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Prevention of Hemiplegic Shoulder Pain (HSP) in post-stroke patients presenting with Shoulder Subluxation (SS)

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Introduction:

Shoulder (glenohumeral) subluxation is one of the most common complications in patients following a stroke. Subluxation involves the humeral head slipping out of the glenoid cavity, either due to weakness of the rotator cuff muscles or direct trauma to the shoulder. In stroke patients, subluxation typically manifests as an inferior subluxation. The gravitational forces on the arm pull the head of the humerus downward, while the muscles that counteract this downward force (supraspinatus and posterior deltoid) are weak or completely nonfunctional. Thus, hemiplegic shoulder pain is a common symptom of shoulder subluxation, which can be caused by stretching, shortening or damage to the capsule, ligaments or muscles of the shoulder joint.[1]

Studies have shown that shoulder subluxation is the most common causes of shoulder pain following stroke. Up to 81% of patients report shoulder pain with shoulder subluxation. It has been theoretically accepted that shoulder subluxation is a trigger to a cascade of complications that lead to new pain foci. The downstream complications include tendinitis, adhesive capsulitis, impingement syndrome, and brachial plexus neuropathy. The current standard of care is to treat pain in patients by treating the shoulder sub-luxation; however, previous studies have shown that chronic pain is refractory to treatment. Therefore, there is a need to focus on prevention of pain instead of treatment of pain.[2]

Neuromuscular electrical stimulation (NES) has shown to have effects in preventing shoulder subluxation when initiated following a stroke. In our case report, we want to investigate if NES has any effect in reducing the incidence of hemiplegic shoulder pain by preventing shoulder subluxation from occurring.

Case Description:

A 56 year old female with a past medical history of HTN, SAH in 2013, s/p L PCA coiling-presented on 3/21/2015 for elective clipping of right MCA aneurysm via craniotomy. Operative course was complicated by rupture of distal MCA vessel and blood loss. Patient was extubated on 4/1/15 and noted to have left sided hemiplegia. CT-head findings include right subcortical stroke including corona radiata, caudate/lens, and temporal lobe. During examination, the patient was alert and oriented. An extremity exam noted shoulder subluxation on the left side. Patient had a positive sulcus sign on physical exam. The patient reported no pain in the left upper extremity, but has limitations in strength and range of motion. At this time, the patient was deemed to be a good candidate for acute inpatient rehabilitation, and she was transferred for therapy on 4/9/15. Figure 1 demonstrates left shoulder subluxation on radiograph.

Discussion:

This patient's physical examination is demonstrative of shoulder subluxation after a cerebrovascular accident. A prospective, single blinded, randomized control trial had looked into the evidence of neuromuscular electrical stimulation and the incidence of shoulder pain. Fourty subjects were recruited within 48 hours of a stroke, and they were randomized into control and treatment groups of 20 each. Initial evaluation for both groups included shoulder radiographs, baseline pain survey and clinical evaluation before treatment was started. Both groups received physical and occupational therapy for a period of 4 weeks. The treatment group was administered electrical stimulation modality in addition to physical therapy-occupational therapy. The electrical stimulation sessions lasted for an hour, with the patients receiving 28 sessions a week over a four week period. Both groups were reevaluated at the end of four weeks of treatment. Furthermore, both groups received physical and occupational therapy only during an 8 week follow up period before one final evaluation. Based on a subjective verbal pain scale, there was no significant difference found in pain incidence or relief between the control and treatment group due to use of electrical stimulation.[3]

This study is poor indicator of effective pain prevention, since 9 out of 20 patients in the treatment group reported pain at the initial evaluation. As stated above, downstream complications of subluxation may have generated new pain foci (capsulitis, tendonitis, etc.). This may misrepresent pain directly attributed to shoulder subluxation. Additionally, the treatment period with electrical stimulation was only four weeks. A future question to investigate would be if maintenance therapy with electrical stimulation would provide appropriate prevention of shoulder pain. Finally, the small sample size reduces the power of this study and provides weak evidence on pain outcomes.

