شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

INTRODUCTION

Low back pain (LBP) is the most frequent type of musculoskeletal pain. "It is often recurrent and has important socio-economic consequences ***(Walker, 2000)***". LBP is defined as pain and discomfort in the lumbosacral region, below the twelfth rib and above the gluteal crease. "It is categorized according to its duration from symptoms onset, as acute (<6 weeks), subacute (6weeks-12 weeks), and chronic (>12 weeks) ***(Bekkering et al., 2003)"***. In up to 24% of the patients, the pain lasts for more than 3 months turning into chronic low back pain (CLBP) ***(Burton, 2005).***

Ninety percent of low back pain is mechanical. This type of low back pain is the result of overuse, straining, spraining, lifting, or bending that result in ligament sprains, muscle pulls or disc herniations. Mechanical low back pain is the most common cause of work related disability and 4 % of low back pain is due to herniated disk ***(Ombregt, 2003).***

Neural prolotherapy or (Perineural therapy), first discovered and later significantly developed by John Lyftogt consists of a series of small injections immediately under the skin targeting painful areas where the nerves are sensitive with simple and natural substances. The substances Lyftogt used is a buffered dextrose 5% in sterile water (D5W) with a neutral PH of 7.4 ***(Balagué et al., 2012)***

There is type of inflammation is called neurogenic inflammation (N-inflammation) which is produced by certain small sensory nerves that are protein producing (peptidergic). Buffered dextrose injection in low concentration (5%) reduces N-inflammation. The main goal is not to grow new tissue, but to reset nerves to a healthy functioning state ***(Reeves, 2011).***

Perineural injection therapy (PIT) blocks the transient receptor potential vanilloid – type 1 (TRPV1) receptors which inhibits the propagation of the neuropathic pain signals. The patient will feel immediate analgesia, inhibits the neurogenic inflammation and stimulates the release of nerve growth factors, helping in the repair and restoration of the soft tissues ***(Liang, 2014)***

- The utility of perineural therapy is based upon several publications supporting its safety and efficacy (several level 1 ***(Dumais, 2012; Rabago, 2013)*** or level 2(***Yelland, 2004)*** ***(Kim, 2010)***.

AIM OF THIS WORK

The aim of this study is to evaluate efficacy of perineural injection in treatment of chronic low back pain due to degenerative lumbosacral lesions among sample of Egyptian population.

Chapter 1

ANATOMY

Back pain anatomy

The **human back** is the large posterior area of the human body, rising from the top of the buttocks to the back of the neck and the shoulders ***(Herman, 2008)***.

Functionally, the back is involved in three primary tasks:

- Support: the vertebral column forms the axis of the body and is critical for our upright posture (standing or sitting), as a support for our head, as an attachment point and brace for movements of our upper limb, and as a support for transferring the weight of our trunk to the lower limbs.
- Protection: the vertebral column protects the spinal cord and proximal portions of our spinal nerves before they distribute throughout the body.
- Movements: muscles of the back function in movements of the head and upper limb and in support and movements of the vertebral column ***(Hansen, 2010).***

➢ The vertebral column:

The vertebral column in an adult typically consists of 33 vertebrae arranged in five regions: 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal.

Significant motion occurs only between the 25 superior vertebrae. Of the 9 inferior vertebrae, the 5 sacral vertebrae are

fused in adults to form the sacrum, and after approximately age 30, the 4 coccygeal vertebrae fuse to form the coccyx. The lumbosacral angle occurs at the junction of the long axes of the lumbar region of the vertebral column and the sacrum ***(Moore et al., 2013)***.

The central feature of the human back is the vertebral column, specifically the length from the top of the thoracic vertebrae to the bottom of the lumbar vertebrae, which houses the spinal cord in its spinal canal, and which generally has some curvature that gives shape to the back. The ribcage extends from the spine at the top of the back (with the top of the ribcage corresponding to the T1 vertebra), more than halfway down the length of the back, leaving an area with less protection between the bottom of the ribcage and the hips. The width of the back at the top is defined by the scapula, the broad, flat bones of the shoulders ***(Lovejoy, 2005)***.

Muscles:

The muscles of the back can be divided into three distinct groups; a superficial group, an intermediate group and a deep group ***(Kjaer et al., 2007)***.

Superficial group

The superficial muscle group is composed of trapezius, latissimus dorsi, rhomboid major, rhomboid minor and levator scapulae. It is innervated by anterior rami of spinal nerves, reflecting its embryological origin outside the back ***(Behm et al., 2010)***.

