

Evaluation of Lumbar Sympathectomy in Peripheral Arterial Disorder of Lower Limbs

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Abstract

Background: Peripheral arterial disorders of the lower limbs, including chronic arterial ischemia, present significant clinical challenges. Lumbar sympathectomy has emerged as a potential therapeutic option to address these issues.

Aim: This study aimed to evaluate the efficacy and safety of lumbar sympathectomy in patients with chronic arterial ischemia in the lower limbs.

Methods: A prospective observational study was conducted on 60 patients admitted to a tertiary care center between December 2020 and June 2022. Demographic data, comorbidities, preoperative ankle-brachial index (ABI), and the location of arterial stenosis were documented. All patients underwent lumbar sympathectomy. Postoperative outcomes, including limb perfusion, pain relief, and ulcer healing, were assessed. Comparative analysis with existing literature from PubMed was conducted.

Results: Lumbar sympathectomy significantly improved limb perfusion, as indicated by a substantial increase in ABI. Pain relief was reported by 86.7% of patients, and 60% experienced improved ulcer healing rates. No intraoperative complications were observed. Comparative analysis with previous studies supported current findings.

Conclusion: Lumbar sympathectomy appears promising in enhancing limb perfusion, relieving pain, and promoting ulcer healing in patients with chronic arterial ischemia in the lower limbs. Long-term follow-up studies are warranted to confirm the durability of these benefits and assess potential complications. This procedure offers hope for improved outcomes in this challenging patient population.

Keywords: Lumbar sympathectomy, peripheral arterial disorder, lower limbs, chronic arterial ischemia, surgical intervention

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Introduction

A major healthcare concern around the world is peripheral arterial diseases of the lower limbs, particularly chronic arterial ischemia. The arteries that carry blood to the lower limbs are prone to constriction or occlusion in certain illnesses, which reduces blood flow to the afflicted limb. Particularly chronic arterial ischemia can cause a variety of incapacitating symptoms, such as gangrene, non-healing ulcers, claudication, and rest pain. If neglected, these disorders can significantly lower patients' quality of life and, in the worst case, may require amputation of a limb [1-5].

The treatment of peripheral vascular diseases of the lower limbs has been studied using a variety of therapeutic modalities over the years. Pharmaceutical treatments, endovascular procedures, and surgical revascularization methods are some of them. Some patients continue to endure persistent symptoms and consequences despite the fact that these treatments have shown various degrees of efficacy, emphasising the need for new and potent therapies [5-8].

Lumbar sympathectomy is one procedure that has attracted attention recently. A lumbar sympathectomy is a surgical technique in which sympathetic nerve fibres in the lumbar portion of the spine are cut or disrupted. This procedure's justification stems from the knowledge that sympathetic nerves control blood vessel constriction. The goal of lumbar sympathectomy is to cut these nerves in order to enhance blood supply to the lower limbs, potentially reducing symptoms of chronic arterial ischemia [6-10].

Within the medical profession, there is interest in and debate regarding the use of lumbar sympathectomy in the treatment of lower limb arterial problems. The therapy, according to proponents, offers a hopeful alternative for patients who have not responded to conventional treatments by perhaps increasing blood flow, minimising pain, and accelerating wound healing. Critics, however, raise questions about the procedure's effectiveness over the long term, safety, and potential for unforeseen adverse effects [8-11].

In the ongoing discussion about the use of lumbar sympathectomy in the management of chronic arterial ischemia in the lower limbs, this study aims to add to the conversation. This study intend to offer doctors and patients useful insights into the potential advantages and hazards associated with this strategy by performing a thorough study of its efficacy, safety, and outcomes.

The following are the goals of this investigation:

1. To evaluate how lumbar sympathectomy affects the perfusion of the limbs in patients with chronic arterial ischemia.
2. To assess the efficiency of lumbar sympathectomy in reducing pain and enhancing afflicted people's quality of life.
3. To look into how lumbar sympathectomy aids in the recovery of ulcers that won't heal and prevents gangrene.
4. To examine the lumbar sympathectomy's safety profile, including the prevalence of complications and unfavourable occurrences.

5. To put the results of this study in the perspective of the larger body of knowledge in the field of vascular surgery by comparing them with previous research on the topic.

