

Endopelvic cup migration in the presence of concomitant infection and pseudoaneurysm of the external iliac artery

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SUMMARY

Endopelvic migration of the acetabular prosthetic component is an uncommon but serious complication in hip replacement. When the medial acetabular wall is perforated, intrapelvic injuries may occur. In such cases, the external iliac artery and bladder are the most commonly involved structures. In this case three main sources of potential problems that emerge from preoperative assessment must be taken into account: presence of infection with periprosthetic collection, significant lymphedema in the lower extremities complicated by the presence of ulcerative lesions in both legs, and vascular involvement with the presence of a pseudoaneurysm of the external iliac artery. In order to minimize the surgical risks presented by explanation of the prosthesis, interventional angiography should be conducted, which can reveal the previously undiagnosed pseudoaneurysm and allow positioning of a covered stent to protect the vessel. Placement of a vascular covered stent before explanation of the acetabular component offers a two-fold advantage: i.e. to secure this important blood vessel before surgery and allow a less invasive approach, which is of particular relevance when taking into account the precarious situation of soft tissues.

Key words: endopelvic cup migration, infection, pseudoaneurysm, external iliac artery, vascular stent

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Introduction

Mobilization of the acetabular prosthetic component and its endopelvic migration is an uncommon but serious event in hip replacement. In case of medial acetabular wall perforation, intrapelvic injuries may occur. In such cases, the external iliac artery and bladder are the most commonly involved structures. When endopelvic loosening occurs, infection may occur in up to 43% of cases ¹.

As described in the literature, before proceeding with removal of the loose prosthetic cup there are several principles that must be followed: as a first step, all potential risks need to be identified through careful preoperative planning. This allows defining the best strategy for each individual case. Preoperative examina-

tions include imaging studies (X-ray, CT, angio-CT), as well as hematochemical tests looking for possible signs of infection (CRP, ESR, joint aspirate/arthrocentesis) ².

Herein, we present the case of a patient with endopelvic cup migration associated with the presence of sepsis and external iliac artery pseudoaneurysm (Fig. 1).

Case description

The patient is a 76-year-old woman with septic acetabular cup loosening and pseudoaneurysm of the external iliac artery. The patient's remote clinical history is characterized by a vulvar carcinoma treated surgically (with bilateral inguinal lymphadenectomy) followed by chemotherapy and radiotherapy. Soon afterwards she manifested significant lymphedema in the pelvis and in the lower extremities complicated by the presence of ulcerative lesions in both legs. In 2021, the patient underwent left total hip replacement as a consequence of radiotherapy induced femoral head necrosis. Recently, in September 2023, a left peri-trochanteric secretory cutaneous fistula at the surgical incision site was observed. X-rays, culture swabs and cold blood cultures were performed. X-rays showed intrapelvic cup mobilization. Blood cultures were positive for *S. epidermidis* as a likely contaminating agent, and wound swab showed positivity for *Citrobacter farmeri*. After performing an antibiogram, optimized antibiotic therapy was established.

To complete the preoperative planning, CT of the abdomen and left hip was performed with and without contrast medium. CT showed the presence of a 5.2 x 6.1 x 7 cm collection in the context of the periprosthetic soft tissues, and concomitant prosthesis induced compression of the external iliac artery with formation of a pseudoaneurysm without evidence of vascular injury (Figs. 2,3).



Figure 1. Standard x-ray view of the pelvis.

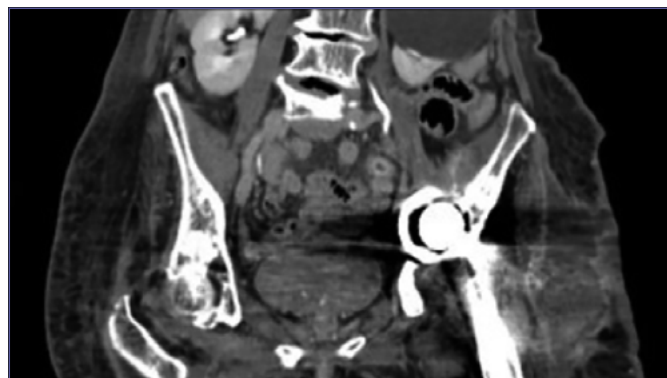


Figure 2. Computer tomography of the pelvis before revision.



Figure 3. Computed tomographic angiography before revision.

A pre-operative arteriography confirmed the marked compression of the left external iliac artery caused by the prosthesis with evidence of a previously undiagnosed pseudoaneurysm (Fig. 4). As a preventive measure, before proceeding with explanation of the prosthetic component, a covered vascular stent was put in place with the aim of completely excluding the pseudoaneurysm (Fig. 5). It was only after this step that the prosthesis was carefully explanted (Girdlestone) along with major debridement of soft tissues, and samples taken for microbiological assessment.

