

Clinical report

Chronic traumatic hip dislocation: the Cambodian experience

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Background: Evidence is conflicting on the best way to manage patients presenting late following a traumatic hip dislocation.

Objective: Report our experience of managing patients presenting late following a traumatic dislocation of the hip.

Patients and method: A retrospective analysis of patients presenting late with a traumatic hip dislocation to the Children's Surgical Centre between January 2002 and September 2010 was performed. Thirty-three eligible patients were identified. Twenty-eight patients underwent femoral head conserving treatments. In four patients, total or hemi-arthroplasty was performed, and one patient underwent hip arthrodesis.

Results: Eleven patients had documentation of the absence or presence of evidence of avascular necrosis (AVN). Of these, three patients had clinical or radiological signs of AVN. Nineteen patients returned for follow-up and five had an excellent outcome, seven had a good outcome, four had a fair outcome, and one had a poor outcome. Two patients did not have enough clinical information in their medical records to have their outcome classified. A better outcome at follow-up was associated with a shorter mean average time from trauma and the use of femoral head conserving operative interventions.

Conclusion: This study supports the theory that patients presenting late following a traumatic hip dislocation can achieve satisfactory outcomes if managed with femoral head conserving strategies, as the femoral head retains its vascular supply in the majority of cases. We also propose that consideration be given to drilling the femoral head during open reduction to ascertain the integrity of its blood supply.

Keywords: Avascular necrosis, hip dislocation, hip trauma

Traumatic dislocation of the hip is usually the result of high-energy blunt trauma and is commonly associated with motor vehicle accidents or a fall from a significant height. A traumatically dislocated hip represents an orthopaedic emergency. Early medical intervention is required to reduce the femoral head back into the acetabulum to minimise the incidence of one of the principal early complications – avascular necrosis (AVN) of the femoral head. The rate of AVN is less than 10% if reduction is achieved within six hours. This figure, however, rises to 26% if reduction is not achieved until a mean time of 15.3 hours after injury [1]. Therefore, early reduction can have a significant impact on the long-term function of the affected hip joint [2].

Patients in the developing world, however, frequently fail to present immediately for a multitude of reasons. As a result, the hip remains dislocated for durations far longer than the aforementioned 15.3 hours. With time, the femoral head migrates proximally, shortening the leg (**Figure 1**). There is conflicting evidence surrounding the most appropriate form of management for patients presenting late following traumatic hip dislocation. Some advocate the use of femoral head replacement [3], where as others have reported success with late reduction of the native femoral head into the acetabulum [4-6].

In this retrospective analysis of cases presenting late to the Children's Surgical Centre, Phnom Penh with traumatic hip dislocation, we aim to report our experience of managing these patients from pre-operative presentation and preparation to post-operative follow-up.

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Figure 1. A 13 year-old boy with history of six years dislocation of the hip, whereby the femoral head has migrated proximally (19323).

Materials and methods

The electronic database and operating room logbooks at the Children's Surgical Centre, Phnom Penh were reviewed retrospectively between January 1, 2002 and September 27, 2010 to identify all patients presenting with traumatic hip dislocations that underwent operative management. The medical records were then reviewed and the relevant data extracted. This consisted of patient demographics, history of presenting complaint, site and direction of dislocation, time from injury, operation details, and outcome at follow-up.

One of the main interests of the study was to determine the presence or absence of intra-operative or radiological evidence of AVN. After August 2008, all patients undergoing open reduction of a late hip dislocation underwent drilling of the femoral head prior to reduction, to ascertain its vascular supply as shown in **Figure 2**. Prior to this, the only evidence of AVN came from radiological findings.

Thirty-three patients were identified as having presented with a traumatic hip dislocation. Of these patients, 23 were male and 10 female with the average age at first presentation being 28 years (range 3-67 years). Thirteen patients were recorded as having a posterior dislocation, one patient had an anterior dislocation and 19 patients had no documentation of the direction of dislocation, but anecdotally, they were all posterior.

