Endovascular Repair of Iliac Aneurysms with Preservation of Internal Iliac Artery Flow.

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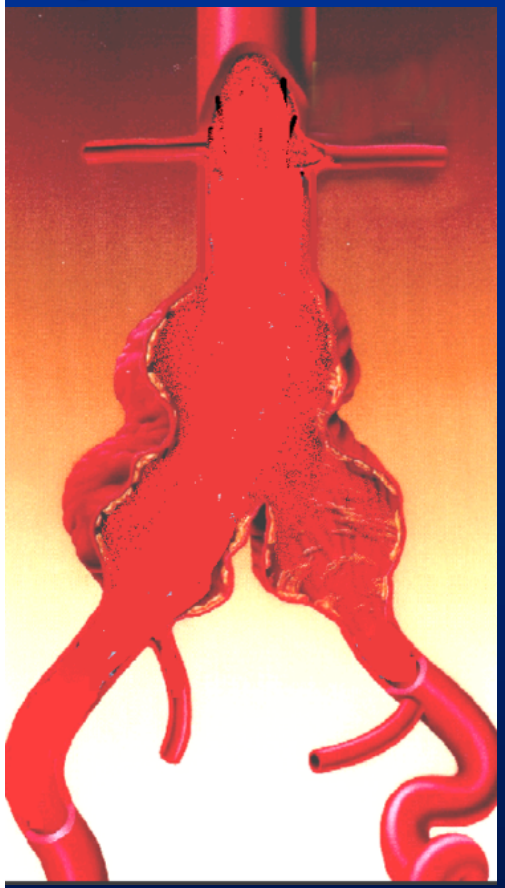
Iliac Artery Aneurysms could be encountered as

1) Aortoiliac



2) Isolated IAA

always posed a problem for a solitary and uneventful OPEN or EVAR repair.

Aortoiliac aneurysms

- **Appear in high frequency**
- **Actually 20 % of AAA are Aortoiliac aneurysms**

(have concomitant iliac aneurysm or >24mm iliac dilatation)

Common Iliac Artery Aneurysms in Patients with Abdominal Aortic Aneurysms

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Objectives: *To determine the incidence of common iliac artery (CIA) aneurysms in patients with abdominal aortic aneurysms (AAA) and to evaluate the relationship between AAA and CIA diameter.*

Methods: *Spiral CT angiography was used to measure the maximum diameters of the abdominal aorta and the common iliac arteries of 215 patients with AAA.*

Results: *The median CIA diameter was 1.7 cm – significantly greater than the published mean of 1.25 (2 S.D.= 0.85–1.65) cm of an age-matched, non-vascular population. Thirty-four patients (16%) had unilateral and 26 patients (12%) bilateral CIA aneurysms ≥2.4 cm diameter. Eight-six vessels (20%) were affected. Right CIA diameters were wider than left CIA diameters (p<0.0001, Wilcoxon matched-pairs signed rank test). The correlation between AAA size and CIA diameter was weak.*

Conclusions: *The AAA population has abnormally dilated common iliac arteries. In this population, common iliac artery aneurysms should be defined as those greater than 2.4 cm diameter. 20% of CIAs in patients with AAA are aneurysmal according to this definition.*

Eur J Vasc Endovasc Surg 15, 255–257 (1998)

Isolated Iliac Aneurysms

Very rare

- In a population based study 0,03% - autopsy findings.(1)
- "Of all aortoiliac aneurysms only 0,6% were isolated to the iliac ateries (common, internal, external).(1)

(1) Brunkwall J, Hauksson H, Bengtsson H, et al : Solitary aneurysms of the iliac arterial system : An estimated frequency of occurerence. J. Vasc Surg 10:381, 1989

Isolated Iliac Aneurysms

- CIA 70-90%

  IIA 10-30%

  EIA usually spared, for reasons not understood .[1-2]
- Male/Female ratio : 5-16:1 with most patients being 65 to 75 yrs old in surgical series.[1-3]
- 50% are bilateral.[3]

(1) McReady RA, Pairolero PC, Gilmore JC, et al : Isolated iliac artery aneurysms. Surgery 93:688, 1983
(2) Richardson JW, Greenfield LJ : Natural history and management of iliac aneurysms. J. Vasc. Surg 8:165, 1988
(3) Krupski WC, Selzman CH, Floridia R, et al : Contemporary management of isolated iliac aneurysms. J. Vasc. Surg 28:1, 1998

Clinical Symptoms

- Depends of the size.
- Usually asymptomatic until rupture.
- They may present with unique signs due to local compression of adjacent pelvic structures:
  - ureteral obstruction,
  - hematuria,
  - iliac vein thrombosis,
  - large bowel obstruction,
  - lower extremity neurologic deficit.

Prognosis (1-10)

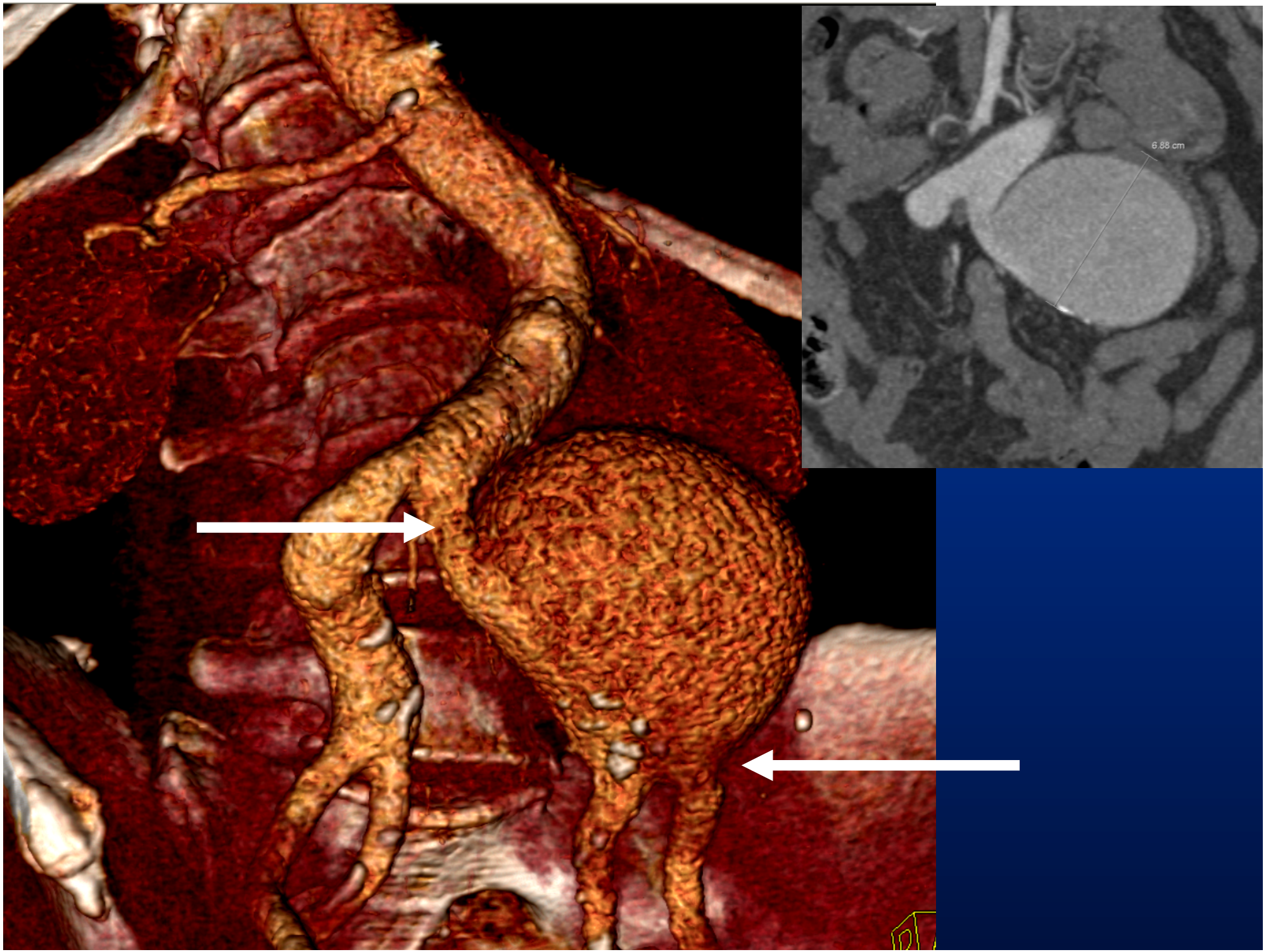
- **Risk of rupture:**
  - > 4 cm, from 10 to 70 % during 5 years (independent upon the exact diameter)
- **Classical treatment:**

  OPEN repair for > 3cm
- **Mortality:**
  - In elective CIAA open procedures is even higher than elective AAA repair, ranging between 5-11 %
  - emergency operation, is dramatically high, 40-50 %.

1. Cardon JM. Et al, J Cardiov. S.1996, 37: 45-50
2. Razavi MK et al, Radiology 1995, 197: 801-804
3. Ruebben A et al, Cardiov Int. Rad, 1998, 21: 339-342
4. Lowry SF et al, Arch Surg, 1978, 113: 1289-1293
5. Brin BJ et al, Arch Surg, 1982, 117: 1329
6. Richardson JW et al, JVS, 1988, 8: 165-171
7. Mc Cready RA et al, Surgery, 93: 688
8. Van Sambeek et al, E. J. Vasc Endov. S 1998, 15: 91-92
9. Krupski WC et al, JVS, 1998, 28: 1
10. Steven M.S, J Vasc Surg 31:114, 2000

Case Report

- 72 yrs old Female.
- Asymptomatic Isolated Left CIAA, 6,9cm.
- Heavy smoker.
- COPD.
- Hypertension.
- Coronary artery disease.
- ASA 3.


