

Integration

Ultrasound is a treatment that uses acoustic energy and has many indications with a relatively short treatment time. Ultrasound can be used to help release tight soft tissues such as joint contractures and scarring. It can also be used for the treatment for subacute and chronic inflammation, although it is contraindicated for acute inflammation. Ultrasound can also reduce pain caused by spasms, muscle guarding, and trigger points. This form of treatment uses a soundhead to transmit the frequency range of .8 – 3 MHz into a localized area. The smaller the MHz the deeper tissue penetration, up to 2 inches. Care needs to be taken with the soundhead as it can easily be damaged. Therapeutically, ultrasound can provide both a thermal effect and a non-thermal effect. Thermally, it gives a deep heat that the patient does not really feel. According to the book *Physical Agents in Rehabilitation*, thermal effects include “acceleration of metabolic rate, reduction or control of pain and muscle spasm, alteration of nerve conduction velocity, increased circulation and increased soft tissue extensibility” (Cameron, 2018). Non-thermal ultrasound provides 3 effects; cavitation, micro massage, and increased cellular permeability. Care needs to be taken with populations who have circulation deficiencies, malignancies, or anesthetic skin. Furthermore, ultrasound can be problematic over superficial metal implants, acute inflammation in joints, and for those with infectious processes. As PTAs, we never go over areas with the potential for cavitation and we stay off the anterior triangle.

I chose the *Efficacy of therapeutic ultrasound in treatment of adhesive capsulitis: A prospective double-blind placebo-controlled randomized trial* by Tugce Onal Balci, Ayla Cagliyan Turk, Fusun Sahin, Nurdan Kotevoglul, and Banu Kuran. The 30 participants of this study were between the ages of 41-77 with 14 males and 16 females. All participants were Dx with adhesive capsulitis and randomly divided in to two groups. Both groups were provided TENS (20 min), Hot Pack (20 min) and exercises for the effected shoulder. In addition, Group one was provided with an active ultrasound dose of 1.5 Watt/cm² with a frequency of 1 MHz for 8 mins. Group two was provided with sham ultrasound the same way as group one but with a dose of 0 Watt/cm². All therapies were applied at the clinic, 3 days a week for 66 weeks, except for a home exercise program. Participants were asked to do pendulum exercises every 2

hours for 5 mins thought out the day. Patients were evaluated 3 times before treatment began, at the 6th and 24th week after treatment. The results of this study concluded that adding ultrasound to the modalities of TENS, Hot pack, and exercise did not provide any additional benefits for the treatment of adhesive capsulitis.

Therapeutic Application

Noella is a 96-year-old who lives at home alone and is very active and loves to play the piano and bridge. She has arthritis (chronic inflammation) in her hands and has difficulty doing the things she loves. She will be treated with ultrasound for pain, precautions need to be taken with her advanced age. Dosage will be set at 3 MHz (shallow), pulsed 20% 1:4 (non-thermal), treatment time 8 mins, and intensity 1.0 W/cm². Noella will be comfortably seated in a chair with a back rest with her arm elevated on a table with a pillow. Medium placed on the back of the hand and ultrasound head placed on the hand starting treatment. Continue US as above to help improve hand movements.

George is an 18-year-old with scarring in his right middle finger from a past injury. The scarring is affecting his ROM. He will be treated with thermal ultrasound for soft tissue shortening. Dosage will be set at 3 MHz (shallow), 100% duty (thermal), treatment time 8 mins, and intensity 0.5 W/cm². George will be seated in a chair with a back rest with his arm elevated on a table with a pillow. Medium placed on the back of the middle finger over the PIP knuckle and ultrasound head placed on the knuckle and begin treatment. Continue treatment 2 times per week with US to improve functional use of his hand.

References

- Balci, T. O., Turk, A. C., Sahin, F., Kotevoglul, N., & Kuran, B. (2018). Efficacy of therapeutic ultrasound in treatment of adhesive capsulitis: A prospective double blind placebo-controlled randomized trial. *Journal of Back and Musculoskeletal Rehabilitation*, 31(5), 955–961. doi: 10.3233/bmr-150482
- Cameron, M. H. (2018). *Physical agents in rehabilitation: an evidence-based approach to practice*. St. Louis: Elsevier.