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A Short Note on Minimally Invasive Lumbar Spine Surgery

Anthony T Yeung[1,2,3*]

[1]*University of New Mexico School of Medicine, Albuquerque, New Mexico*

[2]*International Intradiscal and Transforaminal Therapy Society, Phoenix, Arizona, USA*

[3]*Desert Institute for Spine Care, Phoenix, Arizona, USA*

[*]**Corresponding author:** Anthony T. Yeung M.D., Voluntary Professor, University of New Mexico School of Medicine, Albuquerque, New Mexico, Executive Director of International Intradiscal and Transforaminal Therapy Society, Associate in Desert Institute for Spine Care, Phoenix, USA, Tel: +1 602-944-2900; E-mail: ayeung@sciatica.com

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Introduction

Almost all spine surgeons tout minimally Invasiveness in spine surgery as a beneficial focus. The meaning of minimally invasiveness, however, is actually a concept with different meanings for each surgeon. To some, it is the use of smaller incisions using standard surgical approaches, the use of tubular retractors, and/or the use of surgical magnification with a microscope, or an endoscope. Minimally invasiveness often advertises the use of lasers as a sexy and high tech surgical tool to tout their state- of- the- art surgical technique in minimally invasiveness, but it is not used as a needed part of the surgery unless visually used with endoscopes under irrigation.

Studies published in peer reviewed journals promote microscopic surgery, different types of MIS fusion, robotics guided fusion, and minimally invasive lumbar decompression as beneficial and cost effective. All tout less surgical morbidity using the measured parameters of less intra-operative blood loss, less surgical time after a short learning curve, faster recovery, decreased pain, and faster ambulation.

The obvious overall conclusion is that while all spine surgeons support minimally invasive spine surgery, the surgeons are mainly focused on their area of surgical experience and expertise in minimally invasiveness, which takes many forms.

The literature is cited to support their opinion. Published writings quoting data in the literature do not always translate into universal surgical results for practical purposes. The "surgeon factor", like the skills of professional athletes in their area of expertise, is also important and critical. Published articles reviewing the benefits of minimally invasive surgery may all conclude that minimally invasive surgery provides better or the same results, and with less surgical morbidity. Published articles may also emphasize it's "cost effectiveness", based on a narrow version of a minimally invasive procedure. Extensive Level 5 EBM, however, may need to be factored in and considered.

The costs of delivering health care is at a crisis for affordability and cannot be sustained when faced with limited financial resources to provide the level of promises by politicians in developed countries as a right of citizenship without the ability to deliver the promises in a fiscally sound manner. I refer to the points made in my first Spine editorial "Moving away from Fusion: Secrets of an Endoscopic Master".

In order to achieve MIS surgical goals one must:

- Understand the patho-physiology of pain.
- Identify and visualize the patho-anatomy of pain.
- Surgically treat the pain generator in a staged manner.
- Reserve expensive salvage procedures such as fusion, as the last procedure except for gross instability and deformity.

Pain relief or function improvement is the reason patients go to their physicians for their spine problems globally. Pain is better understood with *in vivo* visualization and probing of the pain generators using endoscopic transforaminal visualization that correlates with imaging studies with further elucidation of the source. This may be achieved by using diagnostic and therapeutic injections to help pinpoint the pain source, then use this information for surgically based "pain management". Symptoms, aided by detailed descriptions and patient generated symptom diagrams are correlated with imaging studies. Correlating the image study with response to therapeutic injections suspected to be the source of symptoms using the same trajectory as the minimally invasive treatment will then help provide the location of the patho-anatomy responsible for the patient's pain.

Image abnormalities, or lack of imaging confirmation, however, may not explain the pain and disability experienced by each individual patient. Images do not always show variations in nerve supply and patho-anatomy, nor do they quantify the pain experienced by each individual patient, so correlation of diagnostic and therapeutic injections may be needed. The patient's pain complaints with respect to their response to these tests will require clinical acumen in the "art of medicine". The ability to deliver results will depend more on surgical skill.

The ability to provide relief will need to be tied in with the surgeon's ability to isolate and visualize "pain" generators in the foramen as well as the pain relief requirement of the patient with an endoscope. Patients also have a wide spectrum of pain tolerance and can be affected by ethnicities and different societies. Treating persistent pain by visualizing inflammation, removing the source of inflammation, and decompression of nerves, serves as the basis for transforaminal endoscopic [TFE] surgery. This is best accomplished not just with transforaminal endoscopic (visualized) discectomy (PED), but adding to the discectomy procedure visualized foraminoplasty (PEDF).

There are also different surgical philosophies and techniques proposed by various pioneers in transforaminal endoscopic surgery for treating these conditions, but I report on and embrace the "inside out" philosophy of TFE surgery as the most safe and precise in trained and good surgical hands. I have trademarked my philosophy and technique as selective endoscopic discectomy™ (SED™) of the "YESS" technique. It provides basic access to the disc and foramen that cover a large spectrum of painful pathologies with the least surgical risk.

Indications

Current indications for SED™ are:

1. Annular tears with discogenic lumbar pain as determined by evocative discography, both positive and false negative.
2. All disc herniations and protrusions accessible through the foramen whether contained, extruded, or sequestered.
3. Foraminal and extraforaminal herniations.
4. Central disc herniations (contained or uncontained) with stenosis.
5. Foraminal and extraforaminal stenosis.
6. Foraminal osteophytosis.
7. FBSS from foraminal fibrosis, recurrent HNP, and subarticular lateral recess stenosis.
8. Mild and soft tissue central spinal stenosis.
9. Discitis.
10. Juxtafacet and pedunculated cysts.

These indications are dependent on surgeon experience, each patient's individual anatomy, and the patho-anatomy being addressed surgically.

Discussion and Conclusion

The current health care environment in western developed countries like the USA is not conducive to the development and acceptance of transforaminal surgery due to the lack of formal academic training programs and lack of adequate re-imbursement to reward the surgeon for the extra training it requires. There are also many stakeholders. Specialized surgical skills are required to perform technically more difficult surgical procedure through tubular retractors using an endoscope for direct visualization. This is a surgical procedure and not a pain management percutaneous, fluoroscopic guided procedure.

Different countries with different health care delivery systems may also dictate adoption and acceptance.

In the USA, if visualized endoscopic spine surgery is not adopted by newly trained specialists to perform transforaminal endoscopic properly, safely, and effectively, our patients will lose out, and our health care system will continue to spiral out of control. Industry will also have to play a role by developing image guidance and robotic enhancement using the Artificial Intelligence of pioneers of this highly technical surgical procedure that will serve not only to enhance surgical performance, but also reduce radiation exposure.