Bell-bottom aortoiliac endografts: An alternative that preserves pelvic blood flow

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Objective: **Dilated common iliac arteries that complicate aortic aneurysm stent grafting usually have been managed with endograft extension across the iliac artery bifurcation with internal iliac artery (IIA) occlusion. We studied 25 patients with significant common iliac artery (CIA) dilation treated with two methods: endograft extension across the iliac bifurcation or a new approach with a flared cuff within the CIA that preserves the IIA.**

Methods: **Of 86 patients with abdominal aortic aneurysm (AAA) who underwent bifurcated endovascular stent grafting (ESG), 25 (29.1%) had at least one dilated CIA. Two treatment groups had different methods of management of iliac artery dilation. Group 1 underwent ESG with straight extension across the iliac bifurcation and IIA coil embolization before the ESG procedure (n = 2) or simultaneously with ESG (n = 8). Group 2 underwent ESG with flared distal cuff (AneuRx, Medtronic AVE, Santa Rosa, Calif) contained within the CIA, the so-called "bell-bottom" procedure, thus preserving the IIA (n = 15). Iliac artery dimensions, operating room time, fluoroscopy time, and postoperative complications were prospectively gathered.**

Results: **Two women and 23 men had mean diameters of AAA of 56.6 mm (range, 38 to 98 mm) and of CIA of 21.4 mm (range, 15 to 48 mm). The diameters of CIA treated with device extension into external iliac artery after IIA coil embolization in group 1 and with the bell-bottom procedure in group 2 were not different (mean CIA diameter, 19.9 mm; range, 15 to 26 mm; and mean, 19.1 mm; range, 15 to 24 mm; respectively). However, significantly lower operating room and catheter procedure times were found in group 2 compared with group 1 (137 versus 192 minutes; 58 versus 106 minutes; *P* = .02 and .02, respectively). No periprocedural type I endoleaks were found in either group. Nine patients in group 2 also had a second contralateral CIA aneurysm, and five patients (mean CIA diameter, 33.0 mm; range, 22 to 48 mm) underwent treatment with extension across the iliac artery bifurcation and IIA occlusion. Use of the bell-bottom procedure on the other side allowed preservation of one IIA. Four cases (mean diameter, 19.3 mm) also underwent contralateral bell-bottom procedure. Two of these group 2 patients had complications, with severe buttock claudication in one and distal embolism necessitating limb salvage bypass after preoperative coil embolization of the IIA in another.**

Conclusion: **Significant CIA ectasia or small aneurysm is often associated with AAA. In such cases, the bell-bottom procedure that preserves IIA circulation is a new alternative to the common practice of placement of endograft extensions across the iliac artery bifurcation in patients with at least one CIA diameter of less than 26 mm. Additional benefits include reduced total procedure time. Early technical success appears to justify continued use. However, long-term evaluation is necessary to determine durability because the risk of rupture as the result of potential expansion of the excluded iliac artery or late failure is unknown. (J Vasc Surg 2002;35:874-81.)**

Endovascular stent graft (ESG) repair of abdominal aortic aneurysm (AAA) is rapidly becoming an acceptable alternative treatment since first reported by Parodi, Palmaz, and Barone.[1] Careful patient and device selection are critically important for achieving the best results with this technique for treatment of AAA. However, challenging aortoiliac anatomy, such as diseased proximal neck or angled tortuous vessels, is present in a significant number of patients considered candidates for ESG. The common iliac artery (CIA) plays a crucial role because it is the distal attachment zone for the stent graft and must be completely sealed to assure exclusion of the aneurysm. One or both CIAs are dilated in 16% to 30% of ESG cases,[2-7] making them unsuitable for adequate distal sealing with commercially available endovascular devices. The dilated CIA may be ectatic or aneurysmal, more than 18 mm or greater than 50% of adjacent normal artery,[8] which is larger than the diameter of device limbs currently available.

