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EARLY FAILURE OF ACETABULAR ORIF IN SEVERE OBESITY: RETHINKING SALVAGE STRATEGY IN A YOUNG PATIENT

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ABSTRACT

Introduction: Open reduction and internal fixation (ORIF) remains the gold standard for displaced acetabular fractures in young patients. However, severe obesity imposes extreme cyclic mechanical loading that may render ORIF biologically futile regardless of surgical technique. When fixation fails in this setting, salvage arthroplasty presents a formidable challenge,compounded further by concurrent sciatic nerve injury and the inherent tension between joint preservation and mechanical reality in a young patient. We report this case to challenge the default surgical paradigm and propose a framework for rethinking decision-making in this high-risk intersection.

Case Presentation: A 35-year-old male weighing 120 kg sustained a left posterior-superior acetabular fracture following a motor vehicle accident and underwent ORIF at an outside

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institution two days post-injury. Within weeks, he developed progressive hip pain, wound erythema, systemic chills, and clinical hip subluxation. Plain radiograph and CT 3D reconstruction confirmed implant failure with severe acetabular comminution and loss of femoral head containment. Sciatic nerve palsy and leg length discrepancy were established on examination. After careful pre-operative planning, bipolar hemiarthroplasty via a posterolateral approach was performed at our institution (Bali Royal Hospital). Intraoperatively, the retained posterior column plate provided structural scaffolding for the bipolar articulation. The patient was discharged on post-operative day five with residual lower limb paraesthesias managed conservatively.

Discussion: The failure in this case was not incidental,it was biomechanically foreseeable. In a 120 kg patient, peak hip joint reactive forces may exceed 900 kg per step, subjecting a comminuted posterior acetabular construct to repetitive cantilever bending that promotes fatigue failure at the implant-bone interface before consolidation occurs. A structured counterfactual analysis raises a provocative question: had primary arthroplasty been chosen at the index procedure, would the patient have been spared a second major operation, cumulative sciatic nerve risk from two posterior approaches within three months, and a two-month interval of pain and progressive joint destruction? Current literature supports the durability of modern arthroplasty constructs in this setting, yet the paradigm of ORIF as the default 'joint-preserving' choice in young patients persists,even when the joint, under these mechanical conditions, may not be preservable.

Conclusion: Bipolar hemiarthroplasty is a viable salvage strategy following early ORIF failure in a severely obese young patient with posterior-superior acetabular fracture. The retained posterior

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column hardware can serve as a structural scaffold for bipolar articulation in cases of compromised acetabular bone stock. Timely recognition of failure and decisive surgical re-intervention are critical to preventing irreversible joint destruction.

Clinical Importance: Severe obesity must be recognised not merely as a comorbidity but as a fundamental biomechanical contraindication to standard ORIF constructs in comminuted acetabular fractures. Surgeons should explicitly discuss primary arthroplasty as an alternative,even in young patients,when the convergence of extreme BMI, posterior wall comminution, and suboptimal bone quality predicts fixation failure. The question is no longer whether we can fix it, but whether fixing it serves the patient.

Keywords: *acetabular fracture; ORIF failure; bipolar hemiarthroplasty; severe obesity; implant failure; sciatic nerve palsy; salvage arthroplasty*

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INTRODUCTION

Acetabular fractures represent one of the most technically demanding injuries in orthopaedic traumatology. Open reduction and internal fixation (ORIF) remains the gold standard for displaced acetabular fractures in younger patients, with the primary aim of restoring articular congruency and preventing post-traumatic arthritis, which has been reported to occur in 12-57% of cases even after surgical fixation.[1]

Despite advances in technique and implant design, ORIF of acetabular fractures carries a significant complication burden. Obesity is an increasingly prevalent comorbidity that independently worsens outcomes following acetabular fracture surgery. Studies have demonstrated that obesity is associated with significantly higher rates of wound infection, deep vein thrombosis, fixation failure, and overall adverse events following ORIF, with risks scaling proportionally with BMI class.[2]

