

Scientific Paper

**SACRAL EPIDURAL STEROID INJECTIONS USED
FOR THE PREVENTION OF HAMSTRING INJURIES**

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Károly Szalai, Árpád Illyés

Department of Orthopaedics, Semmelweis University, Budapest, Hungary
E-mail: illyes_arpad@hotmail.com

Abstract. *Hamstring injuries can be a severe risk in the career of a professional athlete. The authors suppose that the origin of chronic hamstring pain can be neurogenic; therefore, sacral epidural steroid injections were used for the treatment of the condition. The aim of the study was to assess the effectiveness of the therapy with sacral epidural steroid injections. According to strict criteria, 25 elite athletes (11 males and 14 females), mostly track and field runners, were selected for the follow-up study. A fractionated sacral epidural steroid injection (SEI) was administered once, rarely twice within a 4-week interval. The injection consisted of 8ml 1% Lignocain, 2ml 80mg/ml DepoMedrol and 10 ml 0, 25% Marcain (bupivacain). A visual analogue scale (VAS) on hamstring discomfort and/or pain was taken prior to and 3, 6, 12, 18, 24, 30, 36, 42, 48 and 54 weeks after the epidural injection. The recovery time and the time the athletes spent without pain and/or uninjured were also observed. Hamstring pain and discomfort significantly decreased by the time of the follow up. The average time for reaching painless high level training sessions were 3 weeks after the injections. One half of the duration of the therapy was 37 weeks. Our results indicate that in the case of hamstring pain the condition can be treated and injuries can be prevented effectively by sacral epidural steroid injections. By administering these injections, the effectiveness of training sessions can indirectly be increased and the possibility of hamstring injuries can be decreased.*

Key words: *hamstring injury, prevention, sacral epidural injection, lumboschialgia, sport*

INTRODUCTION

The most frequent injury among professional and recreational athletes is muscle strain or rupture, due to which heavy training must be suspended for 6-8 weeks after which there is a gradual return to physical activity at the previous level. The most common

cause of muscle injuries are inappropriate warm-ups, overtraining, a generally weak condition and a lack of regular stretching exercises. On the other hand, other orthopedic or neurological conditions may also be the cause of muscle injuries.

Runners, especially sprinters, often complain of hamstring discomfort or pain. Strain or rupture of the hamstring muscles can have a great effect on the career of an athlete, as being injured for several weeks may easily lead to the end of the whole season. By continuous training and stretching of the hamstring muscles, athletes can assure appropriate muscle balance (Yamanoto, 1993) and thus injuries due to heavy physical loads can be prevented. Some studies explored that chemical radiculitis and inappropriate stability of the lower back can cause chronic hamstring pain (Hennessey & Watson, 1993; Turl & George, 1998; Vad et al., 1998a; Vad et al., 2000; Worrell, 1994).

Several years of experience has shown that in addition to the causes listed above, neurogenic reasons are also supposed to lead to hamstring injuries in track and field runners of the Hungarian National Team. Almost anything, such as any degenerative changes of the spine, disc herniation etc., or simply an uncontrolled movement of the lower back can cause a slight inflammation of the nerve roots that as a consequence may change the basal tone of the hamstring muscles. At this stage athletes feel discomfort, rarely pain at rest. During training or heavy exercise the contractions between the flexor and extensor muscles are disturbed and this can lead to muscle injury. Treating such conditions with epidural steroid injections seems to be effective.

The guiding idea of our study was to suspect neurogenic causes in the case of any negative ultrasound results, MRI or electrophysiologic findings. In our paper we examine the effectiveness of sacral epidural steroid injections in relation to time of recovery, the return to training without pain, and the appearance of severe muscle injuries.

METHODS

Between January 2000 and March 2001, 62 professional athletes with sciatic pain were treated at our clinic. Following a detailed anamnesis and physical examination the patients were divided into the following groups (1) those with isolated lower back pain (2) those with positive clinical findings on the MRI and/or ultrasound examination (3) those with negative clinical findings on the MRI.

