

# Endovascular Treatment of Isolated Bilateral Common Iliac Artery Aneurysms Using Iliac Branched Stent Graft

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Endovascular treatment of isolated bilateral common iliac artery aneurysm (CIAA) requires salvage of at least one internal iliac artery to prevent complications such as ischemic buttock claudication. We treated a case of bilateral CIAAs using an internal iliac branched stent graft. We report a case of a 58-year-old man who presented with bilateral CIAAs. The left internal iliac artery was occluded with coil embolization. The right internal iliac artery was saved by using a branched stent graft. The aneurysms were excluded with conventional endovascular aneurysm repair. Completion angiography showed technical success. Follow up computed tomography angiogram at three months showed complete exclusion of bilateral CIAAs, no endoleaks, and patent right internal iliac artery. There was no pelvic ischemic complication. We treated successfully a case of isolated bilateral CIAAs using an iliac branched stent graft.

**Key Words:** Iliac branched device, Aneurysm, Endovascular procedures

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## INTRODUCTION

Iliac artery aneurysms (IAAs) are the second most common aneurysms after abdominal aortic aneurysms (AAAs), and most iliac aneurysms are common iliac artery aneurysms (CIAAs). Most CIAAs develop simultaneously with AAAs, and isolated CIAAs are rare, less than 2% of all abdominal arterial aneurysms [1-3]. Isolated CIAA is relatively uncommon with an incidence rate as low 0.03% in an autopsy series [1,2]. However, ruptured CIAAs are as fatal as ruptured AAAs [4]. Therefore, prophylactic repair is important to reduce mortality.

Recently stent graft therapy is being more widely used for aortic aneurysmal diseases. Embolization of internal iliac artery (IIA) and endograft limb extension into external

iliac artery (EIA) during conventional endovascular aneurysm repair (EVAR) can be applied to isolated CIAAs [5,6]. However, bilateral IIA obstruction can lead to pelvic ischemic symptoms such as buttock claudication, sexual impotence, and colon ischemia [7,8]. We report a case of isolated bilateral CIAAs treated with an iliac branched device (IBD) to preserve the IIA.

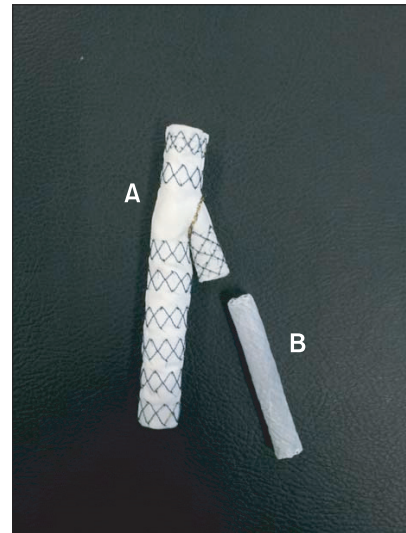
## CASE

A 58-year-old male patient presented with enlarging isolated bilateral CIAAs, which was diagnosed 2 years ago. Their maximum diameter was 35 mm on computed tomography (CT) angiogram 2 years ago. The right aneurysm had enlarged to 40 mm at the largest trans-

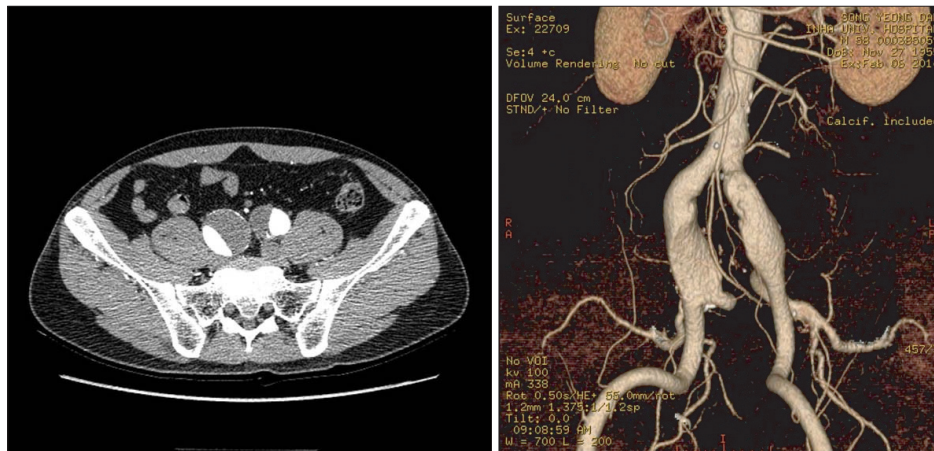
verse diameter and 50 mm in length, and the left one had increased to 38×42 mm (Fig. 1). He was on antihypertensive medication, and had no DM or other medical illnesses.

