Caudal Epidural Block Outcomes in Economically Active Patients With Low Back Pain

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ABSTRACT

Introduction: Low back pain is a very common health problem worldwide and a major cause of disability, affecting performance at work and general well-being. It is included in the priority diseases list of the World Health Organization (WHO). Low back pain is one of the leading causes of work absence worldwide. The caudal epidural block is a popular approach in managing lumbar pain conditions in adults. **Materials and Methods:** An observational, descriptive, retrospective study was conducted in our institution, from January 2017 to January 2019, on patients who had undergone caudal epidural block for low back pain. We excluded patients with a history of previous epidural blocks, lumbar surgery, or who were lost to follow up. We collected patient demographic and clinical data (including age, sex, etc) and procedure outcomes (pain score, surgery performed, lost working days, and return to work activity). **Results:** 38 patients were included. Mean age was 43 (27- 62) years old. Mean pain scores 3 months after treatment were 3.5 (2 – 6) with a difference of 4.5 (IQR -2.7 – -7) from baseline values. This was statistically significant. 55.3% (n=21) of patients returned to active duty in the first month; it is important to note that 52.4% of those (n=11) did it after the first week. **Conclusions:** The improvement of pain scores after the procedures was statistically significant. The mean return to work at the end of the first month was 55.3%, and 76.2% of those (N= 16) did it after the first two weeks.

Key words: Caudal epidural injection; caudal block; missing working days; low back pain; return-to-work.

Level of Evidence: IV

Resultados del bloqueo epidural caudal en pacientes laboralmente activos con dolor lumbar

RESUMEN

Introducción: El dolor lumbar es una de las entidades categorizadas por la Organización Mundial de la Salud como enfermedades prioritarias y una de las principales causas de ausentismo laboral. El bloqueo caudal epidural es una técnica anestésica utilizada para tratar el dolor lumbar de diversos orígenes. **Materiales y Métodos:** Se realizó un estudio observacional descriptivo retrospectivo en pacientes sometidos a bloqueo caudal guiado por radioscopia, entre el 1 de enero de 2017 y el 31 de enero de 2019. Se excluyó a los pacientes con bloqueo caudal previo, con antecedente de cirugía de columna lumbar y a quienes abandonaron el seguimiento. Se registraron variables relacionadas con el paciente y los resultados del procedimiento (dolor según la escala analógica visual, intervención quirúrgica posterior, actividad laboral posterior y licencia médica solicitada). **Resultados:** Se incluyó a 38 pacientes (media de la edad 43 años [rango 27-62]). La mediana de dolor a los tres meses fue de 3,5 (rango 2-6), con una diferencia de 4,5 (RIC de -2,7 a -7) respecto del puntaje basal. Estas diferencias fueron estadísticamente significativas (p <0,001). El 55,3% retornó al trabajo al primer mes, y el 52,4% de ellos (n = 11) solo requirió una semana de licencia. **Conclusiones:** Los valores del dolor a corto plazo luego del procedimiento se modificaron de forma estadísticamente significativa respecto de los valores basales. El promedio de reinserción laboral al mes fue del 55,3% (n = 21), y el 76,2% de ellos (n = 16) lo hizo a las dos semanas.

Palabras clave: Inyección epidural caudal; bloqueo caudal epidural; días laborales perdidos; dolor lumbar; retorno al trabajo.

