MEET 2015
MULTIDISCIPLINARY EUROPEAN ENDOVASCULAR THERAPY

Access vessels challenges and best access route

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Disclosure

Speaker name:

Francesco Setacci

I have the following potential conflicts of interest to report:

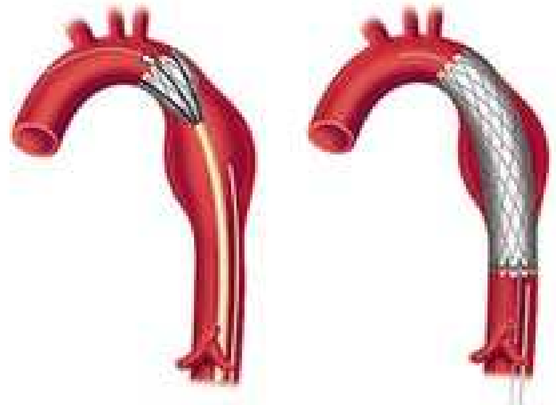
- ✓ Consulting for Trivascular
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)

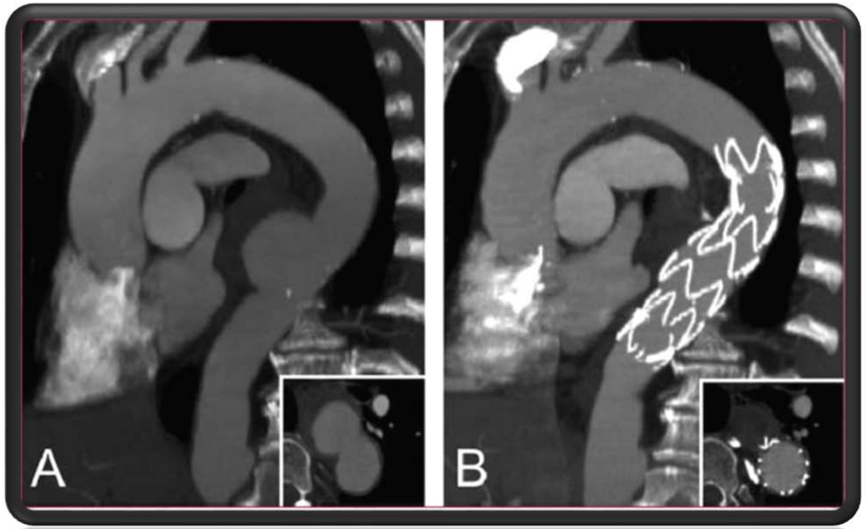
- ☐ I do not have any potential conflict of interest

Background

At the beginning of the endovascular era

TEVAR was only for selected cases

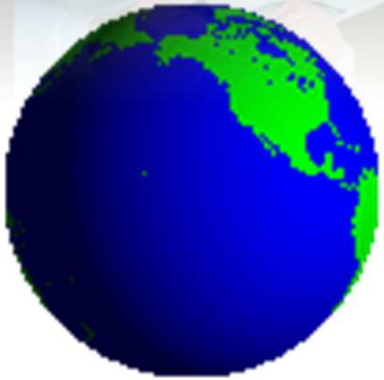




Background

The evolution of devices and imaging allows us to think about treating more complex cases

Background



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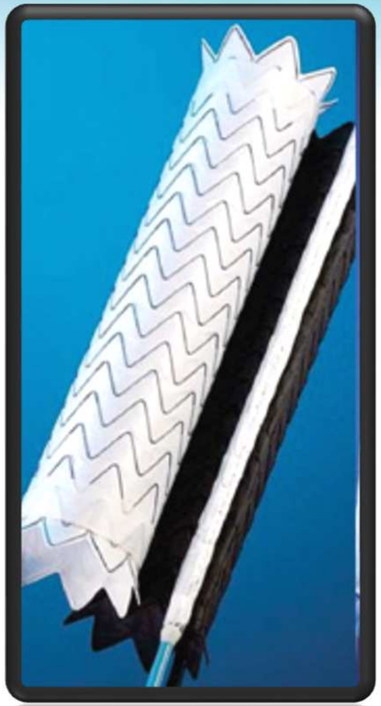
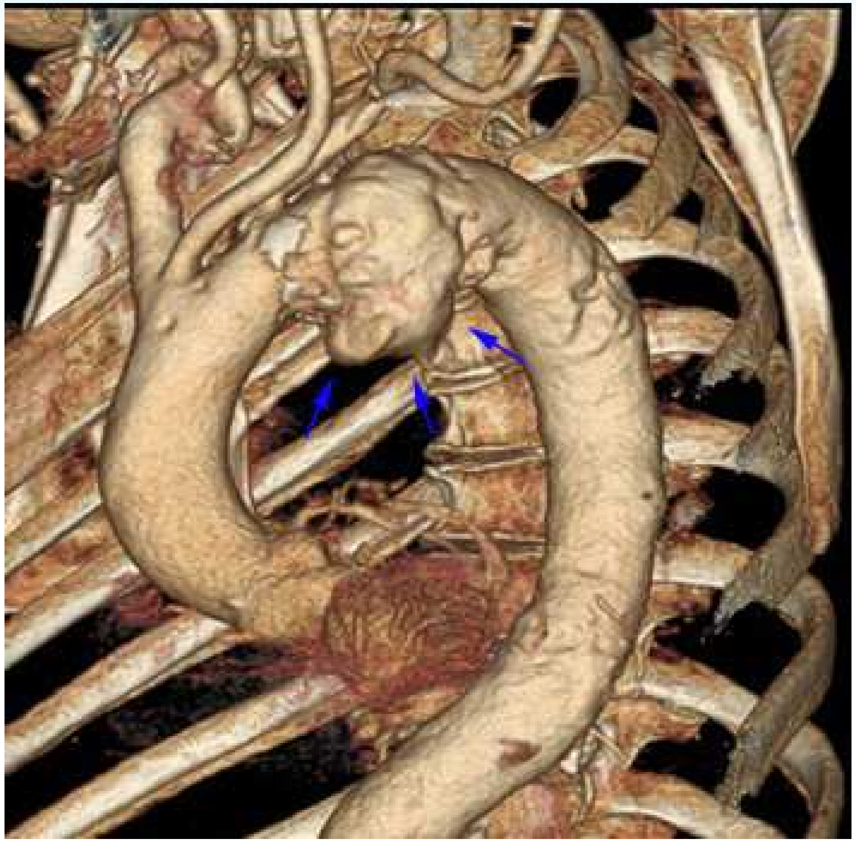


2002

2012

Background



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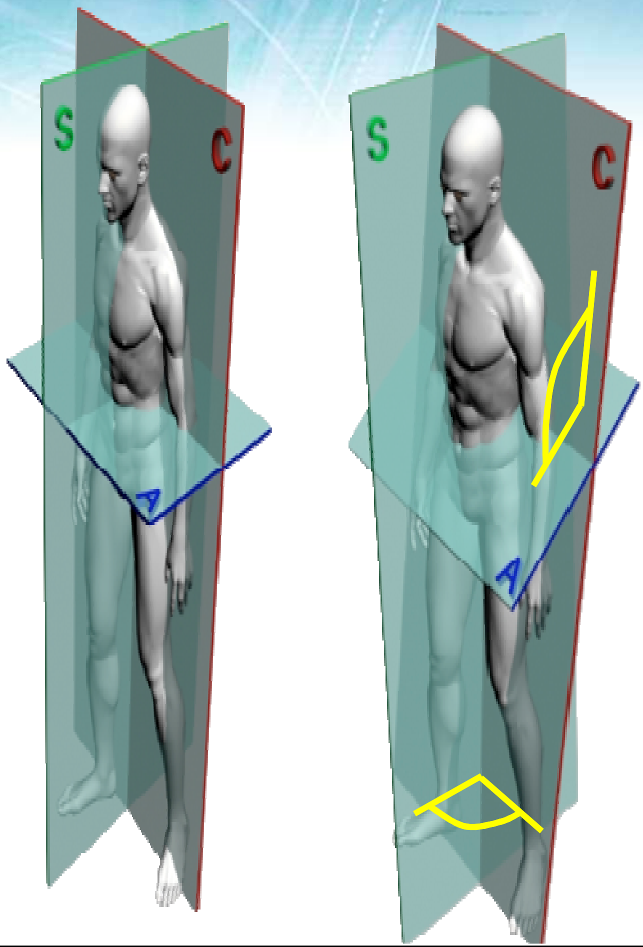
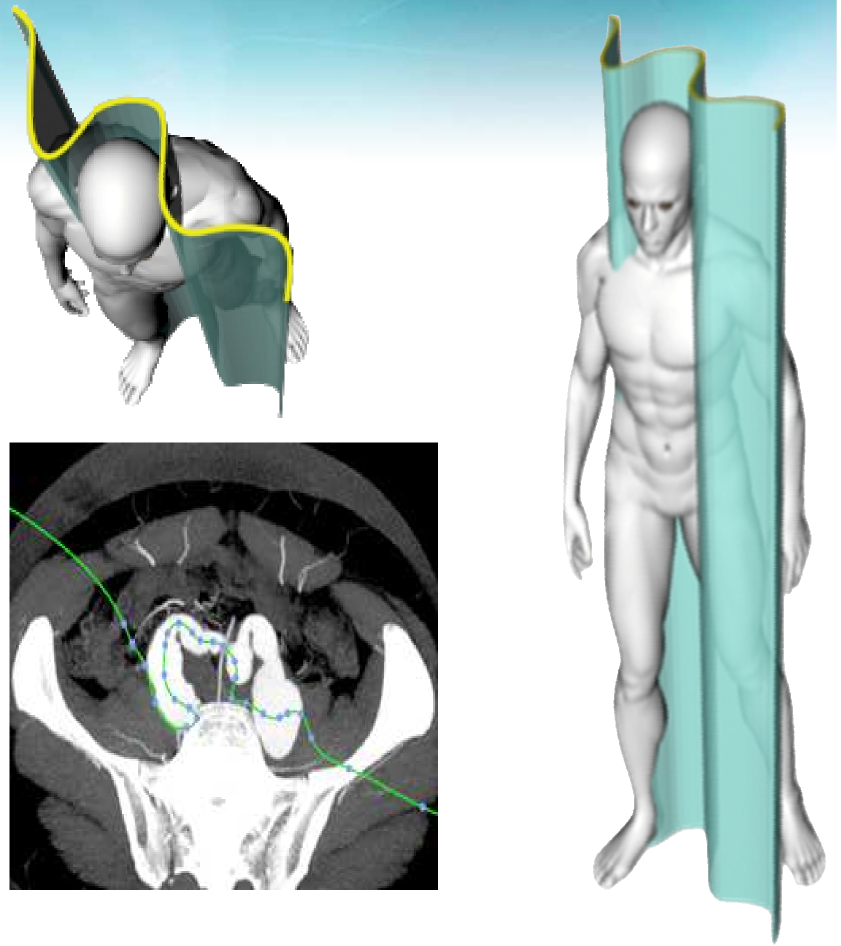
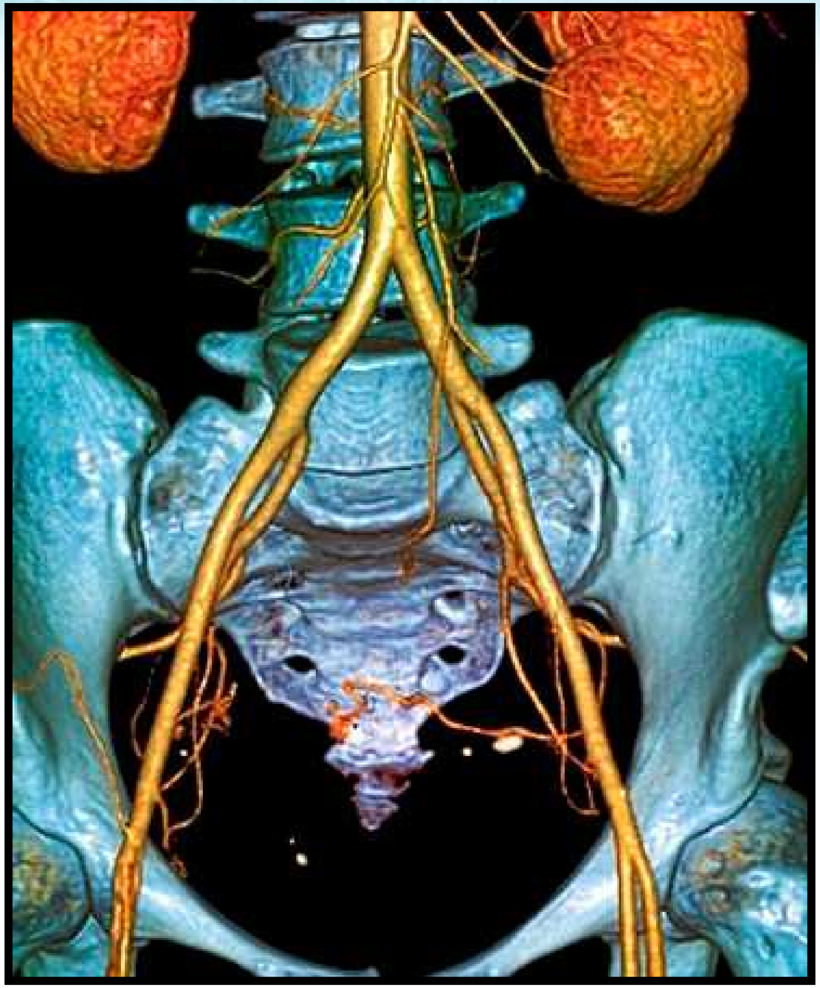




