Lipomatous tumours of the hand and wrist

A series of 25 cases and review of the literature

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AIM: *Lipomatous tumours presentation in the hand and wrist is uncommon, and those involving the digits are very rare, consequently reports in the international literature are mainly of individual cases and small series.*
MATERIAL OF STUDY: *This is a retrospective review of a series of 25 patients with lipomatous tumours of the hand and wrist treated between 2001 and 2009. All patients underwent clinical and radiological assessment and a marginal excisional biopsy. 23 lipomas, 1 fibrolipomatous hamartoma (FLH) and 1 well differentiated lipoma-like liposarcoma/atypical lipomatous tumour (WDLLL/ALT) were identified.*
CONCLUSION: *Choosing the most appropriate investigations is mandatory for a correct diagnosis and planning. Ultrasound should always be considered as the first line investigation. MRI helps delineating the anatomy of the lesions and their relationships with the surrounding structures in the hand and wrist, enabling more accurate surgical planning. Histological examination of the excised specimen remains the gold standard for the formulation of the definitive diagnosis and should be performed in every case.*

KEY WORDS: Digits tumours, Fibrolipomatous hamartoma, Hand tumours, Lipoma, Lipoma-like liposarcoma, Wrist tumours.

Introduction

Lipomas are benign proliferations of adipocytes. They are the most common soft tissue tumours[1], accounting for almost 50% of all cases. Their prevalence has been estimated at 2.1% and they have been reported to almost never undergo malignant transformation[2]. Women are more frequently affected[3]. Peak incidence is between the fifth and the seventh decades of life[4], where they are most common in the back, neck, abdomen, shoulder and proximal extremities. Lipomas infrequently occur in the hand and wrist and only a few cases of digital involvement have been reported in literature[5-9]. The first description of a hand lipoma, in a 20-year-old Afro-Caribbean female, dates back to 1959[10].

Hand lipomas are most frequently located subcutaneously in the thenar eminence or the mid-palm, but they can present anywhere, including intramuscularly or in an intermuscular location[11]. Deep palmar space lipomas often present at the periphery of the hand because of the unyielding nature of the overlying palmar aponeurosis[12,13]. 0.3% of lipomas are found in close relationship with the periosteum and referred to as

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"parosteal/periosteal lipomas"; this is often the case for those located close to the phalanges[14,15]. The aetiology remains unclear however multiple factors including endocrine, inflammatory and genetic disorders, obesity, hypercholesterolemia and trauma have been postulated as potentially causative. Although the mechanism is unknown, it has been reported that fatty tissue necrosis and presence of large and severe haematomas may lead to the stimulation of pre-adipocytes and formation of lipomas[16]. Lipomas carry a low risk of malignant degeneration into liposarcomas, but rapid growth, pain, or large size (greater than 5 cm) should raise suspicion of malignancy[17].

FLH are rare benign fibrofatty proliferations which have been reported affecting most frequently the median nerve and its branches[18].

Liposarcomas are malignant tumors that originate from fat cells, most often in deep soft tissues, and are the most common type of soft-tissue sarcomas[19]. WDLL-LL/ALT represent the largest subgroup of liposarcomas, accounting for 40-45% of cases[3]. These are lipomatous neoplasms with a tendency to local recurrence, which tend to occur with equal frequency in the retroperitoneum and the limbs, and less frequently in the paratesticular region and the mediastinum, with peak incidence between the fifth and the seventh decades of life[20].

Materials and Methods

A retrospective analysis of the data of patients who were assessed and underwent treatment between 2001 and 2009 at our hospital for lipomatous tumours of the hand and wrist was carried out. The clinical records and histopathology database were examined retrospectively for all patients. Patients demographics, clinical history, clinical findings, pre-operative investigations, operative records, histopathology reports, post-operative outcomes and follow-up were reviewed.

25 cases were identified, 8 males and 17 females. Mean age at presentation was 52 years (range 14-84 years). All patients had undergone tumour excision and every specimen had been sent to the laboratory for histopathological examination (excisional biopsy). Mean post-operative clinical follow-up was 9 months (range 3-24 months). All patients who had reported preoperative functional impairment underwent functional rehabilitation under the care of the hand therapists after surgery, with early active mobilization.

