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Epidural steroid injections in chronic discogenic low back pain treatment

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Abstract. Background. Low back pain (LBP) remains one of the most common problems of the spinal column and chronic pain syndromes. It is a frequent cause of disability, and the treatment expense is quite high. Nowadays, there are three methods of treatment for discogenic pain: physiotherapy, drug therapy and surgery. Interventional treatment of discogenic pain by injecting drugs into the epidural space can equally be attributed to both minimally invasive surgery and active target therapy. The purpose of this study is to research the dynamic of pain among patients suffering from chronic discogenic low back pain taking epidural steroid injections as the treatment. **Materials and methods.** The retrospective study included 74 patients aged from 25 to 83 years (53.86 ± 14.27) treated from 2015 to 2017 in Neuromed Clinic and Uzhgorod Regional Center of Neurosurgery and Neurology. After a comprehensive examination, a therapeutically resistant chronic discogenic LBP was diagnosed in all patients. We applied interlaminar and transforaminal injections of corticosteroids under a radiological control of the C-arm. A total of 35 (47 %) transforaminal epidural injections, or blockades and 39 interlaminar epidural blocks were performed. Depending on the localization, the manipulations performed were distributed as follows: at L5-S1 level — 36 (48 %), at L4-L5 level — 17 (23 %), at L3-L4 level — 12 (16 %) and at L2-L3 level — 9 (12 %). Pain syndrome was assessed using a 10-point visual analogue scale (VAS) before manipulation, 7 and 30 days after treatment. **Results.** No complications were registered. All patients have reported a pain reduction. Most patients, right before the manipulation, complained about “a very strong or unbearable” pain ($VAS 7.01 \pm 0.86$), and a week after the procedure, the majority of the patients confirmed that their pain turned to a “mild or sometimes moderate” ($VAS 3.68 \pm 0.87$). A similar trend persisted a month after the manipulation ($VAS 1.98 \pm 1.01$). **Conclusions.** Epidural injection of corticosteroids is a safe and effective way to treat a chronic lower back pain. This intervention technique can significantly reduce the intensity of suffering.

Keywords: low back pain; discogenic pain; epidural corticosteroids

Introduction

Low back pain (LBP) remains one of the most common problems of the spinal column and chronic pain syndromes in general [1]. In the US, it's one of the prevalent causes of long-term disabilities [2]. In Ukraine, up to 20 % of the working population get permanently disabled due to this condition [3]. In the Great Britain, 37 % of insurance payments were LBP-associated, while in the Netherlands, the cumulative annual LBP costs make 4, 2 billion euros [4, 5]. Direct and indirect expenses incurred by the US due to LBP patients account for an astronomical annual amount of 200 billion dollars [6]. Nowadays, there are three methods

of treatment for discogenic pain: physiotherapy, medication and surgery. The first one is usually performed at the early stage of degenerative-dystrophic spinal changes, and as a part of rehabilitative complex. A significant disadvantage of the conservative pharmacological therapy is an absence of direct influence on the pathological substrate, reducing its effectiveness and promoting the chronization. Moreover, pharmacological therapy is usually associated with serious side effects. Surgical methods, lacking the above-mentioned disadvantages, have a higher risk of intra- and post-operative complications, recurrences, aggravation of the condition and even disability [7]. Interventional treat-

ment of discogenic pain by injecting drugs into the epidural space can equally be attributed to both minimally invasive surgery and active targeted therapy.

Epidural steroid injections were first performed to treat the discogenic LBP and radiculopathies in the USA in 1950s, and since then are most often used to tackle pain [8, 9, 10, 11]. Corticosteroids suppress inflammatory mediators (Phospholipases A2 (PLA2s)) in the epidural space, prevent Group C unmyelinated fibers ectopic damage and reduced centralized sensitization [12, 13, 14]. In the clinical practice, there are three methods of epidural injection: interlaminar, transforaminal and caudal one. Axial and radicular pains originate in the dural funnel of the spinal nerve and posterior radix's ganglia. It is only logical to suggest that a transforaminal injection is preferable as the medication is delivered straight into the anterior epidural space, where the disc-radicular conflict occurs [15, 16]. However, the studies show a similar degree of efficacy for all three methods (Level of evidence: II) [17, 18]. The technical characteristics of manipulations vary in terms of their complexity and potential complications. Thus, a choice of method is up to the healthcare provider relying on the individual conditions. Among the essential requirements of the procedure there are an X-ray control (C-arch, Q-arch, CT), adequate venous access and vital function monitoring. It is necessary to provide at least an hour-long observation after the manipulation [12, 19]. For this procedure, several different corticosteroid types may be recommended [20]. Their combination with a local anesthetic is also up to the healthcare provider's decision [19].

