



Original article

Clinical features of soft tissue sarcomas

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The presenting features of 526 patients referred to an open access 'lumps and bumps' clinic were reviewed to try and identify whether the four cardinal features of soft tissue malignancy were in fact predictive of this. The features investigated were: size bigger than 5 cm, pain, increase in size, depth beneath the deep fascia. All of these factors were found to be associated more frequently with malignancy than a benign state. Using the summed weights of evidence method we have constructed a graph which will allow prediction of whether a lump is likely to be malignant or not.

Key words: Soft tissue sarcoma – Clinical features – Weights of evidence.

Soft tissue swellings are common, but only 1 in 200 will turn out to be malignant.¹ Detecting these malignancies early is important as it will not only reduce the treatment burden but will also improve survival. Of the three, well established, good prognostic factors in soft tissue sarcomas (STS) – size less than 5 cm, low histological grade and location superficial to the deep fascia – only size can be affected by early as opposed to late diagnosis.² Given that the mean size of STS at diagnosis in most series varies from 11–15 cm, there is clearly scope for earlier detection of these tumours.

There are four clinical features suggestive of malignancy in a soft tissue swelling. These are: size >5 cm, location deep to the deep fascia, increase in size, and pain.³ Conventional teaching suggests that any lump exhibiting any of these features should be considered malignant until proved otherwise.

We have investigated the accuracy of this teaching by reviewing the frequency of these symptoms in a large series of patients.

Patients and Methods

The Royal Orthopaedic Hospital has an open access 'lumps and bumps' clinic at which patients with possible malignancy are reviewed within one week. Diagnosis is made by clinical examination combined with appropriate imaging and biopsy. We have reviewed the presenting clinical features of all patients with soft tissue swellings referred from whatever source over a 2 year period from January 1997 to December 1998. The presence of the above four clinical features was noted in each case and compared with the eventual histological diagnosis. Details of age and sex were also noted.

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Table 1 The frequency of clinical features by diagnosis

	Sample total	Feature	Malignant	Benign
Size	526	5 cm	222	93
		<5 cm	53	158
Pain	470	Present	91	50
		Absent	132	197
Change in size	470	Increasing	141	44
		Static	82	203
Depth	470	Deep	209	171
		Superficial	14	76

There were 590 patients seen over this time period with a soft tissue swelling; 4 cases had no confirmed diagnosis, 60 cases had no details recorded of symptoms whilst 59 contained information as to the size of the lesion only.

The sensitivity, specificity and accuracy with approximated standard errors were then calculated.^{4,5} In order to simplify understanding the diagnostic value of the presence or absence of the combined symptoms, the weights of evidence were calculated.⁶

Results

Of the 526 patients who had information on at least one clinical feature, 275 had a malignant tumour and 251 had a benign condition. The frequency of benign and malignant conditions graded by clinical feature is shown in Table 1.

Of the 64 patients who exhibited all four clinical features, 86% were malignant, whilst 44 patients had none of the clinical features and none had a malignant tumour. If there were three or more features present, then the probability of malignancy was 81%. The weights of evidence show that an increasing size is the best indicator of malignancy, whilst size less than 5 cm is the best indicator of a benign lump (Table 2).

The ratio of male:female was 1.25:1 in the whole group with no significant difference between the benign and malignant groups. Patients with sarcomas had a higher mean age than those with benign swellings, 54.3 years versus 46.5 years ($P < 0.0001$ unpaired *t*-test).

Table 2 The sensitivity, specificity, accuracy and weights of evidence tabulated for individual features

Symptom	Sensitivity (SE)	Specificity (SE)	Accuracy (SE)	Weight of evidence for malignancy	Weight of evidence against malignancy
Size > 5 cm	0.81 (0.02)	0.63 (0.03)	0.72 (0.02)	0.78	-1.18
Pain	0.41 (0.03)	0.80 (0.03)	0.61 (0.02)	0.70	-0.30
Increase size	0.63 (0.03)	0.82 (0.02)	0.73 (0.02)	1.27	-0.80
Deep to fascia	0.94 (0.01)	0.31 (0.03)	0.60 (0.02)	0.30	-1.59

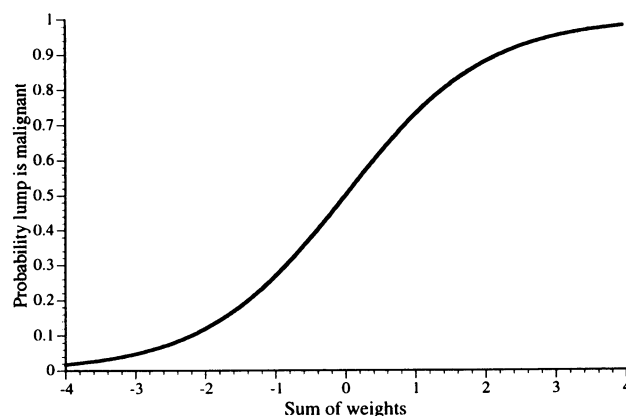


Figure 1 Graph relating the summed weights of evidence to the probability of any lump being malignant. This is calculated by: probability = $1/(1 + e^{-x})$ where x is the summed weights of evidence.

Discussion

Early diagnosis of any malignancy is desirable. Soft tissue swellings are common and the vast majority will be benign; however, late diagnosis of malignant soft tissue sarcomas is common.⁷

We have presented here simple confirmation of previously held teachings. Clearly, all malignant tumours will at some stage of their life be below 5 cm in size, but the presence of pain or rapid growth should alert the clinician to the possibility of malignancy. However, most benign lumps will be superficial, painless, static in size and less than 5 cm and hence would fit into our category in which no malignant tumour was identified.

In order to simplify the clinical significance of a mixture of the features, we have presented weights of evidence. These are the natural logarithms of the likelihood ratios and can hence be added if it is assumed they are independent probabilities.⁶ A positive result indicates the likelihood of malignancy whilst a negative result suggests a benign lesion. Thus a patient with a tumour of 6 cm that is growing but is painless and superficial would have a sum of the weights of 0.78 +



Figure 2 A soft tissue swelling of the leg. Is it benign or malignant? It is larger than 5 cm, deep to the fascia and increasing in size but is not painful. The summed weights = 2.05 which equates to a probability of over 95% for malignancy – it proved to be a liposarcoma.

$1.27 - 0.3 - 1.59 = 0.16$; this positive result suggests that the tumour is malignant.

At the two extremes, a patient with no positive features would have a summed weight of -3.87 and a patient with all positive signs a weight of 3.05 . It is useful to be able to convert these weights back to probabilities. This can be done by using the graph shown in Figure 1.⁸ Thus, for the example given above the summed weights of 0.16 gives a probability of malignancy of 0.54 .

Normally the prior probability of finding a malignancy is included in the summation of weights. This is given by the ratio of the proportion malignant/proportion benign. At this centre, just over half the referred lumps are malignant, giving a starting value of $\ln(0.52/0.48) = 0.091$. However, in a primary care setting where malignant lumps are rare, a negative value would occur.

We have clearly demonstrated that the more of the features present the greater the risk of a soft tissue swelling being malignant. Any patient exhibiting any of these features should be referred appropriately for speedy investigation and diagnosis (Fig. 2).

Conclusions

Any soft tissue lump exhibiting any of these four clinical features should be considered to be malignant until proved otherwise: (i) increasing in size; (ii) size > 5 cm; (iii) painful; or (iv) deep to the deep fascia.

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