Case Report

Valgus Osteotomy in Neglected Femoral Neck Fractures: A Case Report

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ABSTRACT

Femoral neck fracture continues to be regarded as an "unsolved fracture." In developing countries, neglected neck of femur (NOF) fractures frequently lead to complications such as osteopenia, neck resorption, and avascular necrosis (AVN). Neglected femoral neck fractures in young patients present significant challenges due to complications such as nonunion and AVN. Preservation of the femoral head is paramount in managing these cases. Valgus intertrochanteric osteotomy, combined with dynamic hip screw (DHS) fixation, offers a biomechanical solution by converting shear forces into compressive forces, thereby promoting fracture healing. This case report details the management of a 16-year-old male with a neglected femoral neck fracture, successfully treated with valgus osteotomy and DHS fixation. The patient presented with a 2-year-old femoral neck fracture, classified as Garden IV, and exhibited symptoms of pain, restricted mobility, and limb shortening. Preoperative radiographs confirmed nonunion without signs of AVN. The surgical intervention involved valgus intertrochanteric osteotomy and fixation with a DHS, providing enhanced stability and compression. Postoperative care included physiotherapy focusing on gradual weight-bearing. This case highlights the efficacy of valgus intertrochanteric osteotomy with DHS fixation in treating neglected femoral neck fractures in young patients. The procedure is cost-effective, promotes fracture union, and preserves hip function with minimal complications. Given these outcomes, valgus osteotomy should be considered a primary treatment option for femoral neck nonunion in physiologically young individuals.

Keywords: *Neglected femoral neck fracture, valgus osteotomy, dynamic hip screw, nonunion, Femoral head preservation.*

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INTRODUCTION

Femoral neck fractures are often referred to as "the unsolved fracture" due to their complexity and high complication rates, including nonunion and avascular necrosis (AVN)[1]. Neglected femoral neck fractures (NOF) are more commonly observed in the developing world. They are often associated with complications such as osteopenia, femoral neck resorption, and AVN, which further compromise head salvage efforts[1]. These fractures account for a significant proportion of hip fractures worldwide, particularly affecting elderly patients and young individuals involved in high-energy trauma[2]. In young patients, preserving the native hip joint is critical to maintaining long-term function and quality of life[3].

The management of femoral neck nonunion typically focuses on enhancing the biological environment

through non-vascularized or vascularized bone grafts and muscle pedicle grafts[4] or improving biomechanics via valgus intertrochanteric osteotomy[3]. The incidence of nonunion in femoral neck fractures is estimated at around 30%, particularly in high-angle Pauwels type III fractures[4]. Nonunion often results from unfavorable biomechanical conditions, including high shear forces at the fracture site[5]. Non-union rates of 10% to 59% have been reported and may be seen more frequently in young patients due to high-energy trauma[6].

Despite improvements in the techniques of surgery and internal fixation devices, non-union is still reported in one-third of cases of femoral neck fracture with displacement[2]. Pauwels first refined the concept of valgus osteotomy in 1927 and identified that high shear forces due to the vertical orientation of the fracture were the primary contributors to nonunion[7]. He proposed that angulation osteotomy could convert these detrimental shear forces into compressive forces, thus fostering fracture healing. This approach, later modified by Muller, remains widely utilized today due to its high success rates, particularly in correcting coxa vara deformities and addressing limb length discrepancies[8]. Valgus intertrochanteric osteotomy has emerged as an effective surgical intervention to address nonunion in femoral neck fractures. By converting shear forces into compressive forces, this technique enhances the biological environment for fracture healing[5]. Dynamic hip screw (DHS) fixation further stabilizes the construct and allows controlled compression at the fracture site, promoting union[1]. Despite advances in surgical techniques and a better understanding of femoral neck anatomy, nonunion remains prevalent, especially in cases where initial treatment is delayed. Maninger et al. reported a reduced incidence of femoral head collapse when surgical intervention occurred within six hours of injury[9]. However, in many cases, patients present after weeks or even months following the incidence of trauma which ultimately increase the risk of complications[2].

This case report highlights the successful application of valgus osteotomy and DHS fixation in managing a neglected femoral neck fracture, emphasizing its role as a cost-effective and efficient treatment option for young patients with similar conditions in our country.

