

# *An endovascular solution for aortoiliac disease and Leriche syndrome: The CERAB technique*

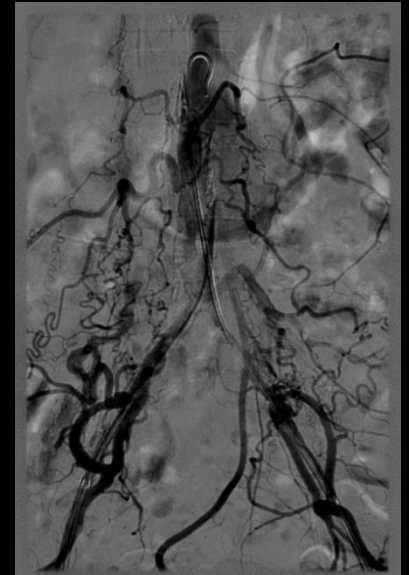
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Vascular Clinic ZNA, Antwerp, Belgium*



# *Aorto-iliac occlusive disease*

- Current standard for complex occlusive aorto-iliac lesions is open surgical repair
- 5-year patency rate 87 - 91%
- Complication rate 8 - 12%
- Mortality rate 4%



# Late complications of open repair

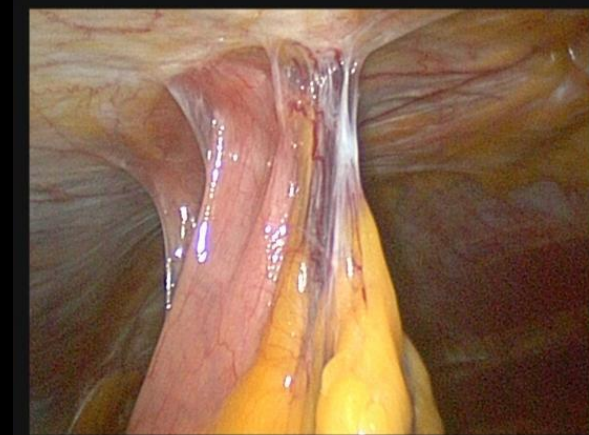
## Incisional hernia

- Incidence 11%
- Complication rate 24-30%
- Recurrence rate 2-10%



## Postsurgical adhesions

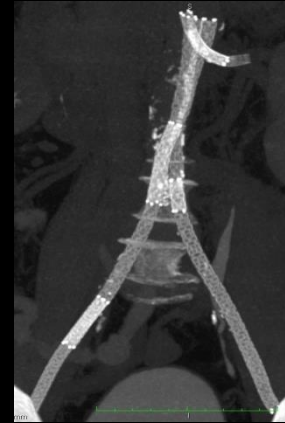
- Incidence 67-93%
- Small bowel obstruction 19%
- Inadvertent enterotomy



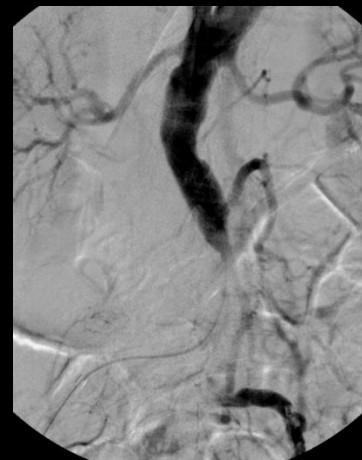
# *Extensive aortoiliac occlusive disease*

## Endovascular alternatives:

- Kissing stents and double barrel bare metal stents
- Use of AAA devices
- Covered endovascular reconstruction of the Aortic Bifurcation (CERAB)

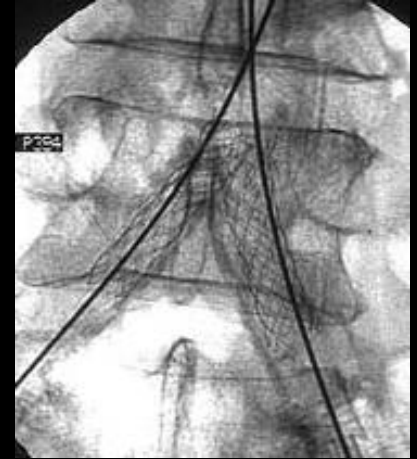


*Case courtesy of Dr Mangialardi-Ronchey, San Filippo Neri Hospital, Rome*



# *Lesions of the aortic bifurcation and kissing stents*

- Results of kissing stents inferior compared to isolated stents in iliac artery or aorta
- Patency affected by:
  - **Radial mismatch**; aortic lumen dead space around the protruding segment of the stents
  - Differences in **stent conformation**
  - The overlap of the **free proximal stent ends**
    - Re-circulation, turbulence and stasis
    - Mesenchymal tissue, thrombus and intimal hyperplasia

