Identification of Fibronectin Aggrecan Complex (FAC) Associated with Inflammatory Cytokines in Cervical Radiculopathy Resulting from Herniated Disc

G.J. Scuderi1, M. Reuter2, R. Golish3, L. Hanna4

1Stanford University, Orthopaedics, Stanford, CA, United States, 2Lake Worh Medical Center, Lake Worth, CA, United States, 3Stanford University, Stanford, CA, United States, 4Cytonics, Jupiter, CA, United States

Introduction: Both inflammatory markers and fragments of structural matrix proteins have been identified in the pathophysiology of lumbar intervertebral disc disease and of painful conditions of synovial joints. In particular, a Fibronectin-Aggrecan Complex (FAC) containing the G3 domain of aggrecan bound to fibronectin has recently been identified in painful meniscal pathology (1), and validated in a larger series (2). The FAC has also been associated with relief of symptoms following successful treatment of radiculopathy due to lumbar herniated disc (3). We sought to investigate the presence of inflammatory cytokines and the FAC in individuals undergoing surgical treatment for cervical radiculopathy secondary to herniated disc.

Materials and methods: This study was a single center, prospective, consecutive case series of patients undergoing disc lavage prior to treatment of radiculopathy due to cervical disc herniation. A total of 11 patients with radiculopathic pain and MRI positive for disc herniation elected for single level cervical discectomy and gave informed consent for study participation. Lavage was performed by needle injection and aspiration upon entering the disc space for fluoroscopic localization prior to discectomy. The lavage fluid was assayed for cytokines IL-6, interferon-gamma (IFN-g), monocyte chemotactic protein 1 (MCP-1), and macrophage inflammatory protein-1 beta (MIP-1b), as well as for the FAC and pH. All patients were treated by a single board-certified, fellowship-trained orthopedic spine surgeon.

Results: There were seven females and four males with mean age 50.6 years (standard error 9.7; range 36 - 70). The mean (standard error; range) in picograms/milliliter for IL-6 was 7.9 (4.4; 0 - 44), for IFN-g was 25.3 (15.5; 0 - 159), for MCP-1 was 16.1 (11.9; 0 - 121), and for MIP-1b was 6.1 (2.8; 0 - 29). The optical density at 450nm of the FAC was 0.151 (0.036; 0.1 - 0.32), and the pH was 6.68 (0.1; 6.10 - 7.15). There were statistically significant correlations between MCP-1 and FAC (p = 0.036), and between FAC and pH (p = 0.008).

Conclusion: Biochemical analysis of injured cervical intervertebral discs reveals inflammatory markers such as MCP-1, fragments of structural matrix proteins such as FAC, and a relationship with pH. Complex interactions among inflammatory markers and structural matrix proteins have also been observed in the lumbar disc disease and in painful intraarticular pathology of the knee. Further evaluation of the FAC as a possible cartilage breakdown product associated with painful inflammation in the cervical spine appears warranted.

