

# Surgical Treatment of Intramuscular, Infiltrating Lipoma

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**Lipoma may occasionally be found within the muscle, which is the intramuscular, infiltrating lipoma. Intramuscular, infiltrating lipoma is an uncommon lesion, and local recurrence can be expected if the surgical margin is not clear. We report 8 patients in a 2-year period diagnosed with intramuscular, infiltrating lipoma who were treated by marginal excision combined with wide excision in the Department of Orthopaedic Surgery, Changhua Christian Hospital. The surgical results were satisfactory, and no local recurrence was noted in an average follow-up period of 40 months. Surgical excision is the best way to treat the symptomatic intramuscular, infiltrating lipoma. Careful preoperative evaluation and complete tumor excision with clear margins are most important to ensure successful surgical results.**

*Key words:* Intramuscular, infiltrating lipoma – Marginal excision – Wide excision

A lipoma is a benign mesenchymal tumor composed of mature fatty tissue. It is the most common form of soft tissue tumor.<sup>1</sup> Superficial subcutaneous tissues of the extremities and trunk are the most common areas in which they can be found. Usually, treatment of lipomas is not necessary, unless the tumors become painful or restrict movement. In most cases, lipomas can be treated by simple excision with minimal recurrence tendency.<sup>2</sup>

A lipoma, however, may occasionally be noted within the muscles with a high tendency of invasion and dissociation of surrounding muscles; this is the intramuscular, infiltrating lipoma. Intramuscular, infiltrating lipoma is a rare variant of lipoma first defined by Regan and his colleagues in 1946.<sup>3</sup> They have a deeper seated location in comparison with

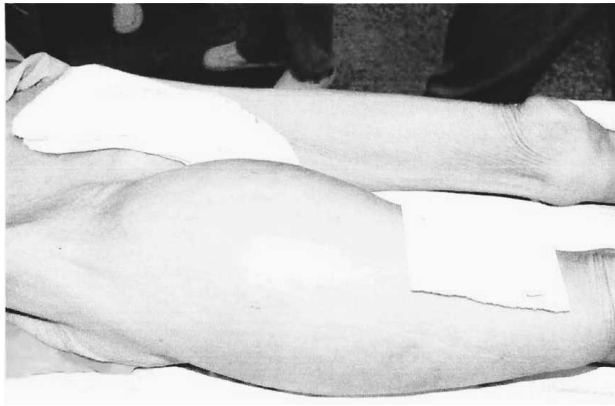
traditional subcutaneous lipomas. A high rate of local recurrence is noted because of their invasive behavior. We report on 8 patients with intramuscular, infiltrating lipomas treated at our institute (Department of Orthopaedic Surgery, Changhua Christian Hospital) by marginal excision combined with wide excision, based on margin competence. With careful preoperative evaluation and clear-margin surgical technique, the surgical results were satisfactory and no local recurrence was noted.

## Materials and Methods

From January 2005 to July 2007, 8 patients with intramuscular, infiltrating lipoma received treatment at our institute. They were all female, with

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**Fig. 1** Photograph of a 78-year-old female with a recurrent huge mass over the right thigh.

an average age of 50 years (range, 38–78 years). The clinical presentations included pain or painless masses over the affected area with occasional numbness. No motion limitation or vascular compromise was noted. Five masses were noted in the thigh and knee, 2 in the shoulder, and 1 in the arm. One patient, a 78-year-old female, had a recurrent, huge mass over her right thigh; the primary surgery had been performed about 12 years earlier at other another institute (Fig. 1).

All of the patients underwent radiographic examination of the affected areas, and no bony involvement could be noted. Magnetic resonance imaging (MRI) was arranged and revealed lobulated lipomatous mass within the involved muscle areas. The T1-weighted image showed high-signal intensity mass and the T2-weighted image showed low-signal intensity mass. Infiltration to surrounding muscles was noted (Fig. 2).

Marginal excision was performed around the well-encapsulated border area. For the infiltration area, which was identified preoperatively from MRI images as well as intraoperatively, wide excision with a muscular cuff was done to ensure the clear margin. Frozen section examinations were arranged to ensure the pattern of the excised tumors.