When ORIF fails, salvage arthroplasty,either total hip arthroplasty (THA) or hemiarthroplasty,becomes necessary. Conversion arthroplasty following failed ORIF is technically demanding due to distorted anatomy, retained hardware, scar tissue, and compromised bone stock. Contemporary series report that THA following prior acetabular ORIF achieves satisfactory long-term survivorship, although complication rates remain higher than in primary arthroplasty.[3]

Sciatic nerve injury further complicates the clinical picture in posterior acetabular fractures. We present a rare case of bipolar hemiarthroplasty performed as a salvage procedure following ORIF failure of a posterior-superior acetabular fracture in a young obese male with concurrent sciatic neuropathy. This case highlights the critical role of obesity as a risk modifier and the importance of timely salvage intervention.

CASE PRESENTATION

History

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A 35-year-old male (born 23 April 1990; body weight 120 kg) with a history of controlled diabetes mellitus presented to our institution with progressive left hip pain persisting over two months. He reported a motor vehicle accident on 26 October 2025, in which his motorcycle was struck by a car. He fell with impact to the right side and was unable to bear weight post-injury. Loss of consciousness was denied. He was helmeted at the time of injury.

He subsequently underwent ORIF of the left posterior-superior (PS) acetabulum at an outside facility on 28 October 2025,two days post-injury. Following a period of physiotherapy rehabilitation, he developed chills, progressive left hip pain, and erythema around the surgical wound. He was referred to our institution (Bali Royal Hospital) for further management. Prior medications included ciprofloxacin, pregabalin, and mecobalamin. No known drug allergies were reported.

Physical Examination

On admission, the patient was alert and fully oriented (GCS 15). Vital signs: blood pressure 155/102 mmHg, heart rate 105 bpm, respiratory rate 20 rpm, temperature 36°C, SpO_2 100%. Pain score 7/10. Local examination of the left hip revealed a post-operative scar with surrounding erythema, swelling, and bruising; tenderness on palpation; and markedly restricted range of motion due to pain. Leg length discrepancy (LLD) was present. Neurological assessment demonstrated features consistent with sciatic nerve injury including radicular pain and lower extremity sensory disturbance.

Investigations

Plain AP pelvic radiograph demonstrated subluxation of the left femoral head with malalignment of the previously placed plate-and-screw construct (Figure 1, 2). CT scan with 3D reconstruction confirmed severe comminution of the left acetabulum, loss of reduction, and displacement of the femoral head, consistent with implant failure and hip subluxation (Figure 3, 4, 5). No operative documentation from the index ORIF facility was available for review.

Diagnosis

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The patient was diagnosed with subluxation of the left hip secondary to implant failure following ORIF of a posterior-superior acetabular fracture, complicated by sciatic nerve palsy and intractable hip pain.

Treatment

Following multidisciplinary review and informed consent, bipolar hemiarthroplasty of the left hip was performed on 13 January 2026 under general anaesthesia, with the patient in the lateral decubitus position via a posterolateral approach. Intraoperatively, the femoral head was extracted and significant acetabular comminution was confirmed. The failed ORIF hardware was identified and retained in situ as it remained integrated to the posterior acetabular column, providing additional structural support. The femoral canal was reamed and a femoral stem size #9 was inserted with femoral head size #50 mm and liner #50 mm; bone screws of 20 mm, 35 mm, and 40 mm lengths were used. Hip stability was confirmed through range of motion testing (flexion, adduction, telescoping). A drain was placed and the wound was irrigated and closed in layers.

Post-operative Course and Follow-up

Post-operative course was as follows:

- Day 0-2 (13-15 Jan 2026): Wound intact; drain in situ; pain managed with analgesia.
- Day 3 (16 Jan 2026): Wound clean; drain removed; range of motion restricted; persistent sciatic nerve signs and radicular pain managed conservatively.
- Day 5 (18 Jan 2026): Patient discharged home. Residual intermittent leg paraesthesias and cramps noted; managed with pregabalin and mecobalamin. Outpatient neurological follow-up recommended.

