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Conservative Treatment in Neer Type II Distal Third Clavicle Fracture: A Case Report

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ABSTRACT

Introduction: Clavicle fractures, common among young athletes, often result from falls onto the shoulder. The Neer classification guides treatment decisions based on ligament and joint involvement. While older studies favored nonoperative treatment, recent research suggests surgery may be beneficial, especially for certain fractures. Recommendations vary, with non-surgical options for non-displaced fractures and surgery for displaced distal third fractures, particularly type II and V. The choice between operative and non-operative management remains debated, as both may yield similar functional outcomes.

Case report: A 38-year-old hotel manager presented with left shoulder pain following a motorcycle accident. Examination revealed a displaced fracture of the left clavicle, with tenderness and limited range of motion. Despite the fracture, he opted for nonoperative management with an arm sling. At three weeks, his pain improved, and X-rays showed better alignment. By six weeks, pain and stiffness had subsided, and X-rays indicated callus formation. At 18 weeks, he had full range of motion and strength, with visible callus formation on imaging. He continued physiotherapy for optimal recovery.

Discussion: In recent years, managing clavicular fractures has shifted towards open reduction and internal fixation (ORIF) due to high non-union rates with conservative treatment. A 38-year-old man with a displaced Neer type II distal third clavicle fracture chose nonoperative treatment despite controversy. He showed significant improvement after six weeks, opting for physiotherapy.

Conclusion: Limitations include the fracture occurring in a non-dominant upper limb and the rarity of Neer type II clavicular fractures, warranting further research.

Keywords: Clavicle fracture, Neer type II clavicular fracture, conservative treatment

INTRODUCTION

Fracture of the clavicle, though may happen in people of all ages, is one of the most common fractures in young and active individuals, especially those who participate in high-impact activities or sports such as football, hockey, cycling, motorcycles. [(1)] It usually produced by a fall directly on the affected shoulder.[(2)] Clavicle fractures account for approximately 2.6% of all fractures, with the majority occurs in midshaft (80% - 85%). Distal third fractures are the next most common type (21% to 28%).[(1,2,9)]

Neer classified distal third clavicle fractures based on the integrity of the coracoclavicular (CC) ligament complex and the complicity of the acromioclavicular (AC) joint.[(1,3,4)] Neer classification helps to determine the prognosis and management.[(5)]

The purpose of treatment for clavicle fracture includes alleviation of pain and importantly restoration of shoulder function.[4] Older studies stated that clavicle fractures, even significantly displaced, still carry good prognosis when treated nonoperatively.[1,4] However, literature nowadays has challenged this and operative management has gained prominence in recent years.[4]

American Academy of Orthopaedic Surgeon recommends non-surgical treatment for all non-displaced or minimally displaced fractures, and surgical treatment for displaced distal third clavicle fractures including type II (especially type IIB) and type V.[3,5] Type II distal clavicle fracture, which involve displacement due to distraction forces, is considered unstable and associated with the highest non-union or malunion incidence (11,5% - 40%) if treated non-operatively.[3,4,5,13] Despite this complication, some several small studies suggest that radiographic non-union does not always generate important symptoms.[2,4,6] Because of this contention, treatment is still controversial.[2,7,13] Nonoperative and operative management may offer similar functional results.[6,7] Thus, our purpose is to present the case of a man who sustained a displaced Neer type II distal third clavicle fracture and treated by non-operative treatment.

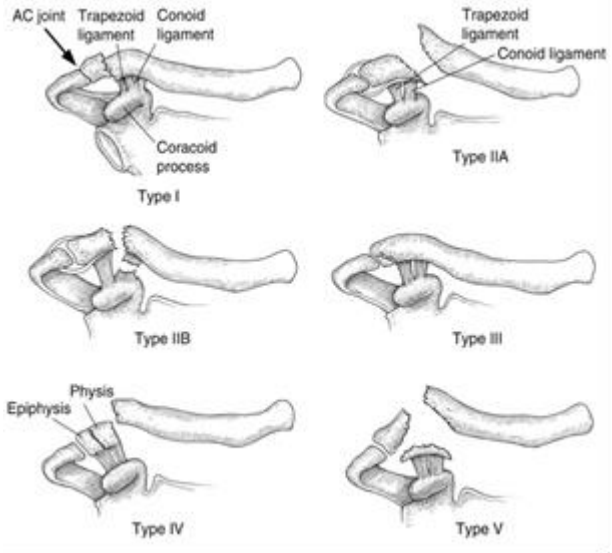

Figure 1. Neer Classification of distal third clavicle fracture [3,9]

CASE REPORT

A 38-year-old man who works as hotel manager came to the hospital with chief complaint of pain on his left shoulder. The pain started after he got into traffic accident approximately 10 days before he came to the hospital. He fell from a motorcycle and landed with his left shoulder. He described his pain was continuous on his distal clavicle and aggravated by elevation of his arm. He denied any other injuries besides his shoulder. He had seen a general practitioner at a clinic and got treated with an arm sling. Nevertheless, he only used it occasionally with his hand hanging down too low.

