

# Percutaneous Treatment of Subacromial Impingement, A Retrospective Review

COLIN O'NEILL, BS<sup>1</sup>, TIM ROBINSON, PHD<sup>2</sup>, BRITNEY BENDER<sup>3</sup>, JOSEPH MCGINLEY, MD, PHD<sup>1,4</sup>

<sup>1</sup>University of Washington, Department of Radiology, <sup>2</sup>University of Wyoming, Department of Mathematics and Statistics, <sup>3</sup>Casper College, <sup>4</sup>The McGinley Clinic, Casper, WY, U.S.A.

## BACKGROUND

- Subacromial impingement syndrome (SIS) is one of the most common shoulder disorders involving structures of the subacromial space and is often associated with pathology of the rotator cuff tendons and subacromial bursa.<sup>1</sup>
- Current literature has demonstrated that acromion angulation on MRI, X-Ray, and sonography can be utilized to diagnose shoulder impingement.<sup>2,3</sup>
- Currently, the predominant treatment plans include either physiotherapy and exercise rehabilitation, or surgical decompression of the subacromial space (SAS).<sup>4,5</sup>
- Surgery inherently poses risks for potential complications, and is becoming less common for treatment of SAS, leaving patients with few options in addressing symptomatic SIS.
- The Tenex device, along with cell therapy, offers patients a minimally invasive treatment option to debulk the area of impingement, specifically, the coracoacromial ligament (CAL) and the lateral acromion, and treat the damaged RTC to improve the healing response.
- The goal of this study was to assess short- and long-term pain reduction following treatment of subacromial impingement with Tenex debridement and cell therapy.

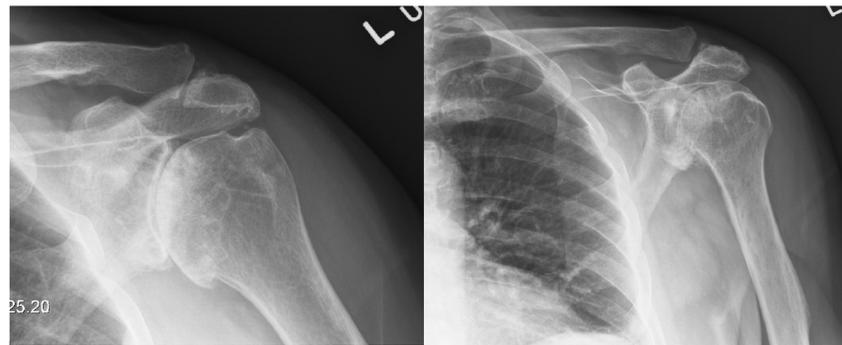


Fig. 1 Fig. 2  
Fig 1,2 coronal radiographs demonstrate acromial downsloping with narrowing of the SAS.

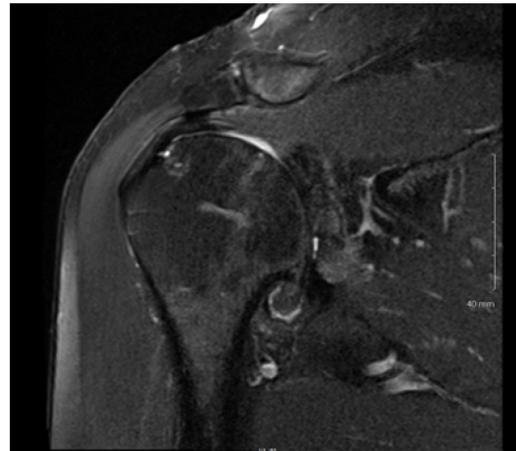


Fig 3. Coronal PDFS MRI image demonstrates thickening of the CAL with narrowing of the subacromial space, rotator cuff tendinopathy, and partial tearing.

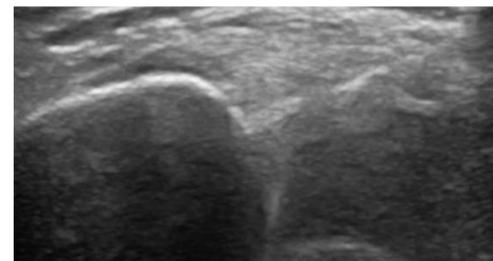


Fig. 4

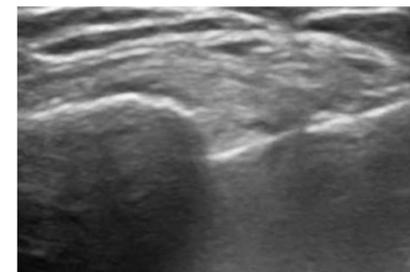


Fig. 5

Fig. 4,5 demonstrate coronal sonographic guided percutaneous insertion of the Tenex needle into the SAS.

