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Free vascularised tissue transfer and brachytherapy for soft-tissue sarcomas of the extremities

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Summary We reviewed the medical files of nine patients with localised soft-tissue sarcomas of the extremities treated with surgical resection, free vascularised tissue transfer, and computerised after-loading iridium-192 high dose rate brachytherapy over a period of 8 years. All patients had external beam radiation therapy in fractions with a total dose of 48—52 Gy, followed by surgery at approximately 4—5 weeks post-irradiation. Surgical treatment included wide resection of the primary tumour in six patients, and marginal resection in three patients. Microsurgical reconstruction of the soft-tissue defect used a free vascularised musculocutaneous flap that included the gracilis flap in five patients, the latissimus dorsi flap in four patients, and the radiovolar flap in one patient. Postoperative brachytherapy dose ranged from 12 to 24 Gy. Adjuvant chemotherapy was administered in five patients with large tumours and marginal resection. At a mean follow-up of 36 months, eight patients were still alive with no evidence of local recurrence or distant metastases; all these patients had good cosmetic and functional outcomes. Two patients died with lung metastases; one of these patients had local tumour recurrence. Wound healing problems and seroma formations were observed in two patients. Intramedullary nailing was required in one patient for a pathological fracture. Tumour resection for soft-tissue sarcomas combined with microsurgical reconstruction of the soft-tissue defect, preoperative external beam radiation and high dose rate brachytherapy results in a high degree of local control with acceptable complications.

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Introduction

Soft-tissue sarcomas (STS) are rare tumours of mesenchymal origin accounting for approximately 1% of all adult cancer.[42] The extremities are the most common location (59%), followed by the trunk (19%), the retroperitoneum (15%), and the head and neck (9%).[34] The most common soft-tissue sarcomas of the extremities are liposarcoma, malignant fibrous histiocytoma, synovial sarcoma, and fibrosarcoma. In the hands and feet, synovial sarcoma, epithelioid sarcoma, and clear cell sarcoma occur much more frequently than in the more common proximal locations.[36,40]

Treatment of soft-tissue sarcomas has greatly improved over the past few decades. Limb-salvage surgery often with simultaneous soft-tissue microsurgical reconstruction combined with multimodality adjuvant and neoadjuvant treatments including radiation therapy, chemotherapy, hyperthermia and isolated limb perfusion have substantially reduced the need for major amputations.[7]

In this article, we present nine patients with large soft-tissue sarcomas of the extremities treated with surgical resection of the primary tumour, reconstruction using free vascularised tissue transfer (FVTT) and high dose rate brachytherapy (BRT).

Materials and methods

We reviewed the medical records of nine patients with localised soft-tissue sarcomas of the extremities treated with surgical resection, reconstruction using free vascularised tissue transfer, and high dose brachytherapy over a period of 8 years. Data of the patients involved in this study including histological diagnosis, location and staging of the tumour, patients' age and gender, treatment and prognosis are shown in Table 1.

All patients had external beam radiation therapy into fractions of a total dose of 48—52 Gy, followed by surgery at approximately 4—5 weeks post-radiation (Fig. 1). Surgical treatment included wide resection of the primary tumour in six patients, and marginal resection in three patients (Fig. 2A). After tumour resection, the tumour bed was covered with a set of plastic tubes placed as parallel as possible, at 1.5—2.0 cm intervals (Fig. 2B). The soft-tissue defect was reconstructed

Table 1 Details of the 9 patients involved in this study

Patients		Diagnosis	Location	Surgical staging (MSTS)	Surgical resection	Flap	Chemotherapy	FU (mos)
1	75, M	Extraskeletal osteosarcoma (recurrent)	Posterior thigh	IIB	Marginal	Latissimus dorsi	+	12, local recurrence, lung metastases, deceased
2	70, M	Malignant fibrous histiocytoma (recurrent)	Anterior leg	IIA	Wide	Gracilis		84, NED
3	52, M	Myxoid liposarcoma	Anterior thigh	IA	Wide	Latissimus dorsi		24, NED
4	60, F	Malignant fibrous histiocytoma	Anterior thigh	IIB	Wide	Latissimus dorsi		72, NED
5	59, F	Malignant fibrous histiocytoma	Leg	IIB	Wide	Gracilis	+	12, NED
6	75, F	Liposarcoma	Knee (popliteal)	IB	Wide	Gracilis		72, NED
7	20, F	Synovial sarcoma	Knee (popliteal)	IIB	Wide	Gracilis	+	36, NED
8	40, F	Synovial sarcoma	Foot (dorsum)	IIB	Marginal	Radiovolar	+	24, NED
9	31, M	High-grade soft-tissue sarcoma	Arm	IIB	Marginal	Latissimus dorsi	+	12, metastases, deceased

MSTS = Musculoskeletal tumour society score, NED = No evidence of disease.