

Clinical Case Presentations Utilizing Rapid Release Technology for the Treatment of Orthopedic Musculoskeletal Conditions

Conducted at University of Texas Southwestern Medical Center,
School of Physical Therapy

QUESTIONS	Clinician 1 (Ortho resident)	Clinician 2 (OCS, SCS)	Clinician 3 (OCS)	Clinician 4 (Ortho resident)	Clinician 5 (OCS, faculty)	Clinician 6 (Ortho resident)	Clinician 7 (OCS, faculty)	Clinician 8 (advanced fellowship work)
Total patients treated n=60	8	10	10	6	9	5	5	7
Primary dx treated (see codes below)	1, 2, 3, 23	3, 4, 5, 6, 23	1, 3, 6, 7, 8, 9, 10, 23	3, 5, 11, 12, 23	13, 14, 15, 16, 23	17, 18, 19, 20, 21, 23	5, 16, 22, 23	5, 11, 21, 22, 23
Diagnosis Code	1. Rotator cuff (RC) repair; 2. RC tendonitis/osis; 3. Achilles tendonitis/osis; 4. Significant post-surgical scar tissue (hip & shoulder); 5. Lateral/Med Epi tendinopathy; 6. Adhesive capsulitis (thawing); 7. Bicep tendonosis; 8. Hamstring strain; 9. Transtibial amputation (scar tissue/phantom limb pain); 10. Spasticity (CP), 11. Subacromial impingement; 12. S/P knee scope; 13. Greater trochanteric pain; 14. Gastrocnemius strain; 15. Low back pain; 16. Planter fascia fibromatosis; 17. Distal bicep repair (10 wks); 18. Trimalleolar fx; 19. Distal fibular ORIF; 20. ECU tendinopathy; 21. Patellar knee pain/tendinopathy; 22. IT band syndrome 23. In addition to specific diagnosis codes, all clinicians used RRT for general soft tissue tenderness/guarding/ trigger points							
Acute or chronic condition	All clinicians listed both acute and chronic conditions. More chronic was seen due to nature of clinic practice, but interest in treating acute conditions and post op at appropriate time of healing was strong based on benefits seen.							
Primary outcome	All clinicians listed similar primary outcomes of interest including: pain, ROM, mobility (scar or soft tissue), TP Release							
Typical # treatments	3-4	4-5	2-3	5	3	3	5-6	5
Perceived benefit 1-10 (1=no impact; 5 =similar to manual techniques; 10=very effective)	7	7	7	7	7-8,faster, saves my hands vs manual	7	10	9 really saves my hands
Should we continue with formal research projects due to effectiveness/benefit	Yes	Yes, Absolutely	Yes, want to look at more acute	Yes, many areas for potential impact	Yes, really see clinical impact	Yes, wish, I would still be here to help	Yes, would be great to help spread the word	Yes, I want to be part of the project

Data results from “Clinician Rapid Release Technology (RRT) Introduction-Feasibility Project”

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Ongoing randomized controlled trials was utilizing Rapid Release Technology or currently underway within the Department of Physical Therapy

Clinical Case Study 1: Achilles Tendinopathy

Patient: Male, 37-years-old referred to outpatient orthopedic physical therapy for treatment of chronic Achilles tendinosis. Current episode had lasted 4-months with progressively worsening symptoms. No specific injury or mechanism of onset. Chief complaints were pain with weight bearing (especially with any stretch of tissue), progressive weakness noted during last 3 weeks secondary to increasing pain, and inability to complete work and recreational activities. Patient works as a car salesperson with significant periods of standing and walking during his daily requirements for work. Patient is unable to walk more than 3-4 blocks without severe pain. Lower Extremity Functional Scale 50/80. Physical therapist treating patient had 7 years orthopedic clinical experience and advanced manual therapy education.

Initial evaluation:

Pain (NPRS): Best 2/10 (rest, completely unloaded), worst (9/10), current (6/10)

Range of motion: 40° plantarflexion, 8° dorsiflexion, inversion and eversion within normal limits. Pain with overpressure at endrange dorsiflexion was recorded as VAS 4/10 (0-10 scale).

