

[Original Paper]

Why use steroids in lumbar selective nerve root block ? – A randomized control study

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SUMMARY

Sixty-nine patients with lumbar pain and lower limb pain who visited our Hospital, were randomly divided into two groups and selective nerve root block (SNRB) was performed: Group S(+): Received concomitant administration of steroids with local anesthetic at the time of nerve root block; Group S(-): Received administration of local anesthetic alone at the time of nerve root block. Subsequently, Visual Analog Scale and Present Pain Intensity scores obtained before SNRB, 1 hour and 1 week after SNRB were compared between the two groups.

There were no statistically significant differences in Visual Analog Scale and Present Pain Intensity scores between the Group S(+) and Group S(-) at any of the studied intervals. These results do not support the concomitant administration of steroids in SNRB.

Key words: lumbar selective nerve root block, steroids

I. Introduction

Lumbar selective nerve root block (SNRB) is generally performed using local anesthetic in combination with steroids, while there are some unclear points as to what makes SNRB effective.

We compared the effectiveness of SNRB between a group receiving local anesthetic in combination with steroids for SNRB and a group receiving local anesthetic alone using visual analog scale (VAS) and present pain intensity (PPI) scale[1].

II. Materials and Methods

Among the patients who visited the outpatient department of our hospital because of root pain with low back pain and/or leg pain between April 2002 and March 2003, 94 SNRB sessions performed in 69 patients who were found to have sciatica on MRI (the mean number of SNRB sessions performed per patient, 1.4) were targeted. The study population consisted of 46 men and 23 women aged between 15 and 80 (mean 47.5) years.

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Postoperative patients were excluded.

On completion of the follow-up, 59 patients (85.5%) continued conservative therapy, while 10 patients (14.5%) were transferred to surgery.

The presence of lumbar lesion was confirmed with 0.5T MRI equipment (Hitachi Medical Corporation, Tokyo, Japan) 4 to 65 days (mean 17.3 days) after the patient's first visit to our hospital. Based on the clinical findings and imaging findings, it was also confirmed that the site of radiculopathy was between the entry zone and the mid zone defined by Lee[2] et al. Then, the subjects were divided into 2 groups in a random manner according to whether their patient-care number was even or odd, and each group underwent SNRB as follows: the even-number group (Group S(+)) received 2 mL of local anesthetic (lidocaine hydrochloride) and 1 ml (4 mg) of steroid (betamethasone) for SNRB, while the odd-number group (Group S(-)) received 3 mL of local anesthetic (lidocaine hydrochloride) alone for SNRB. The first author performed all the procedures using a conventional technique as discussed. The patient was prone, and a 22 G spinal needle was guided fluoroscopically towards the nerve root. The nerve root was then visualized with contrast medium (Isovist 240 iotroian, 240mg of iodine per ml). Subsequently, VAS scores and PPI scores obtained before SNRB, 1 hour and 1 week after SNRB were compared between the two groups. On the PPI scale, a rating of no pain was converted to 0 point, a rating of mild pain to 1 point, a rating of discomforting pain to 2 points, and so forth for evaluation (Fig. 1).

Data were analyzed with Mann-Whitney's U test, the chi-square test for independence, and Fisher's exact probability test. The level of significance was set at $P \leq 0.05$. Data were expressed as mean \pm standard deviation. We use the analyzing soft, Stat-view 4.02, on a computer.

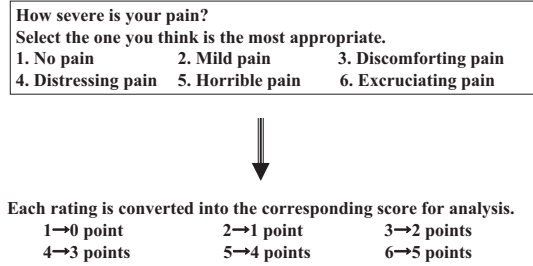


Fig. 1 Present pain intensity (PPI) and method of its evaluation

A patient selects a number, which is converted to the corresponding point and used for evaluation.

