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Role of Operative Lumbar Sympathectomy in Patients with Critical Lower Limb Ischemia not Amenable to Vascular Reconstructive Surgery

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ABSTRACT

Objective — *To assess the effectiveness of operative lumbar sympathectomy (LS) in patients with unreconstructable lower limb peripheral vascular disease.*

Study design — *Cross sectional study.*

Place & Duration of study — *Department of Vascular Surgery Combined Military Hospital (CMH) Lahore, from May 2012 to May 2015.*

Methodology — *A total of 117 LS were performed in 105 patients fulfilling the inclusion criteria. The indications for operation were rest pain only in 61 (52.1%), rest pain with trophic changes in 24 (20.5%) and distal gangrene in 32 (27.3%) patients. Duplex scan was done and ankle brachial pressure index (ABPI) was measured preoperatively. Patients were assessed for pain using Visual Analog Scale (VAS) and improvement in trophic changes. All patients were followed up for one year documenting improvement of pain, healing of trophic lesions and / or amputations.*

Results — *At 6 weeks postoperatively, 85 (72.6%) patients became pain free (p = 0.008), and at one year follow up 60 (51.2%) patients remained pain free (p = 0.002) when compared with preoperative pain scores. Pain improvement was more in patients with ABPI of 0.3 or more. The limb salvage rate was 67.6%. Thirty-eight (32.4%) patients end up in amputations. There was no mortality in this series.*

Conclusions — *LS has a role in the management of ischemic symptoms and limb salvage in patients not amenable to vascular reconstruction. Preoperative ABPI has prognostic value in postoperative outcome, with clinical improvement if it is more than 0.3. Smoking was a negative predictive factor in our series.*

Key words — *Limb ischemia, Vascular, Lumbar sympathectomy, Limb pain.*

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INTRODUCTION:

The management of rest pain in patients of peripheral vascular disease (PVD) where reconstructive surgery for arterial disease is not possible, has always been a challenge and most of the patients end up with limb amputations.[1] In such patients, one possible way of alleviating pain without limb ablation is lumbar sympathectomy. Although this procedure has been performed regularly for over 80 years, its role in PVD still remains debatable. Some authors consider it of value in patients where vascular reconstruction is not possible.[2,3] Others however believe that LS does

not provide adequate long term pain relief and its clinical effects are short lived.[4,5]

Due to the conflicting evidence in literature and a large number of patients presenting who were having with unreconstructable PVD; it was decided to conduct a prospective study to assess the clinical effectiveness of LS in terms of pain relief and improvement in trophic changes.

METHODOLOGY:

All consecutive patients of PVD presenting to Vascular Surgery Department of CMH Lahore, between May 2012 and May 2015, with unreconstructable infragenicular vessels as shown on preoperative CT angiogram, were included in the study. Patients who were planned for femoro-distal bypass but on exploration tibial vessels had poor distal runoff, were also included. Patients who were not considered fit for bypass procedure and patients unwilling to undergo bypass procedure by choice were also enrolled. Patients with only intermittent claudication as their presenting symptom, were excluded from the study.

Baseline characteristics of all the patients including atherosclerotic risk factors were recorded. Ankle Brachial Pressure Index (ABPI) was calculated in all patients. Visual Analog Score (VAS) was used preoperatively one day before the operation to categorize the rest pain. Zero was considered as no pain, 1-3 as mild, 4-6 moderate and 7-10 severe pain. In addition to pain, trophic changes such as skin temperature, dryness, fissuring and presence of ulcers and/or gangrene were also noted.

All patients were assessed by a consultant anesthetist one week before the surgery. Patients who were on oral anti-platelet drugs (aspirin and/or clopidogrel)had their medications stopped 5 days before surgery and were started on 40mg Enoxaparin subcutaneously till the day of operation. Written consent was obtained for the operation. LS were performed through a standard transverse lumbar retroperitoneal approach. A segment of sympathetic chain was excised and sent for histopathology.

