Incidence of postoperative periprosthetic femoral fracture in a geriatric population after short stem primary THA. A multicenter prospective case series.

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Disclosure

The main author has no relevant financial disclosure
Introduction

• THA is one of the most clinically successful and cost-effective interventions in health care\(^1\)

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\(^1\) Bozic et al. JBJS Am. 2009
\(^2\) Kurtz et al. JBJS Am. 2014
Introduction

- THA is one of the most clinically successful and cost-effective interventions in health care¹

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**TABLE II Model Estimates and Projections based on the National Health Expenditure for Primary and Revision Total Joint Replacement Procedures**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary total hip arthroplasty</td>
<td>231,648 (184,165 to 279,132)</td>
<td>293,094 (237,717 to 348,472)</td>
<td>378,089 (308,449 to 447,729)</td>
<td>511,837 (413,092 to 610,583)</td>
</tr>
<tr>
<td>Primary total knee arthroplasty</td>
<td>471,088 (386,256 to 555,920)</td>
<td>655,336 (555,891 to 754,782)</td>
<td>926,527 (799,578 to 1,053,476)</td>
<td>1,375,574 (1,193,173 to 1,557,975)</td>
</tr>
<tr>
<td>Revision total hip arthroplasty</td>
<td>42,451 (26,279 to 58,623)</td>
<td>48,209 (29,296 to 67,122)</td>
<td>55,647 (31,851 to 79,442)</td>
<td>65,964 (32,030 to 99,898)</td>
</tr>
<tr>
<td>Revision total knee arthroplasty</td>
<td>47,262 (31,724 to 62,800)</td>
<td>64,129 (45,861 to 82,397)</td>
<td>88,274 (64,869 to 111,679)</td>
<td>127,510 (93,614 to 161,405)</td>
</tr>
</tbody>
</table>

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¹ Bozic et al. JBJS Am. 2009
² Kurtz et al. JBJS Am. 2014
Introduction

• Ageing of the population

• More THAs in older patients (>75yo)

• Increased risk of PPFx³
  • Qualitative and quantitative bone properties (osteoporosis, osteopenia)
  • Low-energy trauma (falls etc)

³Cox et al. Journal of Arthroplasty 2016
Introduction

• Increased use of short stems\(^4\)
  o Facilitate tissue sparing approaches
  o Preserve proximal femur bone stock
  o Improve reconstruction of hip biomechanics
  o Protection against proximal stress shielding

• Encouraging short and mid-term results\(^4,5\).

\(^4\) van Oldenrijk et al, Acta Orthopaedica 2014
\(^5\) Kim YH et al, JBJS (Br) 2011
Introduction

• A periprosthetic fracture after THA is a devastating event
  o Post-op complications
  o Poor clinical result
  o Increased mortality (17.7% 1-year mortality) \(^6\)

• Risk factors \(^7\)
  o Trauma
  o Age
  o Gender
  o Osteoporosis
  o Osteolysis / Aseptic loosening
  o Index diagnosis
  o Implants / Technique

\(^6\) Shield et al. Geriatr Orthop Surg Rehabil. 2014 Dec
\(^7\) Franklin J, Malchau H INJURY 2007
Question

Is there a higher incidence of postoperative periprosthetic fractures in the elderly after short stem THA compared to younger patients?
Study design

• Data prospectively collected in five centers in Switzerland and Germany

• Demographics:
  o 766 patients = 873 THAs
  o 434 males and 439 females
  o Mean age 64.9 yo (range 24.3 - 91.3 yo)

• Three age classes:
  o Class 1 (<60yo): 257 hips
  o Class 2 (60-75yo): 481 hips
  o Class 3(>75yo): 135 hips
Study design

- Partial collum preserving, metaphyseal engaging, cementless stem (range 84-118 mm) (Optimys™, Mathys Ltd Bettlach, Switzerland)

- Mean follow up: 24.3 months (range 1.2 – 51.9 months)
Results

• Five periprosthetic fractures, all due to documented falls in the first postoperative year

• Two B1, Two B2 and one B3 type according to the Vancouver classification
Results

• Overall incidence: 0.57%

• Individual class values:
  o Age class 1: 0.39% (1/257)
  o Age class 2: 0.21% (1/481)
  o Age class 3: 2.22% (3/135)
Results

• Overall incidence (Fisher’s exact test): p=0.0425

• Pairwise comparison with the Fisher’s exact test
  o Age class 1 vs Age class 2: p=1.00
  o Age class 1 vs Age class 3: p=0.12
  o Age class 2 vs Age class 3: p=0.034

• After Bonferroni correction the significance level was set to 0.0167

• We found no statistically significant differences of the PPFx incidence between the three age classes
Discussion

• Short stems can provide stable fixation
  o Stability and osseointegration are independent of poor bone quality\(^8\)

• No statistically significant differences between younger (<60yo) and elderly (>75yo) receiving a short stem\(^9\):
  o Clinical assessment (Harris Hip Score, VAS)
  o Radiological assessment

\(^8\) Kim YH et al., Int Orthopaedics (SICOT) 2013
\(^9\) Gkagkalis G et al., SwissOrthopaedics 75th annual congress, Basel
Conclusion

• The use of a short stem in the elderly is not associated with a higher incidence of postoperative PPFx.

• A short stem can be a safe choice for primary THA in the geriatric population.

• Longer follow-up and RCTs are necessary in order to further back up our hypotheses.
Thank you for your attention