1. No pain → 0 point
2. Mild pain → 1 point
3. Discomforting pain → 2 points
4. Distressing pain → 3 points
5. Horrible pain → 4 points
6. Excruciating pain → 5 points

III. Results

1. Characteristics of the patients in the Group S(+)

There were 20 men and 14 women aged between 15 and 80 (mean 50.2 ± 15.9) years. SNRB was performed only once in 27 patients and twice or more in 7 patients (Table 1). A total of 44 SNRB sessions were performed in 34 patients. The mean number of SNRB sessions performed per patient was 1.3. The VAS scores were 6.08 ± 1.93 cm before SNRB, 2.97 ± 2.14 cm at 1 hour after SNRB, and 4.24 ± 2.55 cm at 1 week after SNRB (Fig. 2). The PPI scores were 2.55 ± 0.82 points before SNRB, 1.09 ± 0.77 points at 1 hour after SNRB, and 1.80 ± 0.90 points at 1 week after SNRB (Fig. 3). On completion of the follow-up, 3 patients (8.8%) were transferred to surgery, while 31 patients (91.2%) continued conservative therapy (Table 1).

2. Characteristics of the patients in the Group S(-)

There were 26 men and 9 women aged between 17 and 78 (mean, 44.8 ± 16.8 years). SNRB was performed only once in 23 patients and twice or more in 12 patients (Table 1). A total of 50 SNRB sessions were performed in 35

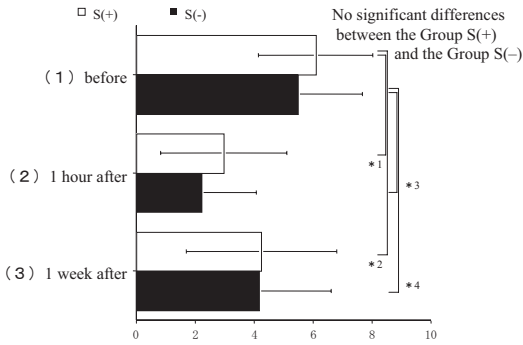



Fig. 2 Visual analog scale (VAS) score in all patients



 S(+): Time course of the VAS score in the Group S(+)
 S(-): Time course of the VAS score in the Group S(-)

No statistically significant differences were noted in the VAS scores between the Group S(+) and the Group S(-) before or at 1 hour or 1 week after lumbar selective nerve root block (SNRB). However, the VAS scores were significantly lower at 1 hour and 1 week after SNRB than before SNRB in both the Group S(+) and the Group S(-) (*1 and *2; *3 and *4).

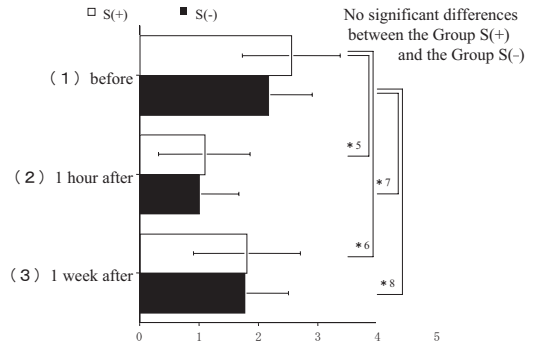



Fig. 3 Present pain intensity (PPI) scores in all patients



 S(+): Time course of the PPI score in the Group S(+)
 S(-): Time course of the PPI score in the Group S(-)

No statistically significant differences were noted in the PPI scores between the Group S(+) and the Group S(-) before or at 1 hour or 1 week after SNRB. However, the PPI scores were significantly lower at 1 hour and 1 week after SNRB than before SNRB in both the Group S(+) and the Group S(-) (*5 and *6; *7 and *8)

patients. The mean number of SNRB sessions performed per patient was 1.4. The VAS scores were 5.47 ± 2.20 cm before SNRB, 2.20 ± 1.86 cm at 1 hour after SNRB, and 4.17 ± 2.45 cm at 1 week after SNRB (Fig. 2). The PPI scores were 2.16 ± 0.74 points before SNRB, 1.00 ± 0.67 points at 1 hour after SNRB, and 1.76 ± 0.74 points at 1 week after SNRB (Fig. 3). On completion of the follow-up, 7 patients (20.0%) were transferred to surgery, while 28 patients (80.0%) continued conservative therapy (Table 1).