Nivel de Evidencia: IV

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INTRODUCTION

Low back pain is one of the entities categorized by the World Health Organization as priority diseases, since it is a health problem in the world and affects quality of life and job performance. The prevalence in adults is around 70% and it is the leading cause of absenteeism in much of the world. The socioeconomic impact of this entity caused a boom in the adequate and timely management and treatment to improve the quality of life, speeding up the return to work.[1,2]

Caudal epidural blocks were first described in 1901 as a blind technique guided by anatomical landmarks, with high failure rates, to treat various causes of low back pain. It was only in 1940 that this procedure resurfaced when Higson et al. described its use in anesthesia for labor and later with the Dawkins study that reflected a low percentage of complications. At present, it is a widely disseminated anesthetic technique in children and adults for the non-surgical management of low back pain of various origins, despite the fact that its outcomes are controversial.[3-7]

In the world, the incidence of chronic low back pain is increasing and, given the great individual and governmental socioeconomic impact that it causes, non-surgical therapeutic techniques have gained importance. Among them, caudal block is one of the most widespread, since it reaches the lower lumbar levels, one of the main sites of the condition, with a low percentage of complications.

The short-term effect of the application of corticosteroids has been demonstrated; on the other hand, its long-term effect (after 12 weeks) is not so clear and the medical literature reflects the controversies.[7-11]

The objective of this study is to report on the work reintegration of patients with low back pain who underwent caudal epidural block. The secondary objectives are to report the improvement in pain in the short term after the procedure and the results obtained in different conditions.

MATERIALS AND METHODS

Design

A retrospective descriptive observational study was carried out at the "Victorio Franchín" Sanatorium of the Autonomous City of Buenos Aires, Argentina, between January 1, 2017, and January 31, 2019. The Sanatorium is an institution dependent on the health insurance of construction workers (OSPECON).

Ethical considerations

This study was approved by the Ethics and Research Committee of the institution. Given its retrospective nature, the informed consent of the participants was not requested and personal information was preserved by encryption in a database exclusively accessed by the researchers.

Eligibility criteria

All patients who had undergone fluoroscopy-guided caudal block within the study period were included. Those cases with previous caudal block, with a history of lumbar spine surgery, and those who abandoned the follow-up were excluded.

Data collection

The information was organized in a database developed by the same researchers from the patients' medical records. Missing information was collected through questioning during follow-up visits.

Variables related to the patient (age, sex, etc.) and the results of the procedure (pain according to the visual analog scale, subsequent surgical intervention, subsequent work activity and requested medical leave) were recorded.

Procedure

The procedures were carried out in the operating room of the sanatorium, on an outpatient basis, with peripheral venous access and monitoring, and were in charge of the spinal team of the Orthopedics and Traumatology Service of the "Victorio Franchín" Sanatorium. All participating health personnel used radioprotection equipment (lead aprons with thyroid shields).

The patients were placed in the prone position, with enhancement at the pelvic level. Skin antisepsis was performed with povidone-iodine solution and sterile drapes were placed. By palpating anatomical landmarks, the

sacral hiatus was located (identifying the posterior superior iliac spines, the coccyx, and the sacral cornua), the skin was infiltrated with 2% lidocaine, and a 22G needle was placed in the sacral hiatus. A fluoroscopic guide was used to control the position and the needle was progressed to the third sacral vertebra. Once the proper position of the needle was verified, 10 ml of physiological solution were introduced, followed by a mixture of 2 ml of lidocaine without 2% epinephrine and 2 mg/ml of triamcinolone.

Leave of absence was indicated for 72 h after the procedure and the controls were carried out at three weeks and three months after it.

Statistical analysis

Categorical variables are expressed as absolute number of presentation and percentage. Continuous variables that assumed a normal distribution are expressed as average and standard deviation (SD) or as median and interquartile range (IQR). To verify the distribution of the sample, the Shapiro-Wilk test was used.

To compare pain before and after the intervention, we used Student's t-test for related samples or the Wilcoxon signed-rank test for related samples, as appropriate. Comparisons between independent groups of variables were made with the Student's t-test for independent samples or the Mann-Whitney U-test, as appropriate.

Data were analyzed with the IBM SPSS Macintosh program, version 24.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The procedure was indicated to 61 patients and was performed in 56 cases. Ten patients were excluded because they were in the postoperative period of lumbar surgery or had had a previous block, four abandoned the follow-up and four could not be included due to incomplete data in the medical records. Three were withdrawn due to interference and two refused to participate. Therefore, 38 patients were included in the analysis. The average age of the sample was 43 years (min. 27- max. 62). Twelve (31.6%) were women. The rest of the characteristics of the sample are detailed in Table 1.