6.88 cm

Preop. planning

- OPEN repair
- EVAR / Hybrid

OPEN repair

- Aortoiliac by pass
- Aortobiiliac by pass

- Heavy smoker.
- COPD.
- Hypertension.
- Coronary artery disease.
- ASA 3.

rejected

Endovascular IAA repair

Constrains

A) proximal landing zone

- Short
- Wide / Aortoiliac involvement

B) distal landing zone

- Short
- Wide / IIA aneurysm

C) Coverage of IIA

EVAR Constrains Coverage of IIA

- Unilateral occlusion:

  asymptomatic

  buttock claudication, impotence

  less frequently colon and spinal ischemia

  all symptoms summing up from 12% to 45%. (1-5)

(1) Mehta M, Veith FJ, Ohki T, et al: Unilateral and bilateral hypogastric artery interruption during aortoiliac aneurysm repair in 154 patients. A relatively innocuous procedure. J Vasc Surg 33:S 27-32, 2001
(2) Razavi MK, DeGroot M, Olcott C, et al: Internal iliac artery embolization in the stent-graft treatment of aortoiliac aneurysms. Analysis of outcomes and complications. J Vasc Interv Radiol 11:561, 2000
(3) Karch LA, Hodgson KJ, Mattos MA, et al: Adverse consequences of IIA occlusion during endovascular repair of AAA. J Vasc Surg 32;676, 2000
(4) Yano OJ, Morrissey N, Eisen L, et al: Intentional IIA occlusion to facilitate endovascular repair of aortoiliac aneurysms. J Vasc Surg 34;204, 2001
(5) Geraghty PJ, Sanchez LA, Rubin BG, et al: Overt ischemic colitis after endovascular repair of aoroiliac aneurysms. J Vasc Surg 40;413, 2004

- Bilateral interruption:

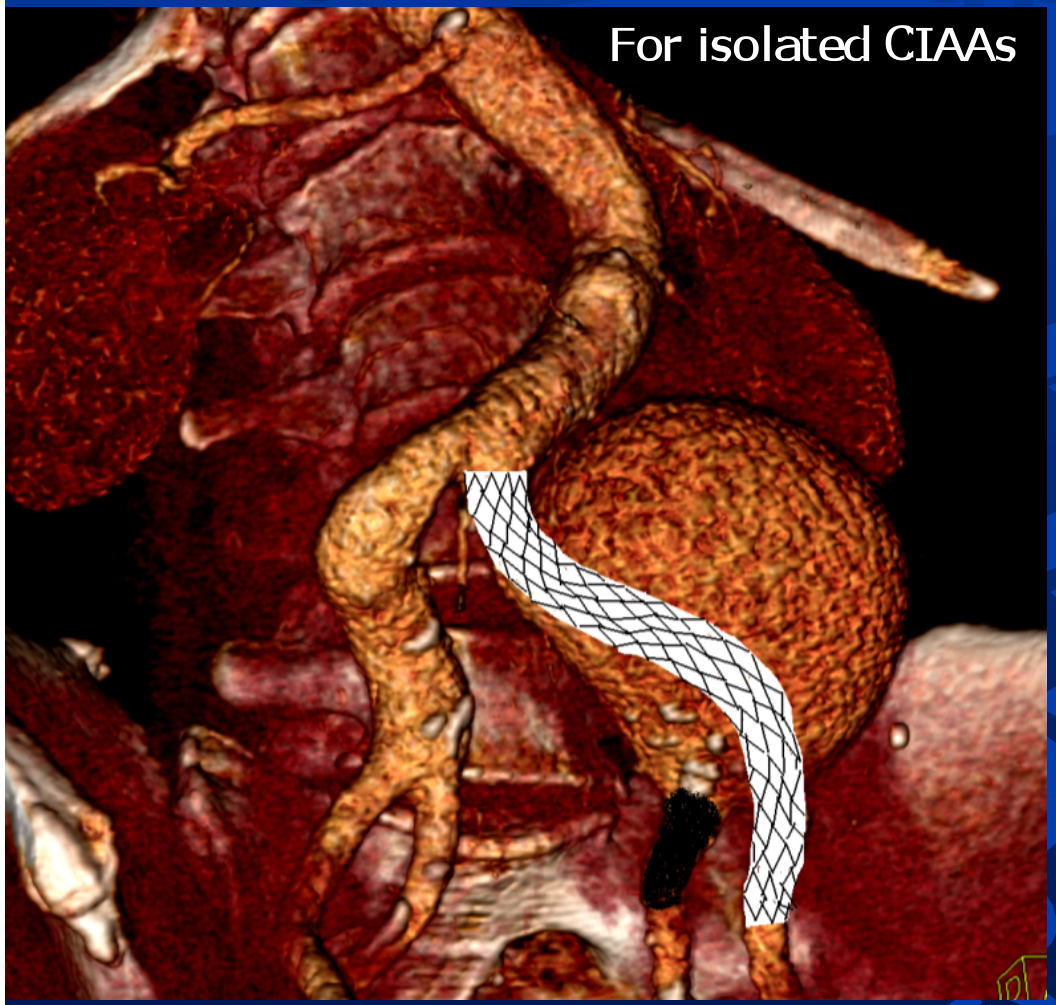
  rarely asymptomatic and ischemic complications can result in severe morbidity and mortality.(1-3)

(1) Razavi MK, DeGroot M, Olcott C, et al: Internal iliac artery embolization in the stent-graft treatment of aortoiliac aneurysms. Analysis of outcomes and complications. J Vasc Interv Radiol 11:561, 2000
(2) Karch LA, Hodgson KJ, Mattos MA, et al: Adverse consequences of IIA occlusion during endovascular repair of AAA. J Vasc Surg 32:676, 2000
(3) Yano OJ, Morrissey N, Eisen L, et al: Intentional IIA occlusion to facilitate endovascular repair of aortoiliac aneurysms. J Vasc Surg 34:204, 2001

Endovascular CIAA repair

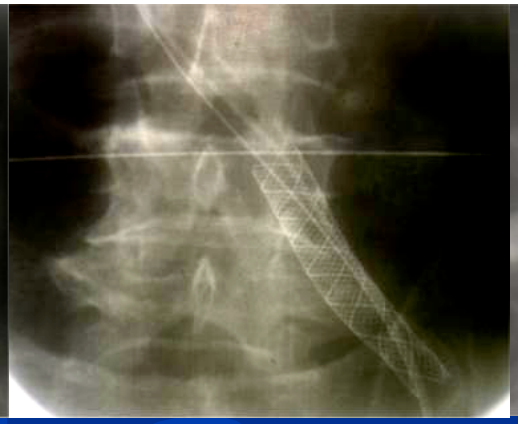
1. Covered endoprostheses (covered stents / IIA coiling).
2. Ipsilateral AUI endograft to the EIA (IIA coiling) + occluder + fem-fem by pass.
3. Contralateral AUI endografts in conjuction with EIA to IIA endografts (endo by pass) followed by a fem-fem by pass.
4. Tapered endoprostheses to the EIA (IIA coiling) with terminal aortic fixation.
5. Bifurcated endoprostheses with bell bottom iliac legs.
6. Bifurcated endoprostheses with ipsilateral extension to the EIA (IIA coiling).
7. Hybrid procedure (endovascular CIAA exclusion + IIA transposition or bypass to the EIA or femoral artery.
8. Endoluminal antegrade preservation of IIA flow (Iliac side branch).

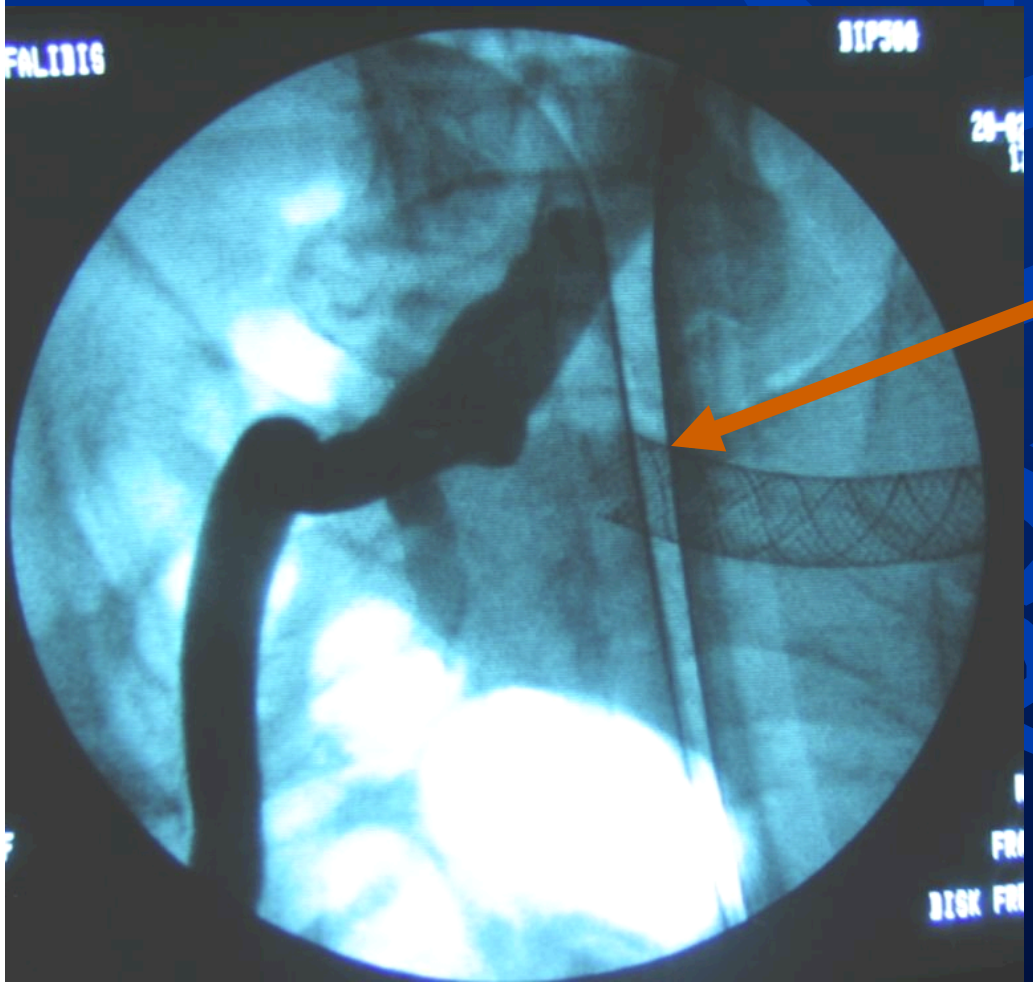
Endovascular CIAA repair
1) Covered stents / IIA coiling



