

## Case Report

# Inferior Hip Dislocation during Treatment of Developmental Dislocation of Hip – A Rare Complication from Hip Abduction Splint: A Case Report and Review of Literatures

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## Abstract

**Background:** DDH constitutes a group of conditions involving hip subluxation and dislocation. It is mandatory for management of these cases to be followed by aftercare with Braces. Some complications may develop during follow-up in hip spica or hip brace.

**Introduction:** DDH encompasses a spectrum of diseases that includes dysplasia (a shallow or underdeveloped acetabulum), subluxation, and dislocation. These conditions are commonly seen with arthrogryposis, myelomeningocele, and Larsen's syndrome. Cases of developmental dislocation of the hip (DDH) still occur after walking age because of Late or missed diagnosis and failed conservative treatment. Lack of follow-up leads to a lot of complications.

**Case presentation:** 4years old female child admitted to our hospital complaining of limbing and had neglected history of right DDH. She w managed by derotation femoral osteotomy and hip spica cast with smooth follow-up recovery. At 12 weeks an abduction hip brace was advised but follow-up last for few weeks. When returned back and during routine x-ray inferior dislocation was noticed. Patient planned for surgery and hip Spica cast. Follow-up passed smoothly for 12 months then the Spica cast replaced by Abduction hip brace. The reduction was confirmed by good x-ray.

**Discussion:** Bracing is an important step in follow-up treatment program of DDH. Loss of reduction as a complication may occur during follow-up regimen. Inferior hip dislocation in the hip abduction brace is a rare complication and rarely mentioned in the literatures. Avoidance of this complication can be achieved by having good orthotics in the hospital and applying the brace under supervision of the orthopedic surgeon. Immediate x-ray to check for good position of the head, and closed monitoring of the patient to detect any changes in the hip position.

**Conclusion:** Inferior hip subluxation in the hip brace rarely occurs as a complication during follow-up program of DDH treatment. Early recognition of this complication and reduction of the flexion angle led to a stable dislocation of the hip.

**Keywords:** Developmental hip dislocation, Dysplasia, Hip spica, Hip brace

## Introduction

Developmental hip dysplasia (DDH) encompasses a spectrum of conditions that include dysplasia (a flat or underdeveloped acetabulum), subluxation, or dislocation. There is also a teratologic hip that is dislocated in utero and irreducible on neonatal examination. It has a pseudo-acetabulum, and is associated with neuromuscular and genetic disorders. These disorders are common in arthrogryposis, myelomeningocele, and Larsen syndrome. Cases of developmental hip dislocation (DDH) continue to occur even after walking age owing to late diagnosis or failure of conservative treatment [1]. Conservative or surgical treatment for DDH needs aftercare for braces. Lack of aftercare leads to a lot of complications related to Spica Casting – hip abduction braces (Figure 1). These complications involve compression of femoral



Figure 1: Spica Casting – hip abduction braces.

nerve due to hyperflexion, inferior dislocation, skin detachment and the most important one is avascular necrosis of femoral head. Care of the cast or the brace should bear attention to the fully reducible hip, child not attempting to stand, close regular follow-up (every 1-2 weeks) by imaging and adjustments of the brace when necessary by the surgeon[2-3]. Pavlik Harness Failure may occur due to: Improper application and follow-up by the physician, inadequate initial reduction, failure to recognize persistent dislocation and poor parent compliance. The risk factors predispose to Pavlik harness failures include: bilateral hip dislocation, age greater than seven weeks prior to initiation of treatment with the harness and lack of Ortolani sign at initial examination.

### Case Presentation

Four years female child presented to the orthopedic department of El-Hussein University Hospital with painless limping, limb shortening and radiographs showed a neglected right DDH. The patient was scheduled for surgery (femoral shortening with derotation osteotomy) and hip spica. Recovery was smooth and follow-up care was good. At 12 months the hip Spica was removed and the patient was advised to have an abduction hip brace. She went to a place outside the hospital and the technician applied the brace. The patient did not come back to the hospital to continue the follow-up program. After 6 weeks the child's parents returned back to our hospital to make sure of the condition. Unfortunately plain x-ray showed strange inferior dislocation of hip (Figure 2a and 2b) and CT confirmed the diagnosis Figure 3.