Examination of the shoulder showed bruises, minimal swelling, asymmetrical shoulder but no gross deformity and no skin tenting. Point tenderness and crepitation on his lateral clavicle were apparent. He was able to move his elbow, wrist, and finger normally, however, he felt pain on forward flexion and abduction of his shoulder, therefore reducing his active and passive range of motion. He was found to be distally neurovascularly intact.

Figure 2. Initial visit, 10 days after accident. – Anteroposterior view revealed a displaced Neer type 2 distal third clavicular fracture.

Patient's left shoulder anteroposterior plain x-ray [Figure 2] revealed that there was displaced fracture at the lateral end of his left clavicle with surrounding soft tissue swelling. Treatment options, operative and nonoperative way, were discussed. Despite his displaced fracture, patient opted for nonoperative management. We measure his functional outcome with Disabilities of Arm, Shoulder, and Hand (DASH) score and the result was 40,2.

Treatment by using arm sling was continued. Patient was educated to use the arm sling in a good and proper position, where patient's hand needs to be put in a high position but still provide comfort for the patient. Patient needed to maintain this good position as best as he could to support the weight of his arm. Exercise of the shoulder was not recommended at this time, but he could train his elbow, wrist, and finger joint motion. No medicine was given.

At the third week on conservative treatment, patient felt better about his shoulder. The pain had subsided. He only felt mild stiffness when he tried to move his left shoulder. On physical examination, his point tenderness and crepitation were gone. X-ray control [Figure 3] was performed and showed minimal callus formation and better reduction of the displace fragment. His DASH score was reduced to 17,2. Patient was kept on using arm sling and advised to start exercise on his left shoulder (including pendulum and wall crawl exercise).

Figure 3. 3rd week. Better reduction had achieved, callus was still minimal.

At 6th week, the pain was completely gone and his stiffness was subsided. He confessed that he was already returned to his normal activity with no continued issue at all.

Physical examination showed a good active and passive range of motion. Repeat left shoulder X-ray demonstrated that reduction was maintained like before, and callus formation was observable [Figure 4]. His DASH score satisfyingly lessened to 3,4. Patient was instructed to continue physiotherapy, as well as strengthening shoulder exercise.

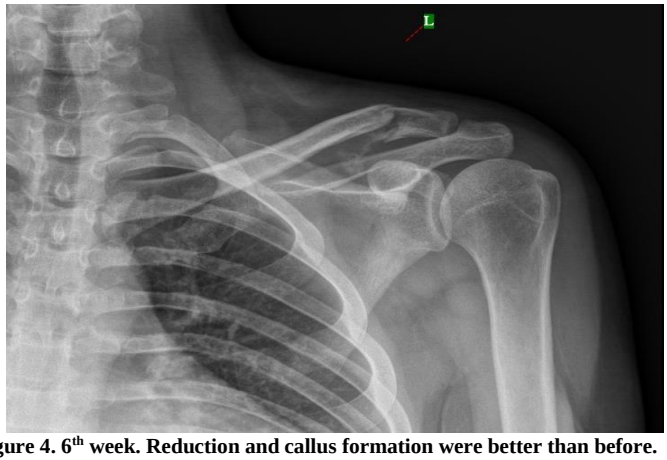

Figure 4. 6th week. Reduction and callus formation were better than before.

The 18-week follow-up showed painless full active and passive range of motion with good strength of the left shoulder and 0,9 on DASH score. Imaging at that time [Figure 5] demonstrated more visible callus formation although the fracture line was not completely healed.

Figure 5. 18th week. Bone had not completely healed yet, however, callus formation continued and no visible bone shift in this radiological feature.

