



Innovative Grid Positioning System (GPS) Guidance for Endoscopic Transforaminal Microdecompressive Lumbar Disc Surgery in the Morbid Obese Patient

John C. Chiu MD
Neurosurgery Department
California Spine Institute
Thousand Oaks, CA 91320



Introduction

Morbid obesity is characterized by an individual having a body mass index (BMI) of 40 or higher. The morbidly obese patient poses many unusual surgical/anatomical challenges during endoscopic minimally invasive spine surgery (MISS), especially to target the lesion with precision and accuracy through a surgical portal of entry. The problem that faces the surgeon performing MISS is that it is done with limited surgical exposure and visualization of the surgical field.

Introduction

The morbid obese - more than 100 pounds over ideal body weight, or a BMI of 40 or higher. More than 5 percent of Americans
Double the incidence (2.41x) of low back pain
Greater incidence of surgical complications, up to 36% including wound healing, infection, pneumonia, DVT and repeated surgery
Under anesthesia, have increased risks including difficult airway control and intubation, ventilation/perfusion mismatching, altered pharmacokinetics of anesthetics and drugs
Risk of developing other co-morbidity diseases, i.e. diabetes, hypertension, cardiovascular disease, stroke, restrictive lung disease, osteoarthritis and others
Six or more co-morbid conditions in 25 percent



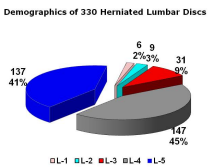
1680 painting of an obese girl by Juan Carreno de Miranda

Methods

In response a logical and simple Grid Positioning System (GPS) was developed to provide a precise surgical trajectory/approach for the disc lesion to undergo decompression.

Material and Method

- Since 1995, **203 morbidly obese patients** - 330 herniated lumbar discs
- Average **age of 42.2** (20 to 67) - symptomatic, single or multiple herniated lumbar discs
- Males: 99 Females: 104**
- Each failed at least 12 weeks of conservative care
- Post operative follow up:** 7 to 60 mos. (average **46.1 months**)



203 morbidly obese surgical patients with 330 intractable symptomatic herniated lumbar discs underwent endoscopic MISS, guided by GPS.

Introduction

Advantages of Minimally Invasive Spinal Surgery (MISS) for the Morbid Obese:



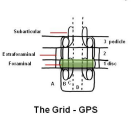
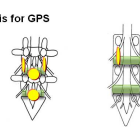
Years of wilderness created 24,000-22,000 BC

- Through a very **small incision**
- Less tissue trauma** - tissue sparing approach
- MISS has **fewer complications** (less than 1%)
- Often **local anesthesia with IV sedation**
- Early ambulation and post - op exercise**
- Ideal for high risk anesthetic patients** including morbidly obese, emphysematous, and cardiac conditions
- IOM** - Intra-operative neurophysiological/EMG monitoring, and **direct visualized endoscopy** provides a safer surgery
- Preserves spinal motion**

GPS involves 3D geometric triangulation of 3 different planes guided by fluoroscopy for introduction of surgical instruments along a geometric line toward the lesion without compromising healthy anatomical structures. This system facilitates MISS, especially in the morbidly obese.

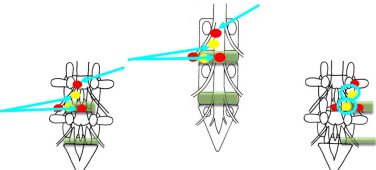
The Lumbar Spine GRID - Basis for GPS

- In order to reach the lumbar discs or lesion precisely and to avoid trauma to the nerve vessels, DRG, dura and even the spinal cord
- Need to have a precise path to reach the lesion
- The location should be precisely localized - in the grid - GPS System - Zones (in A,B,C, D and 1,2,3)

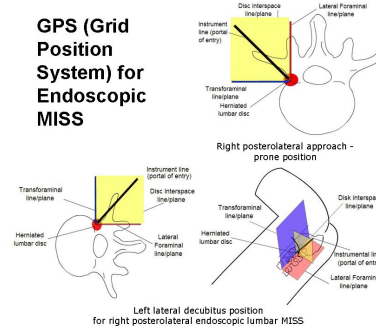


The Grid - GPS

Portal of Entry into the GPS



GPS (Grid Position System) for Endoscopic MISS



Mini Endoscopic Spinal Surgical Instruments for MISS

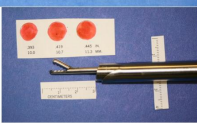
- Endoscopic duck bill tubular retractor, slanted opening
- For navigating into the grid - GPS to avoid neural vascular injury
- To remove difficult deep lesions, even behind the pedicle
- The duck bill opening of tubular retractor is manipulated and rotated in a clockwise manner, on the left spinal foramen at 10 o'clock, 12 o'clock, 3 o'clock and 6 o'clock
- For successful endoscopic MISS



Endoscopic Spinal Instruments

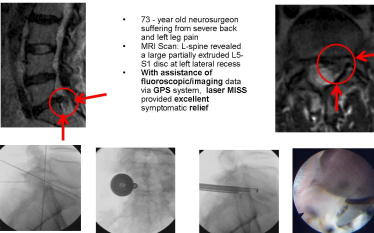


Larger (12mm) spinal endoscope can accommodate **larger instruments** and cutter forceps with teeth for removal of a **large herniated disc** or **intraspinal lesion**



Surgical Technique with GPS

A Large Herniated Lumbar L5 Disc treated with GPS

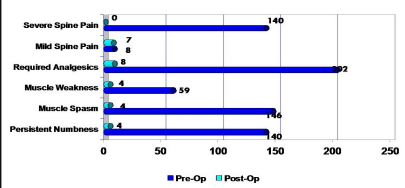


Results

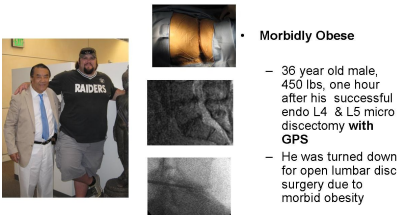
Overall result 90% patients with good to excellent results. Fair results 6.4% patients, for single level, average satisfaction score is 93.1%.

SURGICAL OUTCOME: symptomatic improvements)

Lumbar disc patients (203)



Case Illustration



Morbidly Obese

- 36 year old male, 450 lbs, one hour after his successful endo L4 & L5 micro discectomy with GPS
- He was turned down for open lumbar disc surgery due to morbid obesity

Conclusions

Applying the concept of Grid Positioning System (GPS) to MISS can help the surgeon to facilitate the MISS process by quickly identifying the surgical portal of entry to the disc without compromising vital anatomical or neural structures and accomplish needed spinal microdecompression, especially in medically high-risk patients including the morbidly obese and even those with prior surgeries. It can be very effective in surgical treatment of degenerative spine and herniated lumbar discs condition.

Learning Objectives

1. By the conclusion of this session, participants should be able to describe endoscopic transforaminal microdecompressive lumbar disc surgery for morbid obese patients 2. To discuss the definition of a morbid obese patient being 100 lbs over ideal body weight, with a high body mass index (BMI) which significantly increases surgical complications in these patients 3. To identify the effective surgical technique with GPS System (grid positional system) which facilitates the spinal surgery and reduces surgical complications

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