In-vivo Endoscopic Visualization of Patho-anatomy in Painful Degenerative Conditions of the Lumbar Spine

A.T. Yeung, C.A. Yeung

Desert Institute for Spine Care, Phoenix, AZ, United States

Introduction: The patho-anatomy and degenerative processes in an aging spine have been defined by Wolfgang Rauschning’s anatomic cryosections of cadaveric specimens. Theories of pain generation are suggested by close examination of these specimens. If the visualized patho-anatomy can be studied in-vivo by spinal probing, rational treatment options can be developed, and the patho-physiology of spinal pain can be better understood. This study is made possible by evaluating painful tissue and structures in vivo in a conscious, partially sedated patient.

Method: Endoscopic spinal endocopy is studied as a method capable of clearly visualizing the patho-anatomy in the spine. An IRB approved study of 56 patients in 1997 provided evidence that endoscopic transforaminal surgery was feasible for a diagnosis and treatment of a wide spectrum of degenerative conditions. Discography was also a critical tool to help correlate pain production with the patho-anatomy visualized, and correlated with in-vivo probing. An intra-operative chromo-discogram was used to evoke concordant pain. Dilute Indigocarmine stained the degenerated nucleus and annulus. Foraminal normal and patho-anatomy was probed under local anesthesia.

Results: Patho-anatomy ranging from annular tears to synovial cysts and spinal stenosis provided evidence that foraminal decompression, ablation, and irrigation was a minimally invasive surgical technique that could treat painful conditions with minimal morbidity. It provided evidence that even instability from spondylolisthesis can be successfully treated. Intradiscally, the most common endoscopic finding was Inflammatory tissue in the disc and annulus. Inflammation was correlated with the presence of painful annular tears. Inflammation may affect all tissues in the foramen. Lateral recess stenosis was more accurately assessed by observing lack of foraminal and peri-neuro fat. Neo-angiogenesis and neurogenesis and “Anomalous” furcal and autonomic nerves identified pain generators that have not been reported in the surgical literature.

Discussion: The ability to visualize patho-anatomy and correlate it with surgical results addressing the patho-anatomy resulted in a better understanding of the pain generators in the lumbar spine. The study also provided better understanding of pain generation in spinal instability and stenosis. Findings also served to advance and evolve endoscopic transforaminal technique ranging from intradiscal disc therapy to foraminal lateral recess decompression and intradiscal artificial nucleus implantation and fusion. The endoscopic foraminal approach to the spine and disc is a technique that can meet the goal of sparing normal anatomy, but allowing access to degenerative patho-anatomy in the spine.

Conclusion: The foraminal endoscopic approach to the spine offers the delivery system for minimally invasive spine surgery that is tissue sparing, and effective in selected patients. The learning curve may be high, but results are also good, concomitant with the surgeon overcoming the learning curve, visualization of patho-anatomy, and with the continued evolution of the endoscopic approach to the spine.