COMPARISON OF THE EFFECTIVENESS OF RADICULAR BLOCKING TECHNIQUES IN THE TREATMENT OF LUMBAR DISK HERNIA

COMPARAÇÃO DA EFICÁCIA DAS TÉCNICAS DE BLOQUEIO RADICULAR NO TRATAMENTO DA HÉRNIA DE DISCO LOMBAR

COMPARACIÓN DE LA EFICACIA DE LAS TÉCNICAS DE BLOQUEO RADICULAR EN EL TRATAMIENTO DE LA HERNIA DE DISCO LUMBAR

IGOR DE BARCELLOS ZANON[1], CHARBEL JACOB JÚNIOR[2], IGOR MACHADO CARDOSO[2], JOSÉ LUCAS BATISTA JÚNIOR[2], THIAGO CARDOSO MAIA[2], MARCUS ALEXANDRE NOVO BRAZOLINO[2], TADEU GERVAZONI DEBOM[2]

ABSTRACT

Objective: Compare the interlaminar blocking technique with the transforaminal blocking, with regard to pain and the presence or absence of complications. Methods: Prospective, descriptive and comparative, double-blind, randomized study, with 40 patients of both sex suffering from sciatic pain due to central-lateral or foraminal disc herniation, who did not respond to 20 physiotherapy sessions and had no instability diagnosed on examination of dynamic radiography. The type of blocking, transforaminal or interlaminar, to be performed was determined by draw. Results: We evaluated 40 patients, 17 males, mean age 49 years, average VAS pre-blocking of 8.85, average values in transforaminal technique in 24 hours, 7, 21, and 90 days of 0.71, 1.04, 2.33 and 3.84, respectively; the average VAS post-blocking for interlaminar technique was 0.89, 1.52, 3.63 and 4.88. The techniques differ only in the post-blocking period of 21 days and overall post-blocking, with significance of p=0.022 and p=0.027, respectively. Conclusion: Both techniques are effective in relieving pain and present low complication rate, and the transforaminal technique proved to be the most effective.

Keywords: Intervertebral disc displacement; Lumbosacral region; Diskectomy.

RESUMO

Objetivos: Comparar a técnica de bloqueio interlaminar com a de bloqueio transforaminal, quanto ao quadro álgico e a presença ou não de complicações. Métodos: Estudo prospectivo, de caráter descritivo e comparativo, duplo-cego e randomizado, do qual participaram 40 pacientes, de ambos os sexos, portadores de lombociatalgia por hérnia discal, do tipo centrolateral ou foraminal, que não responderam a 20 sessões de fisioterapia e não tiveram instabilidade diagnosticada em exame de radiografia dinâmica. O tipo de bloqueio interlaminar ou transforaminal a ser realizado foi determinado por meio de sorteio. Resultados: Foram avaliados 40 pacientes, 17 do sexo masculino, com média de idade de 49 anos, média da EVA pré-bloqueio de 8,85, valores médios na técnica transforaminal em 24 horas, 7, 21 e 90 dias foram 0,71, 1,04, 2,33 e 3,84, respectivamente; a média da EVA pós-bloqueio pela técnica interlaminar foi 0,89, 1,52, 3,63 e 4,88. As técnicas diferem apenas no período de 21 dias pós-bloqueio e no pós-bloqueio global, com significâncias p = 0,022 e p = 0,027, respectivamente. Conclusão: Ambas as técnicas são eficazes no alívio da dor e apresentam baixa taxa de complicação, sendo a técnica transforaminal a de melhores resultados.

Descritores: Deslocamento do disco intervertebral; Região lombar; Discotomia.

RESUMEN

Objetivo: Comparar la técnica de bloqueo interlaminar con la técnica de bloqueo transforaminal con respecto al dolor y la presencia o ausencia de complicaciones. Métodos: Estudio prospectivo, descriptivo y comparativo, doble ciego y aleatorizado, que incluyó a 40 pacientes de ambos sexos que sufrían de dolor ciático por hernia de disco de tipo de centro-lateral o foraminal, que no respondieron a 20 sesiones de fisioterapia y no tenían diagnóstico de inestabilidad en la exploración por radiografía dinámica. El tipo de bloqueo, transforaminal o interlaminar, a ser realizado se ha determinado por sorteo. Resultados: Se evaluaron 40 pacientes, 17 hombres, edad media 49 años, EVA promedio pre-bloqueo de 8,85, valores medios de la técnica transforaminal en 24 horas, 7, 21 y 90 días de 0.71, 1,04, 2,33 y 3,84, respectivamente; la EVA post-bloqueo promedio de la técnica interlaminar fue de 0,89, 1,52, 3,63 y 4,88. Las técnicas difieren solamente en el período de 21 días post-bloqueo y en el post-bloqueo global, con significaciones de p = 0,022 y p = 0,027, respectivamente. Conclusión: Ambas técnicas son eficaces para aliviar el dolor y tienen una baja tasa de complicaciones, siendo que la técnica transforaminal presentó mejores resultados.

