

## Long-term outcomes of unilateral iliac stenting and femorofemoral crossover bypass for bilateral extensive iliac disease

İki taraflı büyük iliyak hastalıkta tek taraflı iliyak stentleme ve femorofemoral crossover baypasın uzun dönem sonuçları

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### ABSTRACT

In recent years, hybrid procedures are routinely used in high-risk patients with severe aortoiliac occlusive disease. However, little is known regarding their long-term results, particularly in developing countries. Herein, we report three cases of bilateral severe iliac artery stenosis presenting with critical limb ischemia. All these patients underwent unilateral iliac artery stenting with femorofemoral crossover grafting. All patients had smooth recovery and demonstrated complete resolution of symptoms. The patients were symptom-free with patent grafts during a mean follow-up of four years.

**Keywords:** Femorofemoral bypass grafting; graft patency; iliac stenosis.

### ÖZ

Son yıllarda, şiddetli düzeyde aortoiliyak tıkkayıcı hastalığı olan yüksek riskli hastalarda hibrid işlemler rutin olarak kullanılmaktadır. Ancak özellikle gelişmekte olan ülkelerde, bu işlemlerin uzun dönem sonuçları hakkında çok az sayıda bilgi mevcuttur. Bu yazıda kritik ekstremite iskemisi ile seyreden iki taraflı şiddetli iliyak arter darlığı olan üç olgu sunuldu. Hastaların tümüne tek taraflı iliyak arter stentleme ve femorofemoral crossover greftleme yapıldı. Hastaların tümünde iyileşme sorunsuzdu ve semptomlar tamamen ortadan kalktı. Ortalama dört yıllık takip süresince hastalarda herhangi bir semptom görülmedi.

**Anahtar sözcükler:** Femorofemoral baypas greftleme; greft açıklığı; iliyak darlık.

For severe aortoiliac occlusive disease, conventional approach is aortobifemoral bypass (ABF) grafting in low-risk patients.<sup>[1]</sup> The early patency of ABF for critical limb ischemia is up to 100% and decreases to 87% at five years.<sup>[1]</sup> It is associated with major perioperative morbidity and mortality.<sup>[1]</sup> Extra-anatomical bypasses are performed for high-risk patients who are in danger of limb loss. However, they are associated with limited patency. In patients with complete occlusion of the ipsilateral common and external iliac arteries and with contralateral iliac disease, stenting of the contralateral iliac artery with

a crossover femoral-to-femoral artery bypass is an alternative to surgical ABF.<sup>[2]</sup> These hybrid procedures have been increasingly performed with good results.<sup>[2]</sup> They are also effective, as they need minimal surgical dissection and exposure and with less physiological disturbance, although their durability is still under observation. There are scanty data regarding the long-term patency of these procedures, particularly in developing countries. Herein, we present three cases of ipsilateral iliac stenting and femorofemoral crossover bypass (FFB) for critical limb ischemia with their long-term follow-up results.

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**Table 1. Details of patients treated with unilateral iliac stenting and femorofemoral crossover bypass grafting**

Patient	Age (years)/Gender	Co-morbidities	Presentation	Pre-operative investigation	Size of iliac stent	Graft material	Primary patency (months)	Secondary intervention	Limb salvage	Outcome
1	88/Female	Hypertension DM CKD Ex-smoker	Tissue loss	CTA	Self expanding 10×94 mm nitinol	8 mm PTFE	48	No	Yes	Alive and well, graft patent
2	60/Male	Hypertension DM IHD Congenital solitary Kidney Smoker	Rest pain	CTA	Self expanding 8×120 mm	6 mm PTFE	56	No	Yes	Alive and well
3	63/Male	Hypertension DM Smoker	Rest pain	CTA	Self expanding 14×80 mm	8 mm PTFE	46	No	Yes	Died (MI), graft patent

DM: Diabetes mellitus; CKD: Chronic kidney disease; CTA: Computed tomography angiography; PTFE: Polytetrafluoroethylene; IHD: Ischemic heart disease; MI: Myocardial infarction.

## CASE REPORT

All patients presented with critical limb ischemia. The details of patients are given in Table 1. All patients underwent unilateral iliac stenting in radiology suite followed by FFB in the operation theater. The latter was performed under general anesthesia. Standard groin dissection was done to expose the femoral arteries. An externally supported polytetrafluoroethylene (PTFE) graft (6 or 8 mm in size) was used as the conduit. The graft was placed into the suprapubic subcutaneous space. In all patients, FFB was performed immediately after stenting on the same day. Restoration of the circulation was confirmed with palpable distal pulses at the end of the procedure. Postoperatively, all patients had smooth recovery. During a mean follow-up of four years, all patients had patent grafts with asymptomatic limbs. At discharge, at six months, and annually thereafter, all patients had ankle-brachial index measurements.

## DISCUSSION

The ABF grafting has remained the mainstay of treatment for symptomatic aortoiliac occlusive disease, being both durable and effective.<sup>[3]</sup> The patency rate of ABF is about 85 to 90% at five years.<sup>[4]</sup> However, it is an extensive surgical procedure with a high rate of associated complications (4 to 20%) and a mortality rate of 3 to 5%.<sup>[3]</sup> Hybrid procedures have emerged as a method of revascularization in patients with critical lower extremity ischemia having multilevel arterial occlusive disease.

In the literature, for unilateral iliac disease, FFB has both good short and long results;<sup>[5]</sup> however, in practice, iliac disease is usually more extensive rather than focal, involving both the iliac orifices in most of cases. It may compromise the patency of FFB. Earlier reports showed significant donor iliac stenosis as a risk for subsequent FFB failure.<sup>[6]</sup> The advent of endovascular techniques for the treatment of arterial occlusive disease has expanded the anatomical profile of patients deemed suitable to undergo FFB. Patients with donor inflow disease are anatomically eligible for a concomitant endovascular intervention at the time of surgery. Despite this evolution in practice, the reports of outcomes of FFB with an ipsilateral intervention remain somewhat limited. Previous reports have shown mixed results using donor iliac intervention

in conjunction with FFB for patients with bilateral aortoiliac occlusive disease. Lopez-Galarza et al.<sup>[7]</sup> documented the associated five-year primary patency as 51% in a review of 18 patients who underwent FFB grafting with adjunctive iliac stenting in the setting of stenosis shorter than 3 cm.<sup>[7]</sup> Aburahma et al.<sup>[6]</sup> reported a series of 41 patients who underwent FFB, in whom 92% underwent iliac stenting in the setting of iliac lesions >5 cm in length, compared to with 14% who underwent associated stenting in the setting of a lesion <5 cm in length. For the durability of crossover grafting, it is important to handle contralateral iliac disease. There are series showing that selected iliac artery stenting has also improved the outcome of crossover bypass in patients with a suboptimal donor iliac artery.<sup>[8]</sup> Similar results were duplicated in our case patients.

Furthermore, conduit for FFB is always a concern in terms of its long-term results. We used the PTFE as conduit in all patients. We believe using native venous grafts may add more operative time and can be at the cost of associated wound morbidity.

In conclusion, early and long-term results are encouraging with donor iliac stenting with FFB bypass in patients with symptomatic severe bilateral iliac disease.

#### **Declaration of conflicting interests**

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