In patients treated with ESG, limb extension into the external iliac artery (EIA) with coil embolization of the ipsilateral internal iliac artery (IIA) for prevention of retrograde endoleak into the aneurysm sac is the common management of dilated CIA. Reports claim the relative safety of occlusion of one or both IIAs during ESG.[2,3] However, other investigators have reported serious pelvic ischemic complications.[4-7,9,10] Relocation of the iliac bifurcation with surgical implantion of the IIA onto the distal EIA to preserve pelvic blood flow as proposed by Parodi and Ferreira[11] is another option for management of dilated CIA. Another less invasive method is use of a flared cuff, the so-called "bell-bottom" technique, that anchors the device

From the Jobst Vascular Center.
Competition of interest: nil.
Presented at the Twenty-fifth Annual Meeting of the Midwestern Vascular Surgical Society, Chicago, Ill, Sep 21-22, 2001.
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0741-5214/2002/$35.00 + 0 **24/6/123326**
doi:10.1067/mva.2002.123326

within the CIA, thus preserving IIA patency.[12] A short aortic extension cuff is used in the distal CIA attachment zone to achieve a complete seal.

We reviewed our experience with ESG treatment of patients with AAA who had significant unilateral or bilateral CIA dilation (≥15 mm) with two methods, endograft extension across the iliac bifurcation with IIA coil embolization and bell-bottom technique. The purpose of this study was to compare the feasibility and outcome, particularly pelvic ischemia symptoms, of the patients treated with both techniques and also the operating room (OR), catheter procedure, and fluoroscopic times.

METHODS

From August 1997 to April 2001, 86 patients with AAA underwent treatment with ESG. At least one significantly dilated CIA (≥15 mm) was found in 25 patients (29.1%), 16 unilateral and nine bilateral. The two treatment groups were group 1, ESG with extension across the iliac bifurcation and IIA coil embolization (10 cases), and group 2, ESG with so-called bell-bottom procedure (15 cases, nine bilateral). The bell-bottom procedure uses an aortic extender cuff (AneuRx, Medtronic AVE, Santa Rosa, Calif) as a flared distal cuff within the CIA to preserve blood flow to the IIA (Fig 1). A total of 19 bell-bottom procedures (11 unilateral and 4 bilateral) were performed. Coil embolization of one IIA was performed in all group 1 cases. Five patients in group 2 underwent contralateral IIA coil embolization in addition to the bell-bottom procedure.

All patients underwent evaluation with spiral computed tomographic (CT) scanning with 2-mm reconstruction interval axial slices. The details of the preprocedural imaging methods and the inclusion criteria of the patients were described elsewhere.[13] Two endograft systems were used in these 25 patients: AneuRx (Medtronic AVE; n = 17) and Vanguard (Boston Scientific/Vascular, Natick, Mass; n = 8). Before January 2000, all AAA cases with bilateral dilated CIA were excluded from ESG treatment, and AAA cases with unilateral dilated CIA, which were eligible for ESG, were treated with coil embolization of IIA and limb extension into EIA, preserving one contralateral patent IIA. Eight patients in group 1 received the Vanguard device, and two received AneuRx. All group 2 patients underwent treatment with AneuRx devices, which became commercially available after January 2000. Bilateral bell-bottom procedures were used in four of the nine patients in group 2 who had bilateral dilated CIA (Fig 2), and bell-bottom procedure on one side and IIA coil embolization with device extension into EIA was used in five patients (Fig 3). No patients underwent bilateral IIA coil occlusion.

Occurrence of the following conventional comorbidities was not significantly different between group 1 and group 2, respectively: current or former smoker (80% versus 80%), preexisting heart disease (47% versus 50%), hypertension (53% versus 60%), and hyperlipidemia (67% versus 50%; $P \geq .4$ for all). Less common associated comorbidities in group 1 and group 2, respectively, were diabetes mellitus (20% versus 10%), chronic obstructive pulmonary disease (33% versus 20%), and renal dysfunction (13% versus 0; $P \geq .23$ for all).

Six patients underwent IIA coil embolization before surgery, two cases in group 1 and four cases in group 2. Coil embolization of the IIA with Gianturco coils (Cook, Bloomington, Ind) was performed via the contralateral femoral artery approach. No aneurysmal IIAs were treated. Total occlusion of the IIA was achieved in all cases. One case in group 2 had distal emboli after the procedure that necessitated a limb salvage procedure and had ESG 3 months later. The other five patients underwent IIA coil embolization an average of 17 days before ESG. Embolization of the IIA was done at its origin, proximal to anterior and posterior bifurcation, permitting distal collateral circulation to remain patent. The IIA coil embolization procedures were done before surgery in the most recently treated cases to allow collateral blood flow development in the event that the bell-bottom procedure failed and the remaining IIA occluded.

