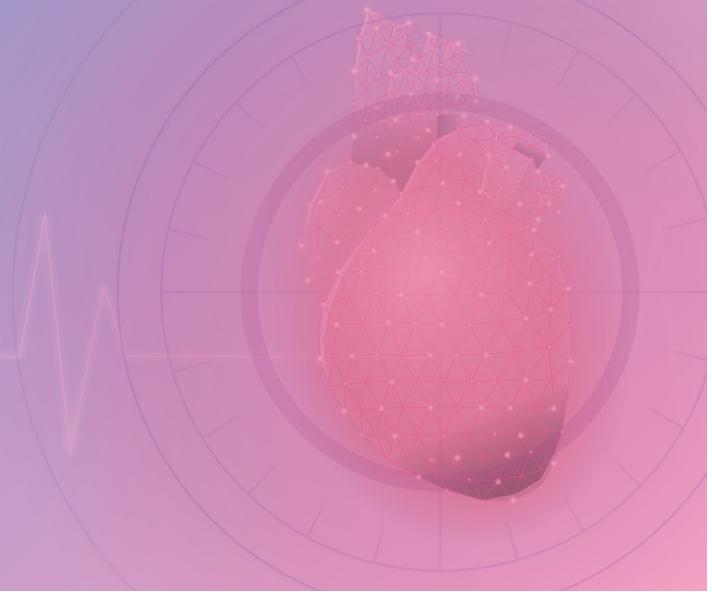
INTERNAL ILIAC ARTERY PRESERVATION STRATEGIES IN THE ENDOVASCULAR TREATMENT OF AORTOILIAC ANEURYSMS

Nut Van Lam, MD., PhD.,

Department of Vascular Surgery,
Cho Ray Hospital



INTRODUCTION

- Abdominal aortic aneurysm accompanied with two iliac arteries aneurysm accounts up to 40% of the aortoiliac aneurysms cases[1,2].
- EVAR helps reduce blood loss, time of surgery, complications and number of deaths.
- Suitable anatomy of the aneurysm and the landing zone, distal zone is required when considering EVAR
- In EVAR treatment of aortoiliac aneurysm, occlusion of one or both internal iliac arteries helps prevent endoleak type II[3]

1. Pua U, Tan K. Rubin B. B. Sniderman K. W. Rajan D. K. Oreopoulos G. D. Lindsey T. F., "Iliac branch graft in the treatment of complex aortoiliac aneurysms: early results from a North American institution". Journal of vascular and interventional radiology : JVIR, 2011. 22(4): p. 542-9.
2. Zhang, Tao Guo Wei Ma Xiaohui Jia Xin Liu Xiaoping Dong Yanfen Xiong Jiang Jia Senhao, "Novel-Designed Iliac Branch Stent Graft for Internal Iliac Artery Reconstruction during Aneurysm Repair". Annals of Vascular Surgery Annals of Vascular Surgery, 2015. 29(2): p. 189-196.
3. Gustavo S. Oderich, Roy K. Greenberg, "Endovascular Iliac Branch Devices for Iliac Aneurysms". Perspectives in Vascular Surgery and Endovascular Therapy, 2011. 23(3): p. 166-172.

INTRODUCTION

Occlusion of one or both internal iliac arteries may have some complications related to ischemia of the pelvis:

- 28 – 42% buttock claudication.
- 17 – 24% erectile dysfunction.
- 3,4% colonic ischemia.
- 0,1 – 0,3% spinal cord ischemia.

Rare complications: sciatica pain, ulceration, death.

Preservation of internal iliac arteries while performing EVAR should be considered in order to prevent these complications.

1. Duvnjak, Stevo, "Endovascular treatment of aortoiliac aneurysms: From intentional occlusion of the internal iliac artery to branch iliac stent graft". World Journal of Radiology, 2016. 8(3): p. 275-280.

INTRODUCTION

Mehta M. et al (2001): 154 aortoiliac aneurysm cases

Occlusion one or both internal iliac arteries

No case has buttock necrosis, colon ischemia and death

12% cases have buttock claudication

J Vasc Surg. 2001 Feb;33(2 Suppl):S27-32.

