

Pneumatic Broaching May Prevent Stem Subsidence in Revision Hip Arthroplasty

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Introduction:

Stem subsidence in revision total hip arthroplasty (THA) represents a significant failure concern. It can provoke postoperative recurrent dislocation, secondary femoral fracture, and discrepancies in leg length. Subsidence has been associated with both implant design and the type of canal model employed during surgery.

The literature shows that tapered conical implants offer higher axial stability than cylindrical implants [1,2,3]. Cylindrical implants typically have a limited cortical contact zone (ca. 5-7 cm), whereas rectangular stems allow a 18-22 cm bed preparation. Despite that, an average subsidence of 6 mm has been reported for a similar tapered conical design used by the authors [2]. We hypothesize that the use of a pneumatic hammer may be associated with less postoperative subsidence.

Methods:

- Sixty-one patients (62 hips), mean age 72 years
- Follow-up, 4.8 years (range, 2.5 - 7 years)
- Varying diagnoses and indications for revision THA
- Prospective, consecutive series
- Uncemented, tapered, rectangular cross-sectional, monoblock femoral component for revision (SLR-PLUS®, Plus Orthopedics AG; Rotkreuz, Switzerland)
- Approach: Anterolateral abductor splitting in the lateral position
- Broaching: Woodpecker™ Percussion Pneumatic Oscillating System (Integral Medizinaltechnik; Lucerne, Switzerland) (Fig. 3, Fig. 4) used in all cases
- Fenestration required in 6 patients
- Extended trochanteric osteotomy was performed in 2 cases
- RX measurement: Diagnostix Software (Gemed; Freiburg, Germany) (Fig. 1)
- Bed of the implant was prepared by double-tapered, sharply cutting, incremental femoral rasps driven by a Woodpecker pneumatic engine

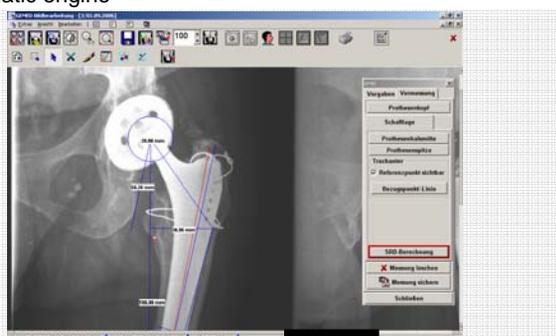


Fig. 1 Migration measurement using conventional x-rays

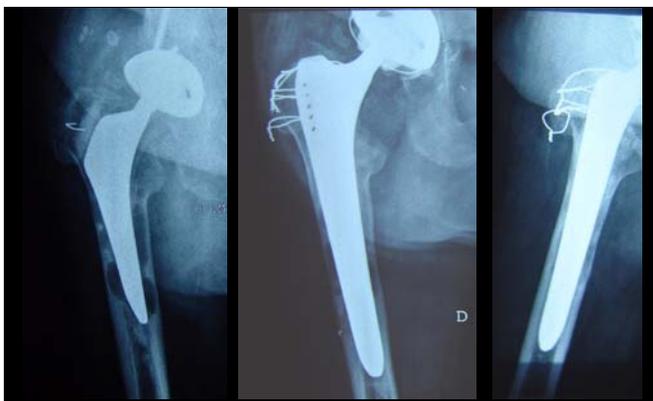


Fig. 3 Woodpecker (Integral, Lucerne, CH)

Results

The use of Woodpecker pneumatic hip broaching was not associated with any complications at the time of the surgical operation. There were no intraoperative fractures. There was 1 reinfection requiring acetabular re-revision. Two dislocations, 1 attributable to a femoral fracture and 1 to an acetabular component left in situ during the first revision, required re-revision. Thus, survivorship of the stem with revision for any reason as an endpoint was 100%. A 1 mm (SD, 1.5; range, 0-6 mm) subsidence of the revision stem was observed during the follow-up period (Table 1).

Intraoperative procedure	Author	Ø Subsidence
Cylindrical reaming	Engh [1]	8 mm
Conical reaming	Böhm [2]	6 mm
Pneumatically broaching	Hourlier	1 mm



Fig. 4. Air-driven broaching

Conclusions:

The motorized preparative broaching system helps to achieve an intimate cortical contact, which allows for the implantation of a femoral tube potentially 3 times as large as other conical preparative devices. Any adverse rotational forces are exerted to the bone during bed preparation. The implants can become more firmly seated through an extended press fitting. The potential benefits of this technique on implant longevity remains to be determined.