Treatment of Malignant Bone Tumors

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Treatment Concept in high-grade malignant bone tumors (osteosarcomas, Ewing-sarcomas)
Types of resection

- Wide or radical resection: R0
- Marginal resection: R1 (R2)
- IntraleSIONAL resection: R2
Principle of wide resection

Frontal section  resected piece
5-year survival in osteosarcomas
5-year survival in Ewing-sarcomas
**Results in Ewing-sarcomas (n = 32) UKBB Basel**

Overall survival = 75%

Krieg, Paulussen, Hefti: Results of treatment of Ewing’s sarcomas at a single institution in Switzerland - Birmingham 2008)

5 year survival rate = 79 %
10 year survival rate = 73.4 %
Survival rate according to type of resection
Options for reconstruction

- autologous bone
  - extracorporeal irradiation
- homologous bone (allograft)
  - combination with autologous bone
- endoprostheses
  - combination with allograft
- special techniques (Joint transfer, rotationsplasty etc.)
Options for reconstruction

- **autologous bone**
  - extracorporeal irradiation

- **homologous bone (allograft)**
  - combination with autologous bone

- **endoprotheses**
  - combination with allograft

- **special techniques** (Joint transfer, rotationsplasty etc.)
Options for reconstruction

- autologous bone
  - non-vascularized
  - vascularized
  - extracorporeal irradiation
Low-grade chondrosarcoma

S.M. f., 13+6
Options for reconstruction

*autologous bone (non vascularized fibula)*

S.M., f.
13+6
postop.

S.M., f. 16+4

S.M., f. 19+10

19+10
Hemangiopericytoma
(low-grade malignant tumor)

M.S. m., 4+9
Options for reconstruction

non-vascularized autologous bone

M.S. m., 16 y.

11 years postop.
Options for reconstruction

Osteosarcoma

K.O. m. 8 J.
Options for reconstruction
vascularized autologous bone

Osteosarcoma

K.O. m. 8 y.
6 y. postop.
In which cases do we use vascularized instead of non-vascularized bone?

- poor soft tissue coverage (forearm, lower leg, hand, foot)
- restricted possibilities for fixation (tumor close to the epiphysis)
- failure of non-vascularized bone (non-union)
Options for reconstruction

- autologous bone
  - extracorporeal irradiation

- homologous bone (allograft)
  - combination with autologous bone

- endoprotheses
  - combination with allograft

- special techniques (Joint transfer, rotationsplasty etc.)
Options for reconstruction
extracorporeal irradiation and reimplantation

Ewing-sarcoma

D.B., m. 7 y.
Options for reconstruction
extracorporeal irradiation and reimplantation

Ewing-sarcoma

D.B., m. 7 y. 6 months postop..
Options for reconstruction
extracorporeal irradiation and reimplantation (in combination with vascularized fibula)

Adamantinoma

L.T., w. 12J.

6 Mon. postop.
Options for reconstruction

- autologous bone
  - extracorporal irradiation
- homologous bone (allograft)
  - combination with autologous bone
- endoprostheses
  - combination with allograft
- special techniques (Joint transfer, rotationsplasty etc.)
Options for reconstruction

allograft

Fibro-cartilaginous mesenchymoma

V.K. m., 12+2

2 y. postop

4 y. postop
Options for reconstruction

- autologous bone
  - extracorporeal irradiation
- homologous bone (allograft)
  - combination with autologous bone
- endoprostheses
  - combination with allograft
- special techniques (Joint transfer, rotationsplasty etc.)
Osteosarcoma

S.J., m., 19 years
MUTARS® tumor endoprostheses

- modular system
- rotating hinge knee joint
- antiinfectious silver coating
- attachment tube
Endoprosthesis with attachment tube
S.J., m., 19 years
Options for reconstruction

total femur endoprosthesis

J.K. w., 20y.  Ewing-sarcoma
Options for reconstruction

total femur endoprosthesis

J.K. w., 20y.  Ewing-sarcoma
Options for reconstruction

expandable endoprosthesis (principle of Fitbone)

M.R. m., 12+3

osteosarcoma
**Mutars® Xpand**

- **non-invasive lengthening** (via electromagnetic signal)
- **lengthening modules as custom implants**
  - maximal lengthening: 5cm
Options for reconstruction

- autologous bone
  - extracorporeal irradiation
- homologous bone (allograft)
  - combination with autologous bone
- endoprostheses
  - combination with allograft
- special techniques (Joint transfer, rotationsplasty etc.)
Options for reconstruction
rotationplasty

I.B. m., 9+6
osteosarcoma
Options for reconstruction

rotationplasty

I.B. m., 10+5

osteosarcoma
Options for reconstruction

Clavicula-pro-humero-plasty

H.S., f. 14+8
Options for reconstruction

Hip joint transfer to the sacrum

N. M., f., 13+4

Ewing-sarcoma
Lengthening with Fitbone-nail after hip joint transfer

N. M., f., 19y.
Cosmas and Damianus 300 AD
René Magritte 1928:
La tentative de l’impossible
Substitution of missing parts