Complications around the knee of mega implants

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Options for knee reconstructions for massive bone loss

- Osteoallograft
- Allograft-Prosthetic Composite
- Intercalary allograft with joint preservation
- Custom mega prosthesis
- Modular mega prosthesis
Advantages of mega implants

- Modularity
- Immediate stability
- Durable
- Readily available
- Off the shelf/ no delay for customization
- Efficient reconstruction

Mechanical Complications

Henderson Classification

Type 1. Soft tissue or instability (i.e. skin necrosis, contractures, patella dislocation)
Type 2. Aseptic Loosening
Type 3. Structural complications (implant failures)
Non-Mechanical Complications

Henderson Classification

• Type 4. Deep infections
• Type 5. Local tumor recurrence

Plan

Everybody has a plan until they get punched in the face” - Mike...
Pushing the limits

Infection
Antibiotic impregnated paste
Proximal tibia replacement
Total femur replacement
Periprosthetic fractures
Stress riser between implants

• Patients with prior hip arthroplasty and massive distal femoral bone loss

Implant fractures
Hydroxyapatite collar

Non oncologic use of knee megaprosthesis
Stage 1 revision

Extensor mechanism deficiency
• Bus, van de Sande, Fiocco et al., Netherlands
• CORR/ MSTS Symposium
• Dec 2015

• What are the Long-term Results of MUTARS Modular Endoprostheses for Reconstruction of Tumor Resection of the Distal Femur and Proximal Tibia?

• 110 reconstructions
• Infection 14%
• Local recurrence 10%
• Structural complication 15% (recommend 12 mm diameter stem or larger)
• 90% successful limb salvage

• Implant failure at 10 yrs 20.7%
• Aseptic loosening most common mechanical complication.
• Uncemented HA coated implants reduced aseptic loosening

• Grimer et al. Royal Orthopaedic Hospital, Birmingham, UK
• JBJS June 2016

Bone Joint J 2016; 98-B: 857-864

• Very long-term outcomes after endoprosthetic replacement for malignant tumours of bone
• 610 procedures
• Mean follow up 30 yrs.
• 49% had revision surgery for aseptic loosening
• 18% still had original prosthesis in at final follow up
• 30 yrs: 16% amputation
• Proximal tibia replacement 43%

• 26% infection
• HA collar virtually resolved aseptic loosening

• Pala, Trovarelli, Calabro et al.
CORR/ MSTS Symposium
University of Bologna,
Istituto Orthopedico Rizzoli Bolagna, Italy
May 2014

• Survival of Modern Knee Tumor Megaprostheses: Failures, Functional Results, and Comparative Statistical Analysis

• 247 GMRS mod onc knees
• Soft tissue failure 8.5%
• Aseptic loosening 5.6%
• Structural failure 0%
• Infection 9.3%
  – DFR 8.5%
  – PTR 11.6%
• Recurrence 5.6%

• Overall failure: 29.1%
• 70% survival at 4 years
• 58% survival at 8 years
• Schwab et al.
• Mass General Hospital
  Boston, MA
  JBJS 2006

• Patella complications following distal femoral replacement after bone tumor resections

• 35 patella complications
• Pain and impingement in 11
• Patella baja in 9
• Patella fractures in 2
• Patella osteonecrosis in 2

• Patella impingement on tibial polyethylene is a complication of the DFR.
• Inaccurate restoration of the joint line and soft tissue contracture

• Houdek et al.
• Mayo Clinic
  The Knee 23 (2016)
  167-172.

• Long term outcomes of cemented endoprosthesis reconstruction for periarticular tumors of the distal femur
• 152 patients
• Implant survival
  - 5  76%
  - 10  63%
  - 15  51%
  - 20  36%
  - 25 yrs  28%
• Limb salvage 93%
• 11 amputations
• Infection incidence 13% leading to 20% amputation incidence

• Zimel et al.
• Memorial Sloan Kettering
  New York, NY
• Revision Distal Femoral Arthroplasty with the Compress Prosthesis has low rate of mechanical failure at 10 years.

• 27 patients
• Experienced failure of DFR and revised to Compress
• Mechanical failure was 11% failure at 10 years
• Infection incidence 18% at 5 and 10 years.
• Angelini et al
CORR (2013) 471: 3326-3335
University of Bologna, Istituto Orthopedico Rizzoli Bologna, Italy

• Is there a Role for Knee arthrodesis with Modular Endoprostheses for Tumor and Revision of Failed Endoprostheses?

• 50% SURVIVORSHIP AT 5 YEARS.
• 32 KNEE MOD ONC
• HIGH COMPLICATION RATE
• INFECTION #1 CAUSE (30%)
• 8/32 had amputation
• Only 1 implant failure
Future directions

- Infection control: silver coated implants
- Aseptic loosening: hydroxyapatite collars
- Periprosthetic fractures: cemented implants or prophylactic cable
- Soft tissue attachments; secure attachment of soft tissue to foam metal or synthetic sleeve