Intermediate group

The intermediate group is also known as respiratory group as it may serve a respiratory function. It is composed of serratus posterior superior and serratus posterior inferior. Like the superficial group, it is innervated by anterior rami of spinal nerves ***(Van Dijk et al., 2012)***.

Deep group

The deep group, also known as the intrinsic group due to its embryological origin in the back, can be further subdivided into four groups:

- Spinotransversales: composed of splenius capitis and splenius cervicis.
- Erector spinae: composed of iliocostalis, longissismus and spinalis
- Transversospinales: composed of semispinalis, multifidus and rotatores

- Segmental muscles: composed of levatores costarum, interspinales and intertransversarii

The deep group is innervated by the posterior rami of spinal nerves ***(Drake et al., 2009)***

- **Bones**

➢ **Lumbar Vertebra**

The lumbar spine consists of five lumbar vertebrae, five corresponding intervertebral discs, twelve zygapophyseal joints (T12-L1 to L5-S1), and multiple ligaments, muscular, and neurological contributions. The design of the lumbar spine allows viscoelastic motion, absorbs energy, moves with six degrees of freedom, and has limited fatigue tolerance. These functions depend on muscular, bone, and ligamentous components for mechanical tasks ***(Rupp et al., 2015)***.

The typical lumbar vertebrae display dramatic height increases when compared to the thoracic spine. The lower vertebrae and discs are wedge shaped, lending to the natural postural lordosis. The anterior aspect of the vertebrae is generally concave and the posterior aspects are flattened and stable ***(Cole et al., 2012)***.

Lumbar vertebrae can be divided into three portions from anterior to posterior. The anterior portion of the vertebral body is essentially flat on the superior and inferior surfaces and provides contact points for the intervertebral disc. The middle

portion includes the pedicles, which are strong posterior projections. The posterior portion of the vertebral body includes the inferior and superior articular processes, the spinous processes, and the transverse processes ***(Moumene and Hawkins, 2007)***.

- **The Vertebral and Intervertebral Foramen:**

In a typical vertebra, the vertebral foramen is the foramen formed by the anterior, the posterior part and the vertebral arch. It begins at cervical level and continues inferior to lumbar vertebra and it houses the spinal cord and its meninges. This large tunnel running up and down inside all vertebrae contains the spinal cord and typically called the spinal canal or vertebral canal ***(Menezes and Traynelis, 2008)***.

The anterior wall of the vertebral canal is flattened, and the discs demonstrate no propensity of bulging into the spinal canal. The anterior wall of the vertebral canal is formed by the posterior surfaces of the lumbar vertebrae, and the posterior wall is formed by the lamina and ligamentum flava of the same vertebrae ***(Cruz et al., 2014)***.

The intervertebral foramen (also called neural foramen), is a foramen between two spinal vertebrae. Cervical, thoracic, and lumbar vertebrae all have intervertebral foramina. A number of structures pass through the foramen. These are the root of each spinal nerve, the spinal artery of the segmental artery,

communicating veins between internal and external plexuses, recurrent meningeal nerves, and transforaminal ligaments. The disc surrounds the intervertebral foramen anteriorly, the pedicle inferiorly and superiorly, and the zygapophyseal joints posteriorly ***(Eguchi et al., 2011)*** (Figure 1)