Postoperatively patients were reassessed for pain using the VAS at 06 weeks, 12 weeks, 6 months and 1 year. Any improvement in trophic changes was also noted. For each patient the endpoint of the study was amputation, death, or discharge from follow-up with successful healing of ulcers or amputation sites when present, and / or the resolution of rest pain.

The data was analyzed using statistical package for social sciences SPSS Version 20. The numerical data such as age, was presented in mean and standard deviation. Patient's gender, improvement in trophic changes and pain were recorded as frequency and percentage. Chi-square test was applied for comparison of pain at various time intervals. The p value was considered statistically significant if less than or equal to 0.05.

RESULTS:

A total of 137 consecutive patients were included. Of these, 16 patients underwent LS bilaterally with a minimum duration of 4 weeks in between the two operations; hence total number of LS performed in this study was 153. Eleven patients of whom two had bilateral LS, died within one year of the operation hence they were excluded from analysis. Twenty one patients including two who had bilateral LS were lost to follow up. After excluding all these patients, the total number of LS under consideration in this study was 117 in 105 patients. Baseline characteristics of these patients including atherosclerotic risk factors and ABPI are given in table I.

Regarding clinical symptoms 61 (52.1%) patients had rest pain only, 24 (20.5%) had rest pain and trophic skin changes such as changes in temperature and ulceration and 32 (27.3%) had documented evidence of distal gangrene with or without tissue loss. The VAS for pain showed that 7 (5.9%) had mild, 29 (24.7%) moderate and 81 (69.2%) severe rest pain before the operation (table II).

Marked improvement was noted at six weeks after the operation. A total of 85 (72.6%) patients became pain free and 32 (27.3%) had residual pain of mild category. A statistically significant improvement in pain was noted at 6 weeks. At six months after the operation, 6 (5.1%) patients reported moderate pain. On further analysis 5 (83.3%) out of these 6 patients were smokers. At one year only 60 (51.2%) patients were pain free 21 (17.9%) had redeveloped moderate rest pain and 32 (27.3%) reported severe rest pain again. On sub analysis of 53 patients who redeveloped moderate to severe rest pain, it was noted that 33 (62.2%) were smokers. The p-value of 0.002 for pain recurrence at 1 year when compared with six weeks postoperative figures was again statistically significant. However when pain scores at one year were compared to preoperative scores, the p-value of 0.022 was statistically insignificant. This clearly demonstrated that although there was a significant improvement in terms of rest pain after the operation, but this improvement was short lived and significant number of patients re-developed

Table I: Baseline Characteristics of Study Participants	
Total LS (n)	117
Males	92 (78.6%)
Females	25 (21.4%)
Age (in Year)	Range 29-58 (Mean 39 + 6)
Atherosclerotic Risk factors:	
Diabetes mellitus alone	41 (35%)
Smoking alone	47 (40.1%)
Hypertension alone	10 (8.5%)
Combination of two or more risk factors	19 (16.2%)
Ankle Brachial Pressure Index (ABPI):	
Less than 0.3	15 (12.8%)
From 0.3 to 0.6	91 (77.7%)
More than 0.6	11 (9.4%)

