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## Original Article

# Outpatient minimally invasive spine surgery using endoscopy for the treatment of lumbar spinal stenosis among obese patients



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## ARTICLE INFO

## Article history:

Received 9 July 2014

Accepted 4 January 2015

Available online 3 March 2015

## Keywords:

Body mass index (BMI)

Pain

Disability

Body weight

Decompression

## ABSTRACT

**Introduction:** The safety and effectiveness of outpatient endoscopic minimally invasive spinal surgery (MISS) for the treatment of lumbar spinal stenosis among obese patients is not well documented.

**Methods:** Pain, disability, and surgical variables were examined on 41 adult obese patients that underwent lumbar laminotomy and foraminotomy surgeries.

**Results:** A significant decrease in pain and disability scores between preoperative and postoperative were found (p-value's < 0.001).

**Discussion:** MISS using endoscopy can achieve sufficient decompression that results in a significant reduction in the level of pain and disability among obese patients with minimal blood loss and no complications.

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The standardized method of determining obesity is by measuring an individuals' body mass index (BMI). BMI is an index relating weight to height and is calculated by taking a patient's weight (kg) by the square of the patients' height (m<sup>2</sup>).<sup>1</sup> Based on this computation, guidelines have been set for classifying individuals as underweight (BMI ≤ 18.49), normal weight (BMI 18.50 – 24.99), overweight (BMI 25.00 – 29.99), or obese (BMI ≥ 30.00).<sup>1</sup>

The prevalence of obesity has been steadily increasing.<sup>2</sup> Between the early 1960's and 2002, mean BMI for men and women aged 20–74 increased from around 25 to 28.<sup>2</sup> More recently, national data reported from 2007 to 2008 indicated that 33.8% of the U.S. population over the age of 20 was defined as obese.<sup>3</sup> During this same time period, if one were to

take into account those that were overweight (34.2%), approximately 68% of the U.S. population over the age of 20 was defined as such.<sup>3</sup>

Some studies indicate that obesity is an independent risk factor in the development of low back pain and that being overweight increases the risk for disc degeneration.<sup>4</sup> A commonly diagnosed degenerative condition that can cause severe chronic back pain among the adult population is lumbar spinal stenosis (LSS). In 1911, Baily and Casamajor<sup>5</sup> first defined LSS as the narrowing of the spinal canal. The cause has been described as multi-factorial, but includes age-related degenerative processes such as enlargement of the facet joints, bony overgrowth, ligamentum flavum hypertrophy, or bulging and herniated discs.<sup>6</sup> The narrowing of the spinal

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<http://dx.doi.org/10.1016/j.jor.2015.01.007>

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**Table 1 – Demographics.**

Demographics	N = 41
Age in years (M (SD))	55.10 (12.31)
Diabetes (% Non-diabetic)	82.9%
Smoker (% Non-smoker)	85.4%
Gender (% males)	68.3%
Race (% white)	92.7%

canal can cause the natural elements within the canal to become compressed. This can result in intense back pain, neurogenic claudication, and radicular symptoms.<sup>6</sup>

To treat LSS, conservative treatments such as medications, chiropractic care, and physical therapy can provide relief for some individuals. However for most people with symptomatic LSS, conservative treatments cannot provide an adequate amount of pain relief. For such individuals, surgical treatment may be needed.<sup>7</sup> The conventional surgical treatment for LSS, open spine decompression, is considered to be invasive so less destructive surgical treatments are being sought.<sup>8</sup> To fulfill this need, outpatient minimally invasive spine surgery (MISS) has advanced and gained popularity.<sup>8</sup> Studies indicate that MISS is successful at providing satisfactory decompression for the treatment of LSS as open surgery without the larger incisions, or damage to the posterior ligamentum, muscles, and tissues.<sup>8–10</sup> This is significant because the extensive surgical dissection and muscle detachment can cause weakness and has led, at times, to paraspinal muscle denervation and atrophy; which is linked to an increased prevalence of “failed back surgery syndrome” and chronic pain.<sup>11</sup>

Although any patient can experience a variety of complications from surgery, there is evidence that minimally invasive spinal procedures result in fewer complications that do not significantly vary between weight classes. For example, Park et al<sup>12</sup> examined the complication rate among overweight and obese patients that underwent MISS. Results indicate no significant relationship between BMI and number of complications. Thus, being overweight or obese did not increase the chance of experiencing perioperative complications with MISS.

The objective of this study is to examine surgical outcomes and self-reported pain and disability at preoperative and 12-months postoperative among obese patients who underwent an outpatient endoscopic MISS for the treatment of LSS.

## 1. Methods

### 1.1. Inclusion criteria

Analyses included patients who underwent lumbar laminotomy and foraminotomy surgery for the treatment of LSS during an 8-month period, who have not had previous lumbar surgery, did not have more than one moderate or severe level of LSS, over the age of 18, had complete preoperative and postoperative data, had a BMI  $\geq 30.0$ , and were not classified as a worker's compensation case.

After implementing the inclusion criteria, 41 patients were eligible for participation in the study. The eligible sample

consisted of adults between the ages of 20 and 72 years (M = 55.10, SD = 12.31). The sample was mostly male (68.3%) and Caucasian (92.7%). See Table 1 for demographic statistics.

### 1.2. Outcome measures

In past spine surgery studies, the Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) have been frequently used.<sup>9,10</sup> In this study, the VAS was used to measure pain intensity. Patients were asked to rate their current level of pain ranging from 0 to 10 with 0 indicating no pain and 10 indicating the worst pain they can imagine. The ODI was used to measure patients' level of disability. For this measure, scores range from 0 to 100. Lower scores on the VAS and ODI indicate a lesser amount of pain and disability respectively.

### 1.3. Operative variables

Data pertaining to estimated blood loss (EBL), number of intraoperative and postoperative complications up to 30-days out (NOC), and length of surgery (LOS) were retrieved from patients' medical records.

### 1.4. Procedure

Patients who underwent a single-level laminotomy and foraminotomy for the treatment of LSS completed a VAS and ODI both preoperatively and 12-months postoperatively. Informed consent was obtained from all patients included in this study.

### 1.5. Surgical procedure

In brief, a scalpel was used to make a stab wound through which a guide-wire was inserted down to the facet region of the vertebral body. Over this guide-wire, the tissues were dilated with the use of a series of increasing diameter dilating tubes to approximately 18 mm. A drill bit was used to create a window into the lamina. This was confirmed through the use of fluoroscopy to determine the depth of penetration of the drill unit. Electrocautery and holmium lasers were used for hemocoagulation and soft tissue removal. Once this was accomplished, a standard mechanical burr system was utilized to grind away the lamina of the vertebral body and widen the opening that was created with the bit. Kerrison and pituitaries rongeurs were utilized during the entire process to assist in bone removal and for general debulking of soft tissues and loose bone fragments. Once the region of the lamina and foraminal canal was properly opened and decompressed, the tube was removed and the procedure was completed. All surgeries were performed in an outpatient setting.

## 2. Results

### 2.1. Missing data

Patients with missing data on the outcome measures were excluded from analyses. There was one missing data point for the EBL and NOC variables. There were no missing data points for the VAS, ODI, or LOS.

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