Descriptores: Desplazamiento del disco intervertebral; Región lumbosacra; discectomía.

INTRODUCTION

Lumbar disc herniation is the displacement of the nucleus pulposus contained in the intervertebral disc through the fibrous ring. This displacement can lead to compression and irritation of the lumbar nerve roots and dural sac, and is clinically characterized by sciatic pain.[1]

The etiology of sciatic pain is multifactorial. It can be caused by mechanical compression of the intervertebral disc and by the

1. Santa Casa de Misericórdia de São Paulo, Pavilhão Fernandinho Simonsen, São Paulo, SP, Brazil.
2. Spine Group of the Hospital Santa Casa de Misericórdia de Vitória, Vitória, ES, Brazil.

Study conducted at Hospital da Santa Casa de Misericórdia de Vitória (HSCMV), Vitória, Espírito Santo, Brazil.
Correspondence: Rua Ceará, n. 10 apto. 1004. Praia da Costa, Vila Velha, ES. 29101290. jcharbel@gmail.com

http://dx.doi.org/10.1590/S1808-185120151404152856 Received on 08/04/2015, accepted on 10/13/2015.

release of inflammatory and nociceptive mediators from the nucleus pulposus.[2-8] It is estimated that between 2% and 3% of the population have herniated lumbar discs, with a prevalence of 4.8% in men and 2.5% in women aged over 35 years. It is the most common diagnosis among degenerative alterations of the lumbar spine, and the main reason for surgery.[1]

Initial treatment of herniated disc is usually conservative. Surgical treatment is the exception, and is reserved only for cases of failure of adequate conservative treatment, progressive neurological deficit, or cauda equina syndrome.[1,9] Of the different techniques described in the literature, minimally invasive surgeries are currently more valued because of less tissue aggression, shorter hospitalization times, lower risk of anesthesia, and an earlier return to work activities.[1,8-10]

The root block is a good option among the minimally invasive techniques for the treatment of a herniated lumbar disc. Using this method, it is possible to reduce the inflammatory response, improve the pain profile, reduce the consumption of analgesics, continue work activities, and eliminate the need for surgery in most individuals.[8,11-13]

In patients refractory to appropriate conservative care, radicular block may be indicated in an attempt to delay or even prevent surgery. This can be performed via interlaminar and transforaminal techniques or via the caudal approach (through the sacral hiatus).[1,14,15]

There are few studies found in the literature that compare blocking techniques – interlaminar or transforaminal – to determine which is the safest and most effective. This study was conducted to clear up these doubts and contribute significantly to relieving the symptoms of herniated discs.

METHODS

Forty patients were evaluated in this prospective, randomized, double-blind study. The work was authorized in advance by the Institutional Review Board, under number 015/2012, and the participants signed an informed consent form.

The inclusion criteria for the sample selection were patients with lumbosciatalgia secondary to a herniated disc, in a posterolateral, foraminal, or extraforaminal location, whether contained or uncontained, who did not respond after 20 physiotherapy sessions, and without instability diagnosed in a dynamic radiograph of the lumbar spine. We considered instability to be an angulation of the vertebral plateaus of 18º and excursion of more than 3 mm in the dynamic lumbar profile radiographs.[16]

The exclusion criteria were patients with lumbosciatalgia caused by factors other than herniated disc, those who responded to conservative treatment in 20 physiotherapy sessions, or those with dynamic instability observed in the radiograph.

The visual analog scale (VAS) was applied to all patients both pre- and postblock.[4,6,17] The blocking technique to use was determined by random draw. The number 1 represented the transforaminal technique and the number 2, the interlaminar.