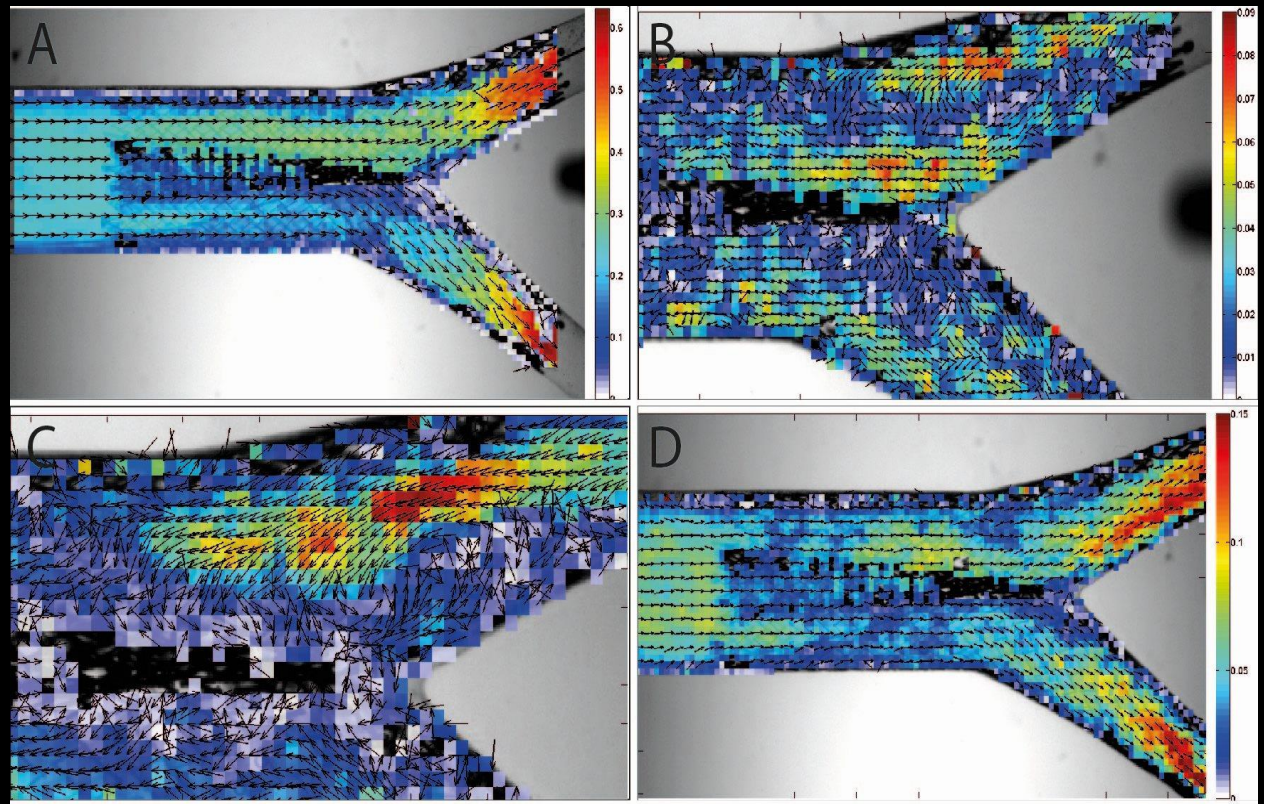
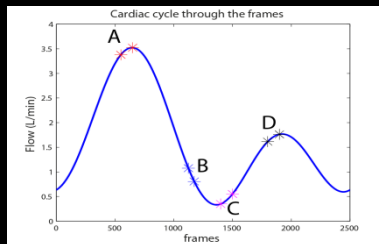
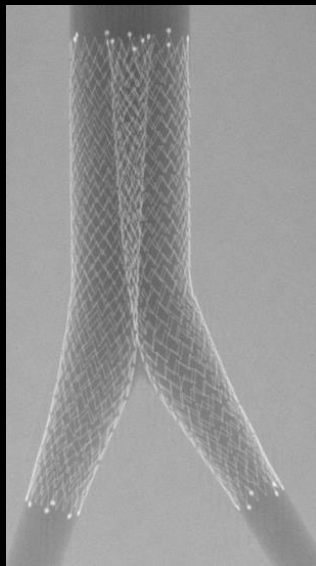


*Greiner A, et al. J Endovasc Ther 2005; 12: 696-703*

*Sharafuddin MJ, et al. Ann Vasc Surg 2008;22:346-57.*

*Hughes M, et al. Cardiovasc Intervent Radiol 2006; 29: 255-259*

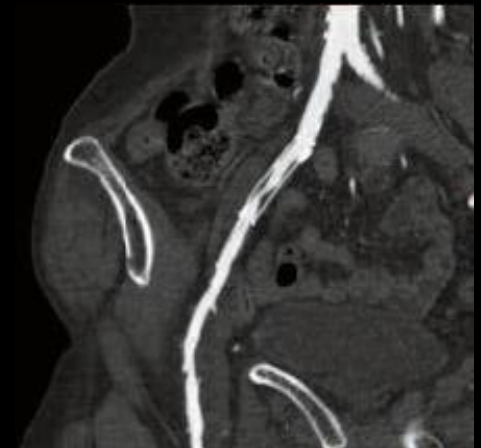
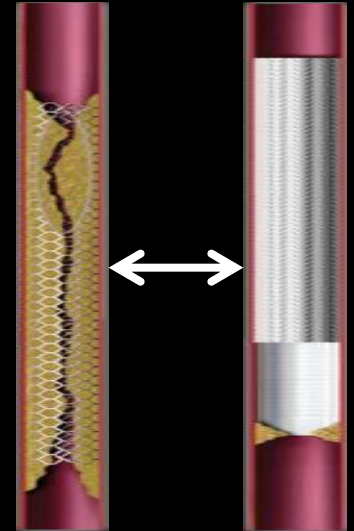
# *Lesions of the aortic bifurcation and kissing stents*



Particle Image Velocimetry measurements: Turbulence and recirculation at phases B and C

# *Advantages of covered stents*

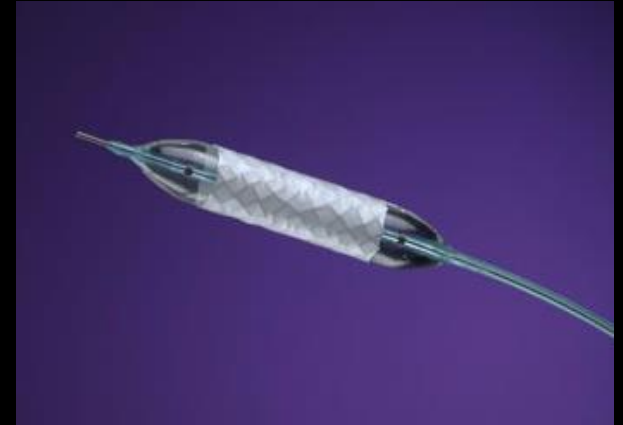
- May reduce the impact of **radial mismatch**
- May reduce the risk on **embolization**
- Prevention of **in-stent re-stenosis**
- May reduce the risk on **rupture**



# Why using Advanta V12 covered stents?

Due to specific characteristics:

- low profile
- double ePTFE layer
- easy and accurate deployment
- radial force
- dog-bone type inflation of balloon
- diameter adaptiveness





