The effect of different anaesthesia techniques on postoperative pain and hospital discharge in varicose vein surgery

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Abstract

Introduction: Venous insufficiency caused by varicose veins, especially in the lower extremities, is widespread and can cause severe complications. Anaesthesia is essential for any surgical approaches in varicose vein surgery. This study evaluated the effect of single-dose epidural anaesthesia on postoperative pain scores and length of hospitalisation after varicose vein surgery, comparing it with general anaesthesia.

Methods: The study was conducted on a total of 100 patients, aged 18 years and older, with the American Society of Anaesthesiologists (ASA) physical status classification I–III, undergoing unilateral lower-extremity stripping due to varicose veins within a six-month period at the Prof Dr Cemil Taşçıoğlu City Hospital Anesthesiology and Reanimation Service. Fifty patients with single-dose epidural anaesthesia were consecutively included in the EA group. For comparison, 50 patients who were operated on under general anaesthesia were included in the GA group.

Results: The groups showed statistically significant differences between the 30th-minute and first-, second-, fourth- and sixth-hour visual analogue scale (VAS) scores ($p < 0.01$). Patients with epidural anaesthesia had lower 30th-minute VAS scores compared to those administered general anaesthesia. There were statistically significant differences identified between the groups for the additional analgesia requirements of patients ($p < 0.01$). Subjects with epidural anaesthesia had lower additional analgesic requirements than those administered general anaesthesia.

Conclusion: Epidural anaesthesia provided adequate anaesthesia with more effective postoperative analgesia compared to patients operated on under general anaesthesia and receiving multimodal analgesia for postoperative analgesia.

Keywords: epidural anaesthesia, multimodal analgesia, stripping, varicose vein

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Venous insufficiency caused by varicose veins, especially in the lower extremities, is prevalent and can cause severe complications. Today, rather than life-threatening complications, aesthetic and cosmetic issues caused by varicose veins have made treatment more popular, especially for women. This popularity has recently led to many new therapies apart from standard varicose vein surgery, such as stripping.

Endovenous laser ablation, radiofrequency and foam sclerotherapy are recently described protocols for varicose veins that have replaced surgical treatment. Limited availability of non-invasive venous imaging methods causes surgery to be the only treatment option for many patients. For all new treatment interventions and surgeries, a substantial number of patients require general or regional anaesthesia.

During surgery, sedation and regional anaesthesia techniques, different from classical anaesthetic approaches, are applied in parallel with minimally invasive surgical procedures to shorten the hospital discharge time, increase patient comfort and reduce postoperative pain. Despite the effective use of intravenous analgesics in patients operated on under general anaesthesia, severe postoperative pain delays discharge and causes serious movement restrictions in the postoperative period.

Neuraxial anaesthesia allows surgery without unintentional movement of the patient’s arms or hands and includes postoperative analgesia, so it is preferable to general anaesthesia. However severe complications such as dural puncture and transient or permanent peripheral nerve injury limit the use of regional anaesthesia. Some patients undergoing regional anaesthesia often need sedation, depending on the patient’s level of anxiety.

Single-dose epidural anaesthesia is used in many centres for patients with planned varicose vein surgery, both for surgical anaesthesia and because it provides long-term postoperative analgesia, as with other regional anaesthesia techniques. It causes fewer motor blocks, unlike peripheral blocks. It offers prolonged postoperative analgesia equivalent to peripheral block, and there is no risk of peripheral nerve damage.

General anaesthesia is also routinely used in varicose vein surgery because it promotes early recovery. However, delayed mobilisation due to severe postoperative pain after general anaesthesia prevents early hospital discharge and prolongs hospitalisation.

This study evaluated the effect of single-dose epidural anaesthesia on postoperative pain scores and hospitalisation after varicose vein surgery, comparing it with general anaesthesia.
Methods
The local ethics committee approved this prospective, observational study (date 08.01.2019, number 1081). After obtaining written informed consent from the patients, the study was conducted on a total of 100 patients aged 18 years and older, with the American Society of Anesthesiologists (ASA) physical status classification I–III, undergoing unilateral lower extremity stripping due to varicose veins within a six-month period at the Prof Dr Cemil Taşçoğlu City Hospital Anesthesiology and Reanimation Service.

