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Challenges in Total Hip Replacement after McMurray's Osteotomy: A Report of Two Cases and Review of Literature

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ABSTRACT: Background: McMurray's osteotomy, first described in 1936, was historically used to treat femoral neck fractures and degenerative hip disease before reliable internal fixation and modern arthroplasty techniques became available (1,2). Over time, patients who underwent this procedure may develop complications, including secondary osteoarthritis and limb length inequality, often making total hip replacement (THR) necessary (3,9). Total hip replacement in such cases is especially complex because of significant anatomical alterations, periarticular contractures, and biomechanical changes, all of which demand thoughtful planning and customized implant selection (3,9).

Methods: We reviewed two male patients, aged 41 and 54 years, who had previously undergone McMurray's osteotomy for femoral neck fractures and later required total hip replacement due to secondary osteoarthritis. Both cases were assessed clinically and radiologically, and the surgical approach, intraoperative challenges, and postoperative rehabilitation were documented and analyzed.

Results: In this report, two male patients (aged 41 and 54 years; mean age 47.5 years) underwent total hip replacement (THR) after previously having McMurray's osteotomy for femoral neck fractures. The average time between the initial osteotomy and THR was 25.5 years. Before surgery, patients had moderate disability with an average Harris hip score of 63, which improved to an average of 86 at one-year follow-up. Both patients regained good hip movement and pain relief without evidence of implant loosening, dislocation, or significant weakness in the abductor muscles. Mild residual limb shortening (about 1.1 cm on average) remained, but both patients could walk independently with gradual return to daily activities.

Conclusion: Performing total hip replacement after McMurray's osteotomy is technically challenging due to changes in bone shape and tight soft-tissue contractures. However, by using detailed preoperative planning, careful surgical technique, and suitable modern implants, good outcomes are achievable. In these cases, THR effectively reduced pain and improved hip function, showing that it can be a safe and reliable option for treating secondary osteoarthritis long after an earlier osteotomy.

Keywords: Total hip replacement, McMurray's osteotomy, femoral neck fracture, secondary osteoarthritis, hip biomechanics

I. METHODS

We reviewed two male patients aged 41 and 54 years (mean age 47.5 years), previously treated with McMurray's osteotomy for femoral neck fractures who later developed secondary osteoarthritis. The mean interval between osteotomy and THR was 25.5 years (range 21–30 years). Clinical and radiological details were summarized and analyzed in Table 1.

Table 1. Demographic Details of THR Cases

Case	Age (years)	Indication for McMurray's osteotomy	Indication for THR	Preop Harris hip score	Postop Harris hip score	Follow-up (years)	Type of THR
1	41	Femoral neck fracture	Secondary osteoarthritis	65	87	1	Solution stem,pinnacle cup (depuy)
2	54	Femoral neck fracture	Secondary osteoarthritis	61	85	2	Cemented THR(needs editing)

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II. CASE SUMMARIES

Case 1:

A 41-year-old male presented with progressive left hip pain, stiffness, and limp over two years. Pain that disturbed sleep and daily activities, requiring regular analgesics. He had a history of road traffic accident 20 years ago, managed with McMurray's osteotomy and Wainwright's plate fixation. Examination showed true shorteningof the left leg by ~2 cm.
(Figs. 1–3)

Fig.1. Preoperative radiograph showing McMurray's osteotomy and advanced OA changes.

Fig.2. Intraoperative view after femoral head removal.

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Fig.3. Postoperative radiograph with implanted prosthesis.

Case 2:

A 54-year-old male reported right hip pain and stiffness with noticeable shortening of ~2.5 cm. He had sustained a femoral neck fracture 30 years ago, treated similarly. He remained mobile with a limp until four months before presentation, when pain worsened significantly. Clinical assessment revealed marked restriction of hip movement.
(Figs. 4–6)

Fig.4.Preoperative radiograph of second case.

