CASE REPORT

Dislocated trial femoral head during total hip arthroplasty: review of the literature and the new algorithm for treatment

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SUMMARY

Dislocation of the trial femoral head is a rare and unpleasant event that can compromise the success of the total hip arthroplasty. A 62-year-old Caucasian woman with osteoarthritis was admitted to our Department and underwent an elective total hip arthroplasty. While performing the dislocation manoeuvre the trial femoral head dissociated from the taper in the superior and anterior direction in the soft tissue and could not be retrieved immediately. The operation was then executed and finished in an ordinary manner. Three months after discharge from our department patient presented with the pain in the hip and groin and periprosthetic joint infection was diagnosed. The successful second operation for the retrieval of the dislocated trial femoral head was conducted through ilioinguinal approach. In this paper we reviewed the published literature and developed the algorithm for the decision-making while dealing with the dislocated and lost trial femoral head.

BACKGROUND

Although regarded as one of the operations that offer the best functional outcome, and even named the operation of the 20th century, THA (total hip arthroplasty) still has some intraoperative complications.¹ Dislocation of the trial femoral head is a rare and unpleasant event that can compromise the success of the operation. In this paper we reviewed the published literature and developed the algorithm that can help in making decisions while dealing with the dislocated and lost trial femoral head. In addition, we present a case of periprosthetic joint infection (PJI) in the setting of dislocated femoral head that is the first description in the literature to the best of our knowledge.

CASE PRESENTATION

A 62-year-old Caucasian woman with a history of a painful left hip and radiographic signs of osteoarthritis was admitted to our Department. The patient underwent an elective total hip arthroplasty through a direct lateral approach in a right lateral decubitus position. Cementless acetabulum (Lima Corporate, SPH-ST) was implanted in a press fit fashion. After preparation and broaching of the femoral canal and prior to the implantation of the original femoral component (Lima Corporate, C2 femoral stem) the trial reduction took place with the 28 mm femoral trial head and a standard taper (12/14 mm). Good range of motion was obtained,

the hip was stable and there were no signs of impingement. While performing the dislocation manoeuvre the trial femoral head dissociated from the taper and was lost in the soft tissue. The trial femoral head dislocated in the superior and anterior direction and could not be retrieved despite numerous immediate attempts that only prolonged the surgery for 60 min and pushed the trial femoral head deeper in the soft tissue. Intraoperative fluoroscopy was performed and showed intact acetabulum. However, the trial femoral head was radiolucent and therefore could not be identified. It was lost in the anterior and somewhat superior direction. Given the intact acetabulum, it was proposed that it had most likely migrated superiorly along the iliopsoas muscle tendon. It passed along the iliopsoas tendon under inguinal (Poupart's) ligament, lateral from iliopectineal arch and through the lacuna musculorum ended in the pelvis. It could not be retrieved utilising direct lateral approach as clearly evidenced. The operation was then executed and finished in an ordinary manner.

TREATMENT

After the operation the patient was informed about the incident and of possible consequences and treatment options. The patient decided for the retention of the trial femoral head initially. However, 3 months after discharge from our department presented with the hip and groin pain that prevented physical therapy and return to everyday activities.

Follow-up showed elevated erythrocyte sedimentation rate and C reactive protein. Hip aspiration was performed and came positive, with *Staphylococcus epidermidis* isolated. Periprosthetic hip infection was diagnosed and antibiotic therapy was administered. According to the hospital's protocol, a two-stage revision procedure should be performed in the setting of PJI. In this case, it was decided that the retrieval of dislocated femoral head must be done before the two-stage revision procedure. Multislice CT (MSCT) was obtained and showed the accurate localisation of the dislocated trial femoral head. It was placed extraperitoneally in the pelvis in front of the iliic muscle, just posterior and in close vicinity of the colon sigmoideum (figure 1). Displacement of the external iliac artery and vein by the thickened iliac muscle was also shown. The planned second operation was conducted 6 months after the initial operation through ilioinguinal approach. After the dissection of abdominal musculature from the iliac crest, iliac

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Figure 1 Postoperative axial CT image showing extraperitoneal localisation of the trial femoral head in pelvis in front of the iliac muscle (arrow pointing at the trial femoral head).

muscle was retracted medially and the trial femoral head was extracted with hemostat without complication.

OUTCOME AND FOLLOW-UP

Three-month antibiotic therapy ensued and was followed by the extraction of endoprosthesis. In the following year the patient underwent revision procedure with the implantation of the primary total hip endoprosthesis. The postoperative period was complicated by the THA dislocation that occurred after 2 months. Closed reposition failed and surgery with the open reposition was conducted. The patient was subsequently immobilised with the hip orthosis for 6 weeks. After 9 years of follow-up, the patient can ambulate without symptoms and signs of periprosthetic hip infection.

