

Review of: "Costs of Full Endoscopic Spine Surgery: a Narrative Review"

Anthony Yeung¹

¹ Desert Institute For Spine Care

Potential competing interests: No potential competing interests to declare.

ENDOSCOPIC MINIMALLY INVASIVE TECHNIQUES FOR THE TREATMENT OF SPINE AND BRAIN, An Instructional Reference Atlas for Minimally Invasive Endoscopic Spine Surgery

Anthony T. Yeung, M.D.

Professor of Orthopedic and Neurosurgical Spine Surgery

University of New Mexico School of Medicine, Albuquerque, New Mexico

Retired founding Associate, Desert Institute for Spine Care, Phoenix, Arizona

Christopher Alan Yeung, M.D.

Senior Associate, Desert institute for Spine Care Phoenix, Arizona

C-0 Director of Endoscopic Spine Surgery Fellowship Program, 2004-2019

Squaw Peak Surgical Facility, Phoenix, Arizona

Associates of Desert Institute for Spine Care,

Christopher Yeung, M.D., Justin Field M.D., Nima Salari, M.D., Josh Abrams, M.D., Mark Wang, M.D.

Collaborating Arizona MIS Spine Organization

Kai-we Lewandrowski, M.D. Surgical Institute of Tucson

Tucson, Arizona

THE MINIMALLY INVASIVE SPINE SURGERY CONCEPT

Minimally Invasive Surgery is the most cost- effective procedure in the spectrum of spine treatment algorithims where many options are available for treating symptomatic conditions of a young, active or aging spine. Current surgical technology provides the ability to identify the patho-anatomy of pain generators, whether it is pain, numbness from stenosis, or intermittent claudication from the anatomic and physiologic source of symptoms affecting a patient's athletic functional level or quality of life. The spine is important in a healthy as well as in a aging spine. Even if the patient's athletic

demands is not affecting his or her performance level, the effects of aging will eventually affect an individual's overall health and well being. The co-morbidities from aging and disease co-morbidities may also be a factor that may not be apparent until it is discovered during the treatment process. Surgical options offer the most direct and effective in a myriad of procedural options as Science, advances of machine learning and artificial intelligence technology evolves. Surgeon expertise, however, provides a variety of definitive treatment options encompassing all methodologies, including incorporation of a growing number of non-surgical specialists involved in multidisciplinary health care delivery worldwide. Stakeholders are all trying to advance their position for profitability by using the internet marketing concept of their chosen specialty, maximizing the focus of their training, when contributing to delivery of spine care.

Globally, endoscopic surgeons who consider themselves as the ultimate “captain of the ship” in the traditional hierarchy of surgical and nonsurgical treatment, may also need non surgical experts in physical rehabilitation and psychologic support to augment Minimally invasive surgery. Minimally invasive surgical techniques incorporate and augment all non-surgical methods and philosophies, such as naturopathic methods, physical rehabilitation, and pain management. Imaging advances also aids surgical decisions, but the patient's mental health may also come into play. We can label this concept as personalized surgical pain care, with contributions from all health care providers. The global trend in spinal surgery, however, is minimization. This concept is being increasingly adopted and accepted since 2006, but early historical introduction of patient care from i.e., from Asian Philosophies dating back thousands of years, affect surgical practice as a combination of art, philosophy, and technique. Expertise in techniques and surgical indications will continue to evolve.

Symptoms experienced by patients will be the first clinical signs recognized by patients seeking intervention. Many will either simply deal with their symptoms or seek out health care providers who, either through referral recommendations by friends and family, or to health care providers where they received successful treatment. If the referral goes to a spinal surgeon, the surgeon should be open minded and informed enough to able to provide scientific literature to back their recommendations in order to support their surgical recommendation. Although most spine surgeons focus on demonstrating their expertise surgically, highly accomplished surgeons should also inform their patients about all available treatment options backed by knowledge of their patient's condition in relation to their actual surgical expertise. The literature continues to evolve and expand. Original philosophies and techniques continue progressive validation. Surgeons are encouraged to promote the staging of treatment options with personal treatment algorithms for the patient's individual wants and needs.

Of these surgeons, especially from Asia, surgeons and nonsurgeons who visited Anthony Yeung and who were trained in the Yeung endoscopic technique after it was established and promoted in 1998, is now advancing what they learned in their own countries. Yeung's focus was on innovations in surgical minimalization for an ultimate surgical outcome that incorporates safety, efficacy, and cost effectiveness. Good surgical results on Yeung's patients creates patient gratitude and subsequent patient demand. Many of Yeung's endoscopic spine fellows, including innovative non-surgeons, are recognizing this phenomenon and are now contributing to, and advancing and publishing their own work, expanding their expertise, each in accordance to their own skills and experience. Some may also be “self-taught”, due to the vast amount of instructional information available on the internet. Others, under evolving global economic systems, are also

contributing to the advancement of endoscopic surgery. Their surgical concepts and results will also and contribute to create patient gratitude and subsequent patient demand for their services, in their respective practice areas and countries.

