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Technical Note

A modified iliofemoral approach to intrapelvic acetabular revision – technical note☆

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ABSTRACT

Among the patterns of acetabular osteolysis associated with acetabular loosening, the authors emphasize the severity of pelvic dissociation and medial segmental losses in which the quadrilateral lamina is severely affected. Such lesions are potentially lethal in cases of large vascular injury. This note aimed to describe a modified iliofemoral approach in cases of massive intrapelvic migration of the acetabular component in patients with total proximity of the iliac vascular bundle and absence of an anatomical demarcation plane between the migrated contents and the iliac bundle. This approach was performed in 12 of 21 patients who had these criteria.

Acesso iliofemoral modificado para revisão de componente acetabular intrapélvico – nota técnica

Palavras-chave:
Artroplastia de quadril
Articulação do quadril
Acetábulo

RESUMO

Entre os padrões de osteólise acetabular associados às solturas acetabulares, os autores destacam como de maior gravidade a dissociação pélvica e as perdas segmentares mediais nas quais a lâmina quadrilátera está gravemente acometida. Tais lesões são potencialmente letais em casos de lesão vascular de grande porte. O objetivo desta nota foi descrever um acesso iliofemoral modificado quando há migração intrapélvica maciça do componente acetabular em pacientes com proximidade total do feixe vascular ilíaco e ausência de plano demarcatório anatômico entre o conteúdo migrado e o feixe ilíaco. Esse acesso foi feito em 12 pacientes de 21 que apresentavam tais critérios.

☆ Study conducted at Instituto de Ortopedia e Traumatologia, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo (HC-FM-USP), São Paulo, SP, Brazil.

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Introduction

In the last 50 years, total hip arthroplasty has been the best option for surgical treatment in patients with osteoarthrosis, presenting good results in all orthopedic reference centers.[1]

However, over the years, periprosthetic osteolysis due to wear of the polyethylene interface and metal particles, with the production of debris, has become one of the major challenges for hip orthopedists, leading to major surgical revision procedures, with increased morbidity, a long learning curve for the surgeon, and great costs for the paying sources. An exponential growth in the number of these procedures is also predicted, due to the wide dissemination and diffusion of primary hip arthroplasty technique, in addition to the aging and increase of life expectancy observed in most countries.[2]

Among the acetabular osteolysis patterns associated with acetabular loosening, the authors highlight the severity of pelvic dissociation and the medial segmental loss, in which the quadrilateral lamina is severely affected (AAOS).[3]

These migration patterns with the massive presence of the acetabular component in the intrapelvic position may present a high risk of damage to vital anatomical structures. According to an anatomical cadaver study, these structures include the internal and external iliac arteries and veins, urethra, bladder, sigmoid colon, rectum, femoral nerve, obturator nerve, and vas deferens.[4]

Such lesions can be caused by compression of migrated metal components, whether an acetabular screw, the acetabular component itself or even cement particles adhered to the risk structures.

Among the intrapelvic lesions, the lesion of the femoral iliac bundle (mainly the external iliac vein) is the situation that presents the highest risk of intraoperative death.[5]

Despite the relevance of the subject, there is still no consensus in the literature regarding the ideal flowchart for the treatment of these patients. Some authors indicate retroperitoneal access in all patients at risk, with the isolation of the iliac femoral bundle and reconstruction in one or two surgeries.[6]

Regarding vascular imaging, some authors claim it is unnecessary, while others suggest arteriography or angiotomography. There is also no consensus as to the best approach to be used in revision surgery: posterior, lateral, or anterior (iliofemoral or ilioinguinal).[7]

This study is aimed at describing a modified iliofemoral approach for revision of massive intrapelvic migrations of the acetabular component in a particular vascular risk situation.

Risk migration was defined as the presence of an angular migration above 90 degrees in relation to the limits of the iliopectineal line in the anteroposterior pelvic radiograph. This measurement was carried out using the digital goniometer software available (Enterprise, Philips®; Fig. 1).