We aimed to compare the efficiency of two anaesthesia techniques used for stripping. Fifty patients with single-dose epidural anaesthesia were consecutively included in the epidural anaesthesia (EA) group. For comparison, 50 patients who were operated on under general anaesthesia were included in the GA group. Patients with general anaesthesia due to failed epidural anaesthesia, using surgical methods other than stripping, with neurological deficit, medication allergies and bleeding diathesis were excluded from the study.

General anaesthesia was induced with fentanyl (1 μg/kg) and propofol (2.5 mg/kg) 90 seconds before laryngeal mask airway insertion after the loss of eyelash reflex. Maintenance of general anaesthesia was done with sevoflurane (2%) using 4 l/min fresh 50% oxygen and nitrous oxide mixture. An appropriate laryngeal mask for the patient’s age and weight was inserted without using any neuromuscular blocker.

Epidural anaesthesia was administered after patients were taken to the operating room, before surgery and after standard monitoring. With patients in a sitting position, the epidural interval was found using the resistance-loss technique with a Tuohy sharpened 18-G epidural needle (Perifix® ONE Paed filter sets) in the lumbar 3–4 intervertebral gap. A total of 20 ml of local anaesthetic, 10 ml 2% prilocaine and 10 ml 0.5% bupivacaine was administered into the epidural interval. For 15 minutes after epidural anaesthesia, paresthesia and paralysis assessment was permitted to begin after sensory block.

The study noted anaesthesia type, duration of surgery, amount of medication consumed, time of first mobilisation, time to discharge from hospital, nausea, vomiting, complications linked to medications and surgery, and pain scores. In the postoperative period, pain scores at rest and while moving were assessed with the visual analogue scale (VAS) from 0 to 10, where 0 means no pain and 10 means the worst pain. Parameters related to patients in the study were recorded in the recovery room.

All patients with general anaesthesia had an intra-operative 10-mg/kg dose of intravenous acetaminophen administered routinely. Patients with epidural anaesthesia had no intravenous analgesic administered during the intra-operative period.

After recovery, when pain scores in the postoperative period were above five, patients were routinely administered a 1-mg/kg dose of intravenous tramadol for supplementary analgesia. Additionally, data such as height, weight and age of patients were noted, and these data were statistically analysed.

Statistical analysis
Statistical analyses used the Number Cruncher Statistical System (NCSS) program (Kaysville, Utah, USA). Descriptive statistical methods [mean, standard deviation (SD), median, frequency, proportion, minimum, maximum] were used when analysing study data. The fit of quantitative data to normal distribution was tested with the Kolmogorov–Smirnov test, Shapiro–Wilkinson test and visual assessments.

For two-group comparisons of quantitative data with normal distribution, we used the Student’s t-test, while for two-group comparisons without normal distribution we used the Mann–Whitney U-test. For assessment of monitored variables without normal distribution we used the Friedman test, and for evaluation of two-way comparisons we used the Bonferroni–Dunn test.

Significance was assessed at the p < 0.05 level. Power analysis results using the G*Power program, taking the effect size d = 0.725 for pain score and SD = 2.7 with power = 0.80 and α = 0.05, identified that the sample number in each group was a minimum of 31.

Results
For both groups, there were no statistically significant differences between age, weight, body mass index (BMI) and BMI classification of patients (Table 1, p > 0.05). There were statistically significant differences between the 30th-minute, and first-, second-, fourth- and sixth-hour VAS measurements for patients between the groups (p < 0.05) (Fig. 1, Table 2). Patients with epidural anaesthesia had lower 30th-minute VAS scores compared to those administered general anaesthesia.

The variation in 30th-minute, and first-, second-, fourth- and sixth-hour VAS measurements in the group receiving general anaesthesia and intravenous intra-operative analgesia was statistically significantly different (Table 2, p = 0.001; p < 0.01). The variation in 30th-minute, and first-, second-, fourth-, and sixth-hour VAS measurements in the group administered

| Table 1. Analysis of demographic characteristics according to anaesthesia group |
|------------------|------------------|------------------|------------------|------------------|
| Demographics     | Total (n = 100)  | GA (n = 50)      | EA (n = 50)      | p-value          |
| Age (years)      | 34.50 ± 12.65    | 33.60 ± 13.18    | 35.40 ± 12.17    | 0.480*           |
| Weight (kg)      | 77.43 ± 12.63    | 77.94 ± 12.81    | 76.92 ± 12.55    | 0.689*           |
| BMI (kg/m²)      | 28.78 ± 4.72     | 29.32 ± 4.99     | 28.23 ± 4.41     | 0.249*           |
| BMI level, n (%) | Normal weight 23 (23.0) | 10 (20.0) | 13 (26.0) | 0.728* |
|                  | Overweight 40 (40.0) | 20 (40.0)   | 20 (40.0)         |
|                  | Obese 37 (37.0) | 20 (40.0) | 17 (34.0)         |