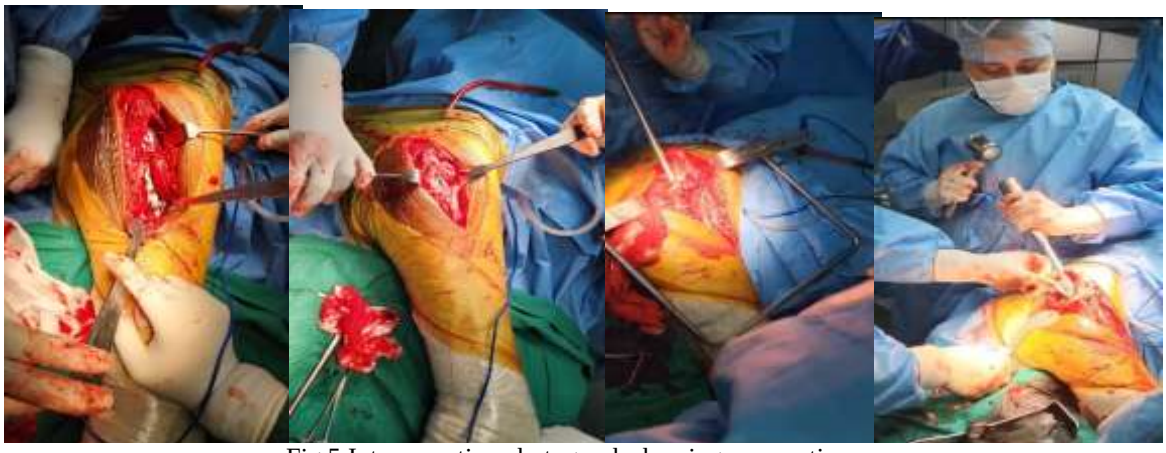

Fig.5.Intraoperative photograph showing preparation.

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Fig.6.Postoperative radiograph showing final implant position.

Surgical Procedure

Both patients underwent THR through a modified Hardinge's lateral approach. Adductor tenotomy was performed to address contractures. Due to severe deformity, the femoral heads could not be safely dislocated and were removed piecemeal. Abundant acetabular osteophytes, including internal osteophytes obscuring the true floor, were carefully removed to seat the acetabular cup correctly.

Well-fitting acetabular components (uncemented in both cases) were implanted. Femoral preparation was challenging: the native canal entry was shifted medially and posteriorly, requiring C-arm guidance. Intraoperatively, a bony bridge at the old osteotomy site was drilled open to access the canal. The femoral necks were short and deformed, complicating identification of landmarks for osteotomy and version alignment. In Case 1, fibrous union at the previous osteotomy site was stabilized by securing the greater trochanter with screws. Restoration of neck length and offset helped achieve soft-tissue balance and stability.

III. RESULTS AND FOLLOW‑UP

Postoperatively, limbs were positioned in abduction with a pillow. The first patient began walker-assisted partial weight-bearing after 48 hours; the second after six weeks, based on intraoperative considerations. Gradual, graded weight-bearing followed as tolerated.

At one-year follow-up, residual limb shortening averaged ~1.1 cm. Harris hip scores improved from a preoperative mean of 63 (range, 61–65) to a postoperative mean of 86 (range, 85–87). Neither patient showed clinical or radiological signs of implant loosening, dislocation, or significant abductor weakness.

IV. DISCUSSION

McMurray's osteotomy was once a widely accepted surgical technique used as a salvage procedure for treating ununited fractures of the femoral neck—especially in younger patients or when modern fixation methods were not available. The procedure realigned the broken bone to turn harmful shearing forces into helpful compressive forces, which promoted bone healing and allowed patients to walk more comfortably even if the fracture didn't unite completely (5). This effect is sometimes called the "armchair effect."

Today, because of the widespread use of reliable internal fixation methods like cannulated cancellous screws, dynamic hip screws, and proximal femoral nails, the need for corrective osteotomies such as McMurray's has become rare (6). Yet, patients who had this surgery decades ago may still develop painful secondary osteoarthritis over time, making total hip replacement (THR)

necessary to restore function and relieve pain (3,7,8).

