

Evaluation of lumbar transforaminal epidural steroid injection by infraneural route

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Abstract

Conservative treatment of Lumbosacral radiculopathy mainly includes Transforaminal epidural steroid injection which delivers the inject ate directly to anterior epidural space, thus giving the nerve root a better relief which is mechanically and chemically irritated by prolapsed nucleus pulposus. In this study, we adopted Kambin's triangle technique which is one of the time tested route, and we designed a novel technique to place the needle at Kambin's triangle. Totally 30 cases studied and results were analysed by Visual Analog Scale and Oswestry Disability Index both Preprocedural and 12 weeks post procedure. The results were satisfactory and is discussed in this paper.

Keywords: Transforaminal epidural steroid injection, Lumbosacral radiculopathy, Safe triangle, Subpedicular triangle, Kambin's triangle.

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INTRODUCTION

Lumbar foraminal spinal stenosis causing Lumbosacral radiculopathy is a common cause for crippling Low backache¹. Along with the mechanical compression, ischemia of nerve roots causing C-fibre activation² and chemical irritation also is the cause for pain. Among the conservative managements available, Fluoroscopy guided Transforaminal epidural steroid injection (TFESI) is considered as one of the successful management, results with decrease in patient morbidity and early return to work. Transforaminal route is more precise and more effective route³ comparing to caudal route and interlaminar route. In the Transforaminal route, the corticosteroid injection is injected close to the probable source of pain in irritated nerve root and this results in better ventral epidural spreading than does the interlaminar approach. Transforaminal epidural steroid

injection can be either given in the preganglionic level (traversing nerve root level i.e. L4-L5 level for L5 root compression) or at ganglionic level (exiting nerve root level i.e. L5-S1 level for L5 root compression). Studies reveal that preganglionic level is more appropriate than⁴ ganglionic level for better outcome. Again the preganglionic approach is recently studied with two separate approaches, one being supraneural subpedicular route and second one being Kambin's triangle route or infraneural route. (Fig.1). The boundaries of subpedicular triangle are, superiorly by inferior border of pedicle, anteriorly by posterior border of vertebral body and postero inferiorly by exiting nerve root. The boundaries of Kambin's triangle are anterosuperiorly by exiting nerve root, base by the superior border of caudal vertebra and posteriorly by traversing nerve root. The Kambin's triangle approach (Fig.2) is having the advantage of less dural injury, less epidural bleeding and epidural scarring and the result is as good as the subpedicular approach⁵. In this context the purpose of our study is to evaluate the outcome of Transforaminal epidural steroid injection using Kambin's infraneural approach, and to study the short term effects and possible complications.

MATERIALS AND METHODS

Totally 30 patients are evaluated at Department of orthopaedics, Government Thiruvapur medical college

hospital in the period from January 2015 to May 2016. All patients had Lumbar disc prolapse either paracentral or foraminal type causing foraminal stenosis. All patients are evaluated with MRI, and degenerative foraminal stenosis cases are ruled out. All Lumbar disc prolapse cases with neurological deficit warranting immediate surgery, diabetic patients, patients with coagulation disorder and patients with generalised immunological disease and infection are also ruled out. Age group of patients range from 25 -58; Out of 30 patients 18 are male and 12 are female. Proper consent has been obtained. Preprocedural Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) were evaluated. Proper Preprocedural consent was obtained from all patients. No preoperative medication was given on the day of procedure. Test dose for Xylocaine has been done for all patients. During procedure, the patient has been placed prone and continuous monitoring of pulse, BP were done. After painting and draping the back, with the help of image intensifier, AP shoot has been done, and midline marked vertically along the line of spinous processes. Next, horizontal line has been drawn along the inferior border of body of superior vertebra of affected level (line a) (Fig 3) Then vertical mid pedicular line in the side of maximal complaints, drawn (line b) intersecting line is marked as point 'c'. (Fig 4) Then the image intensifier is positioned in lateral projection of lumbar spine and oblique line is drawn along the lower border of superior vertebra concerned (the inclination-line d). Then the vertical height between posterior most point of the body and posterior border of vertebra is measured with the help of blunt K wire (length e). The length 'e' is bisected over the extended line 'd' and point 'f' is marked. Point 'f' is now the entry point for the TFESI needle. Since the triangle formed by f and c is equilateral triangle now, the inclination of the needle will be 45 degrees and the vector should be f->c, this will guide to the infraneural area (Kambin's triangle). Entry point was infiltrated with 2ml of Xylocaine at the entry point and with image intensifier guidance, the 9 inches 18 needle gradually introduced, first with AP shoot, the position of the tip is checked and then with the lateral view. At any point of introduction of needle, the sharp pain due to dural pricking is noted. But in no patients, it has been observed. In our study no dye has been injected. For all patients mixture of Xylocaine along with the Methylprednisolone (Depomedrol) was injected.