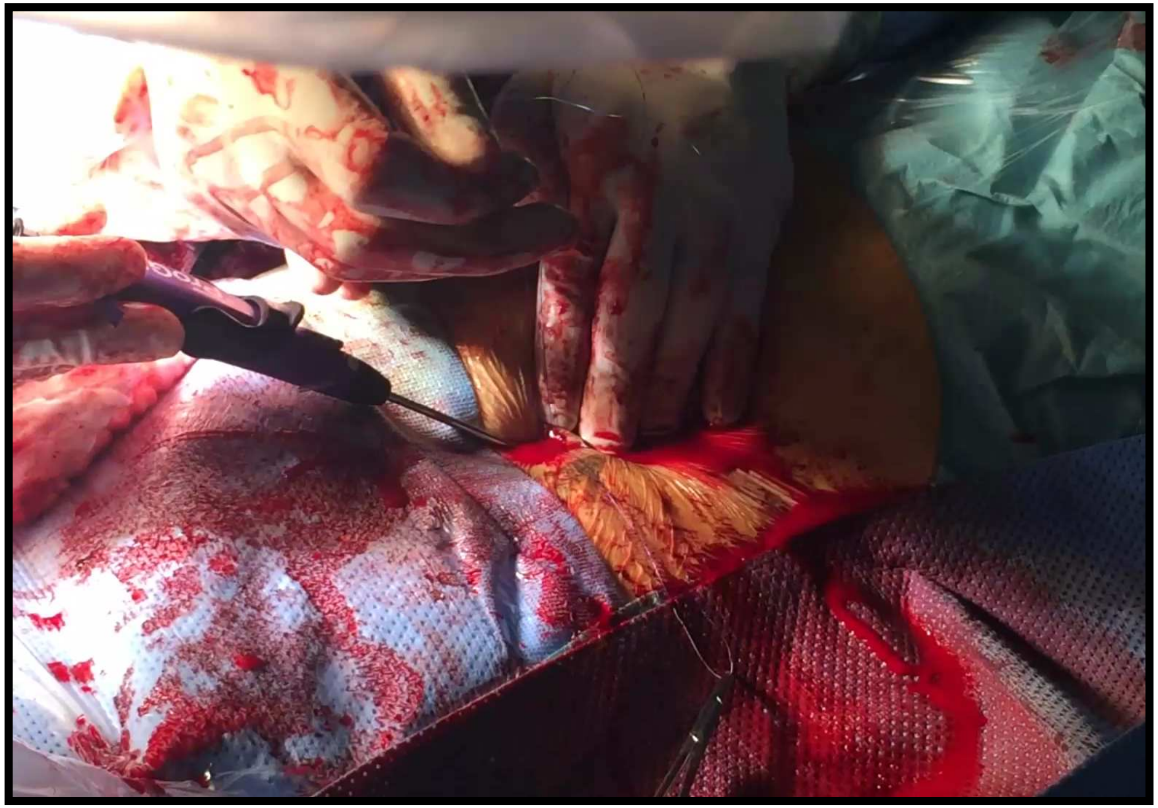
Multi-planar reconstructions

Curved MPR

Ideal anatomy



Ideal anatomy



Challenging access

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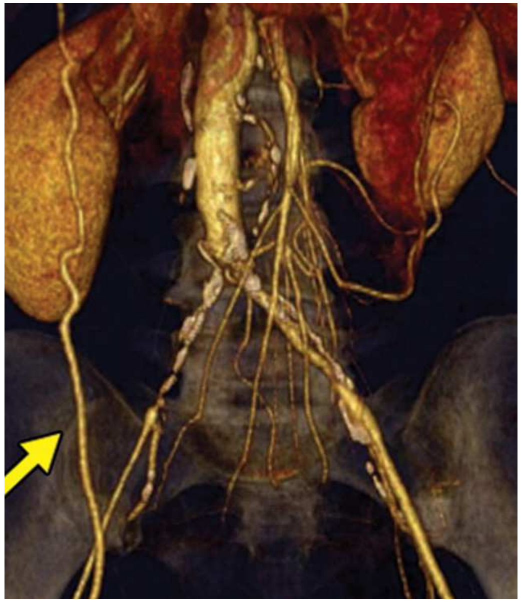
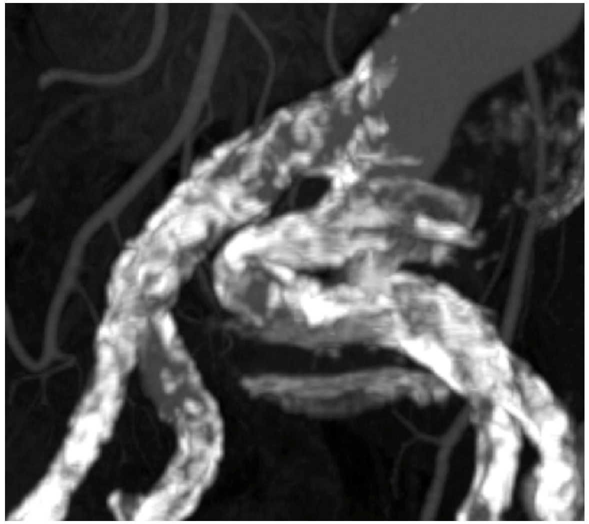
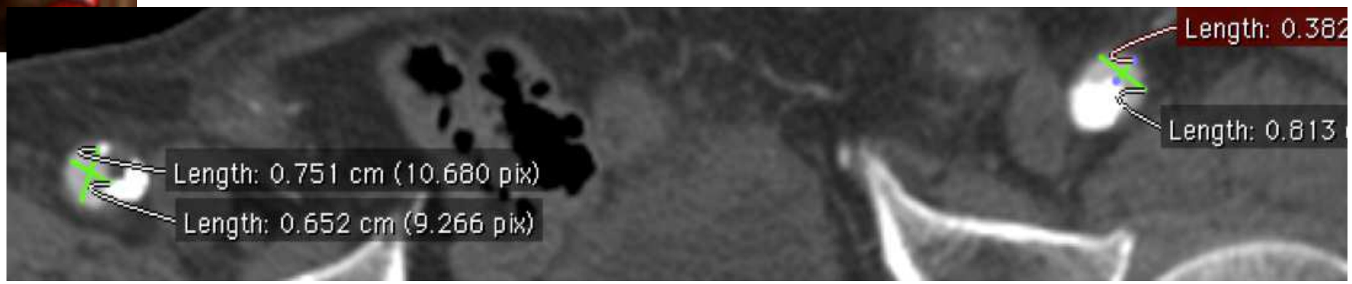
Pushing forward the endovascular limits

