Surgery without radiotherapy in soft tissue sarcoma

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In the mid-1970s, several authors reported that surgery of soft tissue sarcoma combined with radiotherapy reduces the local recurrence rates and improves the outlook for limb salvage (see, for example, Suit and Russell 1975 and 1977). Although the principles for surgical removal, without amputation, of selected soft tissue sarcomas with a low local recurrence rate had been formulated at that time, **(see pp x in this issue)**, surgery combined with pre-, intra- or postoperative radiotherapy grew more more popular. In recent times, limb-salvage surgery (often called conservative surgery with no other definition of the margin obtained) combined with radiotherapy has been regarded as the gold standard for treating soft tissue sarcomas. However, since radiotherapy has side-effects (see for example Bujko et al. 1993), it is of interest to see whether there is a subset of tumors that can safely be treated by surgery alone.

During the last 15 years, there have been very few reports (Enneking et al. 1981, Geer et al. 1992, Karakousis et al. 1995) on surgery alone for soft tissue sarcoma and most of them come from Scandinavia (Markhede et al.1982, Rydholm, 1983, Rydholm et al. 1986, Rydholm and Rööser, 1987, Berlin et al. 1990, Alho et al. 1989, Rydholm et al. 1991). The Scandinavian tradition of limb-salving surgery without radiotherapy is based on

Bertil Stener's experience at Sahlgrenska Hospital, Gothenburg, Sweden. Stener stated clear-cut criteria for a wide margin and found that the local recurrence rate was less than 10%, without adjuvant radiotherapy, when these criteria could be followed (see pages 81–85). Stener's findings have been confirmed at other tumor centers in Scandinavia (for references, see above). Surgery without adjuvant radiotherapy applies especially to subcutaneous and intramuscular sarcomas. Tumors in these locations constitute two-thirds of virgin soft tissue sarcomas in the extremities and trunk wall (Rydholm et al. 1991).

Subcutaneous sarcomas are tumors in the subcutaneous tissue, with or without involvement of the overlying skin, but with no penetration of the underlying deep fascia. In our experience and that of others (Stener 1978) it is uncommon that a primary soft tissue sarcoma grows through the deep fascia, whether its origin is deep or superficial. In most cases, the subcutaneous location can be defined by physical examination. A subcutaneous tumor, in contrast to a deep-seated one, is still movable when the underlying muscles are actively contracted. The position of the tumor can be confirmed by CT or MRI, although tumors close to the deep fascia, but without microscopic signs of involvement of the fascia, may be misinterpreted as involving the fascia on CT or MRI (Söderlund et al. 1994).

A wide margin for a subcutaneous sarcoma requires that the deep fascia beneath the tumor is removed en bloc together with a 3–5-cm cuff of surrounding subcutaneous tissue and usually the skin overlying the tumor. When the tumor has been diagnosed by open biopsy or marginal excision, the skin wound should be excised with a generous margin. In most cases, the skin defect cannot be closed but is replaced by a split skin graft which heals reliably to the underlying muscle(s). Except for cosmesis, there is no morbidity after this type of surgery.

We reviewed 129 patients with subcutaneous sarcoma in a population-based series of sarcomas from southern Sweden (Rydholm et al. 1991). All patients in our region were included, whether they had been treated at our tumor center or at local hospitals. The annual incidence was 0.6/100 000, comprising one third of a all soft tissue sarcomas of the extremities or the trunk wall. Compared to deep-seated sarcomas, subcutaneous sarcomas were half the size, median 4 (1–16) cm, more often malignant fibrous histiocytoma and of lower malignancy-grade. The cumulative 5-year survival was 80%. These findings have been confirmed by Peabody et al. (1994) in a series of 52 patients with subcutaneous sarcoma.

We analyzed the local recurrence rate after a median of 9 (3–24) years of follow-up. After surgery with a wide margin, but without radiotherapy, there were no local recurrences of 14 low-grade tumors. After the same procedure, fewer than one tenth (4/59) of the high-grade tumors recurred locally. We found no dif-

ferences in the local recurrence rates depending on whether surgery was performed on an untouched tumor or was a reexcision because of previous incisional biopsy, or, most commonly, a previous marginal excision. Our conclusion is that adjuvant local or systemic therapy is usually not indicated for patients with subcutaneous sarcomas.

Intramuscular sarcomas comprise one third of the extremity tumors (ref). Surgery is based on the resistance of muscle fascia to tumor penetration. Several single muscles form compartments of their own—for example, the rectus femoris muscle, the sartorius muscle and the gluteus maximus muscle. For a tumor located in a muscle which is connected to another muscle, with no fascia in-between, both muscles should be removed. Thus, for a tumor in the vastus lateralis muscle, this muscle and the intermedius muscle should be removed en bloc. The intermedius muscle must be separated from the femur by subperiosteal dissection (see figure, page 83). We performed a primary myectomy in 24 patients, 20 of them with high-grade malignant sarcomas. After a minimum of 3.5 years of follow-up, local recurrence had occurred in 2 of them (Rydholm et al. 1991).

The low local recurrence rate after these procedures refers to primary myectomies—i.e., the muscle fascia has not been transgressed by an open biopsy. However, we have used fine-needle aspiration in most cases. During an open biopsy there is a risk of tumor spread outside the muscle. A safe procedure after open biopsy, without adjuvant therapy, requires removal of the total compartment, as defined by Enneking. One reason for Enneking's definition of compartments may be that his experience was based on the treatment of patients of whom many had had a previous open biopsy, a marginal excision or a local recurrence.

To be able to perform primary myectomies, the patients must be referred before open biopsy. This problem is discussed on pages 4–8. The treating surgeon must also rely on a diagnosis made without open biopsy, that is by the combined information from physical examination, radiological studies and fine-needle aspiration, see also pages 54–59. With our treatment principles, a diagnosis of sarcoma suffices for a myectomy. The specific histotype and malignancy-grade are irrelevant to this surgical decision. The same is, of course, true for subcutaneous tumors. We accept the small risk of a falsely malignant diagnosis; there is no loss of function after a wide excision of a subcutaneous sarcoma and the loss of function after myectomy is small or moderate in most cases (Markhede and Stener 1981, Markhede et al. 1982).

In summary, some subsets of soft tissue sarcomas can be treated by local surgery alone, with a low risk of local recurrence and moderate, if any, loss of function.

In my opinion, a local recurrence risk of 10 % after wide excision of a subcutaneous sarcoma, does not justify adjuvant radiotherapy. Because of its location, in the subcutis or superficially in muscle, a local recurrence is easily detected—in many cases by the patient—when small. It is therefore easy to excise but surgery should now most probably be followed by radiotherapy to reduce the risk of rerecurrence. The question whether a local recurrence risk of 10% after myectomy would justify radiotherapy cannot be answered. One must know how much the risk of local recurrence is reduced by adjuvant radiotherapy in these 10% of the patients. One should also know if the morbidity from a local recurrence outweighs the wound complications and side-effects of radiotherapy in those 90% of the patients to whom it was given unnecessarily.

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