In the parts that follow, this study'll go into more detail about the tools and techniques used in this study, provide the findings, and have a thorough discussion of them while making comparisons to pertinent publications from the PubMed database. In the end, this study believe that this research will aid doctors in making evidence-based decisions and provide encouragement and better outcomes for patients with persistent arterial ischemia in the lower limbs.

Materials and Methods

Study Design: A tertiary care facility with a focus on vascular surgery served as the site for this prospective observational analysis. The institutional ethics committee gave its approval to the research protocol, and each patient gave their informed consent before participating.

Patient Selection: Participants in this study had to have been admitted to the tertiary care facility's surgery department between December 2020 and June 2022. Individuals must be 18 years of age or older and have a confirmed diagnosis of chronic arterial ischemia in the lower extremities based on clinical assessment, imaging tests (such as an angiography), and non-invasive vascular testing (such as the ankle-brachial index). Patients with contraindications for lumbar sympathectomy (such as infection, active cancer, severe coagulopathy), as well as those who were unwilling to participate, were included in the exclusion criteria.

Minimum of 50 qualified patients were enrolled in the trial, which determined the sample size. To achieve statistical significance in the evaluation of the primary outcomes, the sample size was estimated based on the predicted effect size, study power, and alpha level.

Patient information was gathered through clinician interviews, records review, and physical examinations. All participants' demographic data, medical conditions, and preoperative evaluation results, such as ankle-brachial index values, were recorded. Diagnostic imaging was also used to learn more about the location and severity of artery stenosis or occlusion.

All eligible patients received lumbar sympathectomy, a surgical procedure that involves cutting or severing sympathetic nerve fibres in the lumbar region. Using tried-and-true surgical methods, skilled vascular surgeons carried out the treatment. The level of sympathectomy, the surgical technique, and any intraoperative problems were all documented during the operation.

Patients got postoperative care in accordance with institutional guidelines. Patients also received follow-up care. Regular assessments of wound healing and limb perfusion were made. Data on surgical outcomes, such as improvements in limb perfusion, pain alleviation, and ulcer healing rates, were collected from patients who were followed up at predetermined intervals.

Statistical Analysis: Appropriate statistical techniques were used to analyse the data. Demographic and clinical traits were gathered using descriptive statistics. This study used

inferential statistics to determine how the lumbar sympathectomy affected the primary and secondary outcomes. These techniques included chi-squared tests, t-tests, and non-parametric equivalents. Statistical significance was defined as a p-value 0.05.

Results

Below are the study's findings, which shed light on how lumbar sympathectomy affects individuals who have persistent arterial ischemia in their lower extremities. A total of 60 patients who met the inclusion criteria and received the operation were included in the study. Results were evaluated following lumbar sympathectomy at various time intervals.

1. The study's participants had an average age of 65.4 years, were mostly men (70%) and had a high prevalence of comorbid conditions such diabetes (36.7%) and hypertension (58.3%). Table 1
2. A drastically lowered mean ankle-brachial index (ABI) of 0.56 $\pm$ 0.12 during preoperative testing indicated acute arterial ischemia. The common femoral artery (46.7%) had the highest prevalence of vascular stenosis. Table 2
3. Following surgery, limb perfusion significantly improved, as shown by the large rise in ABI from 0.56 $\pm$ 0.12 to 0.82 $\pm$ 0.15. Eighty three percent of patients (83.3%) had better limb perfusion, 16.7 percent had stable perfusion, and none had deteriorated. Table 3
4. Complete or partial pain alleviation was reported by 86.7% of patients after lumbar sympathectomy, making it a notable outcome.
5. The technique also showed promise for improving ulcer healing rates, with 60% of patients reporting better ulcer healing, 33.3% reporting stable ulcers, and 6.7% reporting worsening.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Number of Patients (n=60)
Age (years), mean $\pm$ SD	65.4 $\pm$ 8.2
Gender (Male/Female)	42/18
Comorbidities	Hypertension: 35 (58.3%)
	Diabetes: 22 (36.7%)
	Smoking: 15 (25.0%)

Table 2: Preoperative Assessment Findings

Parameter	Mean $\pm$ SD (Range)
Ankle-Brachial Index (ABI)	0.56 $\pm$ 0.12 (0.32-0.78)

Location of Arterial Stenosis	Common Femoral: 28 (46.7%)
	Popliteal: 18 (30.0%)
	Tibial: 14 (23.3%)

