



EFFECT ON GLYCEMIC INDEX POST SELECTIVE NERVE ROOT BLOCK IN NEURAL FORAMINAL STENOSIS PATIENTS- PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

Purpose: To study the effect on glycemic index post selective nerve root block in neural foraminal stenosis patients. **Methods:** The study involved 30 patients in total from September 2021 to August 2022, we prospectively enrolled patients who matched our inclusion criteria with IVDP, patients having symptoms of radicular pain for at least 3 months, patients with a known history of type I or type II diabetes mellitus. Patients were made to maintain a diary of their daily fasting blood glucose levels one week before after the SNRB. At the end of the last follow-up at 3 months, HbA1c were repeated along with capillary blood glucose. **Results:** A mean of 135.77 mg/dL and SD of 22.60 mg/dL were blood sugar levels which varies from 78- 204 mg/dl before SNRB. The immediate post-injection glucose levels varied from 78 to 399, with a mean of 216.13 and a SD of 44.19. The average glucose level change was 135.77 ± 80.37 , and the range of this change was from 135.77 to 216.13. The estimated duration of the glucose level increase was 3.7 days with a 95% CI. For the first 2-4 days following injection, there is a noticeable brief spike in blood glucose levels. There was no association between observed glucose level change pre-injection HBA1c levels and 3 months post HBA1c levels after the procedure. **Conclusion:** Administering steroids in selective nerve root blocks for patients with diabetes mellitus is associated with a transient hyperglycaemic state, which will return to baseline level within 4 days of SNRB injection.

KEYWORDS

SNRB, IVDP, HbA1c, Glycemic index, Corticosteroid, Diabetes mellitus.

INTRODUCTION

Degenerative lumbar spinal disorders are frequently seen in the elderly population.¹ The most typical symptom is low back ache amongst these patients. Lumbar radiculopathy is characterized by pain that radiates along a certain nerve., which runs down one or both legs from the lower back.² An inflamed nerve root resulting from mechanical lesions, such as different phases of disc prolapse, ligamentum flavum hypertrophy, facet hypertrophy, and degenerative osteophytes causing foraminal stenosis, is treated with selective nerve root block injections.³

Corticosteroids have been known to reduce the inflammation caused by mechanical and chemical factors⁴. Thus, the role of corticosteroids in patients with radiculitis is arguably better than that of NSAID's (Non-Steroidal Anti-Inflammatory Drugs) as the termination of the inflammatory cascade is done at a greater level by said corticosteroids.

Therefore, the injection of steroids to reduce inflammation at the nerve root can cause the pain to subside as well. The only drawback is that the main cause for the irritation of the nerve root is not treated, hence recurrence can be very well expected.

Keeping in mind that not all patients will want to undergo surgery, due to a variety of reasons, such as lack of funds, poor candidature for undergoing a procedure, or just the fear of undergoing a surgical procedure, there is no doubt that a trial of Selective Nerve Root block, which is cheap and surgeon compliant is a good alternative.⁵

Numerous studies have attempted to show how steroids affect diabetic individuals irrespective of insulin use. To our knowledge, however, no prospective studies have been done on the effects of SNRB on diabetic patients, particularly in terms of post-injection blood glucose levels in relation to glycated haemoglobin (HbA1c) and glycemic control.

MATERIALS AND METHODS

The study involved 30 patients in total and was conducted in a tertiary care hospital in Southern India. From September 2021 to August 2022, we prospectively enrolled patients who matched our inclusion criteria, which included those with posterior intervertebral disc prolapse at the lumbar level with or without lumbar canal stenosis, patients having symptoms of radicular pain for at least 3 months, patients with a known history of type I or type II diabetes mellitus.

Patients who had a progressive neurological impairment, an active

infection, cancer, a history of allergic reaction to contrast material, anaesthetics, steroids, pregnant women, active congestive heart failure, or uncontrolled diabetes mellitus were excluded from the study. Following admission, patients underwent a complete spinal assessment.

Patients were made to maintain a diary of their daily fasting blood glucose levels. One week before the surgery and one week after the procedure, the data was maintained.