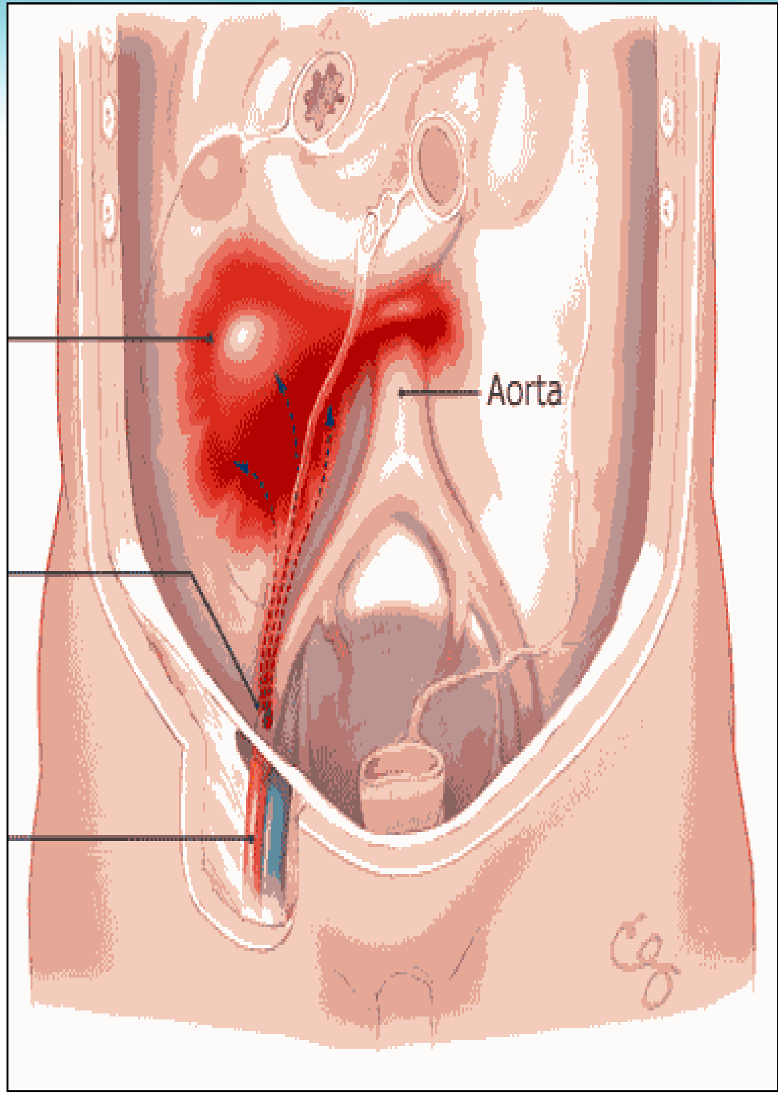





Large thoracic sheaths

① Iliac dissection

② Iliac rupture

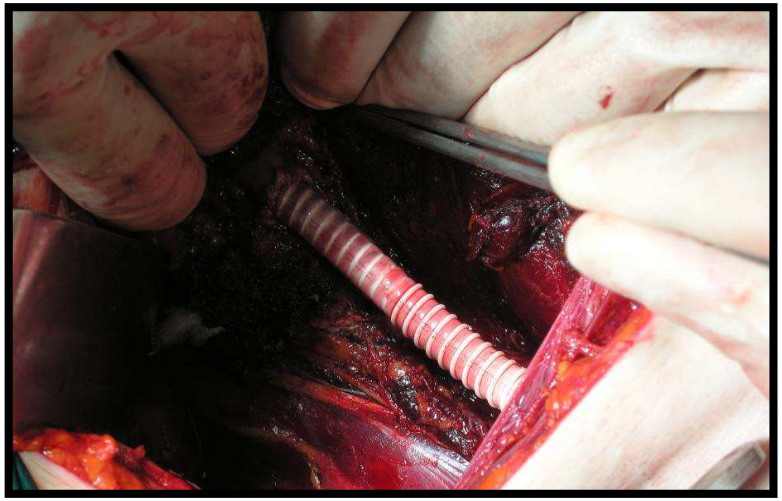
③ Iliac stripping

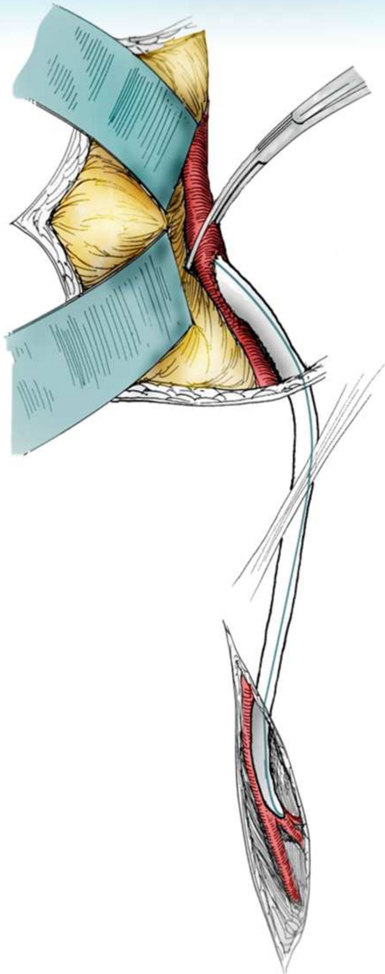


Pushing the endovascular limits

Iliac Stripping

Pushing the endovascular limits





Background

TEVAR is associated with access and device delivery challenges and alternative access techniques can be used to deliver the stent graft with TEVAR when a standard transfemoral access is not feasible

Anatomic factor severity score

JOURNAL OF VASCULAR SURGERY
May 2002

Table III. Definition, grading, and categorization of an initial morphologic state

Attribute	*Absent = 0*	*Mild = 1*	*Moderate = 2*	*Severe = 3*
Aortic neck				
Length (L)	L > 25 mm	15 < L < 25 mm	10 < L < 15 mm	L < 10 mm
Diameter (d)	d < 24 mm	24 < d < 26 mm	26 < d < 28 mm	d > 28 mm
Angle	> 150°	150° < angle < 135°	135° < angle < 120°	Angle < 120°
Calcification/thrombus	< 25%	25-50%	> 50%	–
Aortic aneurysm				
Angulation and tortuosity				
Aortic tortuosity index (T)	T < 1.05	1.05 < T < 1.15	1.15 < T < 1.2	T > 1.2
Aortic angle (Φ)	160° to 180°	140° to 159°	120° to 139°	< 120°
Thrombus	0	< 25%	25%-50%	>50%
Aortic branch vessels	No vessels	1 lumbar/IMA	2 vessels d < 4 mm	2 vessels IMA d > 4 mm
Pelvic perfusion	Patent bilateral IIA	Single IIA occlusion	Single IIA occlusion Contralateral IIA > 50% stenosis	Bilateral IIA occlusion
Iliac artery				
Calcification	None	<25% vessel length	25%-50% vessel length	>50% vessel length
Diameter/occlusive disease	d > 10 mm No occlusive disease	8 < d < 10 mm No stenosis <7 mm diameter or >3 cm long	7 < d < 8 mm Focal stenosis <7 mm diameter and <3 cm in length	d < 7 mm Stenosis < 7 mm diameter and >3 cm in length More than one focal stenosis < 7 mm diameter
Angulation and tortuosity				
Iliac tortuosity index (τ)	τ < 1.25	1.25 < τ < 1.5	1.5 < τ < 1.6	τ > 1.6
Iliac angle (ϕ)	160° to 180°	121° to 159°	90° to 120°	< 90°
Iliac artery sealing zone				
Length (L)	L > 30 mm	20 < L < 30 mm	10 < L < 20 mm	L < 10 mm
Diameter (d)	d < 12.5 mm	12.5 < d < 14.5 mm	14.5 < d < 17 mm	d > 17 mm

IIA, Internal iliac artery; *IMA*, inferior mesenteric artery.

Chaikof E.L.,. et al. J Vasc Surg 2002

Anatomic factor severity score

Iliac artery				
Calcification	None	$<25\%$ vessel length	25%-50% vessel length	$>50\%$ vessel length
Diameter/occlusive disease	$d > 10$ mm No occlusive disease	$8 < d < 10$ mm No stenosis <7 mm diameter or >3 cm long	$7 < d < 8$ mm Focal stenosis <7 mm diameter and <3 cm in length	$d < 7$ mm Stenosis < 7 mm diameter and >3 cm in length More than one focal stenosis < 7 mm diameter
Angulation and tortuosity				
Iliac tortuosity index (τ)	$\tau < 1.25$	$1.25 < \tau < 1.5$	$1.5 < \tau < 1.6$	$\tau > 1.6$
Iliac angle (ϕ)	160° to 180°	121° to 159°	90° to 120°	$< 90°$

Subscore grading for access failure

Calcification 0-3
Diameter 0-3
Occlusive disease 0-3
Iliac tortuosity index 0-3
Iliac angle 0-3

