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Femoral Neck Fracture with Contralateral Hip Dislocation in a Pediatric Patient: A Case Report

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ABSTRACT

This case report presents the unique occurrence of a femoral neck fracture with contralateral hip dislocation in a pediatric patient, a rare and challenging injury pattern. A 9-year-old boy presented following a road traffic accident (RTA) with a right femoral neck fracture and left hip dislocation, along with a left elbow fracture. Management involved closed reduction and percutaneous screw fixation for the femoral neck fracture, while the left hip dislocation was reduced promptly in the emergency room. Postoperatively, the patient was immobilized in a hip spica cast for stability. Post-surgery and reduction x-ray and CT Scan show acceptable reduction and fixation. Regular follow-up included radiographic assessments and clinical evaluations to monitor for complications, particularly avascular necrosis (AVN) of the femoral head. Favorable outcomes were observed, highlighting the effectiveness of a multidisciplinary approach and meticulous postoperative care in managing complex pediatric orthopedic injuries. This case underscores the importance of prompt diagnosis, precise intervention, and comprehensive follow-up in optimizing outcomes for such rare and challenging cases.

Keywords: *Femoral neck fracture, Hip dislocation, Pediatric, Case report, Road traffic accident (RTA)*

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INTRODUCTION

Pediatric trauma involving the hip joint is relatively rare but poses significant challenges due to the unique anatomical and physiological characteristics of children (Menger *et al*., 2021; Bahri *et al*., 2022; Suominen & Saarinen, 2023; Yeslam *et al*., 2023). Although femoral neck fractures and hip dislocations are rare in this population, they necessitate prompt and precise intervention to prevent complications such as avascular necrosis (AVN) of the femoral head. AVN can take months to appear and can severely impact growth and development. The coexistence of a femoral neck fracture on one side with contralateral hip dislocation is an exceedingly rare and complex injury pattern, demanding a highly coordinated, multidisciplinary approach to management (Ramadanov *et al*., 2020; AlHussain *et al*., 2022; Hosny *et al*., 2022; Parhizkar *et al*., 2022; Shaker *et al*., 2022; Kazley & Bagchi, 2023; Maiti *et al*., 2023; Hayat *et al*., 2024; Yale Medicine, 2024).

Femoral neck fractures with contralateral hip dislocation account for less than 1% of pediatric fractures and predominantly affect males, with a male-to-female ratio of approximately 2.5:1. The incidence follows a bimodal distribution: the first peak occurs in very young children (under 2-3 years old) often due to non-accidental trauma, while the second peak is seen in adolescents, typically resulting from high-energy events such as motor vehicle accidents (Maghami *et al*., 2022; Orthobullets, 2024).

This case report details the presentation, diagnosis, and management of a 9-year-old boy who sustained a right femoral neck fracture and left hip dislocation following a road traffic accident (RTA). The case highlights the critical need for timely intervention and comprehensive postoperative care. Through this report, we aim to contribute to the limited literature on pediatric hip trauma and provide insights into effective management strategies for similar cases.

Case presentation and management

Patient information

A 9-year-old boy was admitted to King Khaled Hospital in Tabuk following a RTA. The patient had no known medical problems prior to the incident. Upon arrival at the emergency department, the patient was conscious and alert with a Glasgow Coma Scale (GCS) score of 15/15, indicating full consciousness. His vital signs were stable, indicating no immediate threat to life.

Clinical and radiographic findings

A physical examination revealed multiple injuries: a distal humerus medial condyle intra-articular closed fracture in the left elbow, a neck of femur (NOF) fracture in the right hip, and a dislocation of the left hip **(Figure 1)**. Importantly, the neurovascular status was intact in all limbs, which was a positive sign considering the severity of his injuries. A pelvis radiograph confirmed a femoral neck fracture on the right side and a dislocation of the left hip **(Figure 1)**.

Figure 1. Initial Pelvis x-ray show right femoral neck fracture with left hip posterior dislocation

Diagnosis

The patient was diagnosed with a right femoral neck fracture and a left hip dislocation, along with a left elbow distal humerus medial condyle intra-articular closed fracture.

