

Is Surgery the Only Fate of the Patient with Leriche Syndrome? Our Endovascular Therapy Results Early Follow-Up Outcomes

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ABSTRACT

Aim: In this research, we aimed to present early follow-up results of the endovascular treatment in patients with Leriche syndrome at our single center.

Methods and materials: Between October 2020 and January 2022, 14 patients with Leriche syndrome (12 men, two women) who underwent endovascular treatment at our center retrospectively were evaluated. Before the treatment, the ankle-brachial index (ABI) was found 0.50 ± 0.11 on the right leg and 0.45 ± 0.09 on the left leg.

Results: All of the patients with Leriche syndrome applied to our clinic for the first time. In five patients, the fully occluded lesion length was over 3 cm (ranging between 3.5-7.2 cm), hence they were treated with aortic and bilateral iliac bare metallic stents. Although in one patient, the aortic occluding lesion was below 3 cm; it was treated with a bare aortic and bilateral bare iliac stent application because the lesion in the aorta was too calcific. In eight patients, the lesion length was less than 3 cm, bilateral iliac metal bare stents were applied in a kissing stent way.

Conclusion: Endovascular therapy for chronic aorto-iliac occlusive disease has an early high technical success with primary and secondary patency rates. Especially in patients with high risk factors, it may be considered as a good alternative to conventional surgery.

INTRODUCTION

Leriche syndrome first was described as a peripheral artery disease in which the aorta is totally occluded and can be accompanied with occlusions in the iliac arteries, by R. Leriche in 1940 [Leriche 1948]. Like all of the peripheral artery diseases, most of the patients have risk factors such as hypertension, diabetes mellitus, hyperlipidemia, and smoking

[Matsuura 2021]. The disease is known for symptoms like the absence of the femoral pulses conjoined with hip claudication and erectile dysfunction, as it is more common in the male population. However, some patients may be asymptomatic, due to adequate collateral blood flow [Krankenbergl 2009].

According to TASC (Trans-Atlantic Inter-Society Consensus) II guidelines (2007), currently the first treatment option of Leriche syndrome (as a type D lesion) is surgical vascular grafting [Norgren 2007]. In the first years of the disease, many obstacles were faced due to the increased risk of morbidity and mortality while performing revascularisation [Oztas 2021]. Between 3-5% of the patients, who underwent surgical reconstruction, required re-intervention; there is a mortality rate of 1/4 in patients who require re-intervention [Mavioglu 2003; Brown 2021].

Because of the gradual increase of advancement in endovascular treatment technology options, the use of endovascular treatment methods in peripheral arterial patients with TASC II C and D lesions increased in a parallel way [Onur-Beyaz 2021]. Despite all these developments, the results of the endovascular treatment of Leriche syndrome still are limited [Mangialardi 2014; Schmalstieg 2012].

In this research, we aimed to present our results of the endovascular treatment and therapy management in the patients with Leriche syndrome at our single center.

METHODS AND MATERIALS

This study was approved by the ethics committee of Hatay Mustafa Kemal University Tayfur Ata Sökmen Medical Faculty on 17.02.2022 at the meeting numbered 2 with decision number 36. All patients or their legal representatives signed and accepted the informed consent forms.

Between October 2020 and January 2022, 14 patients with Leriche syndrome (12 men, two women) who underwent endovascular treatment at our center retrospectively were evaluated. The mean age was 67.7 (range: 33-79) years. A patient who voluntarily preferred open surgical treatment instead of endovascular therapy was excluded from the study.