# Why using Advanta V12 covered stents?

1 stent = 4 different shapes

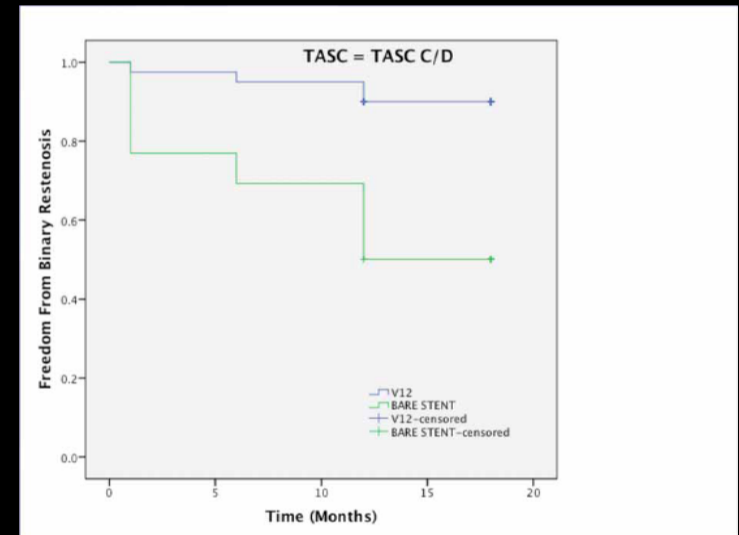
Atrium Advanta V12 L 12x 61 mm



# Covered stents in iliac artery occlusive disease

## Cobest trial:

- Advanta V12 covered stents (n=82) randomised to bare metal stents (n=86)
- TASC B: Similar patency
- TASC C and D:
  - Less binary re-stenosis
  - Less occlusions



# Aorto-Iliac experience with covered stents

## Distal Aorta (n=36):

- Follow-up 22 months (0-60 months)
- No distal embolizations or vessel wall ruptures
- Clinical success 100%
- Primary patency 100%



## Covered versus bare metal kissing stents:

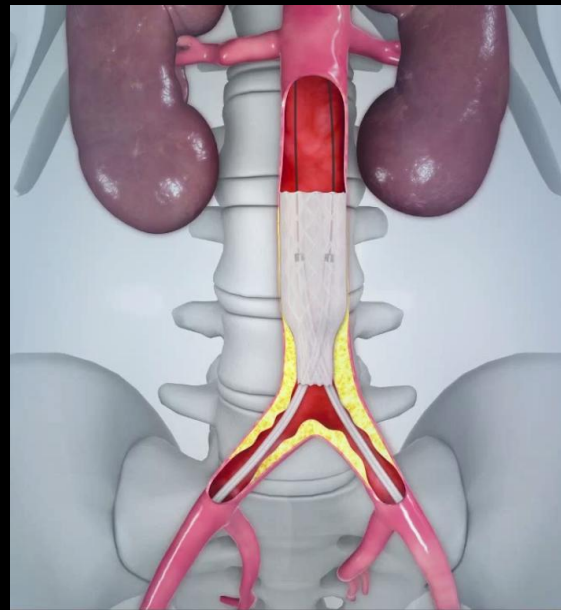
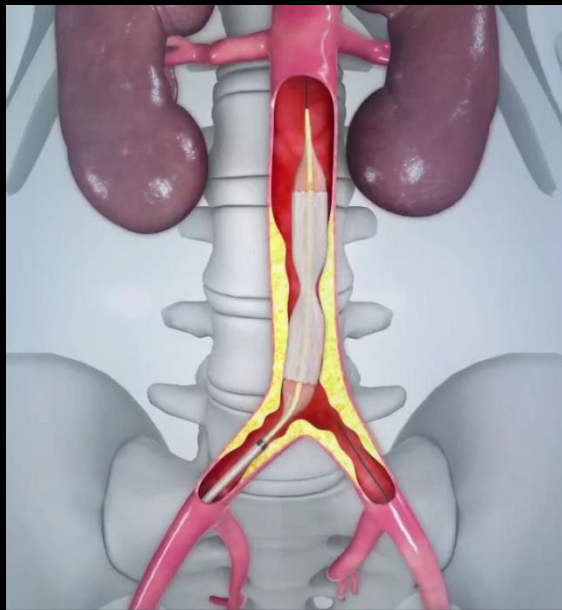
- Superior patency at 24 months
- (92% versus 62%,  $p < .05$ )
- Increased clinical improvement ( $p < .05$ )

