Patient Satisfaction After Transforaminal Epidural Steroid Injection: One Year Follow Up

Transforaminal Epidural Steroid Enjeksiyonu Sonrasında Hasta Memnuniyeti: Bir Yıllık Takip

Mert AKBAŞ, MD,[a]
Arif YEĞİN, MD,[a]
Kamer DERE, MD[b]

[a]Department of Anaesthesiology, Division of Algology, Akdeniz University Medical Faculty, Antalya
[b]Department of Anaesthesiology, Division of Algology, GATA Haydarpaşa Medical Faculty, Istanbul

Geliş Tarihi/*Received:* 01.08.2008
Kabul Tarihi/*Accepted:* 26.02.2009

Yazışma Adresi/*Correspondence:*
Mert AKBAŞ, MD
Akdeniz University Medical Faculty, Department of Anaesthesiology, Division of Algology, Antalya, TÜRKİYE/TURKEY
akbasmert@akdeniz.edu.tr

ABSTRACT Objective: Patients whom were admitted to Algology clinic for radiculopathic pain due to herniated discs were determined and analysed prospectively. We analysed 30 patients prospectively with radiculopathy in order to assess the effectiveness of transforaminal epidural steroid injection. **Material and Methods:** Procedures were performed between the dates 01.11.2005-01.11.2006. The transforaminal injection was performed at the level of disc herniation. All patients received a combination of 80 mg triamcinalon acetate + 2 mL levobupivacaine HCL 2.5 % in total, a 4 mL volume was injected. All patients were evaluated at 2. week, 3, 6, and 12. months after their first transforaminal epidural steroid injection. Patients were asked to rate their pain on the Numerical Rating Scale (VNRS). Also, each patient rated their level of satisfaction according to a 4-point scale at the end of follow up period. **Results:** The most significant improvement in the pain score was seen at second week. VNRS was 5.03 ± 1.62 at the initial assessments and reduced to 2.06 ± 1.36 at the end of one year. 21 patient (70%) underwent only one injection, whereas 9 patient (30%) underwent for the second injection during one year period. Any complications have been observed at the patients. **Conclusion:** Transforaminal epidural steroid injections may offer significant pain reduction up to 3 months initiation of treatment in patients with radiculopathic pain and according to our first experience blunt needle may also help to reduce complications.

Key Words: Injections, epidural; radiculopathy; patient satisfaction

ÖZET Amaç: Herniye disk nedeniyle radikülopatik ağrısı olan ve algoloji kliniğine basvuran hastalar belirlendi ve bir yıl boyunca takip edildi. Radikülopatisi olan 30 hastada transforaminal epidural steroid enjeksiyonunun etkinliği değerlendirildi. **Gereç ve Yöntemler:** İşlemler 01.11.2005-01.11.2006 tarihleri arasında uygulandı. Transforaminal enjeksiyon, herniasyonun olduğu disk seviyesinden yapıldı. 2 mL 80 mg triamsinalon asetat ve 2 mL levobupivakain HCL %2.5 toplam 4 mL volumde enjekte edildi. Tüm hastalar transforaminal enjeksiyon sonrasında 2. hafta, 3, 6 ve 12. aylarda takip edildi. Ağrıları Verbal Numerical Rating Scale (VNRS) ile değerlendirildi. Ayrıca her hastanın memnuniyeti olusturulan 4 dereceli bir skala ile takiplerde değerlendirildi. **Bulgular:** Ağrı skorlarındaki en iyi gelişme 2. haftada gözlendi. Başlangıçtaki VNRS değeri 5.03 ± 1.62, bir yıl sonunda 2.06 ± 1.36 idi. Bir yıllık takiplerde 21 hastaya (%70) bir kez enjeksiyon, 9 hastaya (%30) ise ikinci kez enjeksiyon uygulandı. Hastalarda hiçbir komplikasyon gözlenmedi. **Sonuç:** Radikulopatik ağrısı olan hastalarda transforaminal epidural steroid enjeksiyonu 3 aya kadar belirgin ağrı azalması sağlayabilir ve ilk deneyimlerimize göre de künt uçlu iğneler komplikasyon oluşumunu azaltmada yararlı olabilir.

