**Shoulder joint contracture and plasma levels of substance P levels after arthroscopic repair of the rotator cuff**

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**Introduction:** Postoperative stiffness (POS) of the shoulder may occur after an apparently successful reconstruction of a rotator cuff tear.

The role of the peripheral nervous system in tissue healing has only recently been recognized.

Apart from transmitting nociceptive information to the spinal cord, sensory nerves have efferent effects, including vasodilation and plasma extravasation. These effects are mediated by several neuropeptides that exert trophic effects in different tissues, participating in the regulation of fibroblast and synoviocyte proliferation, and of angiogenesis. They have also been implicated in the synthesis and release of cytokines and growth factors.

Substance P (SP) is mainly localized in unmyelinated C-fibers, and is synthesized in the dorsal root ganglion (DRG) as a result of nerve-ending stimulation by nerve growth factor. SP is secreted by nerves and inflammatory cells such as macrophages, eosinophils, lymphocytes, and dendritic cells, and it is transported both centrally and peripherally, where it is released from terminal cells within the spinal cord and peripheral tissues, although most transport is to the latter. SP acts by binding to the neurokinin-1 receptor (NK-1R). It has proinflammatory effects in immune and epithelial cells, and participates in inflammatory diseases of the respiratory, gastrointestinal, and musculoskeletal systems.

We determined the plasma levels of SP in patients with postoperative stiffness after arthroscopic repair of a rotator cuff tear, and compared them with those in patients with a good outcome after arthroscopic rotator cuff repair.

**Materials and Methods:** Plasma samples were obtained at 15 months from surgery from 2 groups of patients who underwent arthroscopic repair of a rotator cuff tear. In Group 1, 30 subjects (14 men and 16 women, mean age: 64.6 years, range 47 to 78) with shoulder stiffness 15 months after arthroscopic rotator cuff repair were recruited. In Group 2, 30 patients (11 men and 19 women, mean age: 57.8 years, range 45 to 77) were evaluated 15 months after successful arthroscopic rotator cuff repair. Immunoassays were performed with commercially available assay kits to detect the plasma levels of SP.

Statistical analysis were performed with Wilcoxon Sign Rank test. Significance was set at P< 0.05

**Results:** The concentrations of the neuropeptide SP in sera were measurable in all patients. Patients with postoperative stiffness had statistically significant greater plasma levels of SP than patients in whom arthroscopic repair of rotator cuff tears had resulted in a good outcome (P < 0.05).

**Discussion:** Postoperative stiffness (POS) of the shoulder may occur after an apparently successful reconstruction of a rotator cuff tear.

An increased amount of SP in the subacromial bursa has been correlated with the pain caused by rotator cuff disease.

SP stimulates DNA synthesis in fibroblasts, which are the cellular components of the adhesive capsulitis of the shoulder. Also, SP is a pain transmitter peptide, and pain may cause a secondary muscular and/or capsular contracture.

Our results show that the plasma concentrations of substance P in patients with shoulder stiffness after arthroscopic rotator cuff repair are higher compared to plasma levels of SP in patients with a good postoperative outcome.

We cannot determine the cause of POS in our patients, but the findings of this study suggest a possible neuronal role in the pathophysiology of POS after arthroscopic repair of rotator cuff tears. The knowledge of the pathophysiological role of sensory nerve peptides in tissue repair in these patients could open new therapeutic options to manage conditions of the musculo-skeletal system with impaired tissue-nervous system interaction.