The Role of CT-Scan Guided Transforaminal Epidural Steroid Injection in Lumbar Radiculopathy

Thesis

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By

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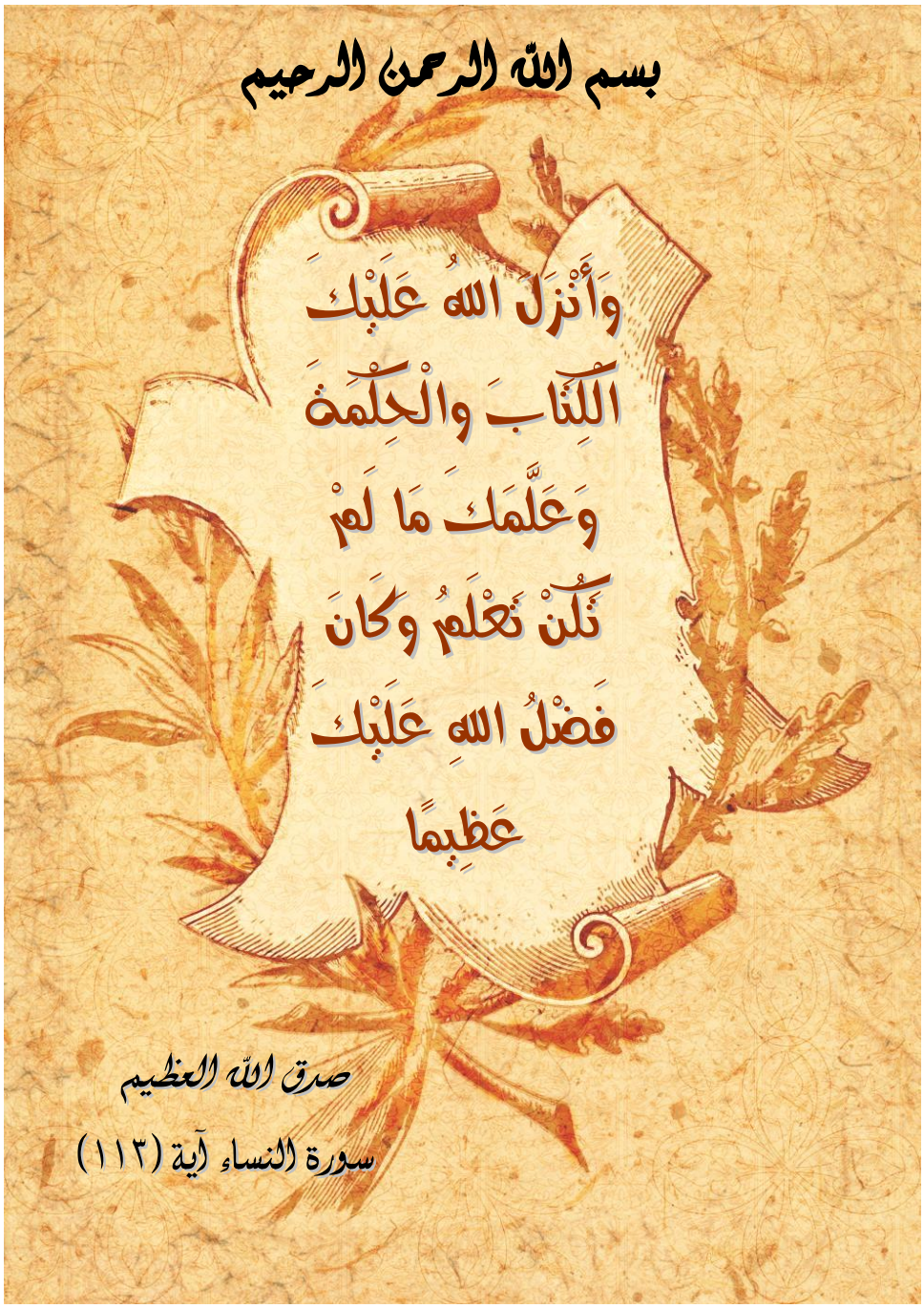
بسم الله الرحمن الرحيم
وَأَنْزَلَ اللهُ عَلَيْكَ
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صدق الله العظيم
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Hajed Hani Muhamed Antabli

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List of Abbreviations

Abb.	Full term
ALT	*Alanine amino transferase*
AST	*Aspartate amino transferase*
BUN	*Blood urea nitrogen*
CBC	*Complete blood count*
CRP	*Quantitative C reactive protein*
CSF	*Cerebrospinal fluid*
CSLR	*Contralateral straight raising test*
CT	*Computer-assisted tomography*
ESR	*Erythrocyte sedimentation rate*
FABER	*Flexion, abduction, external rotation*
FIB	*Fibrillation potentials*
FNS	*Femoral nerve stretch test*
HS	*Highly significant*
IBM SPSS	*Statistical Package for Social Science*
IQR	*Inter-quartile range*
MRI	*Magnetic resonance imaging*
NS	*Non significant*
NSAIDs	*Non-steroidal anti-inflammatory drugs*
ODI	*Oswestry Low Back Pain Disability Questionnaire*
PLA2	*Phospholipase A2*
PSW	*Positive sharp waves*
S	*Significant*
SIJ	*Sacroiliac joints*
SLR	*Straight leg raising test*
SNAP	*Sensory nerve action potential*
SSEPs	*Somatosensory evoked potentials*
TFESI	*Transforaminal epidural steroid injections*
VAS	*Visual analogue scale*