Discussion

Loosening of the acetabular component in the presence of its endopelvic migration can be an important surgical problem, since adjacent structures such as the external iliac artery and femoral nerve can be injured as well as damage to pelvic organs, i.e. urogenital and digestive tract. The causes of loosening can be various: mechanical loosening, malposition of the

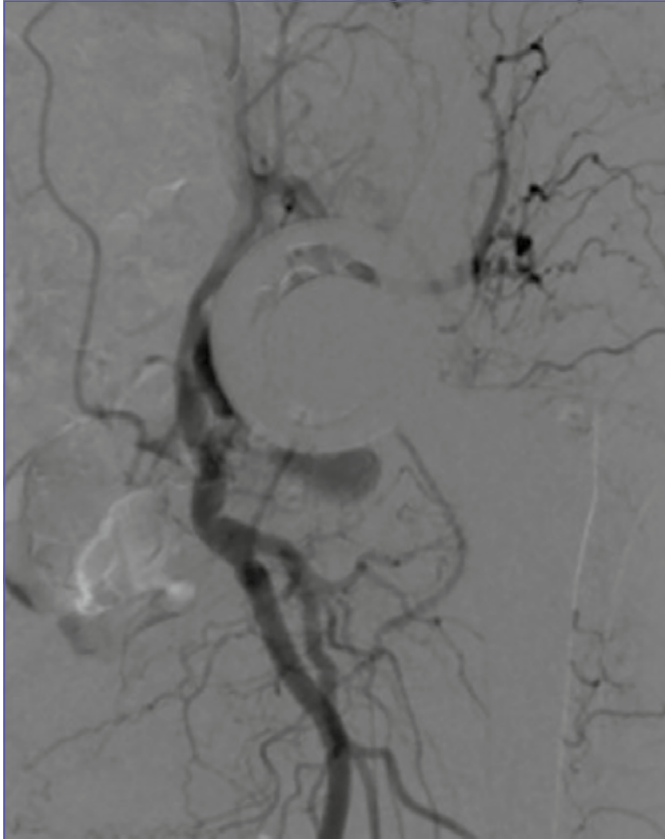


Figure 4. Pre-operative arteriography.

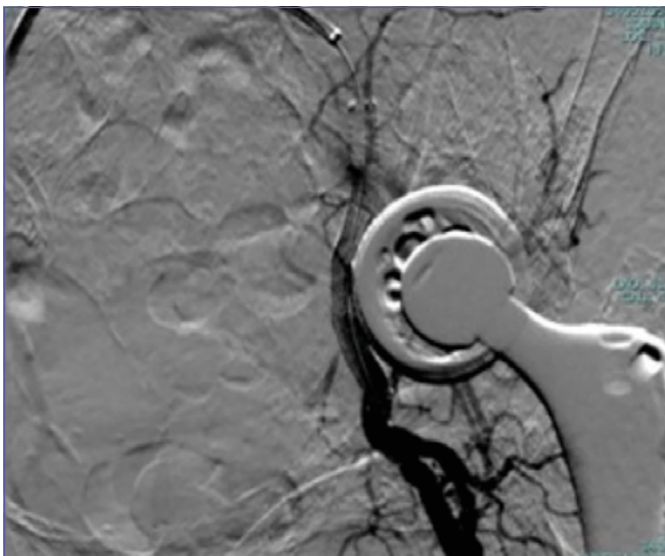


Figure 5. Covered vascular stent in place.

cup resulting in chronic instability, injury, chronic infection, previous radiotherapy in the pelvic site, aplastic anemia, metastasis from carcinoma, and osteolytic lesions ^{1,2}.

Prosthetic revision in these cases exposes the patient to a number of risks: neurovascular injury, intrapelvic organ injury, and potentially life-threatening complications. In order to plan a safe removal of the migrated implant, several key-points must be taken in consideration, such as careful identification of all potential risks, a thorough pre-operative workup, and consequently surgical tactics aimed at removing the migrated device without causing injuries to important tissues, sparing as much as possible muscle and bone-stock and finally a satisfactory pelvic anatomy and acceptable limb length through prosthetic revision ². When the aforementioned structures are considered to be at risk (injured and/or threatened), the endopelvic subperitoneal approach allows a controlled removal of the acetabular component ^{4,5}. Additionally, depending on the conditions of the iliopsoas muscle, i.e. when the iliopsoas muscle is damaged and components are in contact with the peritoneum, a transabdominal approach should be preferred ⁶. For these reasons, it is essential to carry out thorough preoperative evaluation, including arteriography. The literature recommends performing an arteriography of the external iliac artery because in case of pseudoaneurysm the surgical program needs to be adapted accordingly ^{3,7-11}.