Unilateral and bilateral hypogastric artery interruption during aortoiliac aneurysm repair in 154 patients: a relatively innocuous procedure.

Mehta M[1], Veith FJ, Ohki T, Cynamon J, Goldstein K, Suggs WD, Wain RA, Chang DW, Friedman SG, Scher LA, Lipsitz EC.

INTRODUCTION

In 2008, 18 researchs in 634 cases.

Occlusion one or both internal iliac arteries

28% cases have buttock claudiation:

- 31% cases have symptoms after embolization of one internal iliac artery
- 35% cases have symptoms after embolization of both internal iliac arteries

17% cases have erectile dysfunction

Cardiovasc Intervent Radiol. 2008 Jul-Aug;31(4):728-34. doi: 10.1007/s00270-008-9319-3. Epub 2008 Mar 13.

Buttock claudication and erectile dysfunction after internal iliac artery embolization in patients prior to endovascular aortic aneurysm repair.

Rayt HS[1], Bown MJ, Lambert KV, Fishwick NG, McCarthy MJ, London NJ, Sayers RD.

INTRODUCTION

Outcome after Interruption or Preservation of Internal Iliac Artery Flow During Endovascular Repair of Abdominal Aorto-iliac Aneurysms

G.N. Kouvelos [a,*], A. Katsargyris [a], G.A. Antoniou [b], K. Oikonomou [a], E.L.G. Verhoeven [a]

[a] Department of Vascular and Endovascular Surgery, Paracelsus Medical University Nuremberg, Germany
[b] Department of Vascular and Endovascular Surgery, The Royal Oldham Hospital, Pennine Acute Hospitals NHS Trust, Manchester, UK

Conclusion: Unilateral or bilateral IIA occlusion during EVAR seems to carry a substantial risk of significant ischemic complications in nearly one quarter of patients. Bilateral IIA occlusion was related to a significantly higher rate of BC. IIA preservation techniques represent a significant improvement in the treatment of aorto-iliac

- Systematic review
- 57 reports

30 reports on embolization of internal iliac arteries (1468 cases)

27 reports on preservation of internal iliac arteries (816 cases)

DISCUSSION

- Preservation of IIA is strongly recommended in the US and Europe.
- Preservation of at least one (hypogastric artery) internal iliac artery is consider to be the goal of EVAR.
- 1 – 2 weeks internal is required when perform embolization of both IIA

We recommend preservation of flow to at least one internal iliac artery.	
Level of recommendation	1 (Strong)
Quality of evidence	A (High)
We recommend using FDA-approved branch endograft devices in anatomically suitable patients to maintain perfusion to at least one internal iliac artery.	
Level of recommendation	1 (Strong)
Quality of evidence	A (High)
We recommend staging bilateral internal iliac artery occlusion by at least 1 to 2 weeks if required for EVAR.	
Level of recommendation	1 (Strong)
Quality of evidence	A (High)

The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm

Elliot L. Chaikof, MD, PhD,[a] Ronald L. Dalman, MD,[b] Mark K. Eskandari, MD,[c] Benjamin M. Jackson, MD,[d] W. Anthony Lee, MD,[e] M. Ashraf Mansour, MD,[f] Tara M. Mastracci, MD,[g] Matthew Mell, MD,[b] M. Hassan Murad, MD, MPH,[h] Louis L. Nguyen, MD, MBA, MPH,[i] Gustavo S. Oderich, MD,[j] Madhukar S. Patel, MD, MBA, ScM,[a,k] Marc L. Schermerhorn, MD, MPH,[a] *and* Benjamin W. Starnes, MD,[i]
Boston, Mass; Palo Alto, Calif; Chicago, Ill; Philadelphia, Pa; Boca Raton, Fla; Grand Rapids, Mich; London, United Kingdom; Rochester, Minn; and Seattle, Wash

EVAR: recommendation on preservation of internal iliac artery flow

- **Society Clinical Practice Guidelines support the value of preservation.**
  - U.S. (SVS, 2009): It is recommended that blood flow be preserved to at least one hypogastric artery in the course of OSR or EVAR.[1]
  - Europe (ESVS, 2011): Preservation of flow to at least one hypogastric artery is recommended in standard risk patients.[2]

1. Chaikof E.L., Brewster D.C., Dalman R.L., *et al.* SVS practice guidelines for the care of patients with an abdominal aortic aneurysm: executive summary. *Journal of Vascular Surgery* 2009;50(4):880-896.
2. Moll F.L., Powell J.T., Fraedrich G., *et al.*; European Society for Vascular Surgery. Management of abdominal aortic aneurysms clinical practice guidelines of the European society for vascular surgery. *European Journal of Vascular & Endovascular Surgery* 2011;41(Supplement 1):S1-S58.