- Early experience: early and late adverse event rate of 27 %. (1-7)
- Following publications: reported encouraging results, (1-5, 8-10, 12-15)
- Primary and secondary patency rates are 92 and 96 %. (11)

1. Dorros Get al. J Endovasc Surg 1997; 4:370-375.
2. Cardon JM, et al. J Cardiovasc Surg 1996; 37: 45-50.
3. Razavi MK, et al. Radiology 1995; 197: 801-804.
4. Marin ML, et al. Am J Surg 1995; 170: 179-182.
5. Ruebben A, et al. Cardiovasc Intervent Radiol 1998; 21 : 339-342.
6. Scheinert D, et al. Circulation 2000 Nov; 102 : III 253-258.
7. Pisco JM, et al. Acta Med Port. 2001; 14(4): 419-422.
8. Van Sambeek MRHM, et al. Eur J Vasc Endovasc Surg 1998; 15 : 91-92.
9. Michel C, et al. Jradiol 1996 ; 77 : 433-436.
10. Quinn SF, et al. JVIR 1997; 8 : 1057-1063.
11. Henry M, et al. J Cardiovasc Surg 2000 ; 41 : 871-883.
12. Fahrni A, et al. Cardiovasc Intervent Radiol. 2003 Sep-Oct;26(5):443-7.
13. Sahgal A et al. J Vasc Surg. 2001 Feb;33(2):289-4;
14. Iseki H , et al. Jpn Circ J. 2000 Feb;64(2):99-102.
15. Parsons RE, et al. J Vasc Surg. 1999 Nov;30(5):915-21.



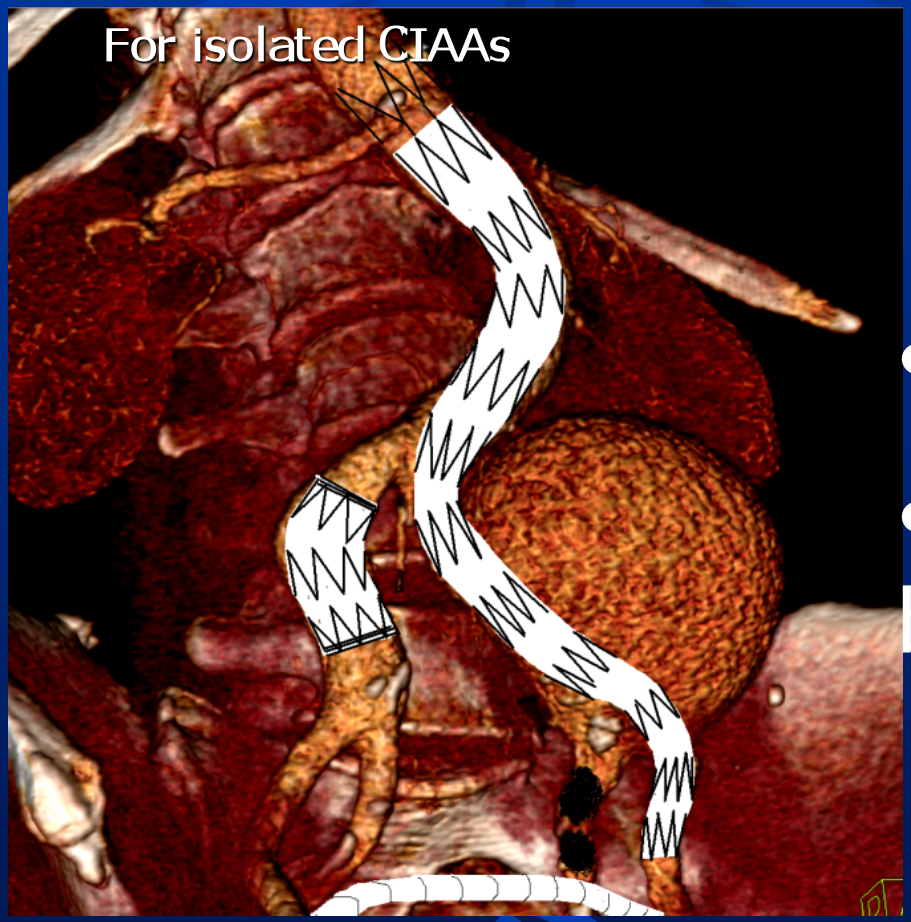


- IIA coverage
- Late migration and endoleak

rejected

Endovascular CIAA repair

2a) Ipsilateral AUI endograft to the EIA (IIA coiling) + occluder + fem-fem by pass.



- IIA coverage
- Extranatomic bypass

Endovascular AAA Repair With the Aortomonoiliac EndoFit Stent-Graft: Two Years' Experience

J ENDOVASC THER
2005;12:280–287

Nikolaos Saratzis, MD; Nikolaos Melas, MD; John Lazaridis, MD; George Ginis, MD; Polychronis Antonitsis, MD; Dimitrios Lykopoulos, MD; Athanasios Lioupis, MD; Christos Gitas, MD; and Dimitrios Kiskinis, MD

rejected

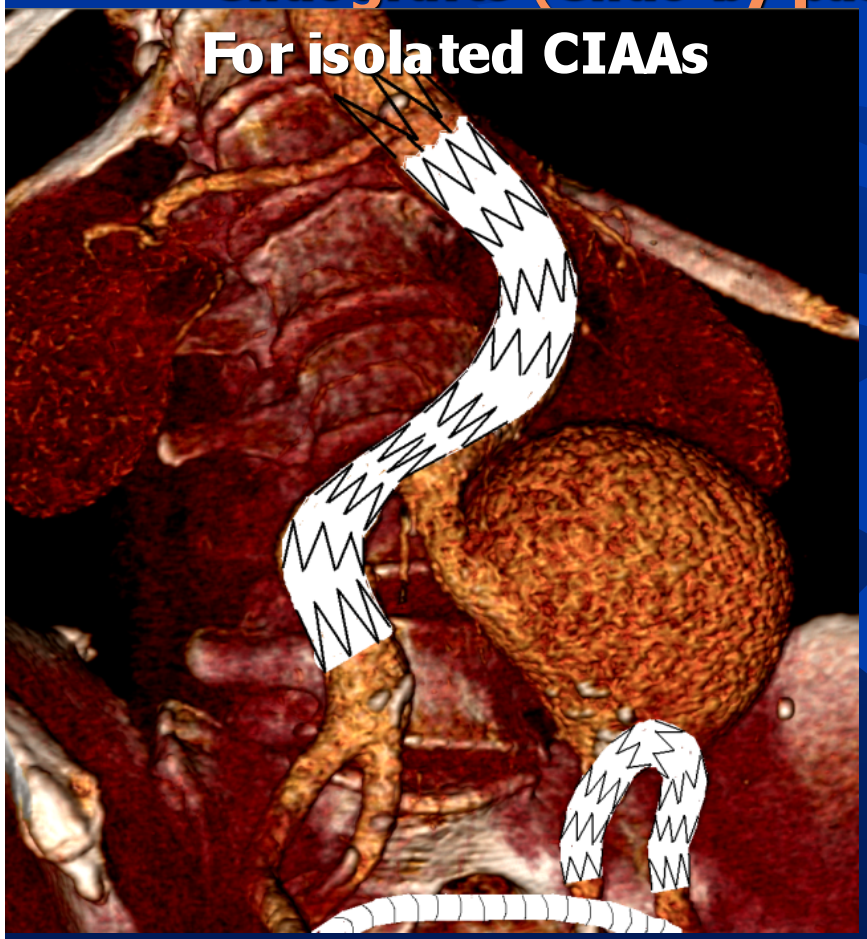
Endovascular CIAA repair

2b) Contralateral AUI endograft to the EIA (IIA coiling) + occluder + fem-fem by

rejected

Endovascular CIAA repair

3) Contralateral AUI endografts in conjuction with EIA to IIA endografts (endo by pass) followed by a fem-fem by pass



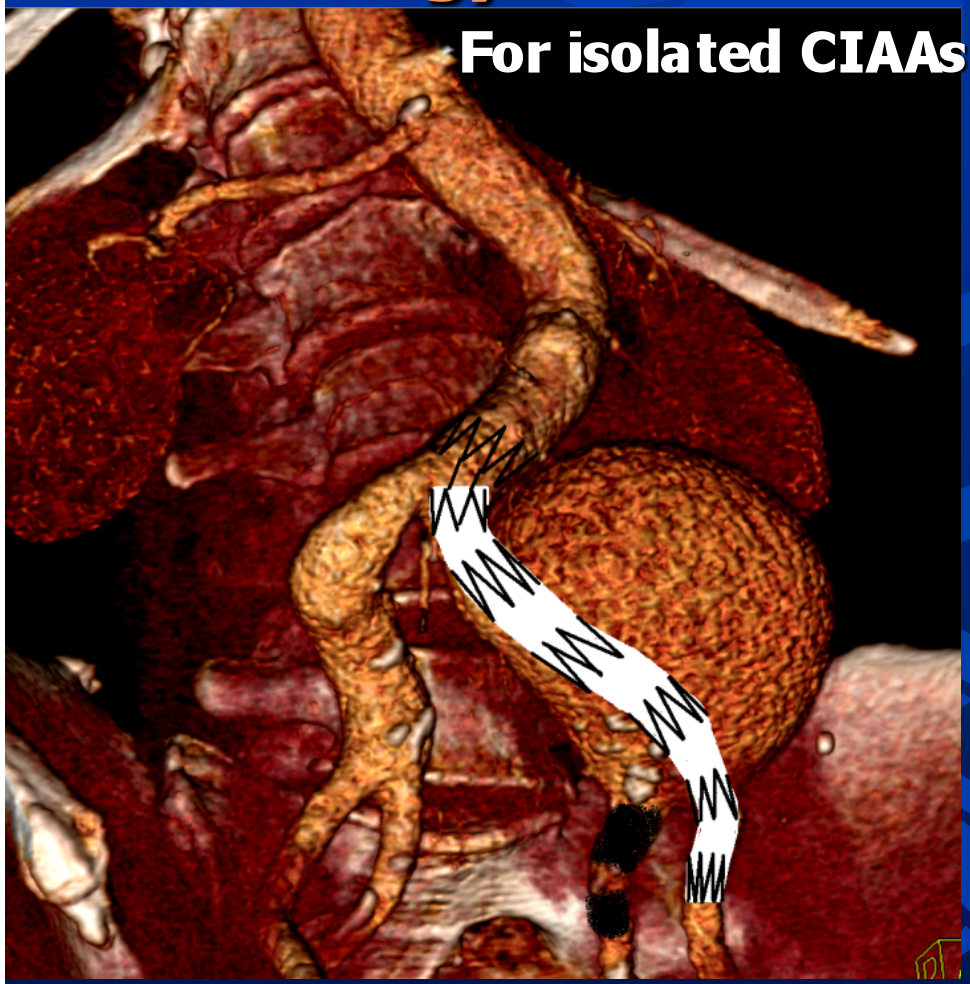
- Extranatomic bypass
- Patency of the endoluminal bypass