→ 0-15 one side /5
→ 0-30 bilateral /10

Risk score:
0 - none
1 - Low
2 - Moderate
3 - Severe

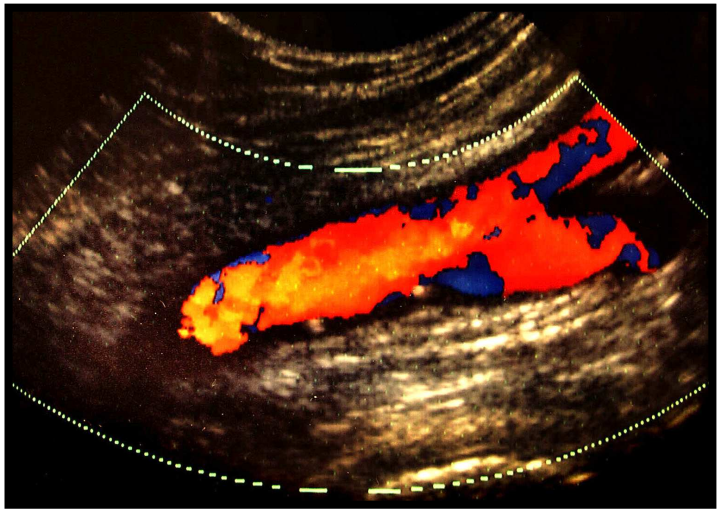
Chaikof E.L.,. et al. J Vasc Surg 2002

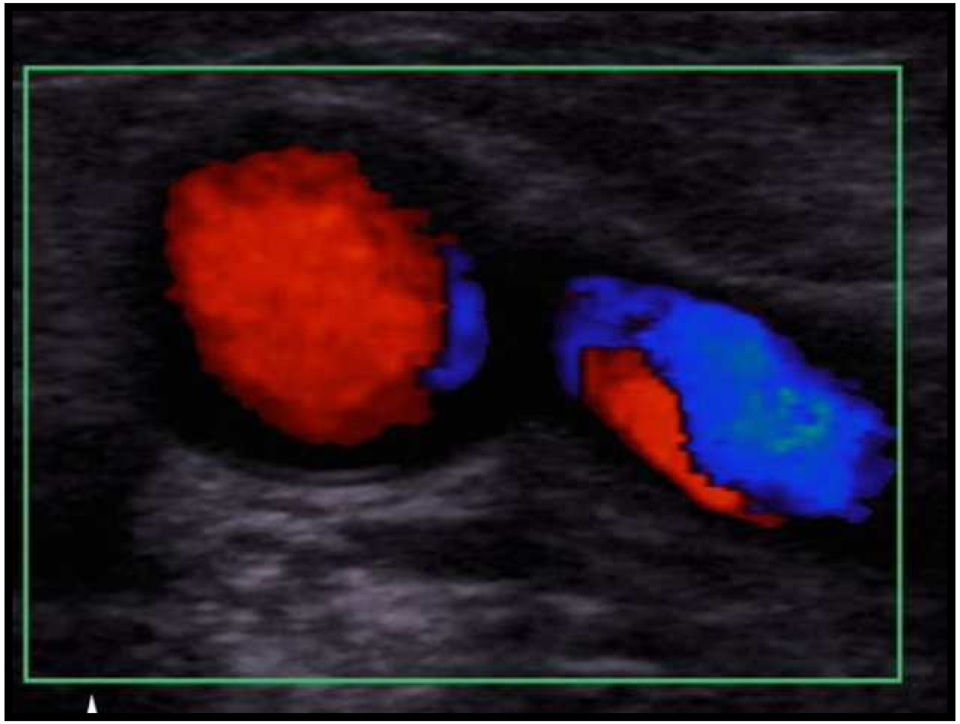
Routine Access

Preoperative DUS measures

Common femoral a.

(narrowest diam.)

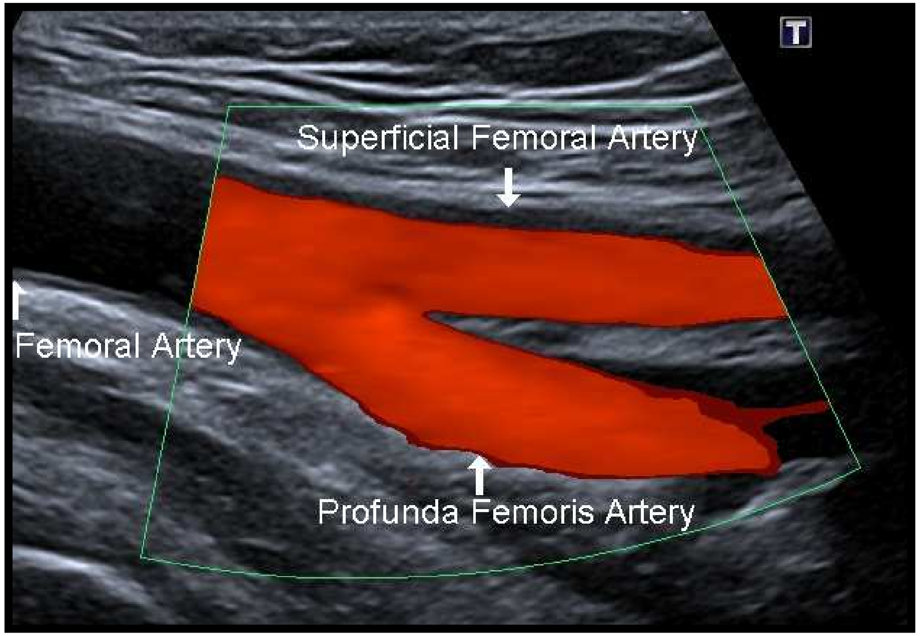




Preop. Planning: DUS

Common femoral artery evaluation

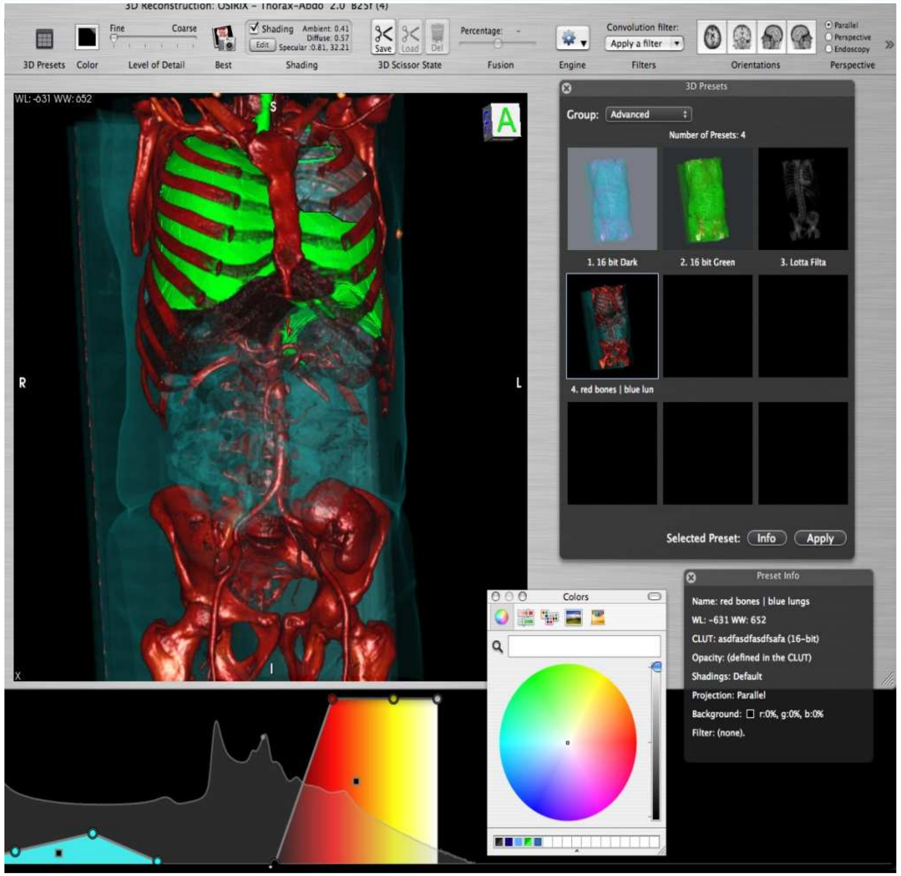
- ✓ Vessel size
- ✓ Calcification
- ✓ Associated pathology



Preop. Planning

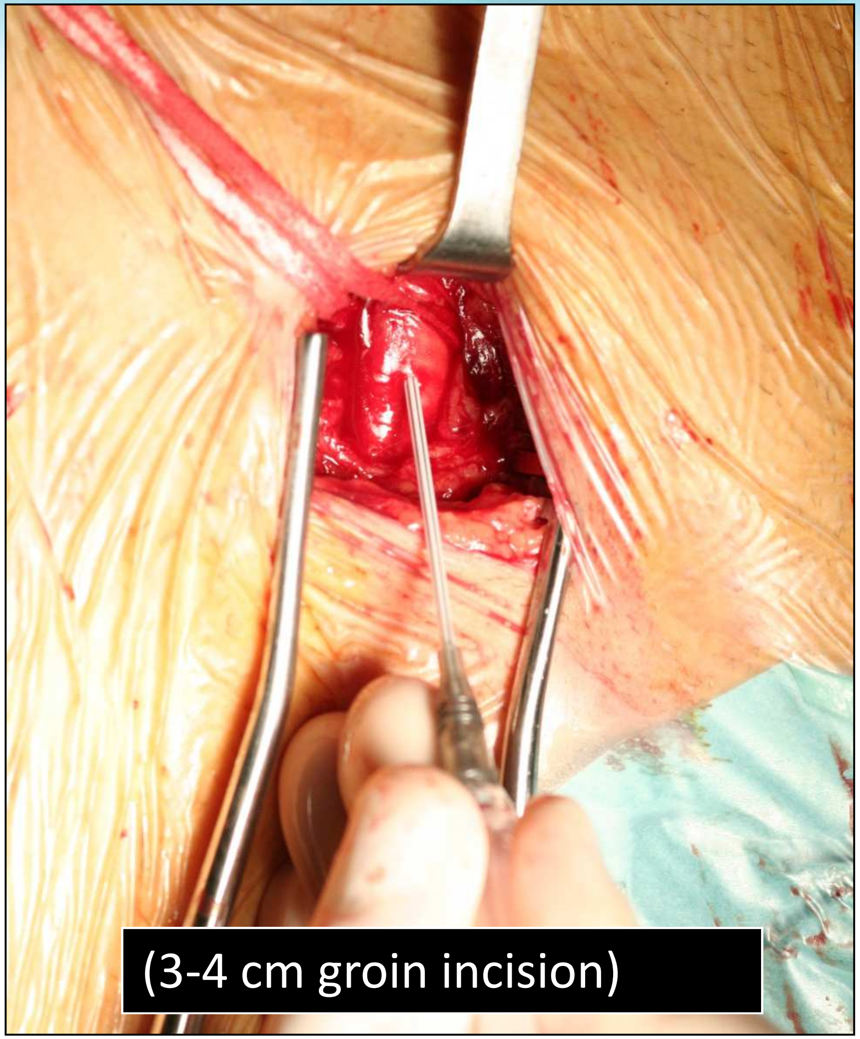
Improved evaluation with post-processing