Recommendations for the Treatment of Concomitant Common Iliac Aneurysms
Referenced studies that support the recommendations are summarized in the Online Data Supplement.

COR	LOE	RECOMMENDATIONS
1	C-LD	1. For patients with asymptomatic small AAA and concomitant common iliac artery aneurysm(s) ≥3.5 cm, elective repair of both abdominal and iliac aneurysms is recommended.[1-4]
1	B-NR	2. When treating common iliac artery aneurysms or ectasia as part of AAA repair, preservation of at least 1 hypogastric artery is recommended, if anatomically feasible, to decrease the risk of pelvic ischemia.[5,6]

CASE REPORT

A 63 – year – old male patient

Chief complaint: 1 - week abdominal pain

Transferred to Cho Ray Hopitals with the diagnosis of infrarenal aortic aneurysm

Past history: hypertension, type 2 diabetes

CASE REPORT

- Physical examination: conscious, BP 120/70 mmHg, clear pulses, dull abdominal pain, palpable mass following the rhythm of the pulse, d#5cm
- Laboratory: normal CBC
- ECG: atrial premature beat
- Echocardiography: EF 68%, normal LV systolic function, doppler ultrasound of carotid arteries within normal
- Chest X ray: normal

CASE REPORT

CTA: infrarenal aortic aneurysm d#5.5cm, associated with common iliac artery aneurysms d#3cm(R), d#3.5cm(L), thrombus aneurysm wall #12mm, no leakage

CASE REPORT

Diagnosis: Infrarenal aortic aneurysm associated bilateral common iliac artery aneurysms, dmax#5.5cm, hypertension, atrial premature, bradycardia, type 2 diabetes.

Management: EVAR, control BP and glycemia

MANAGEMENT

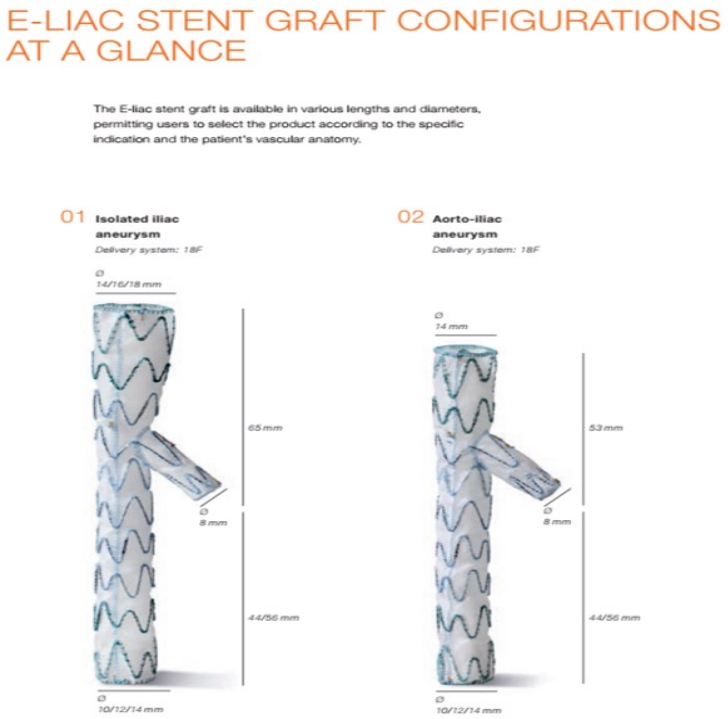
- EVAR Requirements:

