Introduction

The lumbar vertebrae are the lowest five of the presacral column. In a normal individual, there are five lumbar vertebrae and five associated discs. Because the lumbar vertebrae are subjected to the greatest loads in the spinal column, they are relatively massive structures **(Weinstein, 1982).**

Each lumbar vertebra consists of a vertebral body and a neural arch. The neural arch consists of two pedicles, the transverse processes, the superior and inferior articular processes, the laminae, and the spinous process. The five lumbar vertebrae are distinguished by their large size and absence of costal facets and transverse foraminae **(Gray, 2005).**

Each vertebra is attached to its neighbors by the intervertebral disc, variety of spinal ligaments, and the articular facet joints. The ligaments connecting lumbar vertebrae are, the anterior longitudinal ligament, the posterior longitudinal ligament, the ligamentum flavum, the interspinous ligament, the supraspinous ligament, the intertransverse ligament, the corporotransverse ligament, and the iliolumbar ligament **(Cramer, 1995).**

The intervertebral disc acts as an articulation between the vertebrae and as a shock absorber or a cushion. It is composed of three parts; the cartilaginous plate, a structure of hyaline cartilage covering the bone of the vertebra and acting as a limiting plate above and below; the annulus fibrosus, a concentric series of fibrous lamellae that encase the nucleus pulposus and strongly unite the vertebral bodies; and finally, the nucleus pulposus, the fibrocartilagenous center of the disc which is in semigelatinous state is subjected to the laws of fluids and therefore is incompressible (**Hardy, 1996**).

A number of distinctions between disc bulge, sequestrated disc, free fragment… have been made, often based on pathologic or operative findings. Clinically these distinctions are usually of little significance, with the possible exception of a contained herniation which may make a patient candidate for an intradiscal procedure (**Greenberg, 2006**).

Disc herniation may cause a variety of clinical problems but, in addition, disc protrusion may often be found on magnetic resonance imaging (MRI) in asymptomatic patients **(Findlay, 2002).**

Manifestations of lumbar disc herniation include, low-back pain, radiculopathy; which is pain or parasthesia or both in the distribution of a nerve root, tenderness over the lumbar spine with paraspinal muscle spasm and limitation of movement, motor weakness (of the muscle supplied by the compressed nerve root) , and/or diminished sensation (in the area of skin supplied by the compressed nerve root). Cauda equine syndrome represents a surgical emergency which may occur with large central herniated lumbar disc causing urinary retention, saddle anaesthesia, significant motor weakness that may progress to paraplegia, diminished anal sphincter tone, and/or sexual dysfunction (**Greenberg, 2006**).

The radiological evaluation of patients with suspected lumbar disc disease begins with plain radiographs, computed topography (CT) (**Ellenberg** *et al.*, **1994**). Magnetic resonance imaging (MRI) has became the method of choice for further radiographic evaluation (**Stalhman, 1999**).

Spine surgical procedures are often referred to as an open procedure or minimally invasive. Open procedures require larger incisions, muscle stripping, more anesthesia, operating time, hospitalization and, the patient usually needs more time to recuperate. Minimally invasive surgical techniques utilize portals or tiny incisions made in the skin (percutaneous) through which small, specialized instruments are inserted **(Thongtrangan** *et al.,* **2004).** The push toward less invasive techniques is derived from the concept that smaller incisions, and therefore less soft tissue injury, will potentially lead to less approach-related morbidity, less postoperative narcotic usage, earlier mobilization, less hospitalization, and earlier return to function (**Schwender** *et al.,* **2005; Arts** *et al.,* **2006; Deutsch and Ratlif, 2006).**

Lumbar disc disease has been treated using intradiscal surgical procedures, micoendoscopic discectomy and minimally invasive microdiscectomy techniques (**Thongtrangan** *et al.,* **2004**).

Intradiscal surgical procedures are among the most controversial procedures for lumbar spine surgery. They are group of minimally invasive surgical procedures that treat contained, herniated discs. One theory for improvement from it suggests that removal of disc material reduces the intradiscal pressure so that the herniated segment can fall back into place. Another proposed mechanism is that removing disc material may prevent release of chemical mediators that directly injure the nerve root. They include Chemonucleolysis, automated Percutaneous lumbar discectomy (APLD), manual percutaneous lumbar discectomy, percutaneous laser-assisted discectomy, intradiscal electrothermal therapy (IDET), and nucleoplasty **(Delamarter, 1995).**

Almost all significant technical advances are initially met with skepticism if not active resistance. This was certainly the case with the operating microscope and, in particularly, with application to microsurgery of the lumbar disc. The small incision, diminished muscle trauma, and manipulation of neural structures allowed by a magnified view into the disc space under coaxial illumination has softened this resistance, and the majority of neurosurgeons now use the operating microscope to perform lumbar disc surgery. Over the past decade, lumbar microdiscectomy has become an outpatient procedure with success rates equal to those found in initial microdiscectomy studies (**Koebbe** *et al.,* **2002**).

In 1997, Foley and Smith introduced MED® (micro-endoscopic discectomy), the original MED® instrumentation set was modified to improve compatibility with the operative microscope with the METRx-MD® system

(Microscope Endoscopic Tubular Retractor System - Microdiscectomy) (**Foley and Smith, 1997**). MED® system and METRx-MD® system can be used for treatment of free fragment disc herniations as well as canal stenosis, conditions that were previously unaddressed by other percutaneous procedures (**Thongtrangan** *et al.*, **2004**).

Minimally invasive alternatives to traditional fusion surgery are still very new. These systems involve a steep learning curve for the spine surgeon, and surgical times may initially increase when using a minimally invasive spine fusion system versus a traditional open spine fusion approach. In addition to the type of technology or medical device used for a fusion, there are several important factors that influence the outcome of any spine fusion surgery, including the spine surgeon's skill and experience, indications for a spine fusion, patient selection, and the type of fusion and surgical technique that is used (**Rakesh and Jeffery , 2004**).

Complications of minimally invasive spinal surgery can be related to anesthesia, patient positioning, and surgical technique. The performance of successful minimally invasive spinal surgery is beset with several technical challenges, including the limited tactile feedback, two-dimensional video image quality of three-dimensional anatomy, and the manual dexterity needed to manipulate instruments through small working channels, which all account for a very steep learning curve. Knowledge of possible complications associated with particular minimally invasive spinal procedures can aid in their avoidance, (**Perez-Cruet** *et al.*, **2002**).

AIM OF THE ESSAY

The aim of this essay is to review minimally invasive surgery used for treatment of lumbar disc prolapse, as regarding the different techniques, indications, contraindications, complications and guides for its use to gain advantage over conventional open procedures.