rejected

(1) Cynamon J, Lerer D, Veith FJ, et al : Hypogastric artery coil embolization prior to endoluminal repair of aneurysms and fistulas : buttock claudication, a recognized by possibly preventable complication. J Vasc Interv Radiol 11:573, 2000
(2) Bergamini TM, Rachel ES, Kinney EV, et al : External iliac artery to internal iliac artery endograft: a novel approach to preserve pelvic inflow in aortoiliac stent grafting. J Vasc Surg 35:120, 2002
(3) Woo EY, Lombardi JV, Carpenter JP. Endovascular external to internal iliac by pass as an adjunct to endovascular aneurysm repair for patients with extensive common iliac artery aneurysmal disease. J Vasc Surg 39:470, 2004
(4) Delle M, Lonn L, Wingren U, et al : Preserved pelvic circulation after stent-graft treatment of complex aortoiliac artery aneurysms : a new approach. J Endovasc Ther 12:189, 2005
(5) Faries PI, Morrissey N, Burks JA, et al : Internal iliac artery revascularization as an adjunct to endovascular repair of aortoiliac aneurysms. J Vasc Surg 34:892, 2001

Endovascular CIAA repair

4) Tapered endoprostheses to the EIA (IIA coiling) with terminal aortic fixation



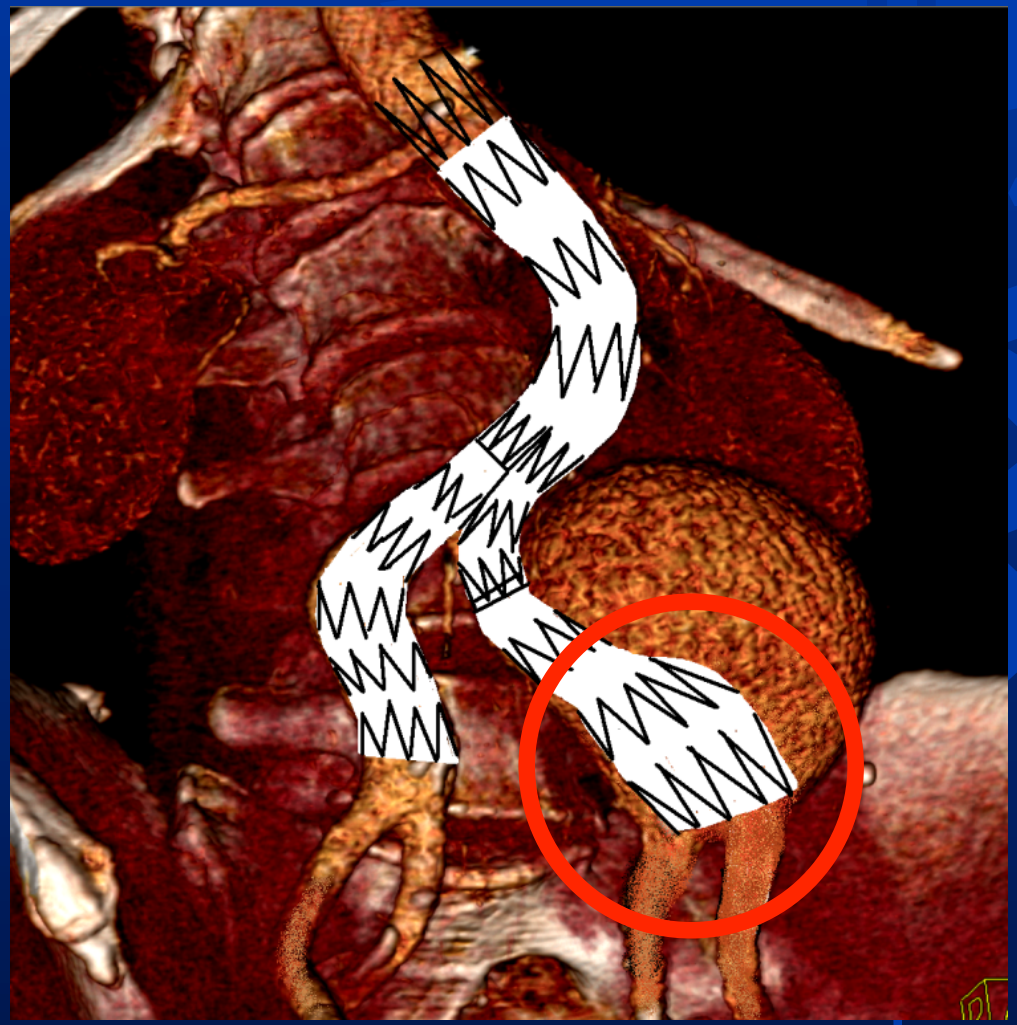
- IIA coverage
- Late migration and endoleak (short proximal neck)

rejected

EndoFit stent-graft repair of isolated common iliac artery aneurysms with short necks.
Saratzis N, Melas N, Saratzis A, Lioupis A, Lazaridis J, Ginis G, Ktenidis K, Kiskinis D.
J Endovasc Ther. 2006 Oct;13(5):667-71.

Endovascular CIAA repair

5) Bifurcated endoprostheses with bell bottom iliac legs



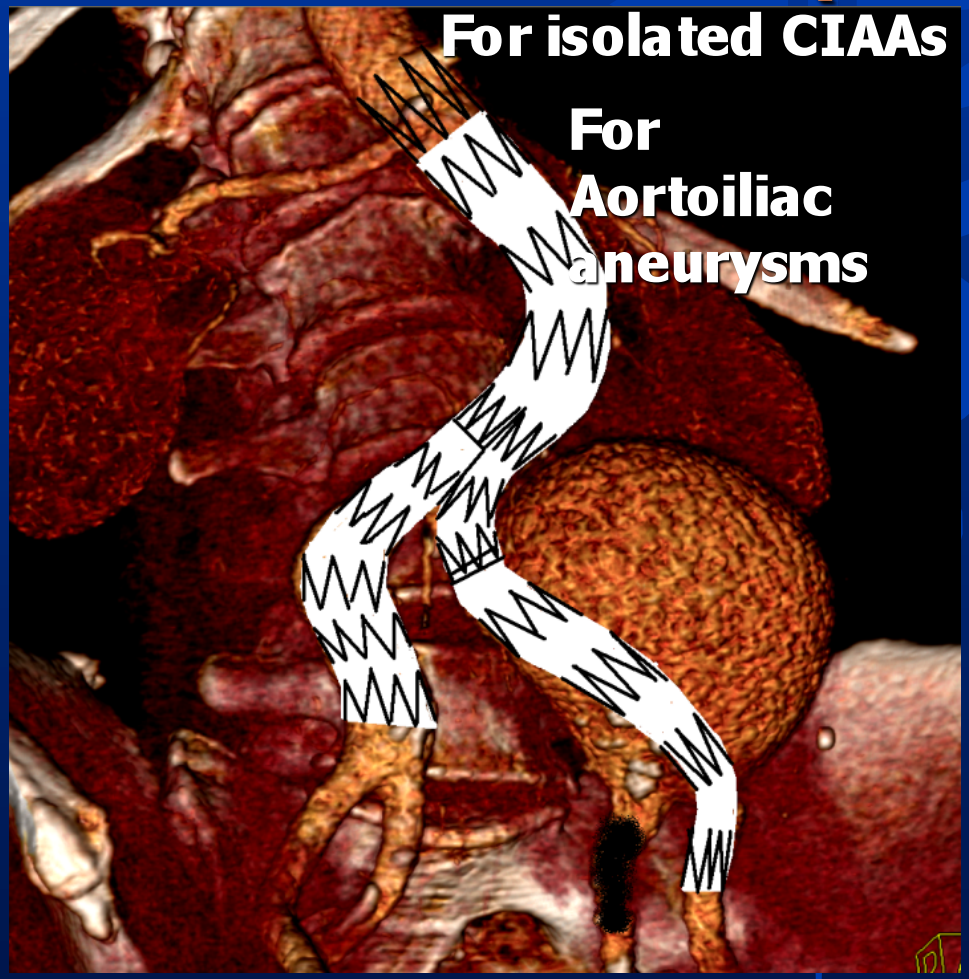
- No distal landing zone to the CIA

rejected

Distal CIA up to 22mm might often be treated by the "bell bottom" technique

Endovascular CIAA repair

6) Bifurcated endoprostheses with ipsilateral extension to the EIA (IIA coiling).