- ✓ Vessel size
- ✓ Tortuosity
- ✓ Calcification
- ✓ Associated pathology



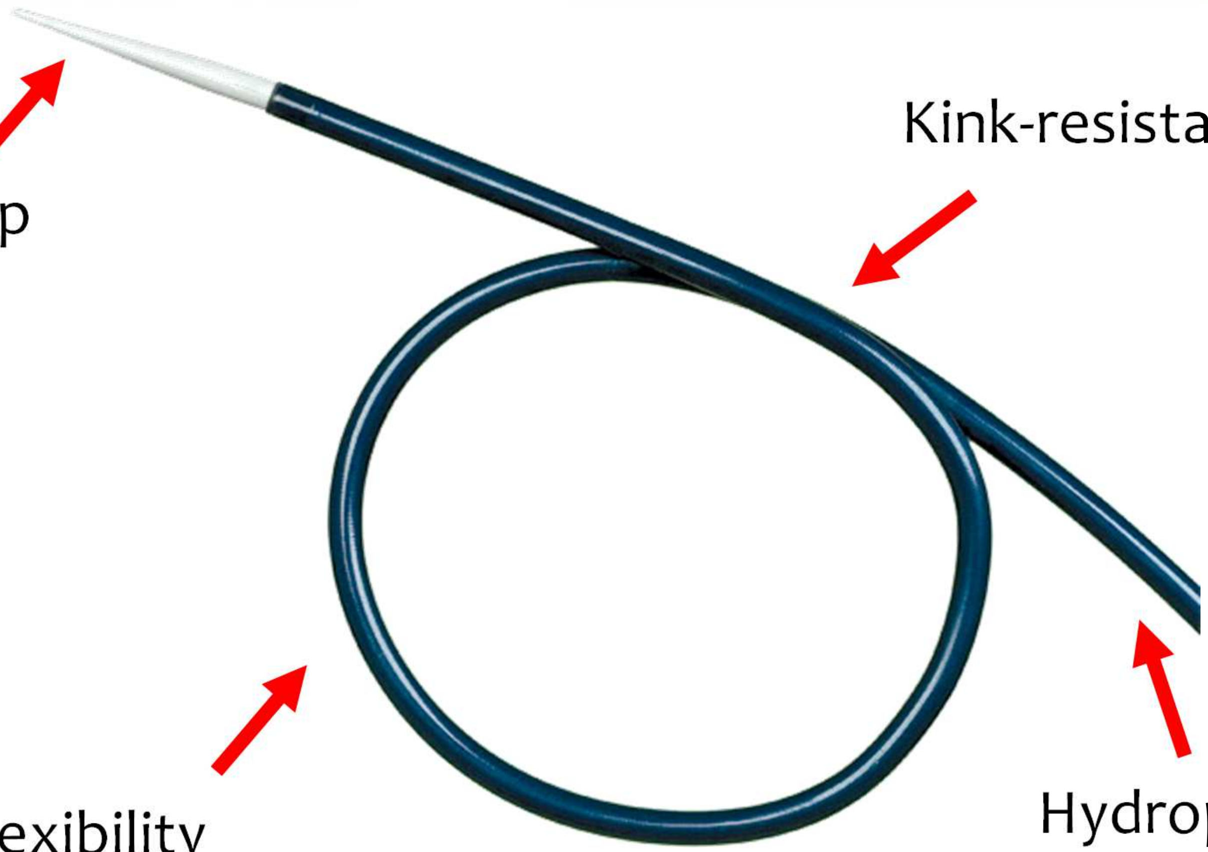
Common femoral surgical access

- ✓ Direct view of the artery
- ✓ Choose the best puncture site
- ✓ Hand-control of artery during pushing
- ✓ Safe access below the ligament