CASE SUMMARY

A 16-year-old male boy presented with a history of persistent left hip pain and limping for two years following a fall. Initially treated by a local practitioner without appropriate orthopedic intervention, the condition progressed to nonunion with significant functional impairment. Upon admission to the National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka, Bangladesh, in March 2022, the patient exhibited restricted hip movement, limb shortening, and inability to bear full weight. Radiographic evaluation revealed a neglected femoral neck fracture with nonunion and varus deformity (Fig. 1 & 2). Surgical management involved a valgus intertrochanteric osteotomy to realign the femoral neck and improve biomechanical loading, followed by fixation with a dynamic hip screw (DHS) (Fig. 3). The procedure tried to convert shear forces at the fracture site into compressive forces to enhance fracture healing potential. Postoperative care included a structured rehabilitation program, starting with non-weight-bearing mobilization and progressive weight-bearing as radiological healing was observed (Fig. 4). Follow-up assessments over 12 months demonstrated significant clinical improvement, with restored hip function, pain relief, and corrected limb length discrepancy. Radiographs confirmed complete union (Fig. 5), and the patient resumed normal activities without assistance. At the final follow-up, the patient reported no pain, achieved full weight-bearing capacity, and demonstrated a normal hip range of motion. Functional recovery was assessed using the Harris Hip Score, which improved significantly, indicating excellent post-surgical outcomes. This case underscores the effectiveness of valgus intertrochanteric osteotomy combined with DHS fixation in managing neglected femoral neck fractures in young patients with full hip function.

Fig. 1: *Preoperative X-rays showing femoral neck nonunion and malalignment.*

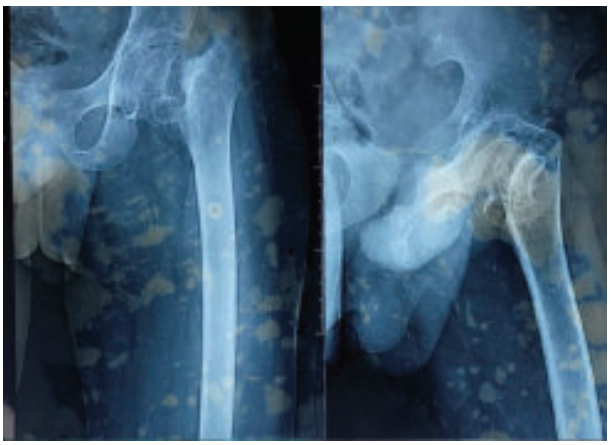

Fig. 2: *Preoperative X-rays showing femoral neck nonunion and malalignment*

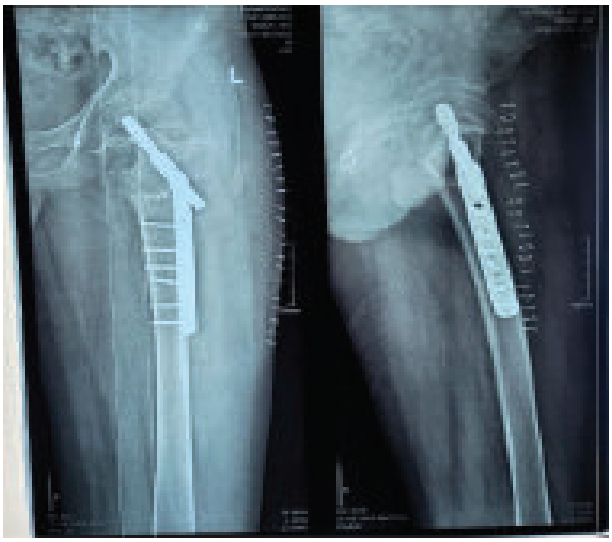

Fig. 3: *Postoperative X-rays demonstrating valgus osteotomy correction and stable DHS fixation*

Fig. 4: *X-ray showing fracture union before implant removal, whiich demonstrated progressive healing, and upon achieving complete union, the implant was removed.*

Fig. 5: *X-ray showing complete union after implant removal.*

DISCUSSION

This case demonstrates the effectiveness of valgus intertrochanteric osteotomy combined with dynamic hip screw (DHS) fixation in managing neglected femoral neck fractures. The successful union observed aligns with prior studies reporting union rates of 86% to 98% following valgus osteotomy[3,4]. The Harris Hip Score, in this case, improved significantly from 66.6 preoperatively to 88 postoperatively, reflecting substantial functional recovery, including the ability to sit cross-legged, squat, and perform one-leg stances without discomfort.