Results

2 lesions were found affecting the right side and 11 the left. Six patients presented with a painful mass, four with pain and paraesthesias (two reported paraesthesias within the median nerve distribution and the other two reported local paraesthesias around the lump) and nine with functional impairment. The duration of symptoms ranged between 6 months and 3 years (mean duration 11.8 months). The remaining six patients reported the unsightly appearance of a lump in the absence of any pain, neurological symptoms of functional impairment. In this subgroup, the lesions had been noticed between 4 and 8 months (average 5 months) before presentation. On clinical examination all patients had a soft, rubbery subcutaneous mass that did not transilluminate (Fig. 1A). In 50% of the patients with paraesthesias there were a subjective alteration of sensation within the median nerve distribution and a positive Tinel sign over the mass. In those with functional impairment 3 had reduced grip strength, 2 reduced digital flexion and 4 complained of a generally reduced hand function.

All patients underwent ultrasound examination (US). In 14 patients diagnosis of lipoma was made on US scan alone.

In 11 cases where either the US scan findings did not allow to formulate a diagnosis or the lesion was in close relationship to neuro-vascular structures, a magnetic resonance imaging (MRI) study of the tumour was performed. MRI provided in all cases the precise anatomical characterisation (Fig. 1B) required for a thorough pre-operative planning, in order to perform a safe surgical excision.

In one of the patients who presented with clinical symptoms of median nerve compression the MRI showed both the coaxial-cable-like and the spaghetti-like appearance of the lesion in the transverse and sagittal planes respectively, typical of FLH [18] (Fig. 2A, B)

In one case the US appearance of the lesion was suggestive of malignancy, with ill-defined margins and a chaotic intralesional vascular pattern on colour Doppler imaging, and the MRI showed evidence of hemorrhage, fibrosis and an adipose cells heterogeneity, all suggestive features of WDLLL/ALT.

In 7 cases, where the lesion appeared to be close to bones, standard plain radiographs were also performed. X-rays showed calcifications within the lesion in 1 case, and bone erosion in 3 cases.

The most challenging cases were discussed at a multidisciplinary Hand Management meeting with Radiologists, Plastic and Orthopaedic Hand Surgeons prior to treatment.

No incisional biopsies were performed. All patients underwent excisional biopsy of the tumour. All procedures were carried out under general anaesthesia, with loupe magnification. Marginal excision was performed in all cases. Fifteen smaller lesions, with no involvement of noble structures, were simply "shelled out" from the surrounding tissues. Meticulous dissection of the neuro-vascular structures was required in the residual ten cases; in 1 case this was performed due to the origin of the lesion (FLH) from the second common digital nerve (Fig. 2C) and in 9 cases because of the displacement of the neuro-vascular structures caused by tumours of