The purpose of this study is to research the dynamic of pain among patients suffering from chronic discogenic low back pain taking epidural steroid injections as the treatment.

Materials and methods

The retrospective study included 74 patients aged from 25 to 83 years (53.86 ± 14.27) treated from 2015 to 2017 in "Neuromed" Clinic (Kyiv) and Uzhgorod Regional Center of Neurosurgery and Neurology. Among them 46 were female (62%) and 28 were male (37%). All the examined patients suffered from LBP irradiating into the lower limbs. The symptoms lasted over 6 weeks, i.e. the pain was chronic. During the pre-procedural period, the patients had undergone a conservative treatment with NSAIDs, Pregabalin Gabapentin, physiotherapeutic procedures with no apparent effect. All of the patients had had a complex standard examination: functional spondilography, MRI, X-ray densitometry, CT, neurological evaluation. Patients with lumbosacral disk extrusions up to 7 mm and minor spinal stenosis were included in the study. Among the exclusion criteria there were earlier operations of the respective spinal-locomotor segment; epidural steroid injections in the previous 2 months; a long-term corticosteroid therapy *per os* in case of concomitant

pathologies; pregnancy; cognitive disorders; anti-coagulant treatment; osteoporosis. Pain syndrome was assessed using a 10-point visual analogue scale (VAS) before manipulation, 7 and 30 days after it was carried out. Statistical analysis was performed using Statistica 10 software (StatSoft. Inc. USA). Before undergoing the procedure, all of the patients signed the Informed consent form №003-6/o. Epidural injections were made in the surgery with the patient lying prone. Fluoroscopic control was carried out by means of C-arch. We applied interlaminar and transforaminal injections of corticosteroids. The method was chosen depending on the prevailing (either uni- or bilateral) root symptomatic complex and anatomical spinal features (interlaminar and intervertebral space sizes).

While performing the interlaminar injections, the following algorithm was adhered to. The patient was instructed to lie down at the X-ray-negative table. The primary fluoroscopic visualization detected the required interlaminar space. The patient's skin was treated with antiseptics while the manipulation area was demarcated with sterile films. The local anesthesia of skin and underlying tissues was performed with 1% lidocaine solution. After that, a Tuohy 18G needle for percutaneous injection was inserted along the medial line between two adjacent spinous processes in the direction of the above-located basis. As soon as the needle's point reached a yellow ligament, the mandarin was removed. Using the 'resistance loss' method, the healthcare provider used his/her syringe to penetrate the epidural space. After a negative aspirational test (no blood or spinal fluid), 0,5 – 1,0 ml of iohexol solution (350 mg/ml) were introduced to confirm epidural penetration. Control fluoroscopy was carried out both in the frontal and lateral projection (Fig. 1).

The medication contained 4 mg of dexamethasone and 4,0 ml of 0,25% lidocaine solution. After the manipulation was over, aseptic bandage was kept on the area for 4-6 hours. Post-procedural observation with an hour-long bed confinement included neurological evaluation, vital function control and awareness testing. All of the patients were recommended to keep exertions to a minimum for 3 days.

Preparation prior to a transforaminal injection of corticosteroids was similar, the only difference being a tunnel method of visualization. In this case, initial positioning is performed in the C-arch oblique projection with a 20-25° angle to the ipsilateral side. After a 1% lidocaine solution local anesthesia, a 22G needle is moved into a safe intervertebral space area. This area is a triangle with the following sides: the upper one is a vertebral arch root, the lateral one is a vertebral edge, the medial one is a spinal nerve edge. Aspirational test was performed to reveal any blood or spinal fluid. 0,5–1,0 ml of iohexol solution (350 mg/ml) were introduced to confirm epidural penetration. Control fluoroscopy was carried out both in the frontal and lateral projection; however, the former was found more informative (Fig. 2).