DISCUSSION

In general, management of clavicular fractures has changed drastically in recent years.[1,4] Due to the current trend of non-union rates in conservative management, open reduction and internal fixation (ORIF) has become readily accepted in clavicular fractures management.[5, 9] The patient in this case sustained a displaced Neer type II distal third clavicle fractures following a direct impact on his left shoulder because of motorcycle accident. Distal third clavicular fractures are considered to be the second most common site for clavicular fractures. It accounts for 21% to 28% of all clavicular fractures.[1,2,5,9,10] Among these, 10-52% are displaced fractures.[5] Neer type II fractures are secondary to four displacing forces: 1) the gravity from weight of the arm; 2) the pull of the pectoralis major, pectoralis

minor, and latissimus dorsi; 3) scapular rotation, which affects the distal segment but not the proximal; and 4) the trapezius muscle, which draws the medial segment posteriorly and superiorly.[5,11] The recommendation for type II distal third clavicular fractures management somehow still controversial. Some literature recommend that it is best treated with operative because of its instability and high risk of non-union, whereas some suggest there is still place for non-operative treatment.[5,6,10,11]

In our case, patient used his arm sling inappropriately for the first week after accident. Physical examination and radiographic workup showed that his proximal clavicle displaced superiorly and distal part displaced inferiorly. This appearance is matched with displacing forces that stated by Fang et al.[11] Still, he chose to continue nonoperative treatment with sling immobilization for 6 weeks where he kept his hand in a high position in order to minimize the displacing forces.

After 2 weeks in that proper high position, both his symptoms and radiographic changes showed some improvement. His pain lessened and radiographic changes demonstrated better reduction of the distal fragment although callus formation was still minimal. Patient started physiotherapy program with gentle stretching, range of motion exercise as well as rotator cuff strengthening as tolerated. Timing of immobilization and exercise also plays important role in conservative treatment. Immobilization in a long period will result in stiffness, while doing exercise too soon may increase the risk of developing a nonunion or malunion.[8]

At 6 weeks period of conservative treatment, patient was clinically free from any pain and gained a satisfying shoulder function in spite of the incomplete healing of the bone that still obvious on the plain X-ray. He admitted that he could be returned to his full activity within 6 weeks. At 18th week, patient had no noticeable symptom although on the radiography the bone has not completely healed yet. Nevertheless, we notice that addition of callus formation was apparent. His functional outcome reduced significantly compared to the first week (DASH Score reduced from 40,2 to 0,9). Those patients with symptomatic nonunion or malunion after 3 months of appropriate conservative management should be referred to an orthopaedic surgeon to discuss options for definitive surgical management.[8,9]

A systematic review conducted by Oh et al[10] explained about the treatment of distal clavicle fracture. Among 425 cases in the literature, 60 patients treated by conservative treatment and 365 patients by surgical treatment with different modalities including hook plate (162 patient), coracoclavicular stabilization (105 patient), intramedullary fixation (42 patient), interfragmentary fixation (16 patient), and K-wire plus tension band wiring (40 patient). There were 20 non-unions and 4 other complications in nonsurgical treatment whereas 6 non-unions and 81 other complications, such as shoulder impingement, plate migration, acromion hole widening, infection, acromioclavicular arthrosis, were reported in surgical treatment. For the nonsurgical treatment, the functional outcomes were generally acceptable despite the high non-union rate. In other words, from this review we can conclude that significantly, the non-union rate was higher in the nonsurgical group, but the other complication rate was higher in the surgical group. Nevertheless, the functional

outcome of both treatments have similar results [10].

In the last decade, one of the most frequent used methods for fixating Neer type-II clavicular fractures is hook-plate fixation because of its high rates of union and good shoulder function.[7,12,13,14] The most significant advantage of hook plate fixation in the treatment of distal clavicular fractures is the possibility of initiating early physical therapy which is useful for the restoration of shoulder functions. [12] Sükür et al[12] performed a level IV therapeutic study to analyze the clinical and functional results of hook plate fixation in Neer type 2 distal clavicle fractures. They followed 16 patient who treated with hook plate fixation between 2013 and 2014 for 12 to 18 months, then evaluated with radiography and modified UCLA (University of California Los Angeles) scoring system. Results had shown that bone union was reached at the end of the first 4 months and at 12 months follow up mean modified UCLA score was 32.75 (range 31-35). This means good functional outcome was achieved. Complications that followed were impingement syndrome, implant failure, and subacromial osteolysis. For those problems, 12 patients (68%) underwent plate removal at 3rd and 4th month. After removal, the complaints subsided and shoulder range of motion increased. The foremost disadvantage of hook plate was the requirement of early implant removal due to the hardware related complications and good functional results can be achieved only after plate removal [12]. According to this, patient chose to try non-operative instead of operative treatment.

CONCLUSION

The limitation of this study is that this case occurred in a non-dominant upper limb. Also, Neer type II clavicular fracture still considered a rare fracture with lack of documentation. Further research with adequate sample size and different characteristic will be needed to see and compare the feasibility and success of this fracture treatment.

Declaration by Authors

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