Anahtar Kelimeler: Enjeksiyon, epidural; radikulopati; hasta memnuniyeti

Turkiye Klinikleri J Anest Reanim 2009;7(2):55-9

Epidural steroid injections (ESI) have been used decades for the treatment of spinal pain, particulary for radicular symptoms and radiculopathy. It is one of the most commonly used interventions in

managing chronic spinal pain.[1,2] In the recent years the popularity of caudal, interlaminar, and transforaminal epidural injections has been waxing and waning as the most effective method in managing low back pain.[2,3]

One major concerns about lumbar and caudal epidural steroids is that their true efficacy might not be evident in clinical trials because the injectate fails to reach the desired target.[3]

Increases emphasis is placed on fluoroscopically guided, target specific injections, guarantees the proper injection and delivery of medication. Therefore, modern study design focus on fluoroscopically guided transforaminal injection techniques. They have the theoretical advantage of delivering the injectate to the site of the pathology in the anterior epidural space.[4]

This study was undertaken to assess the effectiveness of transforaminal epidural steroid injections for radiculopathic pain after one year follow up period prospectively.

MATERIAL AND METHODS

ASA physical status I-II, 30 patients were admitted to Algology clinic for radiculopathic pain due to herniated discs. All patients underwent transforaminal epidural steroid injections after obtaining informed consents. Procedures were performed in Akdeniz University Faculty of Medicine, Department of Anesthesiology Division of Algology between the dates 01.11.2005-01.11.2006. Patients presenting with one or more of the following criteria were excluded: 1) known allergy or contraindications for steroid injections[5] 2) previous lumbar epidural steroid injections 3) previous lumbar spine surgery 4) unstable neurological deficits and cauda equine syndrome, mental retardation 5) other back pain disorders like spinal stenosis, failed back surgery 6) diabetic patients 7) coagulation defects and patients on anticoagulant therapy and 8) Infection at puncture site 9) disc protrusion more than one level, 10) patients who have disc extrusion or sequestration on magnetic resonance imaging (MRI). 11) straight leg test less than 30º or more than 70º on physical examination 12) pain radiating both legs. All patients were examined and imaging studies were reviewed prior to the injection by the same pain management physician. All procedures were performed in the department of Anesthesiology and division of Algology at University Hospital of Antalya/Turkey.

All of the patients had a previous MRI study with positive findings. The level of the transforaminal injection was chosen depending of MRI findings and physical exam. Before the procedure patients were sedated with 1 mg midazolam intravenously. Standard monitoring (pulse oximetry, non-invasive blood pressure and five lead electrocardiogram) was instituted before procedure. All patients received oxygen 2 L min^{-1} via nasal canula. All procedures were performed with the patient in prone position and under fluoroscopic guidance. After positioning the patient in the optimal position and cleaning the skin with povidone-iodine solution and the skin overlying the target area was anesthetized with lidocaine 1%.

For the transforaminal approach, a 22 gauge curved blunt needle was used. We did not prefer to use nerve stimulator because blunt needles are less likely than sharp needles to enter vital structures, nerves, and vessels.[6] The needle was placed in the superior and anterior aspect of the corresponding neuroforamen under frequent fluoroscopic guidance, using standard technique described in the literature.[5] The needle placement was confirmed after injection of non-ionic contrast material (Omnipaque 300), demonstrating the contrast going through the foramen. At any session, the transforaminal injection was performed at the level of disc herniation. After the needle was determined radiographically to be in the appropriate position, 0.5-1 mL of non-ionic contrast material was injected to document appropriate contrast spread along the spinal nerve into the epidural space without intravascular uptake.

Next, a combination of 2 mL 80 mg triamcinalon acetate with 2 mL levobupivacaine HCL 2.5% in total, a 4 mL volume was injected. The curved blunt needle was then withdrawn and the patients were transfered to the recovery area whe-

re they were observed 60 minutes prior to discharge home.

