

Effectiveness of Plates and Screws as an Alternative to Reinforcement Rings in Dysplasia of the Hip: A Case Report

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ABSTRACT

Background: Developmental dysplasia of the hip (DDH) is a disorder of hip joint development that can lead to instability, pain, and functional limitations. Surgical intervention is often necessary; however, conventional methods such as reinforcement rings and major osteotomies may be difficult to implement in resource-limited facilities. **Case Report:** The report is on a patient with complaints of intermittent hip pain for four years, which had progressively worsened and resulted in a limping gait. The history indicated that these symptoms began when the patient started walking, with limb length discrepancy causing frequent falls and fractures. Various therapies, including surgery, had been attempted, yet the hip pain had not been fully alleviated. **Discussion:** We utilized a modified technique using plates and screws for the reconstruction of the acetabular roof, which successfully stabilized the acetabular cup. Evaluation using the Harris Hip Score indicated a result of 85, nearly equivalent to the use of a reinforcement ring. This technique proved to be safe and effective, enhancing mobility, reducing pain, and improving quality of life without invasive procedures. **Conclusion:** The modified technique provides stability for patients with DDH, making it an economical alternative with satisfactory clinical outcomes.

Keywords: plates and screws; reinforcement rings; hip joint; acetabular cuff; femoral stem; Harris Hip Score.

INTRODUCTION

Developmental Dysplasia of the Hip (DDH) is a developmental disorder of the hip joint that can lead to instability, pain, and functional limitations. As people age, the condition often progresses to osteoarthritis due to mechanical imbalance between the acetabulum and the femoral head. Surgical intervention is necessary to address these issues; however, traditional approaches, such as the use of reinforcement rings and major osteotomies, are not always feasible, especially in healthcare facilities with limited resources. Therefore, surgical interventions such as the use of modified plates and screws have emerged as an innovative alternative for managing the condition. These methods are more approachable than reinforcing rings, give the hypoplastic acetabulum sufficient stability, and can conform to the patient's anatomical shape to provide sufficient structural support and promote better healing.¹⁻³

One of the main objectives of changing the surgical approach for DDH is to reduce the number of osteotomies, which are commonly used in conventional treatment but may raise the risk of infection, slow bone healing, and decrease mobility. Therefore, this modified technique offers a more

conservative yet effective approach, helps expedite patient recovery times, and decreases the rate of operative morbidity.^{1,4}

The surgery of DDH often aims to improve the quality of life by minimizing pain and restoring hip joint function in adult patients. By employing a modified plate and screw approach, patients can avoid highly invasive procedures, such as total hip arthroplasty (THA), which is typically considered a last resort. This approach allows for bone tissue preservation and extends the time before a patient requires full joint replacement, providing a better option for adults facing limited medical resources.⁵

CASE REPORT

A patient presented to the orthopaedic outpatient clinic seeking consultation regarding hip pain that has been experienced for the past four years. The pain has been intermittent but has progressively worsened over time. This condition has caused the patient to walk with a noticeable limp due to a perceived length discrepancy, with the right leg feeling longer than the left. The patient's parents reported that this issue was first noticed when the patient began to walk.

As the patient matured, the altered gait became more pronounced. Due to this imbalance, the patient experienced frequent falls and occasional fractures due to pain. The patient has undergone various therapies, from traditional massage to specialist consultations and even surgery; however, the hip pain has not yet been effectively addressed.

Vital signs and general physical examination were within normal limits. Neurological status revealed normal physiological reflexes, with negative pathological reflexes. A local examination of the pelvic area revealed asymmetry and the appearance of the right leg being shorter than the left. On palpation, no masses or swelling were found in the knees or pelvis; however, crepitus was noted bilaterally in the knees, and tenderness was present in the hip, knee, and lower back areas, particularly during external rotation and abduction. Knee movement was severely limited, with a range of motion of 0 – 5 degrees, while the right hip exhibited limitations in flexion, abduction, and external rotation.



FIGURE 1: Pelvic X-ray.

The pelvic and femur X-ray examination of the patient revealed a dislocation of the right femoral head and a displacement of the right hip joint from the acetabulum (Figure 1).

The management for the dislocation brought on by the patient's DDH was started after the X-ray results were examined. Several surgical steps were undertaken, beginning with the patient seated in a position ready for regional anesthesia, and aseptic measures were implemented.



FIGURE 2A: Cocher-Langenbeck of Femur.

