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Original Article / Özgün Makale

Endovascular treatment of patients with bilateral internal iliac artery disease and buttock claudication

Bilateral internal iliyak arter hastalığı ve kalça klodikasyonu olan hastalarda endovasküler tedavi

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ABSTRACT

Background: This study aims to investigate the therapeutic value of endovascular treatment in patients with buttock claudication caused by stenosis or occlusion of the bilateral internal iliac arteries.

Methods: This single-center, retrospective study included a total of 12 patients (9 males, 3 females; mean age 63.7±6.4 years; range 54 to 74 years) with persistent buttock claudication who underwent endovascular repair of bilateral internal iliac artery stenosis or occlusion and were treated with percutaneous transluminal angioplasty in another session at our center between July 2012 and February 2016. The iliac Doppler ultrasonography and/or computed tomography angiography were performed at six and 12 months to evaluate restenosis or occlusion. Symptom relief was considered a successful outcome.

Results: The median follow-up was 16.5±3.7 (range, 12 to 24) months. Four patients underwent a bilateral intervention and eight patients underwent unilateral intervention. There was a 100% technical success rate with no complications. The primary patency rate at 12 months was 87.5%. Six patients (50%) had complete and four patients (33.3%) had partial relief of the buttock claudication symptoms.

Conclusion: Percutaneous angioplasty of the internal iliac arteries is a technically feasible and safe method in patients with buttock claudication and bilateral internal iliac artery occlusion or stenosis. Complete or partial relief of symptoms can be achieved in the majority of patients with a high primary patency rate.

Keywords: Balloon angioplasty; buttock claudication; internal iliac artery.

ÖZ

Amaç: Bu çalışmada iki taraflı internal iliyak arterlerde darlık veya tıkanıklığın neden olduğu kalça klodikasyonu olan hastalarda endovasküler girişimin tedavideki yeri araştırıldı.

Çalışma planı: Bu tek merkezli, retrospektif çalışmaya Temmuz 2012 - Şubat 2016 tarihleri arasında devam eden kalça klodikasyonu olan, birlikte iki taraflı internal iliyak arter tıkanıklığı veya darlığı endovasküler tamir edilen ve merkezimizde bir başka seansta perkütan translüminal anjiyoplasti ile tedavi edilen toplam 12 hasta (9 erkek, 3 kadın, ort. yaş 63.7±6.4 yıl; dağılım, 54-74 yıl) dahil edildi. Tekrar darlığı veya tıkanıklığı değerlendirmek için altı ve 12. ayda iliyak Doppler ultrasonografi veya bilgisayarlı tomografi anjiyografi yapıldı. Semptomatik rahatlama, başarılı bir sonuç olarak kabul edildi.

Bulgular: Medyan takip süresi 16.5±3.7 (dağılım, 12-24) ay idi. Dört hastaya iki taraflı girişim ve sekiz hastaya tek taraflı girişim yapıldı. Herhangi bir komplikasyon olmaksızın, başarı oranı %100 idi. Primer açıklık oranı 12. ayda %87.5 olarak bulundu. Altı hastada (%50) kalça klodikasyonu semptomlarında tam ve dört hastada (%33.3) kısmi iyileşme gözlendi.

Sonuç: Kalça klodikasyonu ve iki taraflı internal iliyak arter tıkanıklığı veya darlığı olan hastalarda, internal iliyak arterlerin perkütan anjiyoplastisi teknik olarak uygulanabilir ve güvenli bir yöntemdir. Hastaların büyük bir çoğunluğunda, yüksek primer açıklık oranı ile tam veya kısmi semptomatik iyileşme sağlanabilir.

Anahtar sözcükler: Balon anjiyoplasti; kalça klodikasyonu; internal iliyak arter.

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The internal iliac artery (INIA) occlusive disease may cause buttock claudication.[1,2] In certain cases, physicians may neglect vascular cause of pain in isolated IIA stenosis, as normal lower extremity pulses may be preserved.[2] In addition, extensive collateral formation often occurs, when a unilateral INIA is occluded. Patients with unilateral INIA occlusive disease may develop transient signs and symptoms of pelvic ischemia which resolve over time. Only a small proportion of these patients manifest recurrent or long-term symptoms.[2] Patients with bilateral INIA occlusive disease may present significant symptoms of pelvic ischemia.[2] Treatment options in patients with INIA occlusive disease and buttock claudication include *(i)* conservative management + exercise therapy, lifestyle changes, and antiplatelet therapy, *(ii)* percutaneous transluminal angioplasty (PTA) with or without stent placement, and *(iii)* open surgery.[1,2] Endovascular treatment is the preferred procedure, since open surgery is technically more demanding and brings along a higher risk to the patient.[3,4]

In the present study, we aimed to investigate the therapeutic value of endovascular treatment in patients with buttock claudication caused by stenosis or occlusion of the bilateral INIAs.

