Central fracture dislocation of the hip associated with fracture of femoral neck treated by femoral head autograft and total hip arthroplasty: A rare case report

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A B S T R A C T

Central Fracture Dislocation of the Hip is a rare condition requiring more attention in its management, caused by high-energy trauma and is often associated with other injuries. This case report presents a 57-years old female who was injured in a traffic accident and diagnosed with polytrauma, abdominal blunt trauma with 7th zone liver laceration, central fracture dislocation of the left hip associated with closed fracture left acetabulum anterior column and closed fracture left neck femur. Until now, there is no mandatory management to treat this kind of injury. Several surgical techniques were explained in previous literatures to treat this condition such as Open Reduction and Internal Fixation (ORIF) procedure and Total Hip Arthroplasty (THA). Some studies chose THA as a treatment for similar condition in older population due to high risk of nonunion and avascular necrosis of the femoral head, especially in cases of significant displacement and devitalization of the femoral head. In this case, we performed femoral head autograft and total hip arthroplasty as a definitive treatment.

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1. Introduction

The normal adult hip is one of the most stable joints in the body. Being a ball and socket joint, its stability depends largely on the shape of its articulating surfaces [1]. Thus, pure hip dislocation or dislocation with femoral head fracture is generally a result of high-energy trauma and is often accompanied by associated injuries that must be recognized [2]. The hip may be dislocated posteriorly or anteriorly (with or without an associated fracture or it may be dislocated centrally in which case there is always an associated fracture [1]). The common type of dislocation of the hip were anterior and posterior dislocation of the hip. The latter type is more common with comparison about 90% of all hip dislocation [3].

There is no specific classification that can mainly talk about central hip dislocation associated with femoral neck fracture. Fractures of the acetabulum occur when the head of the femur is driven into the pelvis [4]. From data available obtained after the enactment of mandatory seatbelt legislation in 1983, the overall incidence of acetabular fractures is approximately 3 patients/100,000/year and has remained stable over the past few decades [2]. Seizures as a cause of central dislocation of the hip has been described in some literatures. Rath et al. in 1997 suggested that the mechanism of injury around the hip joint following seizures is due to severe uncontrolled muscle contraction of proximal thigh muscle leading to strong force towards the hip joint.

Meinhard et al. [6] reported that central fracture-dislocation of the hip associated with fracture and intrapelvic intrusion of the femoral head as a very rare condition. Stewart and Milford classified central fracture of the acetabulum with associated fracture of the

Fig. 1. Pelvic AP Radiograph showed a central fracture dislocation of the hip associated with cetabular and femoral neck fracture.
femoral neck as Grade IV Central, but had hardly any cases, and none with end results, in their study. Similarly, there is little information about how the condition should be managed [5].

We report a case of 57-year-old female who suffered central fracture dislocation of the hip and femoral neck fracture with extrusion of the femoral neck into the pelvic cavity with associated acetabular injury. Our aim of this case report is to discuss our method of treatment, result, and our recommendations for treating similar cases.

2. Case presentation

A 57 years old female polytrauma presented to our emergency department after had an accident. Patient was involve in a motorcycle crash in which she struck a tree. On the primary survey is clear with patent of airway, spontaneous breathing, stable haemodynamic and the patient was conscious. On secondary examination we found there were a bruise at her face, left hemithorax and abdomen. Focused Assessment Sonography for Trauma (FAST) was positive and revealed that a free fluid appearance on hepatorenal region. We also found swelling on the left hip and tenderness at the proximal femur. At the left lower extremity showed gross deformity with shortening and external rotation. Laparotomy was performed in the same day to explore any possibility of active bleeding in the abdominal region. Patient do not have any medical history and family history including any relevant genetic information, and psychosocial history that correlate with the injury.

Pelvic AP radiograph view revealed the discontinuity of left acetabular rim, femoral neck and displacement of femoral head craniomedially (Fig. 1). A computed tomography (CT) scan with...
three-dimensional reconstruction showed a comminutive fracture of the left acetabulum with involvement of the anterior columns fracture associated with discontinuity of femoral neck that resulting femoral head protruding into pelvic cavity (Fig. 2).