Time from injury varied from six days to 26 years, although only three cases (out of 33) presented within one month of injury. It was not possible to classify the patients reliably according to the Thompson and Epstein radiological classification system for traumatic hip dislocations [7]. Twenty-eight patients underwent operative interventions that preserved a functional, native hip joint as shown in **Table 1**. The remaining five patients underwent procedures that did not involve reduction of the native femoral head into the acetabulum. Because of the expanding surgical



Figure 2. Drilling the femoral head to see if it bleeds and, therefore, assess for AVN

Table 1. Number of patients and time from trauma depending on the operation performed

Operation	Number of patients	Average time from trauma (months)	Range of time from trauma (months)
Closed reduction	8	0.8	0.2-1.5
Open reduction	16	8.7	1.5-72
Open reduction with subtrochanteric osteotomy	3	38.7	8-60
Hemi-arthroplasty	2	4.5	4-5
Total hip replacement	2	162	12-312
Arthrodesis	1	120	120
Contralateral knee epiphysiodesis	1	84	84

expertise at the Children's Surgical Centre over the eight-year study period, the ability to perform advanced procedures, such as total hip arthroplasty and hemi-arthroplasty, increased, as did the availability of prostheses. It should also be noted that hip arthrodesis is generally avoided, as this would have significant limitations on the patient's ability to squat and use native toilets.

Only 19 of the 33 eligible patients were followed-up in the outpatient clinic. The range of time to follow-up was from 1 month to 6 years post-final operation (mean average 11.6 months). Outcome at follow-up was grouped according to the criteria [3]. This grading system consisted of four groups; excellent, good, fair, or poor (**Table 2**). In two patients that returned for follow-up, the medical records did not contain enough information to grade them according to Garrett criteria.

Results

Patient presentation

The patients included in this study presented late following a traumatic hip dislocation. Of the 33 cases included in this study, 17 had documentation in the notes regarding the reason behind the delay in presentation. Of these 17 patients, 82% initially presented to providers of Khmer Traditional Medicine

(KTM). The remaining 18% also initially went to KTM, but subsequently went to an alternative Cambodian hospital prior to presentation at the Children's Surgical Centre. Twenty-one patients had documentation of their level of function at presentation. All 21 patients had a reduced level of function and/or deformity (leg shortening, sciatic nerve palsy) and/or pain. No patients reported having a good level of function at the time of presenting to the Children's Surgical Centre.

Pre-operative management

Prior to definitive surgical management, patients received no intervention, external fixator distraction, or skeletal traction. Closed reduction was only attempted in patients presenting within six weeks of dislocation and these patients received no pre-operative distraction or traction. In the initial cases of patients who presented too late for an attempted closed reduction, there was no intervention prior to definitive surgery. However, it was sometimes very difficult to get the head of the femur back into the acetabulum without shortening the femur by removing a block of bone in the subtrochanteric region and then fixing the femoral osteotomy with an intermedullary nail as can be seen in **Figure 3A**. In subsequent cases, an

Table 2. Criteria for classification of disability on first presentation [3]

Grade	Symptoms	Deformity	Range of movement at hip
Excellent	No pain	Nil	Full, no limp
Good	No pain	Nil	75% of normal hip movement, no limp
Fair	Some pain (not disabling)	Nil	Some limitation of movement, moderate limp
Poor	Disabling pain	Adduction deformity	Marked limitation of movement

external fixation device was fixed to the ipsilateral iliac crest and the femur, and the distance between the two bones was gradually increased by jacking them apart, trying to bring the head of the femur back down to the level of the acetabulum. This enabled patients to keep mobile and out of bed whilst undergoing “external fixation distraction” as can be seen in **Figure 3B**. This procedure did not work well for a variety of reason. Eventually, all patients had skeletal traction through a traction pin in the supracondylar area of the ipsilateral femur (**Figure 4**). They were then bed-bound during the subsequent period of traction when the traction weight was increased by 5kg increments until the femoral head was brought down to the level of the acetabulum, or the maximum traction of 40kg was reached, in a population with an average weight of about 50kg.

