

# Using Ultrasound in Patients with Persistent Shoulder Pain

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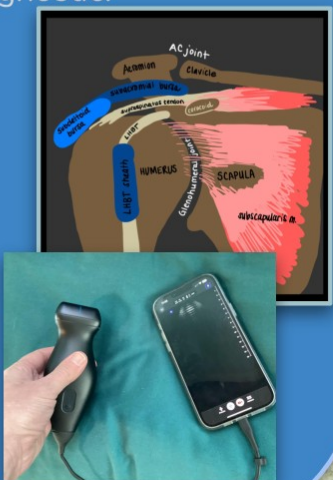
## BACKGROUND

### CHRONIC SHOULDER PAIN

- 56% of patients experience shoulder pain yearly and nearly half of those patients will have persistent or recurring pain a year later.<sup>1</sup>
- Pain is related to overuse or repeated stress leading to bursitis, tendinopathy and atraumatic acromioclavicular (AC) joint pathology.<sup>1,2,3,4</sup>
- Pain is currently assessed with orthopedic special tests (OST) which have a wide range of diagnostic accuracy.<sup>3,4</sup> The gold standard, but most invasive diagnostic is arthroscopic surgery.<sup>3,5</sup> MRI is a widely used diagnostic.<sup>3,4</sup>

### ULTRASOUND (US) & PHYSICIAN ASSISTANT (PA) TRAINING

- In the 1970s, the advent of high frequency US probes allowed assessment of the shoulder joint.<sup>6</sup>
- Recent introduction of handheld or "pocket" ultrasound increased physician assistant (PA) access to point-of-care ultrasound (POCUS).<sup>7</sup>
- Many employers encourage PAs to learn POCUS on the job.<sup>7</sup>
- Only 29% of PA schools include POCUS in their curriculum and there is no standard therefore programs vary in the amount of hands-on US training.<sup>7</sup>



## PURPOSE

To answer the question: *Does use of ultrasound by physician assistants enhance patient care in patients with persistent or recurring shoulder pain?*

## METHODS

Keyword search of PubMed free full text was conducted including clinical trial, meta-analysis and randomized controlled trial filters. Search used keywords "Ultrasonography" and "Rotator Cuff/diagnostic imaging" or "biceps tendon" or "acromioclavicular" or "subdeltoid bursa". Results discussing ultrasound-guided procedures, elastography, neck dissection and repair were excluded.

## EFFICIENCY & SAFETY

**QUICK:** It takes 10-15 minutes to perform a shoulder US which is quicker than MRI.<sup>8</sup>

**COST-EFFECTIVE:** It saves money by reducing expensive diagnostics like MRI and surgery.<sup>4,5</sup>

**DYNAMIC:** Allows for dynamic assessment of the shoulder.<sup>3</sup>

**SAFE:** No contraindications, no radiation, non-invasive and can guide injections/aspirations.<sup>4,9,10</sup>

**PORTABLE:** Small pocket ultrasounds can be carried easily from patient to patient.<sup>7</sup>

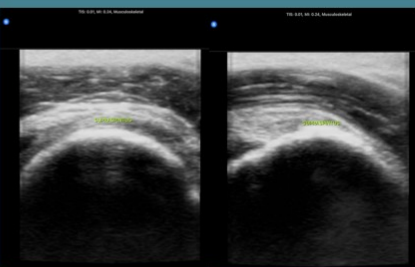
## DIAGNOSTIC ACCURACY

### Sensitivity and Specificity of Ultrasound in Shoulder Pathology\*

	% Sensitivity	% Specificity
RC tendinopathy	95	72
SA-SD Bursitis	93	83
LHBT tendinopathy	22-100	88-100
LHBT effusion	79-100	73-83
LHBT rupture	64-100	87-100

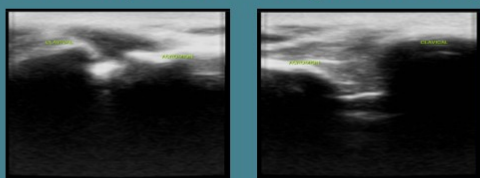
\*Using High Resolution Ultrasound with Gold Standard of MRI, Arthrography or Surgery