Strength: screen of lower leg indicated 5/5 strength in all compartments except plantar flexion which indicated 2/5 strength secondary to severe pain limiting full range of motion and progressing with repetitions.

Joint mobility: within normal limits

Tenderness to palpation: Severe pain (8/10) along a 3 cm length of medial Achilles tendon insertion.

Primary interventions: included clinical standard of care for this diagnosis. Focus was on stretching and gastrocnemius/soleus complex, progressive resistance exercise for gastrocnemius/soleus complex dependent on tolerance. Typical manual therapy for cross friction technique across affected area was replaced with high-frequency vibration therapy utilizing Rapid Release Technology Pro 2 (RRT). The RRT device was specifically selected versus other mechanical soft tissue devices secondary to the frequency specificity resonance with scar tissue adhesions and also the facilitation of the Tonic Vibration Reflex the clinical goal to decrease spasms, and reduce pain.

Application of RRT:

Completed after gentle stretching and prior to exercises

1. RRT treatment disc, which is the larger treatment surface intended for superficial myofascial tissue mobility was utilized for 1-2 minutes over entire gastrocsoleus complex. Purpose was to facilitate myofascial manipulation as well as progressive desensitization of surrounding tissue.
2. Treatment was then localized linearly across the Achilles tendon utilizing either the small treatment tip which had the softer surface contact or the large treatment tip which contained a more rigid surface and imparts the highest intensity of high-frequency vibration. Treating surface was determined by tolerance of the patient. On initial visit the softer treatment surface was appropriate. RRT was applied across all surfaces of the Achilles tendon covering approximately 8 cm region for 4 minutes.

Results:

After initial treatment with RRT: Patient reported a 30% reduction of pain with weight bearing, and a 40% reduction in tenderness to palpation. Reduction of pain was recorded as asking the patient to compare pain at the beginning of the evaluation with pain after RRT. Pain with terminal stance during walking (posterior compartment under load and stretch) and a 50% reduction in pain compared to entering clinic that day.

Visit #2: Patient returned 72 hours later and reported a "mild" increase in his pain compared to when he left the clinic, but still a "significant reduction" in pain compared to prior to physical therapy. He was able to consistently walk at an athletic event he attended since last visit. Intervention protocol of RRT and stretching strengthening were implemented. Patient demonstrated increased tolerance to gastrocnemius strengthening with fatigue and discomfort limiting calf exercises after 12-15 repetitions. At this point eccentric strength training of gastrocnemius was initiated. IMPORTANT NOTE: There was no increase in tenderness to palpation or pain discomfort at the end of this progressive increase in exercise intensity.

Visit #3: This visit was 1-week post initial evaluation. Patient subjectively states that he only felt Achilles discomfort when completing the eccentric portion of his home exercise program. Pain with walking at work had subsided greater than 80%. Patient states that he had not had this much relief since prior to the onset of symptoms. Protocol with RRT was repeated with a progression of the eccentric exercises and initiation of balance exercises. No pain was reported during additional activities at this visit.

Visit #4: 2-weeks post initial evaluation. Patient denies having any pain during ambulation at work. The only pain that continues at this point were mild symptoms (2/10) first thing in the morning which resolve within 30-60 minutes. Patient has minimal to no pain on palpation along the Achilles tendon. Tolerance to eccentric exercise continued to progress. Activity intensity and balance challenge exercises were increased in complexity with no subsequent complications.

Visit #7: 4-weeks post initial evaluation. Patient reported no pain or discomfort with home, work, and recreational activities. Patient can walk unlimited distances with no subsequent compromise. Upon reevaluation, patient had full range of motion, and strength of plantar flexion was 4/5 pain free. Lower Extremity Functional Scale 74/80.

Summary: Patient was treated a total of 7 visits over 28 days. Lower Extremity Functional Scale improved 24 points. Patient's original functional limitation in walking was 3-4 blocks. Functional ability rapidly progressed to unlimited distances with minimal pain. Total RRT treatments = 6.