Of the 33 patients presenting with a chronic traumatic hip dislocation, 22 were operated upon without a pre-reduction orthopedic procedure, and 11 underwent distraction or skeletal traction prior to definitive surgical management as shown in **Table 3**. Of the eight patients who received traction alone prior to definitive surgical intervention, the average duration of documented traction was 12 days (range 1 to 21 days). From the six patients who had clear documentation of the incremental weight increases applied to the traction device, the average ultimate weight was 15.5 kg (range 8 to 20 kg). Many patients were children, but the average adult body weight of the patients receiving skeletal traction was 50 kg.



Figure 3. **A:** The hip has been reduced, but a block of bone has been removed from the subtrochanteric area to shorten the femur and get the head back into the acetabulum, and a Rush Rod has been used to stabilize the femoral osteotomy. **B:** External Fixation Distraction: Pins in the Iliac Crest and Femur are distracted to bring the femoral head down to the level of the acetabulum



Figure 4. Femoral traction through femoral pin with water bag as traction weight

Table 3. Type of pre-definitive surgical management used

Muscle/tendons released	Number of patients
Hip adductors	2
Hip flexors and adductors	2
Hip flexors, adductors and extensors	2
Hip flexors	1
Hip flexors and extensors	4
Hip external rotators	1

Open reduction procedure details

Of the 16 patients who underwent open reduction as the definitive procedure, nine had a posterior incision (one converted to an anterior incision secondary to inability to locate the acetabulum), two postero-lateral, one lateral, and one anterior. The remaining three patients did not have documentation of the incision used.

All patients undergoing open reduction had acetabulae filled with soft tissue, making it difficult to locate the acetabulum initially. In all cases where it was documented in the operation note (12 of 16 cases), the hip capsule and multiple muscles and tendons had to be released (**Table 4**). The short external rotators of the hip were routinely released in all posterior approaches, and occasionally, the hip abductors and extensors were released. When released, the gluteal muscles and hamstrings were usually partly divided. The hip flexors often released were the iliopsoas, rectus femoris, tensor fascia lata, and sartorius. Specific mention of which adductors were released to facilitate reduction of the hip joint was not documented; mainly as subcutaneous release was performed. Therefore, the extent of the release was not specified in each patient's operation note.

Evidence of AVN

Of the 33 patients included in this study, 11 had mention of the presence or absence of blood supply to the femoral head associated with AVN. Six patients had records of drilling of the femoral head at the time of open reduction. Five of them had a femoral head that bled when drilled (**Figure 2**), and their ages ranged from 13 to 41 years (average 26 years). The time from injury in these patients varied from two months to six years and only one has returned for follow-up. This patient was a 13-year old male who presented six years after trauma with a posterior dislocation. He was treated with an open reduction. His outcome five months post-operation was poor, due to minimal movement at the hip joint with a flexion/external rotation/abduction deformity of the affected hip.

The patient in whom drilling of the femoral head did not cause bleeding was a 67-year old male who presented four months following dislocation of the left hip. An open reduction was planned, but this was subsequently converted to a hemi-arthroplasty when vascularity of the femoral head was not confirmed.

Table 4. The muscles/tendons released around the hip joint to allow reduction of the native femoral head into the acetabulum

Outcome	Number of patients	Mean average time from trauma (months)	Range of time from trauma (months)
Excellent	5	4.6	0.25-18
Good	7	9.71	1.5-48
Fair	4	95.25	4-312
Poor	1	72	72 only

Avascular Necrosis of the femoral head (AVN) is documented radiologically by collapse of the head, but only five patients had documentation in the postoperative records specifically mentioning this feature. Records of three of these patients showed no radiological evidence of AVN in postoperative X-rays were taken between one month and three years after operation. The remaining two patients did show collapse of the femoral head on their follow-up plain radiographs. The first patient was an 11-year old male who presented five years following a posterior traumatic dislocation. He initially underwent a one-month period of external fixator distraction, followed by open reduction with a subtrochanteric osteotomy and IM nail fixation. A plain radiograph taken of this patient's hip three months following the last operation showed evidence of AVN (**Figure 5**). Due to the patient's age, the decision was made to manage the patient expectantly at this stage, but he will most likely need an arthrodesis or hip replacement in the future.