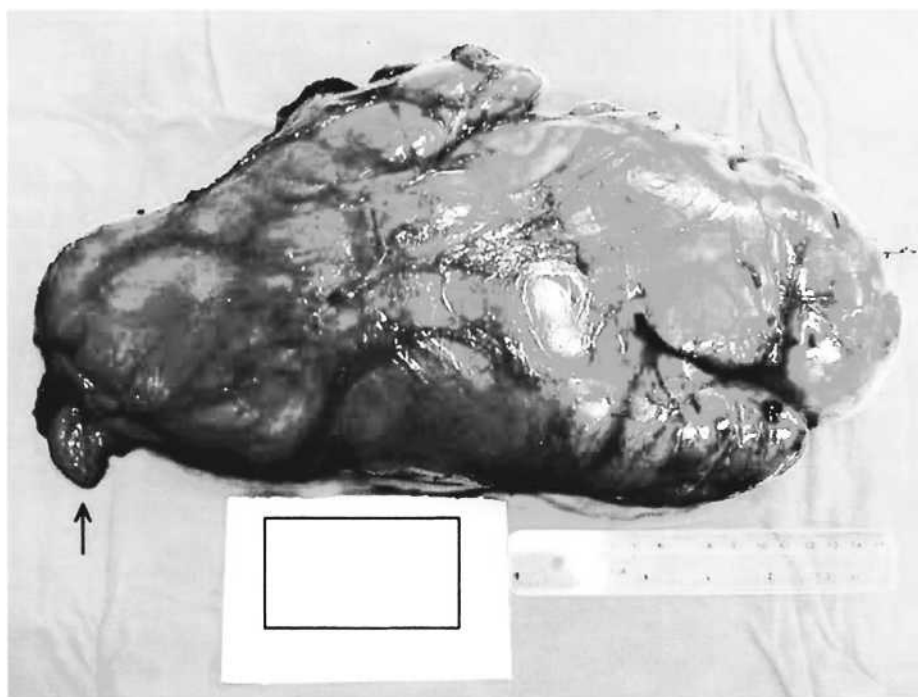
## Results

Of the 8 patients, marginal excision combined with wide excision was performed. The maximum diameter of the specimens ranged from 4.7 to 30 cm (average 10.9 cm). Grossly, most areas of these tumors were well encapsulated apart from the infiltrative portions. The outer surface was smooth and glistening. On the cut surface, they showed



**Fig. 2** Magnetic resonance image of intramuscular, infiltrating lipoma. (A) Sagittal T1-weighted image shows a lobulated high-signal intensity mass with infiltration area (arrow). (B) Coronal T1-weighted image shows the lesion in high-signal intensity. Infiltration of surround muscles can be noted (arrow).

multi-lobulation and a wide range in color from yellowish to yellow-tan admixed with brown areas. Areas of muscular infiltration without obvious capsulation were also noted (Fig. 3).



**Fig. 3** Photograph of a resected specimen, showing a huge, glistening lipomatous tumor measuring 30×15×10 cm. Infiltration area is noted (arrow).

The tumor locations included vastus lateralis in one patient, semimembraneous in one, posterior deltoid in two, quadriceps in two, popliteal fossa in one, and biceps brachii in one (Table 1).

Benign lipomatous tumors were reported by the frozen section and permanent pathologic examinations. Histologically, the lesions showed mature adipocytes without cellular atypia. Intramuscular infiltration was noted in the infiltrative areas (Fig. 4).