There were no statistically significant differences in the male to female ratio, age, number of SNRB sessions performed, or time course of the VAS score or PPI score between the Group S(+) and the Group S(-). Again, no statistically significant differences were noted in the time course of the VAS score or PPI score between the Group S(+) and the Group S(-) either in patients with LDH or in those with SCS.

On completion of the follow-up, in the Group S(+), three patients (8.8%) were transferred to

Table 1 Characteristics of the patients

| | S(+) | S(-) |
|--|------------------------------|------------------------------|
| Number of subjects (Men: Women) | 34 (20 : 14) | 35 (26 : 9) |
| Age (mean) | 15-80 years (50.2 ± 15.9) | 17-78 years (44.8 ± 16.8) |
| No. of nerve block sessions performed (mean) | (1.3 times) | (1.4 times) |
| Once | 27 | 23 |
| Twice or more | 7 | 12 |
| Operative Treatment | 3 | 7 |
| Conservative Treatment | 31 | 28 |

surgery, while 31 patients (91.2%) continued conservative therapy. In the Group S(-), seven patients (20.0%) were transferred to surgery, while 28 patients (80.0%) continued conservative therapy. Again, there were no statistically significant differences.

In the Group S(-), no statistically significant differences were observed in the VAS score or PPI score between the patients who continued conservative therapy and those who were transferred to surgery. In the Group S(+),

statistical analysis could not be performed, because there were only 3 patients (8.8%) who were transferred to surgery.

Similarly, there were no statistically significant differences in the male to female ratio, number of SNRB sessions performed, or time course of the VAS score or PPI score between the Group S(+) and the Group S(-) either in patients with LDH or in those with SCS.

However, the VAS and the PPI scores were significantly lower at 1 hour and 1 week after SNRB than before SNRB in both the Group S(+) and the Group SS(-) (Figs. 2 and 3).

IV. Discussion

In many cases of lumbar selective nerve root block (SNRB), local anesthetic is used for pain relief in combination with steroids, which is used for resolution of inflammation of nerve root. However, it is open to question whether the effectiveness of SNRB is attributable to steroids.

The following reports have so far been available on the significance of the use of steroids for SNRB: (1) Among patients with radicular pain who had been recommended to undergo surgery, significantly fewer of them were transferred to surgery after receiving steroids in combination with local anesthetic than after receiving local anesthetic alone. [3] (2) Among patients with radicular pain, a group receiving local anesthetic in combination with steroids was compared with a group receiving local anesthetic in combination with physiological saline. It was found that the combination of medication was more effective on leg pain at 2 weeks after SNRB, while there were no significant differences at three months after SNRB. [4] (3) Patients with radicular pain who had unilateral symptoms who failed conservative management were randomized

for single injection with bupivacaine and methylprednisolone or bupivacaine only. There is no statistically significant difference in the outcome measure between the group of 3 months, no change of the Oswestry Disability index, no change in VAS in back pain and leg pain, no change in walking distance. [5]

In the present study, no statistically significant differences were detected in the time course of the VAS or PPI score between the group receiving local anesthetic in combination with steroids for SNRB and the group receiving local anesthetic alone. The differences between VAS and PPI are as follows: Visual Analogue Scale (VAS) is a straight line that presents the pain intensity to be rated. Small quantitative changes can be assessed, although quality of pain cannot be measured by VAS. Present Pain Intensity (PPI) is a simple and easy test rated on a scale of 0 to 5 or 6 of intensity of pain verbally. It is impossible to know even small quantitative changes not to mention quality of pain by PPI. Therefore there was a possibility of obtaining similar results from these tests. However, we thought that it would be easier to know the tendency by performing two measurements than doing only one, so we used both VAS and PPI ratings. In addition, since many elderly people were included in the subjects, we evaluated by VAS and PPI, which were thought to be less difficult in understanding. Again, there were no statistically significant differences in the number of SNRB sessions performed or the proportion of patients who were transferred to surgery on completion of the follow-up. In other words, there were no significant differences in the treatment results between the use of local anesthetic in combination with steroids for SNRB and the use of local anesthetic alone for SNRB. This finding suggests that concomitant use of steroids is not necessary for SNRB; local anesthetic alone suffices.

