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### Case Report

# Posterior wall acetabulum fracture–dislocation with subsequent ipsilateral pipkin IV fracture–dislocation: How many hits can a hip take?

Jonathan R. Helms\*, Peter J. Nowotarski

University of Tennessee–Chattanooga Department of Orthopaedics, USA

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#### ABSTRACT

The treatment of acetabulum fractures is a technically-demanding task for orthopaedic trauma surgeons. The treatment of femoral head fractures associated with acetabulum fractures, pipkin IV fractures, presents difficulty as usually the femoral head fracture requires treatment through an anterior approach and the acetabulum fracture, which is commonly a posterior wall fracture, requires treatment through a posterior approach. Recently, surgical dislocation of the hip has become an accepted option for treatment of these fractures as it allows treatment of the femoral head fracture and posterior wall acetabulum fracture through one approach. However, dual anterior and posterior approaches are acceptable. We present 15 year follow up of an 18 year old female who underwent open reduction internal fixation of a posterior wall acetabulum fracture through a Kocher–Langenbeck approach. Four months later the patient sustained a second fracture dislocation of the same hip, this time a femoral head fracture with an associated posterior wall acetabulum fracture that was treated with a Kocher–Langenbeck approach for the revision acetabulum and a approach for the femoral head fracture. At fifteen years the patient had a Merle d'Aubigne score of 15 and a Harris hip score of 71. She was gainfully employed and subjectively happy with her surgical result. While treatment of pipkin IV fracture dislocations can be treated through a surgical dislocation of the hip, dual surgical approaches are a viable option in certain cases.

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\* Corresponding author at: UT College of Medicine Chattanooga, Department of Orthopaedic Surgery, 975 East Third Street, Hospital Box 260, Chattanooga, TN 37403, USA. Tel.: +1 423 778 9008; fax: +1 423 778 9009.

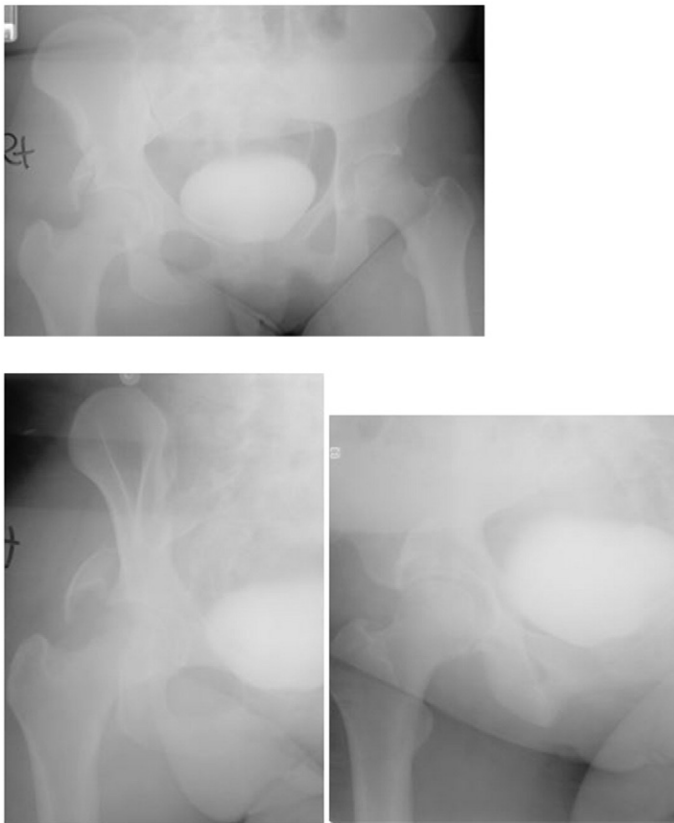
E-mail address: [jonhelms02@gmail.com](mailto:jonhelms02@gmail.com) (J.R. Helms)