Low profile devices

From TEVAR to aortic valve



Short tip

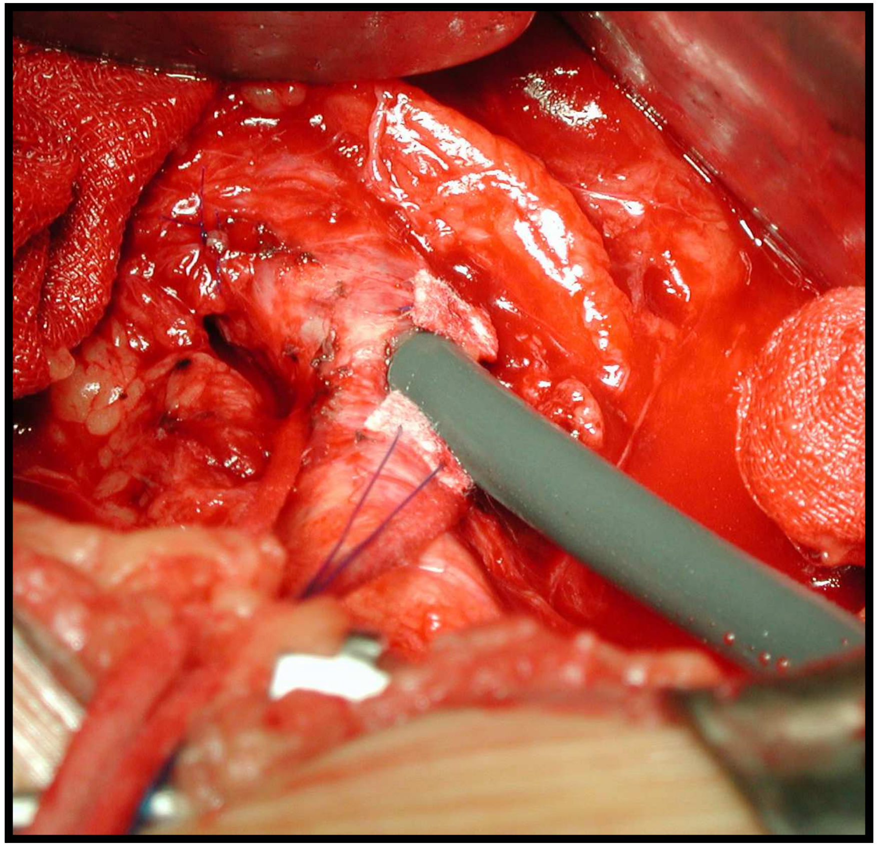
Kink-resistant

↑Flexibility

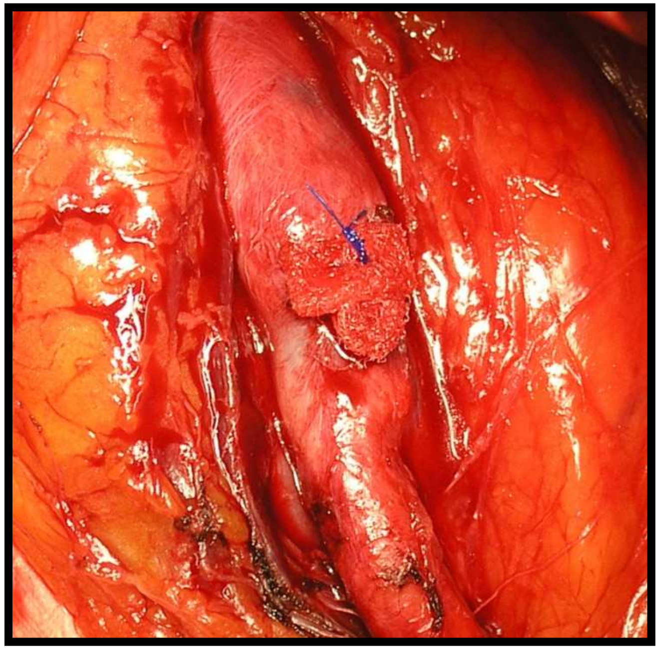
Hydrophilic
coating

Iliac access

Direct puncture

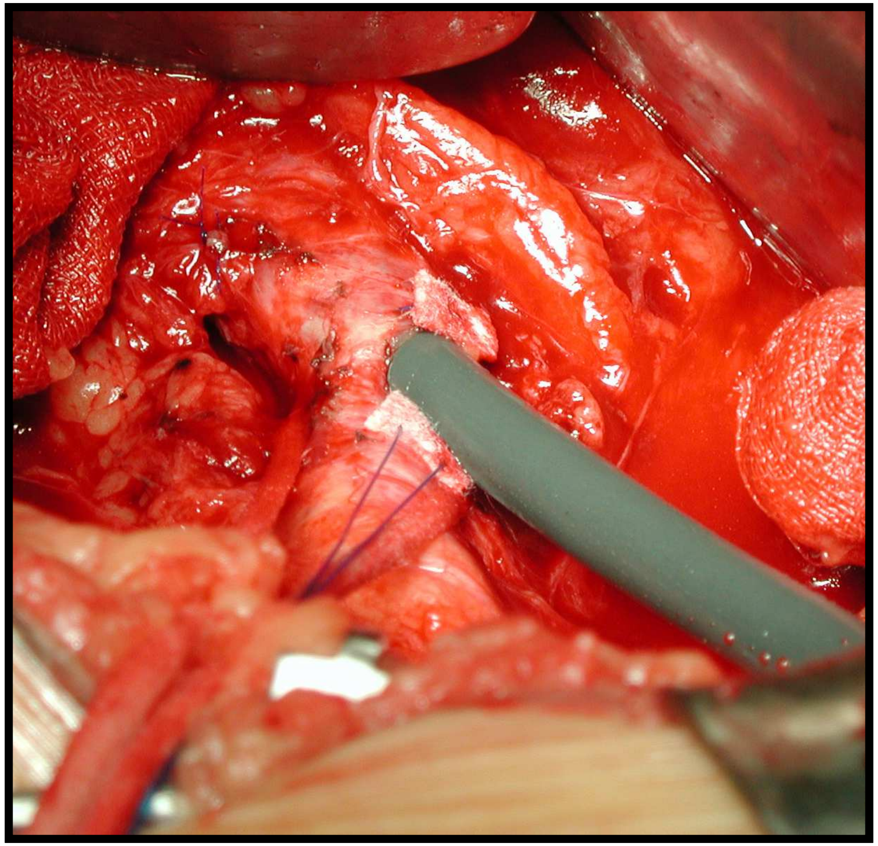


No conduit

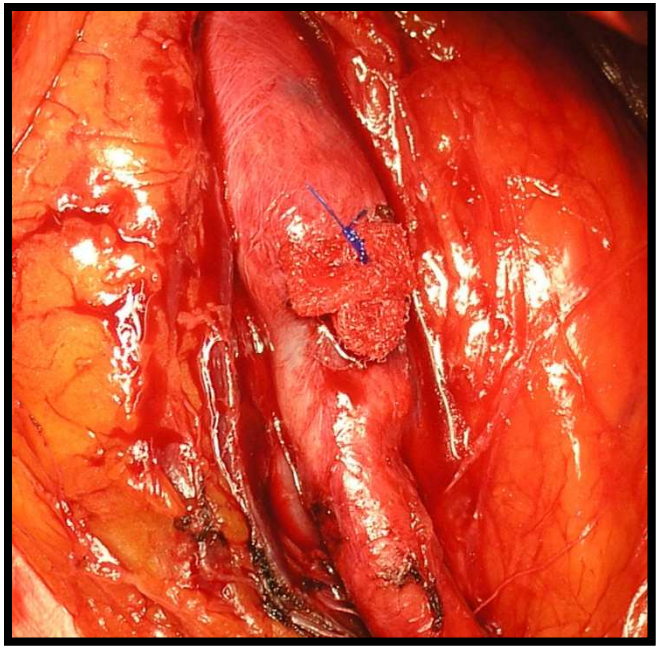


Iliac access

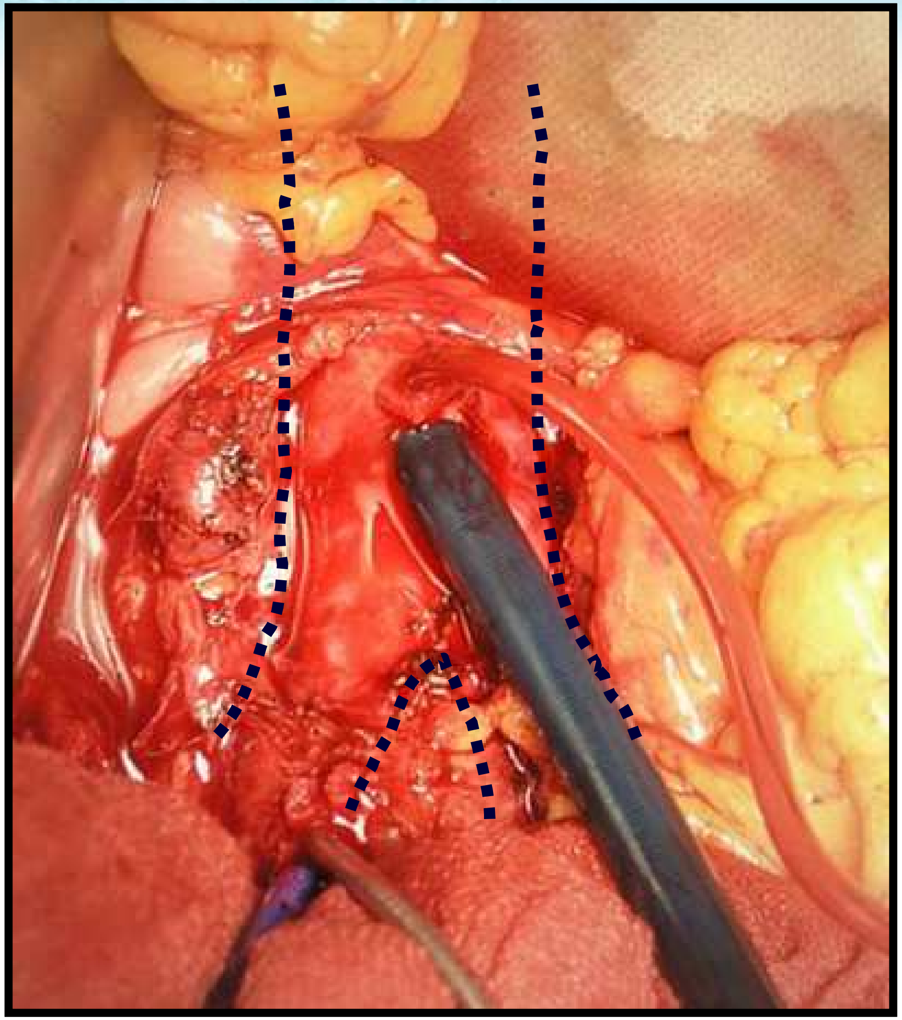
Direct puncture

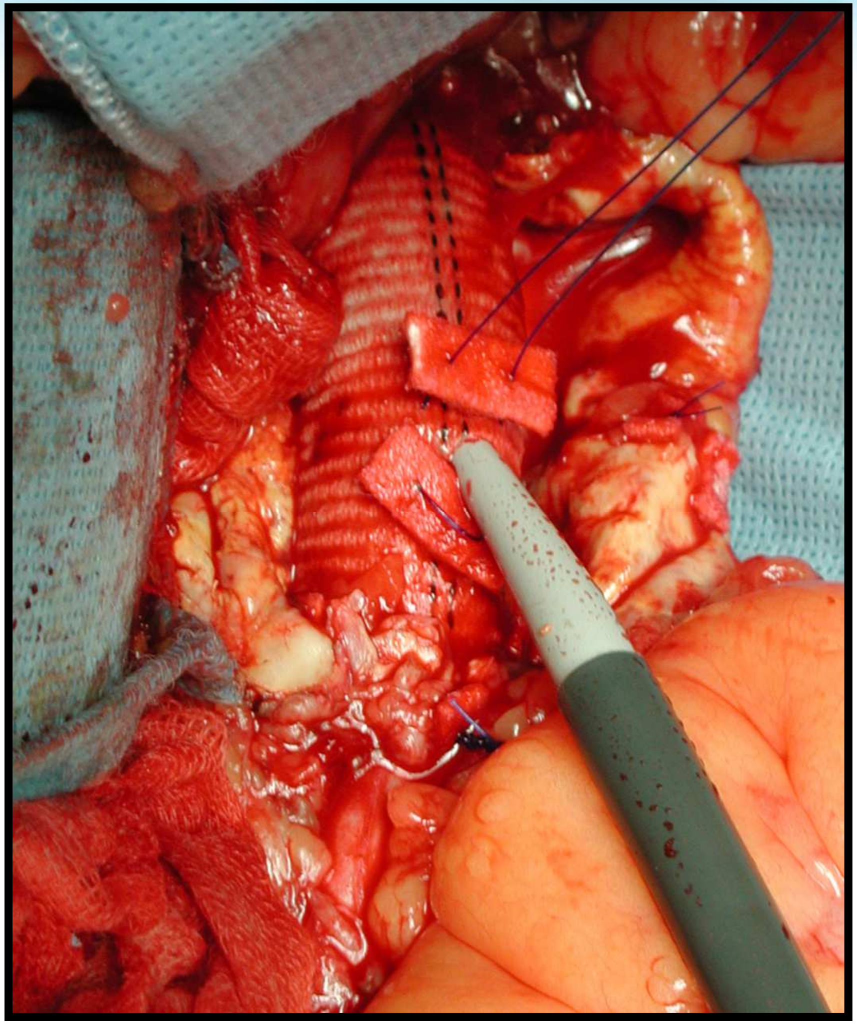


No conduit

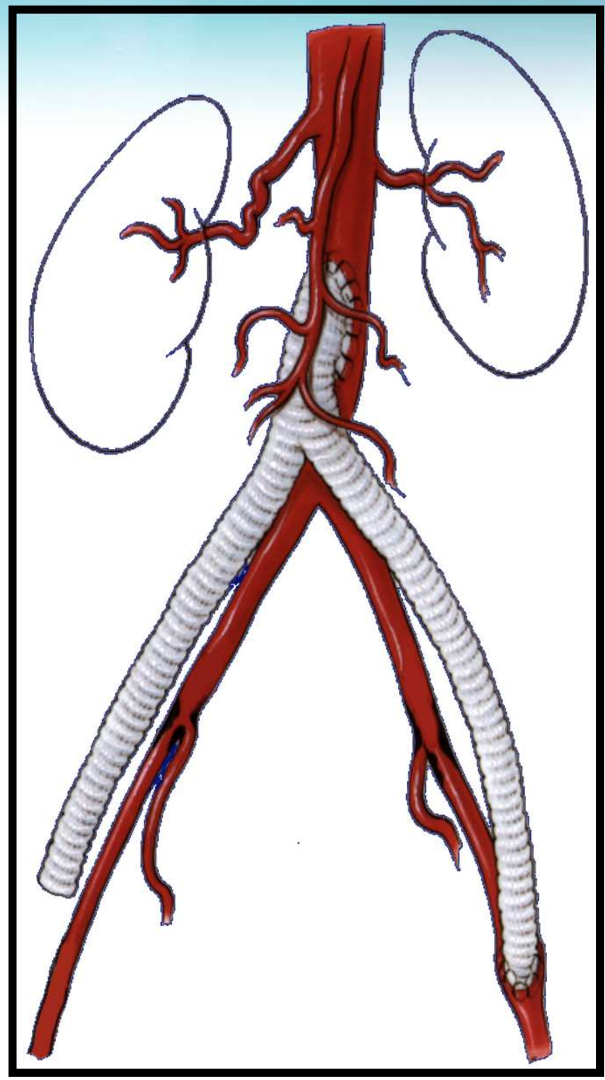


Aortic access

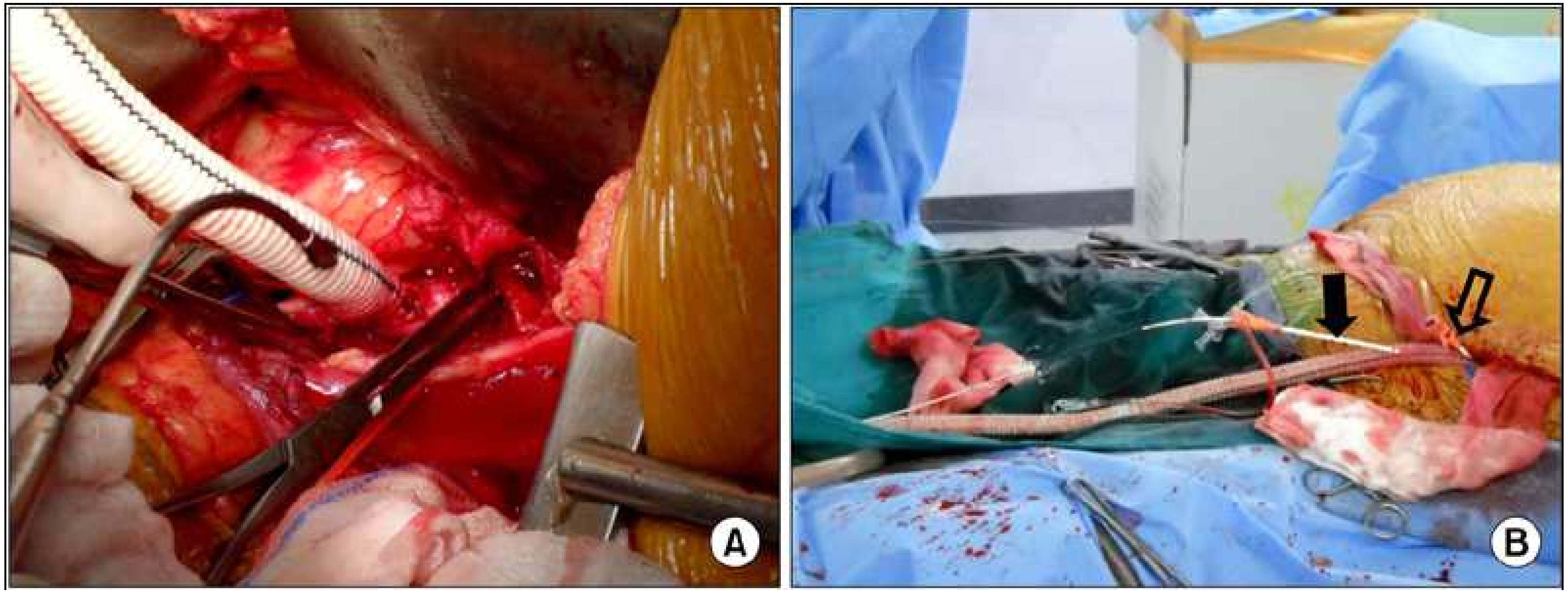




Conduit access



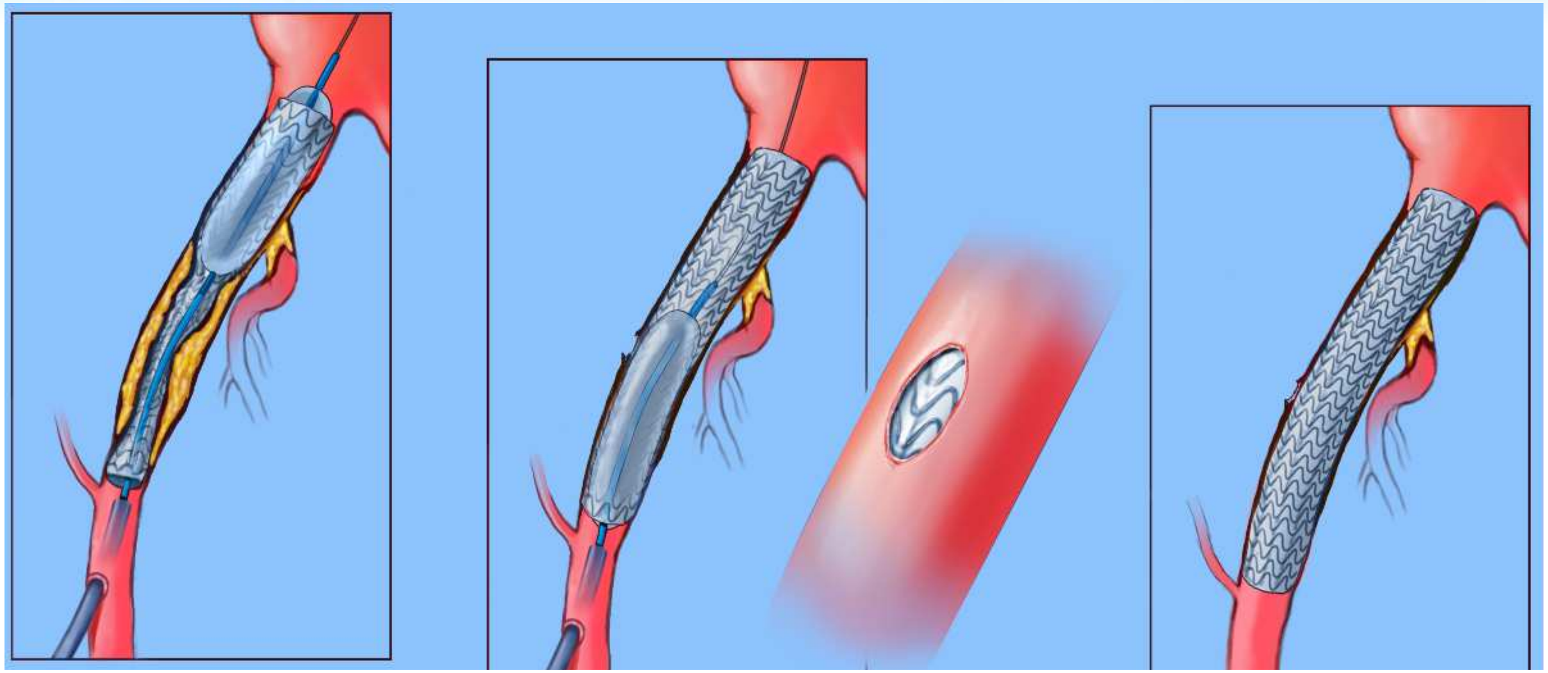
Open Conduit



General anesthesia
Retroperitoneal access

Hypogastric preservation

Endoconduit



Risk of hypogastric coveradge

Less complications and infection?

Surgical Conduits

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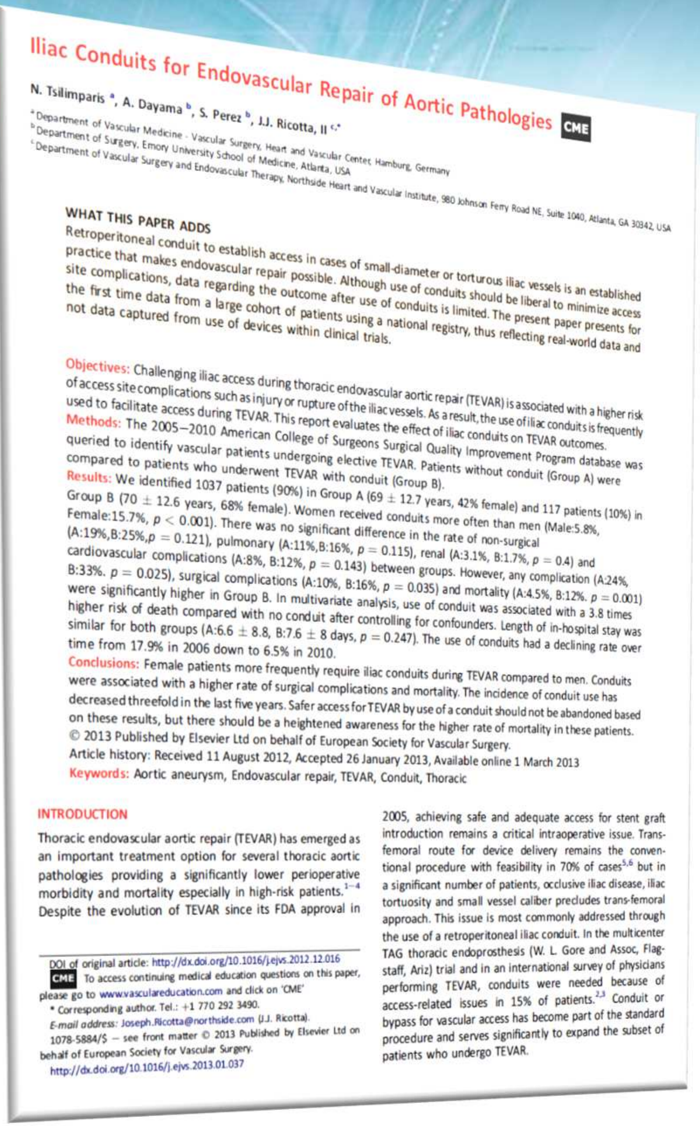

Iliac Conduits for Endovascular Repair of Aortic Pathologies CME

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WHAT THIS PAPER ADDS

Retroperitoneal conduit to establish access in cases of small-diameter or torturous iliac vessels is an established
practice that makes endovascular repair possible. Although use of conduits should be liberal to minimize access
site complications, data regarding the outcome after use of conduits is limited. The present paper presents for
the first time data from a large cohort of patients using a national registry, thus reflecting real-world data and
not data captured from use of devices within clinical trials.

Objectives: Challenging iliac access during thoracic endovascular aortic repair (TEVAR) is associated with a higher risk
of access site complications such as injury or rupture of the iliac vessels. As a result, the use of iliac conduits is frequently