Table 1. Characteristics of the sample

Variables	n = 38
Female sex, n (%)	12 (31.6)
Age, average (SD), years	43.3 (10.2)
Reason for consultation, n (%)	
Low back pain	15 (39.5)
Sciatica	23 (60.5)
Diagnosis, n (%)	
Lumbar spinal stenosis	6 (15.8)
Central disc disease	22 (57.9)
Posterolateral disc disease	5 (13.2)
More than one condition	5 (13.2)
Affected level, n (%)	
L3/L4	1 (2.6)
L4/L5	7 (18.4)
L5/S1	14 (36.8)
L3/L4/L5/S1	16 (42.1)
Baseline pain, median (IQR)	9 (8-9)

IQR = interquartile range, SD = standard deviation.

The median pain evaluated at three months was 3.5 points (range 2-6), with a difference of 4.5 points (IQR -2.7 to -7) in relation to the baseline score. These differences were statistically significant (p <0.001) (Figure 1).

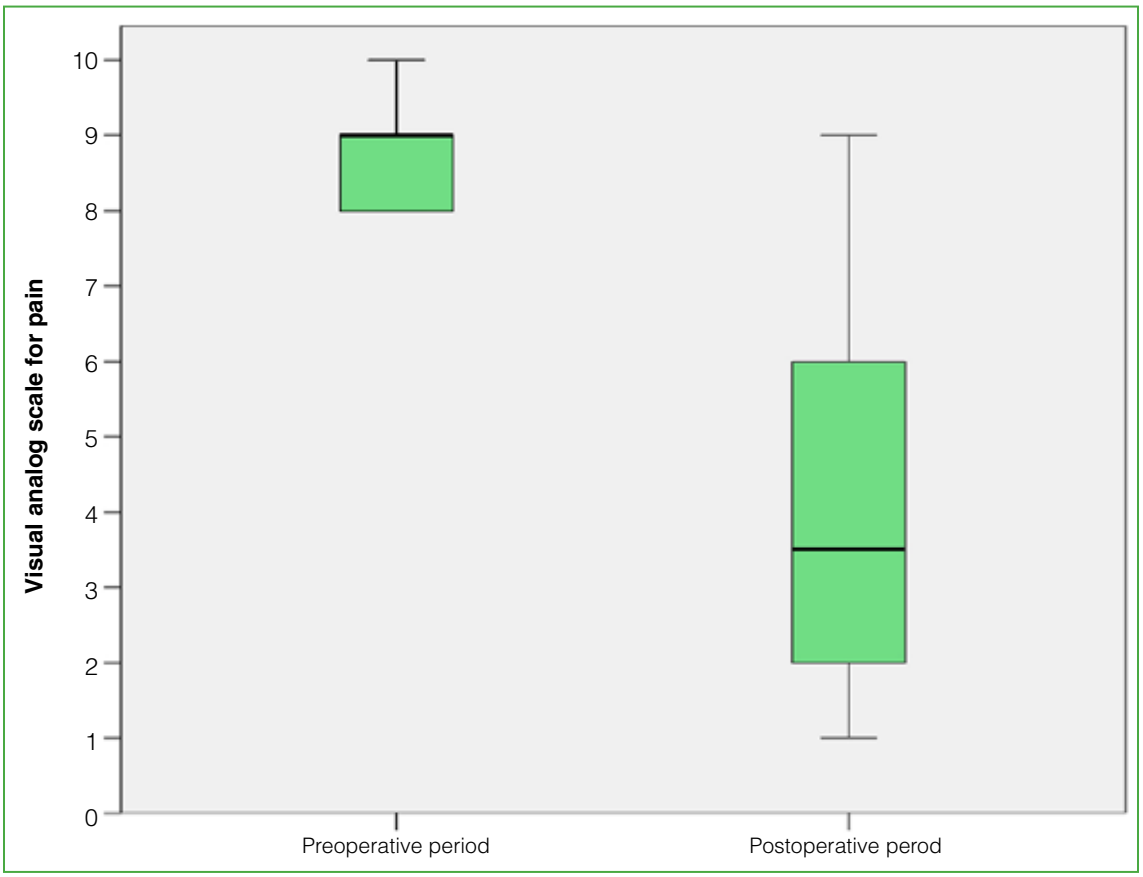

Figure 1. Pain values before surgery and three months after the procedure.

Patients with posterolateral disc disease had a 7-point change (IQR 1.5-7) in pain compared to those with central disc disease and a narrow lumbar canal, who presented a decrease of 5 (IQR 2-7) and 4.5 (IQR 2.25-5.5) points, respectively. The change was 4 points (IQR 3.5-6.5) in patients with more than one diagnosis (Table 2).

Regarding the reason for consultation, the change in pain was 5 (IQR 4-7) in patients with low back pain and 4 (IQR 2-7) in those with sciatica. These differences were not statistically significant (p = 0.18).

Five patients (13.1%) required surgery. Two were operated on within a month.

Twenty-one (55.3%) patients required a leave of absence of up to four weeks. Of them, 11 (52.4%) required a week; five (23.8%), up to two weeks; three (14.3%) and two (9.5%), 4 weeks (Figure 2).

Twenty-two (57.9%) kept their job, eight (21.1%) changed it, and eight (21.1%) lost it.

Table. Changes in pain according to diagnosis

Diagnosis	n	Preoperative pain	Postoperative pain	Difference
Lumbar spinal stenosis	6	8.5 (8-9)	4 (2.7-6.5)	4,5 (2,2-5,5)
Central disc disease	22	9 (8-9)	3 (2-6)	5 (2-7)
Posterolateral disc disease	5	9 (9-10)	3 (2-8)	7 (1.5-7)
More than one condition	5	10 (8-10)	4 (2.5-6.5)	4 (3.5-6.5)

Values expressed as median and interquartile range.