DISCUSSION

This case crystallises one of the most challenging dilemmas in orthopaedic traumatology: a young patient,whose life expectancy demands durable, long-term fixation,burdened with an extreme mechanical risk factor that renders standard fixation inherently precarious. At 35 years of age, any implant decision carries a time horizon of four to five decades. Yet at 120 kg body weight with a

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posterior-superior acetabular comminution, the biomechanical environment is arguably incompatible with conventional plate-and-screw ORIF from the outset. The treating surgeon at the index institution faced an unenviable choice; this case invites us to critically examine whether that choice was the right one,and what we should do differently next time.

The failure observed in this case was not merely an association between obesity and poor outcomes,it was a predictable mechanical consequence. In the upright stance, the acetabulum transmits forces equivalent to three to five times body weight; during dynamic activities such as stair climbing, this may reach seven to eight times body weight. In a patient weighing 120 kg, peak hip joint reactive forces plausibly exceed 800-960 kg per step. A posterior-superior acetabular plate construct, anchored to comminuted cortical fragments rather than intact column bone, is subjected to repetitive cantilever bending at each loading cycle. Fatigue failure of the implant-bone interface,rather than catastrophic implant fracture,is the dominant failure mode in this context: progressive micromotion at the screw-bone interface causes osteolysis and screw loosening, ultimately permitting femoral head migration and subluxation before radiographic consolidation is achieved.[2] In our patient, this sequence appeared to unfold within weeks of surgery, consistent with the timeline reported for early fixation failure in obese acetabular fracture patients.

The literature does not condemn ORIF in obese patients categorically, but it demands that the decision be made with open eyes. A large database analysis of 99,721 patients demonstrated that obesity Class III carries a 2.3-fold increased mortality risk and a 1.3-fold increase in any adverse event following acetabular fracture, with risk scaling proportionally to BMI class.[2] More critically, analysis of ORIF outcomes stratified by fracture complexity shows that associated fracture patterns,such as the posterior-superior pattern in this case,carry higher reoperation rates even in non-obese patients.[1] When these two risk dimensions converge,complex fracture pattern and severe obesity,the likelihood of ORIF providing a durable construct sufficient to outlast consolidation is substantially diminished. One must ask: was ORIF here a biologically sound decision, or a technically achievable but ultimately futile one?

A structured counterfactual analysis is instructive. Had primary arthroplasty been performed at the index institution, the patient would have faced different trade-offs. Acute THA combined

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with ORIF (the 'fix and replace' paradigm) has demonstrated substantial functional recovery with acceptable complication rates in selected patients with unreconstructible acetabular fractures.[5] A contemporary Mayo Clinic series reported 98% revision-free survivorship at 15 years for THA following prior acetabular ORIF, suggesting that modern implants and techniques can achieve durable outcomes even in post-traumatic hips.[3] Primary arthroplasty in this patient would likely have avoided the two-month interval of pain, progressive subluxation, wound complications, and sciatic nerve compression that attended the failing ORIF construct,and would have spared the patient a second major operative procedure under general anaesthesia. The counterargument,that primary arthroplasty in a 35-year-old commits him to one or two revision surgeries over his lifetime,remains valid but must be weighed against the demonstrated reality that his ORIF failed catastrophically within weeks. A failed ORIF followed by salvage arthroplasty is, arguably, a worse outcome than planned primary arthroplasty performed electively under optimal conditions.

The choice of bipolar hemiarthroplasty over THA at our institution was guided by the patient's age and the intention to preserve future options. Bipolar hemiarthroplasty avoids the complexities of cementless acetabular cup fixation in a severely comminuted socket, where press-fit stability may be unachievable. The retained posterior column plate, well-integrated to residual iliac bone, served as an unplanned but fortuitous structural scaffold for the bipolar head articulation. A systematic review of 1,220 THAs for post-traumatic arthritis reported mean Harris Hip Score improvement from 41.5 to 87.6 at long-term follow-up, albeit with higher complication rates than primary arthroplasty.[4] Whether bipolar hemiarthroplasty confers superior longevity over THA in this specific demographic remains an open question, as direct comparative data in young obese patients with post-ORIF failure are absent from the literature. This patient will, with high probability, require conversion to THA within one to two decades,the question is whether the interim stability and pain relief justify that trade-off. We believe it does, but prospective registries are urgently needed to validate this reasoning.