We also advised the patients not to alter the dietary intake or diabetic medication regimens which they had been following beforehand. If the fasting glucose levels exceeded 250 mg/dL for more than 2 consecutive days after the procedure; patients were asked to consult an endocrinologist for modification of the oral hypoglycaemic drugs and or insulin therapy. During the follow-up appointment, the variation in the drug dosage and schedule of oral hypoglycaemic drugs was noted as advised by the consulting endocrinologist. Here the consulting endocrinologist was the same for all patients.

Patients were sequentially followed up in the spine outpatient department at intervals of 2 weeks, 4 weeks 8 weeks, and 16 weeks. At the end of the last follow-up, glycosylated haemoglobin levels were repeated along with fasting and post-meal blood glucose levels.

Technique

On the day of the procedure, all patients were admitted to the day-care ward, and their vital are monitored. The patient was started on intravenous crystalloids. Patients were placed in prone position on the operating table.

Under fluoroscopic guidance, the pedicles were identified on an anteroposterior view of the lumbar spine. We used the technique described by Bogduk et al ⁶ i.e., through the "safe triangle", above the exiting nerve root and below the corresponding pedicle. 2-3 cc of 2% ordinary Lidocaine were used to locally anaesthetise the skin.

Using 18G spinal needle 1ml of Iohexol dye was administered once the needle position had been confirmed under fluoroscopic guidance until a radiogram was acquired. Subsequently, a cocktail solution of 2ml 0.25% bupivacaine mixed with 1ml (40mg) of triamcinolone was injected.

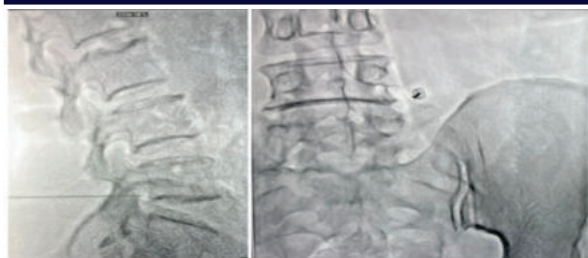


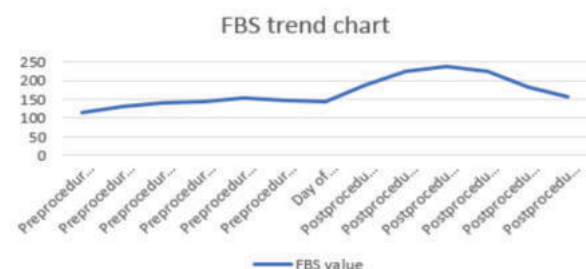
Figure 1: Showing SNRB at L5 level left side.

Statistical Analysis

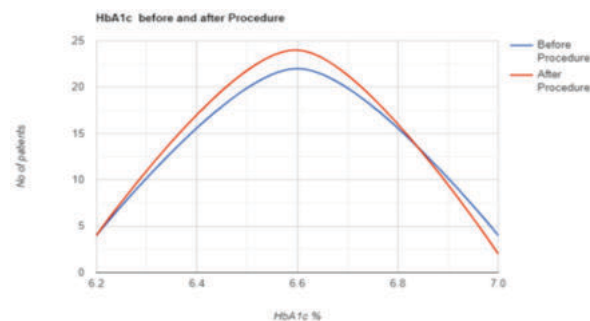
We determined the average blood sugar level throughout these seven days and used that as the baseline glucose level. The following step compares the glucose level post-procedure SNRB with the baseline and its 95% CI. Data were analysed in the statistical software (SPSS IBM version 1.0.0.1406). A P value < 0.05 was found to be statistically significant.

RESULTS

All FBS values were recorded in mg/dL. A mean of 135.77 mg/dL and a standard deviation of 22.60 mg/dL were blood sugar levels which varies from 78-204 mg/dL before SNRB. The immediate post-injection glucose levels varied from 78 to 399, with a mean of 216.13 and a standard deviation of 44.19. The average glucose level change was 135.77 ± 80.37 , and the range of this change was from 135.77 to 216.13. Twenty-seven of the 30 patients (90%) Compared to before injection, glucose levels were significantly higher soon after injection. The mean glucose level increased based on pre-procedure and post-procedure which was highly significant ($P < 0.0001$). The estimated duration of the glucose level increase was 3.7 days with a 95% confidence interval. All glucose results are summarized in (Table 1). There was no association between observed glucose level change pre-injection HbA1c levels and 3 months post HbA1c levels after the procedure. For the first 2-4 days following injection, there is a noticeable, brief spike in blood glucose levels.