Satisfaction with pain control was measured at the end of follow up period using subjective 4-point scale, designed specifically for every cultural level of patients (not satisfied at all, only slightly satisfied, somewhat or partly satisfied, satisfied) in order to understand easily.

The satisfaction rating scale described above has not been validated. Therefore, verbal numerical rating Scale was also used and assessed. Within one hour before the procedure, the patients were asked to rate their pain on the Verbal Numerical rating Scale (VNRS, 0-10) by a nurse not involved in the performance of the procedures. All patients were followed up at 2^{nd} week, and 3^{th}, 6^{th}, 12^{th} months period after their first transforaminal epidural steroid injection. Only patients completed the follow up period (pre-injection, post-injection and follow-up) were included in the study.

DATA ANALYSIS

Mean and standard deviations of antropometric ve demographic datas were given. For VNRS comparisons, Friedman test was used, and Wilcoxons signed rank test with Bonferroni correction was applied. Significance was accepted at 0.05.

RESULTS

The study population included only patients with radiculopaty, who were then treated with transforaminal epidural steroid injection under fluoroscopic guidance. The age, Initial VNRS, 2. week VNRS, 3. month VNRS, 6. month VNRS and 12. month VNRS and numeric rating scale scores are presented in Table 1. The most significant improvement in the pain score was seen at second week. VNRS scores showed significant decreases (P<0.05).

Using the 4-point rating scale as described above in the method section, we classified 70% patients were satisfied with the procedure and 30% were not satisfied after the procedure. Those 9 of the patient underwent for the second injection at the end of third month. 55.5% of these patient were somewhat or partly satisfied. After one year follow up those 5 patients were slightly satisfied (Table 2).

21 patients (70%) underwent one epidural steroid injection and they had no signs of pain radiation nor positive straight leg test on physical examination, 9 (30%) underwent for the second injection at the end of third month. Second injection was performed when the VNRS scores were four and above. 4 patients who did not have benefit from second transforaminal steroid injection were sent to neurosurgery for consultation. No complications occur in any of the patients.

DISCUSSION

High levels of phospholipase A2 , an enzyme involved in the production of prostaglandin and leukotrienes during inflammation, have been found in herniated discs, and may be involved in the generation of radiculopathic pain.[7,8] Epidural steroid injection have been used to treat radiculopathic pain, with varying degrees of effectiveness.[9,10]

Transforaminal lumbar epidural steroid injections have better profile in terms of therapeutic efficiency in managing radiculopathic pain than

TABLE 1: Descriptive statistics.

	N	Minimum	Maximum	Mean	Std. Deviation	Median
AGE	30	19.00	77.00	51.16	13.55	51.0
Initial VNRS	30	4.00	10.00	5.03	1.62	4.0
2. Week VNRS	30	1.00	4.00	2.23	0.81	2.0
3. Month VNRS	30	1.00	6.00	2.06	1.25	2.0
6. Month VNRS	30	1.00	6.00	2.08	1.36	2.0
12. Month VNRS	30	1.00	6.00	2.36	1.56	2.0
Valid N (listwise)	30					

TABLE 2: Satisfaction Scale after the procedure and after one year.

	(n= 30) Patients after the first procedure	(n= 9) Patients after the second procedure	(n= 30) Patients after one year
Not satisfied	9 (30%)	4 (44.5%)	4 (44.5%)
Slightly satisfied	-	-	5 (55.5%)
Partly satisfied	-	5 (55.5%)	-
Satisfied	21(70%)	-	21(70%)

blind interlaminar epidural injections, as well as fluroscopically directed caudal epidural injections.[10,11]

Epidural steroid injection not done under fluoroscopy may fail to reach the target area in up to 30% of cases, even in experienced hands.[7,9,12] Results of studies with transforaminal epidural injections have been encouraging.[11,13] The transforaminal approach has been the favourite approach by most interventional pain physicians for the treatment of lumbar radicular symptoms over the last several year. This is supported by some controlled trials.[14,15,16]

The currently published standards indicate that ESIs should be performed under fluoroscopic guidance with contrast injection to ensure appropriate localization of the needle and confirmation of the appropriate delivery of the injectate to the target area.[7,17]