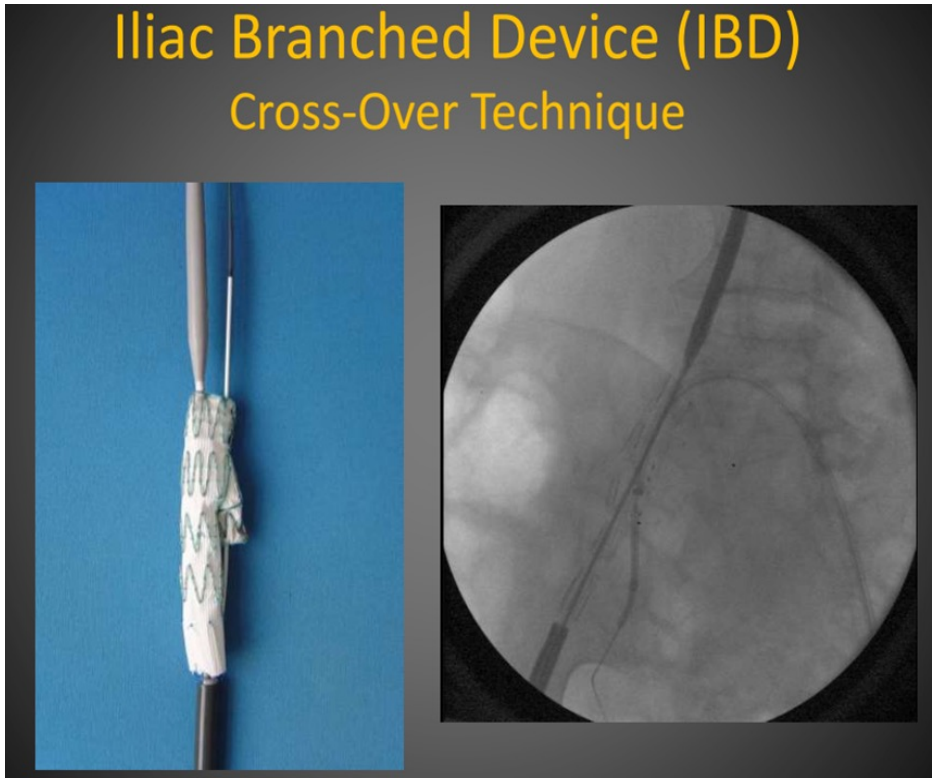
- Detailed Sizing
- Detailed and specific planning
- Complete equipment preparation
- Precise marking of the exact position
- Surgeon's skills and experience
- Coordination between the surgeon and the anesthesiologist.