The transforaminal blocking technique was performed with the patient in ventral decubitus, with a cushion under the abdomen. All patients were submitted to blocking of at least one level. We used a fluoroscopy apparatus to obtain the anteroposterior image and to identify the desired level of the spine, followed by an ipsilateral oblique "Scotty dog" angle. The six o'clock position of the pedicle was marked and infiltrated with 1% lidocaine using a 25-caliber 1.5-inch needle. A 22-caliber 3.5-inch Tuohy needle was directed towards the spine, with intermittent fluoroscopic guidance in the neural foramina such that the tip rested on the triangle formed by the nerve root medially, the pedicle bone superiorly, and the lateral edge of the foramina laterally. The position of the needle was confirmed by observing the flow of 2 mL of 68% Ioversol contrast medium with 320 mg/mL of iodine in concentration injected into each level. Once the placement was confirmed, a solution was injected consisting of 3 mL of betamethasone phosphate at 40mg/mL, 2 mL of neo-bupivacaine at 0.25%, and 5 mL of distilled water, to make up a total volume of 10 mL.[3,5,6,12,18] (Figures 1 and 2)

Figure 1. Transforaminal block. Fluoroscopic image.

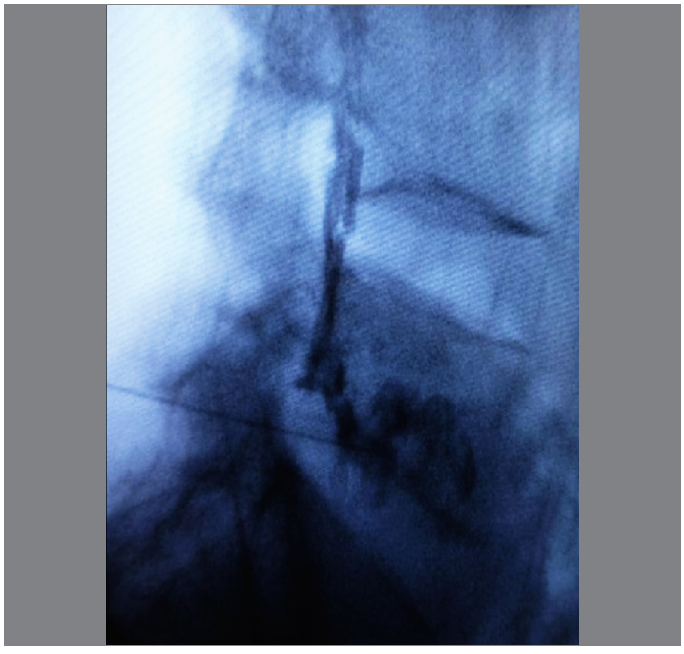

Figure 2. Transforaminal block (in profile – for adequate viewing of the distribution of the contrast). Fluoroscopic image.

For the patients who underwent the interlaminar technique, we used a position similar to that of the transforaminal technique. The upper edge of the inferior ipsilateral lamina was marked, and the skin and tissue covering the target location were infiltrated. A lack of resistance is the key sign for having entered the epidural space. Once inserted into the epidural space, a lateral fluoroscopic view was obtained to ensure that the point of the needle remained in the posterior epidural space and the same volumes of the same medications as described for the transforaminal technique were injected. (Figures 3 and 4)

Following the block, the patients used the same analgesic medication in the hospital and upon discharge. The medication of choice was dipyrone 500 mg every six hours in the event of pain. The patients were only referred for motor physical therapy 90 days after the block. The VAS was applied immediately before

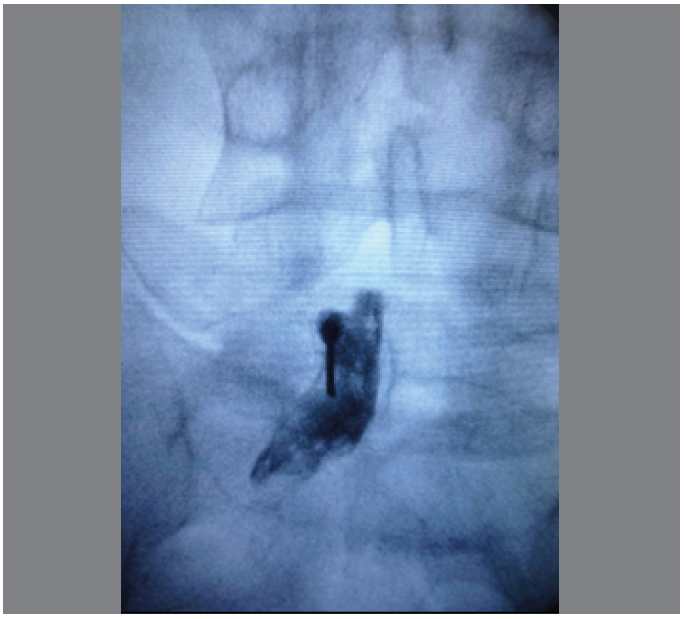

Figure 3. Interlaminar block. Fluoroscopic image.