The approach described below was performed in the 12 patients, of a total of 21 patients with intrapelvic migration >90 degrees, who met the following criteria:

- absence of gastrointestinal or genitourinary symptoms;
- massive intrapelvic acetabular migration according to the radiographic criteria described above;

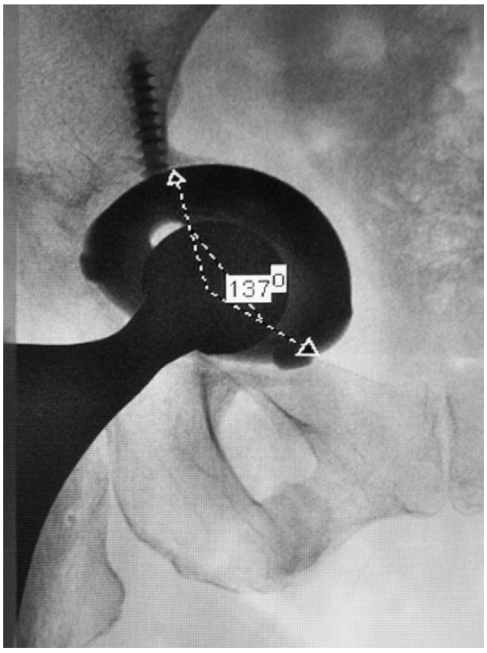

Fig. 1 – Measurement of intrapelvic angular migration.

- absence of a radiographic sclerotic line that surrounds the intrapelvic portion of the migrated component;
- direct contact of the migrated component with the external iliac vascular bundle or a distance of less than 5 mm between the external iliac artery or the external iliac vein visualized in the axial sections of pelvic angiotomography (Fig. 2).

Surgical technique

The anesthesiology team must provide a safe surgical protocol for this type of situation. This protocol includes: general anesthesia with the patient in a horizontal dorsal decubitus position, mean arterial pressure monitoring, bladder

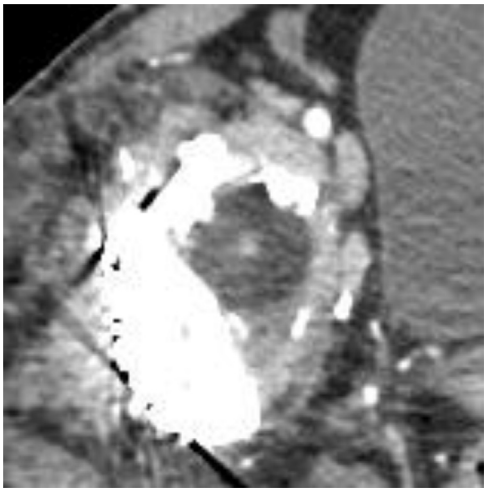

Fig. 2 – Angiotomography demonstrating direct contact of the external iliac vein with the acetabular component.

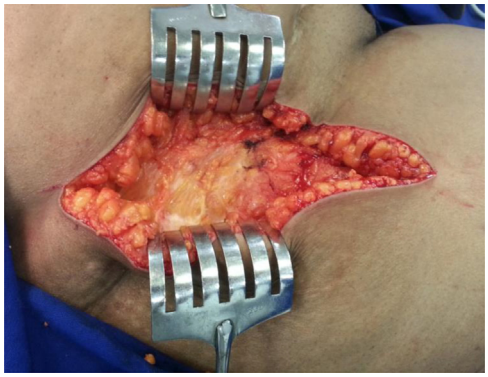

Fig. 3 – Initial incision.

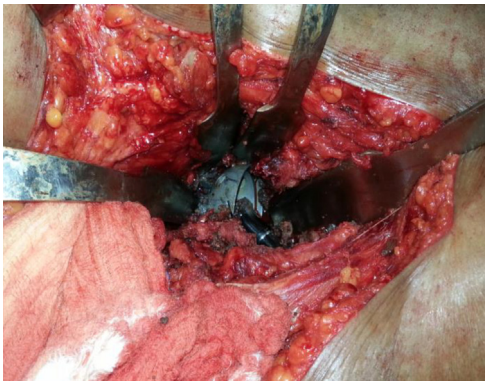

Fig. 5 – Dissection and complete isolation of the component to be removed.

catheterization, as well as central venous access. Such measures facilitate the management of blood volume, with possible rapid transfusion of large volumes, red cell concentrates, or plasma. It is also recommended that the immediate postoperative care should be performed in an intensive care unit.

