PETER BREHM
Die Präzision in Titan
für den Menschen

Executive Summary

Publication	**Management of severe periacetabular bone loss combined with pelvic discontinuity in revision hip arthroplasty** Friedrich MJ, Schmolders J, Michel RD, Randau TM, Wimmer MD, Kohlhof H, Wirtz DC, Gravius S Int Orthop. 2014 Dec;38(12):2455-61. doi: 10.1007/s00264-014-2443-6. Epub 2014 Jul 16.
Study	Retrospective analysis of routine clinical data
Implant	Custom made partial pelvic replacement, Peter Brehm GmbH, Germany
Patients	18 consecutive patients (7 male, 11 female) with a Ø age of 68 years (26-79 years) and Paprosky type 3B or AAOS type III and IV periacetabular defects.
Follow-up	Ø 30 months (range 17-62 months)
Method	Restoration of pelvic continuity and reconstruction of the anatomical hip rotation center are general principles in the treatment of severe periacetabular bone defects. Typical complications with this type of restoration are migration and loosening of components, dislocations and periprosthetic infections. Various techniques are available for the treatment, which are applied depending on the severity of the bony defects. One of these is the possibility of restoration with a custom-made implant, which is anchored mechanically stable in the existing host bone in order to achieve healing of the pelvic discontinuity and biological fixation. The hypotheses of the study are that the reconstruction of the bone stock in combination with the restoration of the anatomical center of rotation of the hip allows a survival rate as well as clinical and radiological results comparable to those of current publications. The custom made implant is planned on the basis of a CT scan (1 mm slices) of the entire pelvis. The existing landmarks as well as the contralateral hip joint are included to determine the center of rotation, the anchoring flaps and the cup orientation as well as the axes for the anchoring screws, which are critical for primary stability. The flaps are precisely matched to the remaining bone to prevent medial migration. They offer the option of additional screw fixation. After planning, modification if necessary and final release by the surgeon, the custom-made implant is built up in layers using the electron beam melting process (EBM®) and then milled with a 5-axis milling machine. The patients were operated via the lateral, transgluteal (n=13, 72%) or postero-lateral (n=5, 28%) approach. The final classification of the defects was performed intraoperatively.

	Cavitary defects were filled with the impaction grafting technique using allogeneic cancellous bone. After insertion of the implant, fixation was performed with an 8 mm pole screw and further 6.5 mm cancellous bone screws in the area of the acetabulum and flaps. The postoperative X-ray control was performed routinely after three days, six and twelve weeks, after 6 months and annually thereafter. The evaluation of healing was carried out according to the criteria of *Berry et al.*, the evaluation of cup migration according to the criteria of *Peters et al.* Bone grafts were defined as incorporated if the density and architecture of the bone structure corresponded to that of the surrounding bone. In determining the success rate, all cases of failure were considered regardless of the cause of failure. Case data were collected in Microsoft Excel (Micrsosoft Corporation, Richmond, USA) and statistic evaluation was performed with SPSS Version 18 (IBM, Armonk, NY, USA). Arithmetic mean values and standard deviations were calculated as part of a statistical analysis. For the *Paired Student´s t-tests* the statistical significance was assumed to be $p < 0.05$. *Kaplan-Meier analysis* was used to determine survival probability with a confidence interval of 95%; the endpoint was clinical or radiological failure.
Results	No significant complications occurred intraoperatively. In the clinical results, the HHS improved on average by 40 points (25-66 points) from 28 (12-46) points preoperatively to 69 (47-91) points postoperatively. Radiologically, 88.9% (16 of 18) of the implants were stably anchored with no signs of migration. The two unstable implants had to be explanted due to recurrence of periprosthetic infections. **Aseptic loosening of implants did not occur in any case.** **The Kaplan-Meier survival rate was 88.9% (84.6-93.8%).**
Key Points	**The clinical results are at least comparable to those described in other publications. The survival rate of the custom-made implant is also comparable.** **The advantages of this type of surgical restoration are the possibility of bridging large, combined defects, individual adaptation to the remaining bone stock and rigid anchoring, which supports healing of the pelvic discontinuity.**
Abbreviations	HHS – Harris hip score, EBM® - electron beam melting

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