the entire infraspinatus muscle, part of the teres minor and teres major muscles, and almost all of the scapular periosteum, with a 3-cm-wide margin.

functional reconstruction of the shoulder joint in a one-stage operation, the latissimus dorsi muscle was severed at its insertion to the humerus and sutured to the stump of the severed infraspinatus tendon at a shoulder abduction angle of 30° and external rotation angle of 10° (Fig. 5). Grossly, the tumour was encapsulated by thin fibrous tissue with a yellowish-white, solid cut surface measuring 8.0 x 8.0 x 4 cm partially mixed with a mixoid area.

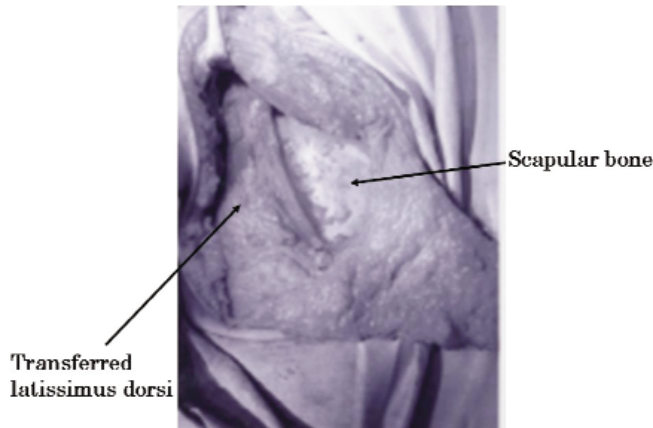


Fig. 5: To achieve functional reconstruction of the shoulder joint in a one-stage operation, the latissimus dorsi muscle was severed at its insertion to the humerus, and sutured to the stump of the severed infraspinatus tendon at a shoulder abduction angle of 30° and external rotation angle of 10° .

Histologically, the tumour showed features of poorly differentiated pleomorphic sarcoma containing osteoclastic giant cells in some areas, accompanied by central haemorrhagic necrosis (Fig. 6). On haematoxylin-eosin staining and

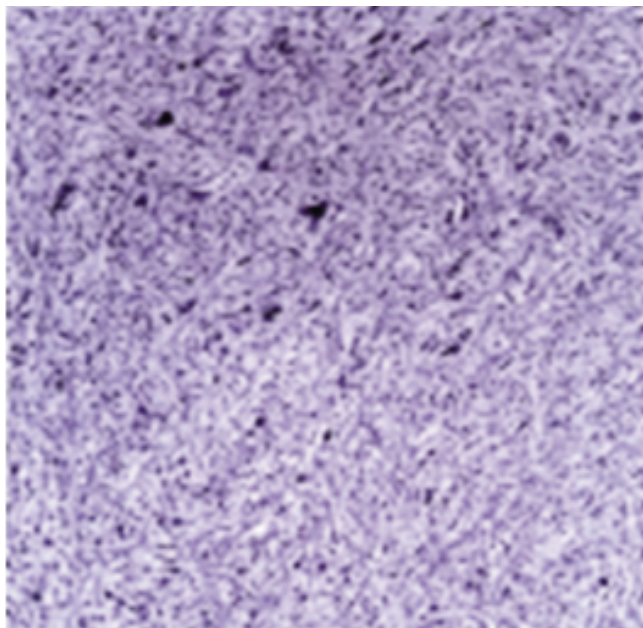


Fig. 6: Histological findings (Haematoxylin-Eosin staining, $\times 100$). The tumour mass showed features of poorly differentiated pleomorphic sarcoma containing osteoclastic giant cells in some areas, accompanied by central haemorrhagic necrosis. The sarcoma had no obvious tendency toward differentiation, and was diagnosed as MFH.

immunological staining, the sarcoma had no obvious tendency toward differentiation and was diagnosed as MFH. The stump of the excised tumour was negative for tumour cells. Postoperatively, the patient was immobilized with an airplane-type shoulder abduction brace to maintain the shoulder joint at an abduction angle of 70° and external

rotation angle of 10° for five weeks, and prescribed passive exercise with only forward flexion in supine position under the brace from four weeks after surgery. At five weeks, the shoulder abduction brace was discontinued. Thereafter, the patient was followed, and currently, two years and five months after surgery, remains disease-free. Also, she did not complain of pain or discomfort when lying on the shoulder. Her shoulder joint function at the final examination was 97 points on the Japan Orthopaedic Association scoring system. Although the peak torque measured by a Cybex machine remained below that on the non-affected side (comparison to the non-affected side: forward flexion 82.5%, abduction 79.5%, external rotation with the arm at side 77.1%), the range of active motion was 180° of flexion, 180° of abduction, 90° of external rotation and $Th6$ of internal rotation (Fig. 7).