used to facilitate access during TEVAR. This report evaluates the effect of iliac conduits on TEVAR outcomes.
Methods: The 2005–2010 American College of Surgeons Surgical Quality Improvement Program database was
queried to identify vascular patients undergoing elective TEVAR. Patients without conduit (Group A) were
compared to patients who underwent TEVAR with conduit (Group B).
Results: We identified 1037 patients (90%) in Group A (69 ± 12.7 years, 42% female) and 117 patients (10%) in
Group B (70 ± 12.6 years, 68% female). Women received conduits more often than men (Male:5.8%,
Female:15.7%, $p < 0.001$). There was no significant difference in the rate of non-surgical
(A:19%,B:25%,$p = 0.121$), pulmonary (A:11%,B:16%, $p = 0.115$), renal (A:3.1%, B:1.7%, $p = 0.4$) and
cardiovascular complications (A:8%, B:12%, $p = 0.143$) between groups. However, any complication (A:24%,
B:33%. $p = 0.025$), surgical complications (A:10%, B:16%, $p = 0.035$) and mortality (A:4.5%, B:12%. $p = 0.001$)
were significantly higher in Group B. In multivariate analysis, use of conduit was associated with a 3.8 times
higher risk of death compared with no conduit after controlling for confounders. Length of in-hospital stay was
similar for both groups (A:6.6 ± 8.8, B:7.6 ± 8 days, $p = 0.247$). The use of conduits had a declining rate over
time from 17.9% in 2006 down to 6.5% in 2010.
Conclusions: Female patients more frequently require iliac conduits during TEVAR compared to men. Conduits
were associated with a higher rate of surgical complications and mortality. The incidence of conduit use has
decreased threefold in the last five years. Safer access for TEVAR by use of a conduit should not be abandoned based
on these results, but there should be a heightened awareness for the higher rate of mortality in these patients.