Sacral epidural steroid injections (SEI) were administered to the last group to solve the problem of pain and discomfort in the hamstring muscle group in 29 cases (all of them were track and field athletes). Our indicating criteria was (1) discomfort or pain in the hamstring muscles during exercise that made the athlete unable to train at a high level; (2) unsuccessful conservative therapy which lasted for at least two months and was carried out by immobilization, local iontophoresis, non steroids per os or locally, stretching or special gymnastic programs; (3) a lack of neurological signs; (4) no clinical findings of soft tissue involvement in the hamstring muscles (a negative ultrasound examination as well). No neurological deficit was found in the lumbosacral MRI results and no electrophysiological changes could be detected. Tenderness of the upper Valleix-points was important. Furthermore, Lasegue's sign was negative in the classical sense, but upon lifting the lower extremities, discomfort or pain was generated in the hamstring muscles. The same discomfort appeared symmetrically or asymmetrically during exercise.

As part of the follow up study, data collected from 25 patients (11 male and 14 female) was selected. The average age was 24.2 years (SD 4.1 years), the average height 182.9 cm (SD 23.9 cm), and the average mass 72.1 kg (SD 3.4 kg). All the patients were top athletes with a special interest to get back to their high level training as soon as possible. On average, they had exhibited symptoms up to three months prior to the administration of the SEI (from one month –up to one and a half years.) Their complaints are listed in Table 1.

Table 1. Patient complaints (N=25)

	At rest	While running	In all
Lower back pain	6 (24%)	11 (44%)	17 (68%)
Hamstring discomfort/pain	9 (36%)	16 (64%)	25 (100%)
Gluteal pain	0	3 (12%)	3 (12%)
Hip pain	1 (4%)	3 (12%)	4 (16%)

Patients treated with SEI were divided into three groups according to the pathology shown on the MRI. In Group I there were no changes in the MRI results. In Group II, initial degenerative changes could be seen. In Group III, disc herniation could be observed (Table 2). Most of the patients (20/25) had no disc herniation or any other causes of spinal stenosis. In five of our patients with a herniated disc there were no neurological deficiencies. Due to the increasing severity of their symptoms, four of the patients with a herniated disc were operated on in other institutes. They were eliminated from the follow up study.

Table 2. Lumbosacral MRI

Group A: MR – negative	10 (7 female 3 male)
Group B: MR - protrusio, prolapsus, other degenerative changes in the joints	10 (4 female, 6 male)
Group C: MR - disc herniation	5 (2 female, 3 male)

We administered steroid injection (8 ml 1% Lignocain, 2 ml 80 mg/ml DepoMedrol, 10 ml 0, 25 % bupivacain) in the sacral epidural space. Following the treatment an easy training program was allowed for the first two weeks. The patients could return to their original training program if they experienced no pain while exercising. If the therapeutic result was not satisfactory, but there was some positive development, the treatment was repeated after four weeks.

Visual analogue scales (VAS) on hamstring discomfort and/or pain were implemented prior to and 3, 6 and 12 weeks after the epidural injection. The recovery time and the time the athletes spent without pain and/or uninjured were also observed.

A paired t-test was used for comparing groups before and after the treatment and at different post-operative intervals. An unpaired t-test was used for a comparison of the groups. The level of statistical significance was set at 0.05.

In addition, the patients were also asked to evaluate their personal experiences with the sacral epidural injections and to compare them to other conservative methods they were treated with before. They also subjectively evaluated the effectiveness of the therapy. The physical examinations were made by the same two doctors on all patients.

RESULTS

The hamstring pain/discomfort reached the score of 68.8 (SD 15.5) on the VAS before the therapy. Afterwards it dropped significantly to 7.4 (SD 19.8 and $p < 0.01$) (Fig. 1). Before the SEI all the 25 patients were not able to train at their highest level, while 4 weeks after the therapy 22 of them were able to do physical exercises with maximum performance (88%). The average recovery time was 3 weeks (Fig. 2). The time spent without any complaints is shown by the Kaplan-Maier curve. Half of the duration of the therapy was 37 weeks. Significant differences could be observed in the time spent without feeling any pain between the three groups. The duration of the therapy was shorter in the case of the patients who had severe MRI findings (Fig. 3). Ninety two percent of our patients were satisfied with this therapy (Fig. 4).