RESULTS

Total number of patients are 30. Male: Female=18:12. Age ranges from 25 to 58; Mean age being 41.2.

Table 1: Age and Sex distribution

AGE	Mean 41.2(n=30)
25-29	2(6.7%)
30-39	9(30%)
40-49	17(56.6%)
50-58	2(6.7%)
SEX	
Male	18(60%)
Female	12(40%)

The following table shows the distribution of target roots

Table 2: Distribution between target roots

L3	1(3.3%)
L4	18(60%)
L5	2(6.7%)
L3andL4	1(3.3%)
L4andL5	8(26.7%)

For each patient Preprocedural Visual Analog Scale (VAS) was done and again post procedural (12 weeks) VAS has been measured. Simultaneously Oswestry Disability Index (ODI) also studied.

Table 3: VAS and ODI results (average)

STUDY	Pre procedure	Post procedure(12wks)
VAS	7.14	3.34
ODI	71.74	35.94

The average reduction in pain observed in our study according to both VAS and ODI readings suggest 51% reduction after 12 weeks. When comparing our results (VAS) with results of authors from international journals gave the near normal results.

Table 4: Comparison of results

Name of author	No of patients	Pre procedure	Post procedure	Reduction of pain(%)
Our study	30	7.14	3.34	53%
Ji Woong Park(5)	42	7.11	2.92	59%
Carette et al (7)	158	8.0	2.5	68%

Regarding complications, Spinal nerve pricking, Intradiscal injections, and intravascular injection of injectate were observed for patients. Out of 30 patients there was one case of spinal nerve pricking encountered. Patient had sharp pain down the sciatic distribution and the course of the needle was altered and injection was done. In one case the intradiscal injection encountered and needle slightly withdrawn and injection done. In no cases intravascular injection of injectate encountered. Comparison table of complications of our study and Ji Woong Park *et al* is given below.

Table 5: Comparison of complications

Complications	Our study	JiWoong Park
Spinal nerve pricking	1	0
Discal injection	1	0
Intravascular injection	0	3

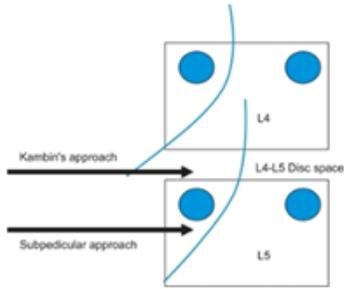


Figure 1



Figure 2



Figure 3



Figure 4

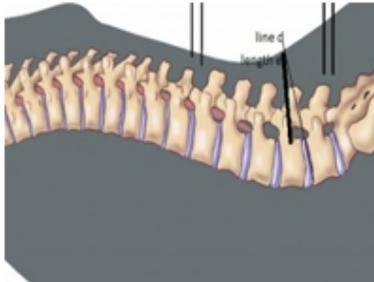


Figure 5



Figure 6

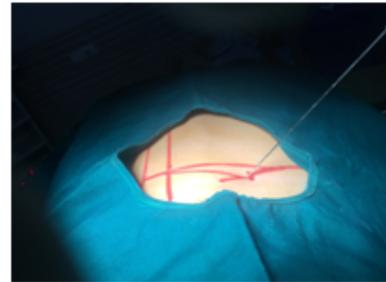


Figure 7

Figure 1: Schematic picture showing both Subpedicular and Kambin's approach; **Figure 2:** Kambin's triangle; **Figure 3:** Picture of midline drawing under C-arm; **Figure 4:** Mid pedicular vertical line drawing; **Figure 5:** Tangential line to border of vertebral body; **Figure 6:** Drawing vector for direction of needle; **Figure 7:** Needle positioning