### Plan of Management

The patient was scheduled for operative intervention. Closed reduction was an attempt first but failed as there was a band of elasticity feeling preventing relocation of the hip. We decided to go to open intervention.

### Operative Details

We used the same incision. The operative findings revealed the femoral head was buttonholed in the capsule that preventing reduction. The capsule was release and the head was relocated easily to the acetabulum. The position was checked by C-arm and hip Spica applied for 4 weeks. The abduction hip splint was applied by the orthopedic surgeon and an immediate X-ray was done and confirmed the good reduction (Figure 4). The postoperative course

was uneventful, with no early or late infection being observed. The results were evaluated according to modified McKay criteria, Severin radiological criteria, and Bucholtz - Ogden system of AVN grading after a mean follow-up for 6 months. In the last follow-up, the Clinical Evaluation patient reported no significant hip pain, and radiologically no signs of dislocation or AVN (Figure 5).



Figure 3: CT diagnosis.



Figure 4: X-ray of abduction hip splint.

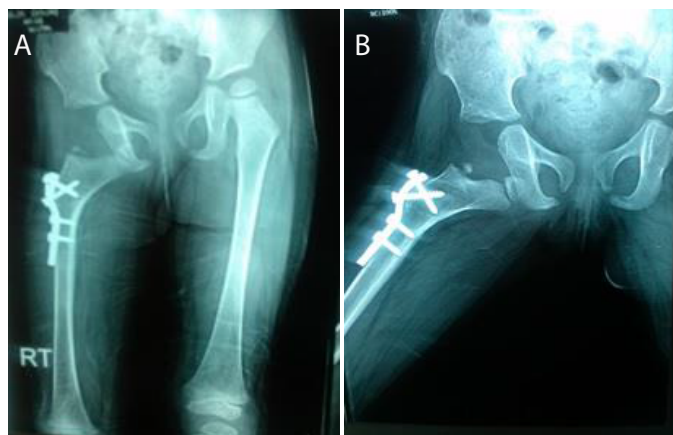


Figure 2: X-ray showing strange inferior dislocation of hip.



Figure 5: Radiologically no signs of dislocation or AVN.

## Discussion

Bracing is considered a gold standard in treating Developmental Dysplasia of the Hip (DDH) in infants less than 6 months of age with reducible hips. A variety of braces are available that work on similar principles of limiting hip adduction and extension. The brace eliminates dislocating forces from the hamstrings, the block to reduction of the psoas and improves the muscle line of pull to stabilize the hip joint [4]. The use of excessive force or exceeding the safe zone to maintain hip position can lead to complications, such as femoral nerve palsy and avascular necrosis (AVN) [5-6]. Inferior dislocation (obturator dislocation) from the abduction brace rarely mentioned in literature. Rombouts and Kaelin [3] mention two cases of inferior dislocation but in a neonate due to the Pavlik harness. Also, they reviewed the literatures and mentioned Five cases of inferior (obturator) dislocation complicating the treatment of developmental dislocation of the hip that had been reported previously [7-10]. Only one of these cases was in a neonate [10]. Pediatric orthopedic surgeons have been aware of the problem but no one has studied it fully to declare why it happens and there were no studies to follow up and report on the final results for children with this complication. Ramsey et al. [11] emphasized that adequate hip flexion must be obtainable so that the femoral head is directed towards the triradiate cartilage. Excessive hip flexion, however, directs the metaphysis of femur to come below the triradiate cartilage and may produce an inferior (obturator) dislocation. This complication is classified as grade IIIb according to the Clavien-Dindo classification [12] (Intervention under general anesthesia). To avoid this complication we need to have good orthotics in the hospital, application of the brace should be under the supervision of the orthopedic surgeon, immediate x-ray to check for good position of the head, and closed monitoring of the patient to detect any changes in the hip. In our case and after open reduction; a hip spica cast was applied and followed for 4 weeks. After that an abduction brace was applied carefully by the surgeon and under C-arm image control to verify the proper location of the hip. The brace was gradually weaned over a period of several months [13].

## Conclusion

Abduction brace can cause inferior hip dislocation during treatment of DDH. Gentle manipulation may be tried and if failed go for open reduction. Closed monitoring of the brace is mandatory. Early recognition of the complication and diminution of the angle of flexion gave a stable relocation of the hip joint.

## Abbreviations

DDH: Developmental Dysplasia of Hip; AVN: Avascular Necrosis.

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