TRANSFORAMINAL LUMBOSACRAL EPIDURAL INJECTION IN LOW BACK PAIN AND FAILED BACK SURGERY SYNDROME; EFFICACY OF SHARP NEEDLE VERSUS BLUNT NEEDLE AND INCIDENCE OF VASCULAR SPREAD

Thesis
Submitted in complete fulfillment of
the degree of M.D in anesthesiology

By

Mohamed Shehata Mohamed Nassar
MBBch, M.Sc. Anesthesia

Under Supervision of

Prof. Dr. Inas Kamel Ahmed
Professor of Anesthesia
Faculty of Medicine, Cairo University

Porf. Dr. Mohamed Abdel Raoof Nasr
Professor of Anesthesia
Faculty of Medicine, Cairo University

Prof. Dr. Maged Salah
Professor of Anasthesia
Faculty of Medicine, Cairo University

Dr. Mohsen Mohamed Sayed
Lecturer of Anesthesia
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
2015

بسم الله الرحمن الرحيم

﴿قُلْ إِنَّ صَلَاتِي وَنُسُكِي وَمَحْيَايَ وَمَمَاتِي لِلَّهِ رَبِّ الْعَالَمِينَ﴾

صدق الله العظيم

Dedication

I dedicate this work to my family, whom without their sincere emotional support, pushing me forward, this work would not have ever been completed.

Acknowledgement

First and foremost, thanks are due to Allah, the most kind and merciful.

Words will never be able to express my deepest gratitude to all those who helped me during preparation of this study.

I gratefully acknowledge the sincere advice and guidance of ***Prof. Dr. Inas Kamel Ahmed,*** *Professor of Anesthesiology, Faculty of Medicine, Cairo University, for her constructive guidance, kindness, moral support, encouragement and valua6le help in accomplishing this work.*

I am greatly honored to express my deep appreciation to ***Prof. Dr. Mohamed Abdel Raoof Nasr,*** *Professor of Anesthesiology, Faculty of Medicine, Cairo University, for his continuous support, sincere supervision, direction and meticulous revision of this work.*

I am greatly thankful to ***Prof. Dr. Maged Salah,*** *Professor of Anesthesiology, Faculty of Medicine, Cairo University, for his valuable help, encouragement and moral support.*

I am really thankful to ***Dr. Mohsen Mohamed Sayed,*** *Lecturer of Anesthesiology, Faculty of Medicine, Cairo University, for his great help, kind encouragement and moral support.*

Mohamed Shehata Nassar

Abstract

Transforaminal lumbosacral epidural injection was used in low back pain targeting anterior epidural space and nerve roots.

Objectives: to compare incidence of vascular spread and degree of local pain between sharp and blunt needle.

Methods: eighty patients underwent transforaminal lumbosacral epidural steroid injection in four groups each one is 20 patients. Incidence and severity of vascular spread under fluoroscopy and degree of local pain were recorded.

Conclusion: incidence of vascular spread was less in sacral group using the blunt needle. Blunt needle increase local pain during the procedure.

Key words:

low back pain, blunt needle, sharp needle, transforaminal epidural injection.

Abbreviations

AHRQ	Agency for Healthcare Research and Quality
ASA	American Society of Anesthesiologists
DSA	Digital Subtraction Angiography
ESIs	Epidural corticoSteroid Injections
HIVD	Herniated InterVertebral Discs
IL	InterLaminar
IVD	InterVertebral Disc
IVDH	InterVertebral Disc Herniation
IVF	InerVertebral foramina
MRI	Magnetic Resonance Imaging
NRC	Nerve Root Canal
PLA_2	PhosphoLipase A_2
SS	Spinal Stenosis
TF	TransForaminal
TFESI	TransForaminal Epidural Steroid Injection
TNF	Tumor Necrosis Factor
VAS	Visual Analogue Scale

List of Figures

Table of Contents

INTRODUCTION AND AIM OF THE WORK

Lumbosacral radicular pain and radiculopathy are problem frequently encountered by the pain physician. These entities result from inflammation and irritation of the spinal nerves and dorsal root ganglion. The most common cause of these symptoms is a herniated nucleus pulposus or foraminal stenosis secondary to spondilolithesis (Musky H and bogduk N, 1994).

