Soft-tissue metastases

THEIR PRESENTATION AND ORIGIN

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In our database of 7935 patients referred for investigation of a soft-tissue mass, only 100 were found to have a soft-tissue metastasis (1.3%). Our aim was to define the clinical features of such patients and to identify the site of their primary tumour.

The most common presentation was a painful lump, deep to the fascia, ranging between 2 cm and 35 cm (mean 8.3 cm) with 78% of the lumps located deep to the fascia. The mean age of the patients at presentation was 64 years (22 to 84) and there were almost equal numbers of men and women. Of 53 patients with a history of malignancy, 52 had metastases from the same primary (lung in 12, melanoma in ten, kidney in nine, gastro-intestinal track in four, breast in five, bladder in four, and others in eight). The other 47 had no history of malignancy and the metastasis was the first presentation. The primary sites in these cases were the lung in 19, gastro-intestinal track in four, kidney in two, melanoma in nine, other in three, and unknown (despite investigations) in ten. There was no correlation between the site of the metastases and the primary tumour.

Of the 7935 patients, 516 had a history of malignancy. Of these, only 10% had a soft-tissue metastasis, 29% had a benign diagnosis, 55% a soft-tissue sarcoma and 6% another malignancy. Patients with soft-tissue metastases have similar clinical features to those with soft-tissue sarcomas and should be considered for assessment at appropriate diagnostic centres for patients with suspicious soft-tissue lumps.

Metastases to soft-tissue are rare[1] and can represent a diagnostic challenge. Most present as a painless soft-tissue mass which can be mistaken for a benign swelling or soft-tissue sarcoma. Their identification, however, is important for treatment both of the lesion itself and possibly also of the primary cancer. We investigated the clinical features of patients with soft-tissue metastases to try and identify whether they have any particular characteristics that distinguish them from other soft-tissue lesions. We also investigated the chance of a patient with a history of malignancy presenting with a soft-tissue lump, and what such as mass was likely to be.

Patients and Methods

From our unit's prospective database of 7935 patients referred for investigation of a soft-tissue lump, only 100 were found to have a soft-tissue metastasis (1.3%). Patients with nodal metastases and areas of regional recurrence were excluded, as were those with a history of a soft-tissue sarcoma. Patients with a medical history of malignancy of any sort were also identified to allow correlation with the subsequent diagnosis. We analysed the presenting features of patients with soft-tissue metastases and compared them with those with benign diagnoses and those with soft-tissue sarcomas. Data on the size and location of the soft-tissue mass were also collected, and we identified the site of the primary both in those with and those without a history of malignancy.

All patients were investigated according to our routine assessment of any soft-tissue mass. This includes a full clinical history and examination, imaging and biopsy (Fig. 1). The results were discussed at a weekly multidisciplinary team meeting, where treatment decisions were made.

Statistical analysis was carried out using the chi-squared test for nominal data and non-parametric tests for continuous data. The level of significance was taken as $p < 0.05$.

Results

There were 51 men and 49 women with a mean age of 64 years (22 to 84). The presenting complaint was a painful mass in 55 patients, a painless mass in 43, one patient had leg swelling and, in another, the mass was discovered incidentally. The mean duration of

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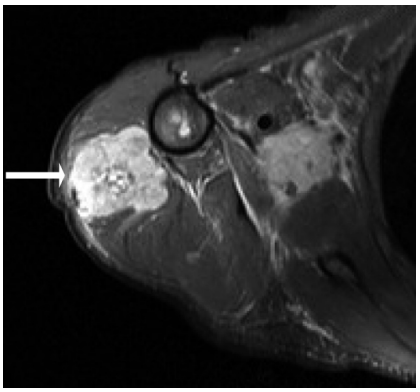

Fig. 1

MR scan of the right shoulder of a 72-year-old man who presented with a painful 5 cm mass in his right deltoid (arrow). Although suspected to be a soft-tissue sarcoma, needle biopsy confirmed the diagnosis of metastatic adenocarcinoma with the primary site identified in the lung.

Table I. The site of primary malignancy in patients with soft-tissue metastases, according to whether there was a documented history of cancer

	Number		
Site of primary malignancy	**Total**	**History of malignancy**	**No history of malignancy**
Lung	31	12	19
Skin	19	10	9
Kidney	11	9	2
Gastro-intestinal track	8	4	4
Breast	6	5	1
Bladder	4	4	0
Oropharynx	4	3	1
Female genital track	3	2	1
Unknown	10	0	10
Others	4	4	0
Total	100	53	47

symptoms was seven months (1 to 24). The soft-tissue metastases ranged between 2 cm and 35 cm in diameter (mean 8.3 cm); 78 were deep to the fascia and the rest were superficial. Most were in the lower extremity (thigh in 24, buttock in 17, calf in seven, popliteal fossa in one and foot in two), 34 were in the upper limb (shoulder in 11, arm in ten, elbow in five, axilla in four, forearm in three and hand in one), six were in the chest wall, four in the back, three in the pelvis and two were in the neck.

There was a history of malignancy in 53 patients, of whom 52 had metastases from the same primary (lung in 12, melanoma in ten, kidney in nine, gastro-intestinal track in four, breast in five, bladder in four and others in eight). One patient with a history of bladder carcinoma had a soft-tissue metastasis from a second, unrelated malignancy, namely breast carcinoma (Table I). The other 47 patients had no history of malignancy and the soft-tissue metastasis was the first such presentation. The primary sites in these cases were later found to be the lung in 19, gastro-intestinal track in four, kidney in two, melanoma in nine, other in three and unknown in ten, despite investigations (Table I). There did not appear to be any relationship between the site of the metastases and the primary tumour.