Graph 1: Showing FBS trend before and after the procedure.



Graph 2: Showing HbA1c relationship before and follow-up after SNRB

DISCUSSION

The number of people receiving treatment for diabetes mellitus has dramatically increased due to the aging of our population and the epidemic of obesity in our culture. Similarly, an increase in degenerative diseases, especially involving the spine has been observed.

Prolapsed Intervertebral Disc (PIVD) was considered to be the commonest cause of sciatica among many others. Though the presentation of sciatica is paradoxical, in which, some people

experience sciatica without any disc prolapse on MRI, whereas some people show prolapsed disc without experiencing any of the symptoms related to sciatica. This gave rise to different explanations that a disc prolapse in itself, is not enough to cause sciatica, and there might be some local chemical agents that might be the causative factor due to their insulting attitude on the nerve roots.^{7,8} Corticosteroids have been known to reduce the inflammation caused by mechanical and chemical factors. Thus, the role of corticosteroids in patients with radiculitis is arguably better than that of NSAIDs (Non-Steroidal Anti-Inflammatory Drugs) as the inhibition of the inflammatory cascade is done at a greater level by corticosteroids. So, for patients who don't want to undergo surgery, or who are not fit for surgery, a trial of Selective Nerve Root Block (SNRB) may be given, to alleviate their symptoms. It is also well known that diabetes mellitus leads to early degeneration of a number of systems, including the peripheral nervous system, blood vessels, intervertebral discs, and joints.⁹ Steroid usage, whether orally or intravenously, impairs peripheral glucose metabolism and stimulates gluconeogenesis, leading to increased blood glucose levels and insulin resistance. Most people can adjust by producing more endogenous insulin, but people with diabetes mellitus are unable to do so, which results in hyperglycaemia.

In our study, the data demonstrated elevation of plasma glucose after administration of SNRB with a steroid which was seen in patients of diabetes mellitus for 2-4 days of injection.

Studies involving intra-articular joint pathologies which are managed with steroid injection in diabetic patients have either demonstrated no effect or an increase in plasma glucose levels.² Wang et al¹⁰ assessed the increase in blood glucose following methylprednisolone injections into the trigger finger. They discovered that every patient had elevated plasma glucose levels, with a mean rise of 75% over each patient's average measurements. Similar to this, our study showed that after receiving an interlaminar epidural steroid injection, patients' blood glucose levels increased on average by 79%. The duration of this rise in plasma glucose levels was 2-3 days. This spike may have negative consequences such as increased fatigue, glycosuria, and infection.¹¹ It has been demonstrated that among patients having spine procedures, a rise in plasma glucose levels is a statistically significant risk factor for perioperative infection. This might theoretically result in a higher risk of infection for any invasive surgery. Despite the exceedingly low occurrence of this consequence, we did not have any infections as a result of the injection.

Corticosteroids play a role on the hypothalamic-pituitary axis, which can result in brief spikes in blood sugar and make it difficult for diabetic patients to maintain glycaemic control.¹ Additionally, glucocorticoids which act as insulin antagonists reduce peripheral glucose uptake and increase hepatic gluconeogenesis. Despite pre-injection glycaemic management, our investigation showed that even local delivery of corticosteroids increased plasma glucose levels in people with diabetes mellitus. This is significant because, as doctors, we must advise diabetic patients undergoing an SNRB to closely monitor their plasma glucose levels for at least two days after the injection and adjust their diet and medication use as necessary.

CONCLUSION

Administering steroids in selective nerve root blocks for patients with diabetes mellitus is associated with a transient hyperglycaemic state. Based on the findings from our study, we recommend the counselling of diabetic patients that their plasma glucose levels may increase by 110-125 mg/dL, which will return to baseline level within 4 days of SNRB injection.

Even an uncontrolled glycaemic state should be counselled appropriately to avoid complications related to a hyperglycaemic state.

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