

Lumbar Sympathectomy - Literature Review

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Abstract: Lumbar sympathectomy (LS) is a nerve blocking procedure used as a method of reducing pain and increasing blood flow in the lower limbs, facilitating the recovery of ischemic ulcers, as well as neurological pain and excessive sweating of the feet. In combination with or without vascular reconstruction, the effect is unstable. This is one of the reasons why this method is still controversial and has both supporters and opponents. There is also deficient reliable data from research studies on the effect of LS as the choice of relevant patients is challenging. However, in patients, who had undergone LS, is observed an improvement based on transcutaneous oximetry, ankle-brachial index (ABPI) and feet temperature change.

Keywords: Lumbar sympathectomy, ulcer, ischemia, lower limb

1. Introduction

Lumbar sympathectomy, a method practiced since the 20th Century, is used for conditions represented with vasospasm, such as acrocyanosis, Raynaud's syndrome, critical ischemia of lower limbs and reflex symptomatic dystrophy (causalgia). An additional effect is the improvement of chronic ischemic ulcers. In patients with a permanent claudication, this method is not particularly appropriate since they already have maximum vasodilation from locally releasing metabolites.

Pain relief is achieved in over 70% of patients up to the third month after the procedure, in those who did not require amputation in the meantime [1],[2],[3]. However, the vasomotor tone is recovered within 6 months and therefore LS can not completely prevent limb amputation. After LS, blood circulation improves primarily through the collateral vessels in the ischemic area, in case the collateral vessels already exist. This is accomplished by arteriovenous anastomoses, which while opening reduce the peripheral vascular resistance, which is controlled by sympathetic activity [4],[5],[6]. As a result of all these changes, the feet temperature also increases. Most commonly, these patients do not have any capability for peripheral vessel reconstruction, which makes LS, in combination with profundoplasty or aortoiliac reconstruction, a last chance to prevent amputation [7],[8],[9].

Despite all the benefits, LS is a surgical intervention and, like any other, may have complications including temporary paralytic ileus, hyperhidrosis, sexual dysfunction or post-procedural neuralgia [10],[11]. Another problem in assessing LS results is the presence of additional factors affecting the condition of patient - diabetes, advanced atherosclerosis, smoking, personal lifestyle. The presence of these factors compromise the research between different patients and the analysis of post-treatment results.

For these and other reasons, it is believed that LS should

only be used when there is real benefit and will bring some improvement. Patients who are eligible for the procedure are those who have only pain and toe gangrene, without an underlying infection, with ABPI > 0.3 and a well-developed collateral vessels [12].

2. Literature Survey

For the first time, the sympathetic chain was removed during the First World War to relieve muscle rigidity. For treatment of arterial occlusive disease of lower limb, it was applied in 1924 by Julio Diaz in Buenos Aires [13]. For the 1970-1974 period, a chemical LS was first carried out without X-ray control [14]. Long-term results of this procedure are published and practiced in the following years, specifying the effect on pain syndrome and palliative treatment. Radiofrequency denervation is introduced in 1991 by Haynsworth, and after 1992, endoscopic sympathectomy begins to develop with the improvement of optics and instruments [15]. Laser sympathectomy is the latest approach described by Kantha in 2007 [16],[17].

3. Method/Approach

There are several methods for performing LS, including surgical lumbar sympathectomy and other varieties such as endoscopic, chemical, radiofrequency and laser procedures. The surgical LS is performed under general anesthesia and via retroperitoneal access is removed a segment consisting of L1 to L4 ganglia. The endoscopic method is also associated with the application of general anesthesia, lumbar vessel ligation and subsequent sympathetic chain removal. Its advantages include the absence of drainage and the minimum size of incisions, but the main disadvantages are the post-treatment adhesions. Another method is chemical sympathectomy, which is done under X-ray control and local anesthesia, with Alcohol or a Phenol solution. The radiofrequency procedure is also performed under similar conditions, but with three or more coagulation at 70° C for 2 minutes. This method is considered to be

more traumatic than the chemical. Laser coagulation uses a 360° rotating laser probe for sympathetic ganglia thermal coagulation.

4. Results/Discussion

On the one hand, the high percentage of patients who obtained pain relief and improved the condition of ischemic ulcers, helped to confirm the positive impact of LS. The procedure can be applied to patients with critical ischemia as an alternative to amputation. LS is a rather safe procedure, as complications, if there any, are transient. Not only in case of critical ischemia of the lower limbs, the method is applicable, but also is suitable for other conditions such as frostbite, chronic lesions on fingers, kidney pain, and palliative treatment of pain in malignant diseases. On the other hand, researchers believe that this procedure can only be used as an effort to reduce pain at rest but is not reliable, because there is insufficient evidence to support it. In support of this, is the limited choice of patients and the additional factors and diseases related to them. This affects the defying of the stage of ischemia and, respectively, the outcome of the LS.

5. Conclusion

Lumbar sympathectomy as part of the modern treatment of chronic arterial disease of the lower limbs is limited, but with a relevant choice of patients with lack of alternatives, LS can increase distal perfusion and blood supply to the skin and help healing ischemic ulcers. Furthermore it reduces the pain at rest and lower the number of amputations made annually. LS is an intervention that supports the effect of previous vascular reconstructions and its use should be more expended in modern surgery [18].

Techniques of lumbar sympathectomy include two main methods - surgical and chemical, which do not show a statistically significant difference in-between regarding mortality and amputation [19].

6. Future Scope

In literature, randomized controlled trials have not identified significant objective benefits from LS, but subjective improvements in symptoms in patients with critical lower limb ischemia have been demonstrated in over 70% of cases. The lack of imperative data, in the literature, only shows the need for an additional multicenter studies to prove the effects of LS on critical lower limbs ischemia. This deficiency lies in the basis of incorrect patients selection so far and therefore the results are unpredictable, and mostly rather speculative.

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