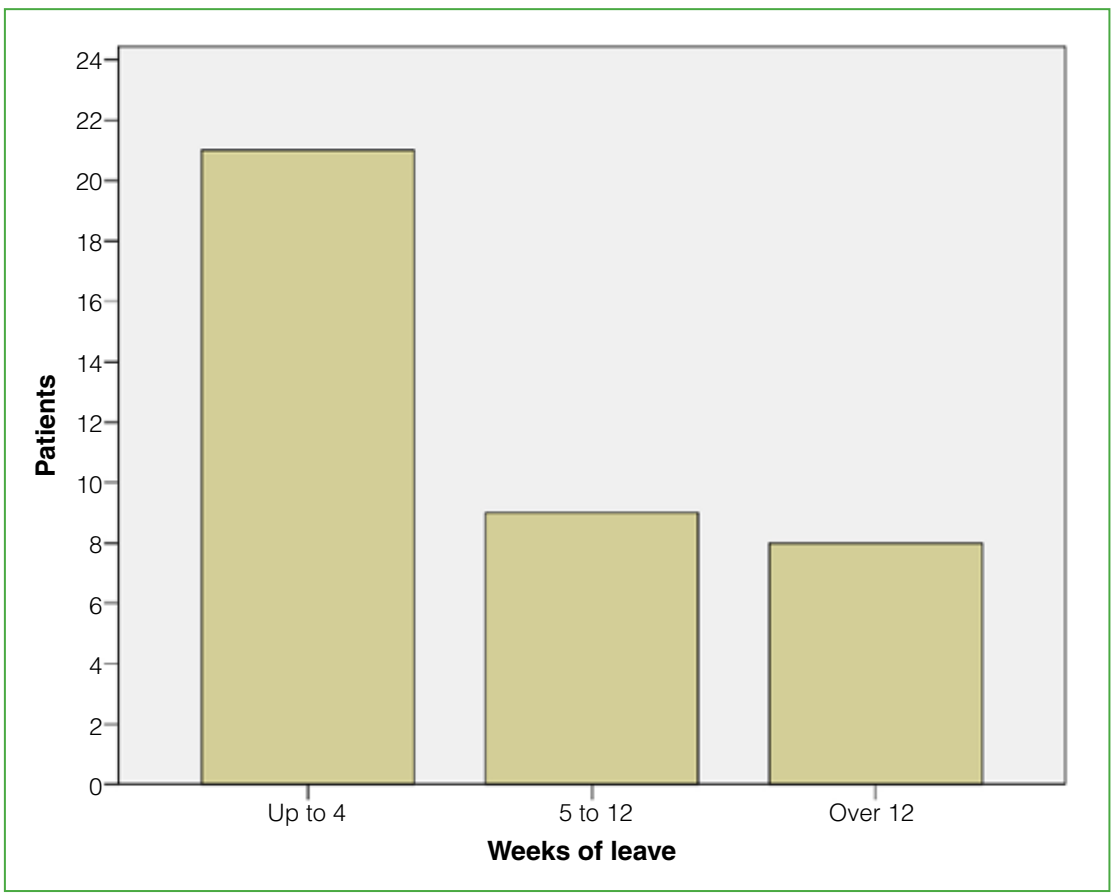

Figure 2. Weeks of leave per patient.

DISCUSSION

The lumbar epidural space can be accessed via the interlaminar, foraminal, or caudal route. In the first case, the medication is placed at the site where the source of pain is assumed; the foraminal pathway requires less volume, as it is even more specific. Despite the fact that it requires greater volumes, the caudal approach is considered the easiest and best access route, with minimal risks of injury to the dural sac and the advantage of reaching different levels affected.[7-9]

The local anesthetic used was lidocaine without epinephrine. Regarding the corticosteroid, there are publications on the use of various corticosteroids, mainly triamcinolone, betamethasone, and methylprednisolone. In this study, we administered triamcinolone.

The elements to ensure the correct positioning of the needle in the sacral canal are: 1) anatomical landmarks and 2) fluoroscopic or ultrasound guidance. The anatomical feature is the sacral hiatus, formed by the dysraphy of the posterior arch of the fifth, and less frequently, the fourth sacral vertebra. Its lateral limits are the sacral cornua, formed by the remnants of the inferior articular processes elongated downwards. As these landmarks may not be palpable (when they measure <3 mm), especially in obese people, another landmark is an equilateral triangle formed by the posterior superior iliac crests and the sacral hiatus.[11-14]

Various publications show that, in children, blind access has high success rates (96%); however, in adults, it decreases (68-75%) even in experienced hands. For this reason, the fluoroscopic or ultrasound guides are currently preferred, arising as an option to reduce the radiation used and as an easily accessible element.[11-13] In our usual practice, we use the fluoroscopic guide.

The mechanism of action of the corticosteroid and local anesthetic administered by this route has not been fully elucidated. The achieved neural transmission block is believed to alter or interrupt nociceptive afferents and pain transmission pathways. Corticosteroids decrease inflammation through inhibition of the synthesis or release of pro-inflammatory mediators and with a reversible local anesthetic effect. The local anesthetic causes a short-term symptomatic improvement by blocking the nociceptive discharge, blocking axonal transport and the sympathetic reflex arc, which in turn produces a long-term effect, probably due to a plastic modification of the transmission of afferent information from nociceptors.[8,9]

Conflicting outcomes have been published on the efficacy of this treatment for low back pain of various origins. The first systematic review was carried out by Kepes and Duncalf in 1985, and these authors found no justification for performing this procedure. In 1986, Benzon's group obtained good outcomes with the administration of corticosteroids for cases of low back pain, mainly those that present with nervous irritation. Since that time, multiple studies have been conducted, some of them with conflicting results.[9]