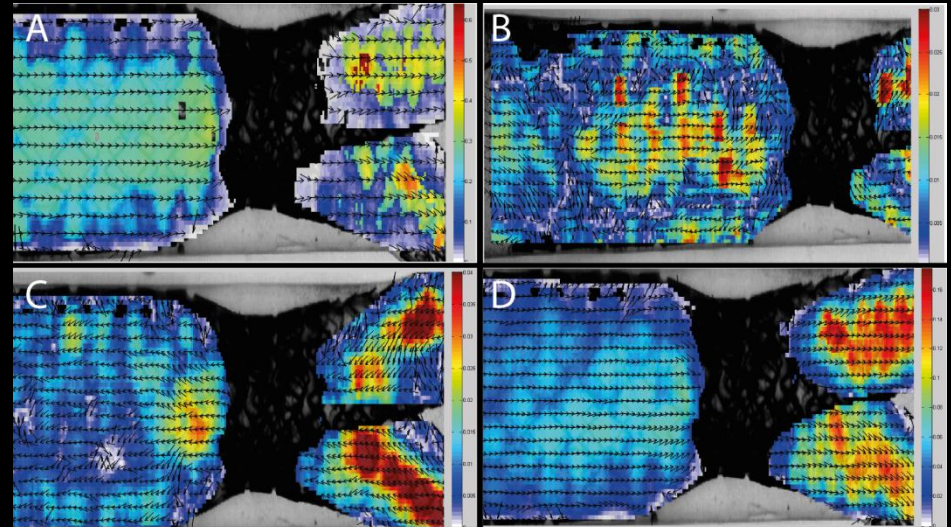
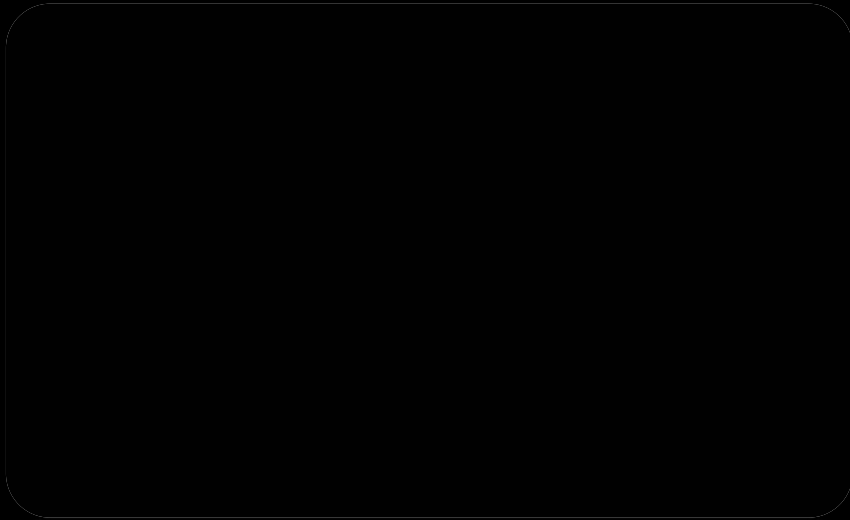
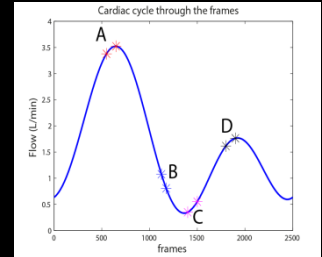




Covered  
Endovascular  
Reconstruction  
Aortic  
Bifurcation





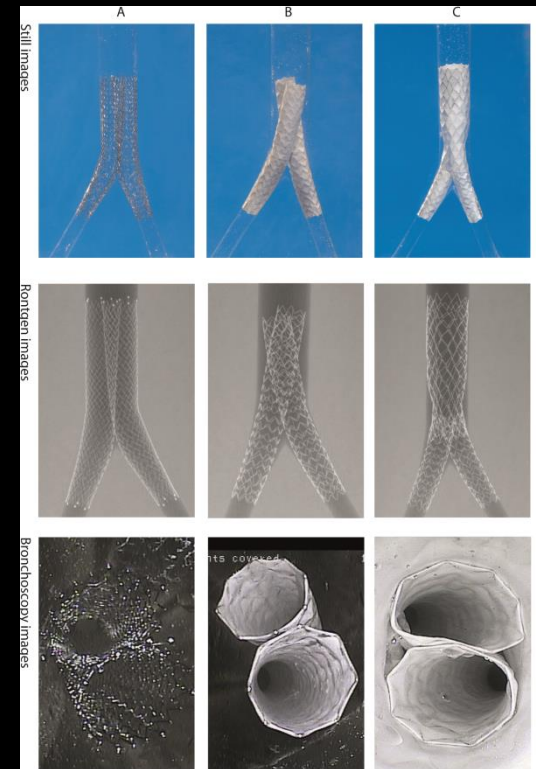
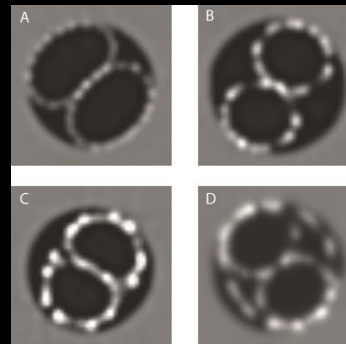
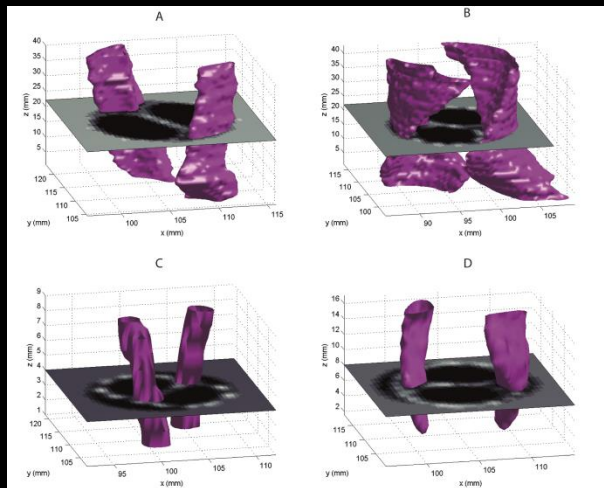


Particle Image Velocimetry measurements: Mostly laminar flow throughout the cardiac cycle



## CERAB related to:

- Lowest radial mismatch
- High conformation ratio ('double-D' configuration)

