

4.2 Clinical and Technical Aspects in THA-Revision Surgery: Current Problems, Guidelines for Current and Future Solutions

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Introduction

In total hip revision arthroplasty each case offers the surgeon the possibility to use an implant system in combination with an operative technique matching the new standards of implant technology and evidence based medicine. The objective of this presentation is to demonstrate a consensus-based revision strategy for all possible revision scenarios.

Materials and Methods

All possible revision scenarios were subdivided in 12 different revision-causes which were linked to either the acetabular or the stem component. Subsequently 12 guide-line tables were developed. Each table demonstrates for each revision scenario the typical current revision procedure and the potential advantages using a new ceramic revision ball system.

Results

The reasons for the current procedures and the new ceramic ball system are systematically reviewed and discussed. As an example Table 1 demonstrates the current and future revision strategy in the case of aseptic loosening and/or mechanical failure of the acetabular component.

Figures 1, 2 and 3 demonstrate an example of acetabular bar leading to mechanical failure.



Figure 1:
Preoperative radiographs of secondary OA due to hip dysplasia (DDH).



Figure 2: Postoperative radiographs after hybrid THA with femoral head autograft acetabular roof augmentation.



Figure 3: Mechanical failure of the left acetabular component.

Table 1: Recommendations in case of aseptic loosening of the acetabular component.

Revision cause	Stem / Cup	Typical current procedure	Why?	Procedure with ceramic revision head	Why?
Aseptic Loosening Acetabular Component	Stem can remain in situ	1. Removal of head component 2. New acetabular component or new PE-Liner 3. Ceramic head should not be used. Metal-head is preferably used if inspection and palpation of the stem taper does not demonstrate any damage.	♣)	1. Removal of head component. 2. New acetabular component or new PE-Liner 3. Ceramic revision head is recommended.	♣) °)

- ♣) During the disengagement of the head component – both with metal and ceramic heads – the surface structure of the stem taper will be damaged. If a ceramic head would be used, there is an increased risk of breakage. Within the conically shaped ceramic ball hoop stress concentrations can develop based on the surface damage of the stem taper.
- ♣) If the articulation partners Ceramic / PE or Ceramic/Ceramic are used a decreased wear rate can be expected eventually leading to a reduced revision rate and to a longer implant survival.
- °) If the articulation partners Ceramic/Ceramic are used the three body wear problem will be excluded.

If in addition considerable damage of the stem taper can be seen either metal heads were used or the stem was exchanged. Now the revision ceramic ball system offers a new solution (fig. 4, 5).

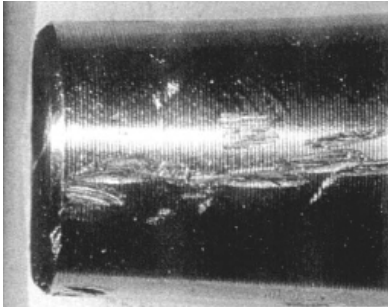


Figure 4:
Damage of the stem taper.

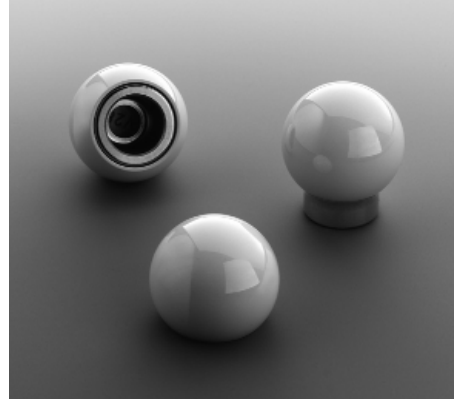


Figure 5:
Revision Ceramic ball system can be used as a new solution to provide a reduced future wear burden.

Discussion

Advantages and disadvantages of different revision strategies will be discussed in detail for all revision causes represented in 12 guideline tables and for each revision table literature references will be given.

Conclusion

To reduce the wear problem the articulation partners of ceramic and polyethylene or ceramic in combination with ceramic are an excellent choice. The new ceramic ball system offers substantial advantages when compared to current revision strategies.

References

1. Amis AA (1996) Is polyethylene still the best prosthetic bearing surface? *J Bone Joint Surg Br* 78: 345-348
2. Archibeck MJ, Jacobs JJ, Black J (2000) Alternate bearing surfaces in total joint arthroplasty: biological considerations. *Clin Orthop* 379: 12-21
3. Boutin P (2000) Total hip arthroplasty using a ceramic prosthesis. Pierre Boutin (1924-1989). *Clin Orthop* 379: 3-11
4. Paprosky WG, Magnus RE (1994) Principles of bone grafting in revision total hip arthroplasty. Acetabular technique. *Clin Orthop* 298: 147-155
5. Paprosky WG, Perona PG, Lawrence JM (1994) Acetabular defect classification and surgical reconstruction in revision arthroplasty. A 6-year follow-up evaluation. *J Arthroplasty* 9: 33-44