## METHODS

### STUDY DESIGN

- A retrospective review of the clinical charts, 44 patients (17 female, 27 male), ages 33-89 (mean age = 58.53), diagnosed and treated for SIS using Tenex and cellular therapy (bone marrow aspirate concentrate (BMAC), 10 mL, or platelet rich plasma (PRP) 10 mL)
- Performed from a single center from 2017 through 2022.
- A 0-10 patient self-reported pain scale was used as the primary outcome, with 0 being no pain and 10 being worst pain imaginable. Pain scores were collected prior to treatment, and at 3 weeks, 6 weeks, 3 months, 6 months, 12 months, 18 months, and 24 months post treatment.
- Secondary measures include adverse outcomes and repeat treatments.

### STATISTICAL ANALYSIS

- A repeated measures mixed effects model was used to fit the percent pain reduction values over time using the R statistical software.
- Secondary outcomes included adverse events and the need for repeat treatments.

## RESULTS

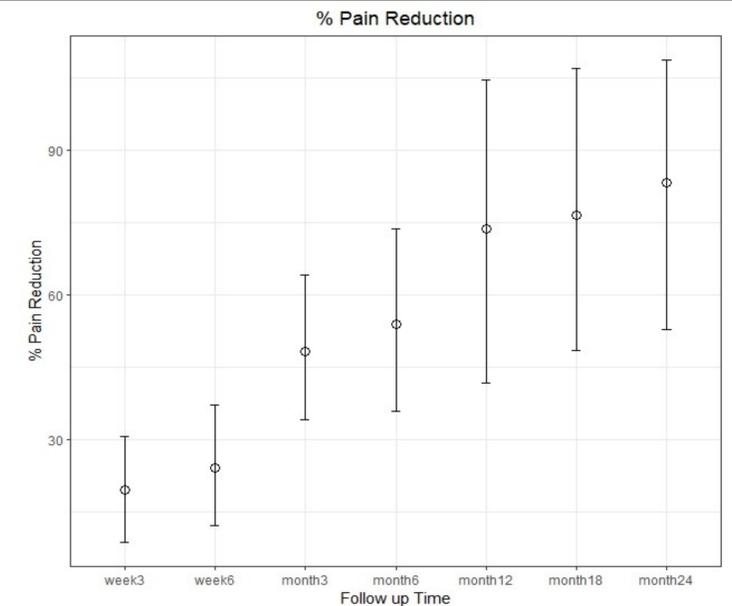


Fig 6. Pre-treatment pain scores ranged from 1-10 with a mean pain score of 5.3. Post Tenex and cellular treatment percent reduction in pain from baseline was 19.7% at 3 weeks, 24.5% at 6 weeks, 48.6% at 3 months, 54% at 6 months, 72% at 12 months, 77% at 18 months and 81.8% at 24 months. No adverse outcomes reported, or repeat treatments required in any patient.

	Lower 95	Upper 95
week3	8.606144	30.63359
week6	12.1392	37.16076
month3	34.17226	64.17097
month6	35.79314	73.65079
month12	41.75705	104.5607
month18	48.52705	106.9086
month24	52.86163	108.6416

## CONCLUSIONS

- Percutaneous subacromial decompression, along with cell therapy, resulted in significantly reduced pain scores in patients with symptoms associated with SIS.
- Significant pain reduction was achieved after 3 weeks, and steadily increased up to the 24-month follow up period.
- No adverse outcomes were reported, validating the safety of this minimally invasive procedure.

## ACKNOWLEDGEMENTS

- Dr. Timothy Robinson for completing the statistical analysis.
- The McGinley Clinic staff for assistance throughout the project.

## REFERENCES

- Michener LA, McClure PW, Karduna AR. Anatomical and biomechanical mechanisms of subacromial impingement syndrome. *Clin Biomech Bristol Avon.* 2003;18(5):369-379. doi:10.1016/s0268-0033(03)00047-0
- McGinley JC, Agrawal S, Biswal S. Rotator cuff tears: association with acromion angulation on MRI. *Clin Imaging.* 2012;36(6):791-796. doi:10.1016/j.clinimag.2012.04.007
- Garving C, Jakob S, Bauer I, Nadjar R, Brunner UH. Impingement Syndrome of the Shoulder. *Dtsch Arzteblatt Int.* 2017;114(45):765-776. doi:10.3238/arztebl.2017.0765
- Gebremariam L, Hay EM, van der Sande R, Rinkel WD, Koes BW, Huisstede BMA. Subacromial impingement syndrome—effectiveness of physiotherapy and manual therapy. *Br J Sports Med.* 2014;48(16):1202-1208. doi:10.1136/bjsports-2012-091802
- Nizam Siron K, Mat Lani MT, Low CL, Kow RY. Arthroscopic Subacromial Decompression in the Treatment of Shoulder Impingement Syndrome: A Prospective Study in Malaysia. *Cureus.* 2021;13(11):e19254. doi:10.7759/cureus.19254