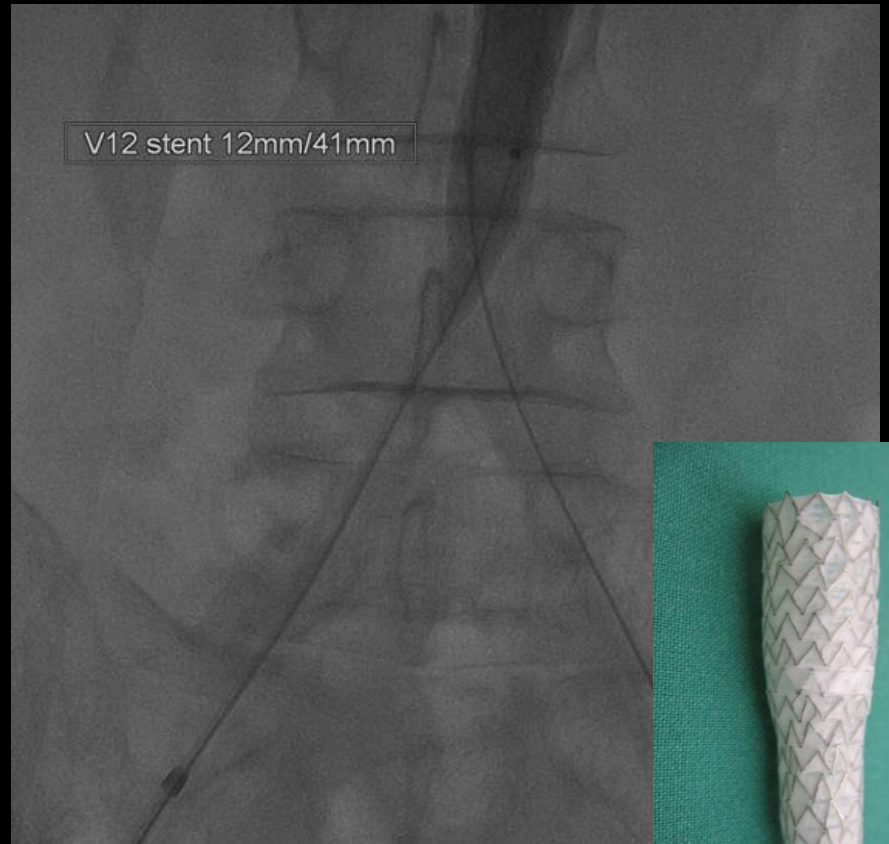
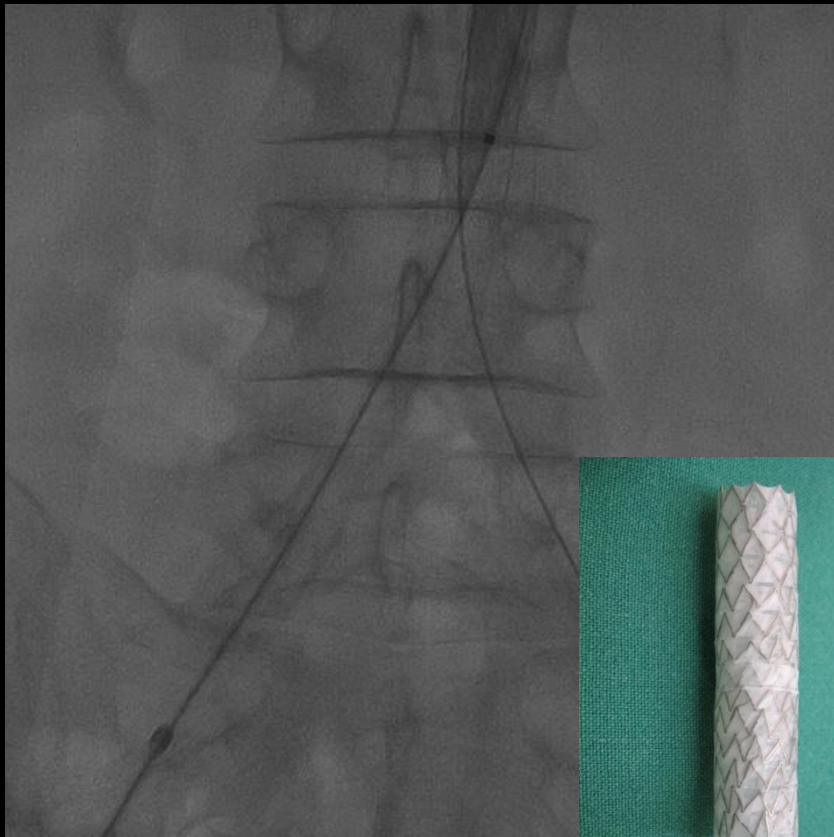


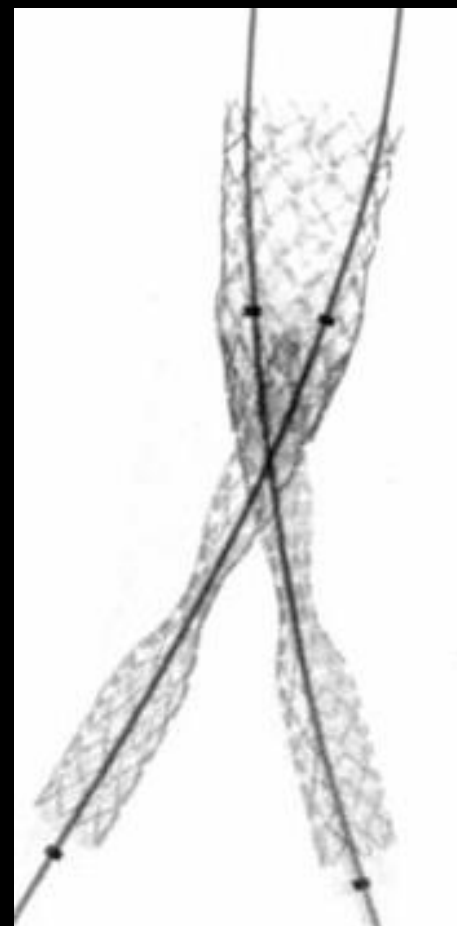
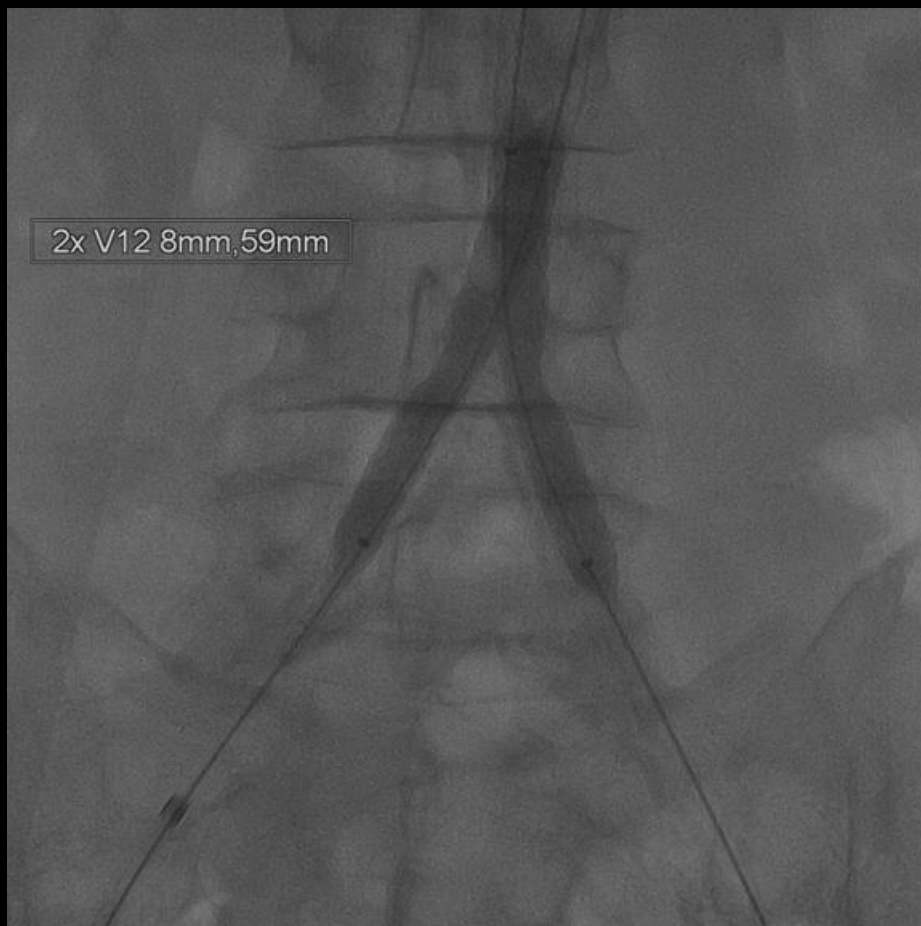
### *Case 1*