The second patient was a 50-year old male presenting eight months post-injury. He also underwent one month of external fixator distraction and then had open reduction with a subtrochanteric osteotomy and IM nail fixation. On his return to the clinic five months later, there was evidence of flattening of the femoral head. However, this was complicated by clinical evidence of ipsilateral femoral osteomyelitis, which was treated with antibiotics. At final follow-up eight months post-discharge, there was no longer evidence of osteomyelitis and the bone had united, but the patient still had to walk with crutches due to stiffness in the

affected hip.

Outcome at follow-up

Of the 19 patients who were successfully followed-up, five had an excellent outcome, seven had a good outcome, four had a fair outcome, one had a poor outcome, and two did not have enough information in their medical records to classify them according to the Garrett criteria [3]. The characteristics of the patients who achieved each outcome are shown in **Table 5**.

The patient who had a poor outcome when followed-up at five months post-operation was a 13-year old male who presented six years following trauma with a posterior dislocation. He was treated with open reduction, and intra-operative drilling of the femoral head found that it bled. A plain radiograph taken at follow-up showed moderate dysplasia of the femoral head and acetabulum. These appearances did not differ much from the pre-operative plain radiographs.

Discussion

This study has shown that 82% of 33 patients went to a clinic providing Khmer Traditional Medicine (KTM) before presenting to the Children's Surgical Centre. Although this may be a result of personal belief in the skill of KTM practitioners, it is most often due to a lack of funds to pay for hospital treatment. This causes patients with serious and debilitating conditions to significant delay receiving appropriate treatment.



Figure 5. Post reduction showing femoral head has disappeared due to AVN and acetabulum is being deformed

Table 5. The relationship between the outcome at follow-up and the time from trauma to presentation

Pre-definitive surgical management	Number of patients	Average time from trauma (months)	Range of time from trauma (months)
Distraction	1	60	
Distraction and subsequent traction	2	28	8-48
Traction	8	28.2	1.5-120
Nothing	22	20.7	0.2-312

There has been much debate over the most suitable form of management for patients presenting late with a traumatic hip dislocation [3-9]. Options include closed reduction, open reduction with or without subtrochanteric osteotomy, hip arthrodesis, and hip arthroplasty. The main short-term concern with strategies that conserve the native femoral head is that the patient will develop AVN of the femoral head.

The key finding from our experience in performing open reduction on late hip dislocations is that before reduction when the hip joint is first exposed, the femoral head bleeds on drilling in almost every case, suggesting that the blood supply is not normally destroyed by the initial dislocation. This was not always mentioned in the records, and so may be underemphasized in our study results. Of the six patients who had recorded drilling of the femoral head during open reduction, five were shown to bleed well. This suggests that the vascular supply to the femoral head itself is satisfactory and, therefore, the risk of the patient subsequently developing AVN is low. However, it must be noted that only one of these five patients has returned for follow-up. That patient was found to have a poor outcome but dysplastic features of the femoral head and acetabulum had been noted pre-operatively. Of the remaining four patients, the status of the hips has not been reviewed following discharge. Therefore, conclusions on the rate of AVN development cannot be made. In the patient whose femoral head did not bleed when drilled during open reduction, a decision was made to convert the procedure to a hemi-arthroplasty. Consequently, it is not possible to comment on the outcome of patients whose femoral head did not bleed when drilled, but still underwent open reduction and conservation of the femoral head.

Patients who did not have recorded drilling of the femoral head, or formal documentation regarding AVN

at follow-up, but were found to have an excellent or good outcome (12 out of 19 patients followed-up) are unlikely to develop subsequently clinically significant degrees of AVN. Those who underwent closed reduction and returned for follow-up had an excellent or good outcome (**Figure 6**). These patients had a mean time from trauma to reduction of only 0.8 months.