Epidural corticosteroid injections (ESI) may be used to treat lumbar radiculopathy or back pain due to disc pathology (Abdi S et al., 2007). The traditional approaches are across the interlaminar (Gerest F, 1958) or caudal (Lindgolm SR and Salenius P, 1964) with or without directional catheters; transforaminal injections (DePalma MJ et al., 2005) may be used to target known irritated nerve roots with steroid injection or for diagnosis with selective neural blockade (Datta S et al., 2007). Therapeutic epidural corticosteroids are thought to be most effective when the affected nerve root and its source of irritation are targeted as specifically as possible (Abdi S et al., 2007).

Abdi et al (Abdi S et al., 2007) performed comprehensive review of the evidence utilizing Agency for Healthcare Research and Quality (AHRQ) criteria for observational studies and

AHRQ and Cochrane review for criteria for randomized trials. This review showed the evidence for interlaminar epidural steroid injections is strong for short-term relief and Limited for long-term relief in managing lumbar radiculopathy, the evidence for caudal epidural steroid injections is strong for short-term relief and moderate for long-term relief in managing chronic low back and radicular pain, and limited in managing pain of post lumbar laminectomy syndrome. In contrast, the evidence for lumbar transforaminal epidural steroid injections is strong for short-term and moderate for long-term improvement in managing lumbar nerve root pain. (Jasper JF, 2004).

When properly performed, transforaminal injections should result in ventro-lateral contrast spread along the segmental nerve (Andrade A and Eckman E.1992) (Hammer M et al., 2001) (Manchikanti L et al., 2004). The major problem of transforaminal approach is the extreme high vascularity with possibility of haematoma formation or intravascular spread of the injected drug (Racz GB et al., 1996).

Objective of the study

* evaluation of both the safety and the efficacy of the transforaminal approach using different needles(sharp versus blunt needles) based on the incidence of intravascular spread.

* measuring the severity of local pain associated with needle insertion (sharp versus blunt needles) is evaluated by Visual Analogue Scale (VAS).

* incidence of local anesthetics systemic toxicity .

Review of the literature

Lumbosacral anatomy

The lumbar portion of the vertebral column has the ideal structure to simultaneously optimize the functions of mobility and stability (Putz and Müller-Gerbl, 1996). This region of the spine is designed to carry the weight of the head, neck, trunk, and upper extremities. However, pain in the lumbar region is one of the most common complaints of individuals, experienced by approximately 80% of the population at some time in their lives (Nachemson, 1976)(Jonsson E, 2000).

This chapter presents the typical characteristics of lumbar vertebrae, the lumbar vertebral canal, and the intervertebral foramina (IVF).

Vertebral Bodies

All the lumbar vertebrae are considered to be typical, although the fifth lumbar vertebra is unique. When viewed from above, the vertebral bodies of the lumbar spine are large and kidney-shaped with the concavity facing posteriorly (Fig.1). However, L5 is more elliptical in shape. In addition, the inferior and superior bony end plates of adjacent vertebrae sharing the same intervertebral disc (IVD) are similar in size and shape. Although the lumbar vertebral bodies of males generally have

greater dimensions than those of females, the shapes of the vertebral bodies are similar (Hall et al., 1998).

The superior surfaces of the vertebral bodies possess small elevations along their posterior rim. These represent remnants of the uncinate processes of the cervical region. The inferior surfaces of the vertebral bodies have two small notches along their posterior rim. These notches correspond to the uncinate-like elevations of the vertebra below. These elevations and notches have been used as landmarks on x-ray films as a means for evaluating normal and abnormal movement between adjacent lumbar segments (Dupuis et al., 1985).

