An Analysis of Location of Needle Entry Point and Palpated PSIS in S1 Nerve Root Block

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Background:
The first sacral nerve root block (S1NRB) is a common procedure in pain clinic for patients complaining of low back pain with radiating pain. It can be performed in the office based setting without C-arm. The previously suggested method of locating the needle entry point begins with identifying the posterior superior iliac spine (PSIS). Then a line is drawn between two points, one of which is 1.5 cm medial to the PSIS, and the other of which is 1.5 cm lateral and cephalad to the ipsilateral cornu. After that, one point on the line, which is 1.5 cm cephalad to the level of the PSIS, is considered as the needle entry point. The purpose of this study was to analyze the location of needle entry point and palpated PSIS in S1NRB.

Methods:
Fifty patients undergoing C-arm guided S1NRB in the prone position were examined. The surface anatomical relationships between the palpated PSIS and the needle entry point were assessed.

Results:
The analysis revealed that the transverse and vertical distance between the needle entry point and PSIS were 28.7 ± 8.8 mm medially and 3.5 ± 14.0 mm caudally, respectively. The transverse distance was 27.8 ± 8.3 mm medially for male and 29.5 ± 9.3 mm medially for female. The vertical distance was 1.0 ± 14.1 mm cranially for male and 8.1 ± 12.7 mm caudally for female.

Conclusions:
The needle entry point in S1NRB is located on the same line or in the caudal direction from the PSIS in a considerable number of cases. Therefore previous recommended methods cannot be applied to many cases.

Key Words:
first sacral nerve root block, needle entry point, posterior superior iliac spine.
INTRODUCTION

Transsacral nerve block through sacral foramen is a common procedure for patients complaining of low back pain with radiating pain, and it is mostly performed through the first sacral foramen (S1 foramen) [1].

With regard to the first sacral nerve root block (S1NRB), the previously suggested method of locating the needle entry point begins with identifying the posterior superior iliac spine (PSIS) and the sacral cornu on the ipsilateral side [2]. Then a line is drawn between two points, one of which is 1.5 cm medial to the PSIS, and the other of which is 1.5 cm lateral and cephalad to the ipsilateral cornu. After that, one point on the line, which is 1.5 cm cephalad to the level of the PSIS, is considered as the needle entry point. Finally, the block needle is introduced until it penetrates the posterior foramen to the transsacral canal. Although this method has the advantage of being performed without the fluoroscopic device, it has a high possibility of failure because the S1 foramen has a variety of locations, which vary from person to person, and there is considerable pain and discomfort upon needle insertion. To solve these technical difficulties, other methods like using a computed tomography (CT) or magnetic resonance imaging (MRI) are being introduced [3,4]. However, since one of the most available imaging aids is the C-arm fluoroscope, S1NRB is used in most cases with the C-arm.

This study aims to analyze distances and directions between the needle entry point on the skin during C-arm guided S1NRB and palpated PSIS. Our results will then be compared to those previously published.

MATERIALS AND METHODS

After informed consent was obtained, in the pain center of our hospital from April to August in 2007 fifty patients undergoing C-arm guided S1NRB were enrolled in this study. The following four groups of patients were excluded from this study:

Patients who have a history of spinal operations
Patients who had a serious compression fracture of the spine
Patients whose PSIS was difficult to find because of excessive obesity
Patients whose S1 foramen was not noticeable on radiographs

The patient was placed in a prone position with a pillow (8 cm in height) under the lower abdomen to reduce lumbar lordosis. The same physician was expected to find the PSIS on the surface of the iliac bone and mark the midpoint. The site of entry is visualized by adjusting the fluoroscopic beam to align the posterior foramen with the anterior foramen by rotating the C-arm cephalad and slightly laterally. From this point, a 22-gauge, 60-mm disposable nerve block needle (K-3 Lancet point, Unisis Corp., Tokyo, Japan) was inserted to have a tunnel view [5]. The proper depth of the block needle was predicted in the lateral radiograph and, finally, the accuracy of needle placement was ensured by fluoroscopic visualization after injecting Omnipaque (Amersham Health, Cork, Ireland).

The distance from the PSIS to the needle entry point was measured horizontally (medially) and vertically (cranially or caudally) (Fig. 1). SPSS version 13.0 (SPSS Inc, Chicago, IL, USA) was used for statistical analysis, and the sum and subtraction of the mean and standard deviation were described. Comparisons between male and female were done by independent sample t-test, and a P value of < 0.05 was considered statistically significant.

![Fig. 1. This figure shows the measurements in this study. A represents the transverse distance between the posterior superior iliac spine by palpation and the needle entry point during C-arm guided S1 nerve root block. B represents the vertical distance between the PSIS by palpation and the needle entry point during C-arm guided S1 nerve root block.](image-url)