All of the male patients suffered from impotence, and they all had a history of previous treatment. The most common reason for consultation was claudication in 11 patients (78.5%) and rest pain in three patients. In one patient (a 33-year-old woman), endovascular treatment was preferred because she did not accept surgical treatment. The other patients were

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Table 1. Age, sex, length of the aortic lesion, preoperative ABI

Age	Sex	Right leg ABI	Left leg ABI	Aortic lesion (cm)	The longest lesion (mean) 8.271429 cm
33	F	0.68	0.49	<3	9.2
68	F	0.41	0.44	>3	9.9
78	M	0.42	0.40	>3	10.1
72	M	0.39	0.41	>3	9.7
64	M	0.61	0.46	>3	6.6
77	M	0.59	0.57	>3	7.2
66	M	0.42	0.41	<3	9.6
78	M	0.52	0.49	<3	9.8
72	M	0.42	0.40	<3	7.7
64	M	0.60	0.36	<3	5.9
77	M	0.59	0.57	<3	8.2
72	M	0.42	0.39	>3	8.7
69	M	0.51	0.46	<3	7.0
75	M	0.39	0.43	>3	6.2

treated with endovascular methods, due to the mortality and morbidity risk related to the surgery. Before the treatment, the ankle-brachial index (ABI) was found 0.50 ± 0.11 on the right leg and 0.45 ± 0.09 on the left leg. Demographic features of the patients are detailed in Table 1. (Table 1)

Endovascular treatment: All patients underwent the procedure, following informed consent. All vascular punctures were performed with the aid of an ultrasonic probe, under local anesthesia. The strategy of treatment consists of bilateral retrograde puncture of the femoral artery, superficial artery intervention and, if necessary, an extra-retrograde approach on the popliteal artery in prone position and, if necessary, an antegrade approach on the brachial artery. A 7F sheath was placed on the bilateral main femoral artery. A standard dose of 1 cc bolus heparin (5000 units) was given after puncture. A pivot XC (0.035 inch, Invamed Istanbul/Turkey) with hydrophilic coating and support catheter (Invamed Istanbul/Turkey) were used. After the lesion was passed and transluminal transition was confirmed, the hydrophilic guide wire was replaced with a 0.018-inch (Invamed Istanbul/Turkey) wire, after that the stenotic lesion was transpierced with the rotational atherectomy catheter TemREN (Invamed Istanbul/Turkey), and thereafter the lesion was dilated with an appropriately sized drug coated (paxitaxel) balloon (Extender, percutaneous transluminal angioplasty/Invamed Istanbul/Turkey) with the aid of the catheter. Then, an aortography was performed to verify the success of recanalization and the vascular system was checked. If the aortic lesion was shorter than 3 cm, a bare metal stent with a diameter of 7-9mm was placed in a kissing stent style (Epic™ Vascular Stent, Boston Scientific; Luminex® Vascular Stent, Bard, Complete® SE Vascular Stent, Metronic). The stents were dilated with balloon catheters of the same size. If the occluded aortic segment

was longer than 3cm, a 20-22 mm bare metal stent (Boston Scientific) was placed, and thereafter a bare metal stent with a diameter of 7-9mm was placed in the kissing stent style. Then, dilatation of the stents was performed with balloon catheters of the same size. A full angiography was performed to see the final state. Endovascular treatment (EVT) was performed under local anesthesia, intravenous sedation and analgesia. All patients had a 1000 IU/hour heparin infusion administered for the first 24 hours after the procedure.

Statistical analysis: Continuous variables are presented as median plus range or mean \pm 1 standard deviation. Categorical items were expressed as total value and percentage (%). Pairs were compared using the Wilcoxon signed-rank test. Nominal variables are given as numbers and percentages. Kaplan-Meier survival curves were used to measure primary and secondary patency rates. A P-value of less than 0.05 was considered statistically significant. Statistical analysis was performed using commercially available statistical software (version 17.0; SPSS, Chicago, IL, USA).

RESULTS

Twelve patients were hypertensive, four had diabetes mellitus, and six had hyperlipidemia. Thirteen patients had a history of smoking; five patients were ex-smokers. Four patients had a history of coronary artery disease (coronary stent in three patients, coronary artery bypass grafting in one patient).