INTRODUCTION

Lumbar radiculopathy is a common clinical condition. An epidemiological review noted lifetime prevalence estimates ranging from 12.2% to 43% and annual prevalence ranging from 2.2% to 34% ***(Konstantinou and Dunn, 2008)***. Although the natural history is generally favorable, patients with radicular pain tend to have poorer outcomes, consume more health care resources, and have greater disability than patients with purely axial back pain ***(Kaufmann et al., 2013)***. The pathophysiology of radicular pain likely involves both mechanical nerve compression and an inflammatory response, mediated by inflammatory cytokines ***(Mulleman et al., 2006)***.

Epidural injection of medications for management of low back pain and lower extremity pain was introduced in 1901 by ***Cathelin (2000), Pasqier and Leri (2000)*** and ***Sicard (2000).*** The earliest technique for epidural steroids injection was the caudal approach, but it didn't gain international universal application until 1925, when ***Viner (2000)*** popularized its use for treating sciatica where he used procaine, Ringer's solution and saline ***(Ogoke, 2000)***.

The objective of an epidural steroid injection is to deliver corticosteroids close to the site of pathology, presumably into an inflammed nerve root resulting in a much higher local concentration of steroids in the target site ***(Dooley et al., 1988; Stanley et al., 1990)***. The epidurally administered steroids

reduce inflammation by inhibiting the synthesis and/or release of a number of pro-inflammatory mediators and also causing reversible local anesthetic effect ***(Pasqualucci et al., 2007)***.

Numerous reports of effectiveness of epidural steroid injections have varied in their response rates from 18% to 90%. Surprisingly, most controlled studies involving epidural steroid injections were performed without fluoroscopic guidance, whereas few uncontrolled open-ended clinical trials used it to ensure delivering the injectate into at least the epidural space if not to the target site. The major cause of disparity proposed is technical error which includes sub-optimal placement or non-placement of the needle in the correct position near the target nerve route leading to the failure of delivery of steroids to the target site ***(Manchikanti et al., 2010; Roberts et al., 2009)***.

Epidural drug injections in the lumbar spine can be delivered by many approaches including: interlaminar, caudal & transforaminal approaches. The interlaminar approach was considered at first to be the preferable route as it is directed more closely to the assumed site of pathology than the caudal approach thus facilitating the delivery of the injectate to its target site using smaller volumes of medications ***(Manchikanti et al., 2010; Roberts et al., 2009)***. However, it has some disadvantages such as extra-dural placement of the needle (which may go unrecognized without CT-Scan guidance) and the discriminatory cranial flow of the solution in the epidural space. The use of this technique results in deposition of

medication in the posterior epidural space. On the contrary, disc/nerve root pathology occurs in the anterior epidural space ***(Rados et al., 2011)***. In addition, various studies reported the failure of the interlaminar approach to produce statistically significant clinical improvements ***(Fredman et al., 1999; Manchikanti et al., 2010)***.

Transforaminal epidural steroid injections (TFESI) have emerged as an alternative to both interlaminar and caudal injections. Some reports mentioned the use of this approach for epidural drug injections, such as ***Robecchi and Capra (١٩٥٢)*** in 1952 in the Italian literature, when they performed a peri-radicular injection of hydrocortisone on the first sacral route and reported relief of lumbar and sciatic pain in a female patient, then ***(Lievre et al., 1953)*** and colleagues in the French literature in 1953 reported transforaminal injection of steroids on the level of the first sacral route ***(Nelson and Landau, 2001).*** Since then, transforaminal epidural injection has been widely used as it is considered as an effective mean for the management of many cases of low back pain and lower extremity pain ***(Manchikanti et al., 1999)***.

The major advantage of transforaminal approach for therapeutic injections is that it ensures that the injected medications incorporates all the sites where the pathology can affect the nerve, which extends from the disc level in the subarticular zone to the extraforaminal zone, including the ventral epidural space ***(Manchikanti et al., 2010)***. Despite this

major advantage, considerable controversy continues to surround the relative efficacy of the different types of epidural steroid injection, its indications, selection criteria, and its cost-effectiveness ***(Wilkinson and Cohen, 2013)***.

Aim of the Work

The objective of this study was to assess the immediate and short-term effects of transforaminal epidural steroid injections in patients with lumbosacral radiculopathy.