In one case a patient sustained partial hamstring muscle rupture which was picked up by an ultrasound examination within one week after the SEI, which happened when he was taking part in a competition – against our orders. Therefore, this patient was eliminated from the follow up study.

There were no complications after the application of the sacral epidural steroid injections.

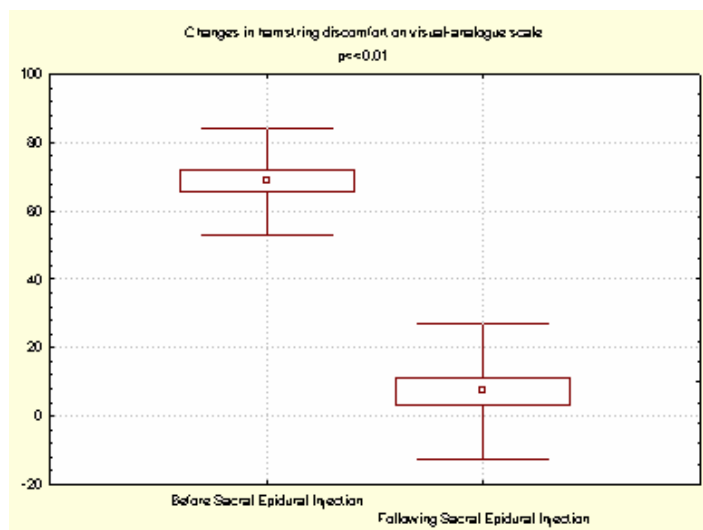


Fig. 1. Hamstring discomfort according to the VAS
 Prior to SEI - Mean: 68,8; Std.Dev.: 15,5; Std.Err.: 3,1
 Following SEI - Mean: 7,4; Std.Dev.: 19,8; Std.Err.: 3,9*
 * The first time the patient considered himself capable of maximal physical effort (Recovery time)