Nevertheless, this study has shown that there is an association between the time from injury to presentation and the likelihood of achieving a good outcome (**Table 5**). This is consistent with previous reports that advocate early intervention [1, 2], although these studies focus predominantly on the early hours after injury.

Regular follow-up is difficult to obtain in hospitals within the developing world due to the work demands placed upon the patients and the economic considerations of travel to and from the hospital. Caution must be taken in assuming those that did not attend follow-up returned to a good level of function. Furthermore, as a retrospective analysis, there are additional limitations to the strength of conclusions that may be drawn from this study. The level of documentation in the medical notes for patient review at follow-up is variable and often limited and, as a result, two patients were not able to have their outcome categorized according to the Garrett criteria [3]. Additionally each patient's original, post-operative, and follow-up radiographs were not available for analysis if they have not been photographed and uploaded onto the electronic system at the Children's Surgical Centre. Thus, it is not possible to identify whether a patient had any associated injuries around the hip joint, such as acetabular rim or small femoral head fractures that may have influenced outcomes, unless these were stated in the original medical documentation or in the operation note.

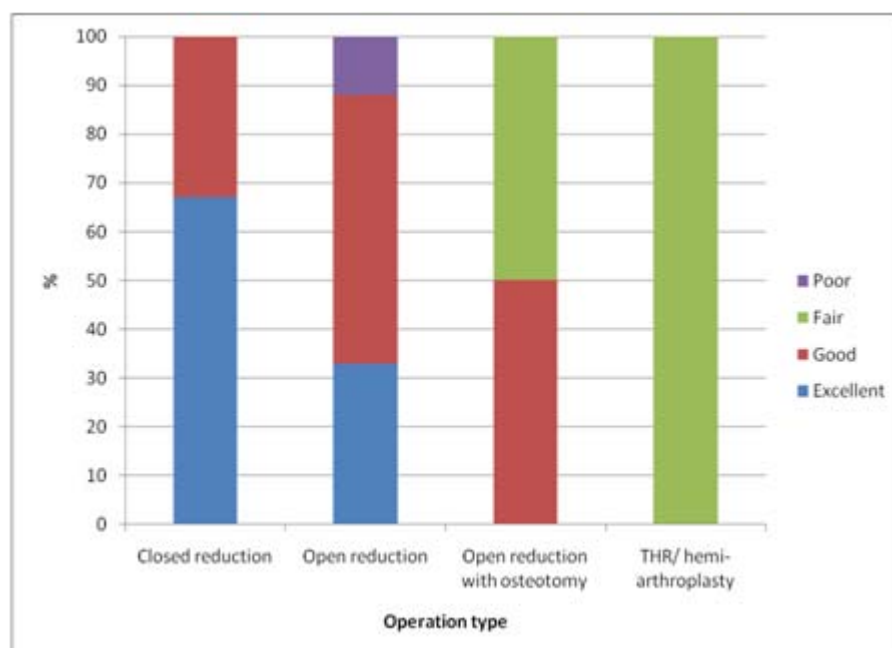


Figure 6. The patient outcome depending on the definitive operative procedure that they underwent.
THR = total hip replacement

Conclusion

This study lends support to the theory that patients presenting late following a traumatic hip dislocation can achieve satisfactory outcomes if managed with femoral head conserving strategies. We also propose that consideration be given to drilling the femoral head during open reduction to ascertain the integrity of its blood supply, and subsequently aid prediction of the likelihood of the patient developing AVN. An additional consideration from demonstrating five out of six femoral heads bled well on drilling before reduction is that in patients presenting late following a traumatic dislocation of the hip, the vascular supply to the femoral head itself is likely to be intact. This should be considered by the surgical team when deciding on the most appropriate intervention. Whether the actual operative reduction of the femoral head impairs the blood supply is unknown, and the authors suggest repeat drilling of the femoral head following reduction could help to predict the likely occurrence of AVN.

The authors have no conflict of interest to report.

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