Table II: Visual Analog Score Before and After Lumbar Sympathectomy

	Pain	Before LS		06 weeks after LS		03 months after LS		06 months after LS		12 months after LS	
	(VAS)	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%
		117	100	117	100	117	100	117	100	117	100
No Pain	**0**	**0**	**0**	**85**	**72.6**	**82**	**70.0**	**75**	**64.1**	**60**	**51.2**
Mild Pain	1	0	0	12	10.2	13	11.1	14	11.9	0	0
	2	0	0	15	12.8	17	14.5	17	14.5	0	0
	3	7		05	4.2	05	4.5	06	5.1	4	3.4
		7	**5.9**	**32**	**27.3**	**35**	**29.9**	**37**	**31.6**	**4**	**3.4**
Moderate Pain	4	1	0.8	0	0	0	0	0	0	0	0
	5	3	2.5	0	0	0	0	3	2.5	1	0.8
	6	7	5.9	0	0	0	0	2	1.7	5	4.2
	7	18	15.3	0	0	0	0	1	0.8	15	12.8
		29	**24.7**	**0**	**0**	**0**	**0**	**6**	**5.1**	**21**	**17.9**
Severe Pain	8	16	13.6	0	0	0	0	0	0	11	9.4
	9	50	42.7	0	0	0	0	0	0	10	8.5
	10	15	12.8	0	0	0	0	0	0	11	9.4
		29	**69.2**	**0**	**0**	**0**	**0**	**0**	**0**	**32**	**27.3**

moderate to severe pain over the period of time.

Furthermore it was also noted that 64.4% of these patient were smokers hence concluding that smoking was a negative predictor for pain relief in terms of outcome.

When assessed in terms of ABPI;out of 91 patients who had ABPI between 0.3-0.6, 80 (87.9 %) had no pain 6 weeks after the operation and 11 (12.1%) had improvement of pain with mean VAS dropped to mild category. At one year 59 (64.8%) patients with ABPI 0.3 to 0.6 remained pain free. In 15 patients with ABPI of less than 0.3, VAS dropped to mild

category but none of these patients had complete relief of pain (VAS of 0) at 6 weeks. The improvement in pain was more in patients with ABPI of 0.3 or more.

In terms of trophic changes, 15 (62.5%) patients showed improvement. Out of these, 10 (66.6%) had diabetes, 3 (20%) were smokers and 2 (13.3%) had both the risk factors of atherosclerosis. At one year, 4 (26.6%) patients returned with recurrent ulceration and ended up with amputations.

In total, 38 (32.4 %) patients ended up with amputations. There were 26 peri-knee and 12 foot amputations. Two below knee amputations developed ulceration of the stump causing non-healing of the stump. Both patients needed revision and ended up with above knee amputations. Hence the limb salvage rate in our study was 67.6%.

Six (5.1%) patients developed prolonged ileus after LS which resolved with conservative management. Three (2.5%) patients had retroperitoneal hematoma which resolved spontaneously. Nine (7.6%) patients developed wound infection which resolved with antibiotics and regular dressings. There was no mortality related to the operation.

DISCUSSION:

Lumbar sympathectomy has been a treatment option for peripheral vascular disease for many years however with the development of reconstructive vascular surgery, its frequency has been reduced. Still it is considered as a last resort to relieve pain in patients where reconstruction is not possible.[6] It is believed to increase the blood flow by causing vasodilation of vessels especially the arteriovenous anastomoses in the subcutaneous tissues and skin.[3,6] It can be performed by removal of the lumbar sympathetic chain at open operation or by chemical ablation.[7,8] The open operation is the procedure of choice and only a small segment of the chain was removed and confirmed histologically. Secondly, it was found that it produce sympathectomised foot more consistently.

In our series, 64.1% patients were pain free at 6 months and 51.2% by the end of one year. This improvement in pain is comparable to other international published studies . Matarazzo et al published his results in 2002 showing an improvement in terms of pain in 63% of patients by one year.[9] Similarly Norman and House showed improvement by 67% in six months whereas Baker and Lamberton showed an improvement in rest pain by 86% in six months.[3,10]

In this study it was found that patients with ABPI of 0.3-0.6 showed more improvement in pain when compared with those having ABPI less than 0.3. Van Driel et al also reported that improvement in pain was poor in patients having ABPI less than 0.3.[11] The TASC (Trans-Atlantic Society Consensus) group also recommended that patient with ABPI greater than 0.3 are more likely to benefit from LS.[12]