- IIA coverage

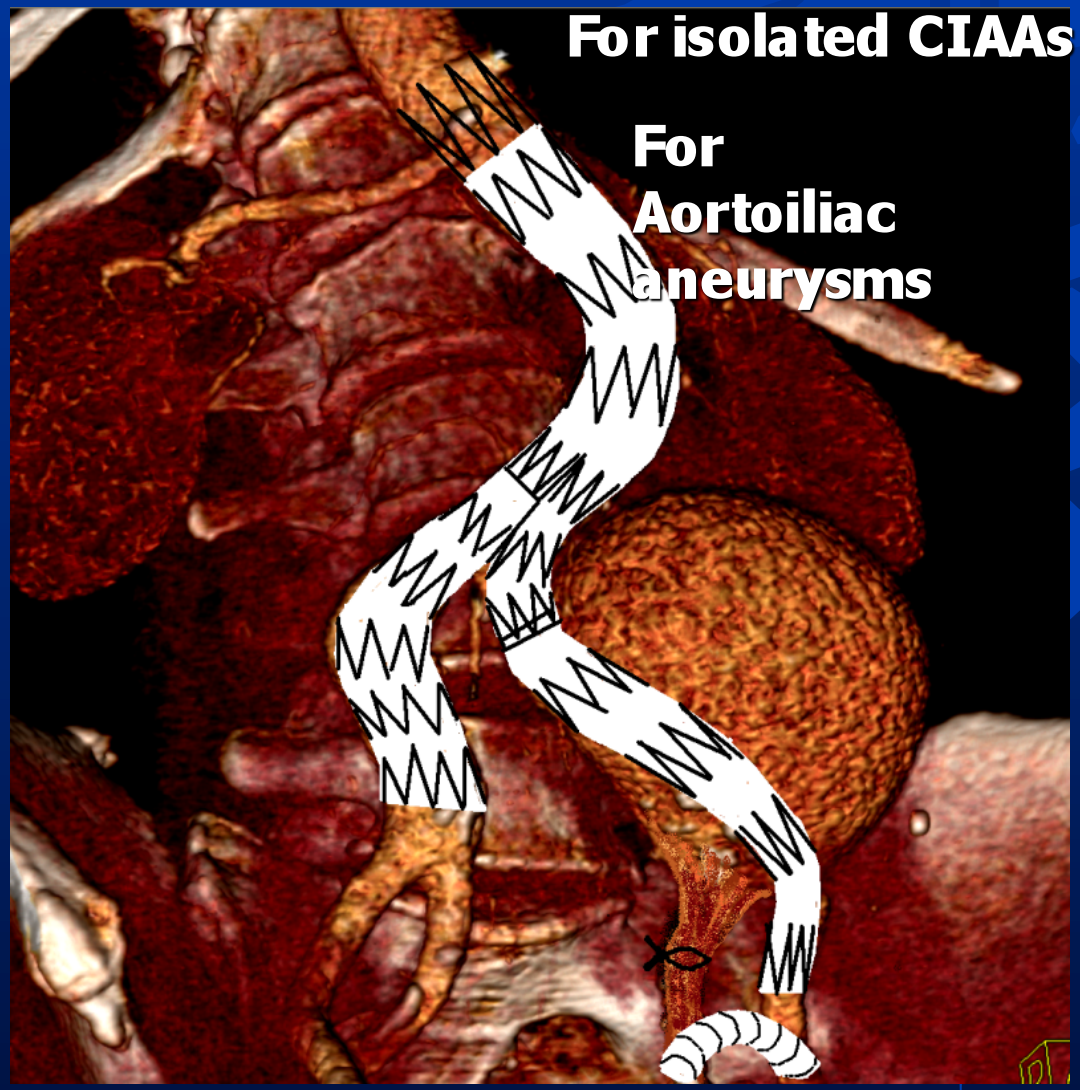
rejected

(1) Cynamon J, Lerer D, Veith FJ, et al : Hypogastric artery coil embolization prior to endoluminal repair of aneurysms and fistulas : buttock claudication, a recognized by possibly preventable complication. J Vasc Interv Radiol 11:573, 2000

(2) Wyers MC, Schermerhorn ML, Fillinger MF, et al : Internal iliac occlusion without coil embolization during endovascular AAA repair. J Vasc Surg 36: 1138, 2002

Endovascular CIAA repair

7) Hybrid procedure (endovascular CIAA exclusion + IIA transposition or bypass to the EIA or femoral artery).



- Surgical complexity in giant iliac aneurysm or aortoiliac aneurysm
- High risk patient

rejected

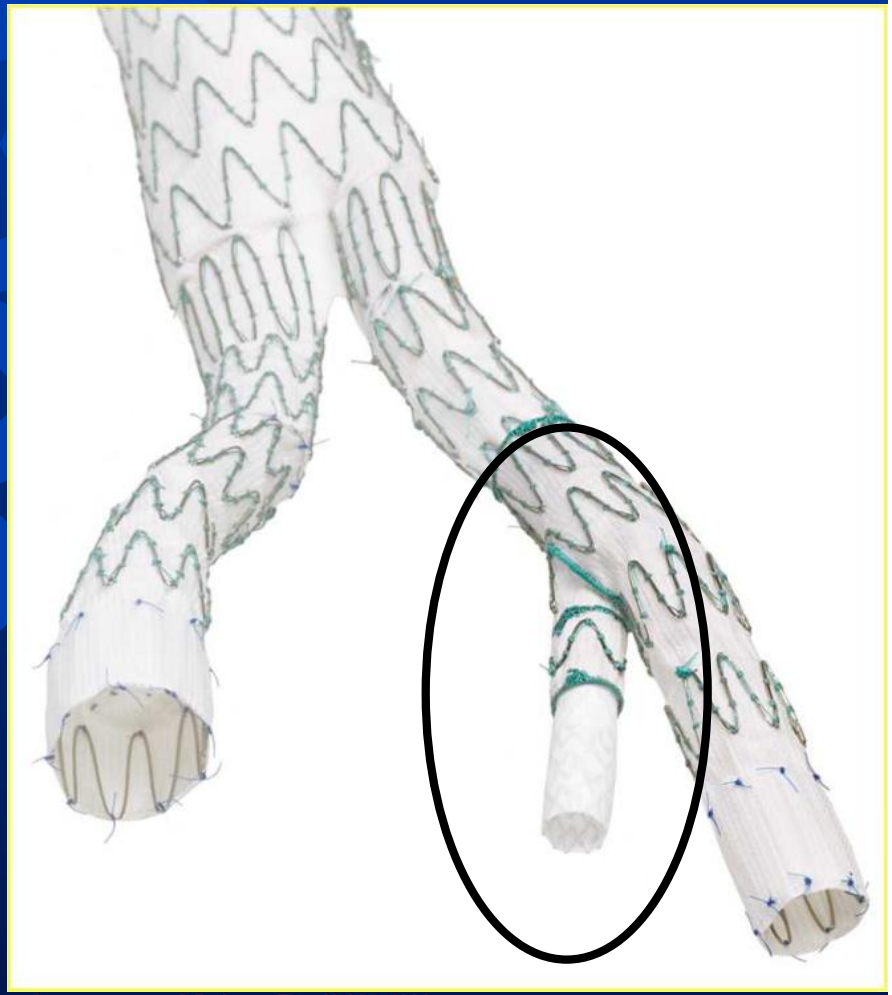
(1) Parodi JC, Ferreira M. Relocation of the iliac artery bifurcation to facilitate endoluminal treatment of AAA's. J Endovasc Surg 43(5):879,1999
(2) Delle M, Lonn L, Wingren U, et al : Preserved pelvic circulation after stent-graft treatment of complex aortoiliac artery aneurysms : a new approach. J Endovasc Ther 12:189, 2005

8) Endoluminal antegrade preservation of IIA flow

Iliac side branch

Innovation

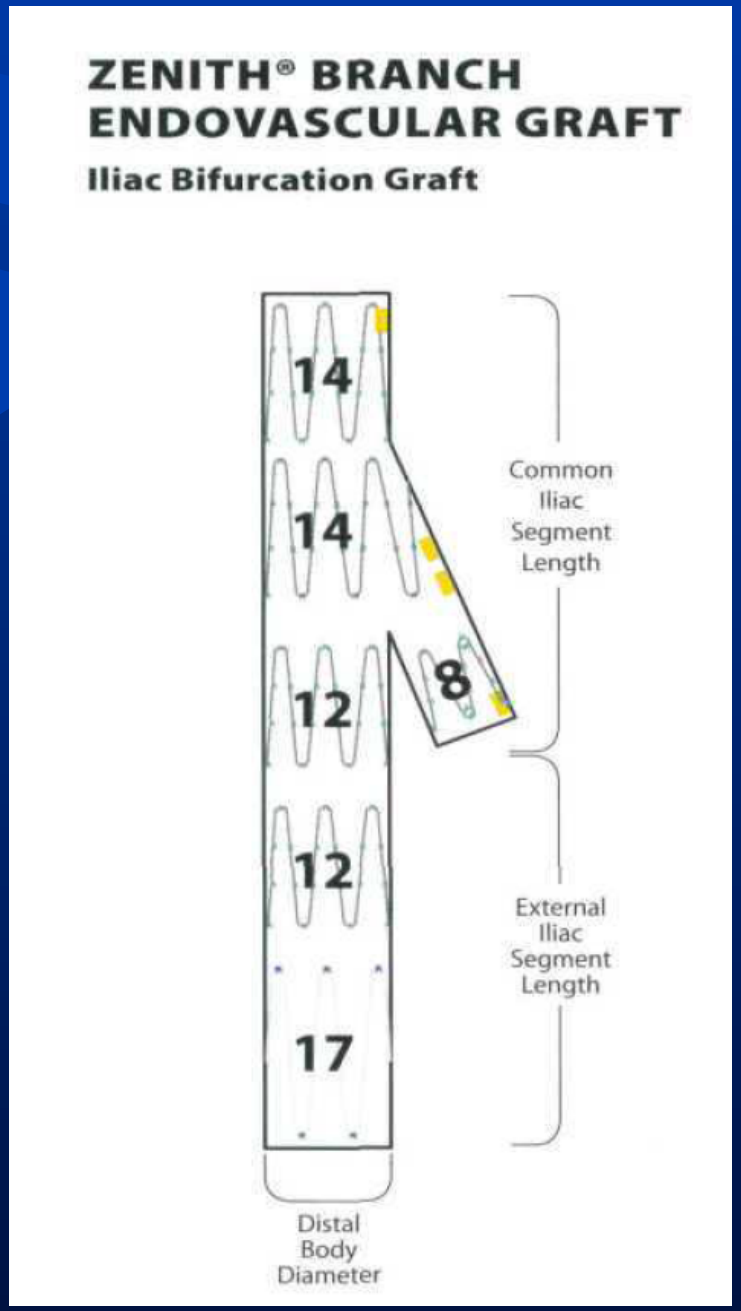
- The Zenith Branch Endovascular Graft preserves blood flow to the internal iliac, reducing the potential for ischemic sequelae.
- expands the treatment options for aortoiliac or iliac aneurysms