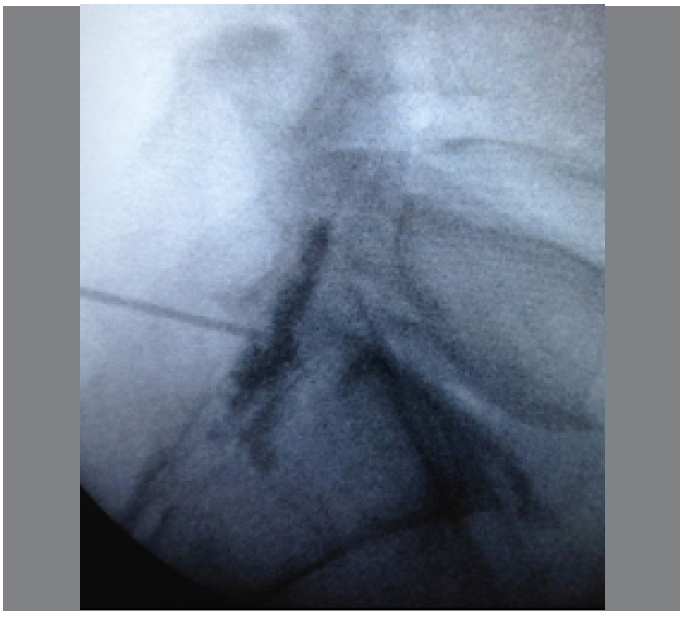

Figure 4. Interlaminar block (in profile – for adequate viewing of the distribution of the contrast). Fluoroscopic image.

the analgesic block, after 24 hours, and at 7, 21, and 90 days. Complications such as headache, sudden pain, lower back pain, temporary motor deficit, permanent motor deficit, and leakage of cerebrospinal fluid were clinically evaluated and described in specific medical reports.[19,20]

The pre- and post-evaluators were not told which technique was used for the patient, and they worked independently during the post-block follow-up period.

We used statistical analysis with parametric tests to evaluate the data with normal distribution, such as the analysis of the results of the transforaminal technique while in cases without normal probability distribution we used non-parametric tests. In this case, the statistical analysis was applied to the analysis of the results for the interlaminar technique, and to the comparison of the results of two techniques. For the estimate of the post-block average, a new set of data was generated using the results from each period, for each patient.

RESULTS

Of the 40 patients analyzed, 17 were male; the average age was 49.45 years. Twenty patients underwent the transforaminal blocking technique and 20 underwent the interlaminar blocking technique. In the interlaminar block group the average age was 50.05 years and of the 20 patients, 10 were male (50%) and 10 were female (50%). In the transforaminal block group, the average age was 48.85 years, with 7 male (35%) and 13 female (65%) patients.

Comparing the pre-block VAS scores with those from the 24 hour, 7, 21, and 90 day periods for both techniques, we found statistically significant results ($p<0.05$) for the entire period, regardless of the technique applied, as shown in Figure 5.

Analyzing and comparing the average VAS scores for the specific periods, we observed that the transforaminal technique had better outcomes in all the periods analyzed, as shown in Table 1.

When we analyzed the average score of the pre-block VAS and the average final post-block score between the two techniques, we observed a statistical difference in both, as shown in Table 2.

In the comparison of the final post-block average VAS between the transforaminal and interlaminar techniques, we observed a statistically significant greater improvement in pain with the transforaminal technique, as shown in Table 3.