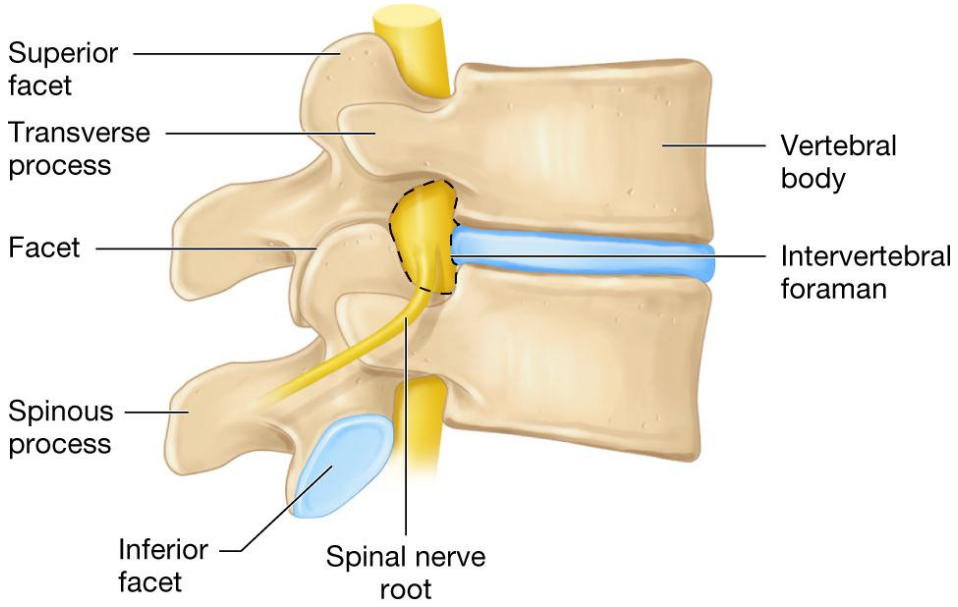

Figure (1): The Intervertebral Foramen ***(Eguchi et al., 2011)***

- **Joints**

➢ **The Zygapophyseal Joints**

The zygapophyseal joints, also known as facets, Z joints or apophyseal joints are a set of synovial, plane joints between the articular processes of two adjacent vertebrae. There are two facet joints in each spinal motion segment and each facet joint is innervated by recurrent meningeal nerves. The facet joints

are enclosed in a fibrous capsule that contains menisci ***(Gellhorn et al., 2013)***.

The menisci are invaginations of the joint capsule and may occasionally project into joint space. Facets do not have "free" motion as does the disc and are limited both structurally and by the capsule. Movement is generally restricted to large sagittal motions guided by the shape of the zygapophyseal joints ***(Rickenbacher et al., 2013)***.

The facets flatten anteroposterior and run slightly dorsally and upward. The zygapophyseal joints and the surrounding structure represent attachment sites for several intertransverse ligaments and muscles. The intertransverse ligaments attach to each transverse process and limit side flexion to the opposite side. The transverse process of L5 attaches to the medial portion of the iliac crest by several strong strands of the iliolumbar ligament, which tends to ossify at older ages. The anterior portions of the lumbar facets orient coronally (promote side-bend forces). The posterior facets face sagittal and resist rotation and side-bend forces ***(Butt et al., 2015)***.

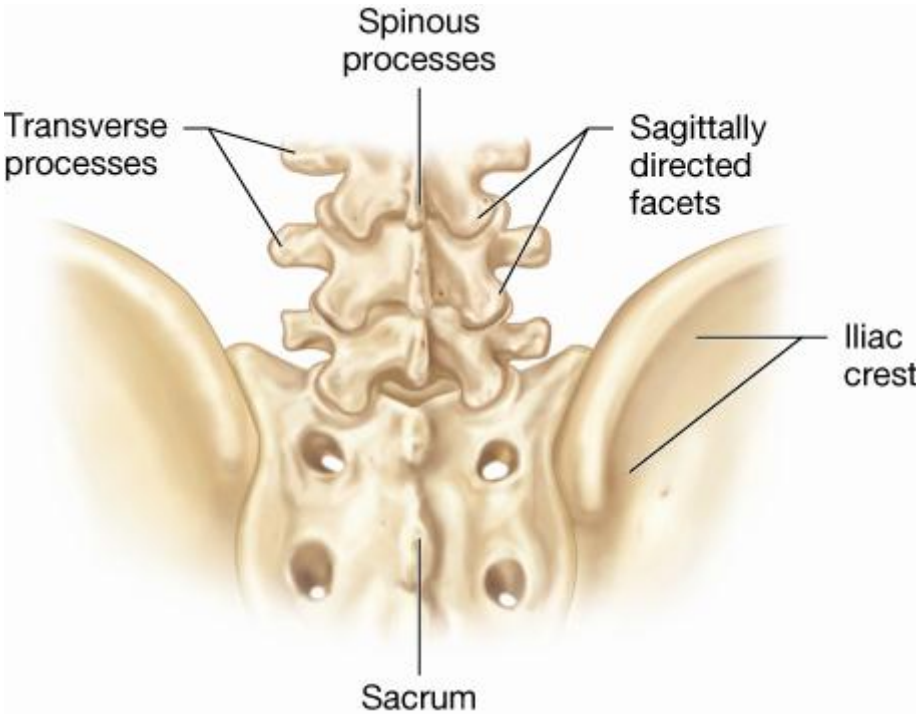

Figure (2): Zygapophyseal Joints of the Lumbar Spine.

- **The Intervertebral Disc (Interbody Joints)**

The basic units of low back anatomy are the intervertebral disc. This disc is a complex cushion between vertebrae. It absorbs the loads of the spinal column and dissipates these loads to allow smooth movement of the spine ***(Balagué et al., 2012)***

The disc has a unique structure as in Fig 3. It has an inner gelatinous portion, the nucleus pulposis, surrounded by a firm outer layer, the annulus fibrosis which are made of an extracellular matrix of type II collagen, proteoglycans, and