Technical Challenges in Performing THR After McMurray's Osteotomy

THR after an old McMurray's osteotomy is often much more complex than a routine primary THR because the anatomy of the hip and surrounding tissues becomes distorted over time.

Bony Challenges

1. **Difficulty dislocating the femoral head:**

Due to scar tissue, contractures, and large bone spurs (osteophytes) around the hip joint, surgeons often find it harder to dislocate the femoral head during surgery (9).

2. **Locating the true acetabulum:**

The actual hip socket (acetabulum) may be deeply hidden under thick layers of internal osteophytes. Careful reaming (shaping of bone) is needed to remove these spurs and correctly position the new cup (9).

3. **Short femoral neck and distorted landmarks:**

The osteotomy changes the normal anatomy, shortening the femoral neck and shifting typical landmarks, which makes it challenging to decide where to cut and how to align the new implant (9).

4. **Displaced greater trochanter:**

The greater trochanter (the large bone bump on the outer side of the thigh) often becomes displaced laterally after osteotomy. As a result, the correct entry point into the femoral canal for implant placement moves medially and posteriorly. If this is missed, there is a risk of fracture or misplacement of the femoral stem (9). To avoid this, surgeons may use flexible reamers, guidewires, and real-time imaging. In very complex cases, a trochanteric osteotomy (cutting and repositioning the trochanter) may be necessary (9).

5. **Dense remodeled bone:**

Over the years, the old osteotomy site may heal with thick, dense bone, making it hard to shape the femur and insert the implant. Decoster et al. recommended re-osteotomy in such cases (7). However, successful THR has also been reported without re-osteotomy when careful planning and technique are used (9).

6. **Effect on muscle mechanics:**

Lateral displacement of the trochanter can increase the lever arm of the hip abductor muscles, sometimes improving their strength (12,13). But if excessive, it may cause weakness or pain from friction between the trochanter and the iliotibial band (9).

Soft-Tissue Challenges

1. **Contractures and shortening:**

Over time, the muscles and soft tissues around the hip can become tight, leading to contractures (especially in flexion and adduction). Surgeons need to release these during surgery to restore the normal position of the hip (9).

2. **Limb length inequality:**

Even after careful correction, it may not be possible to fully equalize leg lengths because of soft-tissue stiffness. Surgeons avoid lengthening the limb by more than 4 cm during surgery to reduce the risk of stretching or injuring the sciatic nerve (14).

3. **Muscle imbalance:**

Uneven strength of muscles around the hip can cause instability of the new joint, increase wear on the implant, or lead to dislocation after surgery (3).

4. **Pain from lateralization:**

When the trochanter is moved outward, it can irritate the iliotibial band on the outer thigh, sometimes leading to lateral hip pain (9).

Choosing the Right Implant

Selecting the right implant depends on patient factors and surgeon experience. Both cemented and uncemented implants can be used, but modular femoral stems are especially helpful because they allow surgeons to adjust the length, offset, and version of the implant to fit the patient's altered anatomy (9). In cases where there is significant bone loss in the upper femur, femoral sleeves or special revision implants can provide extra support (9).

Role of Modern Planning and Technology

Detailed preoperative planning is essential in these complex cases. New tools such as 3D printing and virtual surgical planning help surgeons visualize the deformities, decide on implant size and alignment, and even create custom cutting guides (10,11). Intraoperative imaging, flexible reaming, and having specialized implants available further improve surgical precision and safety.

V. SUMMARY

McMurray's osteotomy played an important historical role in treating ununited femoral neck fractures before modern fixation became common. Decades later, some of these patients develop painful secondary osteoarthritis requiring THR. Although THR after McMurray's osteotomy is technically challenging because of altered bone structure and soft-tissue contractures but careful planning, modern imaging techniques, and specialized implants make it possible to achieve good outcomes. Patients can often experience significant pain relief and improvement in daily activities when the procedure is performed thoughtfully and with meticulous technique (3,7,8,9).

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