Techniques in Preserving the Internal Illiac Artery

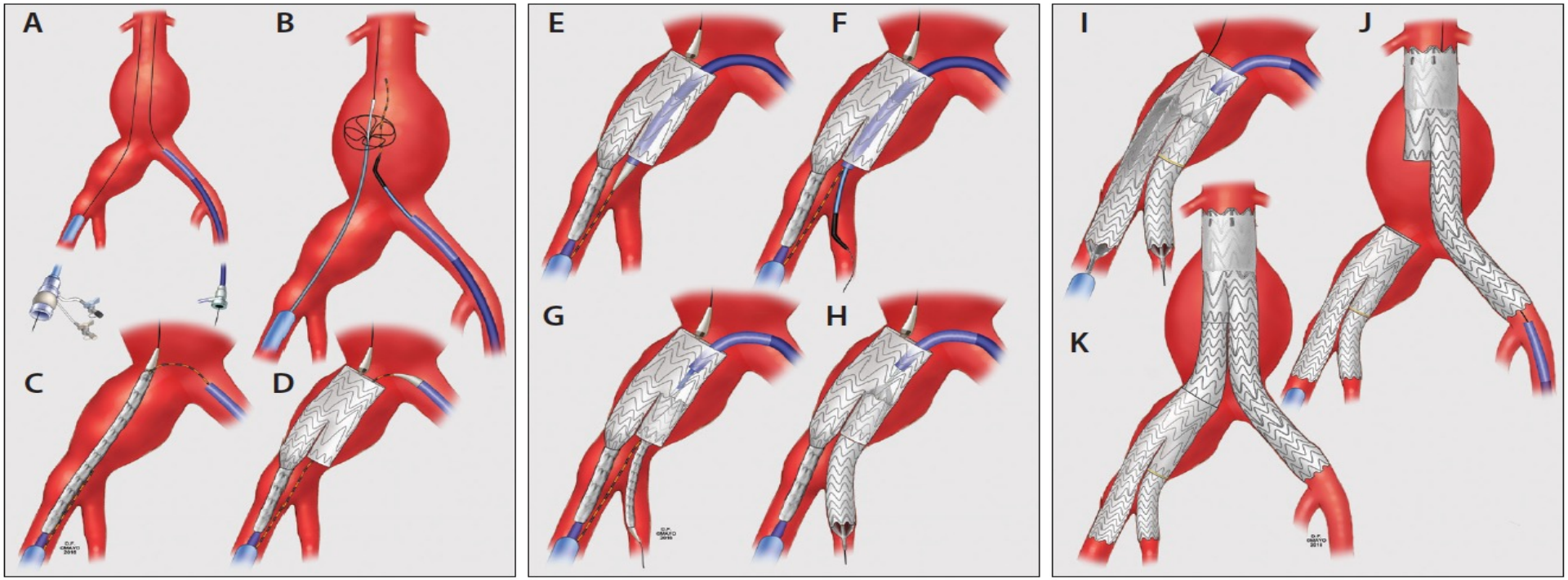
1. Bell-Bottom technique
2. Parallel endo-grafts (Sandwich)
3. External – Internal Surgical Bypass
4. Hybrid technique
5. External or Internal – Internal Endo-Bypass
6. EVAS technique
7. Iliac Branch Devices (IBDs)

Iliac Branch Devices (IBDs)





Iliac Branch Devices (IBDs)

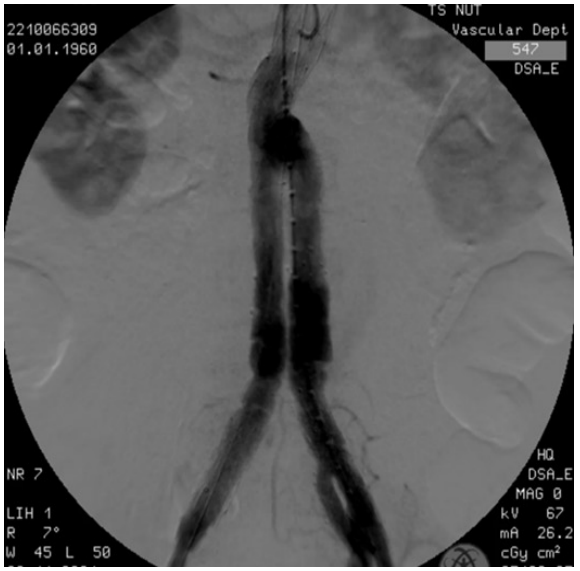


Step by step

STEP BY STEP


2210066309
01.01.1960
Vascular Dept
254
DSA_E
NR 7
LIH 1
R 7°
W 45 L 50
23.11.2021
HQ
DSA_E
MAG 1
kV 74
mA 34.3
cGy cm²
37166.27


2210066309
01.01.1960
Vascular Dept
430
DSA_E
NR 7
LIH 1
R 7°
W 45 L 50
HQ
DSA_E
MAG 0
kV 68
mA 27.0
cGy cm²


2210066309
01.01.1960
Vascular Dept
547
DSA_E
NR 7
LIH 1
R 7°
W 45 L 50
HQ
DSA_E
MAG 0
kV 67
mA 26.2
cGy cm²

- The postoperative patient is stable and discharged after 3 days.
- One-week follow-up: The patient no longer experiences abdominal pain, the CT scan shows good patency of the SG, complete occlusion of the right IIA, and good patency of the IIA with no endoleak.