The aortic extension cuff size (available diameters, 20, 22, 24, 26, and 28 mm; 37.5 mm long) was selected on the basis of the diameter of the planned attachment zone of the CIA. Oversizing of the cuff by 10% to 20% was used. A length of 15-mm to 17.5-mm distal contact between the extension cuff and the CIA was considered adequate for attachment and sealing with 20-mm length of the cuff proximally apposed within the endograft limb.

Preoperative aortoiliac dimensions, including AAA and CIA diameters, the diameter of the extension cuff used, OR time (the total time used from the beginning of skin incision to the finish of skin closure), catheter procedure time (the total time from insertion of the first catheter to withdrawal of the last catheter), fluoroscopy time, and postoperative complications were prospectively gathered. The fluoroscopic times of the preoperative coil embolization procedures were added to the fluoroscopic times of the ESG in both groups. A comparison of these parameters between the two groups was conducted. Student *t* test was used to analyze the means. The main ESG procedures in both groups were: group 1, patients underwent coil embolization of IIA, deployment of the main bifurcated device and its limbs, together with another limb extension into ipsilateral EIA; group 2, patients underwent deployment of the main bifurcated device and its limbs and bell-bottom procedure (short extension cuff within the ipsilateral CIA).

The follow-up protocol for all patients included CT scans and plain abdominal radiography. Follow-up intervals were 1 month, 6 months, 12 months, and yearly thereafter.

RESULTS

Two women and 23 men had an average age of 70.1 years (range, 53 to 80 years). Mean diameters of AAA and CIA were 56.6 mm (range, 38 to 98 mm) and 21.4 mm (range, 15 to 48 mm), respectively.

All coil embolizations of IIAs and bell-bottom procedures were performed successfully. No unintentional covering of the iliac bifurcation was performed. No difference was found between CIA diameters in the two groups. The

