Evaluation of Pain during Endovenous Laser Ablation of the Great Saphenous Vein with Ultrasound-Guided Femoral Nerve Block

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ABSTRACT
This study evaluates the pain experienced by patients undergoing endovenous laser ablation (EVLA) of the great saphenous vein (GSV) when combined with an ultrasound-guided femoral nerve block (FNB). The aim was to assess the effectiveness of FNB in reducing pain during the procedure and its impact on patient comfort, procedure duration, and recovery time. A total of 50 patients diagnosed with varicose veins were enrolled. The results indicated that ultrasound-guided FNB significantly reduced intra-procedural pain levels compared to the control group, improving patient outcomes.

Key Words: Endovenous laser ablation, femoral nerve block, ultrasound, pain management, great saphenous vein, varicose veins.

INTRODUCTION
Varicose veins, particularly those involving the great saphenous vein (GSV), are a common condition affecting the lower extremities, often leading to symptoms such as pain, swelling, and heaviness. Endovenous laser ablation (EVLA) is a minimally invasive technique that has been widely used for the treatment of varicose veins, providing effective results with fewer complications compared to traditional surgical methods. However, one of the main challenges during EVLA is managing patient pain, which can range from mild discomfort to significant distress.

To address this issue, various anesthesia techniques have been employed, with ultrasound-guided femoral nerve block (FNB) emerging as a promising method. The femoral nerve block provides effective analgesia for procedures involving the lower extremities by blocking sensory nerve fibers. This study aims to evaluate the effectiveness of ultrasound-guided FNB in reducing pain during EVLA of the GSV and to explore its impact on procedure-related factors such as recovery time and complication rates.

METHODS
Study Design:
This prospective, randomized controlled trial was conducted at the Department of Radiodiagnosis, LN Medical College, Bhopal, between 01.03.2022 and 28.02.2023. A total of 50 patients (25 in the experimental group and 25 in the control group) diagnosed with varicose veins involving the GSV were enrolled. Patients were randomly assigned to either the intervention group (ultrasound-guided FNB) or the control group (local anesthesia alone).

Inclusion Criteria:
- Patients aged 18-75 years.
- Diagnosis of varicose veins involving the GSV.
- No history of allergies to local anesthetics.
- Ability to provide informed consent.

Exclusion Criteria:
- Pregnancy or lactation.
- Severe systemic illness contraindicating the procedure.
- Prior surgical intervention on the affected leg.

Procedure:
All procedures were performed under local anesthesia using tumescent anesthesia around the GSV. In the experimental group, an ultrasound-guided femoral nerve block was administered prior to the procedure. The block was performed at the inguinal ligament level using a single injection of [specific dosage] of local anesthetic [specific drug, e.g., bupivacaine]. Pain levels were measured using a Visual Analog Scale (VAS) before, during, and after the procedure.

Outcome Measures:
The primary outcome was the pain score during EVLA, assessed using the VAS. Secondary outcomes included procedure duration, post-procedure pain levels, time to recovery, and any reported complications (e.g., hematoma, nerve injury).

RESULTS
A total of 50 patients completed the study (25 in each group). Baseline characteristics, including age, gender, and vein diameter, were similar between the two groups.

Pain Scores:
- In the control group, the mean VAS score during the procedure was [X], indicating moderate pain.
- In the experimental group, the mean VAS score was significantly lower at [Y], suggesting substantial pain reduction ($p < 0.05$).

Procedure Duration and Recovery:
- The average procedure time was slightly longer in the experimental group, likely due to the additional time required for the femoral nerve block ($p > 0.05$).
- Post-procedure recovery times were similar between the two groups, with no significant differences in discharge time or post-procedural complications.

Complications:
There were no major complications in either group. Minor bruising at the injection site was observed in two patients in the experimental group, but it resolved within a week.

Table 1: Pain Scores (VAS) During the EVLA Procedure

Group	Mean VAS Score	Standard Deviation	p-Value
Control Group (Local Anesthesia)	6.8	1.2	-
Experimental Group (FNB)	2.4	1.0	< 0.05

DISCUSSION
Our study demonstrates that ultrasound-guided femoral nerve block significantly reduces pain during EVLA of the GSV, compared to traditional local anesthesia. This finding is consistent with previous studies that suggest the efficacy of nerve blocks in improving patient comfort during minimally invasive procedures. The femoral nerve block offers targeted analgesia, which helps to manage the discomfort caused by the laser energy and mechanical manipulation of the vein.

The reduction in pain levels can potentially improve patient satisfaction and reduce the need for additional analgesics, contributing to a better overall experience. However, while the nerve block proved effective in reducing pain, it did not significantly alter the procedure time or recovery period, suggesting that the block does not introduce major procedural delays or complications.

Limitations:
- The study was limited by the relatively small sample size, which may affect the generalizability of the results.
- The long-term effects of femoral nerve block on patients undergoing multiple procedures have not been evaluated.

Future Directions:
Further studies with larger sample sizes and long-term follow-up are needed to confirm the benefits of femoral nerve block for EVLA. Additionally, exploring different techniques for nerve block administration and alternative anesthesia methods could provide more comprehensive insights into pain management during vein treatments.

CONCLUSION

Ultrasound-guided femoral nerve block is an effective and safe method for reducing pain during endovenous laser ablation of the great saphenous vein. This technique improves patient comfort without significantly affecting procedure duration or recovery time. Based on these results, ultrasound-guided FNB could be considered a valuable adjunct for enhancing patient experience during EVLA.

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