Composition of medication was similar to the one used in the interlaminar injections. Post-procedural actions and recommendations did not differ either. A total of 35 (47%) transforaminal epidural injections, or blockades (TFEB) and 39 interlaminar epidural blocks (ILEB) were performed. In terms of localization, the performed manipulations were distributed as follows: at the L5S1 level - 36 (48%), at the L4L5 level - 17 (23%), at the L3L4 level - 12 (16%) and at the L2L3 level - 9 (12%) (Fig. 3).

Results and discussion

No septic or hemorrhagic complications were registered. There were no perforations of spinal cord sheath, or motor block reported in the examined group.

All patients reported a pain reduction. At statistical data show that most patients, right before the manipulation, complained of a "very strong or unbearable" pain (VAS $7,01 \pm 0,86$), and a week after the procedure, the majority confirmed that their pain turned to a "light or sometimes moderate" (VAS $3,68 \pm 0,87$). This description often referred to an inevitable discomfort following the injection. A similar trend persisted a month after the manipulation (VAS $1,98 \pm 1,01$) though becoming less pronounced (Fig. 4).

In this regard, we need to emphasize the most pronounced pain reduction in the middle-aged and young patients. It is attributed to the more debilitating degenerative-dystrophic spinal changes in the elderly people and increased centralized sensitization

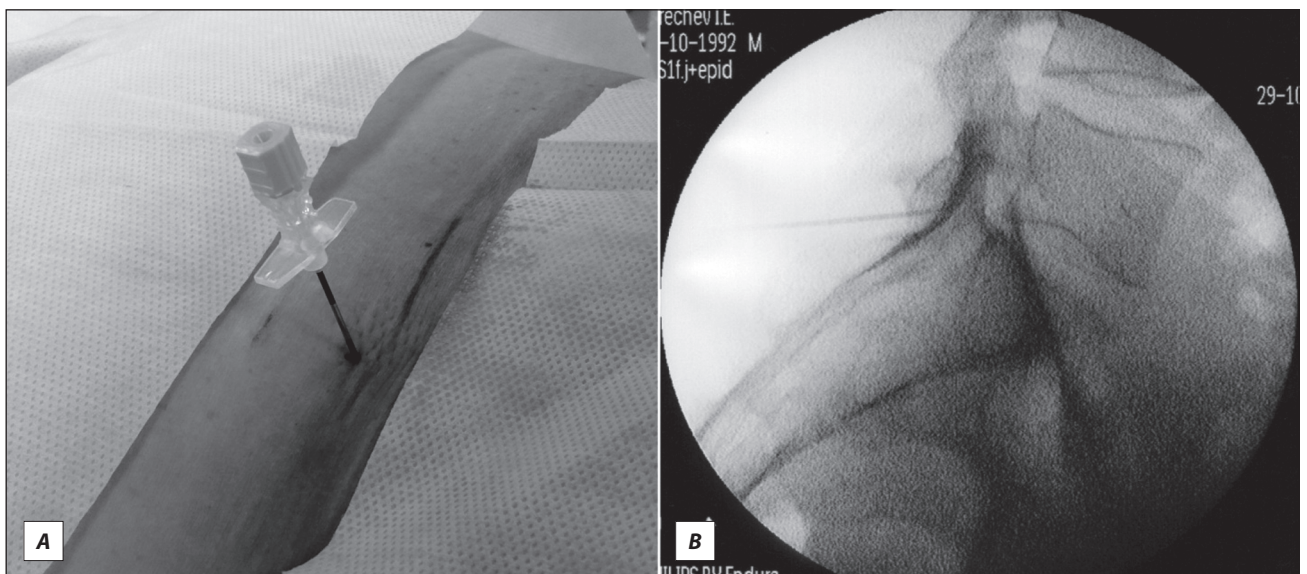


Fig. 1. Interlaminar epidural corticosteroid injection at the L5S1 level (on the left: Tuohy needle is introduced into the interlaminar space; on the right: X-ray control of contrasting agent spread in the epidural space, lateral projection)