The patient is placed in a supine position, on a surgical table that allows limb extension in cases where a concomitant revision of the femoral component is necessary.

The proximal portion of the Smith-Petersen iliofemoral approach was initiated up to 2.5 cm from the anterosuperior iliac spine (Fig. 3). At this point, the incision was extended lengthwise by 15 cm. The "first window" with dissection under the iliac muscle was made until the migrated intrapelvic contents were directly palpated.

A proximal tenotomy of the tensor fasciae latae muscle was performed, and the tendon was repaired with suture for reinsertion at the end of the surgery. At this time, the authors performed what they consider to be a modification of the original approach, which is a quadrilateral osteotomy of the anterior superior iliac spine (2 × 2 cm; Fig. 4).

This procedure aims at relaxing the inguinal ligament and the entire inguinal floor, moving the vascular bundle anteriorly and medially. After the osteotomy, a distal dissection between the rectus femoris and the gluteus minimus is made. In a proximal direction, the dissection should be performed close to the periosteum or close to the prosthesis until total insulation of the component to be removed (Fig. 5).

The femoral component is removed when necessary, followed by removal of the acetabular component. A member of the microsurgery team of the hospital was present in the operating room in all surgeries. In only one patient, a distal dissection of the common femoral vein was made prior to revision, due to the presence of cement adhered to the external iliac vein wall. The acetabular cementation plug was detached from the remaining cemented component using narrow osteotomes while the femoral vein was maintained with a vessel loop.

After the components are removed, the surgical and anesthesiologists teams determined whether the revision would be made in that moment or at another time, in accordance with the clinical conditions of the patient at the moment.

In these cases, acetabular reconstruction requires the use of antiprotrusion devices and the use of bone graft in large quantities; another alternative is the use of a cup-cage combination when trabecular metal components are available (Fig. 6). The femoral revision is performed at 30 degrees of extension and maximal external rotation of the limb, after the deinsertion of the pubofemoral and ischiofemoral ligaments. This deinsertion is part of the femoral exposure technique when the direct anterior approach is used in primary hip arthroplasties. When this deinsertion is done, the femur can

Fig. 4 – Osteotomy of the ASIS after the "first window" and after tenotomy of the tensor fasciae latae muscle.

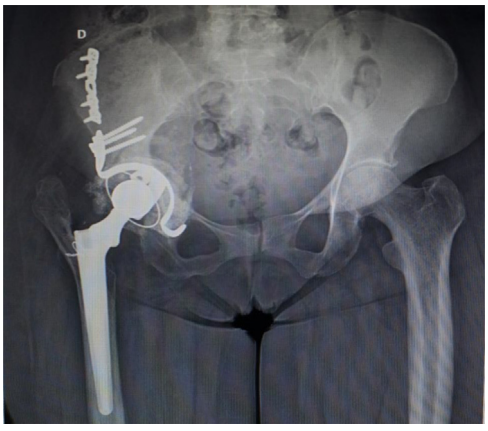

Fig. 6 – Reconstruction with bone graft and reinforcement ring.

be anteriorly mobilized simply by extending the distal half of the surgical table to about 30 degrees. Moreover, using this approach for intrapelvic revision, a proximal tenotomy of the tensor fasciae latae muscle can be performed, which further facilitates femoral exposure, since in the direct anterior approach for primary total hip arthroplasty the tensor fasciae latae muscle is not deinserted from the iliac crest.

After revision of the component(s), the iliac spine is reinserted with a small fragment cancellous screw; the tensor fasciae latae muscle is reinserted, the aponeurosis of the external oblique muscle is closed, and the fascia lata is also distally closed. The superficial layers (subcutaneous and skin) are addressed according to the normal protocol.

No intraoperative or late vascular injuries (such as pseudoaneurysms) were observed in any of the patients in whom this approach was used.

Final remarks

Albeit complex, the use of this approach in the specific situation described is feasible and safe. The authors recommend this approach in patients in whom there is contact (or distance smaller than 5 mm) of the vascular bundle with the migrated content on pelvic angiotomography, as well as the absence of a radiographic sclerotic demarcation plane.

Conflicts of interest

The authors declare to have no conflicts of interest.

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