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Tumour related lower limb amputation: a 23 year experience

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Abstract

This paper records the Dundee experience over 23 years and reports on 42 cases of tumour related lower limb amputations. There were 27 males and 15 females with 37 malignant and 5 benign tumours. Four of the 'benign' tumours proved to be osteoclastoma which were locally malignant. Prosthetic rehabilitation was achieved in all but one case. All patients fitted were able to use their prostheses.

Introduction

Amputations performed in the course of treatment for neoplasm represent only 1-2% of lower limb amputation in contrast to those (85%) performed as a result of peripheral vascular disease. Ebskov (1988) demonstrates the prevalence in Denmark from 1978 to 1983 inclusive of both causal conditions, the percentage due to tumour varying from 1.5 to 2.2%. The experience in Dundee reflects an almost exactly similar picture over the period from 1965-1988 (Murdoch et al., 1988). The population at risk is some 500,000, all amputations are performed by one of two teams of surgeons and all patients referred for prothetic rehabilitation are admitted to Dundee Limb Fitting Centre, where a computerized data base has been established.

The management of malignant tumours e.g., osteosarcoma has changed considerably since Jaffe's paper (1972) on chemotherapy and the increasing number of cases treated by wide excision and internal prosthetic replacement (Scales, 1988). Cases are still treated by radiotherapy but markedly fewer. When amputation is part of the management virtually all authorities believe prosthetic fitting should proceed whatever the presumed prognosis (Aitken, 1987). Inevitably only those patients who receive amputation as part of their management were admitted to the Limb Fitting Centre. A few, three, suffering from osteosarcoma and presenting in the past ten years were treated by wide excision, chemotherapy and internal prostheses. Of these, one subsequently required amputation and is included in this study.

This paper records the experience in Dundee over the past 23 full years and reports on 42 patients with lower limb tumour related amputations. The numbers are small but the experience is important as the population is reasonably static and the surgery and prosthetic rehabilitation concentrated on one clinic team. It is believed that these clinical problems are representative of similar thinly populated areas with no great city conurbations.

Clinical material

There were 27 male patients and 15 female in the 42 cases who represented an admission rate of 1.8 per year. The levels of amputation were as follows:

1	Hindquarter
11	Hip disarticulation (26.4%)
22	Above-knee amputation (52.4%)
1	Knee disarticulation
6	Below-knee amputation (14.2%)
1	Syme's amputation.

The distribution of the tumours affecting these patients and their outcome is displayed in Figure 1.

There proved to be 15 different types of pathology. The tumours may be classified in relation to the tissue involved, thus:

Bone	50%
Soft tissue	24%
Skin	21%
Secondary deposit	5%

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Aetiology:	No. of cases:	% of total:	Av. age:	Sex: Male	Female	Level: Sy	BK	TK	AK	TH	HQ	RT/CT* Yes	No	Survival: Alive	Dead	Fitted: Yes	No
Osteosarcoma	13	30.9%	24.8	9	4	—	1	—	7	5	—	12	1	7	6	13	—
Melanosarcoma	5	11.9%	70.5	1	4	—	3	—	2	—	—	2	3	2	3	4	1
Sq. cell carcin.	5	11.9%	77.7	3	2	—	1	1	2	1	—	1	4	—	5	5	—
Chondrosarcoma	2	4.7%	65.0	1	1	—	—	—	1	1	—	—	2	1	1	2	
Rhabdomyosarc.	1	2.4%	71.1	—	1	—	—	—	—	1	—	—	1	—	1	1	—
2° Nephroma	1	2.4%	63.4	1	—	—	—	—	—	1	—	—	1	—	1	1	—
Fibrosarcoma	4	9.5%	47.4	4	—	—	—	—	3	1	—	1	3	1	3	4	—
Osteochondro.	1	2.4%	52.4	1	—	—	—	—	1	—	—	—	1	1	—	1	—
Osteoclastoma	4	9.5%	39.5	3	1	—	—	—	4	—	—	—	4	4	—	4	—
Neurofibrosar.	1	.2.4%	22.5	1	—	—	—	—	1	—	—	1	—	1	—	1	—
Liomyosarcoma	1	2.4%	66.8	1	—	—	—	—	—	—	1	1	—	—	1	1	—
2° Bladder	1	2.4%	88.1	—	1	1	—	—	—	—	—	1	—	—	1	1	—
Synovial ca.	1	2.4%	63.1	1	—	—	—	—	—	1	—	—	1	1	—	1	—
Lymphosarcoma	1	2.4%	80.0	1	—	—	—	—	1	—	—	—	1	1	—	1	—
Con. tis. sarc.	1	2.4%	58.0	—	1	—	1	—	—	—	—	1	—	1	—	1	—
	42	100%	50.1	27	15	1	6	1	22	11	1	20	22	20	22	41	1

*RT/CT = Radiotherapy/Chemotherapy

Sy = Syme's
BK = Below-knee
TK = Through hip
AK = Above-knee
TH = Through hip
HQ = Hindquarter

Fig. 1. Tumour distribution and outcome.