## Introduction

Acetabulum fractures pose a significant challenge to orthopaedic surgeons due to their complex osseous and surgical anatomy. The importance of anatomic reduction has been well-documented [1,3–6]. The standard surgical approach for posterior wall acetabulum fractures is the Kocher–Langenbeck approach. Femoral head fractures are similarly challenging due to the difficulty of obtaining a good reduction and incidence of articular cartilage damage. The typical surgical approach for these fractures is anterior, through a Smith Petersen interval. When a femoral head fracture is associated with an operative posterior wall acetabulum fracture (pipkin IV) the choice of approach is less clear. Recently, surgical dislocation of the hip has been described as it allows for fixation of both sites of pathology through one incision, while preserving the blood supply to the femoral head. Surgical dislocation is performed through a Kocher–Langenbeck approach, utilising a trochanteric osteotomy and anterior dislocation of the hip. Alternatively, a dual approach utilising a Kocher–Langenbeck and a Smith Petersen can be advantageous in certain scenarios. We present 15 year follow up of a young female involved in a motor vehicle accident resulting in a posterior wall acetabulum fracture dislocation requiring treatment via a Kocher–Langenbeck approach. In short term follow-up the patient was involved in a similar accident resulting in an ipsilateral pipkin IV femoral head/postero-lateral wall acetabulum fracture requiring a revision treatment of the posterior wall via a Kocher–Langenbeck approach and treatment of the femoral head via a Smith Petersen approach.

## Case report

The patient is an 18 year old female who was involved in a motor vehicle accident in October of 2001. She sustained a closed posterior wall acetabulum fracture dislocation to her right lower extremity. She had no



**Fig. 1.** Preoperative AP pelvis, obturator oblique and iliac oblique radiographs.

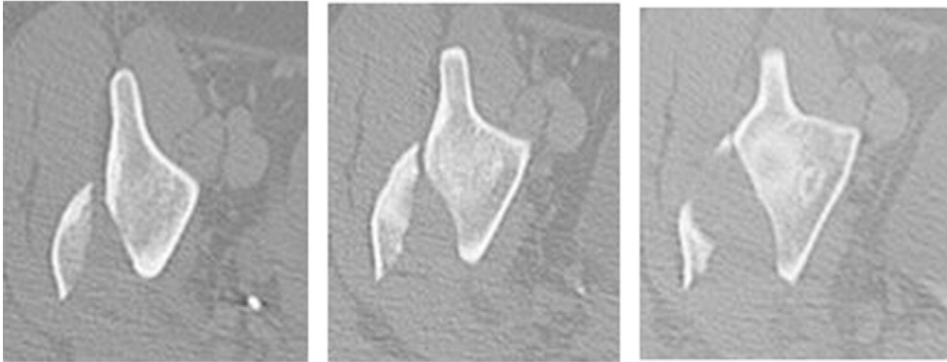


Fig. 2. Preoperative axial CT.

other significant associated injuries. Injury radiographs are shown in Fig. 1 and representative axial CT cuts in Fig. 2. She underwent open reduction internal fixation of her posterior wall acetabulum fracture through a Kocher–Langenbeck approach as shown in Fig. 3. She had an uneventful recovery and began full weight-bearing after 3 months. Four months post-operatively the patient was involved in a second motor vehicle accident, sustaining a suprafoveal femoral head fracture with a posterior hip dislocation and an associated posterior wall acetabulum fracture that was more peripheral than her first posterior wall fracture. Representative axial and coronal CT cuts are demonstrated in Fig. 4. A Kocher–Langenbeck approach was used for the posterior wall acetabulum fracture. The previously placed pelvic reconstruction plate was able to be salvaged. The more peripheral fracture was repaired with two, 2.0 mm cortical lag screws. A three-hole one-third tubular plate was fashioned into a spring plate and placed deep to the pelvic recon plate and fixed with one

