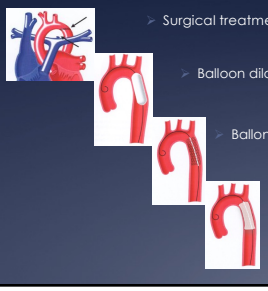
Disclosures

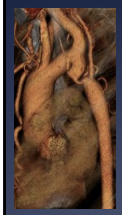
- Consultant: Cook Medical, Philips, Getinge, Terumo Aortic, Arterica
- Research-grants: Cook Medical, Philips, Terumo Aortic, Medtronic
- Travel-grants: Cook Medical, Getinge, Philips
- Speaking fees: Cook Medical, Philips, Getinge
- Shares: Mokita-Medical, Arterica
- IP: Cook Medical, Terumo Aortic, Mokita Medical
- Royalties: Cook Medical, Terumo Aortic
- Devices and Techniques in this presentation are not approved by the FDA

Background



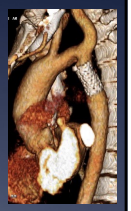
- Surgical treatment since 1944
- Balloon dilatation since 1982
- Ballon-expandable stents since 1991
- Covered stents since 1999

Indication For Repair



Operative treatment if:

- Symptoms:
  - Claudication
  - Headache
- Peak-to-peak gradient >20 mm Hg
- Peak-to-peak gradient >10 mm Hg with LV dysfunction
- Refractory hypertension



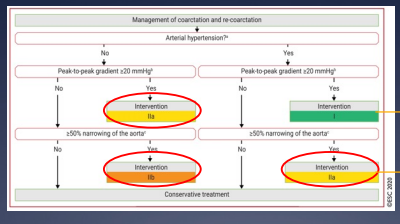
Isselbacher, et al. 2022; Circulation 146:334-482.

ESVS Guidelines 2017: Endo First

Recommendation 61	Class	Level of evidence	References
Open or endovascular repair should be performed in patients with coarctation of the thoracic aorta and clinical manifestations resulting from left ventricular dysfunction, severe hypertension or lower limb ischaemia	I	C	265
Recommendation 62			
Patients with coarctation of the thoracic aorta without clinical symptoms, but with a significant aortic gradient at rest (>20 mm Hg) and/or proximal systemic hypertension (>140/90 mm Hg), should be considered for open or endovascular repair	IIa	C	265
Recommendation 63	**Class**	**Level of evidence**	**References**
For adult patients with aortic coarctation, centralisation of treatment to expert centres may be considered	IIb	C	266–268
Recommendation 64			
In anatomically suitable patients with native thoracic aortic coarctation, endovascular repair should be considered as an alternative to open repair	IIa	C	266,267

Riambau et al. 2017; Eur J Vasc Endovasc Surg 53:4-52

ESC Guidelines 2020



Baumgartner et al. 2021; Eur Heart J 42:563-645

ACC/AHA Guidelines 2022

COR	LOE	RECOMMENDATIONS
1	B-NR	1. In patients with CoA, including those who have undergone surgical or endovascular intervention, an MRI or CT is recommended for initial, surveillance, and follow-up aortic imaging.[1-4]
1	C-EO	2. In patients with CoA, BPs should be measured in both arms and one of the lower extremities.
1	B-NR	3. In patients with significant native or recurrent CoA (Table 37) and hypertension, endovascular stenting or open surgical repair of the coarctation is recommended.[1,4,9-12]
1	C-EO	4. In patients with CoA, guideline-directed medical therapy is recommended for the treatment of hypertension.[1]
2b	B-NR	5. In adult patients with CoA, screening for intracranial aneurysms by MRI or CT may be reasonable.[14-18]

Isselbacher, et al. 2022; Circulation 146;334-482.

Surgery vs. Angioplasty vs. Stent

The Results of Catheter-Based Therapy Compared With Surgical Repair of Adult Aortic Coarctat...

John Alfred Carr, MD

Chicago, Illinois

Cochrane Database of Systematic Reviews Review - Intervention

Stent placement versus surgery for coarctation of the thoracic aorta

Laryssa Maria Siqueira Pádua, Lucas Cezar Garcia, Claudio Jose Rubira, Paulo Eduardo de Oliveira Carvalho

Unavailable adequate comparative data

Padua et al. 2012, Cochrane Database Syst Rev

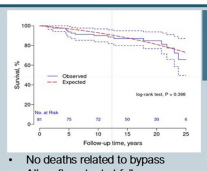
- 54% (13-76)
- ...tosis rate:
  - Endovascular: 15% (8-22)
  - Surgical: 2% (0-9)
- Complications:
  - Endovascular: ?
  - Surgical: 11% (0-25%)

Carr 2006: J Am Coll Cardiol 47: 1101-7

Late Outcomes of Ascending-to-Descending Bypass for Aortic Coarctation

Patients undergoing ascending-to-descending aortic bypass between 1985-2012

Bypass performed for native or recurrent coarctation, hypoplasia of the arch, or patients with coarctation that required additional cardiac procedures



20-year survival of 85%, equivalent to age and sex matched population

- No deaths related to bypass
- All grafts patent at follow up
- Improved hypertension
- No complications at future cardiac operations

Ascending-to-Descending Aortic bypass is safe and durable.

