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Management of Traumatic Anterior Shoulder Instability: A Literature Review

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ABSTRACT

Background: Traumatic anterior shoulder instability (TASI) is the most common form of glenohumeral instability, particularly affecting young, physically active individuals. It often results from a traumatic episode involving forced abduction and external rotation, leading to disruption of static and dynamic stabilizers of the shoulder joint. Common associated injuries include Bankart lesions and Hill-Sachs defects, which predispose patients to recurrence, impaired function, and long-term complications such as glenohumeral osteoarthritis. This literature review aims to provide a comprehensive overview of TASI's current evidence-based management.

Methods: This review synthesizes current literature and guidelines from orthopedic texts and peer-reviewed journals (2010–2024), focusing on anatomical, biomechanical, diagnostic, and therapeutic perspectives relevant to TASI. Sources include clinical trials, epidemiological studies, and expert consensus documents on shoulder instability management.

Results: TASI mainly affects males under 25 involved in contact sports or high-risk activities. First dislocation often causes labral tears or bone loss. Diagnosis combines clinical tests (Apprehension, Relocation, Load-and-Shift) with imaging (X-ray, CT, MRI/MR arthrography) to assess soft tissue and bone lesions.

Non-operative care (immobilization, physiotherapy) can be used for first-time dislocations in low-demand patients but has high recurrence in young athletes. Surgical treatment is preferred for high-risk or recurrent cases. Arthroscopic Bankart repair is standard for soft-tissue lesions with minimal bone loss, while Latarjet or bone grafting is advised for >20–25% glenoid bone loss; remplissage or augmentation is added for large Hill-Sachs lesions.

Modern surgery yields good outcomes, but complications such as stiffness, nerve injury, hardware issues, or redislocation can occur. Management should be tailored to patient and lesion characteristics.

Conclusion: Effective management of TASI requires thorough understanding of shoulder anatomy and biomechanics, accurate clinical and radiological assessment, and a patient-specific therapeutic approach. While conservative treatment may be appropriate for select cases, surgical repair—tailored to the type and severity of lesions—is essential in preventing recurrence and preserving function in high-risk populations. Continuous refinement of surgical techniques and proper identification of bone loss are crucial to optimizing long-term outcomes and minimizing complications.

Keywords: Traumatic shoulder instability, Bankart lesion, Hill-Sachs defect, Latarjet procedure, shoulder dislocation

INTRODUCTION

Traumatic anterior shoulder instability (TASI) is a clinical condition characterized by the loss of stability of the glenohumeral joint due to trauma that causes the humeral head to shift out of the glenoid cavity in an anterior direction. It is the most common form of shoulder instability encountered in orthopedic practice, particularly in young, physically active patients who frequently engage in sports activities involving extreme shoulder movements, such as handball, basketball, volleyball, or martial arts (Provencher et al., 2021).

The first traumatic anterior dislocation typically results from an injury mechanism involving excessive abduction and external rotation of the arm. This event can cause damage to the passive stabilizing structures of the shoulder joint, including the glenoid labrum (which, if torn, is referred to as a Bankart lesion), the joint capsule, and the inferior glenohumeral ligament. The injury may also be accompanied by bone damage, such as an impaction fracture of the humeral head (Hill-Sachs lesion) or a fracture of the glenoid rim.

After the initial dislocation, most patients—especially younger individuals—are at high risk of recurrence or repeated dislocations, which can progress to chronic shoulder instability. Recurrent instability can significantly impair patients' quality of life by causing discomfort, muscle weakness, reduced range of motion, functional limitations, and fear of engaging in physical activities. Over the long term, this condition may also lead to complications such as cartilage damage and the early development of shoulder osteoarthritis (post-dislocation arthropathy) (Bauer et al., 2023).

The management of traumatic anterior shoulder instability largely depends on several factors, including patient age, activity level, frequency of recurrence, and the extent of soft tissue and bone injury. Conservative approaches such as physiotherapy may be effective for some patients, particularly older individuals and those with lower physical demands. However, in younger patients and professional athletes, surgical intervention such as Bankart repair often becomes the treatment of choice to restore stability and prevent recurrence (Clifford et al., 2024).