DISCUSSION

Femoral trial head dislocations are reported and continue to be one of the most frustrating but avoidable situations during THA (table 1).

Dislocated trial femoral head is found in the pelvis in the vast majority of cases.^{2–9}

Measures taken in order to decrease the dislocation and loss of trial femoral head certainly consist of good coordination between the surgeon and the assistants, and the avoidance of using worn trial femoral heads. In addition, Alfonso *et al*¹⁰ developed technique of suturing the trial femoral head thus inhibiting the dislocation from the taper. Although useful, this technique requires time and is not suited for everyday practice in our opinion.

If not avoided, and the dislocation and loss of the trial femoral head does occur, the first reaction of the surgeon is immediate retrieval from the hip approach by the fingers and instruments. In most cases dislocated femoral head is visualised in the operative field and the retrieval is immediately done but these cases are not interesting and are not reported in the literature. However, in cases of loss of the trial femoral head in the soft tissue, finger and hemostat manoeuvres without the visualisation lead to the deeper displacement in the pelvis and even in the abdominal cavity and therefore should be avoided.^{2–5 8–12}

Intraoperative magnification of the incision, if the trial femoral head had migrated in the pelvis, rarely offers the possibility for the retrieval, although there are such reports in the literature. Some authors advocate for the immediate intraoperative retrieval of the dislocated trial heads through hip approach and have developed special intraoperative techniques that can be useful in that particular situation.^{5 6 13 14} Although simple, these techniques still pose an additional risk of extended surgery and are conducted without the consent of the patient. Given that some patients are completely asymptomatic, even in the long follow-up, even the retrieval is questionable and certainly must be done in concordance with the patient.

Batouk *et al*² reported of a pain-free patient 3 months after surgery in a dislocated femoral head retention case. This period prolonged to 8 months in the report of Vertelis *et al*⁸ and was even longer in a 67-year-old patient who was pain free for 2 years as reported by Callaghan *et al*.¹¹ The longest symptom-free patient reported in the literature was by Ikeuchi *et al*⁵ with the follow-up of 3 years. Still, there are issues of long term health consequences with the foreign body reactions and further migrations that could cause compression of vital structures such as nerves, vessels or the ureter, remain not yet answered. Therefore, the situation is maybe best solved in a planned

Table 1 Review of articles dealing with the treatment of dislocated femoral heads

Article	Imaging method	Retrieval	Timing	Approach
Alfonso <i>et al</i> ¹⁰	MSCT	Yes	1 day postoperative	Laparoscopy
Batouk <i>et al</i> ²	MSCT	No	–	–
Callaghan <i>et al</i> ¹¹	Standard radiograph	Case 1: no	–	–
		Case 2: yes	6 weeks postoperative	Ilioinguinal
		Case 3: yes	The same day	Ilioinguinal
		Case 4: yes	The same day	Ilioinguinal
Citak <i>et al</i> ¹³	MSCT	Yes	Early in the postoperative period	Laparotomy
Hamoui <i>et al</i> ⁴	MSCT	Yes	The same day	Ilioinguinal
Ikeuchi <i>et al</i> ⁵	MSCT	Case 1: no	–	–
		Case 2: yes	Initial operation	Extended hip approach
Kalra <i>et al</i> ¹³	–	Yes	Initial operation	Extended hip approach
Madsen <i>et al</i> ¹⁴	–	Yes	Initial operation	Extended hip approach
Princep ⁶	–	Yes	Initial operation	Extended hip approach
Rachbauer <i>et al</i> ⁷	–	Yes	Initial operation	Ilioinguinal
Vertelis <i>et al</i> ⁸	MSCT	No	–	–
Ziv <i>et al</i> ⁹	Fluoroscopy	Yes	Initial operation	Ilioinguinal

MSCT, multislice CT.

Figure 2 Algorithm for decision-making and treatment for the dislocated trial femoral head. PJI, periprosthetic joint infection; MSCT, multislice CT.

second operation, after the exact localisation of the trial femoral head is determined, preferably by the MSCT because the vast majority of the trial femoral heads is radiolucent and intraoperative fluoroscopy and standard radiographs are of negligible significance.^{2-5 8 10}

Most of the reports in the literature favour ilioinguinal approach because of the localisation of the dislocated trial femoral heads in the proximity of the iliac muscle and relative ease in conducting that specific approach.^{4 5 7 9 11}

Citak *et al*³ performed laparotomy in order to retrieve the trial head although there are reports of a potentially less invasive laparoscopic retrieval in the setting of the abdominal cavity localisation.¹⁰ We favour laparotomy over any kind of laparoscopic solution because of two reasons. First, even Alfonso *et al*¹⁰ stated that small incision can lead to the increased risk of femoral trial head dislocation because of the reduced visualisation, which is also true in the setting of laparoscopy, and second because of the possible iatrogenic vascular injury.