**ROTATOR CUFF (RC):** with US tendinopathy appears as thickening or thinning of the tendon with fiber disruption or anechoic fluid.<sup>1</sup> Detecting RC tendinopathy with US is sensitive (95%) but not specific (72%) when compared to arthroscopy or MRI.<sup>3</sup> When compared to surgical findings, US remains fairly sensitive (83%) but specificity falls (57%). Specificity is limited by destructive bone changes and reduced mobility in patients with arthritis limiting US visibility and assessment.<sup>5</sup>



Evaluation of the supraspinatus tendon in short (left) and long (right) axis with pocket US

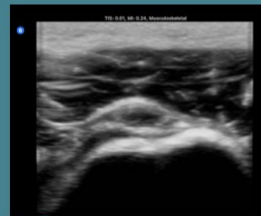
**BURSA:** Subacromial-subdeltoid (SA-SD) bursitis is appears as effusion or hypertrophy of the bursa. There is a strong correlation between pain and bursitis, with good intraobserver reliability in grading bursitis.<sup>2</sup> US is both sensitive (93%), and specific (83%) when compared to surgical findings.<sup>5</sup>



Evaluation of symptomatic AC joint with calcifications (left) and asymptomatic contralateral AC joint (right) using pocket US

### LONG HEAD OF THE BICEPS TENDON (LHBT):

tendinopathy appears with thinning or thickening of the tendon, anechoic fluid and fiber disruption. Detection of these tendinopathies with US varies among studies with sensitivity (22-100%) and specificity (88-100%) when compared to surgery, MRI or MR arthrography.<sup>4</sup> Additionally, although the detection of LHBT effusion is fairly sensitive (79%-100%) and specific (73%-83%) compared to MRI, it is not a great indicator of pathology as it can also be a normal finding.<sup>4</sup> Using US to detect a complete rupture of LHBT is fairly sensitive (64-100%) and specific (87%-100%) compared to surgery or MRI.<sup>4,5</sup> Additionally, power doppler can be used to detect hyperemia which can help distinguish rheumatoid arthritis (RA) from osteoarthritis (OA).<sup>11</sup>



Evaluation of LHBT in short axis with pocket US

**AC JOINT:** pathology is attributable to supraspinatus or biceps tendon injury or bursitis which all narrow the subacromial space which lead to pain and dysfunction known as shoulder impingement.<sup>12</sup> Ultrasound can help detect contributing tendinopathies and bursitis.<sup>1,2,3,4,5</sup> Additionally the AC joint can be observed dynamically as the patient reaches for their contralateral shoulder.<sup>3</sup>

## CONCLUSIONS

**BENEFITS IN CLINICAL PRACTICE:** Ultrasound is a quick, safe, cost-effective way for PAs to...

- Rule out rotator cuff tendinopathy limiting unnecessary MRIs.<sup>3,13</sup>
- Detect and grade the severity of SA-SD bursitis.<sup>5</sup>
- Rule in LHBT tendinopathies and full thickness ruptures.<sup>4,5</sup>
- Help differentiate OA and RA
- Dynamically evaluate and assess the AC joint for pathology.<sup>1,2,3,4,5,12</sup>
- Guide aspiration/injection of the shoulder joint improving pain and range of motion.<sup>9,14</sup>

### DRAWBACKS OF SHOULDER US:

- LHBT effusion cannot be relied upon for diagnosis of tendinopathy.<sup>4</sup>
- Mobility limits and bone changes can obstruct evaluation of shoulder joint in patients with arthritis.<sup>5</sup>
- US is operator dependant and schools and employers lack uniform training for PAs.<sup>7</sup>

### LIMITATIONS OF THE STUDIES EVALUATED:

Shoulder US studies did not use PAs, used high resolution US instead of "pocket" US and underrepresented female patients. No studies directly compared the cost of shoulder POCUS vs MRI. OA was only compared to RA not other hyperemic disorders. Only published, free articles in English were reviewed.

## REFERENCES