Despite advancements in understanding the management of TASI, the optimal treatment strategy remains a subject of ongoing debate, especially when balancing the risks of recurrence, functional demands, and the invasiveness of surgical interventions. Accurate diagnosis, incorporating both clinical examination and advanced imaging modalities, plays a pivotal role in guiding appropriate management. Furthermore, treatment decisions must consider patient-specific factors such as age, activity level, occupation, degree of bone loss, and concomitant soft tissue injuries. This literature review aims to synthesize current evidence regarding the management of TASI. It emphasizes the need for individualized treatment planning and highlights evolving surgical techniques that seek to restore stability while preserving shoulder function.

METHODS

This literature review was conducted by systematically gathering and synthesizing published data from peer-reviewed journals, clinical guidelines, and orthopedic textbooks between 2010 and 2024. Databases searched included PubMed, Scopus, and Google Scholar, using keywords such as “traumatic anterior shoulder instability,” “Bankart lesion,” “Hill-Sachs defect,” “shoulder dislocation,” and “Latarjet procedure.” Inclusion criteria comprised clinical trials, cohort studies, meta-analyses, systematic reviews, and expert consensus documents focusing on the management of TASI. Articles not available in English, case reports, and studies with unclear methodology were excluded. The selected literature was reviewed to extract data on epidemiology, mechanisms of injury,

diagnostic strategies, non-operative versus operative management, surgical techniques, outcomes, and complications. A narrative synthesis approach was used to integrate findings and provide an updated perspective on evidence-based management strategies for TASI.

Definition of Traumatic Anterior Shoulder Instability (TASI)

Traumatic Anterior Shoulder Instability is a clinical condition where the glenohumeral joint loses its stability due to trauma, causing the humeral head to abnormally shift anteriorly (forward) out of the glenoid cavity, either as a complete dislocation or a partial subluxation. This condition usually occurs following a significant traumatic event, such as falling with the arm in an abducted and externally rotated position, producing sufficient blunt force to tear the anterior stabilizing structures of the shoulder joint, including the glenoid labrum and the inferior glenohumeral ligament. Such tears reduce the joint's ability to maintain a stable articulation between the humeral head and the glenoid, increasing the likelihood of recurrent dislocations during similar movements. Clinically, TASI often first presents as a shoulder dislocation that requires reduction and may progress into chronic instability if the damaged structures do not heal properly or if rehabilitation is inadequate. Patients may experience sensations of shifting, discomfort during overhead activities, or even avoidance of certain movements due to fear of redislocation (Rosa et al., 2017).

Epidemiology of Traumatic Anterior Shoulder Instability (TASI)

Traumatic Anterior Shoulder Instability is one of the most common shoulder injuries, particularly in young, physically active populations. Its incidence in the general population is estimated to be about 1.7% per year, making it a significant orthopedic concern, particularly in high-risk groups. TASI has a high recurrence rate that is strongly correlated with the age at the time of the first dislocation. Among individuals under 20 years of age, the risk of redislocation reaches 80–90%, with some studies reporting recurrence rates as high as 90% if no definitive intervention is provided. Although this risk decreases with age, it remains a serious concern due to the potential for long-term structural damage (Galvin et al., 2017).

Demographically, TASI is more commonly observed in young males, particularly those engaged in heavy physical activities or contact sports. High-risk groups include contact sport athletes such as rugby, football, and wrestling players, as well as military personnel, where there is frequent exposure to blunt trauma and extreme shoulder motions. This condition is a major focus within sports medicine and military orthopedics because of its potential to affect functional performance and cause long-term injury risks (Best et al., 2023).

Etiology of Traumatic Anterior Shoulder Instability

The etiology of TASI is typically associated with a blunt traumatic event that damages the anterior stabilizing structures of the glenohumeral joint. The most common mechanism involves trauma during extreme abduction, external rotation, and extension, as might occur when falling backward onto an outstretched arm, or during contact sports like rugby, football, or overhead throwing sports such as baseball and volleyball (Solomon et al., 2010). Such trauma generates a force large enough to displace the humeral head anteriorly beyond the glenoid rim, tearing critical structures like the anteroinferior glenoid labrum, the inferior glenohumeral ligament (IGHL), and the joint capsule. As a result, there is permanent disruption of the shoulder's passive stabilizing system, predisposing the shoulder to recurrent instability (Miller et al., 2020). Predisposing factors such as shallow glenoid morphology, congenital or acquired joint hyperlaxity, and a history of prior dislocations further increase the risk of TASI. In some cases, dysfunction of the dynamic

stabilizers, such as the rotator cuff muscles or scapulothoracic rhythm abnormalities, exacerbates the instability by failing to compensate for passive deficits (Rosa et al., 2017).