NOTE 1: Typical clinical progression for this condition would be expectation of reduced pain and beginning tolerance to eccentric exercise and of progressive loading within 2-3 weeks of treatment, and discharge with 80-100% resolution of symptoms in approximately 5-6 weeks.

NOTE 2: We have had clinical experience with several Achilles tendinopathy patients with similar rapid results. However, we have found that if there is involvement of the subcutaneous or retrocalcaneal bursa, RRT should be used cautiously in the beginning as it may have an aggravating effect until inflammation within the bursa region can subside.

NOTE 3: Achilles tendinopathy is one of the orthopedic diagnoses that are included in our ongoing randomized control trials for the use of RRT.

Clinical Case Study 2: Chronic Lateral Epicondylitis

Patient: Male, 55-years-old referred to outpatient orthopedic physical therapy for treatment of chronic lateral epicondylitis/osis. Patient had an 8 year history of recurring right lateral elbow pain. Current episode had lasted 10-months prior to seeking physical therapy. Current episode was associated with increased workload. Patient worked as a prosthetic/orthotic fabricator with significant upper extremity manual labor tasks. Patient stated the use of a counter-brace provided some decreased symptomatology during work tasks, but minimal impact over time in resolving pain. Currently, patient stated he is limited to 2-3 hours/day of manual work duties before pain reached a 7/10 level. Chief complaints were pain with all activities requiring grip strength. Symptoms are aggravated by classical factors such as manual labor, lifting objects requiring increased grip, combination of elbow extension and wrist flexion. Alleviating factors included cryotherapy, and use of medication. Although these diminished immediate symptoms, there was no long-term carryover. Patient had received physical therapy on prior occasions implementing exercises for stretching and strengthening. The Quick-Dash functional scale 29.5/100. The physical therapist treating patient for this episode had 6 years orthopedic clinical experience and advanced manual therapy education.

Initial evaluation:

Pain (NPRS): Best 0/10 (rest, completely unloaded), worst 6/10, current 3/10

Range of motion: Wrist and elbow range of motion within normal limits except elbow extension lacked 10° to neutral and forearm supination limited to 65°. Pain with overpressure at endrange of elbow extension was recorded as VAS 4/10 (0-10 scale). Wrist flexion at endrange of elbow extension was limited to 25° with muscular end feel and pain (5/10).

Strength: Screen of wrist and elbow strength revealed 5/5 on left throughout all muscle tests. Right screen revealed 4/5 on elbow flexion and wrist flexion (no pain), 4/5 (mild pain) elbow extension 4-/5 (moderate pain) wrist extension (elbow flexed), 4-/5 (severe pain) wrist extension (elbow extended). Grip strength 100 pounds left, 75 pounds right.

Joint mobility: Mild hypomobility of radial ulnar joint.

Tenderness to palpation: Severe pain (8/10) at extensor origin.

Special tests: (+) resisted ECRB: moderate pain, (+) resisted ECRL: severe pain

Primary interventions: Initially, primary treatment included typical clinical intervention including elbow extension/wrist flexion stretching, resisted eccentric wrist flexion (to tolerance), transverse friction massage at origin of extensor compartment, and joint mobilization. Over course of physical therapy, the patient as only treated one time per week. At beginning of 3rd visit (3 weeks post evaluation), patient reported minimal improvement of pain and continued inability to complete work duties without aggravation of symptoms. At this point Rapid Release Technology (RRT) was introduced within the treatment paradigm with the primary focus of collagen/fascia adhesion extensibility and reduction of pain.

Application of RRT:

Completed at beginning and end of exercise sessions. Treatment consisted of 2 minutes of RRT focused on common extensor tendon origin and progressively down ECRB/ECRL. Additionally, at the end of therapy session, an additional 1-2 minutes of general soft tissue mobilization surrounding the elbow and wrist were completed. Total RRT treatment time 4-6 minutes each session.

Results:

After initial treatment with RRT: At end of 3rd visit patient reported tenderness to palpation at 2/10 at common extensor origin. Hand grip of soft object was reported at 80% reduction of pain compared to beginning the treatment.