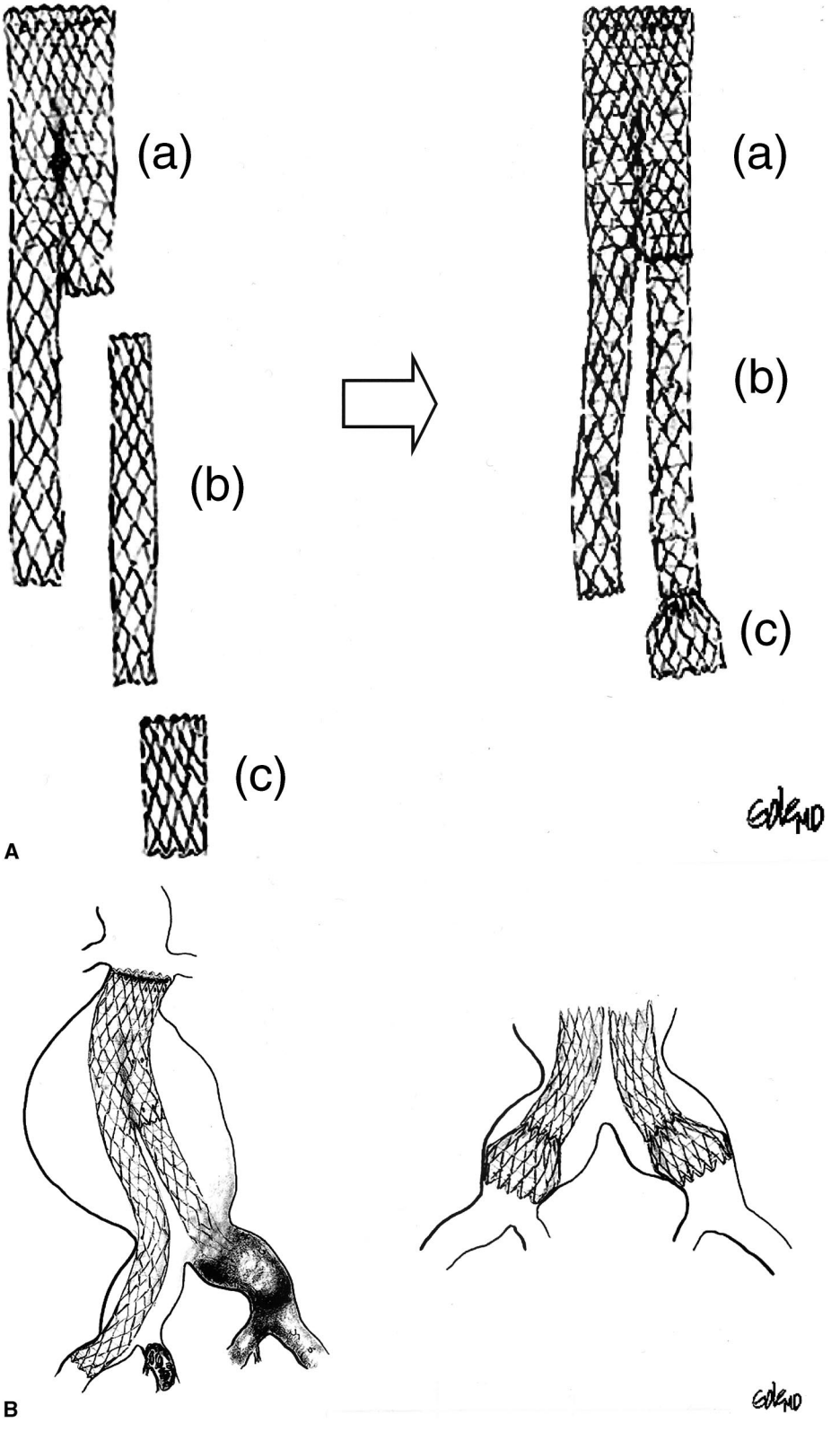

Fig 1. A, Diagram shows devices used in bell-bottom procedure: *a,* main bifurcated device; *b,* contralateral limb; and *c,* aortic extension cuff. **B,** Diagram shows bell-bottom procedures, unilateral or bilateral, as alternative to IIA occlusion and device extension.

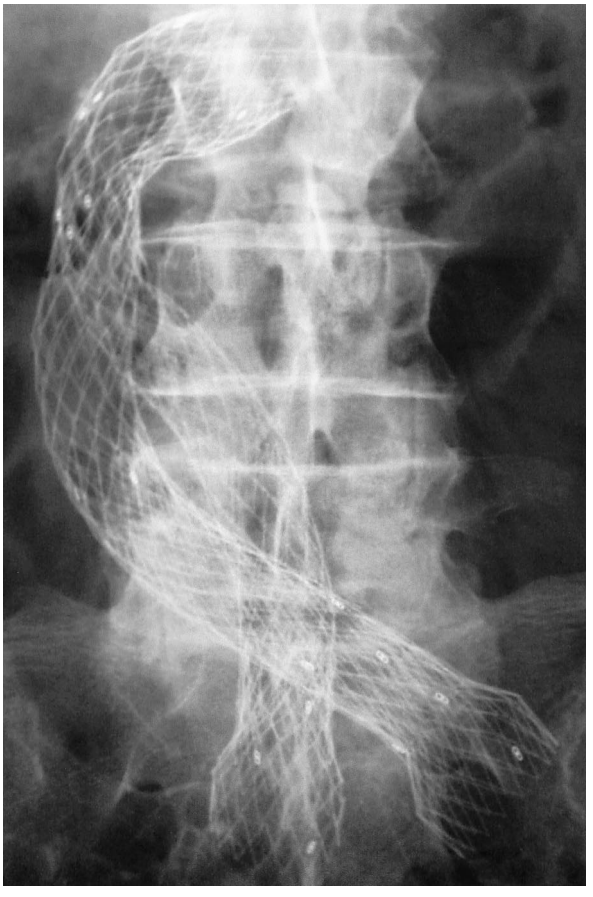

Fig 2. Plain abdominal x-ray shows bilateral bell-bottom procedure.