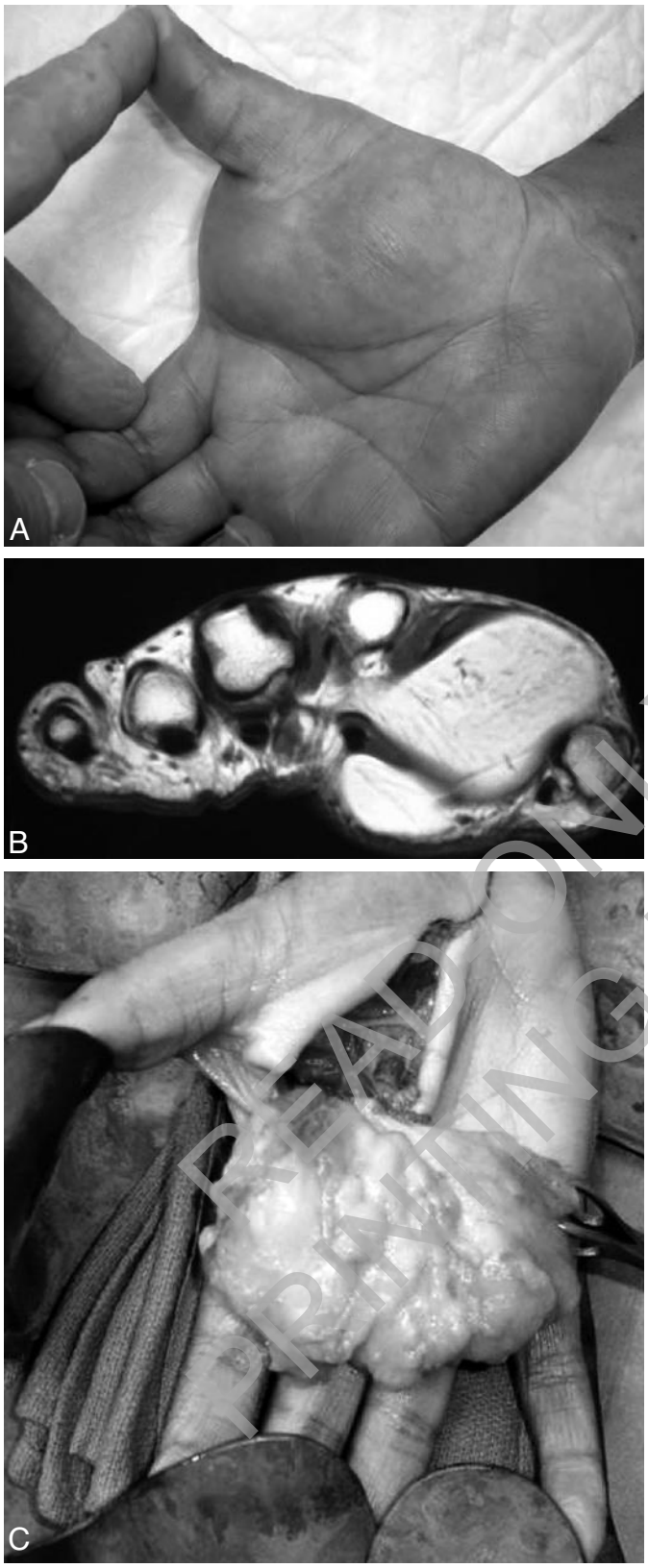

Fig. 1: Benign lipoma, right hand. Preoperative photograph of the right hand showing moderate swelling of the thenar eminence (A). MRI of the right hand showing the homogenous appearance of a benign bilobulated lipoma located in the thenar eminence, transverse plane (B). Intraoperative photograph of the right hand showing the benign bilobulated lipoma dissected from the deep structures of the thenar eminence (C).