All 14 patients with Leriche syndrome applied for the first time for the hospital (Figure 1). In five patients, the fully occluded lesion length was over 3 cm (ranging between 3.5-7.2 cm), and they were treated with aortic and bilateral iliac

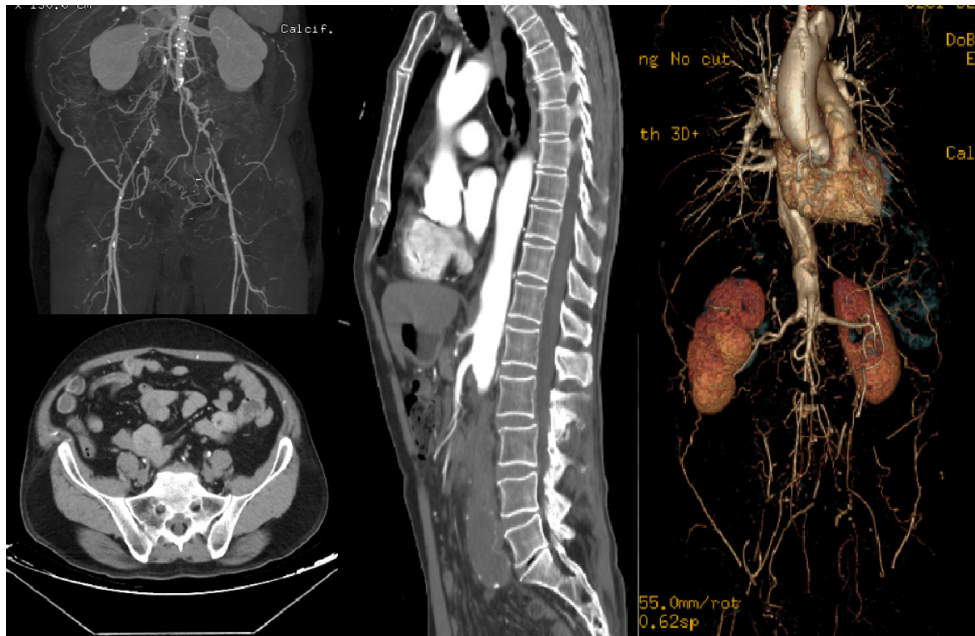


Figure 1.

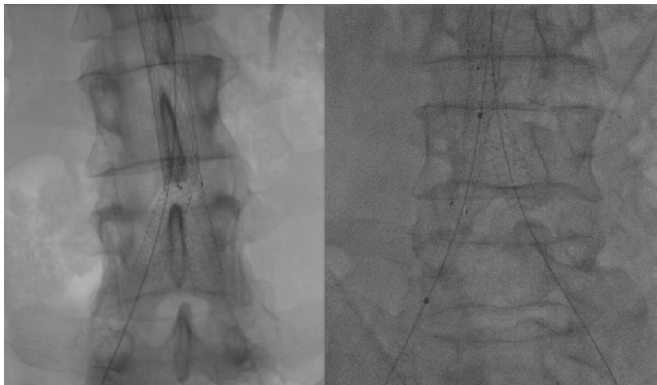


Figure 2.

bare metallic stents (Figure 2). Although in one patient, the aortic occluding lesion was below 3 cm; it was treated with a bare aortic and bilateral bare iliac stent application because the lesion in the aorta was too calcific. In eight patients, the lesion length was less than 3 cm, and bilateral iliac metal bare stents were applied in a kissing stent way (Figure 3).

A total of 28 iliac arteries and six occluded abdominal aortas were treated in 14 patients with Leriche syndrome. Two patients were treated with subintimal angioplasty. One patient had a lesion in the superficial femoral artery, and additionally, popliteal puncture in prone position was required, and recanalization was achieved with atherectomy and balloon angioplasty. Bleeding or acute embolic complications were not seen and intensive care was not required in any of the patients. After the procedure, the femoral pulses of all patients were palpable. All patients were discharged on the fourth day after the procedure.



Figure 3.

Follow up: All patients were given a combination of aspirin (100 mg/day) and clopidogrel (75 mg/day) after successful recanalization. All patients' femoral pulses were palpable when they were discharged from the hospital. In the follow-up period, all had bilateral palpable femoral pulses. According to the rules of our clinic, all patients were followed up on the 30th day after the procedure. All patients underwent ABI control at the end of 30th day, with an average increase of

1.1 ± 0.06 on the right leg and 1.01 ± 0.03 on the left leg ($P < 0.0001$). Claudication complaints regressed in all patients.