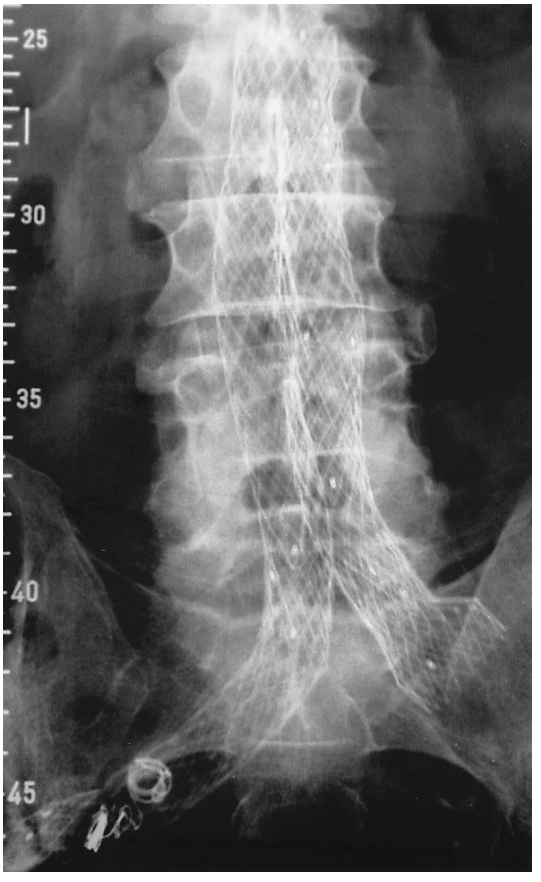

Fig 3. Bell-bottom procedure *(left)* with contralateral IIA occlusion and device extension into EIA *(right)*.

OR time and the catheter procedure time were significantly lower in group 2, the bell-bottom group, compared with group 1, the coiling and extension group. However, no significant difference was seen in fluoroscopic time between the two groups (Table I).

Of the 15 cases in group 2, 11 cases had unilateral and four cases had bilateral bell-bottom procedures. Mean OR time, catheter procedure time, and fluoroscopy time were similar between cases with unilateral and bilateral bell-bottom procedures (Table II). The diameters of the devices used in 15 cases (19 arteries) in group 2 were 20 mm-diameter extension cuffs in 10 procedures and 22 mm, 24 mm, and 26 mm-diameter extension cuffs in three procedures each.

With consideration of the diameter of the treated CIA, the average diameter of the CIA treated with coiling and extension in group 1 was 19.9 mm (range, 15 to 26 mm) in 10 cases (10 arteries). The average diameter of the CIA treated with bell-bottom procedure in group 2 was 19.1 mm (range, 15 to 24 mm) in 19 arteries (Table I). However, there were five cases in group 2 that had contralateral CIA aneurysms treated with coiling IIA and extension cuff into EIA. The average diameter of the five CIA aneurysms was 33 mm (range, 22 to 48 mm).

No perioperative type 1 endoleak, proximal or distal, was seen. One delayed type 1 distal endoleak occurred in group 1. The device was severely kinked in this patient, and at 12 months, the limb contralateral to the coil and extension side pulled up into the aneurysm sac causing distal endoleak. Insertion of a secondary endograft limb was performed, and the distal endoleak successfully sealed. Three type 2 endoleaks were seen with CT scan at 1 month, one case in group 1 and two cases in group 2. Both cases in group 2 spontaneously sealed at 6 and 12 months after surgery. The group 1 case had a persistent small type 2 endoleak through a 3-year follow-up period; however, the AAA diameter was unchanged at 46 mm. Follow-up examination has been scheduled at 6-month intervals with no immediate treatment planned for this 90-year-old patient. No device migration was found.

Two postoperative complications occurred, one from pelvic ischemia and one related to the angiographic procedure. One group 2 patient, with bell-bottom treatment of the left CIA and coil embolization of the right IIA, had mild right buttock pain after surgery. The symptom was not

Table I. Comparison of CIA diameters and procedural times between two groups

	Mean CIA diameter (mm)	*Mean OR time (min)*	*Mean fluoroscopy time (min)*	*Mean catheter procedure time (min)*
Group 1: extension to EIA (n = 10)	19.9 ± 3.7	192 ± 61	43 ± 16	106 ± 53
Group 2: bell-bottom (n = 15)	19.1 ± 3.4	137 ± 40	35.0 ± 17	58 ± 28
P value (*t* test)	.63	.02	.26	.02

