Survival of Modern Knee Megaprostheses – USA/Canada

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Survivorship of Knee Megaprostheses

Disclosures

Stryker

1 in 5 Americans will be 65 or older by 2030
U.S. Population, Age 65 and Over
1996 – 2030 (as a percent of total population)

Source: www.usbjd.org

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Patients Today

Patients are more proactive about their healthcare
- 5.5 million seniors (65+) in the US search the web for health information*
- 40 million people (45-64) search the web for health information*

Patients are living longer
- Patient age decreasing – patients with endoprosthesis more active
- Improved cancer therapeutics/surgery means patients live longer
- Young patients cured of tumors have a long life expectancy


Projected increase in megaprosthesis use

In the past, joint replacement was reserved for patients over 60
- Medically managed longer

Today technology and patient pressures lead to younger patients choosing endoprosthesis vs. other modalities

Risk of having higher revision risk during lifetime and likely need for megaprosthesis reconstruction during lifetime

Annual Cancer cases increasing, while CR deaths in industrialized counties decreasing (who.int; cancer.gov)

Overview

- Indications – are evolving - past and present
- Most commonly used US/Canada Megaprosthesis
- Long term survivorship/common complications
Survivorship of Knee Megaprosthesis

Indications
- Any process necessitating segmental resection of bone around the knee/extremity at risk
- Tumors around the knee – primary/mets/radiation seq
- Failed multiply operated endoprosthesis
- Infections – fracture/endoprosthesis/radiation
- Trauma – complex/failed union/surgery

History
- Used since 1980’s
- Currently mostly modular and relatively easy to use for surgeon and patient recover rapidly
- Functional restoration, cosmesis, emotional/social acceptance
- Cemented and cementless fixation; fixed/rotating hinge
- Results lagging as compared to primary and revision knee replacements in terms of longevity

USA/Canada most commonly used Implants
Femur/tibia fixation:
- Cemented
- Uncemented (Canada)
- Compress
Articulation
- Rotating hinge
- Fixed hinge
Tibia
All poly/metal backed/stemmed
Cemented Distal Femoral Endoprostheses

Advantages

- Immediate weight bearing
- Predictable immediate stability in a setting of chemotherapy, poor bone stock
- Ability to use in irradiated bone
- May be used for local agent delivery – antibiotics, meds

185 patients – 101 custom and 85 modular cemented implants with rotating hinge design

- Non metal backed poly cemented tibial components used for modular prosthesis
- 15 year survivorship 93.7% modular 51.7% custom
- Only 4/85 modular implants revised
- 3/85 aseptic loosening
- 1/85 moore’s taper fracture (cast)
- 11.8% at mean of 159m needed bushing exchange

Survivorship of Knee Megaprostheses

Cemented Distal Femoral Endoprostheses
- 7% wound related issues
- 3.8% temporary peroneal nerve palsy
- 3.2% deep infection
- Surgeon preference is thin cement mantle

Survivorship of Knee Megaprostheses

Cemented Rotating Hinge Endoprosthesis
- Turcotte group
- 77 patients
- Implant failure - amputation of the affected limb and revision of part or all of the components
  - 5 year 84%; 10 year 79%
  - 6 infections 7.8%
  - No aseptic loosening
  - No stem fractures
  - 3 patients - tibial bearing fracture; 1 - loose bumper.

Survivorship of Knee Megaprostheses

Uncemented tumor endoprostheses at the knee: root causes of failure
- 99 patients with a fixed-hinge, bone-ingrowth Kotz Modular Femur and Tibia Resection System endoprosthesis
- 25 patients had complications that resulted in prosthetic failure (removal of the prosthesis) at a median of 24.1 (range, 0.8-72.6) months
  - Prosthesis related failure (n = 18)
  - Tumor related failure (n=7)
- Infection 10%
- Stem fracture 7%
- Aseptic Loosening 0%
- Smaller stem size in the distal femur and longer bone resection length in the proximal tibia - increased risk of prosthetic failure


Survivorship of Knee Megaprostheses

Early follow-up of a custom non-fluted diaphyseal press-fit tumour prosthesis

- Restoration stem with adapter or non fluted GMRS stem
- 54 implants
- Median f/u 36m (22-85)
- Mixed distal femur/proximal tibia
- Most common mode of failure – Infection 10%
- Resorption 5% mild – no functional change

Survivorship of Knee Megaprostheses

Compress - Biomet

- Compress® Compliant Pre-Stress Implant (Biomet Inc, Warsaw, IN, USA)
- Uses compression via a short traction bar
- Stimulates osteointegration at the bone-prosthetic interface
- Promotes hypertrophy of the loaded bone, and avoids stress bypass of the host bone around stem

Exclusion Criteria:

- Bone irradiation, precluding osteointegration
- Inadequate or unreconstructable soft tissue envelope (a very low-profile implant, such as the GUEPAR® implant, would be indicated)
- Metastatic disease that mandates immediate weightbearing (precludes the requisite 3 months of protected weightbearing)
- Inability to cooperate with the postoperative program of early, protected weightbearing

Survivorship of Knee Megaprostheses

Compress – Biomet Healey et al

Survivorship of Knee Megaprosthesis

Compress – Biomet Healey et al

- 82 patients 1998 – 2008
- 33% patients more than 5 year f/u


Patient demographic and clinical characteristics

- Age (years)* 20.4 (14–63)
- Female/Male matched
- Primary 64
- Revision 18
- No tumor (arthroplasty revision) 2


Implant Survival

- 85% at 5 years
- 80% at 10 years

Survivorship of Knee Megaprosthesis

Implant survival


Device failure – 13/82

Survivorship of Knee Megaprostheses

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Number of patients</th>
<th>Site</th>
<th>Prostheses*</th>
<th>Implant survival (%)</th>
<th>Followup (years)</th>
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Summary

Problems with data
- Retrospective studies
- Data is being presented for all comers in terms of diagnosis to have adequate numbers to report
- Prospective studies with direct comparisons are lacking – randomization has been presented at MSTS and surgeon interest was lacking
- Patient demographic is changing with “tumor prosthesis” becoming mainstream revision implant – little data on revisions

Goals
- Multicenter prospective studies
- Tumor registry for “tumor” prosthesis use
- Common classification language
- Eliciting industry understanding and support that the “tumor” prosthesis is no longer just for tumors and “winter is coming” with increased numbers of revisions in the future
References