History Taking

Comprehensive history taking is crucial in diagnosing TASI and in assessing the extent of injury and recurrence risk. Patients usually present with a clear traumatic history, such as falling onto an outstretched arm, experiencing collisions during sports, or undergoing sudden extreme shoulder movements. It is important to determine whether the shoulder was visibly out of place and whether formal reduction at a healthcare facility was required, or if the shoulder spontaneously reduced itself. This distinction helps differentiate between complete dislocation and subluxation. The main complaints typically include acute shoulder pain immediately following trauma, accompanied by a sensation of instability. After the initial event, many patients report apprehension when raising their arm or performing certain movements, particularly abduction and external rotation, due to fear of redislocation. Other frequent complaints include sensations of shifting, clicking sounds, or feelings of looseness, indicating excessive humeral head translation relative to the glenoid. Patients may also describe repeated episodes of subluxation during minor activities such as lifting light objects or reaching behind the head, which suggests chronic instability. Detailed history-taking regarding the frequency, triggers, and residual symptoms following the initial event is crucial for planning appropriate management strategies, whether conservative or surgical (Provencher et al., 2021).

Physical Examination

Physical examination in TASI aims to evaluate the degree of joint instability, detect structural deficiencies, and identify risk factors such as generalized ligamentous laxity. A systematic approach involving validated clinical tests is essential. The Load and Shift Test is performed to assess humeral head translation relative to the glenoid. It is graded based on the degree of translation, with Grade 0 indicating normal motion, Grade I representing translation to the glenoid rim without dislocation, Grade II indicating translation beyond the rim with spontaneous reduction, and Grade III indicating translation beyond the rim without spontaneous reduction, reflecting significant instability (Provencher et al., 2021).

The Apprehension Test, a classic maneuver for detecting anterior instability, is performed with the patient supine, the arm abducted to 90 degrees, and externally rotated. A positive test occurs when the patient displays fear or anxiety that the shoulder will dislocate. The Relocation Test follows, where anterior pressure is applied to the shoulder, and relief of apprehension suggests positive anterior instability. The Sulcus Sign is used to assess inferior instability, where downward traction on the arm reveals a visible sulcus beneath the acromion if instability is present. Furthermore, evaluation for generalized hyperlaxity, such as a Beighton Score greater than 4, or shoulder-specific hyperlaxity assessments, such as passive external rotation exceeding 85 degrees or passive abduction exceeding 105 degrees, is recommended to identify patients at greater risk of recurrence (Provencher et al., 2021).

Supporting Examinations

Supporting examinations play a vital role in assessing the extent of damage and in planning treatment strategies for TASI. Plain radiographs (X-rays) are essential as the initial imaging modality, ideally with a complete trauma series including true anteroposterior, scapular Y, and axillary views to detect dislocation, fractures, or abnormal joint orientation. Additional views such as the West Point view are used specifically to evaluate anteroinferior glenoid bone loss, while the Stryker notch view is helpful in detecting Hill-Sachs lesions (Provencher, 2021).

For more detailed assessment of bone structures, CT scans, with or without arthrography, are recommended, especially for quantifying the extent of glenoid or humeral head bone loss. While CT provides excellent bone visualization, its soft tissue contrast is inferior to MRI.

MRI remains the gold standard for evaluating soft tissue injuries, particularly for detecting labral tears like Bankart lesions, as well as capsular and ligamentous injuries. The use of the ABER (abduction and external rotation) sequence specifically enhances visualization of the anteroinferior labrum, the most commonly injured area in TASI. MR arthrography further increases diagnostic sensitivity and specificity, achieving rates of 86–91% sensitivity and 86–96% specificity, especially for identifying intra-articular soft tissue injuries (Provencher, 2021).