As regards the various existing complications, we cite only two; one

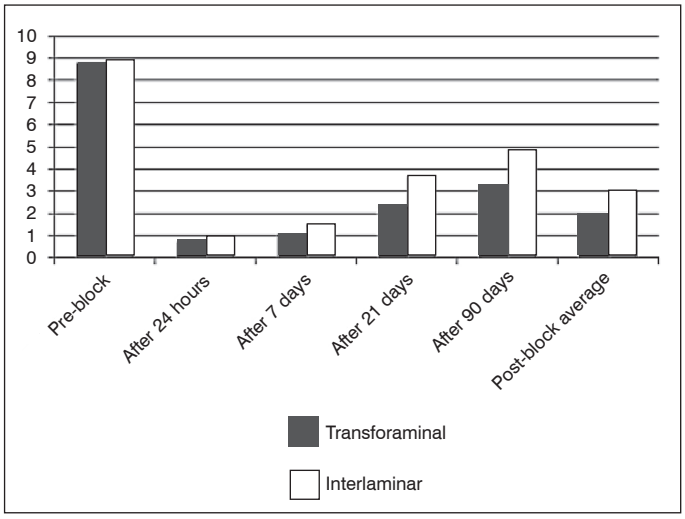

Figure 5. Comparison of the average VAS scores for the two techniques used, by period.

Table 1. Comparison of the average VAS scores for the techniques, by period.

	Pre-block	after 24 hrs.	after 7 days	after 21 days	after 90 days
Transforaminal technique	8.81	0.71	1.05	2.33	3.84
Interlaminar technique	8.89	0.89	1.53	3.65	4.88
p value	0.774	0.492	0.256	0.022	0.195

Mann-Whitney Test (Comparison of two nonparametric independent samples).

Table 2. VAS averages – global pre- and post-block.

Average pre-block VAS	Average post-block VAS	p Value
8.85	2.32	0.000

p – Wilcoxon Statistical Significance Test (comparison of two dependent samples).

Table 3. VAS averages – post-block by technique

Pre-block	Post-transforaminal	Post-interlaminar	p value
8.85	1.97	2.71	0.027

p – Mann-Whitney Statistical Significance Test (comparison of two nonparametric independent samples).

case of lower back pain in the transforaminal technique group, and one case of headache in the interlaminar group. In the patient with the headache, the dura mater was not punctured during the procedure.

DISCUSSION

Radicular blocks can be a good propaedeutic in the relief of symptoms and the restoration of quality of life in patients with herniated discs.

Among the various techniques described, the interlaminar, the transforaminal, and the caudal approach are the most frequently used. In terms of effectiveness, several studies have unequivocally shown that epidural injections of steroids are effective for what they propose, although they offer only short- to medium-term benefits.[6,11,12,21]

In our study we found significant improvement in the post-block pain profile, regardless of the technique used. Most studies indicate greater safety and less lumbar discomfort as the advantages of the interlaminar technique,[22,23] while the transforaminal technique is more effective in reducing pain in the long term.[13-15,18,22-24]

In terms of the pain profile, we observed that even though there was an improvement from both techniques, the transforaminal technique was more effective in reducing the pain profile, especially after 21 days post-block, and this improvement continued through to the end of the study.

Regarding the safety of the procedure, both techniques proved to be safe in our study, and there were no significant complications.

We believe that radicular blocks are a safe option, with good results for relief from sciatica caused by herniated discs in the medium term.

CONCLUSION

The transforaminal blocking technique was safer and more effective in the treatment of sciatic pain secondary to herniated lumbar disc, when compared to the interlaminar technique.

ACKNOWLEDGEMENTS

To Dr. Rodrigo Rezende and the members of the Spine Surgery Group.

All authors declare no potential conflict of interest concerning this article.