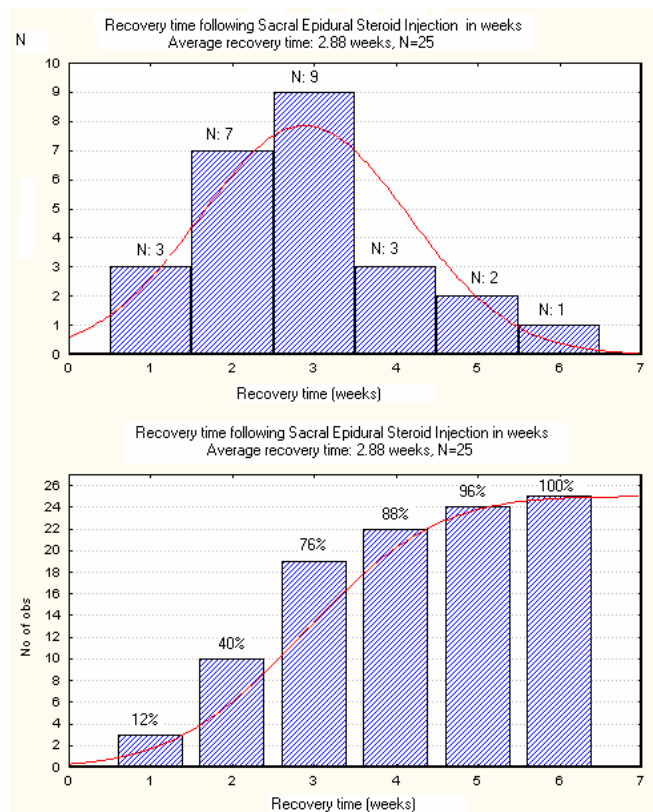


Fig. 2. Recovery time – in weeks

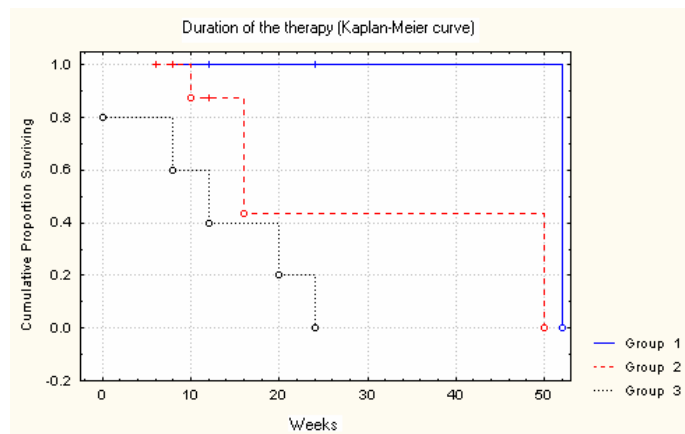


Fig. 3.a. Duration of the therapy – in weeks

1. Group A: MR – negative
2. Group B: MR – protrusio, prolapsus
3. Group C: MR – disc herniation

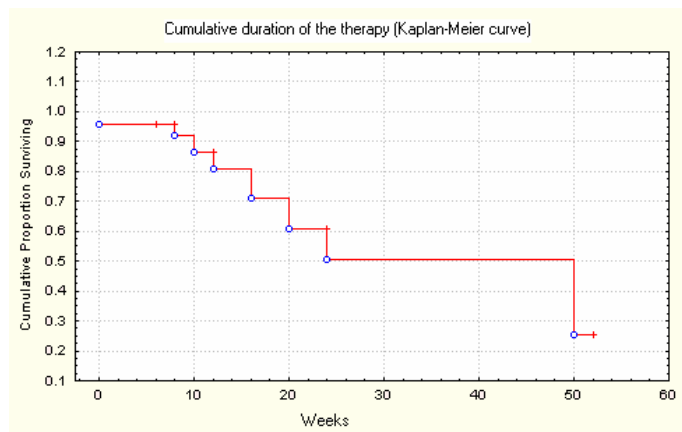


Fig. 3.b. Cumulative duration of SEI – in weeks
50% of the duration: 37 weeks

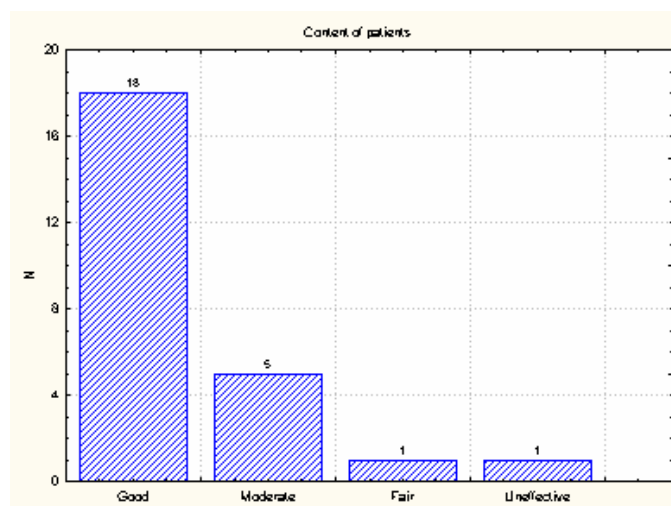


Fig. 4. Content of patients
Perfect: N: 18
Much better: N: 5
Slightly better: N: 1
Ineffective: N: 1

DISCUSSION

Resistance to maximal physical effort is a basic requirement for obtaining top results in athletics. Pain in the hamstring muscles may interrupt training for a long period of time, sometimes for the whole season. During the period of rest the professional athletes' stamina decreases. Early recovery must be achieved but we have to be wary of causing any other complications with an aggressive treatment that could alter the professional athletes' health.

