Nucleotomy

Nucleotomy is a common surgical procedure and is also performed in ex vivo mechanical testing to model decreased nucleus pulposus (NP) pressurization that occurs with degeneration. Claeson et al., utilized magnetic resonance imaging (MRI) to study internal 3D annulus fibrosus (AF) deformations after partial nucleotomy and during axial compression by evaluating changes in internal AF deformation at reference loads (50N) and physiological compressive loads (~10% strain). Intact grade II L3-L4 discs before and after nucleotomy were subjected to identical mechanical testing and imaging protocols. Internal disc deformation fields were calculated by registering MR images captured in each loading state (reference and compressed) and each condition (intact and nucleotomy). Comparisons were drawn between the resulting three deformation states (intact at compressed load, nucleotomy at reference load, nucleotomy at compressed load) with regards to the magnitude of internal strain and direction of internal displacements. Under compressed load, internal AF axial strains averaged -18.5% when intact and -22.5% after nucleotomy. Deformations of intact discs under compressed load oriented in-plane, whereas deformations after nucleotomy oriented axially. For intact discs, in-plane components of displacements under compression loads were oriented radially outward and circumferentially. After nucleotomy, in-plane displacements oriented radially inward under reference load and were not significantly different from the intact state at compressed loads. Re-establishment of outward displacements after nucleotomy indicates increased axial loading restores the characteristics of internal pressurization. Results may have implications for the recurrence of pain, design of novel therapeutics, or progression of disc degeneration [1)].

During a meeting with Adam Schreiber from Switzerland, Mario Brock from the University of Berlin and J.A.N. Shepperd from the UK, a desire to establish an international society dedicated to the research and teaching of the emerging technology was expressed. Dr. Hijikata from Toden Hospital, Japan, had described the removal of nuclear tissue from the intervertebral disc (nucleotomy) for the treatment of herniated discs in 1975.

Professor Schreiber adopted the above technique and utilized this procedure in his practice.

Parviz Kambin resisted the term of nucleotomy in the title of the newly formed society. He believed that the dislodged herniated disc fragments should be accessed and removed. Kambin was elected the first President of the newly organized society. He coined the term Minimal Intervention in Spinal Surgery by registering the Society as a nonprofit organization dedicated to education and research in the Commonwealth of Pennsylvania. The name of International Society for Minimal Intervention in Spinal Surgery (ISMISS) was established on April 10, 1990.

His first textbook, entitled Arthroscopic Microdiscectomy, Minimal Intervention in Spinal Surgery, was published in 1991. The Society was formed under the auspices of the Société Internationale de Chirurgie Orthopédique et de Traumatologie (International Society of Orthopaedic Surgery and Traumatology).

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Claeson AA, Vresilovic EJ, Showalter BL, Wright AC, Gee JC, Malhotra NR, Elliott DM. Human Disc Nucleotomy Alters Annulus Fibrosus Mechanics at Both Reference and Compressed Loads. J Biomech Eng. 2019 May 29. doi: 10.1115/1.4043874. [Epub ahead of print] PubMed PMID: 31141601.