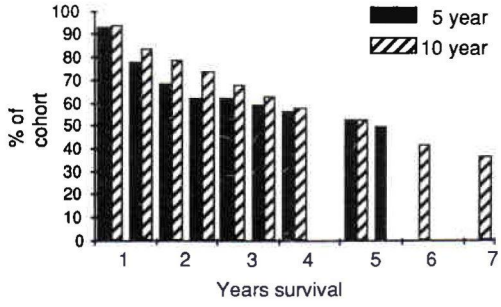

Fig. 2. Survival curves for malignant tumour related lower limb amputees.

Of the 42 cases, 37 (88%) proved to be malignant and five benign.

The five year survival rate for the 37 patients with malignant tumours was 50% (Fig. 2). The ages of the patients with osteosarcoma ranged from 11 years to 63 years 1 month. In two of the 13 cases of osteosarcoma the tumour followed longstanding osteomyelitis, one from a gun shot wound sustained in the 1914-18 war and the other originating in a longstanding varicose ulcer. If these two, aged 66 and 53 respectively, are excluded the average age for the remainder is 15 years 6 months. The levels of amputation employed for this group of patients were five at the hip, seven above the knee and one below the knee.

All but one of the osteosarcoma patients had radiotherapy, chemotherapy or both with survivals ranging from 16 years 1 month to 1 year 1 month. The single patient not having any adjuvant treatment was 66 years old with a long history of chronic osteomyelitis; a below-knee amputation was performed and prosthetic fitting completed but the patient only survived some seven months.

All five of the benign tumour amputees were alive and well at the end of the study (range from 2 years 9 months to 19 years 10 months post-amputation). However, four of the "benign" tumours proved to be osteoclastoma — tumours which are locally destructive with each individual example lying in a unique location in a spectrum of malignancy. One patient suffering from an osteoclastoma was treated by local extirpation and the residual space filled with bone tubes on no less than three occasions. It may be that the local surgery was inadequate each time, or conceivably the nature of the tumour itself changed and became more aggressive. In any case amputation became necessary thirteen years after the first biopsy and the patient is still alive twenty-three years later. Osteoclastoma requires to be treated with great respect and certainly justifies its appearance in this study.

Prosthetic rehabilitation was achieved in all but one case: that patient was an 85 year old lady with a melanocarcinoma treated by an above-knee amputation and in whom prosthetic fitting was deemed inappropriate because of severe mental confusion. At below-knee level the patients were fitted with patellar-tendon-bearing prostheses of one variety or another. At above-knee level conventional prostheses were used until the advent of modular limbs in the 1970's. All patients remained under review until they died or to date and all contrived to use their prostheses.

Discussion

In keeping with other studies a wide range of tumour types was found. In this study 15 different pathologies were identified. Troup and Bickel (1960) described 21 different neoplastic types. Taft (1966) found 26 diagnoses in 350 cases and Pack (1964) described 18. The authors experience concerns a smaller group of patients but remains roughly in keeping with a distribution, already related, divided between bone, soft tissues and skin. In two cases secondary deposits respectively from kidney and bladder were responsible for amputation.

With the numbers available it is not possible to comment on the significance or otherwise of sex, level of amputation or, more importantly, adjuvant therapy such as chemotherapy.

In Dundee Limb Fitting Centre and associated hospitals there is an experience in amputation surgery which has been very carefully documented. The Centre's management of the dysvascular patient has also been carefully recorded in the literature. It is believed that this testifies to a carefully planned and skilfully executed management of the amputee, which concerns primarily 87% of the vascular amputees.

The experience recorded here was gained against the same disciplined background with

concentration of the operative experience and a trained and integrated clinic team performance. But the small numbers, the variety of pathologies and sometimes the demanding surgical operations required point up the real problem for patient, surgeon and clinic team. There is clearly a case to be made to concentrate the experience in one centre comprehensively housed, equipped, staffed and funded. On this basis Scotland with a population of five and a half million might possibly justify such a centre. The reality of course, is that big city and university rivalries, the social problems for patients and families alike and the difficulties of persuading funding authorities to collaborate all militate against such an ideal solution.

In Dundee the first consideration was to develop a loosely formed "tumour" team consisting of the surgeon, the pathologist, a radiotherapist, a radiologist and an oncologist with expertise in chemotherapy. The deliberations of this team largely determine the management for any given patient. Fortunately in Scotland, the Bone Tumour Registry established in Glasgow soon after the Second World War provides a concentration of expertise in identifying tumour types and their likely behaviour. Moreover the free association of pathologists throughout the United Kingdom also contributes in identification in very unusual or difficult cases.

The "local" team having discussed the situation and examined all the evidence including radiographs, angiograms and a range of blood tests will then determine the course of action. The pathologist is always available to offer advice regarding the surgical procedure of any individual biopsy. The surgeon should be the one identified with this work and able to call on an, albeit limited, experience. Excepting the hindquarter procedure where the proximity of the tumour may enforce modifications on the surgical procedure, the amputation will normally be conducted at a site where all the tissues are normal and entitle the surgeon to envisage an "ideal" stump and no problems with wound healing. It is believed strongly that prosthetic fitting should proceed as speedily as the patient's condition permits.

The Dundee experience has been small, 42 cases, but the authors think that the philosophical and organizational approach is justified and reflected in the results.

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