

Multidirectional Instability (MDI) of the Shoulder

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What is MDI?

Multidirectional Instability is a condition of the shoulder characterized by recurrent symptomatic subluxation or dislocation of the glenohumeral joint in more than 1 direction. It is more common between the age of 12 and 35, with a slight female predominance. Typically, MDI occurs in the absence of macrotrauma, and is thought to be caused by a combination of ligamentous laxity, presence of redundant joint capsular tissue, and repetitive use.

It is more common in patients with generalized joint laxity, with or without congenital disorders such as Ehlers-Danlos or Marfan syndrome. It may also be associated with repetitive overhead activities such as in swimmers, gymnasts, volleyball players, and weightlifters.

Occasionally MDI can be caused by a major traumatic event, such as in the case of a labral tear. However, in these traumatic cases, the prognosis and treatment considerations are different – the patient usually does well by surgically addressing the structural lesion (e.g. labral tear).

The rest of this article will focus mostly on atraumatic MDI.

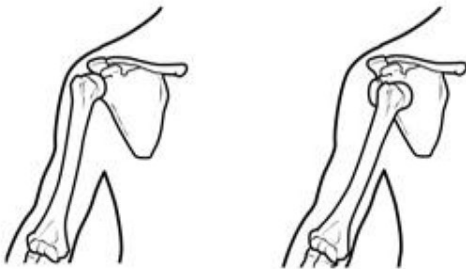


Figure source: <https://orthoinfo.aaos.org/en/diseases--conditions/chronic-shoulder-instability/>

How does MDI present? And how do you diagnose it?

MDI presents on a spectrum ranging from vague shoulder pain without perceived instability to daily occurrences of symptomatic subluxations and frank dislocations with activities. The focus of the history and exam is to identify instability of the shoulder in more than 1 plane.

On history the patient may report some of the following:

- Sensation of subluxation or dislocation in anterior, inferior, or posterior direction
- Anterior instability: pain or subjective instability associated with overhead activities where shoulder is abducted and externally rotated. Avoidance of overhead activities.
- Posterior instability: pain or subjective instability with forward flexion and internal rotation (e.g. pushing open a door)
- Inferior instability: pain or instability with carrying heavy items.

The physical exam involves the following components:

- General shoulder exam looking at all pertinent elements such as AC joint, rotator cuffs, scapular motion, joint mobility, biceps function, etc.
- Assess for generalized ligamentous laxity with the Beighton score (higher score = more ligamentous laxity)
 - Ability to hyperflex elbow or knee > 10 degrees (1 point per joint)
 - Thumb opposition to the ipsilateral forearm (1 point per side)
 - >90 degrees of small finger dorsiflexion (1 point per side)
 - Ability to place palms flat on the ground while bending at the trunk (1 point)
- Special maneuvers for joint instability
 - **Load and shift test** (<https://www.youtube.com/watch?v=txARar71h5E>): stabilize the scapula with one hand. With the other hand, grab the humeral head and attempt to move it anteriorly or posteriorly. Greater translation of the humeral head indicates greater **anterior/posterior laxity** of the joint.
 - **Sulcus sign** (<https://www.youtube.com/watch?v=vV7u2JtdYWI>): with the patient relaxed and in sitting position, pull the arm inferiorly. A feeling of subluxation or appearance of a sulcus or concavity under the acromion is a positive sign for **inferior instability**
 - **Anterior apprehension test** (<https://www.youtube.com/watch?v=hy7zgoEsbzQ>): in supine position, abduct the arm to 90 degrees and add maximal external rotation. Positive test for **anterior instability** is pain or the fear of subluxation reported by the patient.
 - **Relocation test**(<https://www.youtube.com/watch?v=JkO8nnWFlwM>): repeat the apprehension test, but apply pressure at the anterior shoulder (force directed posteriorly). A positive test is reduction of patient's pain or fear of subluxation.
 - **Jerk test** (https://www.youtube.com/watch?v=j_qG1MNOws8): in sitting position, place arm into flexion and internal rotation. While applying an axial force to the humerus, bring the arm into horizontal adduction. A positive test for **posterior instability** is the feeling of posterior subluxation or "clunk" as the humeral head glides over the glenoid rim.

Plain x-rays of the shoulder can be ordered to assess for position of humeral head, and for major glenoid or humeral osseous defects, but are often normal in MDI. MRI of the shoulder allows for assessment of capsuloligamentous structures and evaluation of redundancy of joint capsule. It also helps to rule out other structural lesions such as labral tears that could alter the course of management.

How do you treat MDI?

Most cases of MDI are treated initially with a comprehensive physiotherapy program. The rehabilitation program involves strengthening of rotator cuff and scapular stabilizing exercises to improve stability of the shoulder. An example of a rehabilitation program for MDI is the 6-stage program devised by Watson et al. Most patients respond well to non-surgical therapy.

At least 6 months of therapy should be attempted before considering surgical treatment. Surgical stabilization procedures should be customized for each patient, based on anatomic deficit and direction of symptomatic instability.

In summary, MDI is a condition of shoulder instability in more than one direction, leading to pain and recurrent subluxations. The majority of these patients should be managed with at least 6 months of shoulder rehabilitation program. Refractory cases may be addressed by surgical therapy to stabilize the joint.

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