

Introduction and problem

Modular total arthroplasty as a treatment for tumor patients with bony metastases represents a clinical challenge that has become increasingly important. As in this particular case, situations such as pathologic fractures with advanced bone lesions in the hip are a major indication for this treatment as the extent of bony destruction cannot be properly addressed by joint-preserving therapy. Periacetabular bone metastases frequently require surgical treatment as they are associated with persistent pain and disability and significantly impair these patients' quality of life. Therefore, the therapy objectives include immediate alleviation of pain as well as rapid restoration of hip function and weight bearing in the affected extremity to improve the well-being of the patient.

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Diagnosis

A 78-year-old female patient with reduced general health and pain in the right hip that impaired function and was exacerbated by load was transferred from the geriatric ward of another facility to our center for treatment. Trauma or fracture was initially excluded (Fig. 1). An acetabular fracture was detected on the radiograph obtained in our center 2 months later (Fig. 2). Prior to the fracture event the patient was able to walk with a wheeled walker.

A right periacetabular metastatic bone lesion of class III a according to the modified Harrington classification¹ was right-sided diagnosed. Because of the complexity of their surgical treatment, class III lesions according to the Harrington classification represent the greatest challenge for the orthopaedic surgeon. The extent of bone destruction can make it significantly more difficult to achieve a solid reconstruction and can cause technical difficulties in the removal of the tumorous tissue.

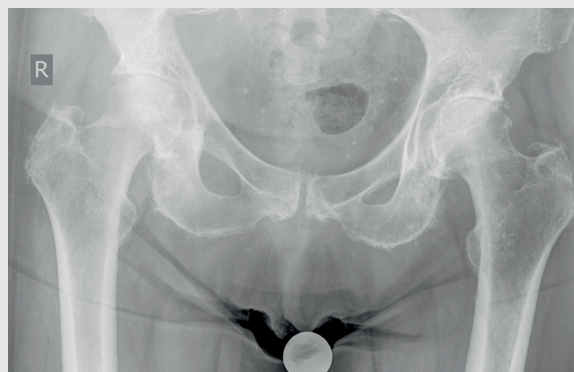


Fig. 1 Preoperative initial situation, no fracture detected, 2 months previously



Fig. 2 Preoperative situation, 2 months later, detection of the acetabular fracture in the right hip

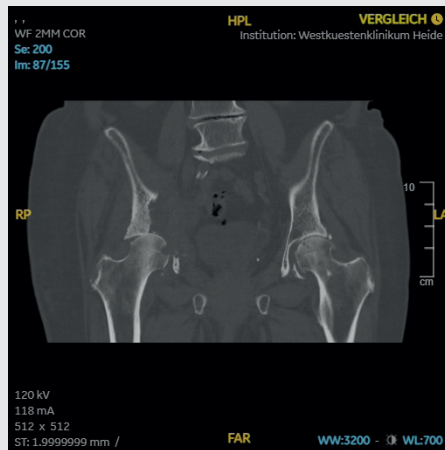


Fig. 3 Preoperative situation, bone destruction

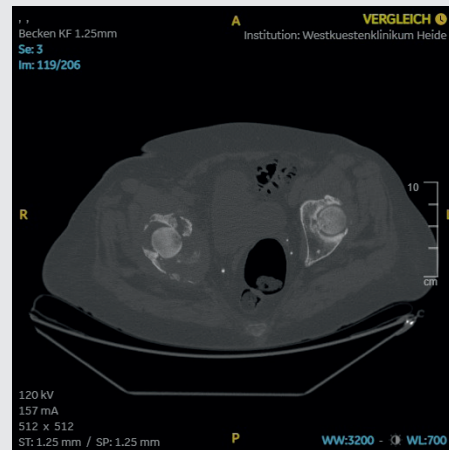


Fig. 4 Preoperative situation, bone destruction

The computed tomographic (CT) image of the pelvis showed advanced massive bone destruction in the region of the os ilium extending into the acetabulum with a pathologic fracture in the region of the anterior and posterior acetabular columns and an extensive soft-tissue tumor component spreading intraabdominally and infiltrating the right obturator internus muscle. The acetabular bearing was unstable; the femoral head was centrally subluxed and showed osteolytic changes (Figs. 3-6). The patient had a severe joint effusion in the affected hip.

A comprehensive systematic evaluation (staging) was initially undertaken to appraise the surgical strategy and the risks of treating the fracture. Both the growth pattern and immunohistochemical findings suggested a manifestation of an endometrial carcinoma, specifically of the endometrioid type. Further metastases that might require orthopaedic treatment were not detected. Within the scope of the evaluation process it was decided that surgical placement of an MRS-TITAN Maximum revision cup (Fig. 7) was indicated in order to facilitate a reconstruction tailored to the specific individual defect situation and achieve a stable weight-bearing construct. In preparation for the operation, a gynecologist was consulted and erythrocyte concentrates were administered to the patient. Mammography could not be performed due to the patient's immobility.