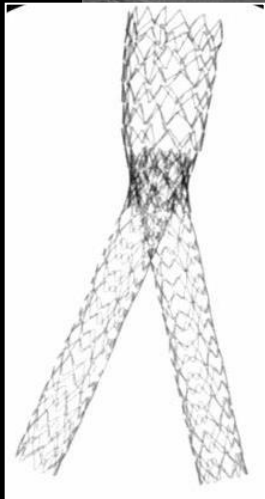
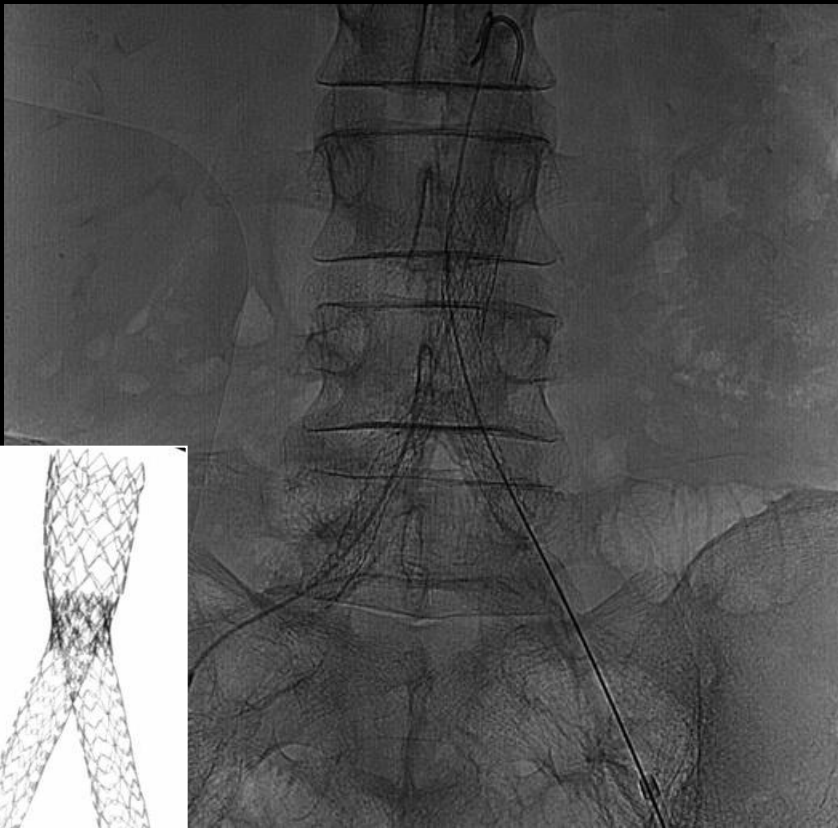
- 56-year old male
- Rutherford 3
- Smoker, hypertension
- ABI: 0.64 / 0.64
- Duplex ultrasound:
  - Bilateral >70% stenosis in CIA
- CT angiography:
  - Calcified lesion in distal aorta and CIA











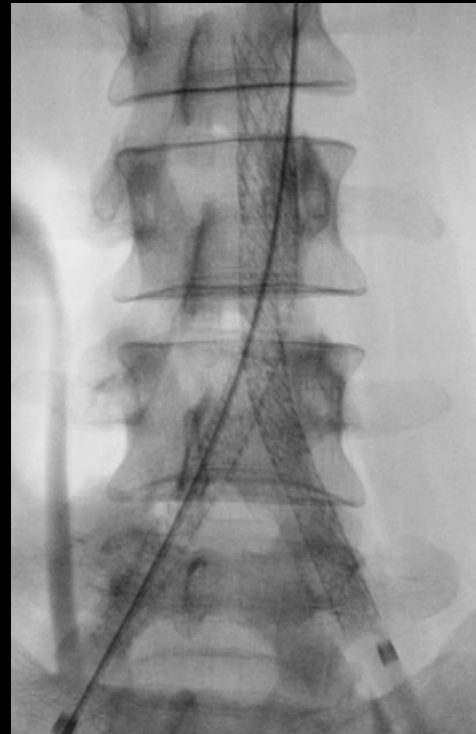
## *Case 2*

- 38-year old female
- Smoking
- Oral contraceptives
- Rutherford 4 caused by Leriche syndrome
- ABI 0,29/0,31





- Postoperative course uneventful
- Discharge 1st postoperative day
- Aspirin/clopidogrel
- ABI 1,03/1,06
- Duplex: no residual stenosis