During preoperative evaluation, as already mentioned, along with radiological examinations (X-ray, CT, angio-CT), it is also important to perform laboratory tests (hematochemical tests, microbiological tests from swab or arthrocentesis sampling). Indeed, severe endopelvic migration of acetabular components occur in cases of chronic infections ^{1,3-4}. It has been reported that the frequency of infections in presence of acetabular loosening and endopelvic migration can be as high as 43% and the most frequently found bacterium is *Staphylococcus aureus* ¹. It has also been supposed that this high risk may be secondary to communication between the subperitoneal space and the hip joint ⁵. In a review of 50 cases, a higher frequency of endopelvic migration of the acetabular component after primary total hip replacement (62%) was reported compared to revision total hip arthroplasty (38%). Device components representing a danger for important structures and organs were mainly cement and screws (66%) rather than the prosthetic cup (34%). Infection was present in 54% of cases. In terms of complications, in the review of 50 cases, 44% involved vessels, 34% urogenital structures (26% involving the bladder), 12% the digestive tract, 6% the sciatic nerve and 4% the iliopsoas muscle ³.

Indeed, in our case, we had to take into account three main sources of potential problems that emerged from preoperative assessment. The first was the presence of infection with peri-prosthetic collection, the second was the significant lymphedema in the lower extremities and in the pelvis which would have been a major concern for both the surgical approach and post-operative healing of the soft tissues and the third was the presence of a pseudoaneurysm of the external iliac artery.

We therefore decided for a lateral surgical access on the previous scar, although in order to minimize surgical risks presented by explanation of the prosthesis, interventional angiography was con-

ducted, which showed the previously undiagnosed pseudoaneurysm and allowed us to place a covered stent to protect the vessel since morbidity and mortality resulting from the presence of a pseudoaneurysm are high, with an estimated 11% incidence of limb loss and a 6% mortality rate⁶. When vascular repair has to be performed as an emergency procedure, the mortality rate increases to 33%^{5,7}. In our case, the placement of a vascular covered stent before explanation of the acetabular component offered a two-fold advantage, i.e. to secure this important blood vessel before surgery and allow a less invasive approach, which was of particular relevance taking into account the precarious situation of the soft tissues.

Only after safe placement of the stent explantation was carried out. A vast debridement of soft tissues which were of very poor quality both because of the presence of the infection and of actinic damage from previous radiation therapy was performed. Samples were taken intraoperatively for microbiological assessment to confirm the preoperative results and adapt the antibiotic therapy if necessary. With extreme care, the prosthesis (Girdlestone) was explanted. In view of the patient's clinical condition, Girdlestone was opted for and not a two-stage revision.

The decision to avoid revision of the implants and opt for Girdlestone was based on the overall benefit-risk assessment which guided the surgical strategy from the very beginning. We decided to focus on restricted clinically important benefits such as decrease in pain and resolution of infection. Optimal functional recovery by the mean of a complete revision of the implants would have represented too much burden for the general conditions of this patient, particularly the two-stage approach. It was then been decided in agreement with patient's expectations to minimize the risks and concentrate on the two very meaningful benefits mentioned.

Conclusions

The management of endopelvic cup loosening requires careful and meticulous preoperative evaluation: comprehensive imaging (X-ray, CT, angio-CT), and a search for signs of infection (hematochemical and microbiological tests). The preoperative course should be supplemented by other examinations, dictated by clinical signs (urinary or digestive system study, ultrasound). Based on the results of preoperative workup, the therapeutic strategy (choice of approach, one-stage or two-stage revision) can be determined. However, treatment should be always individualized, tailored to the patient, aligned with realistic expectations, and must have a true positive impact in terms of benefit to the patient's quality of life. When vascular damage is present, and there is a concomitant presence of negative clinical conditions which might either prevent or render an endopelvic approach not feasible, in line with our experience we suggest the placement of an endovascular stent to secure large vessels before implant explantation.

Finally, it is important to stress the role of a multidisciplinary approach which is fundamental in the management of these cases;

the collaboration of different specialties, i.e. microbiologist, radiologist and orthopedic surgeon, is the basis of proper management.

Conflict of interest statement

The authors declare no conflict of interest.

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Author contributions

All authors have contributed in equal manner to the clinical case as well as to redaction of the manuscript.

Ethical consideration

This is a retrospective case report no Ethical Committee approval was required. The patient agreed in writing to the utilization of the anonymized clinical data for scientific purposes.

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