

## **Reconstruction of the distal tibia following resection of aggressive bone lesions using a custom-made megaprotheses.**

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### **Background**

Limb salvage in distal tibia neoplasms is challenging because of the subcutaneous nature of the bone and the close proximity of vital neurovascular and musculo-tendinous structures. Traditionally patients have been offered amputation as the treatment of choice to control their disease.

The best method of reconstruction following resection of the distal tibia remains undecided. Various methods have been postulated including free vascularised or non-vascularised fibula autograft with arthrodesis, osteoarticular allograft, and endoprosthetic replacement (EPR). EPR offers the attractive options of an earlier return to ambulation with preservation of ankle motion without the need for prolonged immobilisation and the significant risk of non-union and infection associated with a biological solution to a distal tibial defect.

### **Aim**

We report the largest, single-centre, retrospective study of clinical and functional outcomes in patients who underwent excision of the distal tibia with subsequent endoprosthetic reconstruction.

### **Patients and Methods**

Between 1977 and 2012 eight consecutive patients underwent endoprosthetic reconstruction of the distal tibial following resection of aggressive bone lesions. The patients were referred to our tertiary sarcoma service and managed by a multidisciplinary team (MDT). Appropriate preoperative investigations were undertaken. Neo-adjuvant and adjuvant chemo and radiotherapy were administered to sensitive cases using standard protocols.

There were four females and four males, with a median age at presentation of 33 years (range 14-76). There were four cases of osteosarcoma, one Ewing's sarcoma, one leiomyosarcoma of bone, one dedifferentiated chondrosarcoma and one giant cell tumour (Campanacci 3) (Table 1).

<Insert Table 1>

Table 1. Patient Demographics, Complication(s) and MSTs

All endo-protheses used were custom made based on the anticipated level of resection of the tibia. Clinical and radiological records of the patients were reviewed retrospectively. Functional assessment was made using the MSTs criteria.

### **Results**

The median follow-up for all cases was 77 months (range 13-276 months). All patients had clear resection margins on analysis of their post-operative histology. Three patients died as a result of metastases (one of whom had lung metastases at presentation) at 10, 41 and 44 months respectively following surgery. Two patients developed local recurrence; one patient 6 months following surgery for a dedifferentiated chondrosarcoma, the other 33 months following resection of Ewing's sarcoma. The patient with dedifferentiated chondrosarcoma underwent an above knee amputation but later developed lung metastases. The Ewing's sarcoma patient had widespread metastasis at the time of local recurrence and, therefore, they

were treated palliatively. Of the patients who were free of their disease, the median follow-up was 120 months (range 72-276 months).

One patient developed deep infection that required washout and prolonged antibiotics. One patient developed a superficial wound infection in the immediate post-operative period that resolved with oral antibiotics. One patient developed subtle radiological evidence of aseptic loosening of the talar component 55 months after implantation. The patient was asymptomatic.

No patient has required revision surgery. The median MSTS score at last follow up was 66% (range 50-90%). This is comparable with MSTS scores (mean TESS 70%) in patients who have undergone below knee amputation at our unit from our unit.

### **Conclusions**

Careful patient selection is the key to limb reconstruction surgery in patients who present with an aggressive lesion affecting the distal tibia. We suggest that patients with malignant tumours confined to bone with minimal soft-tissue extension, and those with benign-aggressive (Enneking grade 3) lesions should be considered for distal tibial EPR. Of the 508 patients treated at our institute over a 30 year period for a malignant distal tibial lesion, only eight (1.6%) underwent a distal tibial endoprosthetic reconstruction.

Below knee amputation and the use of a prosthesis produce satisfactory and predictable results, but many patients refuse on psychosocial grounds. This single centre review suggests that endoprosthetic replacement of the distal tibia is a viable option and can provide a good function outcome after careful discussion with the patient. We believe the complication rates are acceptable if amputation is the alternative.



<b>Case No.</b>	<b>Sex</b>	<b>Age</b>	<b>Diagnosis</b>	<b>Mets at diagnosis</b>	<b>Follow up (months)</b>	<b>Complication(s)</b>	<b>MSTS (%)</b>
<b>1</b>	F	77	Osteosarcoma	No	44	Deep infection Died from mets	50
<b>2</b>	M	52	Osteosarcoma	No	276	Nil	90
<b>3</b>	F	75	Leiomyosarcoma	No	262	Asymptomatic loosening of talar component	60
<b>4</b>	F	64	Ewing's sarcoma	No	33	Died from mets	67
<b>5</b>	F	77	GCT	No	120	Died from unrelated disease	65
<b>6</b>	M	64	Osteosarcoma	Yes (lung)	82	Superficial post-op wound infection	87
<b>7</b>	M	67	Osteosarcoma	No	72	Nil	73
<b>8</b>	M	83	Dediff chondrosarcoma	No	13	Local recurrence 6 months post EPR	50

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