DISCUSSION

Lumbosacral radiculopathy is a common and expensive crippling medical problem and its lifetime prevalence has been estimated up to 60%.⁸ Based on recent concepts the pain generation at the site of compression is mainly due to chemical irritation by prolapsed nucleus material than the mechanical compression as such⁹⁻¹³. So deposition of corticosteroid injection at the irritation site itself through Transforaminal route gives a better relief than interlaminar and caudal routes. Among the Transforaminal routes, subpedicular and Kambin's triangle approach, we did the study by injecting the steroid using Kambin's approach and the results are comparable to the other studies in the same group. In our study we have used a novel approach in which the vector for needle trajectory is planned using some anatomical lines drawn using the Fluoroscopy. When tested it is having accuracy in reaching the Kambin's triangle. In contrary to Subpedicular triangle, the Kambin's triangle approach is having least possibility of injecting in an inadvertent artery like artery of Adamkiewicz which may be present in 20% of individuals¹⁴. Kambin's approach is studied well for its safety, such as protection of epidural nervous system, prevention of venous congestion and chronic nervous edema and prevention of epidural scarring. In the 12 weeks post procedure assessment, the results were comparable with the subpedicular approach

TFESI injections derived from literature. Subpedicular approach is considered as safe triangle approach. Kambin's approach could be an alternative to the subpedicular approach in severe spinal stenosis, epidural fibrosis and sunken intervertebral disc lesion, in which conditions the placement of needle will be difficult through subpedicular approach.

REFERENCES

1. Jenis LG An HS. Spine update: Lumbar foraminal stenosis, Spine (Phila Pa 1976)2000;25:389-94
2. Jinkins JR, Whittemore AR, Bradley WG The anatomic basis of vertebrogenic pain and the autonomic syndrome associated with Lumbar disc extrusion AJR Am J Roentgenol1989;152:1277-89
3. Thomas E, Cyteval C, Abiad L, Picor MC, Taourel P Blotman F. Efficacy of Transforaminal versus Interspinous corticosteroid injection in discalradiculalgia: a perspective, randomised, double blind study. Clin.Rheumatol 2003;22:209-304
4. Hee Sun Jeong et al, Effectiveness of Transforaminal epidural steroid injection by using a Preganglionic approach: A prospective Randomised controlled study. Radiology2007 volume245:584-590
5. JWoong Park, HeeSeung Nam, Yong bum ParkMD, Kambin's triangle approach of Lumbar Transforaminal epidural injection with spinal stenosis. Ann Rehabil Med .2011 Dec:35(6);833-843

6. LewHL, Coelho P, ChouLH. Preganglionic approach to Transforaminal epidural steroid injections. *Am J Phys Med Rehabil* 2004;83:378
7. Simon Carett, Richard Leclair, Sylvie Marcoux; Epidural Corticosteroid Injections for Sciatica due to Herniated Nucleus Pulposus; *N Engl J Med* 1997;336:1634-1640
8. Anderson GBJ. Epidemiology of spinal disorders JW.ed. *The adult spine: principles and practice*. New York :Raven, 1997:39-48
9. Takahashi H, Suguro T, Okazima Y, Motegi M, Okada Y, Kakuchi T .Inflammatory cytokines in the herniated disc of the lumbar spine. *Spine* 1996;21:218-224
10. Kanemoto M, Hukuda S, Komiya, Katsuura A, Nishioka J. Immunohistochemical study of matrix metalloproteinase-3 and tissue inhibitor of metalloproteinase-1 human intervertebral discs *Spine* 1996;21:1-8
11. Kawasaki M, Weinstein JN, Spratt KF, Chatani K, Traub RJ, Millet ST et al .Experimental lumbar radiculopathy: Immunohistochemical and quantitative demonstrations of pain induced by lumbar nerve root irritation of the rat. *Spine* 1994;19:1780-1794
12. Roberts S, Caterson B, Menage J, Evans EH, Jaffrey DC, Eisenstein SM. Matrix metalloproteinases and aggrecanase their role in disorders of the human intervertebral disc, *Spine* 2000;25:3005-3013
13. Delamarter RB, Bohlman HH, Dedge LD, Biro C, Experimental Lumbar Spinal stenosis. Analysis of cortical evoked potentials, microvasculature, and histopathology; *J Bone J Surg (Am)* 1990;72:110-120
14. Olmarker K, Holm S, Rosenqvist A, Experimental nerve root compression A model of acute graded compressions of the porcine cauda equine and analysis of neural and model of acute graded compressions of the porcine cauda equine and analysis of neural and vascular anatomy *Spine* 1991;16:61-69

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