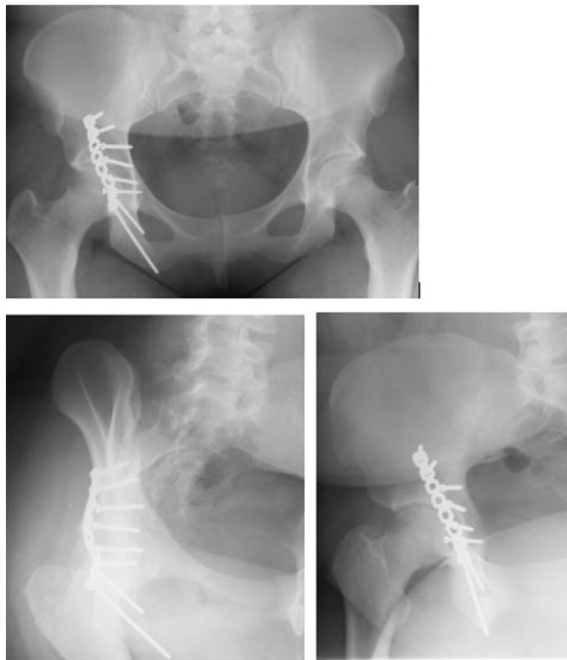
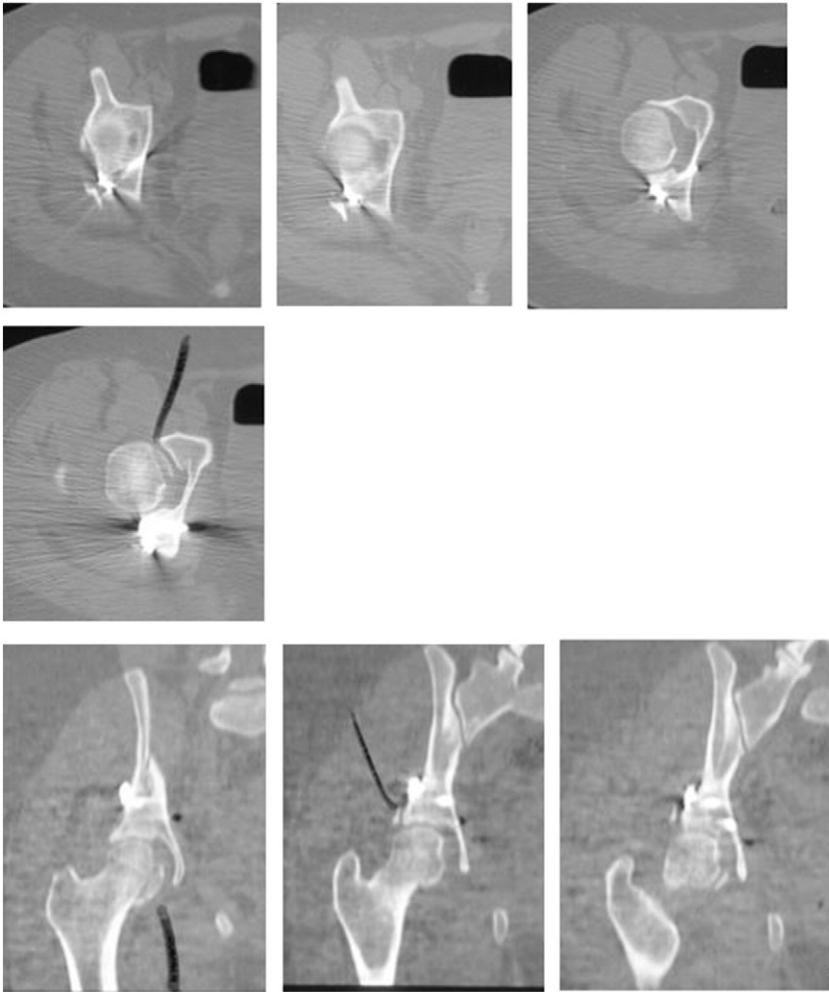


Fig. 3. Postoperative AP pelvis, obturator oblique and iliac oblique radiographs.