The patient was brought to the angiography room. He had general endotracheal anesthetic induction. Both groins were prepared, and the common femoral arteries were exposed. After aortography, the left IIA was embolized with interlock coils (Boston Scientific, Natick, MA, USA). An IBD (12×120; S&G Co., Seoul, Korea) (Fig. 2) was inserted into the right iliac artery from the right femoral approach. The stent was deployed resulting in the IBD limb orienting towards the right IIA. Selection of the right IIA was done from the contralateral left common femoral artery and the IBD limb (10×60, S&G Co.) was inserted through the right IBD branch (Fig. 3). The main aortic body (24×40, S&G Co.) was inserted just below the right accessory renal artery. The left limb (12×120), extension limb (12×60), and right limb (12×100) were subsequently inserted. Overlapping zones were fully dilated with a molding balloon to prevent type III endoleak. Final completion angiography demonstrated complete exclusion of both CIAAs without endoleaks. The

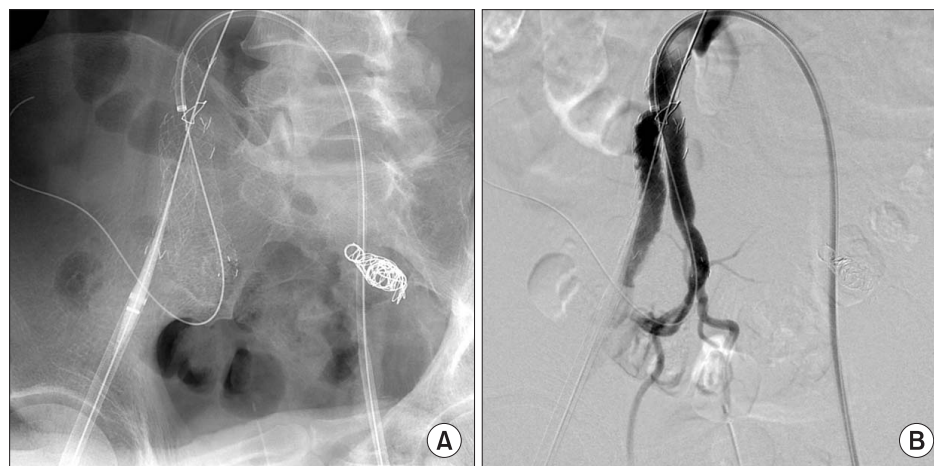
total amount of contrast media (Vispaque; GE Healthcare, Norway) used was 190 mL. The operation time was 170



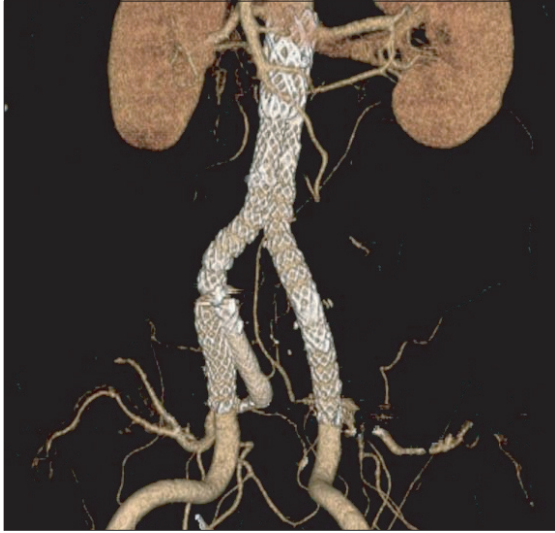
**Fig. 2.** Right iliac branched device (A) and its limb (B).



**Fig. 1.** Preoperative computed tomography angiogram showing both common iliac artery aneurysms. (A) Axial computed tomography angiogram. (B) 3D reconstructed computed tomography angiogram.



**Fig. 3.** Iliac branched device (IBD) procedure and angiogram. Right IBD limb was inserted into the right internal iliac artery through the right IBD branch (A). Iliac angiogram shows good patency of the right internal iliac artery (B).



