Vascularised fibular epiphyseal transfer for proximal humeral resections for primary bone sarcomas in children

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Introduction and objectives

Preserving growth following limb salvage surgery in the paediatric patient remains a challenge in the upper limb. Growing prostheses may present high rates of complications1 or are too large to fit small children2. Vascularised autografts may provide rapid biological incorporation and the potential for growth in children. Free vascularised fibular autografts, first described in 1975,4 have comparable oncological outcomes to endoprostheses but reportedly fewer surgical complications and lower rates of revision5. We aimed to review their use following proximal humeral resection in children.

Patients and methods

Using a prospectively collected database we retrospectively identified ten patients who had undergone wide proximal humeral resection vascularised fibular autograft reconstruction with epiphyseal transfer.

All patients were diagnosed between 2004 and 2014 with primary malignant bone tumours of the proximal humerus (6 Ewing’s sarcoma, 4 osteosarcoma). Mean age at diagnosis was 4.8 years (range 2-8 years) and mean follow-up period was 4.7 years (95% CI: 2.4 to 7 years). We analysed the clinical, oncological and radiological outcomes including mean annual growth.

Results

All patients were stage IIB at diagnosis and underwent neo-adjuvant chemotherapy in line with clinical protocols. At final follow-up nine of the ten patients were still alive; one patient suffered local recurrence and metastasis (both 8 months after surgery) and died a year post-operatively.

Axial growth and hypertrophy was evident in eight of the ten cases, when there was no avascular necrosis of the fibula graft. The mean annual growth was 6.4mm per annum in these eight grafts (range 3.7mm to 9.8mm). Complications included fracture (6), temporary nerve palsy (2), and avascular necrosis (2). There were no cases of infection; all fractures united with conservative management. One patient had two separate re-operations for a slipped fibula epiphysis of the fibula graft and a hemiepiphysiodesis for lateral proximal tibial epiphyseal arrest.

Conclusions

Vascularised fibula epiphyseal transfer in children younger than ten years is a reliable method of limb salvage following primary sarcoma excision of the proximal humerus. Fractures united and peroneal nerve palsies resolved but graft necrosis occurred in two out of ten cases at mean 5-years follow-up.

Keywords : paediatric, sarcoma, fibula, autograft, epiphysis
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