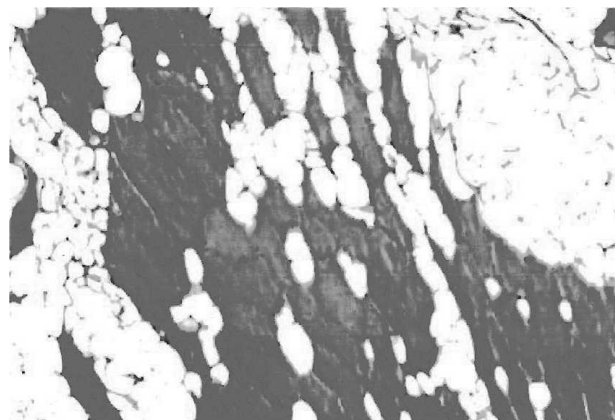
No major perioperative complications were noted. In the mean follow-up duration of 40 months (24–54) after operation, these patients remained tumor-free.

**Table 1** The involved area and muscle

Involved area	Involved muscle	Number
Thigh and knee	Vastus lateralis	1
	Quadriceps	2
	Popliteal fossa	1
Shoulder	Semimembraneous	1
	Posterior deltoid	2
Upper arm	Biceps brachii	1

## Discussion

Most lipomas are small, subcutaneous tumors that require no special treatment. Radiolucency and poor vascularization are characteristics of lipomas on plain radiographic examination. However, lipomas with deep, large or unusual in locations and with neurovascular compression symptoms need radio-



**Fig. 4** Photomicrograph. H&E (×100). Histopathologically, the tumor showed mature adipocytes with infiltration of surrounding muscles. No cellular atypia was noted.

graphic evaluation such as MRI to identify and localize these tumors.<sup>4</sup>

Regan and his colleagues first described intramuscular, infiltrating lipoma as a rare variant of lipoma in 1946.<sup>3</sup> The variant lipoma is deeper seated and found in unusual location in comparison with traditional subcutaneous lipoma. The reported frequency of the intramuscular, infiltrating lipoma, among all benign adipocytic tumors, is about 5.0%.<sup>6</sup> Intramuscular, infiltrating lipoma may be seen in all muscle groups of the body, regardless of big or small muscle masses. Unlike traditional, subcutaneous lipoma, which doesn't invade surrounding tissue, the intramuscular, infiltrating lipoma can invade the surrounding muscles and is usually without complete capsule.<sup>7</sup>

Due to the infiltrative tendency of these tumors, local recurrence rate after surgery is higher than for traditional, subcutaneous lipomas. The reported recurrence rate of intramuscular, infiltrating lipomas ranges from 3% to 62.5%.<sup>8</sup> Inadequate surgical margin is believed to be the major cause of local recurrence. Careful preoperative evaluation of the margin and wide excision at the infiltrative area during operation are the most important steps to ensure the clear margin and decrease the local recurrence rate. With thorough preoperative MRI evaluation and combined marginal and wide excision technique, there is no local recurrence in our patient groups.

The differential diagnosis between intramuscular, infiltrating lipoma and well-differentiated liposarcoma is difficult especially when the tumor is large and deep seated. Increased age, male gender, and large tumor size (>10 cm) were reported as the risk factors of malignancy.<sup>9</sup> However, in our series, the tumor size varied, and increased age did not support such findings, which may be owing to the small case series. But these findings also imply the differential diagnosis between well-differentiated liposarcoma and other lipoma need more information including clinical manifestation, image characteristics, and personal history.

The recurrence of intramuscular, infiltrating lipoma may be delayed up to over 10 years.<sup>8</sup> One of our patients had a recurrent lesion 12 years after the first operation. Current treatment options showed wide excision is the most adequate consideration of avoiding recurrence. Intralesional excision may also be an acceptable treatment if the final excision edge is equivalent to the wide margin.

## Conclusion

Intramuscular, infiltrating lipoma, unlike other subcutaneous lipoma, has characteristics of local invasion and recurrence, and may be accompanied by neuromuscular compression signs and symptoms. Although current literature reveals some characteristics by which to identify intramuscular, infiltrating lipoma and liposarcoma, there are still no clinically diagnostic standards to follow. The factors we must consider for a possible malignancy include increased age, male gender, large tumor size (>10 cm), poor clinical manifestation, image characteristics, and possible personal history. A thorough preoperative history taking, well images study, and tumor excision with clear margin form the cornerstone of success of surgical treatment.

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