Sciatic neuropathy adds a further dimension of complexity that is often underemphasised in the surgical decision narrative. The nerve was compromised prior to arrival at our institution,whether from the initial trauma, from iatrogenic traction during the index ORIF, or from

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progressive compression by the subluxating femoral head remains uncertain in the absence of index operative documentation. What is clear is that each surgical intervention through a posterior approach carries incremental nerve risk, and that the cumulative burden of two posterior hip surgeries within three months substantially exceeds the risk of a single well-planned primary procedure.[5] At discharge, the patient retained residual paraesthesias,a reminder that neural recovery timelines are protracted and that functional outcomes cannot be fully assessed at the index hospitalisation. Long-term electrophysiological and functional neurological follow-up is essential in this patient.

This case report carries important limitations. The absence of intraoperative culture data precludes definitive exclusion of a low-grade septic component contributing to implant failure,the early wound erythema and systemic chills are clinically ambiguous. Pre-operative inflammatory markers (CRP, ESR, leukocyte count) were unavailable. Follow-up extended only to the day of discharge, precluding assessment of functional recovery, nerve regeneration, or implant longevity. These gaps should inform the design of prospective case series examining ORIF failure in obese young patients.

A provocative question for current surgical practice: If we can predict with reasonable certainty,based on BMI, fracture comminution, and bone quality,that a given ORIF construct will fail before biological consolidation is achieved, do we have an ethical obligation to inform the patient of primary arthroplasty as an alternative, even in a 35-year-old? The current paradigm defaults to ORIF as the 'joint-preserving' choice in young patients, but joint preservation is only meaningful if the preserved joint is stable and functional. In the morbidly obese young patient with a comminuted posterior acetabular fracture, the concept of 'preservation' may be a clinical illusion,and our failure to challenge it proactively may condemn patients to exactly the trajectory described in this case.

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CONCLUSION

Bipolar hemiarthroplasty is a viable and effective salvage strategy for implant failure following ORIF of posterior-superior acetabular fractures, including in young obese patients. Obesity must be recognised as a decisive risk modifier in acetabular fracture fixation. Early recognition of implant failure,characterised by progressive hip pain, wound changes, and radiographic subluxation,and timely surgical intervention are critical to achieving satisfactory functional outcomes and preventing irreversible joint destruction.

CLINICAL IMPORTANCE

This case carries several important lessons for orthopaedic surgeons managing acetabular fractures:

- **Obesity as a surgical risk modifier:** A body weight of 120 kg imposes extreme cyclic loading on acetabular hardware. In morbidly obese patients with complex posterior acetabular fractures, surgeons should have a lowered threshold for primary arthroplasty or at minimum implement aggressive post-operative surveillance protocols, rather than defaulting to ORIF alone.
- **Early recognition of implant failure:** The clinical triad of progressive hip pain, wound changes (erythema, swelling), and radiographic subluxation in the early post-operative period should prompt urgent evaluation for hardware failure. Plain radiographs combined with CT 3D reconstruction are indispensable for diagnosis and pre-operative planning.
- **Bipolar hemiarthroplasty as a bridge in young patients:** In young patients where acetabular bone loss precludes reliable cementless cup fixation, bipolar hemiarthroplasty provides immediate hip stability, preserves native acetabular anatomy, and maintains the option for future conversion to total hip arthroplasty as the gold standard salvage.
- **Sciatic nerve vigilance:** Posterior acetabular fractures and their surgical approaches carry inherent sciatic nerve risk. Meticulous nerve identification and protection during salvage surgery, combined with post-operative neurological monitoring and early rehabilitation, are essential components of comprehensive patient care.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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FIGURE LEGENDS