DISCUSSION

Manis Mehta et al (2001): 154 aortoiliac aneurysm cases performing occlusion one or both internal iliac arteries, no case has buttock necrosis, colon ischemia and death, 12% cases have buttock claudication [1]

Rayt et al (2008): 634 cases from 18 reports 28% cases have buttock claudication, 17% cases have erectile dysfunction after embolization of one or both internal iliac arteries during EVAR [2]

1. Mehta, Manish Veith Frank J. Ohki Takao Cynamon Jacob Goldstein Kenneth Suggs William D. Wain Reese A. Chang David W. Friedman Steven G. Scher Larry A. Lipsitz Evan C., "Unilateral and bilateral hypogastric artery interruption during aortoiliac aneurysm repair in 154 patients: A relatively innocuous procedure". Journal of Vascular Surgery Journal of Vascular Surgery, 2001. 33(2): p. 27-32.

2. Rayt, H. S. Bown M. J. Lambert K. V. Fishwick N. G. McCarthy M. J. London N. J. M. Sayers R. D., "Buttock Claudication and Erectile Dysfunction After Internal Iliac Artery Embolization in Patients Prior to Endovascular Aortic Aneurysm Repair". Cardiovasc Intervent Radiol CardioVascular and Interventional Radiology, 2008. 31(4): p. 728-734.

DISCUSSION

Recommendation on preservation of internal iliac arteries with branched stent[1]:

- Patient selection criteria: common iliac artery aneurysm with d > 30mm, may be considered for cases with smaller diameter but suitable anatomy
- Should be considered in cases with
- Young patients, good life quality
- High risk of pelvis ischemia
- History of endovascular treatment
- Occulsion of collateral branches

1. Robalo, C., J. Sousa, and A. Mansilha, "Internal iliac artery preservation strategies in the endovascular treatment of aortoiliac aneurysms". Int Angiol, 2018. 37(5): p. 346-355.

DISCUSSION

Review > Int Angiol. 2018 Oct;37(5):346-355. doi: 10.23736/S0392-9590.18.04004-X.
Epub 2018 Jul 9.

Internal iliac artery preservation strategies in the endovascular treatment of aortoiliac aneurysms

Carolina Robalo [1], Joel Sousa [2 3], Armando Mansilha [1 3]

The technical success rate ranges from 85% to 96.3%, anc… some small studies, it reaches 100%.
The patency rate is between 88% and 91.4% after 5 years.
The branch occlusion rate is approximately 1.2% to 12.2%, and it may be asymptomatic.

Check for updates

Clinical Investigation

JOURNAL OF ENDOVASCULAR THERAPY

Journal of Endovascular Therapy
2017, Vol. 24(3) 405–410

DOI: 10.1177/1526602817705134
www.jevt.org
SAGE

Secondary Procedures Following Iliac Branch Device Treatment of Aneurysms Involving the Iliac Bifurcation: The pELVIS Registry

Konstantinos P. Donas, MD[1,2], Mirjam Inchingolo, MD[1,2], Piergiorgio Cao, MD[3], Carlo Pratesi, MD[4], Giovanni Pratesi, MD[5], Giovanni Torsello, MD[1,2], Georgios A. Pitoulias, MD, PhD[6], Ciro Ferrer, MD[3], Gianbattista Parlani, MD[7], and Fabio Verzini, MD[7], on behalf of the pELVIS Registry collaborators

In the period from 2005 to 2015, 575 patients were treated with iliac artery branch stents, achieving a high success rate of 97.6%.

ELSEVIER

Clinical Research, Basic Science

Efficacy and Safety of Jotec E-Ventus BX Stent Graft for Iliac Branch Device Procedure: A Retrospective Clinical Study

Umberto Marcello Bracale,[a] Davide Turchino,[a,b] Giancarlo Accarino,[b] Anna Petrone,[a] Luca del Guercio,[a] Maurizio Sodo,[a] Giovanni Fornino,[b] Giulio Accarino,[b] Nicola Ielapi,[c] Giuseppe Filiberto Serraino,[d] Pasquale Mastroroberto,[d] Michele Provenzano,[e] Michele Andreucci,[f] and Raffaele Serra,[e,g] Italy

Iliac artery branch stenting is a safe and effective procedure with low complication rates.

CONCLUSION

- Preservation of internal iliac arteries is very important in aortoiliac aneurysm cases that were managed with EVAR
- Branched stentgraft is effective and safe for the use of preservation of internal iliac arteries

THANK YOU