Table 3: Postoperative Outcomes

Outcome Measure	Preoperative	Postoperative
Ankle-Brachial Index (ABI)	0.56 ± 0.12	0.82 ± 0.15
Limb Perfusion Improvement		
- Improved	12 (20.0%)	50 (83.3%)
- Stable	30 (50.0%)	10 (16.7%)
- Deteriorated	18 (30.0%)	0 (0.0%)
Pain Relief		
- Complete	25 (41.7%)	52 (86.7%)
- Partial	20 (33.3%)	8 (13.3%)
- No Improvement	15 (25.0%)	0 (0.0%)
Ulcer Healing Rate		
- Improved	8 (13.3%)	36 (60.0%)
- Stable	25 (41.7%)	20 (33.3%)
- Deteriorated	27 (45.0%)	4 (6.7%)

Discussion

The study's findings will be examined in detail in the discussion section, along with the implications of using lumbar sympathectomy as a therapeutic option for chronic arterial ischemia in the lower limbs. A comparative literature review will also be included to put current findings in the context of earlier studies from PubMed.

Limb Perfusion Is Affected Current research showed that lumbar sympathectomy significantly improved limb perfusion. Ankle-brachial index (ABI) significantly increased from 0.56 ± 0.12 to 0.82 ± 0.15 , indicating that the operation significantly improves blood flow to the affected limbs. This is consistent with earlier research that showed better perfusion following lumbar sympathectomy [1,2].

Pain alleviation: 86.7% of patients reported complete or partial pain alleviation after surgery, making it a notable outcome. This discovery emphasises the possibility of lumbar sympathectomy in reducing the crippling pain brought on by persistent arterial ischemia. The improvements in pain reduction reported by Januja et al. [9] and current results are in agreement with their findings.

Ulcer Healing: Another remarkable result is the beneficial effect on ulcer healing. In current study, the majority (60%) of participants reported faster ulcer healing. This shows that the technique might make it easier for patients with ulcers that won't heal to mend their tissue. This is in line with what Smith et al. [1-5] discovered, who noticed improved wound healing in their study population.

Although there were no intraoperative problems reported in current study, the long-term safety profile of lumbar sympathectomy deserves thought. This study appreciate the short follow-up period of this trial and recommend that the potential for long-term effects like compensatory hyperhidrosis or neuralgia be watched carefully. These possible issues have been discussed in earlier publications [3, 4].

Comparative Literature Current results are in agreement with earlier studies that looked at lumbar sympathectomy as a potential treatment for chronic arterial ischemia in the lower limbs, according to a comparison with the literature available from PubMed. In respective patient cohorts, researchers found increased limb perfusion and pain alleviation [6-10]. It is significant to highlight that there are inconsistent data in the literature, indicating that not all patients may benefit equally from this intervention. Therefore, when deciding if lumbar sympathectomy is necessary, careful assessment of each individual component and patient selection remain crucial [11-15].

Limitations: It's critical to recognise this study's limitations. First off, the absence of a control group makes it difficult for us to demonstrate causality with certainty. The extremely brief follow-up period also prohibits us from determining how long the procedure's effects will last. While the sample size satisfies the minimum requirements, it might not fully represent the range of patient reactions following lumbar sympathectomy. Larger cohort studies over a longer period of time are required to address these limitations.

Clinical Consequences: Current research suggests that lumbar sympathectomy may be a useful treatment for people who have persistent arterial ischemia in their lower limbs. It may also help with pain relief and ulcer healing. Patients should be chosen based on individualised assessments, but its significance in the therapy protocol should be carefully considered. Patients who have undergone unsuccessful conservative therapy or who do not qualify for other revascularization procedures may find this surgery to be especially beneficial.

Conclusion

A lumbar sympathectomy may be advantageous in treating chronic arterial ischemia in the lower limbs, according to the study's valuable conclusions. Current results show that after the treatment, limb perfusion, pain alleviation, and ulcer healing rates were significantly improved. Despite the fact that these results are encouraging, it is important to be aware of

the study's drawbacks, such as the lack of a control group and the relatively brief follow-up period.

A helpful addition to the toolbox of therapies for treating chronic arterial ischemia in the lower extremities is lumbar sympathectomy. To confirm its long-term efficacy and safety, however, more study with extensive follow-up is required. Its role should be seen in the broader context of patient-specific characteristics. Lumbar sympathectomy gives hope for better results and increased quality of life for those who are affected as this study continues to investigate novel techniques to manage this difficult condition.

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