# *Results CERAB Antwerp and Arnhem*

- From February 2009
- 83 patients
- $51 \pm 10$  years
- Rutherford classification
  - 3 (n=50)
  - 4(n=14)
  - 5 (n=14)
  - 6 (n=1)
- Acute ischemia
  - IIa (n=2)
  - IIb (n=1)
  - III (n=1)



# *Results CERAB Antwerp and Arnhem*

- ABI  $0.61 \pm 0.22$
- TASC -2 B (n=6), C (n=6) and D (n=71)
- Risk factors:
  - Smoking n=71 (89%)
  - Hypertension n=63 (79%)
  - Diabetes n=25 (31%)
  - Hyperlipidemia n=64 (86%)
  - Coronary artery disease n=33 (40%)
  - Pulmonary disease n=37 (45%)
  - Renal disease n=17 (21%)

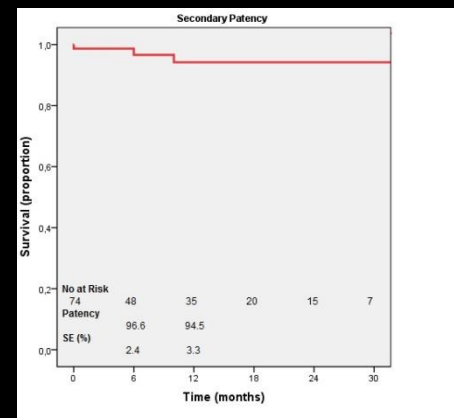
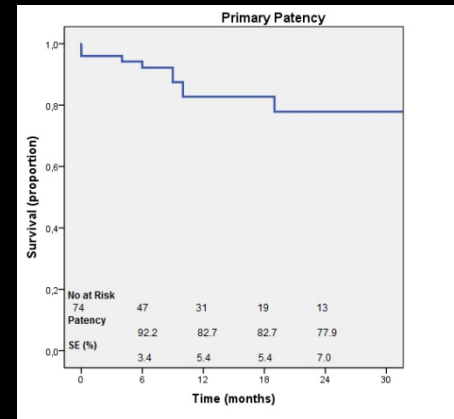
## *Results CERAB Antwerp and Arnhem*

- Technical success 78/83 (94%)
- 30-day mortality 1/83 (1%)
- Complications
  - Bleeding iliac artery (n=2)
  - Dissection (n=7)
  - Hematoma groin (n=12)
  - False aneurysm (n=2)
  - Renal failure (n=1)
  - Pneumonia (n=2)
  - Cardiac (n=1)
- ABI 0.89 ±0.15

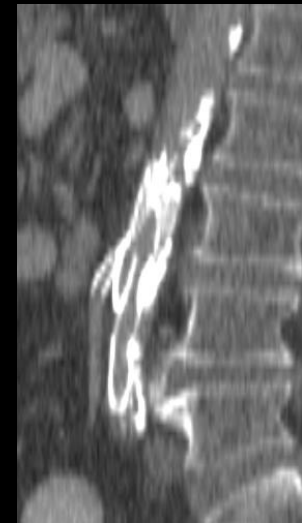
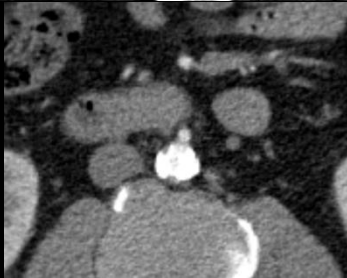
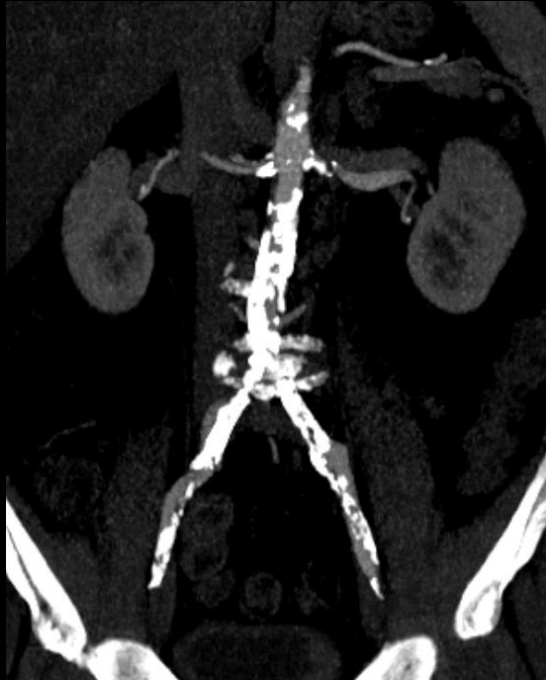