Fig. 7
MRS-TITAN Maximum
with iliac peg

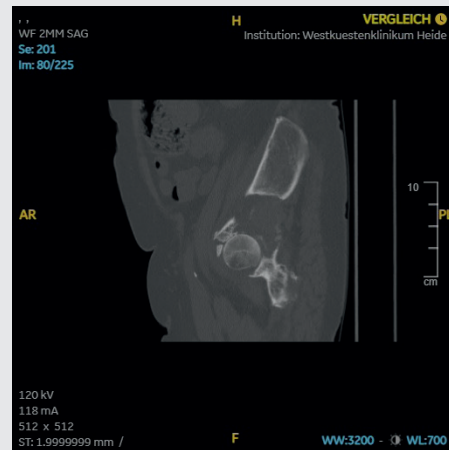


Fig. 5 Preoperative situation, bone destruction

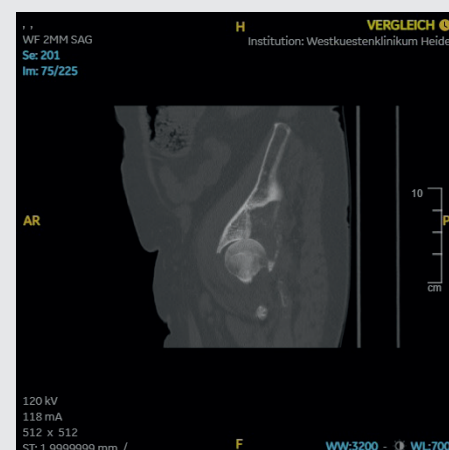


Fig. 6 Preoperative situation, bone destruction

Treatment

The operation was performed corresponding to the pre-operative planning via a modified transgluteal approach according to Bauer with the patient placed in a lateral position. The incision was extended proximally to expose the osteolytic areas on the pelvis. The acetabulum was fractured in the center and destruction was present on the bottom of the acetabulum extending as far as the inferior posterior acetabular margin. Stable bony support at the acetabular roof was present only over a width of 1.5 cm. The anterior column had sufficient bony support. The tumorous soft tissue was radically removed.

The pelvic reconstruction and defect augmentation following the resection of the tumor was performed using a donor femoral head from our own bone bank. After dissection, reaming, and continual checking of the reaming with the aid of the MRS-TITAN Maximum trial cup (size 56), this cup was impacted into the prepared acetabulum. The course of the iliac peg is indicated on the strap of the trial implant. After the trial cup was removed, the MRS-TITAN Maximum cementless modular revision cup (size 56) was placed. The length and positioning of the iliac peg was determined with the aid of the K-wire under fluoroscopic control (Fig. 8).

Correct positioning of the cup was achieved with the iliac peg (70 mm), which was securely fixed with a screw. The cup was sealed with the pole screw in the os ilium. The superior strap and the cup body were also secured with 5 titanium flat-head spongiosa screws. The screw fixation options were used to achieve maximum cup stability. After proper position was verified by fluoroscopy (Fig. 9), the polyethylene insert (56/32 mm) was placed.

After implantation of the cemented stem, correct position of the implant was again verified by fluoroscopy. The joint was found to be very stable without any tendency to dislocate in extreme degrees of rotation.

For subsequent therapy, specimens for histopathologic examination were harvested during the procedure. The patient was transferred to the intermediate care ward for postoperative observation. She was then moved back to the normal ward on postoperative day one in stable cardiopulmonary condition. Intravenous antibiotic therapy (Cefazolin, 2g, 3 times daily) was continued for 7 days. The tumor conference specified radiation therapy of the pelvis and treatment with Denosumab (human monoclonal antibody IgG2, high binding affinity and specificity to the RANKL, receptor activator of nuclear factor Kappa B ligand).