Article history: Received 11 August 2012, Accepted 26 January 2013, Available online 1 March 2013
Keywords: Aortic aneurysm, Endovascular repair, TEVAR, Conduit, Thoracic

INTRODUCTION

Thoracic endovascular aortic repair (TEVAR) has emerged as an important treatment option for several thoracic aortic pathologies providing a significantly lower perioperative morbidity and mortality especially in high-risk patients.[1–4] Despite the evolution of TEVAR since its FDA approval in 2005, achieving safe and adequate access for stent graft introduction remains a critical intraoperative issue. Trans-femoral route for device delivery remains the conventional procedure with feasibility in 70% of cases[5,6] but in a significant number of patients, occlusive iliac disease, iliac tortuosity and small vessel caliber precludes trans-femoral approach. This issue is most commonly addressed through the use of a retroperitoneal iliac conduit. In the multicenter TAG thoracic endoprosthesis (W. L. Gore and Assoc, Flag-staff, Ariz) trial and in an international survey of physicians performing TEVAR, conduits were needed because of access-related issues in 15% of patients.[2,3] Conduit or bypass for vascular access has become part of the standard procedure and serves significantly to expand the subset of patients who undergo TEVAR.

DOI of original article: http://dx.doi.org/10.1016/j.ejvs.2012.12.016
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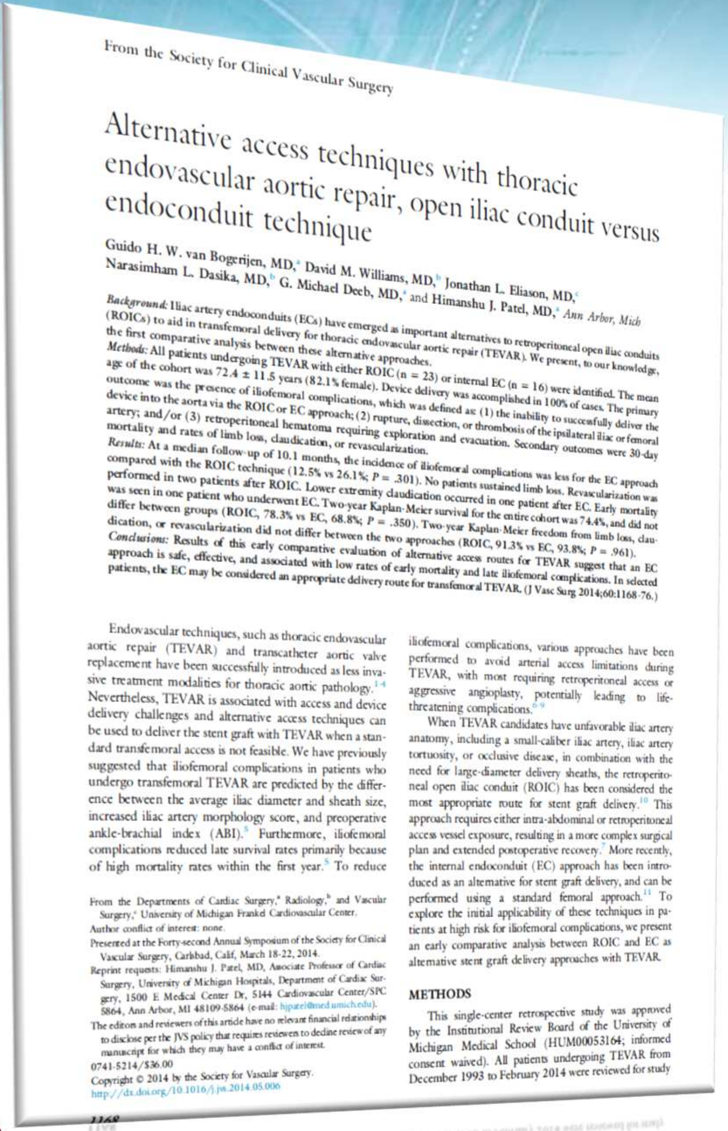
1078-5884/$ – see front matter © 2013 Published by Elsevier Ltd on behalf of European Society for Vascular Surgery.
http://dx.doi.org/10.1016/j.ejvs.2013.01.037

Conduit were associated with a higher rate of surgical complications and mortality. Safer access for TEVAR by use of a conduit should not be abandoned based on these results, but there should be a heightened awareness for the higher rate of mortality in these patients.

Surgical *Vs* Endoconduit



From the Society for Clinical Vascular Surgery

Alternative access techniques with thoracic endovascular aortic repair, open iliac conduit versus endoconduit technique

Guido H. W. van Bogerijen, MD,[a] David M. Williams, MD,[b] Jonathan L. Eliason, MD,[c] Narasimham L. Dasika, MD,[b] G. Michael Deeb, MD,[a] and Himanshu J. Patel, MD,[a] *Ann Arbor, Mich*

Background: Iliac artery endoconduits (ECs) have emerged as important alternatives to retroperitoneal open iliac conduits (ROICs) to aid in transfemoral delivery for thoracic endovascular aortic repair (TEVAR). We present, to our knowledge, the first comparative analysis between these alternative approaches.
Methods: All patients undergoing TEVAR with either ROIC (n = 23) or internal EC (n = 16) were identified. The mean age of the cohort was 72.4 ± 11.5 years (82.1% female). Device delivery was accomplished in 100% of cases. The primary outcome was the presence of iliofemoral complications, which was defined as: (1) the inability to successfully deliver the device into the aorta via the ROIC or EC approach; (2) rupture, dissection, or thrombosis of the ipsilateral iliac or femoral artery; and/or (3) retroperitoneal hematoma requiring exploration and evacuation. Secondary outcomes were 30-day mortality and rates of limb loss, claudication, or revascularization.
Results: At a median follow-up of 10.1 months, the incidence of iliofemoral complications was less for the EC approach compared with the ROIC technique (12.5% vs 26.1%; *P* = .301). No patients sustained limb loss. Revascularization was performed in two patients after ROIC. Lower extremity claudication occurred in one patient after EC. Early mortality was seen in one patient who underwent EC. Two-year Kaplan-Meier survival for the entire cohort was 74.4%, and did not differ between groups (ROIC, 78.3% vs EC, 68.8%; *P* = .350). Two-year Kaplan-Meier freedom from limb loss, claudication, or revascularization did not differ between the two approaches (ROIC, 91.3% vs EC, 93.8%; *P* = .961).
Conclusions: Results of this early comparative evaluation of alternative access routes for TEVAR suggest that an EC approach is safe, effective, and associated with low rates of early mortality and late iliofemoral complications. In selected patients, the EC may be considered an appropriate delivery route for transfemoral TEVAR. (J Vasc Surg 2014;60:1168-76.)

Endovascular techniques, such as thoracic endovascular aortic repair (TEVAR) and transcatheter aortic valve replacement have been successfully introduced as less invasive treatment modalities for thoracic aortic pathology.[1-4] Nevertheless, TEVAR is associated with access and device delivery challenges and alternative access techniques can be used to deliver the stent graft with TEVAR when a standard transfemoral access is not feasible. We have previously suggested that iliofemoral complications in patients who undergo transfemoral TEVAR are predicted by the difference between the average iliac diameter and sheath size, increased iliac artery morphology score, and preoperative ankle-brachial index (ABI).[5] Furthermore, iliofemoral complications reduced late survival rates primarily because of high mortality rates within the first year.[5] To reduce iliofemoral complications, various approaches have been performed to avoid arterial access limitations during TEVAR, with most requiring retroperitoneal access or aggressive angioplasty, potentially leading to life-threatening complications.[6-9]

When TEVAR candidates have unfavorable iliac artery anatomy, including a small-caliber iliac artery, iliac artery tortuosity, or occlusive disease, in combination with the need for large-diameter delivery sheaths, the retroperitoneal open iliac conduit (ROIC) has been considered the most appropriate route for stent graft delivery.[10] This approach requires either intra-abdominal or retroperitoneal access vessel exposure, resulting in a more complex surgical plan and extended postoperative recovery.[7] More recently, the internal endoconduit (EC) approach has been introduced as an alternative for stent graft delivery, and can be performed using a standard femoral approach.[11] To explore the initial applicability of these techniques in patients at high risk for iliofemoral complications, we present an early comparative analysis between ROIC and EC as alternative stent graft delivery approaches with TEVAR.

METHODS

This single-center retrospective study was approved by the Institutional Review Board of the University of Michigan Medical School (HUM00053164; informed consent waived). All patients undergoing TEVAR from December 1993 to February 2014 were reviewed for study

From the Departments of Cardiac Surgery,[a] Radiology,[b] and Vascular Surgery,[c] University of Michigan Frankel Cardiovascular Center.

Author conflict of interest: none.
Presented at the Forty-second Annual Symposium of the Society for Clinical Vascular Surgery, Carlsbad, Calif, March 18-22, 2014.

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0741-5214/$36.00

http://dx.doi.org/10.1016/j.jvs.2014.05.006

Conclusions: This early comparative evaluation of alternative access routes for TEVAR suggests that the EC approach described is safe, effective, and associated with low rates of early mortality and late iliofemoral complications.

Conclusions

- ✓ Endoconduit reduce total operation time
- ✓ More confort
- ✓ Less recovery time
- ✓ No general anesthesia
- ✓ Avoid infection

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Thank you

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