Case Diagnosis:

Left shoulder subluxation s/p traumatic right MCA aneurysm rupture

Treatment Plan:

The patient is currently being treated with dual channel NES to left shoulder to improve sub-luxation. NES of the left shoulder is used 45 min a session three to five times a week for six weeks. Furthermore, the patient receives three hours of physical therapy-occupational therapy five times a week to work on cognition assessment and retraining, functional mobility, therapeutic exercises and neurofacilitation techniques for motor control on the left upper extremity to help perform activities of daily life safe and effectively. Patient uses resting hand splints at night to keep joints in neutral position to avoid contractures.

Conclusion:

Shoulder subluxation is a very common complication of post-stroke patients. There is very little evidence to suggest effective prevention or treatment of hemiplegic shoulder pain after a stroke. More studies need to be done to evaluate acute stroke patients with shoulder subluxation without pain. This will better assess the ability of neuromuscular stimulation to prevent shoulder pain in patients with shoulder subluxation. Furthermore, once pain has started, new pain foci are generated. This suggests that treatment of hemiplegic shoulder pain should be multi-factorial.

References

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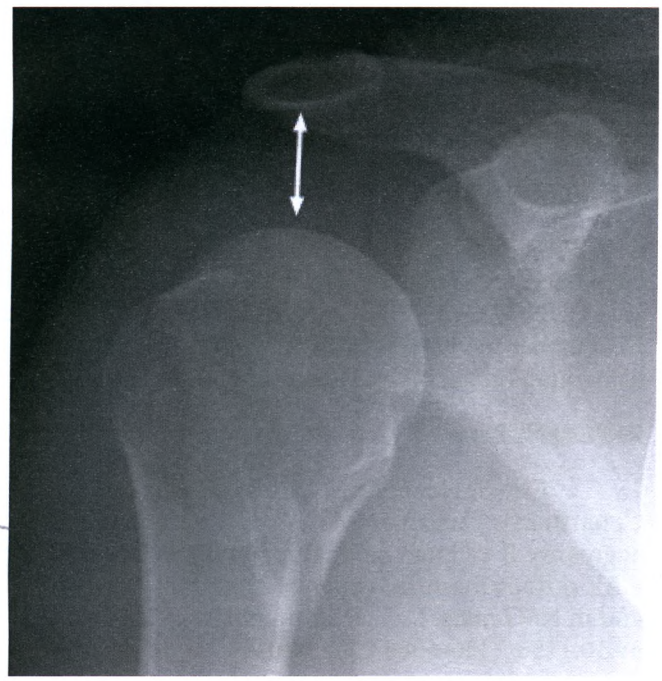

Figure 1: Example of shoulder subluxation.

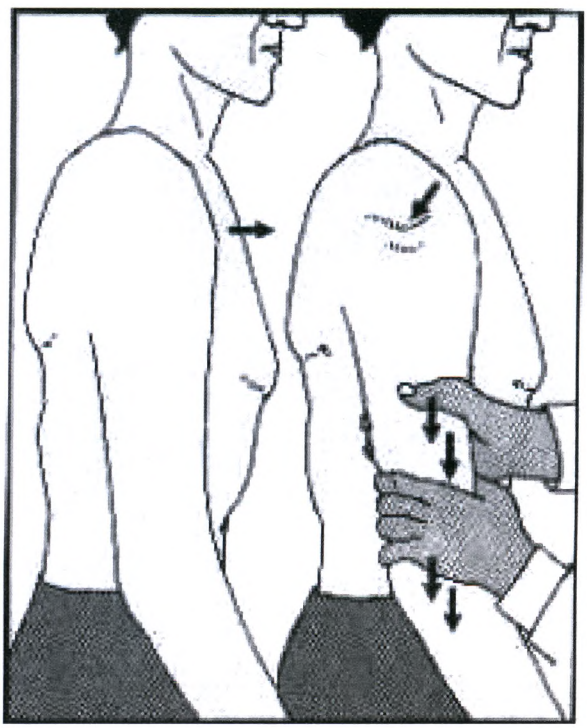

Figure 2: Diagram of sulcus sign.