Soft tissue sarcoma should be treated at a tumor center

A comparison of quality of surgery in 375 patients

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We analyzed the quality of surgery in a population-based series of 375 patients with primary soft tissue sarcoma of the extremity (n 329) and trunk wall (n 46). The quality was measured as the total number of operations performed for the primary tumor—biopsy, excision, reexcision—and the local recurrence rate. A comparison was made between patients referred to our tumor center before surgery (n 195), after surgery (n 102), and not referred for the primary tumor (n 78).

The total number of operations for the primary tumor in patients not referred was 1.4 times higher, and in patients referred after surgery 1.7 times higher than in patients referred before surgery. The local recurrence rate in patients not referred was 2.4 times higher, and in patients referred after surgery 1.3 times higher than in patients referred before surgery.

Our findings show that patients with soft tissue sarcoma should be treated at a tumor center, and that they should be referred before surgery.

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Generally, it is recommended that patients with suspected soft tissue sarcoma should be referred to a tumor center before biopsy or excision. We have earlier shown that a desirable wide surgical margin for a low local recurrence risk was more often obtained in center-treated patients than in those treated at local hospitals (Rydholm et al. 1983).

We have now in a larger, population–based series of 375 patients analyzed the quality of surgery, measured as the total number of operations performed for the primary tumor—biopsy, excision, reexcision—and the local recurrence rate. We compared these in patients referred before surgery, after surgery, and those not referred for the primary tumor.

Patients and methods

Our population–based database contains detailed information about all adult patients with soft tissue sarcoma of the extremity and trunk wall in the South Sweden Health Care Region (1.5 million inhabitants), irrespective of at which hospital treatment had been given, and if follow-up was complete (Rydholm et al. 1991a, Rööser et al. 1991). We selected all patients diagnosed since 1970, when our tumor center was opened, through 1989 (minimum 3-year follow–up of the survivors). After excluding 28 unoperated patients and 18 patients with metastasis at presentation, 375 patients remained. 329 tumors were located in the extremity and 46 were located in the trunk wall. 121 tumors were subcutaneous and 254 were deep-seated. Malignant fibrous histiocytoma was the most common histotype (46 percent) and the thigh was the most common location (32 percent). 20 tumors were of malignancy Grade I, 64 of Grade II, 106 of Grade III, and 185 tumors were of Grade IV. The crude metastasis–free survival was 70 percent. Incisional biopsy was classified as an operation, whereas fine–needle aspiration biopsy was not.

Patients were classified by their referral pattern:

A) 195 patients referred before surgery; 103 with untouched tumors and 92 after fine-needle aspiration biopsy;

B) 102 patients referred (immediately) after surgery; 19 after incisional biopsy, 82 after surgery with a marginal margin, and 1 after surgery with a wide margin;

C) 78 patients not referred for the primary tumor, 18 were referred after local recurrence, and 60 were not referred at all.

Patients referred after surgery or not referred had smaller and more often subcutaneous tumors than patients referred before surgery, otherwise there were no significant differences between the groups as regards clinico-pathologic factors, fraction of ampu-

Table 1. Clinico-pathologic and follow-up data in subsets of 375 patients with soft tissue sarcoma (fraction)

	Before surgery	After surgery	Not referred
Number of patients	195	102	78
Tumor depth			
subcutaneous	37 (0.19)	46 (0.45)	38 (0.49)
deep-seated	158 (0.81)	56 (0.55)	40 (0.51)
Tumor size, median (range) cm	8 (1–30)	5 (1–17)	5 (1–20)
Grades III+IV	148 (0.76)	87 (0.85)	56 (0.72)
Extremity tumors	179 (0.92)	86 (0.84)	64 (0.82)
Amputations for primary tumors[a]	16 (0.09)	13 (0.15)	4 (0.06)
Radiotherapy	37 (0.19)	17 (0.17)	8 (0.10)
Follow-up, median (range) months	50 (4–247)	70 (5–265)	68 (3–263)
Crude tumor death	51 (0.26)	23 (0.23)	24 (0.31)
Crude local recurrence rates			
1970–1979	11/64 (0.17)	12/45 (0.27)	22/57 (0.39)
1980–1989	25/131 (0.19)	12/57 (0.21)	13/21 (0.62)

[a] Extremity tumors only

Table 2. Total number of operations for primary tumors and local recurrence rates in subsets of 375 patients with soft tissue sarcoma

	Before surgery	After surgery	Not referred
Total number of operations for primary tumors/number of tumors (rate)			
subcutaneous	42/37 (1.14)	94/46 (2.04)	62/38 (1.63)
deep-seated	176/158 (1.11)	105/56 (1.88)	61/40 (1.53)
total	218/195 (1.12)	199/102 (1.95)[a]	123/78 (1.58)[a]
Local recurrence rates			
subcutaneous	6/37 (0.16)	6/46 (0.13)	15/38 (0.39)
deep-seated	30/158 (0.19)	18/56 (0.32)[b]	20/40 (0.50)
total	36/195 (0.18)	24/102 (0.24)	35/78 (0.45)[c]

[a] P 0.0001, [b] P 0.04, [c] P 0.0001 compared to patients referred before surgery

tated patients or patients given radiotherapy. The follow-up time was somewhat shorter in the patients referred before surgery than in those referred after surgery. Survival in the groups was similar (Table 1).