(1) Abraham CZ, Reilly LM, Schneider DB, et al : A modular multi-branched system for endovascular repair of bilateral common iliac artery aneurysms. J Endovasc Ther 10:203, 2003
(2) Semmens JB, Lawrence –Brown MM, Hartley DE, et al : Outcomes of fenestrated endografts in the treatment of AAA's in Western Australia (1997-2004). J Endovasc Ther 13:320, 2006
(3) Greenberg RK, West K, Pfaff K, et al : Beyond the aortic bifurcation : branched endovascular grafts for thoracoabdominal and aortoiliac aneurysms. J Vasc Surg 43:879, 2006
(4) Malina M, Ivancev K, Resch T, et al : Feasibility of a branched stent-graft in common iliac artery aneurysms. J Endovasc Ther 13:496, 2006
(5) Haulon S, Grenberg RK, Pfaff K, et al : Branched grafting for aortoiliac aneurysms. Eur J Vasc Endovasc Surg 33: 567, 2007
(6) Ziegler P, Perdikides T, Stelter WJ, et al : Branched iliac bifurcation : 6 years experience with endovascular preservation of IIA flow. J Vasc Surg 46:204, 2007
(7) Serracino-Inglott F, Bray A, Myers P. EVAR in patients with common iliac artery aneurysms – Initial experience with the Zenith bifurcated side branch device. J Vasc Surg 46:211, 2007

Iliac side branch

Can be ordered in various diameters and lengths (custom made)



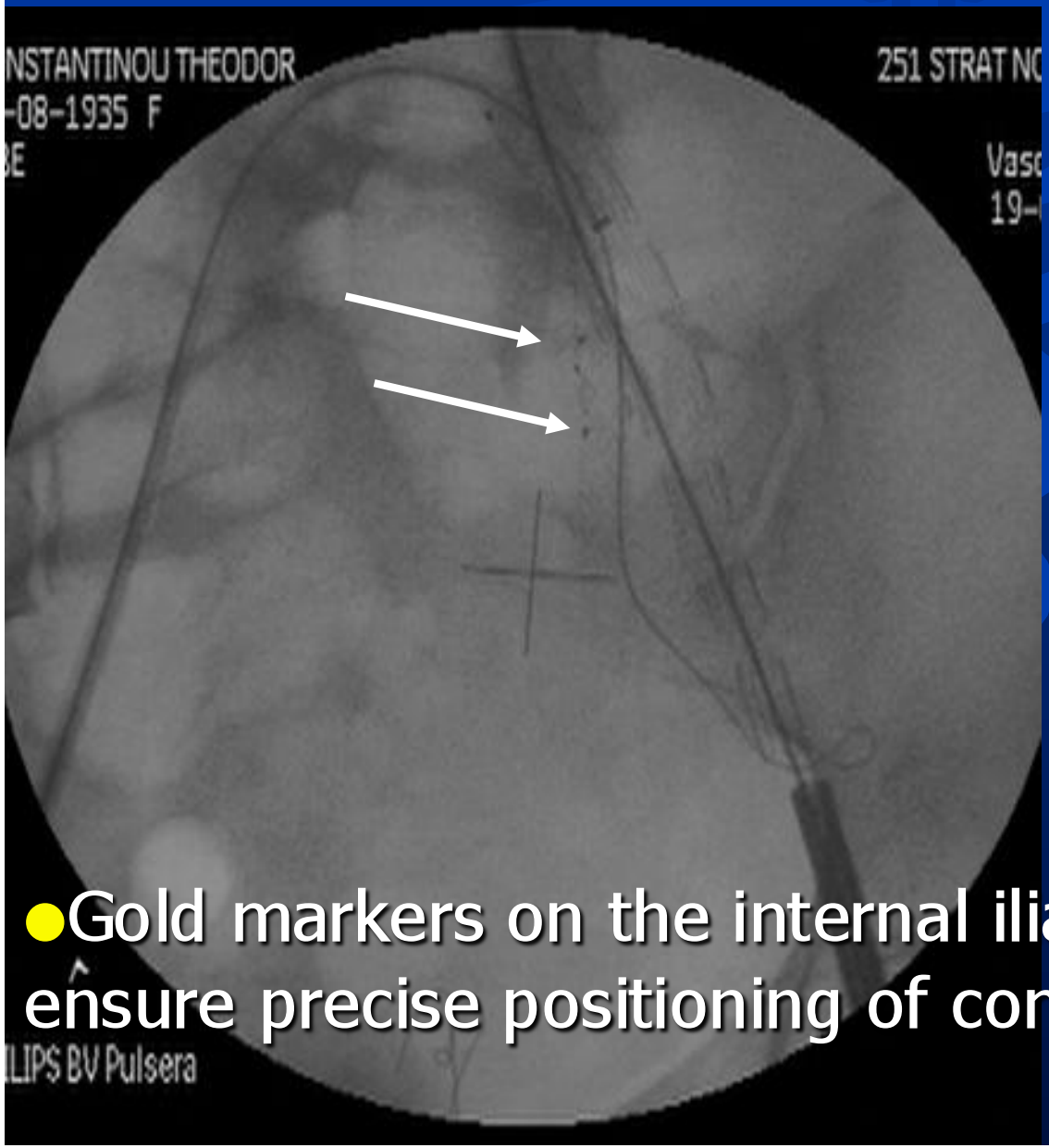
Iliac side branch

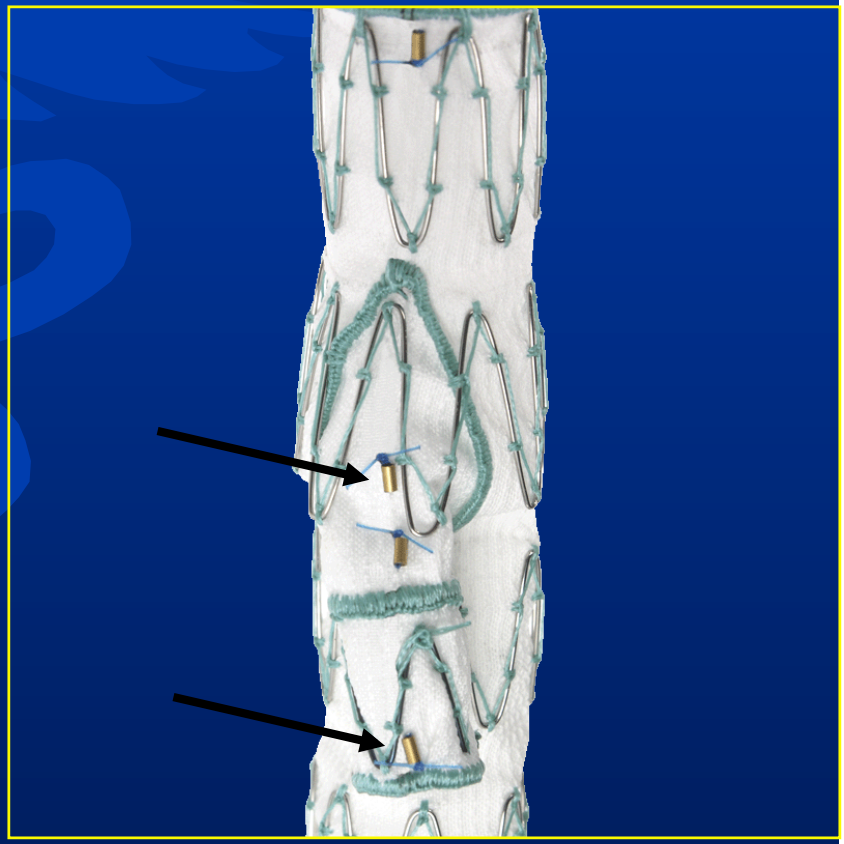
Compatible with balloon expandable and self expanding bridging stent