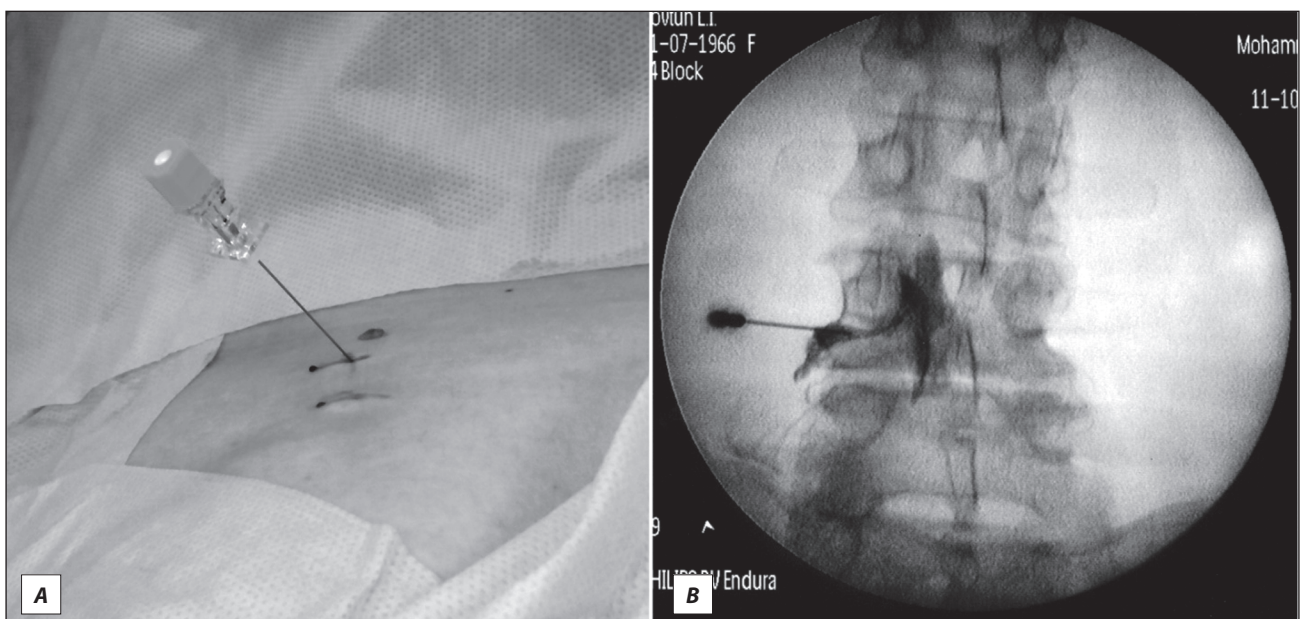


Fig. 2. Transforaminal epidural corticosteroid injection at the left L4L5 level (on the left: 22G needle is introduced into the intervertebral space; on the right: X-ray control of contrasting agent spread in the epidural space, frontal projection)

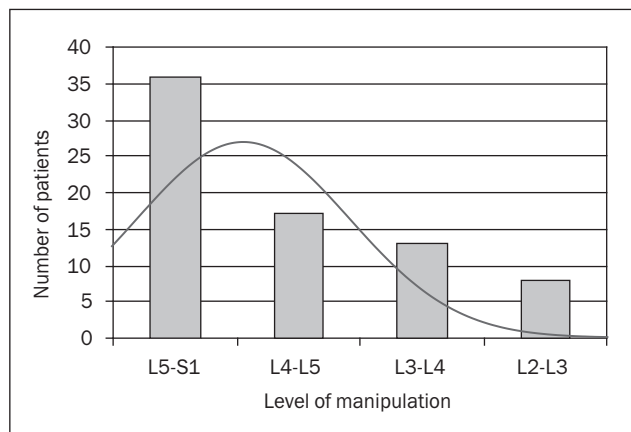


Fig. 3. Distribution of patients according to the level of manipulation

level. All the employed patients returned to their jobs in due time.