The Yeung technique and philosophy, developed and initiated in 1998, has continued to expand due to five basic concepts. The endoscope and instrument system, developed by Yeung, was manufactured by Richard Wolf GmbH, but was retired 20 years later by mutual agreement. Anthony Yeung patented his concept, philosophy, and endoscopic technique, that continued to be refined by other prominent spine surgeons after exposure to the “YESS” philosophy and technique. The “YESS” technique was also aided greatly by anesthesiology and surgeon colleagues who knew Yeung and worked in tandem with Yeung to refine MIS surgery innovations for surgical pain care. To control costs, the out-patient concept for post-operative recovery is enhanced by using local anesthesia and mild sedation. Over time, his 5 concepts increased to over 11,000 case examples, further validated by other surgical colleagues world wide, with their own clinical research and statistical analyses. In the past 5 years research was documented and validated with help from Kai-we Lewandrowski, M.D., of Tucson, Arizona, who worked with Yeung to develop evidence- based statistics to test Yeung’s philosophy and surgical concept. Although Yeung utilized mostly local anesthesia, his technique has also proven safe even using general anesthesia, further advanced by Christopher Yeung, a fellowship trained sports and degenerative spine surgeon. Chris Yeung and his associates enhanced and enabled traditional surgical training methods that is easier under general anesthesia but was also adept in the YESS technique by being exposed to endoscopic spine surgery under local anesthesia and sedation.

Meta-analysis using traditional evidence based (EBM) concepts that evaluated nonsurgical, traditional open, versus minimally invasive techniques for patient care now consist of over in 11,000 thoracic and lumbar segments in Anthony Yeung’s surgical database, performed almost exclusively under local anesthesia with sedation. Endoscopic key opinion leaders world- wide are beginning to support and promote the MIS surgical concept, and continue to expand the concept to include the cervical spine, thoracic spine, and brain conditions with their own clinical studies.

Surgery is a combination of art, philosophy, and technique. It may be disruptive and disparative for those surgeons who were neither visionaries nor early adopters. Some also actively opposed the Yeung concept. Those who believe in the concept will also acknowledge the progressive incorporation of breakthroughs in imaging, navigation, and A.I. The global acceptance of these surgical concepts are also affected by different economic, political, and reimbursement systems. As such, if endoscopic spine surgery is accepted as art, it will be difficult or likely impossible to standardize because Art is variable and in the eyes of the beholder. However, as a technique, different pioneers have promoted the technique either as inside-out, outside in, or more appropriately, as a combined or hybrid technique for identifying and documenting the source of pain, numbness, sciatica, and related symptoms.

Yeung’s own journey in endoscopic spine surgery was influenced by early his early supporters, who encouraged and facilitated his development, such as Phoenix Orthopedic Residency Program Director, Dr. H.J. “Tim” Louis, heir to Johnson and Johnson, and Harry Crock of Melbourne, Australia who visited the Phoenix Orthopedic residency program as well as his endoscopic workshops in 2000 as an invited visiting scholar. Crock introduced the intervertebral disc as a major source of back pain and sciatica. Multiple adopters and global innovators from Asia, North and South America,

Europe, and Africa. In Asia, including SE Asia, Japan, Korea, India, and China, has embraced, contributed, and enthusiastically helped advanced minimally invasive surgical art and technique after visiting Yeung in Phoenix. Israeli engineers and scientists were also major contributors to clinical science. The past 5 years has also attracted endoscopically focused workshops all over the globe.

What A Yeung learned in his 50+ year general orthopedic and spine surgical career is that endoscopic approaches will incorporate minimally invasive transforaminal, translaminar, decompressions, along with foraminal and dorsal rhizotomy ablations, especially in the lumbar spine where he concentrated his early work. A Yeung started with the inside -out concept taught by Parviz Kambin and Hijikata, but now recognizes and also incorporates multiple approaches enhanced by evolving machine learning and A.I.. Doing so decreases the need for more costly and higher risk surgery such as fusion, even when fusion options are available. It can offer further savings by elimination of neuromonitoring. There are also evolving minimally invasive options for fusion. Even if fusion is subsequently needed and subsequently an effective additional surgical option, having an endoscopic option in a staged manner, whether under local anesthesia with sedation or under general anesthesia, the “YESS” technique provides safe and cost-effective options for the patient, and “burns no bridges”. Yeung’s son Christopher, fellowship trained in sports spine with Robert Watkins, now offers the whole spectrum of spine surgery complemented by his highly fellowship trained Desert Institute for Spine Care Associates.

Although A Yeung is not a fellowship trained endoscopic spine surgeon, he started his career as a pediatric spine surgeon with traditional training since 1971. Spine fellowships were not common at that time. He is now focused, following his retirement, on producing an image guided Atlas that will include detailed operative videos augmented by live audio communication with his patients, demonstrating the original transforaminal uniportal and biportal “YESS technique” concept. The translaminar minimally invasive approach is also being further developed by independent innovators. The reference Atlas in progress will illustrate patho-anatomy not usually visualized by open techniques as well as the value of local anesthesia under sedation. This book Atlas in progress can be used as a reference book that utilizes Yeung’s large image database, and is illustrated and populated with extensive audio-video demonstrations.

Technology is changing the delivery of health care worldwide. Health and wellness is universal, but reimbursement for surgeons vary by regions, countries and systems, whether democratic, autocratic, mesocratic, or socialistic. With both orthopedic as well as neurosurgical spine surgeons both performing spine surgery, new peer reviewed publications from both Orthopedic and neurosurgeon key opinion leaders from academic and community based private practices will both continue to advance and evolve. With current artificial Intelligence advances pre WWII US and European economic dominance is also changing since WWII. China has become a major economic player. The concept of endoscopic visualization of pain generators is also here to stay.

Word count 1855