On the basis of the research of Vad et al. (2000) we supposed that mainly neurological causes lead to most hamstring muscle injuries. Following a negative soft tissue ultrasound examination, and a lumbosacral MRI a neurological examination was also performed with the help of a neurology specialist. It was also observed that the electrophysiological test with skin electrodes indicated no differences in H and M potentials. According to the findings of Vad et al. (2000) needle electrodes could show spontaneous activity in the L5 myotome only in similar cases.

The neurological and physical examination indicated that no matter what the trigger mechanism in the lumbar spine that leads to nerve root inflammation/edema is, hyperesthesia develops in the nerves which causes a higher basal tone in the muscles. Thus, stimulus threshold decreases, and during maximal efforts, muscle contraction occurs sooner and the amplitude of the contraction is higher than usual. This can easily lead to an injury. Following sacral epidural steroid injections the hypersensitivity of the nerve roots was decreased by decreasing the epidural and perineural inflammation (Apathy et al., 1999; Cannon & Aprill, 2000). Normal basal tone of the muscles is set again, and the strength of maximal muscle contraction will be normal and equal on both sides, and the muscle group will gain back its muscle trainability. Our findings suggest that at least two weeks are needed to reach painless, normal muscle contraction status after sacral epidural steroid injections. In the case when nerve root hyperesthesia has lasted for a longer period, the time necessary for complete recovery will be longer and epidural steroids may have to be taken again. Strengthening the lumbosacral muscles is a very important rehabilitation step that follows healing and goes in step with it (Vad et al., 1996).

The result of our study showed that the administration of a single epidural steroid injection, according to the criteria given above, is an effective treatment for professional athletes besides any traditional conservative methods. The disadvantage of the conservative methods, as we suggest, is that no healing can be observed for two months. The advantage of epidural steroid injection treatment is that the effectiveness of the training period(s) can be increased by decreasing the time spent injured.

The results of this study could support the idea that the epidural steroid injection may play a role in prevention and treatment of chronic hamstring pain, discomfort and injury prevention.

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SAKRALNO-EPIDURALNO UBRIZGAVANJE STEROIDA U CILJU SPREČAVANJA POVREDA KOLENA

Károly Szalai, Árpád Illyés

Povrede kolena predstavljaju ogroman rizik u karijeri profesionalnih sportista. Autori ovog rada pretpostavljaju da bi poreklo hroničnih bolova u kolenu moglo biti neurogenetske prirode pa se za lečenje ovakvog stanja koristilo sakralno-epiduralno ubrizgavanje steroida. Cilj ove studije je bio da se proceni efikasnost terapije putem sakralno-epiduralnog ubrizgavanja steroida. Prema strogim kriterijumima odabrano je 25 elitnih takmičara (11 muškaraca i 14 žena), većinom atletskih trkača. Delimično sakralno-epidermalno ubrizgavanje steroida je sprovedeno jednom, retko i 2 puta u periodu od 4 nedelje. Sastav injekcija je bio sledeći: 8 ml 1% lignokaina, 2 ml 80mg/ml depomedrola i 10 ml 0,25% markaina (bupivakaina). Vizuelna analogna skala poremećaja i/ili bolova u kolenu je primenjivana pre i 3, 6, 12, 18, 24, 30, 36, 48 i 54 nedelje posle epiduralnog ubrizgavanja. Vreme oporavka i vreme kada su sportisti bili bez bolova / ili bez ikakvih povreda je takodje uzimano u obzir. Bolovi u kolenu i nelagodnosti su se značajno smanjili u post-tretmanskome periodu. Prosečno vreme dostizanja visokokvalitetnih treninga bez bolova je bilo 3 nedelje nakon ubrizgavanja. 50% trajanja terapije je bilo 37 nedelja. Naši rezultati pokazuju da, u slučaju bolova u kolenima, ovakvo stanje može da se leči, a i povrede se mogu sprečiti efikasno, ako se uradi sakralno-epiduralno ubrizgavanje steroida. Davanjem ovakvih injekcija efektnost treninga se indirektno može povećati a mogućnost javljanja povreda kolena se može znatno umanjiti.

Ključne reči: povrede kolena, prevencija, sakralno-epiduralno ubrizgavanje, lumboisijalgija, sport.