REFERENCES

1. Vialle LR, Vialle EM, Henao JES, Giraldo G. Hérnia discal lombar. Rev Bras Ortop. 2010;45(1):17–22.
2. Sociedade Brasileira de Ortopedia e Traumatologia; Sociedade Brasileira de Neurofisiologia Clínica; Federação Brasileira das Associações de Ginecologia e Obstetrícia; Sociedade Brasileira de Neurocirurgia; Colégio Brasileiro de Radiologia. Projeto Diretrizes: Hérnia Discal Lombar no Adulto Jovem. São Paulo: Associação Médica Brasileira e Conselho Federal de Medicina; 2007. Disponível em: http://www.projetodiretrizes.org.br/7 volume/29- hernia.sc.lom.adul.pdf. [Acesso em 15/12/2012].
3. Tachihara H, Sekiguchi M, Kikuchi S, Konno S. Do corticosteroids produce additional benefit in nerve root infiltration for lumbar disc herniation? Spine (Phila Pa 1976). 2008;33(7):743-7.
4. DePalma MJ, Bhargava A, Slipman CW. A critical appraisal of the evidence for selective nerve root injection in the treatment of lumbosacral radiculopathy. Arch Phys Med Rehabil. 2005;86(7):1477-83.
5. Fish DE, Lee PC, Marcus DB. The S1 "Scotty dog": report of a technique for S1 transforaminal epidural steroid injection. Arch Phys Med Rehabil. 2007;88(12):1730-3.
6. 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.
7. Kumar N, Gowda V. Cervical foraminal selective nerve root block: a 'two-needle technique' with results. Eur Spine J. 2008;17(4):576-84.
8. Ng L, Chaudhary N, Sell P. The efficacy of corticosteroids in periradicular infiltration for chronic radicular pain: a randomized, double-blind, controlled trial. Spine (Phila Pa 1976). 2005;30(8):857-62.
9. Postacchini F. Management of herniation of the lumbar disc. J Bone Joint Surg Br. 1999;81(4):567-76.
10. Chou R, Atlas SJ, Stanos SP, Rosenquist RW. Nonsurgical interventional therapies for low back pain: a review of the evidence for an American Pain Society clinical practice guideline. Spine (Phila Pa 1976). 2009;34(10):1078-93.
11. Sousa FA, Colhado OC. Lumbar epidural anesthesia in the treatment of discal lombosciatalgia: a comparative clinical study between methylprednisolone and methylprednisolone with levobupivacaine. Rev Bras Anestesiol. 2011;61(5):544-55.
12. Sayegh FE, Kenanidis EI, Papavasiliou KA, Potoupnis ME, Kirkos JM, Kapetanos GA. Efficacy of steroid and nonsteroid caudal epidural injections for low back pain and sciatica: a prospective, randomized, double-blind clinical trial. Spine (Phila Pa 1976). 2009;34(14):1441-7.
13. 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.
14. Abdi S, Datta S, Lucas LF. Role of epidural steroids in the management of chronic spinal pain: a systematic review of effectiveness and complications. Pain Physician. 2005;8(1):127-43.
15. Abdi S, Datta S, Trescot AM, Schultz DM, Adlaka R, Atluri SL, et al. Epidural steroids in the management of chronic spinal pain: a systematic review. Pain Physician. 2007;10(1):185-212.
16. White AA, Panjabi MM. Clinical biomechanics of the spine. 2nd ed. Lippincott: Philadelphia; 1990.
17. Murata Y, Kanaya K, Wada H, Wada K, Shiba M, Hatta S, et al. The effect of L2 spinal nerve root infiltration for chronic low back pain: GP169 [abstract]. Spine: Affiliated Society Meeting Abstracts, 2011. Disponível em: http://journals.lww.com/spinejournalabstracts/Fulltext/2011/ 10001/The Effect of L2 Spinal Nerve Root Infiltration.165.aspx. [Acesso em 15/12/2012].
18. Weiner BK, Fraser RD. Foraminal injection for lateral lumbar disc herniation. J Bone Joint Surg Br. 1997;79(5):804-7.
19. Goodman BS, Posecion LW, Mallempati S, Bayazitoglu M. Complications and pitfalls of lumbar interlaminar and transforaminal epidural injections. Curr Rev Musculoskelet Med. 2008;1(3-4):212-22.
20. Karaman H, Kavak GO, Tüfek A, Yldrm ZB. The complications of transforaminal lumbar epidural steroid injections. Spine (Phila Pa 1976). 2011;36(13):E819-24.
21. Stafford MA, Peng P, Hill DA. Sciatica: a review of history, epidemiology, pathogenesis, and the role of epidural steroid injection in management. Br J Anaesth. 2007;99(4):46173.
22. Jasper JF. Lumbar Retrodiscal Transforaminal Injection. Pain Physician. 2007;10(3):501-10.
23. Gharibo CG, Varlotta GP, Rhame EE, Liu EC, Bendo JA, Perloff MD. Interlaminar versus transforaminal epidural steroids for the treatment of subacute lumbar radicular pain: a randomized, blinded, prospective outcome study. Pain Physician. 2011;14(6):499-511.
24. Anderberg L, Säveland H, Annertz M. Distribution patterns of transforaminal injections in the cervical spine evaluated by multi-slice computed tomography. Eur Spine J. 2006;15(10):1465–71.