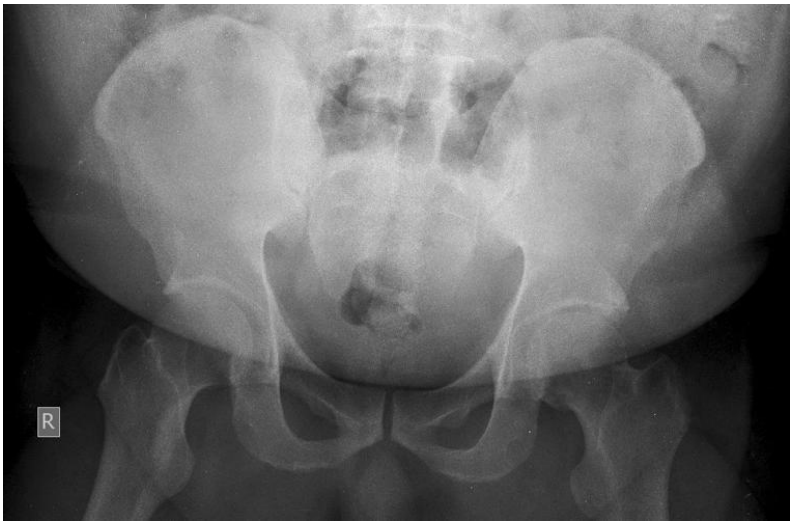


Figure 1. AP pelvis radiograph at initial injury (26 October 2025) demonstrating left posterior-superior acetabular fracture with displacement of the femoral head and hip incongruency.

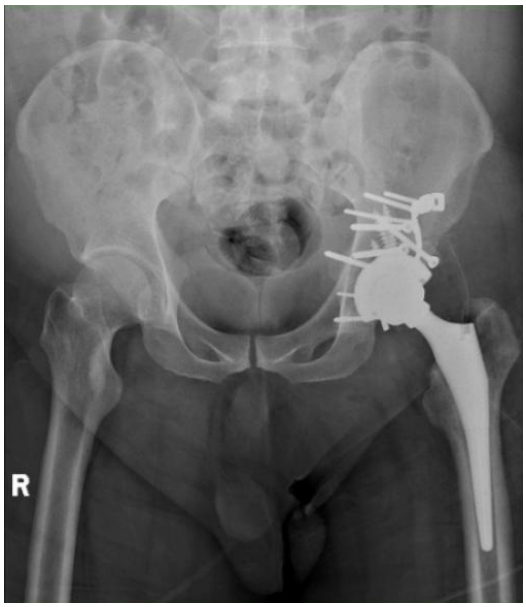


Figure 2. AP pelvis radiograph following ORIF at the referring institution showing plate and screw fixation of the left posterior-superior acetabulum with residual subluxation of the femoral head indicating inadequate reduction.

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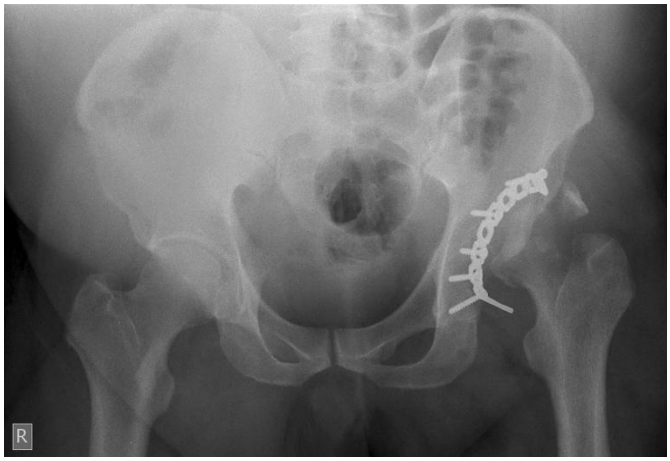


Figure 3. AP pelvis radiograph at presentation to our institution (January 2026) confirming failed ORIF hardware with progressive subluxation of the left femoral head and bipolar hemiarthroplasty implant in situ post-salvage.



Figure 4. CT 3D reconstruction (anterior view) of the left hip demonstrating severe acetabular comminution, retained screw from index ORIF, and loss of femoral head containment.

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Figure 5. CT 3D reconstruction (posterior view) illustrating the extent of posterior acetabular wall destruction and implant failure prior to salvage hemiarthroplasty.

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