Vad et al reported a 84% "success" in patients with lumbosacral radiculopaty who underwent transforaminal ESI, compared to 70 % (21 patients) in our patients at first injection.[14] After second injection our success rate increased up to 86 % (26 patients) which was similar to Vad's study. Our study showed benefical effect in decreasing the pain scores. Karpin's trial demonstrated fewer positive results.[18]

26 patients had significant improvement of VNRS scores directly after injections, which was largely maintained also at follow-up. Our study partially supports the findings of Riew et al that transforaminal ESI decrease the need for further procedures or medications.[15] However this study has obvious limitations: First, this study was performed prospectively and only one year follow up interval for pain improvement were analysed. However, it is commonly agreed that epidural steroid injections are particularly helpful for pain control in the first weeks after injection.[19] Second, the sample size is small. For the purpose of the study, only patients with one level lumbar disc herniation were enrolled the study. This eliminates a large proportion of patients typically seen by other interventionalists because of this our clinic's patient population is low according the other clinic's. Thus, prospective randomised controlled studies which evalutes the different invasive treatment modalities must be performed in the future. Third, all procedured were performed by the same physician. The results of this study therefore reflect the experience of one practioner and may not be generalized.

The most common and worrisome complications and side effects of epidural injections are two types: Those related to the needle placement and those related to drug administration.

Complications related to needle have raised the issue of the safety of blunt vs. sharp needles for doing these procedures.[20] The complications include paresis, paralysis and/or death associated with segmental root, facet joint and transforaminal injections. Furman and colleagues reported that the rate of intravascular injection was 21.3% for S1 transforaminal epidural steroid injection attempts, 8.1% for injections at the lumbar level and 19.4% for cervical transforaminal injections.[21,22] Heavner et al concluded that blunt needles are less likely than sharp ones to enter vital structures, especially those with a tough fibrous capsule or sheath (eg, kidney, nerve bundle) and/or produce hemorrhage.[6] Thus, blunt needles may be preferable to sharp needles for performing interventional pain procedures.

Although we did not compare blunt needle with sharp needle this study reflects our first experience with blunt needles. Also, in our patient population we did not encounter any problem related with the use of curved blunt needle. None

of these complications listed below occur in our study group: dural puncture, spinal cord trauma, paralysis, paresis, infection, hematoma formation, abscess formation, subdural injections, nerve damage, intravascular injection, and effects of steroids.[23,24]

In conclusion, patients who received a transforaminal ESI for lumbar disc herniation had better pain improvement for short-term periods, but in most of the patients this outcome is not long lasting. Also, blunt needles may be preferable for performing transfroraminal ESI to reduce the needle releated complicatios. Further studies are necessary to determine which lumbar disc herniation patients may benefit from transforaminal approach and the comparison of blunt needles with sharp needles according to their advantages for performing injections.