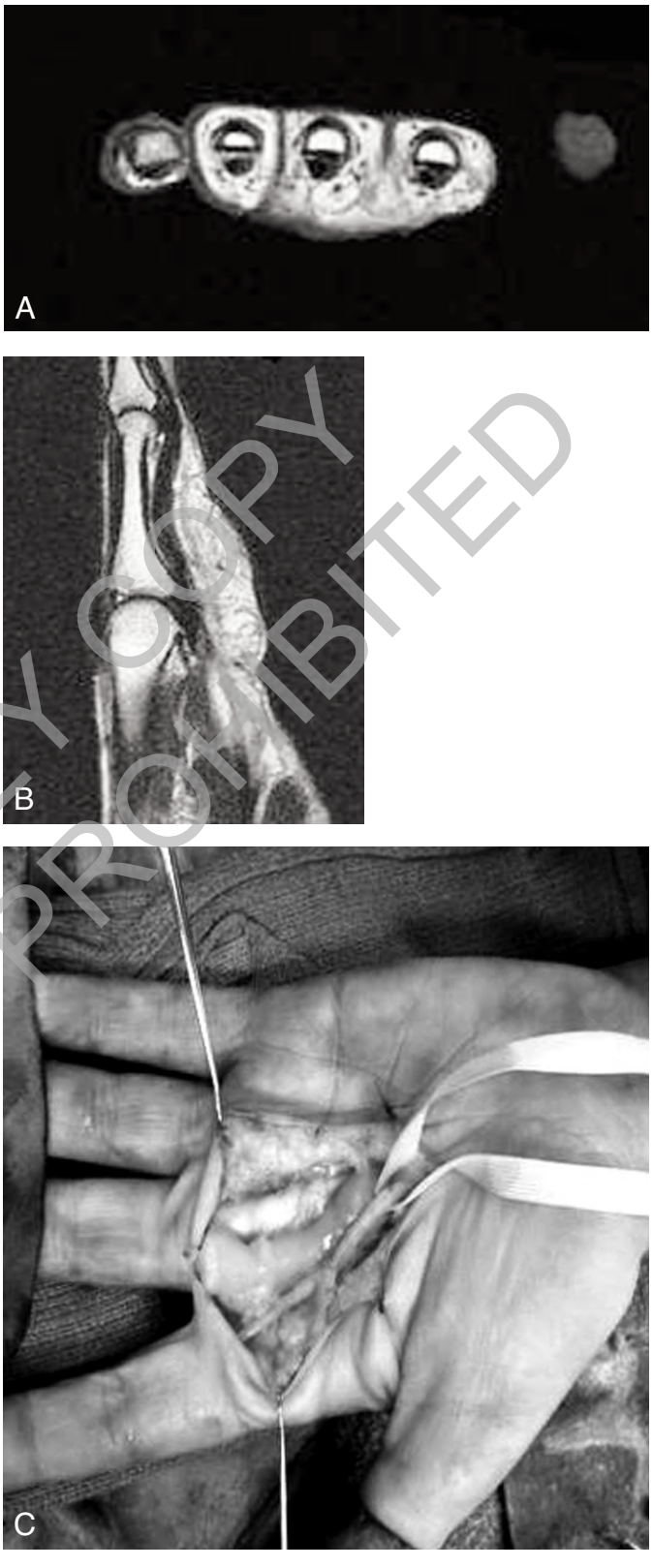

Fig. 2: Left hand FLH. MRI scan of the left hand showing a coaxial-cable-like appearance typical of a FLH affecting the second common digital nerve, transvers plane (A). MRI scan of the left hand showing a spaghetti-like appearance typical of a FLH affecting the second common digital nerve, sagittal plane (B). Intraoperative photograph of the left hand showing the FLH dissected from the second common digital nerve and other deep palmar structures (C).

greater size. In this group, the median nerve was displaced in 2 cases, the digital nerves in 6 cases and the posterior interosseous nerve in 1 case, at the level of the wrist. In all cases the integrity of the osseo-ligamentous and neurovascular structures was preserved. Postoperative recovery was uneventful in all cases, without complications.

Histological examination of the specimens was performed by an experienced Musculoskeletal Histopathologist. The diagnosis was lipoma in 23 cases (Fig. 1), FLH in 1 case (Fig. 2) and WDLLL/ALT in 1 case. All patients that were affected by pain preoperatively reported complete resolution of the symptoms following tumour excision.

Seven patients complained of some dysaesthesias over the site of excision post-operatively, which settled within few months in all cases.

A functional range of movement was restored at 6 weeks follow-up in all patients who had reported preoperative functional impairment. No recurrences were seen at final follow-up. Details on the size and location of the tumours, symptoms, pre-operative investigations and definitive diagnosis after histopahological examination are shown in Table I.

Discussion

This series of 25 histologically confirmed cases is to our knowledge one of the largest series of lipomatous tumours of the hand and wrist reported in the literature, and the largest series of cases with digital involvement.

Our experience confirmed what has been previously reported in the existing literature on this subject with regard to presentation and clinical findings: the most common presenting symptoms are local pain, tenderness on direct pressure, and limitation of range of movement and/or grip strength [1,15,17,21]. Neurological symptoms may rarely occur, most likely caused by compression syndromes when the lesion is located in Guyon's canal or in the carpal tunnel [17 xxii]. In contrast, pain and/or paraesthesias within the involved nerve distribution are often presenting symptoms of FLH [18,22].

Lipomas macroscopically present as rubbery, slowly growing mobile masses that do not transilluminate [22].

Lipomas appear on US as well-defined, solid hyperechoic lesions without a colour Doppler signal [23].

Ultrasonography is cost-effective, of rapid execution and allows three-dimensional visualisation of the lesion[24]. Diagnostic sensitivity of US is good in the hands of an experienced Musculoskeletal Radiologist. Preoperative US allows to differentiate between cystic or solid lesions and visualise the exact position of the lesion and its relationships with the adjacent structures [23,25,26]. US can also confirm or help formulating the definitive diagnosis: in the majority of our cases US alone was sufficient, without the need for further radiological investigations.

Again in our series MRI proved effective in thoroughly

TABLE I. *Series of 25 patients with hand and wrist lipomatous tumours*

Sex	Age	Side	Location	Symptoms	Size (mm)	Imaging	Diagnosis
F	56	left	carpal tunnel	painful mass	20x20x20	US+XR+MRI	lipoma
M	14	right	mid palm	functional impairment	30x20x8	US	lipoma
M	76	right	volar wrist	pain and paresthesias	41x28x17	US+XR+MRI	lipoma
F	48	left	mid palm	pain and paraesthesias	18x21x5	US	lipoma
F	37	left	middle finger	functional impairment	38x18x14	US	lipoma
F	63	left	ring finger	functional impairment	7x11x14	US	lipoma
F	59	left	mid palm	functional impairment	14x12x21	US	lipoma
M	44	right	middle finger	cosmetic impairment	18x10x20	US	lipoma
M	56	right	mid palm	functional impairment	47x20x35	US	lipoma
M	52	right	dorsal wrist	cosmetic impairment	10x16x16	US+XR+MRI	lipoma
F	69	right	mid palm	cosmetic impairment	22x15x10	US	lipoma
M	72	right	thenar emi.	functional impairment	23x22x14	US+XR+MRI	lipoma
F	40	left	thumb	painful mass	15x10x8	US	lipoma
F	42	left	hypothenar	cosmetic impairment	20x20x20	US+XR+MRI	lipoma
F	75	left	ring finger	painful mass	10x8x9	US	lipoma
F	84	right	mid palm	pain and paraesthesias	25x20x7	US+MRI	lipoma
M	59	left	mid palm	functional impairment	45x30x20	US	lipoma
F	63	left	dorsal wrist	functional impairment	25x20x8	US+XR+MRI	lipoma
F	65	right	mid palm	pain and paraesthesias	25x18x3	US+MRI	FLH
F	22	right	mid palm	cosmetic impairment	22x20x15	US	lipoma
M	41	right	dorsal wrist	painful mass	40x20x20	US+XR+MRI	lipoma
F	37	right	thumb	cosmetic impairment	20x15x10	US	lipoma
F	35	right	hypothenar	painful mass	20x30x20	US+MRI	lipoma
F	42	left	mid palm	painful mass	30x50x20	US+MRI	WDLLL/ALT
F	60	right	thenar	functional impairment	60x50x30	US	lipoma