PATIENTS AND METHODS

This single-center, retrospective study included a total of 12 patients (9 males, 3 females; mean age 63.7±6.4 years; range 54 to 74 years) with persistent buttock claudication (8 patients <200 meters, 4 patients <50 meters) who underwent successful angioplasty of iliac or femoral vessel or endovascular repair of an iliac aneurysm with additional bilateral INIA lesions and were treated with angioplasty in another session at our center between July 2012 and February 2016. The patients were evaluated clinically and, then, with computed tomography (CT) scan by an orthopedic surgeon and neurologist for the spine, hip, and peripheral nerve diseases. The primary outcome was the severity of buttock claudication at six months and one-year after the procedure compared to baseline. This comparison was quantified in three categories: *(i)* complete relief of symptoms, *(ii)* partial relief, or *(iii)* no relief of symptoms.

A written informed consent was obtained from each patient. The study protocol was approved by the institutional Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Procedural technique

The femoral artery was punctured under ultrasound guidance. After a 5-6 French (Fr) introducer sheath was inserted and diagnostic angiography was performed, intravenous heparin (100 IU/kg) was administered. The contralateral femoral approach was used in patients with unilateral intervention, whereas both ipsilateral (Figure 1a) and contralateral approaches were used in patients with bilateral intervention. The crossover technique using 0.035 hydrophilic guide-wire, 5-6 Fr left internal mammary artery guiding catheter was placed at the ostium of the INIA (Figure 1a), when contralateral femoral approach was preferred. The INIA PTA was, then, performed using a 3- to 6-mm-diameter and 20-40 mm long balloon catheter (Armada 35, Abbott Vascular Inc., Santa Clara, CA, USA) with predilatation with the coronary

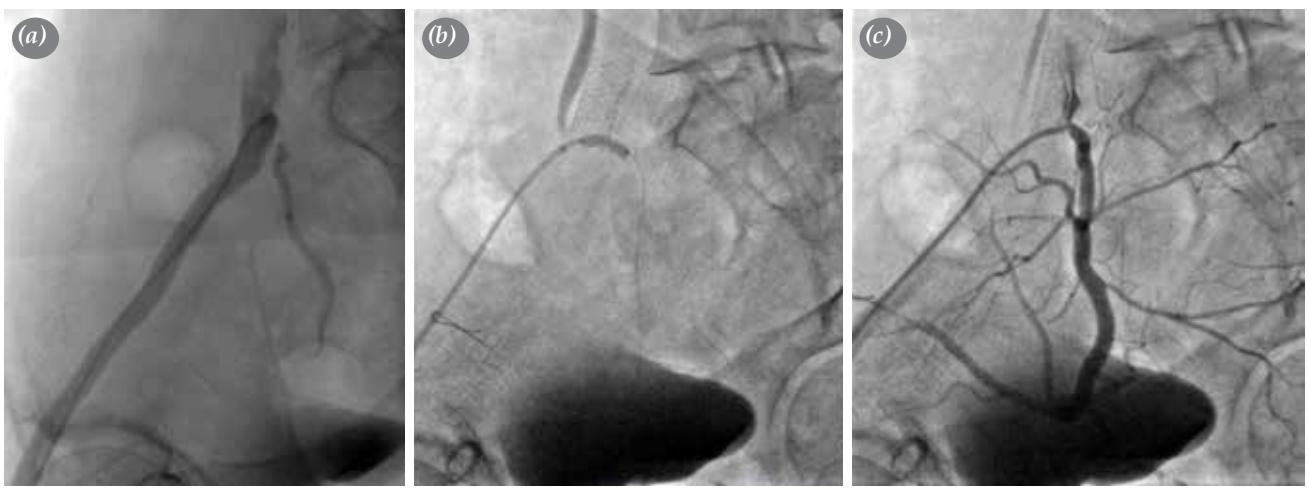

Figure 1. (a) Pre-procedural angiography showing right internal iliac artery subtotally occluded. **(b)** Balloon angioplasty through stent struts. **(c)** Final angiography.