DISCUSSION

The TransAtlantic Intercommunal Consensus working group has developed recommendations for the treatment of arteriosclerotic changes in patients with critical ischemia. Endovascular interventions are preferred in Type A lesions, and surgical interventions are preferred in Type D lesions. In type B and C lesions, endovascular or surgical interventions can be applied, depending on the patient's condition and accompanying diseases. However, priority should be given to endovascular interventions in Type B lesions and surgical interventions in Type C lesions [Norgren 2007]. Despite the high level of evidence recommending surgical treatment for aortic iliac occlusive diseases, the morbidity factors of patients cause endovascular treatment methods to become widespread [de Vries 1997].

In the treatment of juxtarenal aortic occlusions, the angioplastic interventions of the renal arteries were involved in the therapy [Marrocco-Trischitta 2012]. In our study, the renal artery angioplasty was not required, due to infrarenal nature of the aortic occlusions. Renal artery complications or nephropathies were not observed in any patient.

In a study comparing the results of endovascular treatment and open surgery, it was reported that hospital stays were shorter especially in elderly patients, and complications such as hematoma, pseudoaneurysm, and rupture were less common in those treated with endovascular treatment [Ye 2011; Indes 2010]. We did not observe such complications in our patients. Another study stated that endovascular treatment can compete with open surgery with medium-term results [Kashyap 2008]. However, there are studies that present similar results in long-term follow ups [Kim 2011].

The determinant of technical success in the treatment of aorto-occlusive diseases with endovascular methods is to overcome the totally occluded lesion with a hydrophilic wire. In cases with hard plaque that cannot be passed, an antegrade entrance via upper extremity may be used or subintimal treatment may be planned [Kim 2011; Krankenberg 2009]. In our patient population, antegrade entrance through upper extremity was not required; however in two patients, subintimal treatment was required. Recent studies show that the procedures performed in patients with TASC D lesions have a success rate of 90 percent [Kondo 2010]. Although lumen protrusion was achieved by performing subintimal angioplasty in two patients; recanalization was achieved in all patients. According to studies, patients with a TASC D type lesions show patency rates of 90 percent at first, however early- and mid-term patency rates show a decrease, with a patency rate of 80 percent [Etezadi 2010]. In patients who had re-stenosis or complete stent occlusions after the first procedure, endovascular treatments allowed the mid-term patency rate to go up to 95 percent again [Kim 2011; Mwapatayi 2016]. The same study showed that the patency rates were relatively higher in the surgical group than the endovascular group [Taeymans

2018]. Although our study includes early-term results, the fact that no signs of stenosis were observed in the early-term follow ups encourages us for the future.

Limitation: The study is retrospective in nature and single-center and also includes short-term results.

CONCLUSION

Endovascular therapy for chronic aorto-iliac occlusive disease has high early technical success rates with primary and secondary patency rates. Especially in patients with high-risk factors, it may be considered a good alternative to conventional surgery.