Table II. Group 2 bell-bottom procedures: comparison of bilateral and unilateral bell-bottom procedures

	Mean CIA diameter (mm)	*Mean OR time (min)*	*Mean fluoroscopy time (min)*	*Mean catheter procedure time (min)*
Bilateral bell-bottom (n = 4)	19.0 ± 2.9	128 ± 55	26 ± 13	62 ± 40
Unilateral bell-bottom (n = 11)	19.3 ± 3.7	140 ± 36	28 ± 7	57 ± 24

Table III. Incidence of pelvic ischemic symptoms after IIA occlusions in published data

Authors	*Total IIA occlusion cases*	*Pelvic ischemic symptoms cases*				
		Ischemic cases (% of total)	*Buttock claudication*	*Sexual dysfunction*	*Colonic ischemia*	*Other*
Mehta[2]	154	71 (46%)	56	9	4	2 minor neuro deficit
Criado[3]	39	6 (15%)	5	1	0	
Yano[4]	103	22 (21%)	21	NA†	1	
Lee[5]	27	7 (26%)	5	1	0	1 nonhealing sacral ulcer
Razavi[6]	32	12 (38%)	9	2	0	1 urinary retention
Karch[7]	22	10 (42%)	7	NA*	3	
Total	377	128 (34%)	103 (81%)	13 (10%)	8 (6%)	4 (3%)

*Did not include in data.
†Impotence and severe buttock claudication were classified in same group (classification 2 severity).
NA, Not applicable.

improved at 6 months after surgery. Another adverse event occurred in a group 2 patient who underwent preoperative left IIA coil embolization before surgery. The patient had atheroembolic showering to the left foot after angiography and coiled IIA. Popliteal to common plantar artery bypassing was performed to salvage the left foot. ESG with bell-bottom treatment of the right CIA was performed 3 months later without any complications. No colonic ischemia and impotence occurred in this series, and no pelvic ischemia symptoms occurred in the bell-bottom cases.

In group 2 patients who underwent bell-bottom procedures, during the follow-up period (average, 8 months; range, 1 to 12 months), no CIA dilatation or delayed type 1 endoleak occurred. No additional procedures were necessary after surgery among the bell-bottom procedure cases. The diameters of the treated CIAs remained unchanged.

DISCUSSION

Aortoiliac aneurysms that extend to the iliac bifurcation make preservation of IIA patency difficult in treatment of AAA with endovascular grafting. Although rich collaterals exist in the pelvic circulation, interruption of the IIA together with the inferior mesenteric artery may lead to pelvic arterial insufficiency.[14,15] Overall, approximately one third of patients with IIA occlusion have symptoms of pelvic ischemia, and the same sequelae occur in nearly half of bilateral IIA occlusion cases (Tables III and IV). Buttock claudication is the most common adverse event, occurring in 80%, with impotence in 10% and colonic ischemia in 6% to 9% of all pelvic ischemia complications.[2-7] Although patients who undergo even unilateral IIA occlusion are at risk for development of life-threatening sequelae,[4,7,9] these sequelae are temporary in most cases and resolve during the follow-up period. A wide range (20% to 80%) of improve-

Table IV. Incidence of pelvic ischemic symptoms after bilateral IIA occlusions in published data

Authors	*Total bilateral IIA occlusion cases*	*Pelvic ischemic symptoms cases*			
		Ischemic cases (% of total)	*Buttock claudication*	*Sexual dysfunction*	*Colonic ischemia*
Mehta[2]	20	10 (50%)	8	2	0
Criado[3]	11	0	0	0	0
Yano[4]	11	6 (55%)	6	NA	0
Lee[5]	3	1 (33%)	1	0	0
Razavi[6]	7	4 (57%)	3	1	0
Karch[7]	2	2* (100%)	2	NA	2
Total	54	23 (43%)	20 (87%)	3 (13%)	2 (9%)

*Buttock claudication and colonic ischemia developed in both cases.
NA, Not applicable.

ment in buttock claudication symptoms has been reported during follow-up periods up to 3 years.[2-7] Colonic ischemia necessitating laparotomy or resulting in death is rare but has occurred.[4,7]