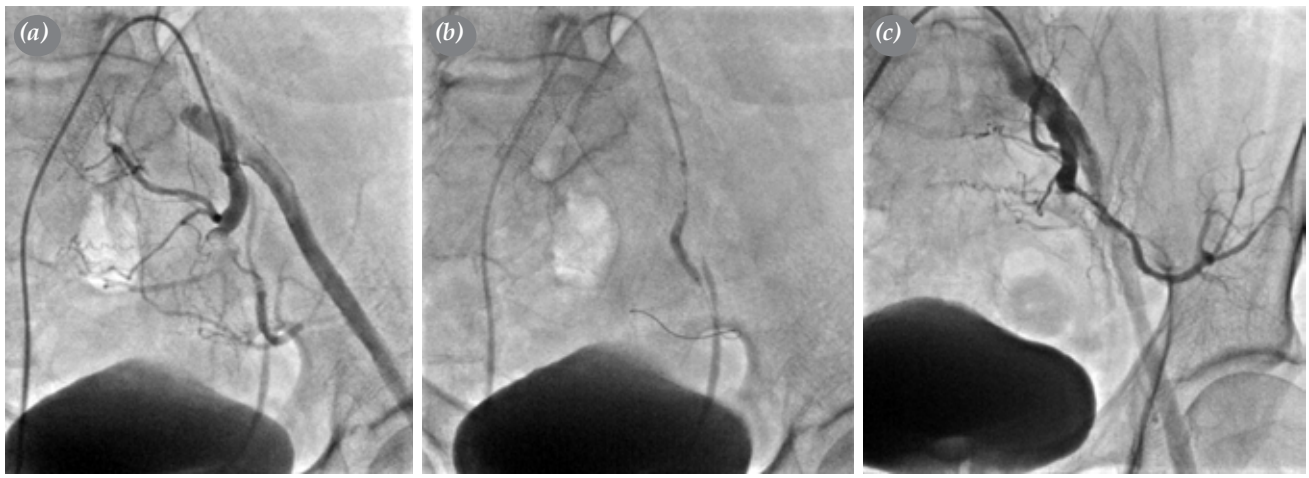

Figure 2. (a) Pre-procedural angiography showing left internal iliac artery mid occluded. **(b)** Balloon angioplasty to mid internal iliac artery. **(c)** Final angiography.

balloon (2-4×12-20 mm, Trek, Abbott Vascular Inc., Santa Clara, CA, USA) in eight patients (Figure 2b). The coronary balloon catheter was delivered through the guiding catheter, whereas the peripheral balloon catheter was delivered without a guiding catheter over through a 0.035 guidewire. Stent deployment in the INIA was not systematic and was reserved in case of flow-limiting dissection where we needed none in our study. A completion angiogram concluded the procedure (Figure 1c). Four patients underwent bilateral intervention of the INIA (Figure 2a-c). The femoral access site managed with digital pressure. Operative data are summarized in Table 1. All patients were discharged with one-month dual antiplatelet therapy consisting of acetylsalicylic acid (100 mg per day) and clopidogrel (75 mg per day) and continued with aspirin alone, thereafter. Proper medication for risk factors such as coronary artery disease, hypertension and hyperlipidemia (particularly with statins) were given after the intervention. The patency rate during follow-up was evaluated with Doppler ultrasonography (a peak systolic velocity ratio of 2.0 was established as the threshold for stenosis) and with CT angiography, when indicated.

Statistical analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for the statistical analysis. Descriptive data were expressed in mean ± standard deviation (SD), median, number, and frequency. A p value of <0.05 was considered statistically significant with 95% confidence interval (CI).

RESULTS

A total of 12 patients with buttock claudication treated with PTA for INIA lesions in our institution were included. Percutaneous transluminal angioplasty was performed in all 12 patients with INIA stenosis (two of them through previously deployed stent struts) and four INIA occlusions. Four patients (33.3%) underwent a bilateral intervention and eight patients (66.7%) underwent unilateral intervention at the

Table 1. Procedural data (n=16)

	Vessel number		
Variable	n	%	Mean±SD
Mean length (mm)			18.8±7.8
Total occlusion	4	25.0	
Technical success	16	100.0	
Bailout stenting	0	0	
2 internal iliac artery treated	4	33.3	

SD: Standard deviation.

Table 2. Baseline and demographic characteristics of patients (n=12)

Variable	n	%	Mean±SD
Age (years)			63.7±6.4
Gender			
Male	9	75.0	
Female	3	25.0	
Diabetes mellitus	7	58.3	
Hypertension	10	83.3	
Hypercholesterolemia	9	75.0	
Current smoker	5	41.7	
Ex-smoker	7	58.3	
Coronary artery disease	8	66.7	
Cerebrovascular disease	1	8.3	
Congestive heart failure	1	8.3	
End-stage renal disease	1	8.3	

SD: Standard deviation.