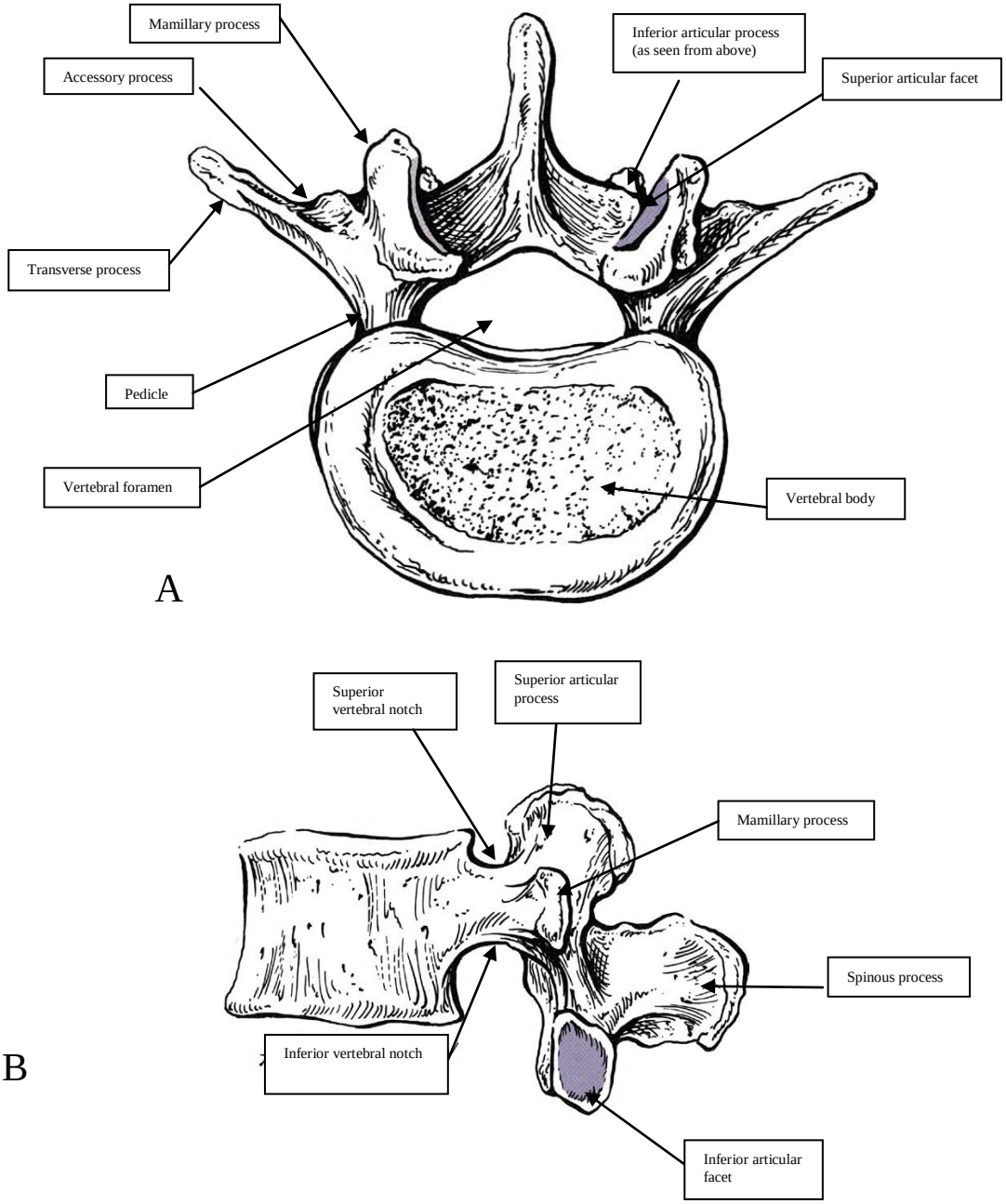

FIG 1. Typical lumbar vertebra. **A** and **C,** Superior view. **B** and **E,** Lateral (slightly oblique) view. **D,** Inferior view. **F,** Posterior view. Notice in **C** that the superior articular process of this typical vertebra is concave posteriorly; also notice the labeled nutrient foramen (one of many) located at the junction of the pedicle and transverse process. Notice in **B** and **E** the superior vertebral notch located above the pedicle. **G-I,** Lumbar spine x-rays: anterior-posterior **(G),** lateral **(H),** and oblique **(I)** (**G,**Courtesy Dr. William Bogar, National University of Health Sciences, Lombard, IL Clinical Anatomy of the Spine, Spinal Cord, and ANS, Third Edition 2014)