The following studies are available on the mechanism of the onset of the therapeutic effect of SNRB without steroids: an increase in the blood flow in nerve roots caused by SNRB,[6] an anti-inflammatory effect of local anesthetic,[7] pain relief and interruption of the vicious cycle of pain by sensory nerve block,[8] and an anti-inflammatory effect and. However, there are still unclear points.

It is also unknown why the use of local anesthetic alone provides prolonged relief. The pharmacological effects of local anesthetics last 5 to 6 hours at the most. Therefore, it is unlikely that the prolonged effect of SNRB is only attributable to the pharmacological action of local anesthetics. Pain stimuli are transmitted to the cerebrum involved in the perception of pain via afferent sensory nerves, while they excite efferent motor nerves and sympathetic nerves. They cause vasoconstriction and thus local ischemia temporarily with the defense mechanism of muscle tone and increased catecholamine secretion caused by stimulation of the adrenals. If pain stimuli continue for some time, they cause tissue hypoxia and an increase in cell membrane permeability, resulting in cytolysis and release of algogenic substances, such as prostaglandin and histamine, thereby increasing pain. This is the vicious cycle of pain[9]. Local anesthetics, with their pharmacological effects, affect sensory nerves and eliminate pain, act on motor nerves and reduce vellication, and affect sympathetic nerves and increase local blood flow. In short, local anesthetics break the vicious cycle of pain. [9] This mechanism seems to provide pain relief and help the body restore natural healing power, generating prolonged therapeutic effect. The present study was conducted over a relatively short period of one year. The possibility cannot be ruled out that, in a long-term study, fewer patients will be transferred to surgery when local anesthetic is used in combination with

steroids for SNRB compared to solo use of local anesthetic for SNRB.

要 旨

【目的】今回腰椎神経根ブロック (SNRB) 施行時にステロイド剤を併用した群としなかった群をつくり、その有効性を visual analog scale (VAS) と present pain intensity (PPI) を用いて検討したので報告する。

【方法】当院を腰痛・下肢痛で受診した患者のうち、MRIで下肢神経根症状を来たす病変を確認した69例を、以下のごとく2群に無作為分類しSNRBを施行。S(+)群: 施行時に局所麻酔剤 (リドカイン) 2mlにステロイド剤 (ベタメタゾン) 1mlを併用した群。S(-)群: 施行時に局所麻酔剤 (リドカイン) 3mlのみ使用した群。そして施行前, 施行後1時間, 施行後1週間のVASを検討した。

【結果】1) S(+)群は34例, S(-)群は35例。2) S(+)群の施行前・施行後1時間・施行後1週間のVASは, S(-)群のそれぞれの値との間に, 統計学的有意差は存在しなかった。

【考察】痛み刺激は大脳痛覚域に伝わるほか, 運動神経と交感神経を興奮させ, 組織酸素欠乏, 細胞膜透過性亢進, 細胞破壊, 発痛物質放出も生じ, 痛みが拡大増強する。これが痛みの悪性循環である。局所麻酔剤は, 疼痛を消失させ, 筋攣縮を軽減させ, 局所血流量を増大させる。またステロイド剤は, 発痛物質産制・分泌を抑制する。一般的には, SNRB施行時に局所麻酔剤とステロイド剤が併用され, これらの共同作用による悪性循環遮断が期待されている。しかし今回の検討では, ステロイド剤の併用による, ブロック効果の増強・延長は確認出来なかった。したがって, SNRB施行時におけるステロイド剤の作用はまだ不明であると思われた。

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