Management

The management of these injuries was carefully planned, with the primary aim being to stabilize the fractures while minimizing the risk of long-term complications, particularly AVN of the femoral head, which is a significant risk in pediatric patients due to the potential disruption of blood supply.

Right femoral neck fracture

The management of the right femoral neck fracture began with skin traction followed by a surgical closed reduction and percutaneous screw fixation. This approach was chosen to stabilize the fracture while minimizing surgical trauma, which is crucial in pediatric patients to preserve growth potential and reduce the risk of complications. During the procedure, fluoroscopic guidance was employed to ensure the accurate placement of screws, optimizing the alignment and stability of the fracture fragments. One of the major concerns in treating femoral neck fractures in pediatric patients is the risk of AVN of the femoral head, a complication that can arise from disrupted blood supply to the femoral head and lead to significant morbidity. To mitigate this risk, meticulous care was taken to minimize soft tissue disruption during the procedure. Postoperatively, the patient was closely monitored for signs of AVN through regular follow-up with radiographic imaging and clinical assessments.

Left hip dislocation

The left hip dislocation was addressed immediately in the emergency room (ER) with closed reduction under sedation. Post-reduction, both X-ray **(Figure 2)** and CT scans were performed to confirm proper alignment and to rule out associated fractures or intra-articular bone fragments that could complicate the dislocation. Despite a successful reduction, the risk of AVN of the femoral head remained a significant concern due to the potential for vascular compromise during the dislocation and reduction process.

Figure 2. Pelvis x-ray post reduction of left hip posterior dislocation

Postoperative outcome and follow-up

Following the surgical interventions, the patient was immobilized in a hip spica cast to ensure stability of both hips. The spica cast was essential in maintaining proper alignment and preventing displacement, especially important in pediatric patients due to their higher propensity for movement and activity. The patient's postoperative care plan included routine follow-up visits to monitor healing progress, evaluate the positioning of the hardware, and detect any early signs of complications. On regular follow-up, demonstrated by radiographic evidence of healing in the femoral neck fracture and no signs of re-dislocation or instability in the left hip. Functionally, the patient exhibited gradual improvement in mobility and a return to daily activities.

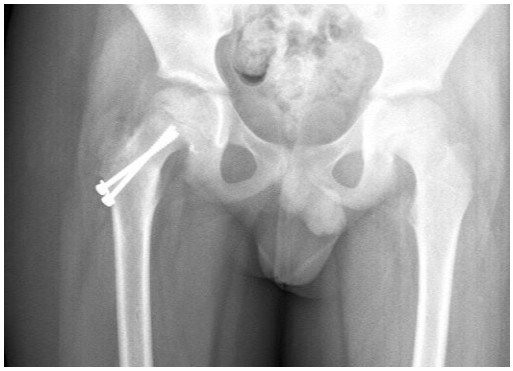

Figure 3. Pelvis radiograph after 6 months follow-up

Regular radiographic assessments were done 6 months post-surgery to ensure proper healing of the fracture and to monitor for AVN of the femoral heads and it was alright **(Figure 3)**. In addition to imaging, the patient's clinical status was assessed, showing no pain, full range of motion, and good functional recovery. Rehabilitation with physical therapy started 3 months post removal of the Spica cast, with gradual progression based on the patient's healing and comfort levels.

RESULTS AND DISCUSSION

The presentation of a femoral neck fracture with a contralateral hip dislocation in a pediatric patient, as described in this case, is exceptionally rare. Pediatric hip injuries such as these present

unique challenges and require a tailored approach to management due to potential long-term complications, including AVN of the femoral head, growth disturbances, and joint instability. This discussion will compare the current case with previously reported cases and studies, highlighting key aspects of diagnosis, treatment, and outcomes.

The rarity of simultaneous femoral neck fracture and contralateral hip dislocation in pediatric patients is underscored by the limited number of reported cases in the literature. Previous studies have primarily documented isolated femoral neck fractures or hip dislocations, but seldom do both injuries occur together. For instance, Thomas Palocaren (2018) reported on femoral neck fractures in children, emphasizing the risk of AVN, particularly with displaced fractures. Similarly, the incidence of pediatric hip dislocations, as discussed by Herrera-Soto and Price (2009), highlights the need to minimize the risk of AVN (Herrera-Soto & Price, 2009; Palocaren, 2018; Alharthi, 2022; Karmanova *et al*., 2022; Sakaeva *et al*., 2022).