**Fig. 4.** Axial and coronal CT after pipkin IV.

3.5 mm cortical screw. 3.5 mm cortical screws were then placed back into the reconstruction plate distally into the ischium. The femoral head fracture was then repaired through a Smith Petersen approach with 3 unicortical, countersunk 2.7 mm lag screws (Fig. 5). She began full weight-bearing at three months post-operatively. At six months she walked with a normal gait pattern, was able to flex her hip to 120°, and had 30° of internal rotation as compared to 40° on the contralateral extremity and symmetric external rotation. Fortunately, at 15 years the patient returned for follow up. She was working full time and subjectively happy with her result. The SF-12 questionnaire was administered and resulted in a physical composite score of 46.4 and a mental composite score of 53.3. The patient's Harris hip score was 71. The Merle d'Aubigne score was 15. Radiographically, she demonstrated increased joint space narrowing as compared to her prior films and increased osteophytic spurring on both her acetabulum and femoral head. The patient's ROM was essentially symmetric with the contralateral extremity with exception of hip internal rotation, 10° vs 35°. The patient endorsed that she did continue to take 2 percocet per day for the last two years, which was provided by her primary care doctor. Radiographs at 7 year and 15 year follow up are demonstrated in Figs. 6 and 7, respectively.



Fig. 5. Pipkin postoperative AP pelvis, obturator oblique and iliac oblique radiographs.

## Discussion

The patient in this case sustained two separate severe injuries to her right hip joint over a 4 month period of time. The clinical success of surgical intervention for these fractures is dependent on several factors, but most importantly on the quality of articular reduction [1,6]. Matta [3] reviewed 255 acetabulum fractures and found an anatomic reduction in 71% of those fractures. Clinical result was graded as excellent or good in 76% of fractures. He found clinical results to be positively correlated to an anatomical articular reduction and congruency between the femoral head and acetabulum. Revision surgery for acetabulum fractures has historically not shown favourable outcomes. Mayo et al. [4] evaluated the success of the reoperation of 64 acetabulum fractures. Anatomic reduction was achieved in only 56% of patients and an excellent or good outcome in only 42% of patients at 4 year follow up. Of the 22 revision posterior wall fractures that were examined only 45% had an excellent or good clinical outcome as defined by Merle d'Aubigne. In a series by Mitsionis et al. [5], anatomic reduction of the posterior wall correlated to a good or excellent clinical outcome 87% of the time.

Pipkin I and II fractures are typically treated via a Smith Petersen approach. A pipkin IV fracture dislocation causes more of a dilemma regarding approach because the pathology is typically located posteriorly and anteriorly. In some cases the femoral head component is small and infrafoveal and can either be ignored or simply excised through a Kocher–Langenbeck approach while addressing the posterior wall component. However, when the femoral head component requires fixation, surgical dislocation of the hip allows for simultaneous treatment of both fractures. Solberg et al. [10] reported on the outcome of 12 pipkin IV fracture dislocations treated through a surgical hip dislocation. The authors reported a 100% union rate, while only 1 out of 12 patients developed osteonecrosis. Average Merle d'Aubigne score was 15.6 and there were no cases of heterotopic ossification that required intervention. Lin Song et al. [2], reported on 22 cases of pipkin I and II fractures that were treated with surgical hip dislocation. The authors in this study felt that a trochanteric flip osteotomy allowed for better visualisation of the femoral head fracture than through an anterior approach. They reported an average Merle d'Aubigne score of 13.77. Three patients developed post-traumatic