Alternative treatments have been proposed to avoid such risks. Parodi and Ferreira[11] proposed the relocation of IIA as an alternative to IIA occlusion to preserve pelvic blood flow, and Karch et al[12] first reported the bell-bottom technique. In the series from Karch et al, the bell-bottom procedure allowed treatment of ectatic CIA, those with diameters 15 to 20 mm, with a short aortic extension cuff, diameter 20 to 24 mm, thus preserving patency of IIA. They treated 14 patients and 18 ectatic arteries with aortic extension cuffs. They reported no complications, and CIA diameter did not change in 11 arteries, whereas it increased by 1 mm in four CIAs and decreased by 1 mm in three CIAs. The authors concluded that the bell-bottom technique is an acceptable option for the management of ectatic iliac vessels during ESG. We cannot currently justify use of the bell-bottom technique for large (>26 mm) CIA aneurysms because the largest aortic cuff device commercially available is 28 mm. As devices evolve, this threshold may increase, but the increased rupture risk in CIA of more than 30 mm must be considered.[16] Furthermore, the bell-bottom technique is not appropriate for the rare occasion when internal iliac aneurysms are present. Internal iliac aneurysms must still be excluded with coil embolization or repaired with conventional open surgery to avoid rupture.

In this report, we reviewed our experience in patients with AAA and dilated CIA treated with either the bell-bottom technique or endograft extension across the iliac bifurcation with coil embolization. A significant number of patients had AAA (30%; 15 cases, 19 arteries) with dilated CIA necessitating some therapy to allow endografting. Both the bell-bottom procedure and IIA occlusion with endograft extension were effective adjuncts to ESG in the immediate perioperative period because no patient had a type 1 endoleak. However, some advantages were observed in the bell-bottom group, including significantly decreased OR time and catheter procedure time (Table I).

No short-term perioperative complications were found in the bell-bottom group: no pelvic ischemic symptoms, type 1 endoleak, device migration, or need of a secondary procedure. The 37.5 mm-long aortic cuff used in our study allowed 20 mm to be telescoped into the endograft limb with 15 to 17.5 mm remaining in apposition to the artery. Although no late endoleak or graft disconnect failure occurred at this junction during our short follow-up period, past experience has shown the importance of diligent surveillance in all patients treated with endovascular therapy.[17]

One IIA occlusion case in our series had mild buttock claudication with symptoms unchanged at 6 months, and one patient had distal embolism that necessitated limb salvage bypass. No change was found in CIA diameter during the follow-up period (average, 8 months; range, 1 to 12 months). Although small CIA aneurysms were excluded from the series by Karch et al,[12] we treated small CIA aneurysms (six cases with diameters between 21 and 24 mm) with the bell-bottom technique with extension cuff devices up to 26 mm. As reported by Santilli, Wernsing, and Lee,[16] small CIA aneurysms (<30 mm) rarely cause symptoms or rupture and expand extremely slowly.

Sequential coil embolization of bilateral IIAs has been suggested to allow increase of pelvic collateral branches with time. The interval between procedures varies from 2 days[3] to 3 weeks[4] and averaged 17 days in our series for preoperative coil embolization. Nonetheless, the preoperative IIA coil embolization itself carries an uncertain morbidity risk besides pelvic ischemia, such as iliac artery dissection, distal emboli, groin hematoma, or failed procedure.[3] One of our cases had limb-threatening ischemia from emboli after preoperative IIA coil embolization necessitating limb salvage, popliteal to common plantar artery bypass. However, performance of the bilateral bell-bottom procedure eliminates the need for a staged procedure together with the need to occlude bilateral IIAs, hence, avoiding pelvic ischemia and other angiographic related complications. Furthermore, the bilateral bell-bottom procedure appears not to complicate or increase OR time, procedure time, or fluoroscopic time compared with unilateral procedure (Table II).

Long-term results of dilated CIA treated with the bell-bottom technique remain to be fully understood. In our experience, after devices to perform the bell-bottom pro-

cedure (group 2 cases) became available, a tendency to treat smaller CIA aneurysms (average, 19.1 mm; range, 15 to 24 mm) with the bell-bottom procedure and larger CIA aneurysms (average, 33 mm; range, 22 to 48 mm) with IIA coil embolization with limb extension was seen. No bilateral IIA occlusion case was performed in our series.