# Results CERAB Antwerp and Arnhem

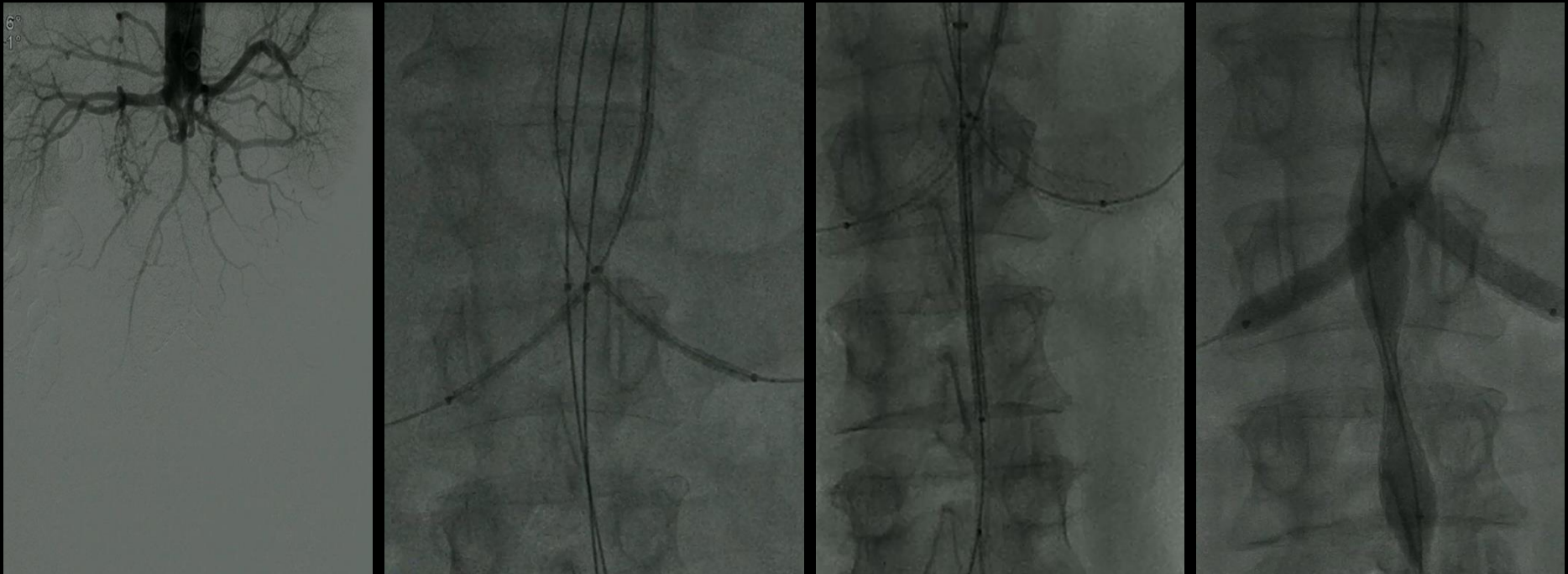
- Median follow-up 12 months
- **Primary patency**
  - 6 months 92%
  - 12 months 83%
  - 18 months 83%
- **Secondary patency**
  - 6 months 97%
  - 12 months 94%
  - 18 months 94%
- **Limb salvage** 99%



# The next step: Chimney-CERAB

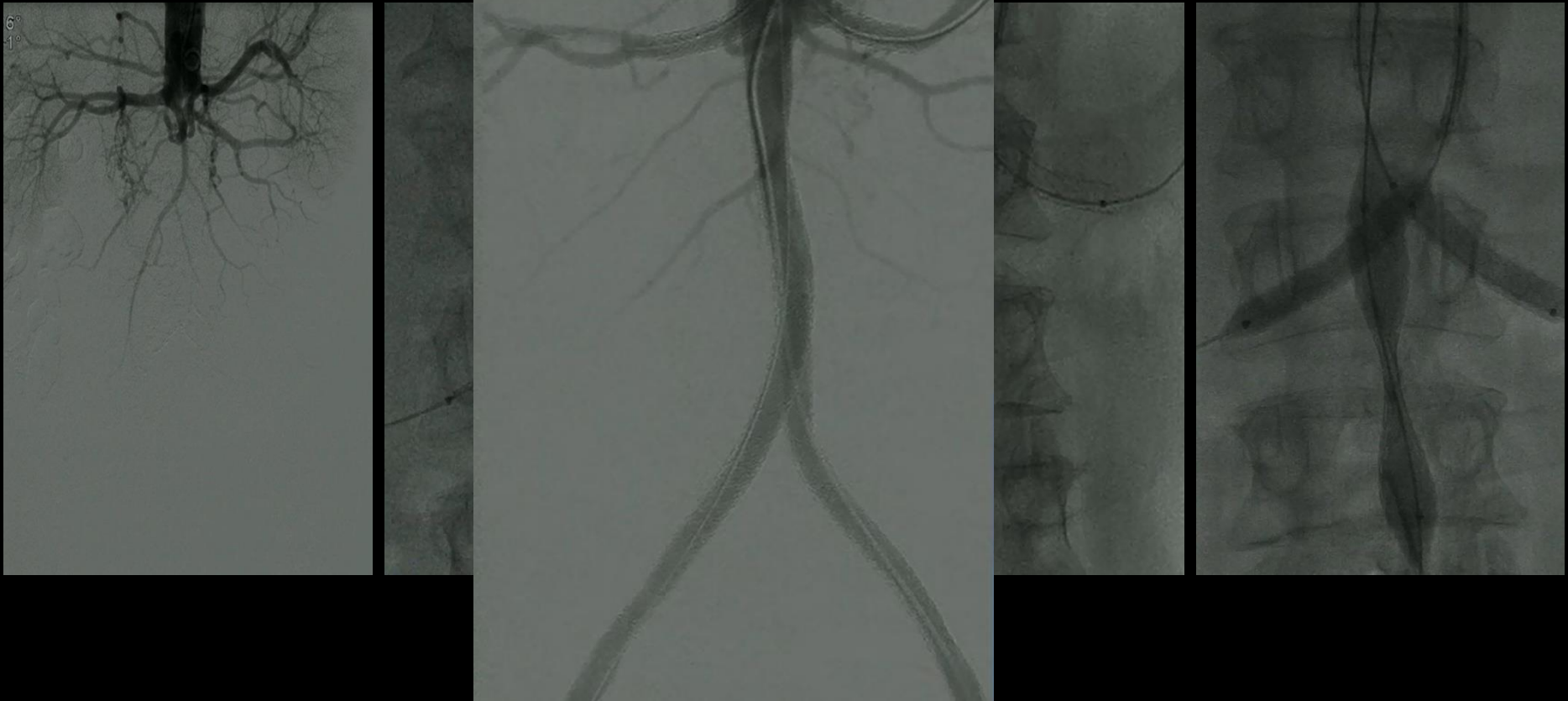


# The next step: Chimney-CERAB



*Case courtesy of A Schmidt, Park Hospital Leipzig, Germany*

# The next step: Chimney-CERAB



*Case courtesy of A Schmidt, Park Hospital Leipzig, Germany*

## *Conclusions*

- Covered stents improve patency rates in extensive occlusive disease in iliac arteries
- Covered endovascular reconstruction of the aortic bifurcation (CERAB) is safe and feasible and seems to be a valid alternative for surgery and/or kissing stents
- Exploration of the chimney-CERAB and patient selection may further expand the indications of the technique

# Acknowledgments

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