This patient was diagnosed with polytrauma, liver laceration 7th zone that caused by abdominal blunt trauma, left central fracture dislocation of the hip associated with closed fracture left acetabulum anterior column and closed fracture left neck femur. At the ward, patient was immobilized by skin traction 5 kg loaded on the left lower extremity. As definitive treatment, we planned to do femoral head autograft and total hip arthroplasty. We wait to do reconstructive procedure until the end of the imunosuppresion period at 21st day.

During surgery, we did posterolateral incision approach and deepened the approach layer by layer until we found the site of fracture. In this case, we did several steps of procedure including investigate the configuration and comminution of the fracture directly followed by extraction of the proximal fragment that consist of head and neck portion of the femur. Femoral head extraction using standard extractor was failed and instead pushed the femoral head further into the pelvic cavity. Afterwards, extraction using bone rongeurs was performed and succeeded. We found the fracture of anterior column but the posterior column is intact (Fig. 3).

We take a half portion of the femoral head to make autograft composite that we use to replace and cover the loss of bonestock area at the anterior column of the acetabulum. After that we reamed the acetabular floor, we put the acetabular metal cup cage (size 46#) and fixated it with 5 screws (Fig. 4). The next step we implanted the acetabular cup (size 44/28) followed by preparing the femoral component. Then we reamed the medular cavity of the femur until size #10 and we decided to use size #9. Stability of the hip joint was confirmed post operatively and looks stable (Fig. 5). For the post-operative rehabilitation, we have informed the patient to do non-weight bearing procedure with two crutches, but patient still
suggested to do active muscle exercise, like quadriceps and calf muscle strengthening. We presented the clinical also radiographic imaging post operatively (Figs. 6, 7 and 8). We will observe the program of weight-bearing procedure, it will be adjusted with clinical and radiographic evaluation each month after the procedure.

3. Discussion

Central dislocation of femoral head was reported as a result of axial loading the femur in abduction. When an impact occurs, the force is usually transmitted from the femoral head to the acetabular columns and walls. Therefore, most quadrilateral plate fractures are associated with acetabular anterior and/or posterior column fractures [5]. Elementary pattern of the acetabular rim are: anterior wall, anterior column, posterior wall, posterior column, and transverse [3]. A severe blow to the lateral aspect of the hip especially when it is abducted may drive the femoral head centrally through a comminuted fracture in the medial wall of the acetabulum (Fig. 7).

The amount of medial penetration of the femoral head into the pelvis varies from slight to extreme, depending the severity of the injury. In the cases that not related by proximal femoral fracture and slight medial displacement of the femoral head can usually be reduced by longitudinal traction through a pin in the lower end of the femur combined with lateral traction through a pin in the greater trochanter. That manipulation then followed by continuous traction that maintained for 8 weeks to allow healing of the fractures [4].

Whether the comminution of the medial acetabular wall is not extensive, open reduction of the fracture-dislocation and internal fixation of the fractures are indicated. According to Salter, if we found the extensive central fracture dislocation of the hip followed by extreme and comminution of the fracture and no possibility to maintain a stable joint, the late reconstruction that involve arthrodesis for young adult patients or total hip joint arthroplasty for middle-aged and elderly patient is indicated [1].

Open reduction and internal fixation (ORIF) should be attempted in the physiologically young patient with a displaced femoral neck fracture. As the older population will increasing the risk of nonunion and AVN are similarly high, especially in cases of significant displacement and devitalization of the femoral head the choice is hip arthroplasty procedure. Operative treatment for central acetabular fractures dislocation includes conservative treatment with skeletal traction, open reduction with internal fixation and total hip arthroplasty. Hip arthroplasty with fixation of acetabulum fracture is helpful in elderly patients in view of high risk of avascular necrosis.