Unfortunately, our study was not without limitations: first and foremost, absence of a placebo group which we considered unethical taking into account the pronounced pain syndrome. Secondly, medication spread in the epidural space was evaluated according to the contrasting agent, though their characteristics differ to a certain extent.

Conclusions

Epidural injection of corticosteroids is a safe and effective way to treat a chronic lower back pain. This intervention technique can significantly reduce the intensity of suffering. It is a reasonable alternative to a long-term NSAID treatment and to an early and unnecessary surgery.

Information of the authors' individual contributions.

Smolanka VI. Concept and design of the study.

Fedurtsia VM. Collection and processing of study materials.

Pavlov BB. Analysis of the data, writing of the text.

Conflicts of interests. Authors declare the absence of any conflicts of interests that might be construed to influence the results or interpretation of their manuscript.

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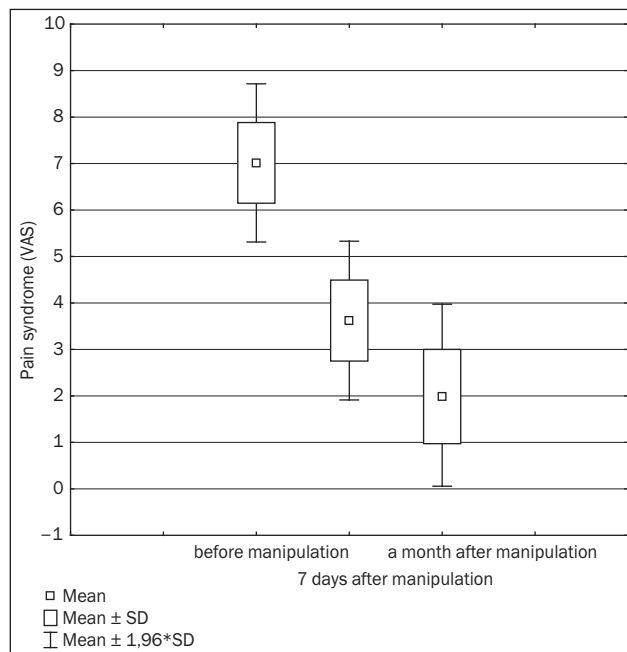


Fig. 4. Dynamics of pronounced pain syndrome: before manipulation – 7 days after manipulation – a month after manipulation. There are mean values (Mean), standard deviations (Mean ± SD.), maximal and minimal value variation (Mean ± 1,96*SD) presented according to a 10-point visual analogue scale (VAS)

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Епідуральне введення кортикостероїдів у лікуванні хронічного дискогенного болю в нижній частині спини

Резюме. *Актуальність.* Біль у нижній частині спини залишається однією з найпоширеніших проблем хребетного стовпа та хронічних больових синдромів взагалі. Вона є частою причиною втрати працездатності, а витрати на неї вражають значністю сум. На сьогодні існують три напрямки лікування дискогенного болю — фізіотерапевтичний, медикаментозний і хірургічний. Інтервенційне лікування дискогенного болю шляхом введення лікарських препаратів у епідуральний простір однаковою мірою можна віднести як до малоінвазивної хірургії, так і до активної таргетної терапії. *Мета дослідження* — вивчити динаміку больового синдрому в пацієнтів, які страждають від хронічного дискогенного болю в нижній частині спини, при використанні в їх лікуванні епідуральних стероїдних ін'єкцій. *Матеріали та методи.* У ретроспективне дослідження включено 74 пацієнти віком від 25 до 83 років (середній вік — $53,86 \pm 14,27$ року), пролікованих із 2015 по 2017 рік у клініці «Нейромед» м. Києва та Ужгородському обласному центрі нейрохірургії та неврології. У всіх досліджуваних після комплексного обстеження діагностовано терапевтично-резистентний хронічний дискогенний біль у нижній частині спини. Нами застосовувалося інтраламбарне та трансфорамінальне введення кортико-