Table 3. Clinical outcomes (at 6 and 12 months)

	Total		6 months		1 year	
	n	%	n	%	n	%
All-cause mortality	0	0	0	0	0	0
Restenosis	2	12.5	1	6.3	1	12.5
Clinical outcome						
Total relief	6	50.0	6	50.0	6	50.0
Partial relief	4	33.3	4	33.3	4	33.3
No relief	2	16.7	2	6.7	2	16.7

discretion of the surgeon. Bailout stent deployment was not needed in any of the patients. Demographic characteristics and risk factors and comorbidities are summarized in Table 2.

The median follow-up was 16.5±3.7 (range, 12 to 24) months. The technical success rate was 100%. The procedural characteristics are summarized in Table 1. Six patients (%50) had complete and four patients (33.3%) had partial relief of the buttock claudication symptoms (83.3% total). The primary patency rate was 87.5% (Table 3). There were two cases of restenosis (12.5%) in patients who underwent bilateral intervention. These patients were documented by Doppler ultrasonography of INIA, followed by CT angiography, and did not need angiography or re-intervention, since the other INIA was open and the patients did not have persistent buttock claudication. One case of access-related hematoma occurred, which resolved on digital pressure.

DISCUSSION

Although buttock claudication is frequent due to INIA occlusion or stenosis, this may be easily missed, since peripheral interventionists are usually more related with other causes of claudication, such as an obstruction in the common iliac artery, external iliac artery, or superficial femoral artery. The physical examination may be misleading, as the patient with claudication may have normal femoral and distal pulses. Another concern is that patients with symptoms secondary to INIA occlusive disease usually have involvement of bilateral INIAs due to a rich collateral supply.[3-6] In patients undergoing endovascular aortoiliac aneurysm repair, new-onset buttock claudication occurred in 12 to 19% of patients with the incidence being higher, if the bilateral interruption was performed.[7,8] Therefore, in the present study, we treated INIA in patients with bilateral stenosis or occlusion in our institute. To the best of our knowledge, this is the first in the

literature to discuss balloon angioplasty (BA) for symptomatic pelvic ischemia resulting from bilateral INIA occlusive disease.

Although buttock claudication may have a vascular origin, symptoms may also mimic other entities, such as orthopedic diseases and neurogenic claudication. Therefore, it should be considered in the differential diagnosis at the time of admission. However, in our study, these entities were excluded, since the patients were evaluated clinically and, then, with CT by an orthopedic surgeon and neurologist for the spine, hip, and peripheral nerve diseases.

Open surgery has for years been the gold standard treatment of occlusive disease of the INIA.[9,10] Open surgery carries a high level of technical success and sustained benefit with an increased operative morbidity and mortality and longer hospital stay. In addition, all patients in our study had bilateral occlusion and stenosis of INIA's, requiring a larger single incision or two separate retroperitoneal incisions. Several studies previously evaluated the endovascular treatment (PTA alone vs. stenting) in small case series and showed that the procedures either for PTA alone or stenting were efficient and safe without any complication.[11-15]

Furthermore, BA may be an effective alternative to stent deployment, as any technology without leaving in the vessel for the improvement of long-term patency may be preferable to the long-term persistence of a foreign body. However, it poses the risk of a stent being crushed or broken in the deep INIA in the osseofibromuscular gluteal canal and, therefore, it should be avoided in this portion of the INIA.[16] Potential problems with stentless strategy with BA, however, are the elastic recoil phenomenon, and the occurrence of flow-limiting dissection. Since there were no flow-limiting dissection and the lesions were mostly focal and non-calcified, we preferred BA rather than stent deployment with a patency rate of 87.5%, which can be considered high with BA alone.

Limitations of this study include the retrospective, single-center design with small sample size. Although impotency is a complaint often accompanying buttock claudication, we were unable to evaluate the outcomes due to the retrospective design of the study. Another limitation is that, although the gold standard for the diagnosis of INIA stenosis is conventional angiography, we were able to use Doppler ultrasonography in the follow-up of the symptomatic patients.

In conclusion, percutaneous angioplasty of the internal iliac artery is technically feasible and safe in patients with buttock claudication and bilateral internal iliac artery occlusion and stenosis. Complete or partial symptomatic relief can be achieved in the majority of patients with a high primary patency rate.

Declaration of conflicting interests

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