Prabakhar et al. (2018) proposed the case of central hip dislocation and displaced femoral neck fractures that performed by multiple cannulated screws gave the unsatisfying result. After the operation, patient is gradually continued to experience pain with increasing ambulation, and serial radiographs obtained at three and four months demonstrated gradual hardware failure and displacement of the fracture despite appearance of callus and no evidence of AVN [7].

Meinhard et al. report a case of intrapelvic dislocation of the femoral head through a central acetabular fracture in a 27-year-old man following high-energy motorcycle collision. Authors per-
formed a posterolateral approach and were able to deliver the head and neck through the acetabular fracture. Surprisingly, they did not find any fracture lines found neither at the anterior nor posterior position in the dome. A vascularised muscle-bone pedicle graft was taken from greater trochanter and rigidly fixed into superoposterior defect in the neck with two screws. Femoral neck fracture was fixed with four partially threaded lag screws. At two-year follow-up, the patient had returned to full activities with no pain, and radiographs demonstrated preserved joint space with no evidence of AVN [5].

Messa et al. reported a 27 years-old female was involved in a traffic accident who suffered central acetabular fracture with intrapelvic intrusion of the femoral head and fracture of the femoral neck. The author treated this patient's acetabulum with acetabular cementless threaded cup and an inner polyethylene liner. On the femoral side was used femoral cementless stem with a modular ceramic head was implanted. The result is satisfying showed by after six months, the patient walked without aids, but there was a slight limp because of a persistent weakness of hip abduction and a marked one-centimetre limb length discrepancy was compensated [8].

Park et al. (2013) reported a 73-year-old suffered left acetabular fracture medial displacement of femoral head was treated by total hip arthroplasty. The bone defect that caused by a previous fracture at the acetabulum was filled with an autologous bone graft from the femoral head. To reconstruct the acetabulum, we used an acetabular roof-reinforcement ring with a hook (Ganz cup and a cementless tapered stem to reconstruct the femoral side. Postoperatively, the patient was maintained non-weight-bearing for 6 weeks and full weight-bearing ambulation was allowed 3 months postoperatively. One year after procedure, there was no pain or limping on her left hip [9]. Operative procedure with open reduction and internal fixation is preferred for young patients otherwise total hip arthroplasty should be reserved for cases with implant failure and elderly patients [10].

This case report has some in order to observe post-operative improvement of this patient, radiographic and functional outcome as measured by Harris Hip Score must be evaluated 1, 3, 6, and 12 months after operative procedure. It is so important to evaluate the efficacy of the procedure performed. This study has several limitations: (1) Long term follow-up has not been evaluated, therefore the efficacy of this procedure is not yet proven. (2) The population included is just a single patient (Level IV Evidence), and it cannot be concluded yet whether this procedure can be performed in all similar cases. However, to our knowledge, there has not been a lot of studies regarding central hip dislocation cases, especially in polytrauma patients. Therefore, this study serves as an important contribution in literatures. In the future, it is hoped that this study might be influential for future study, conducting well-designed trials with bigger amount of samples.

4. Conclusion

The central fracture dislocation of the hip is an extremely rare case which is not described yet in many literatures. As a complex injury, the management for this condition has to be comprehensive; however the treatment of choice is still controversial. Hip arthroplasty with fixation of acetabulum fracture is helpful in elderly patients in view of high risk of avascular necrosis. Though total hip arthroplasty as performed in this case report seemed to yield promising result radiographically and functionally, long-term outcome still needs to be confirmed in order to thoroughly prove the efficacy of this procedure and to compare with other methods of treatment. More studies are needed to reveal the best treatment of choice for this condition.

Conflicts of interest

The authors have no conflict of interest.

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Ethical approval

The study is exempt from ethical approval in our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Dusak WS: Study concept and design, performed surgery
Dharmayuda CGO: Study concept and design
Kawiyana KS: Senior advisor on study concept, design, and paper writing
Afandi R: Data collection, data analysis, writing the paper
Nugraha GKAS: Data collection, data analysis, writing the paper

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