Short Term Outcome of Conventional Open Lumbar Discectomy: Analysis of Prognostic Factors Affecting the Early Clinical Outcome

Thesis

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Abd Allah Maher

List of Contents

List of Abbreviations

BMI	Body Mass Index
CSF	Cerebro-Spinal Fluid
CT	Computed Tomography
EMG	Electromyograpny
LBP	Low Back Pain
LDH	Lumbar Disc Herniation
MRI	Magnetic Resonance Imaging
NSAIDs	Non Steroidal Anti-Nflammatory Drugs
ODI	Oswestry Disability Index
RP	Radicular Pain
SD	Standard Deviation
SLRT	Straight Leg Raising Test
TNF α	Tumor Necrosis Factor Alpha
VAS	Visual Analogue Score

List of Tables

List of Figures

Introduction

Disc herniation is one of the most common spinal diseases ***(Kohlboeck et al., 2004)***. It was originally described by Mixter &Barr in 1934 who proclaimed that a posterior rupture of the intervertebral disc allowed nuclear material to leak and cause compression of the adjacent spinal nerve root ***(Mixter and Barr, 1934).*** The compression of neural structure, as well as a local inflammatory reaction can cause lumbar and leg pain as well as other neurological symptoms ***(Ahn et al., 2002).***

Lumbar open discectomy is the most frequently used method for treating lumbar disc herniation that requires spinal surgery ***(Kohlboeck et al., 2004).*** It was first introduced by **Mixter and Barr** in 1934. Since then, it has been widely used as the basic surgical regimen for the treatment of disc herniation. Discectomy has been performed in recent years by using an endoscope, but conventional open discectomy's effectiveness has been definitely confirmed for the treatment of lumbar disc herniation.Open discectomy has been shown to produce good treatment outcomes in 70-90% of the cases ***(Lee et al., 2010).***

However, the occurrence of residual complaints following lumbar disc surgery ranges from 22% to 45% and 30% to 70%of patients report residual sciatica and residual low back pain, respectively after surgery ***(Raymond et al., 2005).*** It

is assumed that preoperatively, accurately determining the indications for surgery is essential for producing good treatment outcomes ***(Kohlboeck et al., 2004).***

Nowadays, concepts of health and health care are changing. Clinical outcome is the major indicator of patient's life quality. If the patient's perception of the disease on his/her life is known, it becomes easier to choose a treatment. The major aim of a treatment is to enhance the quality of life by reducing the unwanted effects of the disease ***(Varol and Serpil, 2005).***

Although two patients can have the same sickness, the outcome can be different. Therefore, determining the prognostic factors that affect the surgical outcome would be helpful for predicting the surgical outcome and selecting the optimal treatment modality. Beside that, identifying the prognostic factors that predict the clinical course of residual complaints might be important for further development of effective methods of treatment, especially when these prognostic factors can be modified.

Numerous studies have previously been conducted to examine the factors affecting the surgical treatment outcomes of disc herniation.However, to the best of our knowledge, few studies have been conducted on the treatment outcomes of disc herniation depending on radiological findings using 1.5-T MRI equipment and with assessing the clinical outcomes by having

the patients use a subjective pain score visual analogue scale (VAS) or using the Oswestry disability index (ODI) ***(Lee et al., 2010).***

Given the above background, we will analyze the correlations between the sociodemographic, clinical, radiological prognostic factors and postoperative clinical outcomes of patients who will undergo open discectomy for the lumbar disc herniation.

Aim of the Work

Overall the aim of the study is to evaluate short-term result and different factors influencing the result in patients undergoing surgical treatment for a lumbar disc herniation as follows:

- Investigating the short-term result after lumbar disc hrniation surgery and possible predictive factors for surgical outcome; such as demographics, social or clinical .
- Evaluating the relationship between the radiological findings on preoperative MRI and clinical outcome after lumbar discectomy.
- Studying the influence of preoperative factors on outcome using pain visual analogue scale (VAS) and Oswestry disability index (ODI).

History

Hippocrates (Circa 460-370 BC) was probable the first to mention sciatica and low back pain ***(Marketos et al., 1999).***

Intervertebral disc pathology was first described by ***Rudolph Virchow*** in 1857. Between 1927 and 1931 ***Schmorl,*** a german pathologist, established the modern basis for understanding the intervertebral disc ***(Castor et al., 2005).***

The first transdural intervertebral discectomy was reported by ***Oppenheim*** and ***Krause*** in 1908 ***(Oppenheim and Krause, 1909).***

In 1934***, Mixter*** and ***Barr*** published their milestone paper on the pathology and surgical findings associated with a ruptured nucleus pulposus and established the link between disc prolapse and sciatica ***(Mixter and Barr, 1934).***

In 1939, ***Love*** and ***Semmes*** developed the classic approach, which consisted of a subtotal laminectomy and retraction of the thecal sac medially to expose and remove the disc herniation instead of being removed by full transdural approach ***(Gruber and Boeni, 2008).***

In 1967, ***Yasargil*** used the microscope for discectomy ***(Yasargil, 1977).***

Development of the Lumbar Spine

The first axial structures to appear in the embryo are the notochord, the neural tube and the dorsal aorta. The first vertebral column is formed by aggregation of mesenchyme around the notochord. The stages of development of the vertebral column were described as following stages: (A) Blastemal stage (B) Chondrogenous stage (C) Osseogenous stage ***(Bogduk, 2005)***.

A. Blastemal stage:

1- Formation of the mesenchymal column

In embryos of 3 weeks gestation a continuous mesenchymal column is formed around the cylindrical notochord which becomes separated from the gut tube and aorta ventrally and from the neural tube dorsally, as mesenchyme appears around it ***(Naidich, 2002).***

2- Segmentation

A banded pattern becomes evident in the mesenchymal vertebral column. Light bands, at the level of the intersegmental vessels, alternate regularly with dark bands. The dark bands are the forerunners of the intervertebral discs, including cartilage plates, and are known as the perichordal discs. The light bands are the anlagen of the vertebral bodies ***(Bogduk, 2005).***