The amputation rate in our study was 34.4% at one year. Holiday et al reported an amputation rate of 39% at one year.[4] Other studies have shown a variable amputation rate of 25-55% depending on the degree of tissue loss.[13-16] The natural history of severe peripheral vascular disease if left untreated is unclear. It appears that in those with rest pain and no distal necrosis or ulceration, 70% will end up with amputations and this percentage is even higher in those who have established tissue necrosis.[17] No controlled trial has compared the results of LS with the natural history of severe peripheral vascular disease. In our series, although not a controlled trial; the amputation rate of 34.4 % shows higher limb salvage after LS when compared with the natural course of the disease. This improvement in limb salvage is also a strong predictor in favor of LS as a last resort in patients with severe PVD not amenable to vascular reconstruction.

CONCLUSIONS:

LS do have a role in the management of ischemic symptoms and limb salvage in patients not amenable to vascular reconstruction. The preoperative ABPI of more than 0.3 is a positive predictor in our series.

REFERENCES:

1. Dawson L, Hagino T. Critical limb ischemia. Current Treatment Options. Cardiovasc Med. 2001;3:237-49.

2. Ellis H. Lumbar sympathectomy. Br J Hosp Med. 1986;35:124-5.

3. Baker M, Lamerton L. Operative lumbar sympathectomy for severe lower limb ischemia: still a valuable treatment option. Ann R Coll Surg Engl. 1994;76:50-3.

4. Holiday A, Barendregt B, Slappendel R, Crul J, Buskens G, Van der Vliet A. Lumbar sympathectomy in critical limb ischemia: surgical, chemical or not at all? Cardiovasc Surg. 1999;7: 200-2.

5. Aronow S. Management of peripheral arterial

disease of the lower extremities. Compr Ther. 2007;33:247-56.

6. Nesargikar P, Ajit M, Eyers P, Nichols B, Chester J. Lumbar chemical sympathectomy in peripheral vascular disease: Does it still have a role? Int J of Surg. 2009;7:145-9.

7. Watarida S, Shiraishi S, Fujimura M, Hirano M, Nishi T, Imura M, et al. Laparoscopic lumbar sympathectomy for lower-limb disease. Surg Endosc. 2002;16: 500-3.

8. Segers B, Himpens J, Barroy P. Retroperitoneal laparoscopic bilateral lumbar sympathectomy. Acta Chir Belg. 2007;107: 341-2.

9. Matarazzo A, Rosati-Tarulli V, Sassi O, Florio A, Tatafiore M, Molino C. Possibilities at present for the application of lumbar sympathectomy in chronic occlusive arterial disease of the lower limbs. Minerva Cardioangiol. 2002;50:363-9.

10. Norman E, House K. The early use of operative lumbar sympathectomy in peripheral vascular disease. J Cardiovasc S urg. 1988;29:717-22.

11. Repelaer van Driel J, Van Bockel H, Van Schilfgaarde R. Lumbar sympathectomy for severe lower limb ischaemia: results and analysis of factors influencing the outcome. J Cardiovasc Surg. 1988;29:310-4.

12. Dormandy A, Rutherford B. Management of peripheral arterial disease. TASC working group. J Vasc Surg. 2000;31:197-9.

13. Collin J, Rich M, Clagett P, Salander M, Spelar J. Clinical results of lumbar sympathectomy. Am Surg. 1981;47:31-5.

14. Lindenauer M. The value of sympathectomy: Surgical Management of Vascular Disease. London: WB Saunders Company Ltd, 1992; 249-56.

15. SchainfeldM. Management of peripheral arterial disease and intermittent claudication. J Am Board Fam Pract. 2001;14:443-50.

16. Aronow S. Management of peripheral arterial disease of the lower extremities. Compr Ther. 2007;33:247-56.

17. Jamieson W, Ruckley V. Management of chronic ischaemia of the lower limb: Surgical management of vascular disease. London: WB Saunders Company Ltd, 1992: 433-67.

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