Inferior shoulder dislocation with greater tuberosity avulsion fracture treated with Traction-Countertraction method in a rural hospital: A case report and literature review

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ABSTRACT

Introduction: Inferior shoulder dislocation is considered a rare event. Although there is a seemingly low chance of occurrence, this condition should not be prematurely ruled out in the presence of acute shoulder pain. Case: A 45 years old woman complained of pain in her left shoulder and was unable to bring her arm lower than 90° after a car accident. The patient unintentionally put her left arm outstretched above her head to avoid head impact during the crash, causing hyperabduction of the shoulder. She experienced pain, numbness and could not move the ipsilateral hand. Her left arm was locked in hyperabduction (100°), and her elbow was extended. Close inspection showed a loss of left shoulder contour. On palpation, the humeral head was palpable in the axilla. Anteroposterior X-ray view confirmed inferior dislocation of the left shoulder with associated greater tuberosity fracture. A closed reduction under general anesthesia with the traction-countertraction technique was conducted as commonly used in rural settings. After perfect anatomical reduction was obtained and confirmed with X-ray, the patient was immobilized using an arm sling. The shoulder was immobilized for three weeks in adducted position to support soft tissue healing. Physiotherapy was started after three weeks. Conclusion: Inferior shoulder dislocation is a rare orthopedic pathology that should not be easily dismissed in post-traumatic shoulder pain. The mechanism of injury is characterized by downward force or lever mechanism on the hyperabducted arm. Orthopedic surgeons in rural areas could utilize the Traction-countertraction method.

Keywords: Inferior Shoulder Dislocation, luxatio erecta, traction-countertraction method, rural orthopedics.


INTRODUCTION

The shoulder joint is the most unstable joint in the human body due to its large range of motion. Shoulder dislocation comprised about 45% of large joint dislocations.¹ The luxatio erecta, or inferior glenohumeral joint dislocation, is a rare form of glenohumeral dislocation.² Inferior shoulder dislocation is still frequently misdiagnosed in the Emergency Department (ED) as an anterior subglenoid humeral dislocation, resulting in unbearable discomfort for the patient and irreversible neurovascular injury.² This report highlights a case of inferior shoulder dislocation and proper treatment conducted at a limited healthcare facility in eastern Indonesia.

CASE REPORT

A 45 years old woman was brought to the ED due to severe pain in her left shoulder and inability to adduct her arm following a car accident within the previous hour. She reported that she was a car passenger and had put her left arm to protect her head, outstretched above the head as a reflex to avoid direct head impact. The stance caused hyperabduction of the shoulder. After the impact, she experienced pain, numbness and was unable to move her left arm. She has no previous history of shoulder dislocation or other pathologies.

The trauma team’s initial assessment in the emergency room found no related spine or systemic injuries. Her vital signs were within normal limits. Before the secondary survey, the patient has given an intravenous ketorolac 30 mg as a pain reliever. At initial inspection, her left arm was hyperabducted to about 100° and extended at the elbow. She could not adduct her arm below 90°. Careful inspection revealed a loss of the left shoulder contour and a palpable humeral head in the left axilla. Distal pulse palpable and no apparent vascular compromised. Neurologic examinations including axillary, radial and ulnar nerve testing were normal.

The anteroposterior X-ray shown in figure 1 confirmed inferior dislocation of the left shoulder associated with greater tuberosity fracture of the left proximal humerus. Afterward, we informed the patient and obtained their consent for a closed reduction procedure under general anesthesia with the traction-countertraction method.
After the following three weeks, Pendulum immobilization was maintained for three weeks to allow soft tissue healing. The immobilization was performed with the traction-counter traction method, as commonly used in limited facility settings. After anatomic reduction, the patient's left arm was immobilized using an arm sling. We confirmed the reduction with a plain X-ray, which showed an anatomical reduction of the glenohumeral joint, then reduced the avulsed fragment of the greater tuberosity into its anatomical place. The procedure did not result in any evidence of any neurovascular injury. The immobilization was maintained for three weeks to allow soft tissue healing. After the following three weeks, Pendulum exercises and physiotherapy were started. The routine follow-up afterward showed an improvement and almost full shoulder function was returned after three months.