стероїдів під радіологічним контролем С-дуги. Всього було виконано 35 (47 %) трансфорамінальних епідуральних ін'єкцій, або блокад, і 39 інтраламбарних епідуральних блокад. За локалізацією проведені маніпуляції було розподілено наступним чином: на рівні L5-S1 — 36 (48 %), на рівні L4-L5 — 17 (23 %), на рівні L3-L4 — 12 (16 %) і на рівні L2-L3 — 9 (12 %). Больовий синдром оцінювався за 10-бальною візуально-аналоговою шкалою (ВАШ) перед маніпуляцією, через 7 і 30 днів після її проведення. *Результати.* Ускладнень не зареєстровано. Абсолютно всі пацієнти відзначали зниження больового синдрому. Більшість пацієнтів до маніпуляції характеризували свій біль як «дуже сильний, на межі з нестерпним» ($7,01 \pm 0,86$ за ВАШ), а через тиждень після процедури більшість вже описували больові відчуття як «легкі, часом помірні» ($3,68 \pm 0,87$ за ВАШ). Така тенденція зберігалася і через місяць після маніпуляції ($1,98 \pm 1,01$ за ВАШ). *Висновки.* Епідуральне введення кортикостероїдів є безпечним і ефективним способом лікування хронічного болю в нижній частині спини. Ця інтервенційна методика дозволяє істотно знизити інтенсивність страждання.

Ключові слова: біль у нижній частині спини; дискогенний біль; епідуральне введення кортикостероїдів

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Эпидуральное введение кортикостероидов в лечении хронических дискогенных болей в нижней части спины

Резюме. Актуальность. Боль в нижней части спины остается одной из самых распространенных проблем позвоночного столба и хронических болевых синдромов в целом. Она является частой причиной утраты трудоспособности, а затраты на ее лечение поражают внушительностью сумм. На сегодняшний день существуют три направления лечения дискогенной боли — физиотерапевтический, медикаментозный и хирургический. Интервенционное лечение дискогенной боли путем введения лекарственных препаратов в эпидуральное пространство в одинаковой степени можно отнести как к малоинвазивной хирургии, так и к активной таргетной терапии. **Цель исследования** — изучить динамику вертебрального болевого синдрома у пациентов, страдающих хроническими дискогенными болями в нижней части спины, при использовании в их лечении эпидуральных стероидных инъекций. **Материалы и методы.** В ретроспективное исследование включены 74 пациента в возрасте от 25 до 83 лет (средний возраст — $53,86 \pm 14,27$ года), пролеченных с 2015 по 2017 год в клинике «Нейромед» г. Киева и Ужгородском областном центре нейрохирургии и неврологии. У всех испытуемых после комплексного обследования диагностированы терапевтически резистентные хронические дискогенные боли в нижней части спины. Нами применялось интерламинарное и трансфораминальное введение кортикостеро-

идов под радиологическим контролем С-дуги. Всего было выполнено 35 (47 %) трансфораминальных эпидуральных инъекций, или блокад, и 39 интерламинарных эпидуральных блокад. По локализации проведенные манипуляции распределились следующим образом: на уровне L5-S1 — 36 (48 %), на уровне L4-L5 — 17 (23 %), на уровне L3-L4 — 12 (16 %) и на уровне L2-L3 — 9 (12 %). Болевой синдром оценивался по 10-балльной визуально-аналоговой шкале (ВАШ) перед манипуляцией, спустя 7 и 30 дней после ее проведения. **Результаты.** Осложнений не зарегистрировано. Абсолютно все пациенты отмечали снижение болевого синдрома. Большинство пациентов до манипуляции характеризовали свою боль как «очень сильную, на грани с невыносимой» ($7,01 \pm 0,86$ по ВАШ), а спустя неделю после процедуры большинство уже описывало болевые ощущения как «легкие, временами умеренные» ($3,68 \pm 0,87$ по ВАШ). Подобная тенденция сохранялась и через месяц после манипуляции ($1,98 \pm 1,01$ по ВАШ). **Выводы.** Эпидуральное введение кортикостероидов является безопасным и эффективным способом лечения хронических болей в нижней части спины. Эта интервенционная методика позволяет существенно снизить интенсивность страдания.

Ключевые слова: боль в нижней части спины; дискогенная боль; эпидуральное введение кортикостероидов