In a literature review, Conn et al. found level I evidence for the efficacy of caudal block, in the short and long term (cut-off point, 6 months) for low back pain secondary to lumbar disc disease, radiculopathy, and discogenic pain; but not for those secondary to narrow canal or post-laminectomy syndrome, where the evidence decreases to level II-III.[8]

Likewise, Parr et al. found good evidence on the efficacy of the treatment for low back pain secondary to discopathy and radiculitis, but not for axial pain, canal stenosis and post-laminectomy syndrome.[9] In agreement with these authors, we have obtained worse results in patients with lumbar spinal stenosis. In a recent systematic review, Oliveira et al. found moderate-quality evidence for the efficacy of epidural corticosteroid injections in patients with sciatica. However, the analysis carried out included publications with various approaches to the epidural space (foraminal, caudal, and interlaminar) and various corticosteroids (prednisolone, triamcinolone, and methylprednisolone).[7]

The World Health Organization defines low back pain as the leading entity in health-related economic expenditure. In the United States, it amounts to more than 100 billion dollars annually and is one of the main causes of work absenteeism and the most common cause of occupational disability. It mainly affects workers between the ages of 35 and 55.[1,14,15]

In the systematic review by Wynne-Jones et al., the rate of return to work was 68% after a month. In our study, 55.3% returned to work in the first month, and 52.4% of them (n = 11) only required one week of leave.

Only in the United States of America, annualized days lost due to this cause are estimated at 149 million. This causes an expense not only in the treatment of the condition, but also in the decrease in production (primary and secondary expenses).

In our country, the days lost in the field of construction are among the highest in the national economy. According to the 2007 Statistical Report of the Ministry of Labor, Employment, and Social Security, 4,080 days were lost for every thousand workers and it was the second cause of absenteeism from work. In the 2017 statistics, the average of lost working days in the construction sector was 32.4.[16-18]

For construction health insurances, caudal blocks represent an average value that is close to ARS 35,000 (value calculated according to the operating room hourly rates). Although it is a significant cost, we try to reduce the days lost due to work inactivity to two weeks, as in 42% (n = 16) of the patients in our study. This could have a significant impact on the cost per days lost (decreasing the approximate average from 32 to 15 days) (cost data from the sanatorium's administration).

The limitations of this study are its retrospective design, the small number of the sample, and that it belongs to a population with heavy work activity, which may condition some of the results.

We highlight as a strength of the study that the procedures were performed by the Spine Team, under fluoroscopic guidance. This could be related to the good outcomes after two weeks, by reducing the rate of errors in the procedure.

CONCLUSIONS

The average rate of work reintegration per month was 55.3% (n = 21); it should be noted that 76.2% of them (n = 16) returned to work after two weeks. The pain values three months after the procedure were statistically significantly modified with respect to the baseline values. Patients with lumbar spinal stenosis had the worst outcomes, those with posterocentral and posterolateral disc disease had similar outcomes.