Non-Operative Management

Non-operative management of traumatic anterior shoulder instability (TASI) is generally considered in cases of first-time anterior shoulder dislocation, although this decision remains controversial and must be tailored to each patient's clinical condition and activity profile. This approach consists of three main stages: dislocation reduction, immobilization for 3–10 days, and physiotherapy rehabilitation (Clifford et al., 2024).

Reduction is the initial step and should be performed immediately after a diagnosis of dislocation is established. Traction and counter-traction are the most commonly used methods in clinical practice. Other reduction techniques include Kocher's method (external rotation, anterior flexion, followed by internal rotation of the arm), the Hippocratic method (traction with the heel in the axilla for counterforce), and Stimson's technique (with the patient prone and a weight suspended from the arm). After successful reduction, the arm is typically immobilized for a short period (Nofakovski et al., 2022).

Immobilization usually lasts less than one week, as scientific evidence suggests that immobilization beyond this duration does not significantly reduce recurrence risk. Early studies suggested that immobilization in external rotation could lower the recurrence risk, particularly in patients under 40 years of age, by helping to reposition the anterior labrum onto the glenoid and support anatomical healing. However, these findings have been questioned by subsequent studies, which failed to consistently reproduce the results (Clifford et al., 2024).

After the acute phase, a physiotherapy program becomes a crucial component of non-operative management. The main goals are to strengthen the dynamic stabilizers of the shoulder, particularly the rotator cuff muscles and scapular muscles such as the serratus anterior and trapezius, and to restore neuromuscular control and scapulohumeral rhythm. When optimally executed, return to activity or sports can typically be achieved within 7 to 21 days, depending on injury severity and rehabilitation response (Nofakovski et al., 2022).

However, the success of non-operative treatment heavily depends on the patient's risk profile. High recurrence risk is found in patients younger than 20 years, males, contact or overhead athletes, and those with hyperlaxity, glenoid bone loss greater than 20–25%, or major tuberosity fractures. In these groups, recurrence rates are very high, and surgical intervention is usually recommended, particularly for competitive athletes aged 14–30 years with a positive apprehension test and associated bone loss, as per the American Shoulder and Elbow Surgeons (ASES) guidelines (Olds & Uhl, 2024).

Operative Management

Operative management of TASI is indicated for patients with a high risk of recurrence or those who fail non-operative management. The choice of procedure depends on patient age, activity level, degree of instability, and the presence or absence of bone loss in the glenoid or humeral head (Miller, 2020).

The most commonly performed procedure is arthroscopic Bankart repair, aimed at

repairing anteroinferior labral tears. This minimally invasive surgery uses three to four anchors to optimally fix the mobilized labrum. Main indications include first-time traumatic dislocations in athletes under 25 years of age with MRI-confirmed Bankart lesions, and recurrent dislocations with glenoid bone loss of less than 20–25%. If an off-track Hill-Sachs lesion is present, arthroscopic Bankart repair can be combined with a remplissage procedure, which involves inserting the infraspinatus tendon and posterior capsule into the Hill-Sachs defect to render it "on-track" (Clifford et al., 2024).

Open Bankart repair is an alternative, particularly for revision cases or when patients present with significant hyperlaxity requiring capsular shift. This technique is performed via a deltopectoral approach and may include glenoid fracture fixation if a bony Bankart lesion is present. Although clinical outcomes are comparable to the arthroscopic technique, open procedures are associated with greater postoperative pain and reduced range of motion (Rosa et al., 2017).

For patients with glenoid bone loss greater than 20–25%, the Latarjet or Bristow procedure becomes the treatment of choice. This surgery involves transferring the coracoid bone along with the conjoint tendon to the anterior glenoid. The "triple block effect" of the Latarjet procedure—a combination of bony augmentation, tendon sling effect, and capsular repair—aims to enhance anterior stability. Clinical outcomes demonstrate low recurrence rates (0–8%) and more than 90% of patients achieve good to excellent results (Miller, 2020).