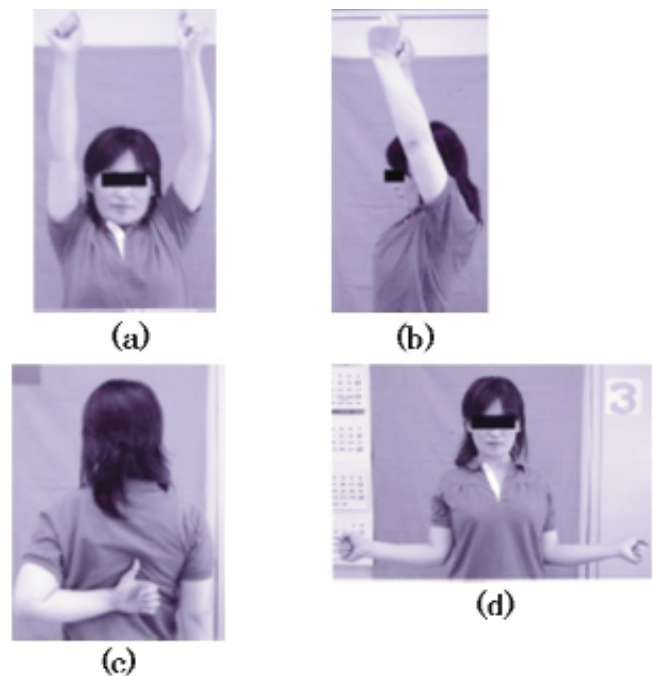


Fig. 7: Range of motion in the shoulder joint: (a) Abduction (b) Forward flexion. (c) Internal rotation (d) External rotation.

DISCUSSION

Malignant soft tissue tumours occurring in the shoulder and shoulder girdle are relatively rare, accounting for only 4.5 – 6% of all malignant soft tissue tumours (1, 2). Malignant fibrous histiocytoma was the most common followed by fibrosarcoma and MPNST. Malignant fibrous histiocytoma is a pleomorphic sarcoma of unknown origin and has a predilection for elderly men but was somewhat atypical in this case in affecting a 28-year old woman. Usually, wide surgical resection is performed but there is no consensus about the preventive effect of adjuvant radiotherapy or chemotherapy on tumour recurrence and metastasis (3–5). However, Kocer *et al* (6) and Bramwell *et al* (7) reported that neoadjuvant chemotherapy is beneficial in MFH. We explained the ad-

vantages, disadvantages and expected results of adjuvant therapy to the patient, obtained consent from her, and decided not to administer adjuvant therapy. Since this tumour has a poor-prognosis soft-tissue carcinoma with a reported five-year survival rate of 25–50%, the patient requires continued careful follow-up for recurrence and metastasis.

The infraspinatus muscle is one of the main external rotators, has approximately 60% of the rotational muscle strength, and is important in lowering the humeral head and providing posterior shoulder joint stability (8). Since the tumour mass in this patient was localized in the infraspinous muscle compartment, we judged that it would be possible to perform tumour resection involving the entire infraspinatus muscle, part of the teres minor and major muscles, and part of the scapular periosteum, with a 3-cm-wide margin. However, postoperative functional reconstruction of the shoulder joint requires reconstruction of the steering group. Therefore, we performed reconstruction of the external rotational function and the rotator cuff function by transfer of the latissimus dorsi muscle. Latissimus dorsi transfer is a surgical technique that involves the transfer of the latissimus dorsi muscle to the rotator cuff to improve the abduction and external rotational functions, humerus-lowering effect and glenohumeral rhythm (9–11), and is used for reconstruction of a temporarily irreparable and massive rotator cuff tear or for reconstruction for shoulder paralysis due to suprascapular nerve paralysis or other causes. Meanwhile, Gibbons *et al* (12) reported that subtotal scapulectomy gave an excellent functional result if all or part of the glenohumeral joint can be preserved. In their series, resection of 80% of the scapula had only a modest effect on function. However, in that report, only 5 of 14 patients did not complain of pain and had full elevation of the shoulder. In this patient, we used this technique to prevent the deterioration in shoulder joint function

due to rotator cuff defect after malignant tumour resection and have achieved good results to date, a short period of two years and five months after surgery.

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