GA, general anaesthesia group; EA, epidural anaesthesia group; BMI, body mass index. *Student’s t-test, given as mean ± SD; *Pearson chi-squared test.

Fig. 1. VAS measurements according to anaesthesia group. VAS, visual analogue scale.
Epidural anaesthesia were statistically significantly different ($p = 0.001$; $p < 0.01$).

There were statistically significant differences identified for the additional analgesia requirements of subjects between the two groups ($p = 0.001$; $p < 0.01$). Subjects administered epidural anaesthesia had lower additional analgesic requirements than those administered general anaesthesia (Table 3). There were no statistically significant differences between the time of additional analgesic requirements and mobilisation of cases (Table 3, $p > 0.05$).

A statistically significant difference was identified between the discharge times of patients in the two groups ($p = 0.001$; $p < 0.01$) (Table 3). Discharge times for cases with epidural anaesthesia were shorter than those with general anaesthesia (Fig. 2).

There was a statistically significant difference identified between the tramadol requirements of patients between the two groups ($p = 0.001$; $p < 0.01$). Patients with epidural anaesthesia had lower tramadol requirements than those with general anaesthesia (Fig. 3).

There was a statistically significant difference between the acetaminophen requirements of cases between the two groups ($p = 0.001$; $p < 0.01$) (Table 3). Patients receiving epidural anaesthesia had lower acetaminophen requirement rates compared to those administered general anaesthesia (Fig. 4).

**Discussion**

Postoperative pain is the most frequent cause of delayed patient mobilisation in the postoperative period and longer hospitalisation. The most frequent cause of postoperative pain is inadequate analgesia. For this, or as an alternative to classic intravenous analgesics, different regional anaesthesia and analgesic methods have been developed and brought into use in recent times.
In our study, age, weight, BMI and BMI classification of subjects undergoing EA and GA were compared but no statistically significant difference was found. Pain scores for patients with epidural for postoperative analgesia were lower than those with multimodal analgesia in the GA group. Although the postoperative additional analgesic requirements were lower in the EA group, no difference was identified for mobilisation times between the groups. This is because patients were mobilised at the same hour postoperatively due to clinical protocol, without regard to pain scores and additional analgesic requirements. Therefore we recommend individualising and changing the standard approaches to patients in the surgical ward.

Similarly, the discharge of patients with epidural anaesthesia was earlier than those with general anaesthesia. This is because these patients had lower postoperative pain scores, fewer additional analgesic requirements, and more stable clinical progress. Patients with general anaesthesia had more additional analgesic requirements because of the standard postoperative mobilisation for every patient. This would have increased the analgesic requirements of patients and caused longer hospitalisation.

In another study, authors compared monitored anaesthesia care using ketamine and dexmedetomidine with spinal anaesthesia for varicose vein stripping. Patients’ postoperative pain scores were higher and satisfaction scores were lower than those who received spinal anaesthesia for varicose vein stripping. The results of our study similarly revealed that regional anaesthesia methods provided adequate postoperative analgesia. The VAS scores were significantly lower among patients administered postoperative analgesia with epidurals.

In parallel with developments experienced in varicose vein surgery, new minimally invasive techniques, defined in the last decade, have become more popular due to less postoperative pain and ensuring early healing. However, they still require anaesthesia. Although local anaesthetics and sedation provide sufficient anaesthesia and analgesia for skin incision, they are ineffective for pain linked to the procedure. For this reason, the anaesthesia and analgesic methods used in our study retain their value and efficacy.

**Conclusion**

Epidural anaesthesia provided adequate anaesthesia with more effective postoperative analgesia compared to patients operated on under general anaesthesia and with multimodal analgesia for postoperative analgesia. In addition, epidural anaesthesia shortened the postoperative hospitalisation of patients, independent of other factors.

**References**