Iliac side branch

very flexible external iliac section

Radiopaque Markers

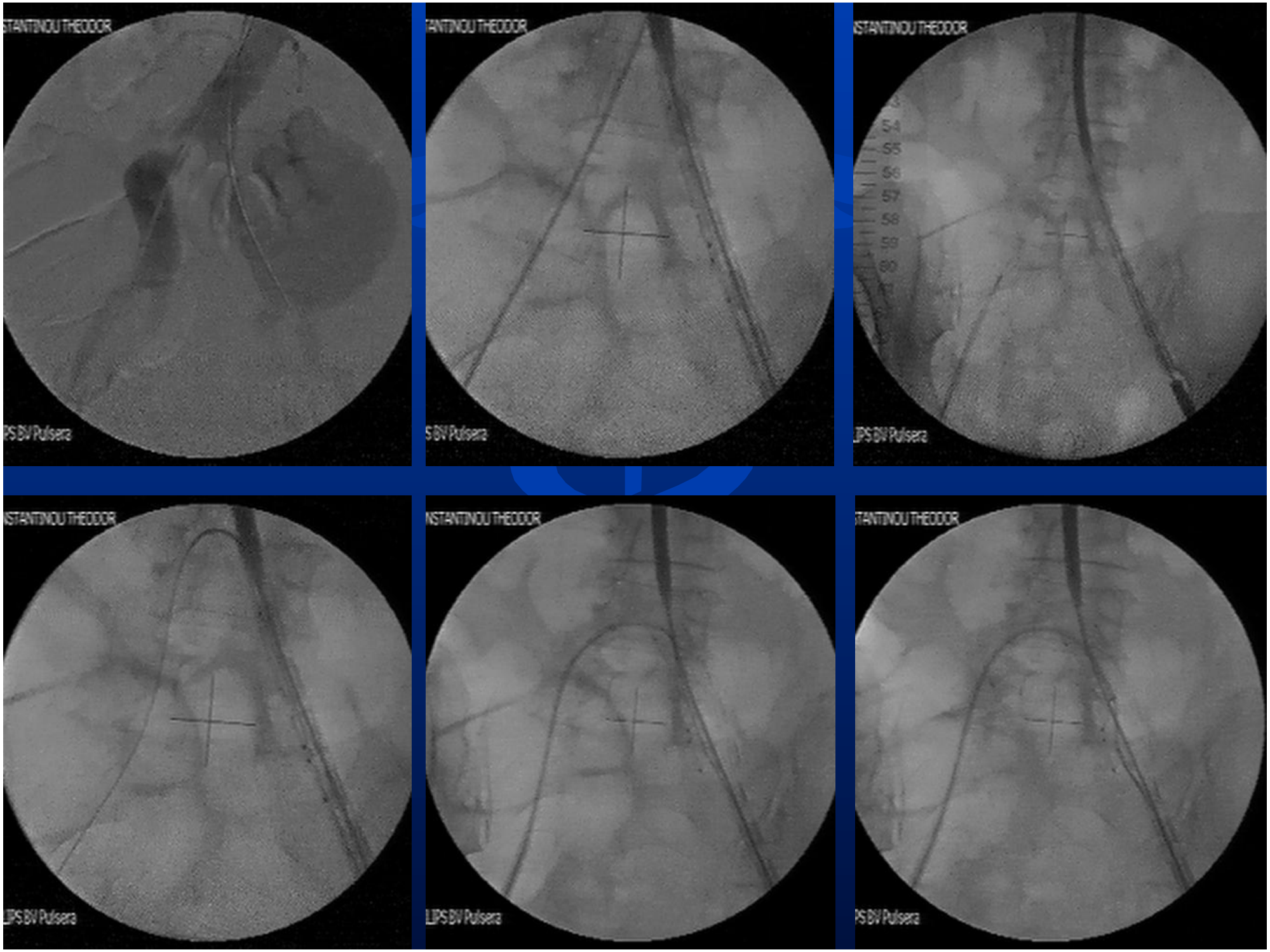


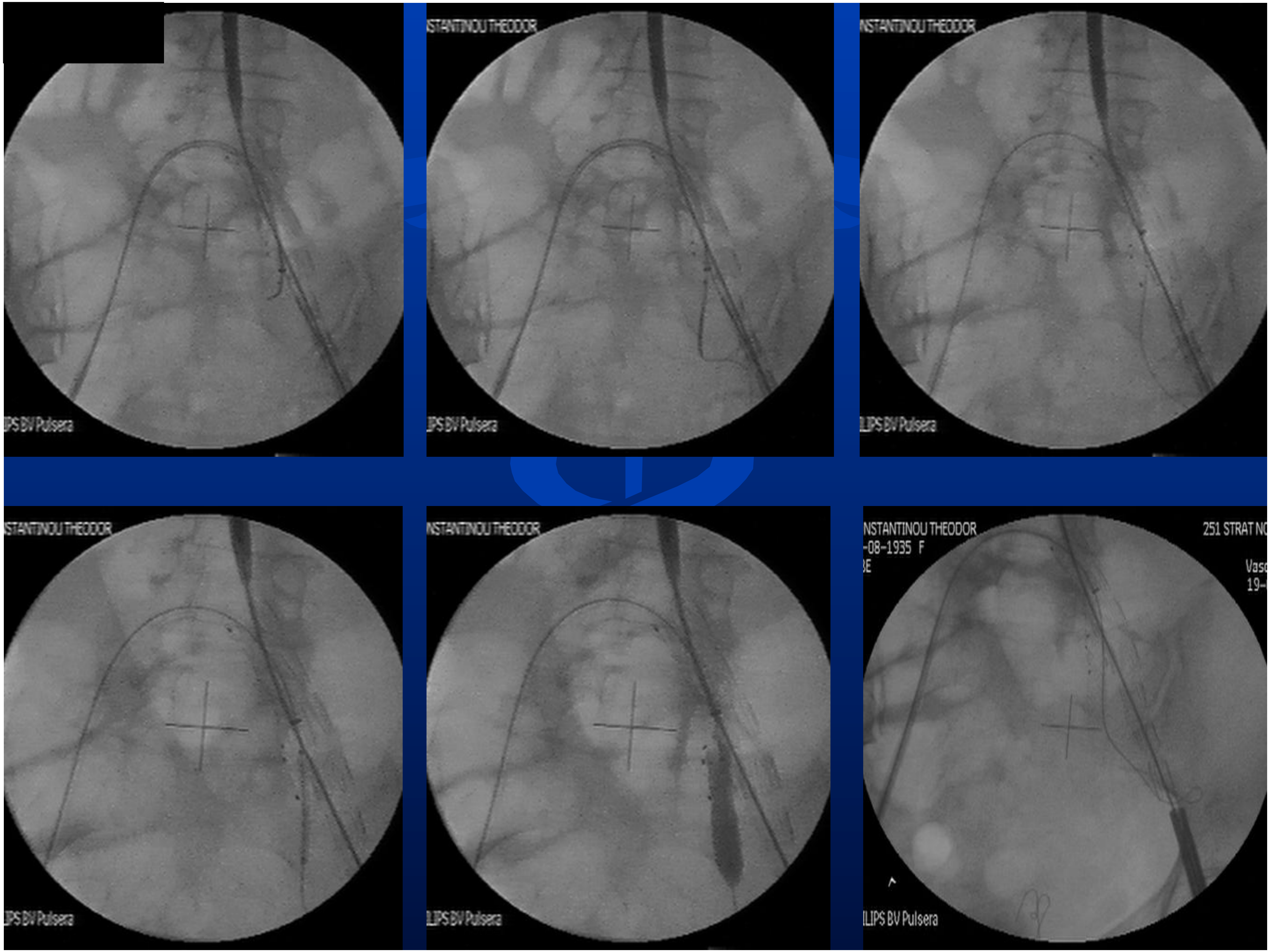


- Gold markers on the internal iliac branch element ensure precise positioning of components.

Pre-loaded catheter

The Zenith® H&L-B One-Shot™ introduction system incorporates a pre-loaded catheter that simplifies access to the internal iliac.

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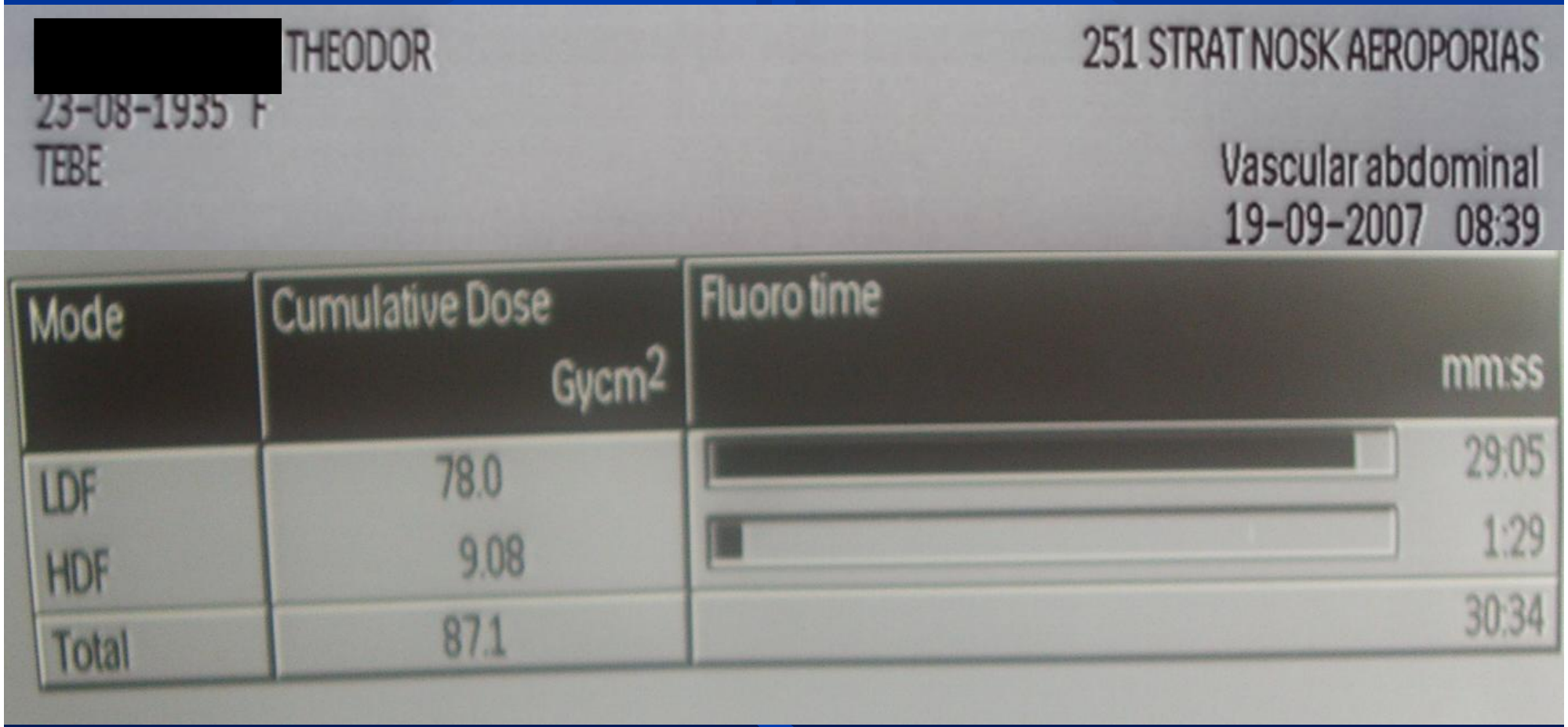
- Atrium Advanta V12 – 9mm X 40 mm (7 Fr)