**Fig. 4.** Follow up computed tomography angiogram at three months. There was no migration of the stents, no endoleaks, and the right internal iliac artery was widely patent.

minutes. The patient had no ischemic buttock complaints or any other complications. CT angiography at three months showed no migration of the stents, no endoleaks, and a widely patent right IIA (Fig. 4).

## DISCUSSION

The subcommittee on reporting standards for arterial aneurysms of The Society for Vascular Surgery defines a CIAA as any permanent, localized dilatation of the iliac artery  $>1.5$  cm in diameter [4-6]. Clinically significant CIAA is reported as a diameter  $>25$  mm [4,6]. Unlike the well-documented progression of AAA, no large scale prospective studies have investigated the natural history for isolated CIAAs. The expansion rates are slow for CIAAs  $<3$  cm (1.1 mm/year) but are significantly greater for CIAAs 3-5 cm in diameter (2.6 mm/year) [6,9]. The size of the aneurysm is the most important determinant as with other aortic aneurysms. It is recommended that elective repair should be considered for CIAAs  $>3.5$  cm whereas those with 3-3.5 cm in diameter should be carefully followed-up with B-mode ultrasound at 6-month intervals [4,6,9].

The mortality rate has been reported as 7%-11% for open surgical procedures such as aorto bi-iliac interposition using Dacron Y graft or aneurysmorrhaphy with graft interposition [3,4]. Operative complications include hemorrhage, damage to adjacent organs during exposure, and colonic or urethral ischemia [4]. Demand for minimally invasive procedures and increased experience with endovascular repair of AAA have led to endovascular methods to treat isolated CIAAs. The

main advantage of endovascular treatment is its minimal invasiveness without the need to dissect intra-abdominal or retroperitoneal organs. Because of these advantages, endovascular treatment is now widely used in CIAAs. It is especially advantageous for elderly patients with multiple co-morbidities. Interventional CIAA repair has been shown to be safe and effective with good mid-term results [10]. The procedural technical success and patency rates were 97.5%-100% [10,11]. Reintervention rates for endoleak were 0%-21%, mostly for type II endoleaks [10,11].

Embolization of the IIA is essential for prevention of type II endoleaks due to retrograde flow from the IIA during endovascular repair of CIAA [12]. Complications following bilateral IIA embolization and EVAR showed 31% buttock and thigh claudication, and 5% impotence [5,12]. These complications result from an abrupt decrease in pelvic blood supply by interruption of the bilateral IIA. Revascularization of at least one IIA is therefore recommended. Several approaches have been reported to maintain arterial supply to the IIA for pelvic revascularization. A hybrid approach of external to IIA bypass surgery following conventional distal landing of the device to EIA has been demonstrated to be a useful treatment method [5]. Crossover chimney technique to preserve the IIA with a covered stent was reported [13], but retrograde flow to the IIA has not been proved. Sandwich technique was also reported to have good mid-term results [14]. However, brachial access to advance an endograft to the IIA can complicate the operation field and increase the rate of stroke. IBD has been introduced as a new endovascular approach to preserve antegrade flow of the IIA [10,11,15]. Periprocedural technical success rate of iliac aneurysm repair with IBD was reported as 95%-100% with no morbidity [10,11,15,16]. Patency rate of IBD was 91% at 5 years [10,11,15,16]. Buttock claudication developed in 4% of patients [10]. Freedom from reintervention rate was 90% at 1 year and 81.4% at 5 years [10,11,13]. As with any endovascular procedure, IBD application has anatomical limitations such as small or tortuous EIA or large internal IAA. As in our case, use of IBD requires CIA  $>20$  mm in diameter, 45 mm in length, and main IIA  $>10$  mm in length for correct graft expansion [11]. If the diameter of the CIA is less than 18 mm, the branch limb may collapse. If the length of the CIA is less than 40 mm, branch limb selection will be difficult. Adequate length of EIA more than 15 mm for a distal landing and EIA diameter  $<12$  mm are also required [11]. However, long term durability for IBD is lacking and an unsolved problem. The present analysis shows that IBD can be used as a treatment for isolated CIAAs or as an EVAR adjunct for successful treatment of AAA with iliac involvement, with safety and durability up to 5 years.

We treated successfully a case of isolated bilateral CIAAs using EVAR with iliac branched stent graft. IBD can be used as a primary choice for endovascular treatment of isolated CIAAs with favorable anatomy. However, long term follow up will be required.

## ACKNOWLEDGEMENTS

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