REFERENCES

- Brown KN, Muco E, Gonzalez L. 2021. Leriche Syndrome. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.
- de Vries SO, Hunink MG. 1997. Results of aortic bifurcation grafts for aortoiliac occlusive disease: a meta-analysis. *J Vasc Surg.* 26, pp. 558-569.
- Etezadi V, Benenati JF, Patel PJ, Patel RS, Powell A, Katzen BT. 2010. The reentry catheter: a second chance for endoluminal reentry at difficult lower extremity subintimal arterial recanalizations. *J Vasc Interv Radiol.* May; 21(5):730-4.
- Indes JE, Mandawat A, Tuggle CT, Muhs B, Sosa JA. 2010. Endovascular procedures for aorto-iliac occlusive disease are associated with superior short-term clinical and economic outcomes compared with open surgery in the inpatient population. *J Vasc Surg.* Nov; 52(5):1173-9, 1179.e1.
- Kashyap VS, Pavkov ML, Bena JF, Sarac TP, O'Hara PJ, Lyden SP, Clair DG. 2008. The management of severe aortoiliac occlusive disease: endovascular therapy rivals open reconstruction. *J Vasc Surg.* Dec; 48(6):1451-7, 1457.e1-3.
- Kim TH, Ko YG, Kim U, Kim JS, Choi D, Hong MK, et al. 2011. Outcomes of endovascular treatment of chronic total occlusion of the infra-renal aorta *J Vasc Surg.* 53, pp. 1542-1549.
- Kondo Y, Dardik A, Muto A, Koizumi J, Nishibe M, Nishibe T. 2010. Primary stent placement for iliac artery chronic total occlusions. *Surg Today.* May; 40(5):433-9.
- Krankenberg H, Schlüter M, Schwencke C, Walter D, Pascotto A, Sandstede J, et al. 2009. Endovascular reconstruction of the aortic bifurcation in patients with Leriche syndrome. *Clin Res Cardiol.* 98, pp. 657-664.
- Leriche R and Morel A. 1948. The syndrome of thrombotic obliteration of the aortic bifurcation. *Annals of surgery.* 127.2: 193.
- Mangialardi N, et al. 2014. Endovascular management of total juxtarenal aortic occlusive disease in high-risk patients: technical considerations and clinical outcome. *The Journal of cardiovascular surgery.* 58.3: 422-430.
- Marrocco-Trischitta MM, Bertoglio L, Tshomba Y, Kahlberg A, Marone EM, Chiesa R. 2012. The best treatment of juxtarenal aortic occlusion is and will be open surgery. *J Cardiovasc Surg (Torino).* Jun; 53(3):307-12.
- Matsuura H, Honda H. 2021. Leriche syndrome. *Cleve Clin J Med.* Sep 1;88(9):482-483.
- Mavioglu I, et al. 2003. Surgical management of chronic total occlusion of abdominal aorta. *Journal of Cardiovascular Surgery.* 44.1: 87.
- Mwapatayi BP, Sharma S, Daneshmand A, Thomas SD, Vijayan V, Altaf

N, Garbowski M, Jackson M. 2016. COBEST co-investigators. Durability of the balloon-expandable covered versus bare-metal stents in the Covered versus Balloon Expandable Stent Trial (COBEST) for the treatment of aortoiliac occlusive disease. *J Vasc Surg.* Jul;64(1):83-94.e1.

Norgren L, Hiatt WR, Dormandy JA, Nehler MR, Harris KA, Fowkes FG. 2007. TASC II Working Group. Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II). *J Vasc Surg.* Jan; 45 Suppl S:S5-67.

Onur-Beyaz M, Demir , Ozer-Ulukan M. 2021. Comparison of atherectomy, drug-eluting balloon, and combined treatment efficiency by near infrared spectroscopy. *Cir Cir.* 89(3):342-346.

Oztas DM, Erdinc I, Beyaz MO, Onalan MA, Badem S, Ulukan MO, Unal O, Conkbayir C, Ugurlucan M. 2021. Issues during coronary and

visceral revascularization in patients with Leriche syndrome and thoracoabdominal aneurysm. *J Card Surg.* Mar; 36(3):1168-1169.

Schmalstieg J, et al. 2012. Long term data of endovascularly treated patients with severe and complex aortoiliac occlusive disease. *The Journal of cardiovascular surgery.* 53.3: 291-300.

Taeymans K, Groot Jebbink E, Holewijn S, Martens JM, Versluis M, Goverde PCJM, Reijnen MMPJ. 2018. Three-year outcome of the covered endovascular reconstruction of the aortic bifurcation technique for aortoiliac occlusive disease. *J Vasc Surg.* May; 67(5):1438-1447.

Ye W, Liu CW, Ricco JB, Mani K, Zeng R, Jiang J. 2011. Early and late outcomes of percutaneous treatment of TransAtlantic Inter-Society Consensus class C and D aorto-iliac lesions. *J Vasc Surg.* Jun; 53(6):1728-37.