Backed by the reports from the literature and the unwillingness of the patient for the retrieval of the dislocated trial femoral head we opted for the retention initially. This was not the case in our patient who not only presented with growing

pain but with the prosthetic joint infection as well. To the best of our knowledge there are no reported prosthetic joint infections in the setting of the retention of dislocated trial femoral head so far. It can be hypothesised that numerous unsuccessful

Learning points

- ▶ Dislocation of the trial femoral head is a rare and unpleasant event that can compromise the success of the total hip arthroplasty.
- ▶ Immediate retrieval by using the hip approach cannot be successful without the increase in complication rate and therefore should not be applied.
- ▶ The operation should be executed in an ordinary manner.
- ▶ Multislice CT is the best suited method for establishing the exact location of the lost trial femoral head.
- ▶ Ilioinguinal approach offers the best solution for the extraction of dislocated trial femoral in the planned second operation.

attempts and prolongation of the initial operation may have been associated with the forthcoming prosthetic joint infection which is another reason for backing the strategy of executing the operation in a routine manner and then, if necessary, doing the retrieval in a second, planned operation according to our algorithm (figure 2).

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. *Lancet* 2007;370:1508–19.
- 2 Batouk O, Gilbert M, Jain R. Intraoperative dislocation of the trial femoral head into the pelvis during total hip arthroplasty: a case report. *J Bone Joint Surg Am* 2001;83:1549–51.
- 3 Citak M, Klatte TO, Zahar A, et al. Intrapelvic dislocation of a femoral trial head during primary total hip arthroplasty requiring laparotomy for retrieval. *Open Orthop J* 2013;7:169–71.
- 4 Hamoui M, Larbi A, Delannis Y, et al. Pitfall in total hip arthroplasty: intraoperative migration of the trial femoral head through the iliopsoas muscle. *Eur J Orthop Surg Traumatol* 2012;22:713–16.
- 5 Ikeuchi K, Hasegawa Y, Warashina H, et al. Intraoperative migration of the trial femoral head into the pelvis during total hip arthroplasty. *Nagoya J Med Sci* 2014;76:203–10.
- 6 Princep A. Intraoperative migration of the trial femoral head into the pelvis during total hip arthroplasty: prevention and retrieval. *J Bone Joint Surg Am* 2002;84-A:880–1; author reply 881.
- 7 Rachbauer F, Nogler M, Krismer M, et al. Intraoperative migration of the trial femoral head into the pelvis during total hip arthroplasty: prevention and retrieval. *J Bone Joint Surg Am* 2002;84-A:881–2; author reply 882.
- 8 Vertelis A, Vertelis L, Tarasevicius S. Trial femoral head loss in to the soft tissues of pelvis during primary total hip replacement: a case report. *Cases J* 2008;1:151.
- 9 Ziv YB, Backstein D, Safir O, et al. Intraoperative dislocation of a trial femoral head into the pelvis during total hip arthroplasty. *Can J Surg* 2008;51:E73–4.
- 10 Alfonso D, Idjadi J, Lamont JG. Retrieval of a trial femoral head that displaces into the periacetabular soft tissue during minimally-incision total hip arthroplasty. A case report. *J Bone Joint Surg Am* 2006;88:866–8.
- 11 Callaghan JJ, McAndrew C, Boese CK, et al. Intrapelvic migration of the trial femoral head during total hip arthroplasty: is retrieval necessary? A report of four cases. *Iowa Orthop J* 2006;26:60–2.
- 12 Ozkan K, Ugutmen E, Altintas F, et al. Intraoperative dislocation of the prosthetic femoral head into the pelvis during total hip arthroplasty. *Acta Orthop Belg* 2008;74:553–5.
- 13 Kalra K, Ries MD, Bozic KJ. Intrapelvic displacement of a trial femoral head during total hip arthroplasty and a method to retrieve it. *J Arthroplasty* 2011;26:338.
- 14 Madsen WY, Mitchell BS, Kates SL. Successful intraoperative retrieval of dislocated femoral trial head during total hip arthroplasty. *J Arthroplasty* 2012;27:820.

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