**DISCUSSION**

The shoulder is the most unstable and frequently dislocated joint in the human body. Based on the direction of humeral head displacement, shoulder dislocations are divided into anterior, inferior, and posterior dislocation. Dislocation of the humeral head to the anterior is the most frequent; in contrast, the inferior shoulder dislocation is the most infrequent, accounting for up to 95% and 1% of all shoulder dislocations, respectively. Even though it is infrequent, there are clinical characteristics of arm position, including the affected upper extremities in hyperabduction and frequently placed over the head with the elbow in a locked position. On clinical examination upon presentation, the average reported humeral abduction is 120° (80°-170°). Injuries to the inferior shoulder have been linked to two different mechanisms, which are direct and indirect. In the direct mechanism, the head of the humerus is forced upon the relatively less soft joint capsule and the inferior glenohumeral ligaments on a completely abducted arm. It is frequently damaging the larger tuberosity and ripping off the rotator cuff. Meanwhile, the force that exaggerates an abduction on a partially abducted arm thus produces a lever-like action over the acromion considered indirect mechanism. Both mechanisms cause the humeral head lied below the glenoid and the arm locked in abduction. Systematic review conducted by Nambiar et al. shows the mechanisms of injury which may result in inferior shoulder dislocation were mainly fall, followed by sport-related impact, motor vehicle accident, and assault. In our case, the patient had to put her left arm outstretched above the head in reflex to protect and reduce head impact during a motor vehicle accident. As a result, the arm was forcefully hyperabducted, and the humerus was forced over the acromion. The other things to consider in patients with an inferior glenohumeral dislocation are soft tissue damage and bone fractures—avulsion fractures of the rotator cuff muscle and greater tuberosity. In addition, the examiner also needs to look for additional fractures, which include fracture of the clavicle, acromion, and coracoid process. Assessment for neurovascular injuries should never be looked out; various injuries to neurovascular structure around axilla may occur, including the brachial plexus and axillary nerve injury, and the axillary vessels rupture.

Various approaches, such as traction-countertraction (Figure 3) and the two-step maneuver (Figure 4), have been advocated for the close reduction technique for this type of injury. Traction-countertraction is the most popular method. The method involved axial traction along the abducted arm's direction. At the same time, counterforce is provided by assistance via sheet across the top of the shoulder. Moderate adduction is performed once the head of the humerus is freed. It is critical to underline that traction must always come before arm extension to avoid the head of the humerus impinging the structure inferior to the glenoid.

The less popular technique, the two-step maneuver, involves a maneuver to change the head of the humerus to anterior position, then subsequently reduce it using any anterior shoulder dislocation reduction technique back into the glenoid fossa. The surgeon started by taking a standing position on the dislocated side of the patient, adjacent to the patient's head, facing the feet. The pulling hand (opposite) should be positioned on the...
medial epicondyle, while the forcing/pushing hand positioned put over the humerus at the lateral side of the midshaft. The pulling hand produces an adequate force superiorly at around the elbow. The pushing hand gently finds the way to push the humeral head anteriorly relative to the glenoid. When the head of the humerus has been positioned to the glenoid’s anterior rim, the first step is completed. When an inferior shoulder dislocation has been converted to an anterior glenohumeral dislocation, the second step is to reduce the humeral head using any anterior shoulder dislocation reduction methods.10

In the event of other injuries, immediate care includes stabilizing the patient. Clinical examination of the limb’s neurovascular condition should be meticulously documented and supplied with sufficient analgesics. Inferior shoulder dislocation must be diagnosed clinically and radiologically to be successfully reduced and managed. A second neurovascular evaluation should be conducted following a timely reduction with suitable analgesia. Post-reduction radiographs should be taken, and a CT scan may be used to facilitate surgical planning in the case of a fracture. Following a reduction, persistent vascular impairment necessitates surgical intervention. Following reduction, immobilization with arm sling or velpeau bandage for 2-3 weeks, and then pendulum and active assisted exercises may be started. If pain or instability persists, it necessitates an MRI, which may reveal a labrum or rotator cuff injury that can be surgically corrected.6,7 Nevertheless, a closed reduction under general anesthesia with the Traction-countertraction method is a feasible and proper technique for an orthopedic surgeon in limited health facilities.

CONCLUSION

Inferior shoulder dislocation is a rare orthopedic pathology that should not be easily dismissed in post-traumatic shoulder pain. The mechanism of injury is characterized by downward force or lever mechanism on the hyperabducted arm. This case report highlighted the clinical finding and non-surgical treatment for inferior shoulder dislocation that orthopedic surgeons in rural areas could utilize.

ETHICAL CONSIDERATION

The patient had approved the informed consent for publication in an academic journal.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

KK and SDTR conduct the patient assessment and treatment. KK and KAW constructed the manuscript. All authors had agreed to the final version before publication.

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