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# Three Key Findings When Diagnosing Shoulder Multidirectional Instability: Patient Report of Instability, Hypermobility, and Specific Shoulder Tests

*J Orthop Sports Phys Ther* 2020;50(2):52-54. doi:10.2519/jospt.2020.0602

**S**onya is an 18-year-old outside hitter on her high school volleyball team. She also plays on 2 travel teams and has done so for the past 5 years. Volleyball is now her year-round sport. Sonya presents to you complaining of recent-onset intermittent pain in her shoulder and complains that her shoulder “feels loose.” How do you approach diagnosing Sonya’s shoulder problem?

## Diagnosis: An Important Foundation to Providing High-Quality Care

In a differential diagnosis process, clinicians typically ask their patients about their history, symptoms, and perceptions, and perform a physical assessment. The examination information is combined with clinical experience to inform hypotheses about which structures are most likely associated with symptoms. With the physical assessment, the clinician aims to pinpoint the anatomical source of a patient’s problem or to reproduce the

symptoms by placing stress on the suspected culprit (eg, contraction, tension, or compression of tissue). For example, tests designed to detect a torn rotator cuff tendon have either an active or resisted component to discern pain or weakness implicating tendon pathology.

It is often difficult to be certain that a test accurately identifies the pathological source of symptoms. Sometimes, uncertainty is related to the close proximity of tissues affected by the same stress. For example, a shoulder impingement test

compresses the rotator cuff tendons, subacromial bursa, and the labrum. Which is the culprit responsible for the patient’s symptoms? Tissue damage may also have little contribution to the patient’s symptoms when that patient presents with altered central pain perception (nociceptive pain) or dominant psychosocial factors.

How well a clinical examination test performs to rule in or rule out a pathology has been historically evaluated by comparing the results to a gold standard (eg, identifying a specific pathoanatomic lesion on imaging or with surgery). Clinical examination is relatively accurate for diagnosing an anterior cruciate ligament tear.<sup>8</sup> In contrast, diagnosing the source of low back pain symptoms may be more difficult due to the increasing prevalence of pathology with age, the

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influence of psychosocial factors, and the poor correlation of imaging with signs and symptoms.

### Sonya's Physical Assessment Findings

Sonya scores 7/9 on the Beighton score and tells you she has always been flexible. Active shoulder range-of-motion testing is unremarkable. Glenohumeral joint accessory motions are excessive in both shoulders. Resisted shoulder testing in cardinal planes is unremarkable. The apprehension test is positive for pain and apprehension, and the posterior apprehension test is positive for apprehension. During the posterior apprehension test, you note a distinctive outline of the humeral head at the posterior aspect of the joint. You stop the hyperabduction test at 110° of isolated glenohumeral abduction because Sonya reports tingling down her arm.

### Diagnosing Multidirectional Instability: Clinical Pearls

Shoulder instability has varying mechanisms of injury (traumatic, atraumatic), direction (anterior, posterior, inferior, multiple directions), and severity (dislocation, subluxation). Classification systems based on clustering signs and symptoms have been developed to define subgroups of shoulder instability.<sup>5</sup> Despite this attempt at homogeneity, multidirectional instability (MDI) suffers from the same lack of diagnostic clarity as low back pain.

Because exercise-based nonsurgical care is the most frequently recommended treatment for MDI,<sup>9</sup> a clinical diagnosis of MDI is critical to direct treatment. Differential diagnosis can distinguish MDI from global hypermobility syndrome, which is important, as these 2 entities may require different treatment approaches and have different prognoses.

We outline 3 key areas to address when diagnosing MDI.

**Patient Interview** The absence of a patient report of a traumatic onset of symptoms is a valuable finding. The patient with MDI, often under the age of 35 years, may use phrases like “double-jointed” or “always been flexible.” She may describe multiple episodes of subluxation, with a low level of irritability after the episodes. She may report pain or a feeling of instability typically at the end range of motion, which may occur in a single motion/position/plane (usually the most stressful or repetitive) or multiple motions/positions/planes. History of participating in overhead sports is relevant, because MDI may be related to repeated microtrauma.

**Medical Comorbidities** Consider screening for global hypermobility using the Beighton score.<sup>1</sup> The Beighton score is a series of 9 joint mobility maneuvers performed bilaterally and involving both the upper and lower extremities. A point is assigned for each positive maneuver, and, generally, a score of 5/9 is considered positive for benign hypermobility syndrome.

*Benign* is an important word, as there is no evidence that the Beighton score helps diagnose anything more sinister.