In cases where greater bone reconstruction is needed, bone grafting can be performed using autografts (from the iliac crest or distal clavicle) or allografts (such as distal tibia). These techniques are useful for failed Latarjet procedures or for glenoid defects larger than 25%, with reported healing rates reaching 89% within an average of 1.4 years (Bauer et al., 2023).

For large (25–40%) engaging Hill-Sachs lesions, combining remplissage with Bankart repair is recommended. In cases with even larger defects (>40%), options include allograft reconstruction, rotational osteotomy, or even shoulder arthroplasty. However, these advanced techniques are still limited to small series and case reports, with a tendency for early-onset arthritis (Provencher, 2021).

Additional techniques such as tendon transfer, including transfer of the conjoint tendon or long head of the biceps tendon, are increasingly popular for addressing capsulolabral deficiencies with large bone defects. These transfers are performed through a split in the subscapularis and use suspensory fixation to the anterior glenoid, showing promising results in preventing recurrence and preserving range of motion (Moya et al., 2021).

Historical procedures such as Putti-Platt, Magnuson-Stack, and Boyd-Sisk have been abandoned due to their association with postoperative stiffness, degenerative joint changes, and high recurrence rates (Provencher, 2021).

Complications

Complications related to the management of TASI, whether through non-operative or operative means, can range from mild to severe, significantly affecting patients' long-term functional outcomes. These complications include mechanical, neurological, infectious, and degenerative aspects.Recurrent dislocation is the most common complication, especially when glenoid bone loss greater than 20–25% is not recognized and only soft tissue procedures, such as Bankart repair without bone augmentation, are performed. The risk of recurrence is notably higher in males under 20 years old, contact athletes, patients with ligamentous hyperlaxity, and those with unrecognized Hill-Sachs lesions that remain off-track. Suboptimal surgical technique, such as using fewer than four anchors during labral fixation, also contributes to re-instability. Among patients with epilepsy,

recurrence risk remains high even after bony augmentation procedures, necessitating optimal medical therapy to control seizures before surgery (Moya et al., 2021).

Postoperative shoulder pain may occur due to overtightening of the capsule during labral repair, leading to post-capsulorrhaphy arthropathy, a degenerative condition caused by abnormal joint tension. Nerve injuries can also occur, especially during the Latarjet procedure, with the musculocutaneous nerve being the most frequently affected, followed by the axillary nerve. Shoulder stiffness, particularly involving external rotation, is commonly observed after Latarjet and/or remplissage procedures, due to space limitation or excessive soft tissue tightening during fixation. Although the incidence of postoperative infection is relatively low in arthroscopic procedures, it remains a universal surgical risk (Provencher, 2021).

In Latarjet procedures, complications such as graft lysis are relatively common, with an incidence of up to 90% within the first six months, although this is not always clinically symptomatic. Implant-related complications, such as anchor loosening in Bankart repairs or screw loosening in Latarjet procedures, can also occur, particularly if fixation is unstable. Chondrolysis, or progressive destruction of articular cartilage, has been reported following thermal capsulorrhaphy or intra-articular pain pump use, both of which have now been banned due to their destructive effects on cartilage tissue (Moya et al., 2021).

CONCLUSION

Traumatic anterior shoulder instability (TASI) is a clinical condition characterized by the loss of glenohumeral joint stability due to traumatic injury, resulting in anterior displacement of the humeral head. A thorough understanding of shoulder anatomy, particularly the role of static and dynamic stabilizing structures, is crucial for accurately diagnosing, evaluating, and optimally managing TASI. The rotator cuff muscles and glenohumeral ligaments play a major role in maintaining joint stability, while biomechanical disruptions following trauma alter muscle force distribution and increase the risk of recurrent dislocations. The diagnosis of TASI relies heavily on a meticulous history-taking process and focused physical examination, including the apprehension test, relocation test, and load-and-shift test, supported by imaging studies such as X-ray, CT scan, MRI, and MR arthrogram to assess structural damage. Management of TASI is divided into non-operative and operative approaches. Conservative management is more appropriate for first-time dislocation cases without high-risk features,whereas operative interventions such as Bankart repair, Latarjet procedure, or combined remplissage procedures are preferred for high-risk populations or those with structural defects. Therapeutic decisions should be individualized, taking into account the patient's age, activity level, and presence of bone loss.

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