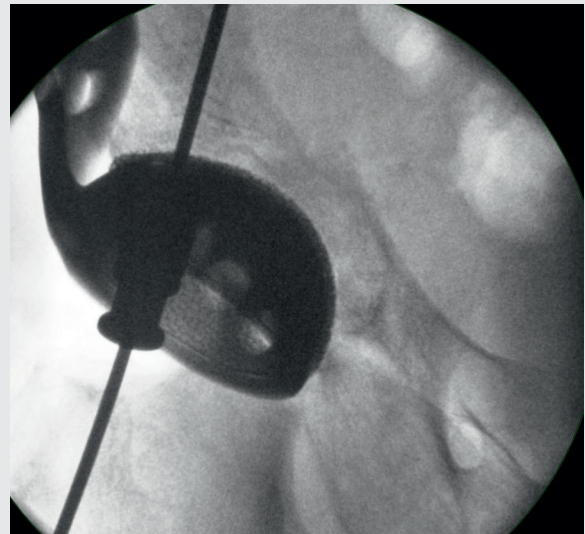


Fig. 8 Intraoperative fluoroscopic verification of K-wire position

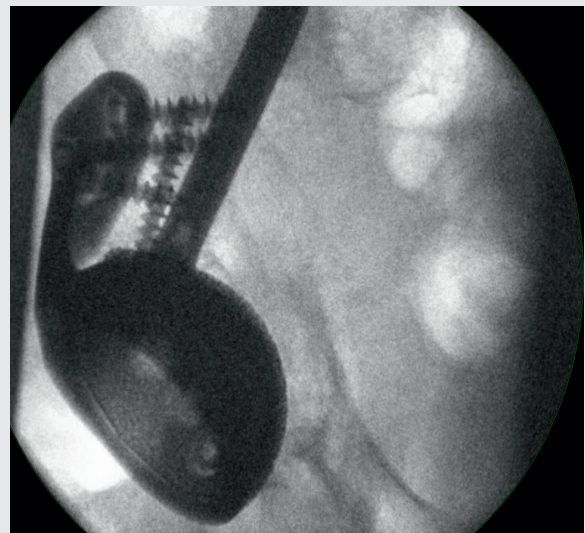


Fig. 9 Intraoperative fluoroscopic verification of cup position

Result

The patient's pain has been decreasing since the operation. The perioperative and postoperative course was normal. No perioperative or implant-associated complications occurred. Mobility training was begun immediately postoperatively under the supervision of a physical therapist. Full weight bearing with the use of a wheeled walker was permitted. There was no difference in leg length. Range of motion was in the target range at 0°/0°/90° extension/flexion. As her recovery was free of complications, the patient was released to rehabilitation.

The present case demonstrates that a modular revision cup as a treatment for total arthroplasty for pathologic acetabular fractures in tumor patients provides a reliable surgical therapy option.

Very good stability was achieved using the MRS-TITAN Maximum revision cup with strap screw fixation and an iliac peg (Figs. 10, 11). The treatment described allows early postoperative mobilization and weight bearing with immediate functional improvement in the affected hip.

References

Wei R, Lim CY, Yang Y et al. Surgical Treatment and Proposed Modified Classification for Harrington Class III Periacetabular Metastases. *Orthop Surg.* 2021 Apr;13(2). Doi:101111/os.12918. Epib 2021 Mar.4. (PMC free full text) <https://pubmed.ncbi.nlm.nih.gov/33665985/>

Image sources:

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Fig. 7 PETER BREHM GmbH

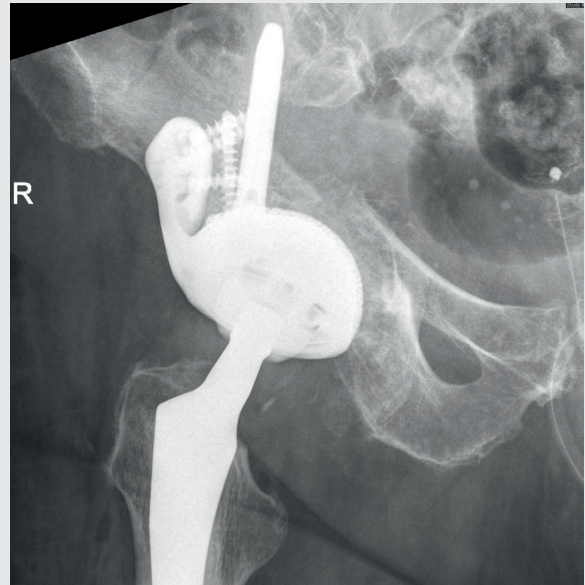


Fig. 10 Postoperative follow-up radiograph with MRS-TITAN Maximum revision cup, screw fixation, and iliac peg.

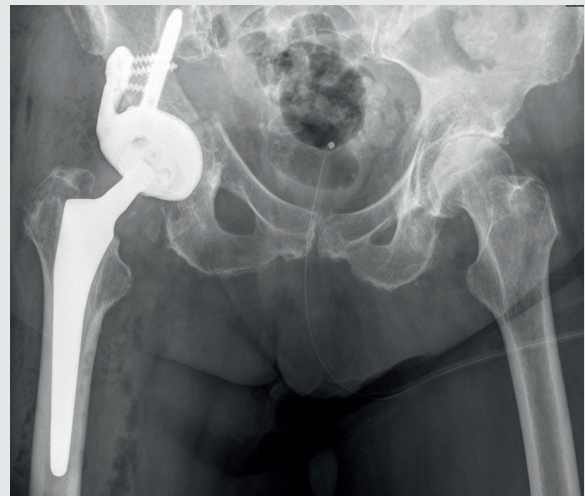


Fig. 11 Postoperative radiographic follow-up examination, plain pelvis radiograph A-P