Differences between the groups were calculated using the Chi-square test and the Mann-Whitney U-test.

Results

Of the 195 patients referred before surgery, 173 were operated on only once, i.e., open biopsy was omitted and primary, definitive surgery was performed. 22 patients were operated on more than once; the second operation was done in 10 because the first was an incisional biopsy, while in 12 others as an attempt to increase the surgical margin from intralesional or marginal to wide.

Of the 102 patients referred after surgery, no subsequent operations were performed in 17. 85 patients were operated on more than once; the second operation was done in 10 because the first was an incisional biopsy, and in 75 as an attempt to increase the surgical margin.

Of the 78 patients not referred, 44 were operated on only once. 34 patients had more than one operation; the second operation was done in 9 because the first was an incisional biopsy, and in 25 as an attempt to increase the surgical margin.

218 operations were performed for the primary tumors in the 195 patients referred before surgery. This figure was 1.7 times higher for patients referred after surgery and 1.4 times higher for patients not referred.

The local recurrence rate in patients referred before surgery was 18 percent (36/195). In patients referred after surgery the local recurrence rate was 1.3, for deep-seated tumors 1.7 times higher, and in patients not referred 2.4 times higher (Table 2).

Discussion

Several studies have demonstrated better treatment of rare malignancies in specialized units (Editorial 1992). Today's international center treatment for soft tissue sarcoma of the extremity aims at removing the primary tumor with preservation of the limb, but yet a low risk for local recurrence. Examination by CT or MRI is followed by a diagnostic incisional biopsy before the definitive treatment, which in most cases consists of limb-sparing surgery with adjuvant local radiotherapy. Systemic, experimental chemotherapy may be given. This approach requires close cooperation between surgeons, radiologists, pathologists, and oncologists. Therefore it is recommended that the patients be referred to specialized centers before any surgery.

Surgery performed before referral of the patient may jeopardize optimal treatment. An open biopsy performed by an inexperienced surgeon may spread tumor to previously unaffected tissue. Also, a misplaced incision makes the radical operation more difficult since the biopsy wound must be included in the specimen. A marginal excision (shelling out) carries a high risk of local recurrence and makes a reoperation difficult, since radiologic imaging will no longer be informative. This applies especially to deep-seated tumors; in our series the local recurrence rate was almost twice as high in the patients referred after surgery as before surgery.

Treatment at our tumor center differs in two respects. Firstly, we omit open biopsy in most cases and instead rely on fine-needle aspiration cytology for diagnosis (Åkerman 1985) which may decrease the risk for local recurrence (Berlin et al. 1990). Secondly, we do not routinely administer radiotherapy. Subcutaneous and intramuscular tumors, which constitute two thirds of all extremity soft tissue sarcomas, can be treated with local surgery, but no radiotherapy with less than 10 percent local recurrence risk, provided open biopsy is omitted and a wide margin is achieved (Rydholm et al. 1991b).

Our findings in the present study clearly show that patients with soft tissue sarcoma benefit from referral to a center before any surgery; both the number of operations and the local recurrence rates were substantially higher in patients referred after surgery or not referred at all. Our better results were explained by better local surgery; the fraction of patients treated by amputation or given adjuvant radiotherapy was similar in patients referred before surgery and patients treated elsewhere.

The incidence of local recurrence among patients not referred did not decrease over the years; in the later period of the study it was three times higher than in patients referred before surgery.

The somewhat shorter median follow-up time in the group of patients referred before surgery should not affect our findings; almost nine-tenths of all local recurrences and metastases occur within 3 years (Shiu et al. 1975, Gustafson et al. 1991).

There was no difference in survival among the groups, despite the different local recurrence rates; local recurrence probably is of minor importance for the development of metastases (Shiu et al. 1975, Potter et al. 1986, Stotter et al. 1990, Gustafson et al. 1991, Williard et al. 1992). However, this should not lead to nihilism in the treatment of the primary tumor; a local recurrence may require amputation for control, and it cannot be excluded that local recurrence sometimes causes metastatic spread.

We have no reason to believe that poor management of soft tissue sarcoma outside a center is unique for Sweden. We have not found any other population-based series analyzing the treatment of patients not referred to a tumor center. However, large center-based series comprise a substantial number of patients referred after either marginal excision or local recurrence; Collin et al. (1986) reported, in a series of 315 patients, that three fourths were referred after either a marginal excision or one or more local recurrences.

The clinical differential diagnosis between a soft tissue sarcoma and a benign lesion is difficult. In most patients referred after surgery, the tumor had been shelled out because the surgeon did not suspect a sarcoma. Because of strict guidelines for referral, an increasing number of the patients in our region have been referred before any surgery: 1985 through 1989 one half of the patients with subcutaneous and four fifths of the patients with deep-seated tumors. This has been made possible by repeated information to physicians at local hospitals, who are recommended to refer before surgery all patients with soft tissue tumors larger than 5 cm or deep-seated ones or those otherwise suspected of malignancy. The cost seems reasonable: for every patient with a soft tissue sarcoma, 10 patients whose tumors turn out to be benign will be referred (Rööser et al. 1987).

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