Some important factors need to be considered if IIA occlusion is to be performed. The technique for coil embolization of IIA to minimize pelvic ischemia is to occlude the main trunk of IIA, preserving the patency of more distal branches.[2,3,5] Cynamon et al[18] reported that when coils were placed at or in the bifurcation of IIA, 12 of 22 (55%) had claudication. When coils were placed in the proximal IIA, one of 10 (10%) claudicated. Comorbid factors, such as shock and distal embolization, also may play a significant role in these complications.[2,4]

In conclusion, the bell-bottom procedure allows complete exclusion of AAA in patients with ectatic and small CIA aneurysms (<26 mm) without sacrificing IIA. We did not observe pelvic ischemia related to the bell-bottom procedure. The bell-bottom procedure appears to have limitations in bilateral large CIA aneurysms because of device availability (up to 28 mm) and rupture risk. Open surgery is still the standard treatment for repair of large and complicated CIA aneurysms and IIA aneurysms associated with AAA. Early technical success appears to justify continued use of the bell-bottom procedure; however, long-term evaluation is necessary to determine durability because the risk of rupture as the result of potential expansion of the excluded iliac artery or late failure is unknown.

We thank Steven Gale, MD, for providing manuscript illustrations and Jack Stedman, MPH, for assistance with manuscript preparation.

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Submitted Oct 9, 2001; accepted Jan 8, 2002.

DISCUSSION

Dr Jon Matsumura (Chicago, Ill). I enjoyed that presentation. I think that this is very useful. I had two questions. One is, with an 8-month average follow-up period, how confident are you in the durability of this procedure, since we know that with large aneurysms one of the late modes of failures is a pull-out phenomenon of the iliac limb up craniad into the aneurysm?

You mentioned that the largest AneuRx cuff is a 28. That is the nominal diameter of the cuff. Do you know what is the actual diameter of the graft material?

Dr Boonprasit Kritpracha. Regarding the first question, we are very cautious about using this technique in the common iliac artery or small common iliac artery aneurysm. We follow these cases very closely, and we will have them follow-up every 6 months. In including the patients into the treatment, we are trying not to

use this procedure in healthy cases. We are trying to limit the use of this procedure to the high-risk patient. I agree that the follow-up time is still too short to say that there will be no complications in the long term.

Regarding the second question about the true diameter of the device, actually we used a 26-mm device and this was the self-expanding device. It eventually expands to 26 as the original diameter that we planned for.

Dr Matsumura. I think the stent does expand to that nominal diameter, but the graft material does not always, which is what you need to get the seal. I would encourage people who pick up this technique to contact their rep about exactly what the actual diameter of the graft material is because that could lead to a failure to seal.

Dr Walter McCarthy (Chicago, Ill). I enjoyed your presentation very much. We currently embolize the internal iliac arteries as a separate procedure beforehand and then place the distal iliac connection in the external iliac. This is a very attractive alternative to the bell-bottom. Can you give me a better idea of what size parameters you address with the bell-bottom technique?

Dr Kritpracha. The device currently available is 20 to 28 mm. We oversize 10% to 20% of the device, so the largest common iliac artery that we put the limit for ourselves would be 25 mm at the most because 28 would be the maximum diameter for the device that we can use.

Dr John Hoch (Madison, Wis). I enjoyed your presentation. I am trying to get a sense of your confidence in this technique. Say you had a patient who had an iliac aneurysm and a contralateral internal iliac occlusion and the common iliac aneurysm was 24 or 25 mm in diameter. Would you employ this technique, or would you recommend an open procedure for that patient, or perhaps a retroperitoneal approach and a handsewn common iliac anastomosis in combination with the endograft?

Dr Kritpracha. It depends on the diameter of the common iliac artery on which we plan to do the bell-bottom procedure. If we can have the diameter of the device oversized at least 10% to 20% and the attachment zone at least 15 mm, then we feel comfortable with the bell-bottom procedure. In many cases, the attachment zone is very short, 10 mm or less, and in that case we tend to do the open surgery or IIA coil embolization with limb extension.