The most common histological diagnosis was adenocarcinoma in 34 cases; in 13 from the lung, eight from the breast, eight from the gastro-intestinal track (seven in colon, one in oesophagus), one from the uterus and four of unknown origin. The second most common histological diagnosis was squamous cell carcinoma in 26 cases with 15 metastases originating from the lung, four from the oropharynx, two from the skin, one from the female genital tract, and four of unknown origin. The other histological diagnoses were melanoma in 19 patients, clear cell carcinoma of the kidney in 11, transitional cell carcinoma in four, others in four (three from the lung and one from the bowel) and undefinable (high grade) in three.

Whereas 516 of the 7935 patients with soft-tissue masses had a history of malignancy (6.5%), only 53 (10%) had a soft-tissue metastasis. Of the rest, 151 (29%) had a benign diagnosis, 282 (55%) a soft-tissue sarcoma and 30 (6%) some other malignancy, for example lymphoma.

We compared the presenting features of patients with metastases to those who had benign masses and those with soft-tissue sarcomas (Table II). This showed that patients with soft-tissue metastases tended to have very similar features to those with soft-tissue sarcomas, most of the tumours having at least three of the four features of potential malignancy suggested by the National Institute for Health and Clinical Excellence (NICE) guidelines (pain, size > 5 cm, increase in size, deep to the fascia).[2]

Discussion

Soft-tissue metastases accounted for only 1.3% of our patients who presented with a soft-tissue mass. These figures are similar to those reported by Plaza et al,[1] who identified only 118 such patients from 7237 who presented with a soft-tissue mass (1.6%). It is poorly understood why metastases to soft-tissue are so rare, despite the fact that skeletal muscle and soft-tissues comprise such a large percentage of the body mass and cardiac output. Several theories have been postulated. The lung, liver and bone are common sites for metastatic disease and have a constant steady blood flow, whereas skeletal muscle has a variable blood flow subject to changing tissue pressure, which may affect tumour implantation.[3,4] Changes in pH due to lactic acid and other metabolites have also been implicated. It is thought that lactic acid production by skeletal muscle may inhibit the implantation and growth of tumour cells.

As all the patients in this study were referred on suspicion of a soft-tissue sarcoma, we accept that not all those with soft-tissue metastases will have been detected, as some

Table II. Percentage of patients with different diagnoses found to have various clinical features suggestive of malignancy. The final column shows the statistical significance between patients with soft-tissue sarcomas (STS) and those with soft-tissue metastases

Feature/diagnosis	Benign diagnosis	Soft-tissue sarcoma	Soft-tissue metastasis	Significance of metastases compared with STS (p-value*)
Pain (%)	*37*	*44*	*55*	0.79
Increase in size (%)	*44*	*82*	*78*	0.15
Bigger than 5 cm (%)	*50*	*82*	*78*	0.81
Deep to the fascia (%)	*70*	*78*	*84*	0.09
Mean size (cm)	5.7 (0.8 to 40)	9.8 (0.2 to 45)	8.3 (1 to 27)	0.14
Mean age (yrs)	46 (1 to 97)	54 (2 to 94)	62 (24 to 86)	< 0.001
Duration of symptoms (weeks)	126 (1 to 2444)	76 (0.2 to 2080)	28 (2 to 1560)	0.02

* chi-squared test

with known malignancy will have had soft-tissue metastases detected and treated by their oncologists.

Most publications on soft-tissue metastases are as small series or single case reports.[5-9] Damron and Heiner[10] reported on only 91 cases from their literature review and added 30 new cases. Their results were consistent with our findings that the most common presenting feature was a painful mass and that the most common primary tumour was lung carcinoma. They also commented on the lack of patients with renal or colonic primaries, in contrast to their review of previously reported cases. Plaza et al[1] reported on the pathology of 118 soft-tissue metastases collected over 30 years. Unlike our findings, skin was the most common primary malignancy, followed by the lung. The combination of our series with those of Plaza et al[1] and the literature review by Damron and Heiner[10] still shows that lung is the most common primary tumour to metastasise to soft-tissue, followed by skin and kidney.

In our series, the most common presenting complaint was a large, painful mass, deep to the fascia. Pain is considered unreliable as a useful diagnostic criterion for soft-tissue sarcomas,[11] but is included as one of the suspicious criteria for a possibly malignant mass in the guidance issued by NICE.[2] Table II indicates that soft-tissue metastases have an almost identical presentation spectrum to soft-tissue sarcomas, but those patients with soft-tissue metastases tend to be older and have a shorter duration of symptoms than those with soft-tissue sarcomas.

The clinical features of soft-tissue metastases are therefore largely indistinguishable from those of any other mass requiring investigation. Only 10% of patients with a history of malignancy, have a soft-tissue metastasis, and this is most likely in those with a history of skin or lung cancer. In the 7419 patients without a history of malignancy, only 47 (0.6%) had a soft-tissue metastasis, and in these cases the identification of the primary was made histologically, as history, clinical examination and chest radiography revealed the primary in only 20 of the 47 cases (43%). Further studies identified the primary in all but ten cases.

The management of the patients varied, depending on the extent of disease, the diagnosis and the condition of the patient. Many of the metastases were excised for symptomatic relief and were treated like a soft-tissue sarcoma, attempting to obtain clear margins. The patients were then referred for adjuvant treatment, often including radiotherapy. We followed up too few for any meaningful assessment of outcome.

We conclude that soft-tissue metastases are rare, they have no unique clinical features and the diagnosis should always be considered a possibility in any patient referred with a suspicious soft-tissue mass. Consideration should be given to referring these patients to an appropriate diagnostic centre as recommended by NICE.[12]

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