Visit #4: Patient stated he discontinued his counter-brace for the entire weekend without drastically increasing symptoms, significant improvement in early morning discomfort. Patient stated that discomfort still increased throughout the day, but he was able to work for 7 hours prior to pain reaching 7/10 threshold. **IMPORTANT NOTE:** Patient primary work tasks included significant demands on grip strength and tension within common extensor compartment.

Visit #5: This week was described as a "key turning point" by the patient. He was able to complete eccentric exercises consistently with only moderate discomfort which resolved quickly and did not linger after exercises. He was able to work for up to 2 hours each day without using counter-brace.

Visit #6: Patient stated continued improvement. He was able to work through 8 hour day with minimal symptoms and without the need to utilize a counter-brace. This exemplified a significant improvement in tissue tolerance and healing especially considering the chronicity of this problem and only being treated formally one time per week.

Visit #7: 7-weeks post initial evaluation. Patient had improved to full home, and work demands with minimal symptoms. He had discontinued the use of his counter-brace for entire week. Patient stated that he has not had this length and magnitude of pain relief for 10 months. Reevaluation demonstrated full elbow and wrist range of motion and strength of 4-5/5 with no pain with wrist flexion (elbow extended). Quick Dash 74/80.

Summary: Patient presented with long term pain and dysfunction. He was treated a total of 7 visits over 7 weeks. Quick Dash functional outcome improved 44 points. Patient's was able to complete all work task without pain. Total RRT treatments = 6.

NOTE 1: Due to the chronicity of this condition (8 years), typical clinical progression would be expectation of reduced pain and beginning tolerance to eccentric exercise and of progressive loading within 4-6 weeks of treatment, but time to resolution of symptoms up to 6-9 months. The addition of RRT with exercise and manual therapy significantly accelerated recovery time with minimal clinical visits (one per week).

NOTE 2: Chronic lateral tendinopathy is included as one of the musculoskeletal/orthopedic diagnoses been investigated in our ongoing randomized control trials for the use of RRT.

Clinical Case Study 3: Hip labral pathology, multiple surgeries for adhesion/scarring.

Patient: Female, 28-years-old referred to outpatient orthopedic physical therapy for treatment of chronic post-surgical adhesion complications following labral repair of left hip. Initial surgery to repair hip labral tear was performed arthroscopically 3 years ago. Postop recovery resulted in what was diagnosed as internal adhesions creating entrapment syndromes within the neural and muscular tissue. Patient underwent two subsequent arthroscopic procedures for adhesion release over a 12-month period. Following both procedures, patient developed similar difficulties with pain, weakness, and significant functional limitations within 6 months. Patient has received physical therapy following previous surgeries. Although improvement occurred during all episodes, or long-term functional status continued to be compromised. Current episode chief complaints were severe pain described as searing and debilitating. Severe pain resulted in inability to develop hip flexion/abduction muscular force resulting in altered gait mechanics and significantly limited functional activities. Patient utilized pain medication for tolerance, but were often ineffective at resolving issues, and she was concerned with long-term use. Patient worked in a business office environment with significant periods of standing and walking during her daily requirements for work. Patient had a history of being extremely active prior to initial surgery. She had been unable to return to any recreational activities. Lower Extremity Functional Scale 38/80. Physical therapist treating patient had 3 years orthopedic clinical experience and advanced orthopedic specialty certification (OCS).

Initial evaluation:

Pain (NPRS): Best 2/10 (rest, completely unloaded), worst (9/10), current (4/10) in sitting

Range of motion: 80° flexion, 8° of extension (severe pain), 30° internal rotation, 20° external rotation. Pain with overpressure at all endrange motions was recorded as VAS 5/10 (0-10 scale).

Strength: screen of lower leg indicated 4-5/5 strength in all motions of right hip. Left hip flexion 2-/5 (pain limited), abduction 3+/5 through limited range of motion, hip extension 3+/5 through limited range.

Gait: Antalgic gait pattern with significant lateral trunk lean on left stance phase secondary to pain. Inability to descend/descend stairs foot over foot without significant pain.