REFERENCES

1. Manchikanti L, Staats PS, Singh V, Schultz DM, Vilims BD, Jasper JF, et al. Evidence-based practice guidelines for interventional techniques in the management of chronic spinal pain. Pain Physician 2003;6(1): 3-81.
2. Manchikanti L, Singh V, Kloth D, Slipman CW, Jasper JF, Trescot AM, et al. Interventional techniques in the management of chronic pain: Part 2.0. Pain Physician 2001;4(1):24-96.
3. Bogduk N, Brazenor G, Christophidis N, Cherry D, Fraser R, Jenkins J, et al. Epidural use of steroids in the management of back pain. Report of Working Party on Epidural Use of Steroids in the Management of Back Pain.Canberra, Commonwealth of Australia: National Health and Medical Research Council; 1994. p.1-76.
4. Schaufele MK, Hatch L, Jones W. Interlaminar versus transforaminal epidural injections for the treatment of symptomatic lumbar intervertebral disc herniations. Pain Physician 2006;9(4):361-6.
5. Bogduk N. International Spine Intervention Society, Standards Commitee. Practice Guidelines for Spinal Diagnostic and Treatment, Procedures. 1st ed. San Francisco: International Spine Intervention Society; 2004. p.237-48.
6. Heavner JE, Racz GB, Jenigiri B, Lehman T, Day MR. Sharp versus blunt needle: a comparative study of penetration of internal structures and bleeding in dogs. Pain Pract 2003;3(3):226-31.
7. Manchikanti L. Transforaminal lumbar epidural steroid injections. Pain Physician 2000;3(4):374-98.
8. Spaccarelli KC. Lumbar and caudal epidural corticosteroid injections. Mayo Clin Proc 1996;71(2):169-78.
9. Manchikanti L, Rivera JJ, Pampati V, Beyer C, Damron K, Barnhill RC. Effectiveness of clinical guidelines in interventional pain management. Pain Physician 2002;5(2):127-32.
10. Manchikanti L, Pakanati RR, Pampati VS. Comparison of three routes of epidural steroid injections in low back pain. Pain Digest 1999;9:277-85.
11. Riew KD, Yin Y, Gilula L. Can nerve root injections obviate the need for operative treatment of lumbar radicular pain? A prospective, randomized, controlled, double-blindstudy. Proceedings of North American Spine Society 16th Annual Meeting. Chicago, 1999. p.94-5.
12. Renfrew DL, Moore TE, Kathol MH, el-Khoury GY, Lemke JH, Walker CW. Correct placement of epidural steroid injections: fluoroscopic guidance and contrast administration. AJNR Am J Neuroradiol 1991;12(5):1003-7.
13. Karppinen J, Ohinmaa A, Malmivaara A, Kurunlahti M, Kyllönen E, Pienimäki T, et al. Cost effectiveness of periradicular infiltration for sciatica: subgroup analysis of a randomized controlled trial. Spine (Phila Pa 1976) 2001;26(23):2587-95.
14. Vad VB, Bhat AL, Lutz GE, Cammisa F. Transforaminal epidural steroid injections in lumbosacral radiculopathy: a prospective randomized study. Spine (Phila Pa 1976) 2002;27(1):11-6.
15. Riew KD, Yin Y, Gilula L, Bridwell KH, Lenke LG, Lauryssen C, et al. The effect of nerve-root injections on the need for operative treatment of lumbar radicular pain. A prospective, randomized, controlled, double-blind study. J Bone Joint Surg Am 2000;82-A(11):1589-93.
16. Ergin A. [Interventional methods in pain therapy]. Turkiye Klinikleri J Surg Med Sci 2007;3(45):62-70.
17. Boswell MV, Shah RV, Everett CR, Sehgal N, McKenzie Brown AM, Abdi S, et al. Interventional techniques in the management of chronic spinal pain: evidence-based practice guidelines. Pain Physician 2005:8(1):1-47.
18. Karppinen J, Malmivaara A, Kurunlahti M, Kyllönen E, Pienimäki T, Nieminen P, et al. Periradicular infiltration for sciatica: a randomized controlled trial. Spine (Phila Pa 1976) 2001;26(9):1059-67.
19. Arden NK, Price C, Reading I, Stubbing J, Hazelgrove J, Dunne C, Michel M, et al. A multicentre randomized controlled trial of epidural corticosteroid injections for sciatica: the WEST study. Rheumatology (Oxford) 2005;44(11):1399-406.
20. Nelson JW. Letter to the editor. Spine. 2002;27(1):3-5.
21. Furman MB, O'Brien EM, Zgleszewski TM. Incidence of intravascular penetration in transforaminal lumbosacral epidural steroid injections. Spine (Phila Pa 1976) 2000;25(20):2628-32.
22. Furman MB, Giovanniello MT, O'Brien EM. Incidence of intravascular penetration in transforaminal cervical epidural steroid injections. Spine (Phila Pa 1976) 2003;28(1):21-5.
23. Waldman SD. Complications of cervical epidural nerve blocks with steroids: a prospective study of 790 consecutive blocks. Reg Anesth 1989;14(3):149-51.
24. Bromage PR, Benumof JL. Paraplegia following intracord injection during attempted epidural anesthesia under general anesthesia. Reg Anesth Pain Med 1998;23(1):104-7.