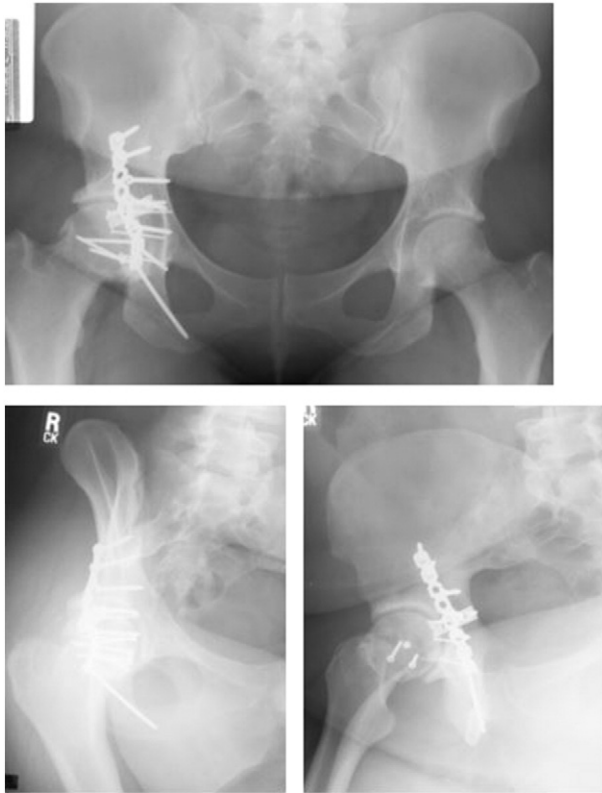


Fig. 6. 7 years f/u AP pelvis, obturator oblique and iliac oblique radiographs.

arthritis, one of which was due to osteonecrosis and ultimately required an arthroplasty procedure. While clinical outcomes from retrospective studies have been favourable, there is still concern about the morbidity of this procedure. Sink et al. [9] performed a multicenter study that identified the complications following a surgical dislocation of the hip for all indications and found a 4.8% complication rate, including osteonecrosis, trochanteric nonunion, iatrogenic femoral neck fracture, nerve injury, ectopic bone formation, and thromboembolic events.

The outcome scales used in this case were the Merle d'Aubigne, Harris hip score, and SF12. The Merle d'Aubigne and Harris hip score are commonly used scales that assess hip function and pain after hip surgery. The SF-12 is used to assess physical and mental function as compared to the general population. At 15 year follow-up the patient in this case had a Merle d'Aubigne score of 15 and a Harris hip score of 71, corresponding to a clinical outcome of good [7] and fair [8], respectively. Her SF-12 physical component score was 46.4, slightly lower than average (50.8) for her age, while her mental component score was 53.3, slightly higher than the average (52.4) for her age. The majority of her complaints centred around pain in her hip, but this pain did not limit her activities. She was involved in normal everyday activities, was employed, and was able to walk without any assistive devices. While she did develop some post-traumatic arthritis, this did not significantly limit her daily activities. She endorsed daily use of a narcotic at night, which began in the previous two years. Prior to her latest visit she had last been seen at 7 year follow up. At that time she demonstrated some osteophytes about her lateral acetabulum, but clinically she did not endorse any pain related to her hip or any difficulty with activities. Her only limitation at that time was a loss of internal rotation of her hip as compared to the unaffected extremity.

We present 15 year follow up of a patient who sustained two severe injuries to her right hip joint within a 4 month span. The first was a posterior wall acetabulum fracture treated through a Kocher–Langenbeck and



Fig. 7. 15 years follow up AP pelvis, obturator oblique and iliac oblique radiographs.

the second was a pipkin IV fracture dislocation treated with posterior and anterior approaches. Recently, the paradigm has shifted in the treatment of pipkin IV fractures. Surgical hip dislocation has been adopted by many orthopaedic surgeons as it allows for one approach to address all pathology from this fracture while sparing the hip abductors and the blood supply to the femoral head. While the senior author (PJN) routinely performs surgical hip dislocation, at the time of the initial injury he was not, thus necessitating dual approaches. Treatment of pipkin IV fracture dislocations of the hip through a dual Kocher–Langenbeck and Smith Petersen approach can provide good clinical and functional outcomes at fifteen years and may be a suitable alternative to surgical hip dislocation for the treatment of pipkin IV fracture–dislocations in appropriate cases.

#### Conflict of interest statement

Jonathan Helms: None  
Peter Nowotarski: None

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