Joint mobility: within normal limits as tested, muscle guarding significant.

Tenderness to palpation: Severe pain (8/10) and hypersensitivity to manual contact along broad region extending from iliac crest, inguinal groove, proximal femur. See picture at right.



Primary interventions: Treatment included clinical standard of care for this diagnosis. Initial focus was on desensitization of tactile contact and progressive myofascial mobility. Typical manual therapy of cross friction and myofascial techniques of affected areas were replaced with high-frequency vibration therapy utilizing Rapid Release Technology Pro 2 (RRT). The RRT device was specifically selected versus other mechanical soft tissue devices secondary to the frequency specificity resonance with scar tissue adhesions and also the facilitation of the Tonic Vibration Reflex with the clinical goal to decrease spasms, and reduce pain. RRT was used specifically in his clinical scenario to evaluate effectiveness with this unique case presentation.

Application of RRT:

1. General application of 3 minutes of RRT over involved anatomical areas. Pressure through RRT device was altered dynamically based off patient's sensitivity, and tolerance to high-frequency vibration.
2. After 3 minutes, manual stretching of tissue concurrent with RRT conducted for an additional 2 minutes.
3. On subsequent treatments, lower extremity was placed on stretch and RRT was applied throughout region of fascial restrictions, and hip flexor insertions. Manual pressure was applied with moderate intensity based off patient's tolerance.

Results:

After initial treatment with RRT: Patient tolerated light RRT pressure in surrounding tissue, but did not tolerate RRT contact directly over incisional scars. After treatment, patient reported a 20% reduction of pain and improved tolerance to tactile contact with areas of incisional scarring even though RRT was applied indirectly in these regions. Patient stated this was "surprising" as these areas had been hypersensitive for several weeks. Pain with attempted voluntary hip flexor activation remained. Patient was given home exercise program for isometrics.

Visit #2: Patient returned 48 hours later and reported a "mild" increase in her pain compared to her last visit. She stated increased walking demands at work had aggravated general pain (6/10). Intervention protocol of RRT and stretching repeated. Patient demonstrated increased tolerance to RRT pressure and after several minutes, light RRT application could be conducted directly over incisional scarring. Voluntary muscle activation still compromised by pain, the patient noted a 20% reduction in overall pain with hip flexor activation.

Visit #3-4: At the conclusion of the second week of treatment (4 total RRT sessions). Patient reported significant improvement (50-60%) in general hip pain during normal daily activities. She noted increased tolerance to walking distance and prolonged sitting without exacerbation of pain symptoms. Patient also began to demonstrate voluntary hip flexor activation with increased resistance tolerance while maintaining pain level less than 4/10.

Visit #6-8: 4-weeks post initial evaluation. Patient demonstrated progressive reductions in tenderness to palpation, pain with ambulation, and concomitant increases in voluntary ability for muscle activation of hip flexion and abduction. Pain now classified as 0/10 at rest, and 3/10 at worst with daily activity and exercise over the last week. Patient stated she had not had this reduction of pain symptoms and improved function for several years. This improvement had a significant emotional impact on the patient as she had been willing to try physical therapy again with the fear of requiring another surgical procedure if unsuccessful.

Visit #9-11: Final 3 visits were focused on progressing patient's home exercise program and initiating her return to recreational activities while closely watching for aggravation of symptoms. Patient was discharged with a Lower Extremity Functional Score of 66/80.

Summary: Patient was treated a total of 11 visits over 6 weeks. Lower Extremity Functional Scale improved 28 points. Patient's original functional limitation in walking was severely limited with pain occurring in almost all daily activities. Functional ability rapidly progressed to unlimited distances with minimal pain. Total RRT treatments = 8.

NOTE: This patient came to therapy with a rather challenging clinical presentation. The chronicity of the condition and extreme hypersensitivity were expected to be problematic for progression. This was one of the first clinical scenarios where RRT was implemented in our clinic. The unexpected and profound results utilizing RRT provided strong motivation for the development of our continuing randomized control trials for musculoskeletal conditions and pain utilizing RRT.