Conflict of interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. WHO. Priority Medicines for Europe and the World 2013 Update. Available at: https://www.who.int/medicines/areas/priority_medicines/Ch6_24LBP.pdf
2. Duthey B. Update on 2004 Background Paper, BP 6.24 Low back pain. Priority Medicines for Europe and the World. "A Public Health Approach to Innovation". WHO. Available at: https://www.who.int/medicines/areas/priority_medicines/BP6_24LBP.pdf
3. Cortiñas Sáenz M, Iglesias Cerrillo JA, Cano Navarro G, Salmerón Cerezuela J, Quirante Pizarro JA, Carricondo Martínez MI, et al. Bloqueo caudal en dolor crónico lumbar. ¿Es necesario el apoyo radiológico para disminuir los fallos de la técnica? *Rev Soc Esp Dolor* 2012; 19(4): 174-80. Available at: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1134-80462012000400003
4. Higson RA, Edwuars WB. An analysis of the first ten thousand confinements managed with continuous caudal analgesia with a report of the authors, first one thousand cases. *JAMA* 1943;123(9):538-46. https://doi.org/10.1001/jama.1943.02840440020006
5. Dieng P, Diouf E, Diene JF. Caudal epidural anesthesia in 70 children. *Dakar Med* 1994;39:95 7. PMID: 7493530
6. Dawkins CJM. An analysis of the complications of extradural and caudal block. *Anaesthesia* 1969;24(4):554-63. https//doi.org/10.1111/j.1365-2044.1969.tb02909.x
7. Oliveira CB, Maher CG, Ferreira ML, Hancock MJ, Oliveira VC, McLachlan AJ, et al. Epidural corticosteroid injections for sciatica. *Spine (Phila Pa 1976)* 2020;45(21): E1405-E1415. https://doi.org/10.1097/BRS.0000000000003651
8. Conn A, MD, Buenaventura RM, Datta S, Abdi S, Diwan S. Systematic review of caudal epidural injections in the management of chronic low back pain. *Pain Physician* 2009;12:109-35. PMID: 19165299
9. Parr AT, Manchikanti L, Hameed H, Conn A, Manchikanti KN, Benyamin RM, et al. Caudal epidural injections in the management of chronic low back pain: a systematic appraisal of the literature. *Pain Physician* 2012; 15(3):E159-E198. PMID: 22622911
10. Nandi J, Chowdhery A. RCT to determine effectiveness of caudal epidural steroid injection in lumbosacral sciatica. *J Clin Diagn Res* 2017;11(2): RC04-RC08. https://doi.org/10.7860/JCDR/2017/21905.9392
11. Kao SC, Lin CS. Caudal epidural block: an updated review of anatomy and techniques. *Biomed Res Int* 2017;2017: 9217145. https://doi.org/10.1155/2017/9217145

12. Waldman SD. Caudal epidural nerve block: prone position. In: Waldman SD, (ed.). *Atlas of interventional pain management*. 2nd ed. Philadelphia: Saunders; 2004: 380-92.
13. Stitz MY, Sommer HM. Accuracy of blind versus fluoroscopically guided caudal epidural injection. *Spine (Phila PA 1976)* 1999;24(13):1371-6. https://doi.org/10.1097/00007632-199907010-00016
14. Aggarwal A, Aggarwal A, Harjeet, Sahni D. Morphometry of sacral hiatus and its clinical relevance in caudal epidural block. *Surg Radiol Anat* 2009;31(10):793-800. https://doi.org/10.1007/s00276-009-0529-4
15. Low Back Pain Fact Sheet. NIH. NINDS, Publication date December 2014. Publication No. 15-5161. Available at: https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Fact-Sheets/Low-Back-Pain-Fact-Sheet
16. Wynne-Jones G, Cowen J, Jordan JL, Uthman O, Main CJ, Glozier N, et al. Absence from work and return to work in people with back pain: a systematic review and meta-analysis. *Occup Environ Med* 2014;71(6):448-56. https://doi.org/10.1136/oemed-2013-101571
17. Estadísticas sobre Accidentabilidad Laboral. Ministerio de Trabajo, Empleo y Seguridad Social, Superintendencia de Riesgos del Trabajo 2007. Available at: www.infoleg.gob.ar/basehome/actos_gobierno/actosdegobierno7-12-2009-3.htm
18. Departamento de Estudios y Estadísticas. Informe Anual de Accidentabilidad Laboral 2017. Ciudad Autónoma de Buenos Aires: Superintendencia de Riesgos del Trabajo. Available at: https://www.argentina.gob.ar/sites/default/files/informe_anual_de_accidentabilidad_laboral_-_ano_2017.pdf