In the presented case, the management approach aligns with established principles from these previous reports, focusing on prompt intervention and meticulous surgical technique to mitigate complications. The closed reduction and percutaneous screw fixation for the femoral neck fracture were chosen to stabilize the fracture while minimizing surgical trauma, consistent with methods described by De Franco S (2023) and C Khoo (2014) (Khoo *et al*., 2014; Sadovnikova *et al*., 2022; Xuan *et al*., 2022; De Franco *et al*., 2023). This technique, combined with fluoroscopic guidance, has been shown to improve outcomes by ensuring accurate screw placement and minimizing soft tissue disruption, thereby reducing the risk of AVN.

The immediate closed reduction of the left hip dislocation in the emergency room, followed by post-reduction imaging to confirm proper alignment and rule out additional fractures, mirrors recommendations from studies by Herrera-Soto and Price (2009) (Herrera-Soto & Price, 2009; Gottlieb, 2018; Lobach *et al*., 2023; Ramush *et al*., 2023; Skarayadi *et al*., 2023). The literature consistently supports urgent reduction of hip dislocations to restore vascular supply to the femoral head and prevent AVN. The utilization of both X-ray and CT scans post-reduction in this case provided a comprehensive assessment, aligning with best practices for ensuring no residual intra-articular fragments or malalignment (Dawson-Amoah *et al*., 2018; Gottlieb, 2018; Carpio-Vargas *et al*., 2023; Febrianti *et al*., 2023; Tsvetkova *et al*., 2023).

The postoperative use of a hip spica cast for immobilization, as employed in this case, is supported by studies on pediatric femoral fractures, such as those by Pisecky L *et al*. (2022), which advocate for immobilization to maintain fracture alignment and prevent displacement. The spica cast also helps to manage the inherent activity levels in pediatric patients, which can pose challenges to maintaining stability postoperatively (Truong *et al*., 2020; Pisecky *et al*., 2021; Alamer, 2023; Bisri *et al*., 2023; Tsvetkova & Kostadinova, 2023).

The favorable outcomes in this case, including radiographic evidence of healing, absence of re-dislocation, and improvement in functional mobility, are encouraging and align with findings from similar cases. For example, the review by Dawson-Amoah K (2018) on femoral neck fractures emphasizes the importance of regular follow-up with radiographic imaging and clinical assessments to monitor for complications such as AVN and ensure proper healing (Dawson-Amoah *et al*., 2018; De Franco *et al*., 2023; El-Sokkary, 2023; Nurcahyo *et al*., 2023; Tawfik *et al*., 2023).

The dual risk of AVN for both the right femoral neck fracture and the left hip dislocation in this patient required vigilant monitoring and a multidisciplinary approach. Previous reports, such as those by Lohiya A Jr *et al*. (2023), highlight the critical need for detection and intervention to prevent AVN. In this case, the comprehensive postoperative care plan, including frequent clinical assessments and imaging, was designed to detect signs of AVN and address them (Fahim *et al*., 2023; Feghhi *et al*., 2023; Lohiya *et al*., 2023; Yale Medicine, 2024).

The successful management of this complex injury pattern underscores the importance of a multidisciplinary approach, involving orthopedic surgeons, radiologists, and physical therapists. This collaborative effort ensures that all aspects of the patient's care are addressed, from surgical intervention to postoperative rehabilitation. The coordinated care model described in this case is supported by literature emphasizing the benefits of multidisciplinary management in pediatric orthopedic trauma, as highlighted by Bach JA *et al*. (Bach *et al*., 2017; Halimah *et al*., 2023).

CONCLUSION

This case report adds to the limited literature on pediatric femoral neck fractures with contralateral hip dislocations, the patient's recovery highlights the effectiveness of a structured and coordinated approach to pediatric trauma care, underscoring the importance of interdisciplinary collaboration in achieving optimal patient outcomes. While the risk of AVN remains a significant concern, meticulous surgical technique and vigilant postoperative care are essential in managing such complex injuries. Future studies and case reports will be valuable in further refining the management strategies and improving the prognosis for similar pediatric patients.

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