delineating the anatomy of the lesions and their relationships with the surrounding structures in the hand and wrist, enabling a more accurate surgical planning.

Over the last years MR imaging has emerged as the most sensitive diagnostic method for lipomas[23]. A study showed that MRI helped formulating the correct diagnosis in 94% of cases for masses in the hand and wrist[27]. On T1-weighted images, lipomas appear as high signal intensity, well-defined, encapsulated, even and lobulated soft-tissue masses[23]. Furthermore, the appearances of FLH on MRI are pathognomonic, and this obviates the need for a diagnostic biopsy, if the typical symptoms are present[18].

Some authors believe that MRI cannot reliably distinguish between benign and malignant soft malignant tumours [17,27]. Heterogeneity within the adipose tissue seen on MRI is characteristic of the malignant lesions. The greater the heterogeneity, the greater the risk of local recurrence. If the MRI appearances are diagnostic, then a biopsy becomes unnecessary [23].

When MRI is not sufficient to formulate the diagnosis or not tolerated by the patient, and in case of giant lipomatous lesions, open biopsy or needle biopsy (US- or CT-guided) should be performed to confirm the diagnosis or for staging the lesion.

On plain radiographs, lipomas appear as radiolucent masses, infrequently containing calcifications [20], like in one of the cases described in our series. Radiographic changes of the bones adjacent to the lesions like bowing, osseous projection, cortical roughening, hyperostosis, subperiosteal bone formation and erosion have been described [6,28,29] being the latter present in 3 of our patients.

Conclusion

We believe that in cases of asymptomatic lipomas, with little or no growth, a watchful waiting approach after discussion of the risks with the patient may be acceptable. The decision to proceed with surgical excision of lipomatous lesions should be based on the type and severity of symptoms the patient is complaining of, the growth rate and behaviour of the mass, and the tumour appearances on the imaging studies. Nevertheless, some patients may request tumour excision due to its unsightly appearance, like six patients in our series. Histological examination of the excised specimen remains the gold standard for the formulation of the definitive diagnosis and should be performed in every case. A biopsy becomes crucial when a conservative approach is considered in lesions that show features that resemble those of a more aggressive pathology [20].

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Riassunto

OBIETTIVI: La presenza di lipomi nella mano e nel polso è poco comune, nelle dita è rara. Di conseguenza, nella letteratura internazionale, si ha esclusivamente la discrezione di casi individuali e piccole serie.

MATERILI E METODI: Questo è uno studio retrospettivo di una serie di 25 pazienti con tumori lipomatosi della mano e del polso trattati tra il 2001 ed il 2009. Tutti i pazienti sono stati sottoposti a valutazione clinica, radiologica ed a biopsia escissionale marginale. Sono stati identificati 23 lipomi, una amartoma fibrolipomatoso ed una liposarcoma lipomatoso ben differenziato, tumore lipomatoso atipico.

CONCLUSIONE: La scelta della metodica radiologica più appropriata è obbligatoria per una corretta diagnosi e pianificazione chirurgica. L'ecografia dovrebbe essere sempre considerata come metodica radiologica di prima linea. La risonanza magnetica aiuta a delineare l'anatomia della lesione e la sua reazione con le strutture circostanti della mano e del polso, permettendo quindi una pianificazione chirurgica più accurata. L'analisi istologica della biopsia rimane il "gold standard": per la formulazione della diagnosi definitiva e dovrebbe essere svolta in tutti i casi.

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