The procedure began with the Cocher-Langenbeck technique, and the incision was deepened until the femur was clearly visible (Figure 2A). A femoral dislocation was observed, along with atrophy of the femoral neck and head, prompting excision of the femoral head and neck. Subsequently, identification revealed that the superoposterior aspect of the acetabular roof was quite shallow.

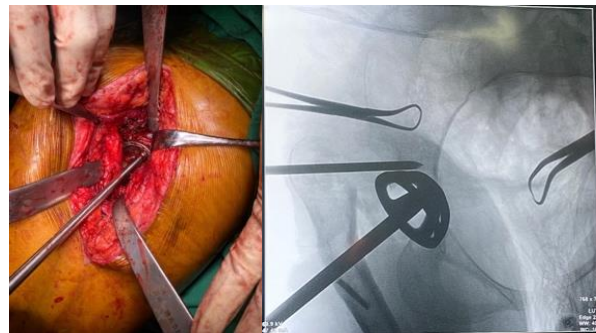


FIGURE 2B: Acetabular Cuff Attachment.

This was followed by the installation of the femoral component and the insertion of a cemented acetabular cup (Figure 2B). After that, a femoral stem with a diameter of 0.6 cm was inserted and secured with cerclage wire and bone cement (Figure 2C).

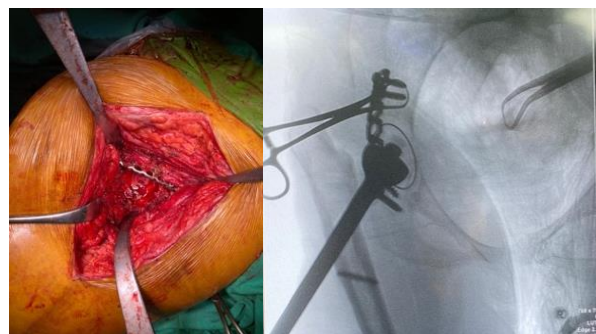


FIGURE 2C: Installation of the modified plate and screw.



FIGURE 3: Femoral Stem Insertion.

After that, a femoral stem with a diameter of 0.6 cm was inserted and secured with cerclage wire and bone cement (Figure 3.). The surgical wound was then closed layer by layer, cleaned, and neatly sutured. The surgical procedure was completed.

DISCUSSION

The use of reinforcement rings has long been used in cases of developmental dysplasia of the hip (DDH) because they are designed to function both as an acetabular cup and a support for a shallow acetabular roof. However, in this surgery, we faced budget constraints that resulted in the unavailability of a reinforcement ring. As an alternative, we reconstructed the acetabular roof using a modified technique with plates and screws to stabilize the acetabular cup, addressing the shallow acetabular roof. This modification successfully fixed the acetabular cup and reduced the risk of mobilization, followed by the insertion of the femoral head.^{4,6}

A study by Attinger et al. reported the use of total hip replacement (THR) in DDH cases with reinforcement rings, evaluation using the Merle d'Aubigné score showed excellent results (18 points), and the Harris Hip Score reached 90 points. In this case, we evaluated the modified acetabular cup support using plates and screws with the Harris Hip Score, achieving a result of 85, which did not show a significant difference compared to the use of a reinforcement ring. This indicates that this modification is a viable alternative to consider, especially in resource-limited areas.⁷

Khan Zimri et al. also reported the use of a 6-7-hole plate and screws in cases of neglected DDH corrected through open reduction. The plates and screws successfully improved hip stability in weight-bearing positions and helped support the femoral head. This modification was deemed safer for older patients, as it could reduce the risk of additional trauma to the bone, which may be fragile in advanced age. Follow-up after one-month post-operation showed significant functional improvement, with the patient able to walk with assistance, stable, and reporting reduced pain.⁸

These results align with the findings in our case, where the modification using plates and screws provided the expected stability, allowing the patient to enhance daily mobility, reduce pain, and ultimately improve quality of life without compromising the efficacy of the outcomes.

CONCLUSION

In this case, the modified technique for supporting the acetabular cup using plates and screws has proven effective in providing stability and fixation for patients with developmental dysplasia of the hip (DDH) who face limitations in accessing reinforcement rings. This technique allows for adequate support, addresses the shallow acetabular roof, and helps maintain the position of both the acetabular cup and the femoral head, thereby enhancing stability in weight-bearing positions. Based on the assessment results using the Harris Hip Score, this technique achieved a score nearly equivalent to that of the reinforcement ring, indicating its potential as an economical alternative without compromising clinical outcomes.

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