- Percutaneous access of both CFA's.
  (RCF : 24 Fr – LCF : 18 Fr)
- Closure devices : Prostar XL (Abbott Vascular)

- X-ray exposure time : 30 min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Vascular abdominal
19-09-2007 08:39

Mode	Cumulative Dose Gycm^2	Fluoro time mm:ss
LDF	78.0	29:05
HDF	9.08	1:29
Total	87.1	30:34

- Total procedure time : 155 min
- Contrast media : 150 ml (Xenetix 300)

6 th month Post op cta depicted no complications

- Iliac side branch device was deployed, for the first time worldwide, by prof. Wolf Stelter (Frankfurt, Germany) in 2001

- Untill now he has the largest series so far consisting of nearly 60 cases with encouraging long term results.(1)

(1) Ziegler P, Perdikides T, Stelter WJ, et al : Branched iliac bifurcation - 6 years experience with endovascular preservation of interrnal iliac artery flow. J Vasc Surg 46:204, 2007

◆ TECHNICAL NOTE ◆

A Modular Multi-Branched System for Endovascular Repair of Bilateral Common Iliac Artery Aneurysms

Cherrie Z. Abraham, MD; Linda M. Reilly, MD; Darren B. Schneider, MD; Shelley Dwyer, RN; Rajiv Sawhney, MD*; Louis M. Messina, MD; and Timothy A.M. Chuter, MD

Divisions of Vascular Surgery and *Interventional Radiology, University of California, San Francisco, California, USA

Purpose: To describe a modular stent-graft for cases of bilateral common iliac aneurysm.
Technique: The aortic aneurysm is repaired using a standard bifurcated modular system (Zenith). A modified bifurcated component is deployed with its trunk in one limb of the original aortic stent-graft, its long limb in the external iliac artery, and its short limb in the iliac aneurysm just above the internal iliac orifice. A flexible extension is introduced from the right brachial artery and used to bridge the gap between the short limb of the modified bifurcated component and the left internal iliac artery.
Conclusions: Endovascular repair of bilateral iliac aneurysm is feasible using a modular stent-graft with separate branches to the internal and external iliac arteries.

J Endovasc Ther 2003;10:203–207

◆ CLINICAL INVESTIGATION ◆

Feasibility of a Branched Stent-Graft in Common Iliac Artery Aneurysms

Martin Malina, MD, PhD[1,2]; Mark Dirven[1,3]; Björn Sonesson, MD, PhD[1,2]; Timothy Resch, MD, PhD[1,2]; Nuno Dias, MD, PhD[1,2]; and Krassi Ivancev, MD, PhD[1]

[1]Endovascular Center and [2]Department of Vascular Surgery, Malmö University Hospital, SE 205 02 Malmö, Sweden. [3]Medical Faculty, Radboud University, Nijmegen, The Netherlands.

Purpose: To evaluate the short-term feasibility, efficacy, and safety of a modular bifurcated stent-graft with an internal iliac artery (IIA) side branch for endovascular repair of aortoiliac aneurysms.

Methods: Between 2002 and 2005, 10 male patients (median age 75 years, range 59–83) were treated with a bifurcated stent-graft that included a unilateral side branch for the IIA. The median diameters of the abdominal aortic and common iliac artery (CIA) aneurysms were 56 mm (range 33–80) and 40 mm (range 27–60), respectively. Four patients were treated mainly for the CIA aneurysm. Postoperative endoleaks, patency rate, and vessel morphology were determined with contrast-enhanced computed tomography (CT).

Results: All endografts were implanted in the desired position. One IIA occluded intraoperatively, and 1 external iliac artery occlusion was noted 6 months postoperatively; both occlusions were asymptomatic and remain untreated. Three graft-related endoleaks were treated with implantation of adjunctive stent-grafts (2 intraoperative and 1 late). Median follow-up by CT was 2 months (1 week to 32 months). One patient died of myocardial infarction 13 days postoperatively; the stent-graft was patent at autopsy.

Conclusion: Stent-grafts with an IIA side branch offer an opportunity to repair aortoiliac aneurysms without sacrificing the IIA. Implantation of the IIA branch is more complex than routine endovascular aneurysm repair and may have contributed to a periprocedural cardiac death. More patients and longer follow-up are needed to verify these data.

J Endovasc Ther 2006;13:496–500

Branched iliac bifurcation: 6 years experience with endovascular preservation of internal iliac artery flow

Peter Ziegler, MD, Efthimios D. Avgerinos, MD, PhD, Thomas Umscheid, MD, Theodossios Perdikides, MD, Kerstin Erz, MD, and Wolf J. Stelter MD, PhD, *Frankfurt, Germany*

Objective: The objective of the current study was to share a 6-year experience with the iliac bifurcation device (IBD) and determine its safety and effectiveness in patients with common iliac artery aneurysms.
Methods: Between 2001 and 2006, 46 patients were prospectively enrolled in a single institution study on the IBD. Indications included unilateral or bilateral common iliac artery aneurysms (CIAA) (combined or not with abdominal aortic aneurysm endovascular repair). The first 26 patients were intended to receive a first generation unibody IBD and the following 20 patients the second generation, modular, IBD.
Results: In 33 patients out of 46 attempted (technical success per patient 72%), 35 iliac bifurcated devices (2 patients received bilateral IBD) out of 51 attempted (technical success per vessel 69%), were successfully implanted. The technical success rate (per vessel) was 58% for the first generation device and 85% for the second generation device. Inability to introduce the side branch into the IIA and intraoperative occlusions were the main reasons for technical failure. Among these failures, only two patients required open conversions. The mean ± SD follow-up (radiological and clinical) of the 33 patients with a total of 35 successful IBD implantations was 26 ± 17 months (median 24, range 3 to 60). During the follow-up period out of 35 successfully-implanted iliac bifurcation devices, four (11%) hypogastric side branch occlusions occurred, all within the first 12 months. Cumulative IBD side branch patency was 87% at 60 months. Comparing the first with the second generation IBD outcomes, cumulative patency rates at 2 years revealed no statistical difference (P = .774). No endoleak, and particularly no IBD, modular side branch disconnection, no late rupture, or deaths have yet been encountered.
Conclusions: Preservation of pelvic circulation in high risk patients treated for bilateral or unilateral common iliac aneurysms combined or without AAA is feasible and secure exclusively by endovascular repair. New generation iliac bifurcated devices show a favourable intraoperative performance and long-term outcomes. (J Vasc Surg 2007;46:204-10.)

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Branched Grafting for Aortoiliac Aneurysms

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Purpose. *To evaluate a novel approach to preserve pelvic perfusion during endovascular AAA repair in patients with common iliac aneurysms extending to the iliac bifurcation.*

Materials and methods. *A multicenter prospective analysis of patients undergoing implantation of a branched endograft designed to perfuse the internal iliac artery was conducted. All patients enrolled were considered high risk for open surgical repair and presented with common iliac artery aneurysms greater than 20 mm and anatomy amenable to implant the branched device. Preoperative high resolution spiral CT, and follow-up CT studies in addition to abdominal radiographs were obtained at discharge, 1, 6, 12, and 24 months.*

Results. *Between 2003 and 2006, 52 patients (53 internal iliacs) were implanted with an investigational device. Mean common iliac aneurysm maximal diameter was 38 mm. The branch graft was combined with a proximal standard bifurcated component (61%), a fenestrated or a visceral branch component (33%), an aortouni-iliac component (2%), and alone in 2 patients (4%, following prior aortobi-iliac repair). Technical success was achieved in 94% of patients. Within the first month, 6 (11%) internal iliac branches occluded. No occlusions were noted after 1 month. The mean follow-up was 14.2 months. Common iliac aneurysm shrinkage was noted in 42% and 81% of patients at 6 and 12 months. There were no rupture, aneurysm related deaths or conversions, but there were 7 deaths during follow-up.*

Conclusions. *The placement of endovascular prostheses that maintain antegrade perfusion of one or both internal iliac arteries is feasible, and early results provide evidence for optimism with regard to safety and efficacy.*

Endovascular abdominal aortic aneurysm repair in patients with common iliac artery aneurysms – Initial experience with the Zenith bifurcated iliac side branch device

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Objective: To present our initial experience with the Zenith bifurcated iliac side branch device that preserves internal iliac artery flow whilst excluding aorto-iliac aneurysms.

Methods: Between November 2005 and October 2006, data was prospectively collected on 8 patients in whom this device was used; 2 aorto-bi-iliac aneurysms, 3 aorto-uni-iliac aneurysms, 1 solitary common iliac aneurysm, 1 distal type 1 endoleak, and 1 internal iliac aneurysm.

Results: No mortality or major complications resulted from use of this device. The median fluoroscopy time was 53 minutes (range 38 to 105) and a median of 102 g of iodine (range 84 to 130) as contrast were used. One patient required a blood transfusion and only one of the eight side branches occluded. There has been no endoleak related to the device in the median follow-up period of 6 months (1 to 14 months).

Conclusion: This device provides an alternative for the management of patients with aorto-iliac aneurysms that is safe and less complex than, previously described, hybrid procedures that preserve internal iliac flow. (J Vasc Surg 2007;46:211-7.)

Conclusions

- High quality preoperative imaging and accurate aneurysm planning are paramount.
- C-Arm Overheating danger and limited imaging quality are the main disadvantages .
- An Angio Suite is probably the ideal place for such operations.
- Branched endografting remains challenging, still referring to advanced users.


MAVIC
"Yesterday was experience,
Today is opportunity,
Tomorrow is imagination"
Charles Dotter (1920-1985)