Valgus osteotomy plays a pivotal role in converting shear forces at the fracture site into compressive forces, thereby enhancing the biological environment conducive to bone healing[5,7]. This biomechanical principle is particularly relevant in Pauwels type III fractures characterized by high shear stresses. DHS fixation complements this by providing dynamic compression and stability, which are crucial for achieving union in nonunion femoral neck fractures[1,8]. Numerous studies support the efficacy of valgus osteotomy in treating nonunion femoral neck fractures. The literature supports the superiority of valgus osteotomy with DHS fixation over other methods, particularly in young patients where femoral head preservation is paramount[3,4,8,9]. As evidenced in this case, timely surgical intervention, meticulous preoperative planning, and structured rehabilitation are critical factors contributing to successful outcomes. DHS fixation is often preferred over angled blade plates due to its ease of application, improved

stability, and effective dynamic compression[1]. However, attention must be paid to potential complications such as limb length discrepancy and excessive lateralization of the femoral shaft. Recent literature emphasizes the importance of early intervention and precise biomechanical realignment in improving patient outcomes[3,4]. Although some neglected cases may ultimately require conversion to total hip arthroplasty due to degenerative changes, valgus osteotomy remains a joint-preserving strategy with high success rates. Our case aligns with these findings, demonstrating that timely surgical intervention, meticulous preoperative planning, and structured rehabilitation contributed to this patient's favorable clinical and radiological outcomes. Furthermore, DHS fixation is often preferred over angled blade plates due to its ease of application, better stability, and capacity for dynamic compression at the fracture site[1]. However, achieving optimal outcomes requires careful consideration of factors such as limb length discrepancy and the risk of excessive femoral shaft lateralization during surgical planning.

CONCLUSION

Valgus intertrochanteric osteotomy combined with DHS fixation is a reliable, cost-effective, and function-preserving approach for managing neglected femoral neck fractures, particularly in young patients where femoral head preservation is essential. This case reinforces its value as a primary treatment modality in young patients, with outcomes comparable to or even surpassing those reported in the existing literature. This case demonstrates that patients can achieve full functional recovery with proper surgical intervention and rehabilitation.

REFERENCES

1. Varghese VD, Livingston A, Boopalan PR, Jepegnanam TS. Valgus osteotomy for nonunion and neglected neck of femur fractures. World J Orthop. 2016;7(5):301-7.
2. Khan AQ, Khan MS, Sherwani MK, Agarwal R. Role of valgus osteotomy and fixation with dynamic hip screw and 120° double angle barrel plate in the management of neglected and ununited femoral neck fracture in young patients. J Orthop Traumatol. 2009;10(2):71-8.
3. Schwartsmann CR, Spinelli LF, Yépez AK, Boschin LC, Silva MF. Femoral neck non-union treatment by valgus intertrochanteric osteotomy. Acta Ortop Bras. 2015;23(6):319-22.
4. Nayak C, Acharyya B, Jain M, Kamboj K. Valgus osteotomy in delayed presentation of femoral neck fractures using fixed angle simple dynamic hip screw and plate. Chin J Traumatol. 2019;22(1):29-33.
5. Zhou QJ, Peng XQ, Fei ZG, Zhu XH, Sun CG. Treatment of nonunion after femoral neck fracture with valgus intertrochanteric osteotomy: A case report with 18-year follow-up. J Int Med Res. 2021;49(5):1-8.
6. Mark H, Thompson JP. Management of femoral neck fractures in young adults. Orthop Clin North Am. 2002;33(4):611-26.
7. Pauwels F. Der Schenkelhalsbruch, ein mechanisches Problem. Stuttgart: Enke Verlag; 1935.
8. Mueller ME. The intertrochanteric osteotomy and pseudarthrosis of the femoral neck. 1957. Clin Orthop Relat Res. 1999;(363):5-8.
9. Manninger J, Kazar G, Fekete G, Fekete K, Frenyo S, Gyarfas F, et al. Significance of urgent (within 6h) internal fixation in the management of fractures of the neck of the femur. Injury. 1989;20(2):101-5.