By using the silastic sheet between the free grafted tendons and bony surface to form the pseudosynovial membranes, the results of free tendon graft combined with free-vascularized flap reconstruction(partially-vascularized tissue single stage approach) is favorable compared with that of the vascularized tendocutaneous flap approach.

We used segmental resection and replantation for large primary malignant or aggressive tumors of the upper limb.

Segmental resection and replantation is a new method of partial limb salvage for large primary malignant tumors for which, because of their extent, amputation would be the treatment of choice.

In conclusion, microsurgical technique is very valuable for the reconstruction of tissue defect or function loss of the upper limb.

Special Lecture 2.

Microsurgical Reconstruction Following Resection of Malignant Bone and Soft Tissue Tumor

M. Usui, M.D., Ph.D.

Associate Professor of Dept. of Orthopedic Surgery, Sapporo Medical University, Sapporo, Japan

Since November 1983 to September 1998, we have done microsurgical reconstruction following tumor resection on 68 patients with malignant bone and soft tissue tumors. I will talk about the surgical procedures and the outcome of these 68 cases.

Patients

35 were male and 33 were female. The average age of the patients was 33.3(range; 9~82). 60 cases were primary malignant tumors, 3 were metastatic bone tumors and 5 were aggresive tumors.

54 cases were bone tumors and 14 were soft tissue tumors. The histological diagnosis was as follows: 31 osteosarcoma; 11 malignant fibrous histiocytoma; 6 chondrosarcoma; 5 angiosarcoma; 3 giant cell tumor of bone; 3 metastatic bone tumor; 2 chodoma; 2 Ewing's sarcoma; 1 desmoid; 1 dermatofibrosarcoma protuberans; 1 malignant, melanoma; 1 fibrosarcoma; 1 diagnosis undetermined.

Reconstructive Procedures

74 grafts used for recinstruction were as follows: 50 free vascularized fibulargraft(FVFG), 8 Pedicle latissimus dorsi flap(LD flap); 8 pedicle vascularized fibular graft(PVFG), 3 free muscle graft; 3 other pedicle vascularized flap; 1 free LD flap; 1 free fillet flap.

Tumors of Extremities

53 grafts used for reconstruction were as follows; 41 FVFG; 8 PVFG; 3 pedicle LD flap; 1 free muscle graft.

Tumors of Pelvis and hip Joint

10 grafts used for reconstruction of pelvis and hip on 9 cases were as follows; 6 FVFG(3 pieces in 4 cases, 2

pieces in 2 cases); 2 free muscle graft; 1 free fillet flap; 1 free LD flap.

Tumors of Trunk

7 grafts used for reconstruction of trunk on 7 cases were 6 pedicle LD flap and 1 pedicle tensor fascia lata flap. Thoracic cage was reconstructed in combination with Madox mesh graft in 2 cases.

Tumors of Sacrum

4 grafts used for reconstruction of sacrum on 4 cases were 3 FVFG(2 pieces in all cases) and 1 pedicle vastus lateralis flap.

Items of Investigation

The following items were investigated : graft survival; prognosis(primary malignant tumor only); functional evaluation(tumors of extremity only); complication. Functional status was evaluated by the evaluation system of Enneking et al.

Follw-up Periods

The average follow-up periods after tumor resection and after reconstruction were 59.8 months and 52.2 months., respectively.

Results

Survival of Graft

2 grafts(free LD flap and free muscle graft) failed to survive. In 3 cases of FVFG, patients died of tumor or other cause before evaluation. Eventually 69 grafts survived and the ultimate survival rate was 94.5%.

Prognosis of Disease

Among 60 primary malignant tumors, one was lost to follow-up. Prognosis of the remaining 59 cases were as follows : 39 CDF(66.1%); 6 NED(10.2%); 2 AWD(3.4%), 10 DOD(16.9%); 2 DOC(3.3%).

Reconstruction of Extremities

Functional score of FVFG for reconstruction of extremity were between 67% and 97%. If the adjacent joints were preserved, the score was more than 90%. When knee joint was fused by FVFG, the mean score was 80%.

The mean functional score in case of wrist or shoulder preservation by fibular head graft was 80%. The problem of this procedure is collapse of fibular head which occurred in 4%. Hypertrophy of graft occurred signiflcantly in lower extremity and little in upper extremity.

The result of free muscle graft for finger flexor reconstruction was 60% and those of pedicle LD flap were stable and satisfactory.

Reconstruction of Pelvis and Hip

Although pelvic ring reconstruction by FVFG was possible in all low grade malignant tumors, one with osteosarcoma died with local and distant recurrence of tumor. Function of reconstructed hip joint by two or three pieces of vascularized fibula resulted in painless and stable joint. Prevention of infection is very important in this particular region.

Reconstruction of Trunk

Skin flap or musculo-cutaneous flap was very useful for wound coverage of trunk.

Reconstruction of thoracic cage with Marlox mesh was a useful technique. Stump coverage in hind quarter amputation with fillet flap was also useful. Function of reconstructed trunk was satisfactory and there was no tumor dissemination in any case of pedicle flap.

Reconstruction of Sacrum

Prognosis of sacral tumor was poor. All 4 cases died of disease. The reasons for poor prognosis in this region were difficulties to get good local control of tumor and to get bone union by FVFG. Patients could move with wheel chair but could not walk. Change of strategy for local tumor control seems to be necessary.

Reconstruction in Metastatic Bone Tumor

We have done this procedure in patients with such good prognisis as thyroid ca., renal cell ca. and hemangioperlcytoma. Although all patients died eventually, all of them survived more than 1 year and maintained good.quality of life.

Complications

17.6% of distant metastasis occurred. 26 complication except for distant metastasis were as follow : 7 non-union; 6 collapse of fibula head; 6 fracture of grafted fibula; 3 acute infection; 3 tumor local recurrence; 1 late infection. Among 7 cases of fatigue fracture of grafted fibula, only one needed surgery and the others were successfully treated conservatively. In case of late infection in which allograft was also used for knee arthrodesis in combination with vascularized fibular graft, amputation was necessary.

Summary

The survival rates of graft is high(94.5%) and microsurgical reconstruction had no bad influence on prognosis of disease.

Skin flap and musculo-cutaneous flap for trunk reconstruction is a useful method and the results of functional free muscle graft can be expected to be MMT 4.

FVFG, when used as intercalary graft, can give patients satisfactory results.

The functional score after preservation of joint mobility byfibular head graft is about 80%.

However, prevention of head collapse by selection of donor vessels or additional vessel anastomosis seems to be necessary.

Although functional results of reconstructed hip and pelvis poor, arthrodesis of hip joint by 2 or 3 pieces of FVFG can give patients painless and stable joint.

Reconstniction of sacrum was too difficult to achieve good result and changes of strategy for local tumor control seems to be neccessary.

Reconstruction in metastactic bone tumor is useful to maintain good QOL in properly selected cases.

Conciusion

Microsurgical reconstruction following resection of malignant bone and soft tissue tumor is a safety procedure, has no bad influence on prognosis of disease and can give patients satisfactory functional outcome except reconstuction of sacrum or a part of pelvis.