We suggest that a higher Beighton score should, at least, bring into suspicion less benign hypermobility syndromes, including Marfan, Ehlers-Danlos, and Loeys-Dietz. These syndromes have diagnostic criteria, like the 2010 revised Ghent nosology for Marfan syndrome, which would heighten suspicion and require referral if met.<sup>7</sup>

**Specific Shoulder Tests and Measures** In addition to the factors discussed in the interview and medical history, there are some tests that likely have a greater ability to rule in MDI (TABLE). We say “likely” because these tests are also helpful in ruling in unidirectional instability, but are diagnostic of MDI.

The apprehension test has a positive likelihood ratio of 17.<sup>4</sup> The posterior apprehension test for posterior instability has a positive likelihood ratio of 19.<sup>6</sup> The hyperabduction test was originally described as an assessment of inferior instability.<sup>3</sup> Although the posterior apprehension test was validated in one high-bias study and the hyperabduction test has only been validated as a test for anterior instability, we suggest that a positive finding of apprehension on any 2 of these 3 tests, in the presence of a positive Beighton score, would enable a diagnosis of MDI.

The specific shoulder tests described in the TABLE do not rely on the clinician's

TABLE

SUGGESTED TESTS TO RULE IN MULTIDIRECTIONAL INSTABILITY

Test	Description	Positive Test	Negative Test
Apprehension	With the patient in a supine position and the arm in 90° of abduction, the examiner passively moves the arm into external rotation	Shoulder pain or a patient report of feeling unstable/apprehensive	Neither pain nor instability is reported when the end range of external rotation is reached
Posterior apprehension	With the patient in a supine position, the examiner applies a posterior force on the elbow while horizontally abducting and internally rotating the humerus	Patient report of feeling unstable/apprehensive	A lack of apprehension with the test
Hyperabduction	With the patient seated, the examiner stabilizes the clavicle and scapula with one hand, while abducting the patient's arm with the other hand	More than 105° of abduction indicates inferior glenohumeral ligament laxity The patient may report feeling unstable or apprehensive, or neurological or pain symptoms	105° or less of abduction

ability to perceive how much translation exists with manual assessment (eg, the sulcus sign)—a method fraught with reliability issues. We emphasize that a patient report of apprehension should characterize a positive test over a report of pain. While pain is often used as a positive sign, the use of pain in cases of instability likely decreases diagnostic accuracy.<sup>2</sup>

## Diagnosing Sonya's Shoulder Problem

Based on history of overuse in a throwing-type motion in a young athlete, a report of her shoulder feeling “loose,” a Beighton score greater than 5/9, positive apprehension tests, and a positive hyperabduction test (greater than 105°), we diagnosed Sonya as having MDI.

Tingling sensations with the hyperabduction test are not a positive finding, but we have observed this finding in clinical practice and suspect it is due to humeral-head encroachment on the brachial plexus. Likewise, an obvious appearance of the humeral head during the posterior apprehension test does not indicate a positive test but may indicate posterior capsule laxity. We would only consider referring Sonya for further genetic testing or diagnostic imaging after application of the diagnostic criteria for syndromes such as Ehlers-Danlos or Marfan.

## SUMMARY

**A**RRIVING AT A PATHOLOGY-BASED diagnosis through the clinical examination is challenging. Literature addressing diagnostic accuracy of tests and measures is helpful for some pathologies. There are no validated clinical examination tests for shoulder MDI. Therefore, we propose using a combination of patient-reported and clinical examination findings.

Diagnosing MDI is important because a correct diagnosis can direct efficient treatment and enable differential diagnosis to rule out other pathologies. Distinguishing MDI from competing unidirectional instabilities and/or global hypermobility syndromes is important to the improvement of rehabilitation treatment approaches and patient outcomes. Our suggestions for diagnosing MDI may help practicing clinicians develop a heightened awareness of hypermobility and suspicion of syndromes, such as Marfan, that require referral.

We hope this Viewpoint fuels discussion and further research on this topic generally, and on our suggested testing regimen specifically. Classifying patients with MDI into a distinct subgroup may improve treatment and outcomes. We welcome further dialog on the diagnosis of shoulder MDI in patients with shoulder pain and dysfunction.

## Key Points

- The clinical examination to diagnose shoulder MDI is based on expert opinion.
- The Beighton score should serve as a screening procedure for suspected shoulder MDI or suspected MDI as part of a larger hypermobility issue.
- To rule in MDI, use a positive finding on at least 2 of the following 3 tests: anterior apprehension, posterior apprehension, hyperabduction.
- Aim to reproduce the patient's feeling of apprehension when diagnosing MDI. A positive finding of pain instead of apprehension should be interpreted cautiously.
- Further research to determine whether MDI is a distinct subgroup necessitating specific treatment is warranted. ●

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