THE ANNALS OF THORACIC SURGERY

Official Journal of The Society of Thoracic Surgeons and the Southern Thoracic Surgical Association

Curran et al, 2024

@annalsthorsurg #TSSMN

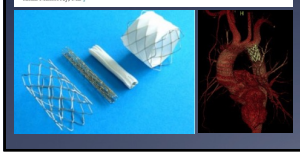
#VisualAbstract #AnnalsImages

RCT: Stent vs. Covered Stent for CoA

Comparison Between Covered and Bare Cheatham-Platinum Stents for Endovascular Treatment of Patients With Native Post-Ductal Aortic Coarctation

Immediate and Intermediate-Term Results

Bahram Sohrabi, MD,* Peiman Jamshidi, MD,† Alireza Yaghoobi, MD,* Afshin Habibzadeh, MD,* Yashar Hashemi-aghdam, MD,‡ Arae Mojis, MD,‡ Babak Kazemi, MD,* Samad Ghaffari, MD,* Mohammad Reza Abdolahzadeh Baghayi, MD,* Khalil Mahmoody, MD†



- RCT, n=120; 23.6y; 79 male
- Severe native coarctation
- Bare CP vs. Covered CP-stent
- FU 31.1±19.2 months
- Procedural success 100% both groups
- Re-coarctation only in bare CP group: 6.7% vs. 0%; p=NS
- Normotension status:
  - Bare CP: from 15% to 73.3%
  - Covered CP: from 16.7% to 78.3%

Sohrabi et al. 2014; JACC Cardiovasc Interv 7:416-23

Metanalysis Of Stenting for CoA

A Systematic Review and Meta-analysis on Stenting for Aortic Coarctation Management in Adults

Petroula Nana, PhD[1], Konstantinos Spanos, PhD[1,2], Alexandros Brodis, PhD[1], George Kouvelos, PhD[1], Carsten Rickers, MD[3], Rainer Kozlik-Feldmann, MD[3], Athanasios Giannoukas, PhD[1], and Tilo Kölbel, PhD[1]

Table 2. Pre-operative Characteristics of the Aorta and Stent Type Distribution Among Patients.

Pre-operative characteristics	Value
Type of stent	
Sx vs Bx stents	
Sx stents	183 (25.6%, 183/715)
Bx stents	489 (68.4%, 489/715)
Unidentified	43 (6.0%, 43/715)
Covered vs bare metal	
Covered	240 (33.6%, 240/715)
Bare metal	432 (60.4%, 432/715)
Unidentified	43 (6.0%, 43/715)

- 27 studies, n=705; 34,1y; 64% male
- Technical success 97%
- 30d mortality: 1%
- Stroke: 1%

FU 29months :

- Mortality 2%
- Restenosis: 2,5%
- Reinterventions: 8%
- Conversion to OR: 2,9%

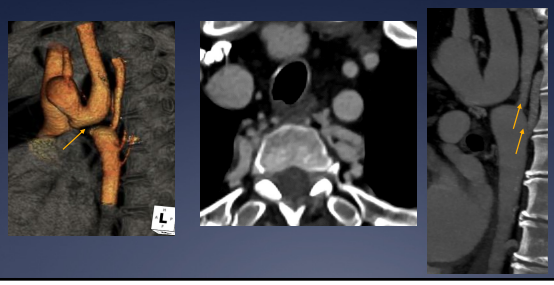
Nana et al. 2023; J Endovasc Ther epub

Available Covered Stents

Catheter System	0.035" OTW (Over-the-wire)	0.035" OTW	0.035" OTW with BiB (= balloon-in-balloon)
Usable Catheter Lengths	75cm & 120 cm	80cm & 120cm	110cm
Nominal Pressure (NP)	Ø 12-14 mm: 7 bar Ø 16-18 mm: 6 bar Ø 20-22 mm: 4 bar Ø 24 mm: 5 bar	n/A	n/A
Rated Burst Pressure (RBP)	Ø 12-14 mm: 10 bar Ø 16 mm: 9 bar Ø 18 mm: 8 bar Ø 20-24 mm: 6 bar	n/A	Ø 12 mm: 7 bar Ø 14 mm: 6 bar Ø 16 mm: 5 bar Ø 18-20 mm: 4 bar Ø 20-24 mm: 3 bar
Max. Post-Dilation	Ø 12-14 mm → 20mm Ø 16-18 mm → 24mm Ø 20-24 mm → 30mm	Ø 12mm → 16mm	Not indicated
Regulatory Status	CE	NOT AVAILABLE	CE + FDA

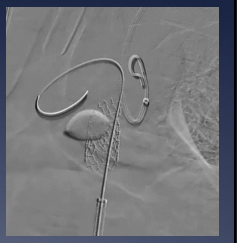
Case: Double Rail Technique in Coarctation

44y, Male, Persistent Sec. HT



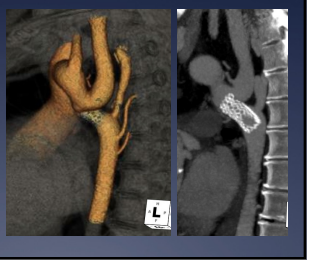
Endovascular repair 12.03.2024

- Aortic Board evaluation
- Stenting with Advanta V12 12/61mm
- Post-dilatation at 16mm
- Invasive pressure gradient 0mmHg



Discharge 17.03.2024

- Blood pressure decreased
  - Not normotensive
  - Three antihypertensive meds
- ABPI (R) 0.8 (L) 0.8
- CTA 16.03.2024
  - Appropriate stent position

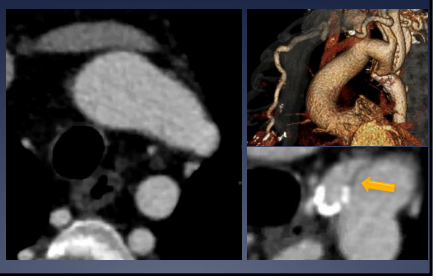


Re-evaluation 11.06.2024

- Persisting hypertension
- Worsening of renal function
- Echocardiography: dilated cardiomyopathy
- Stable ABPI 0.8 bilaterally
- New CTA 11.06.2024

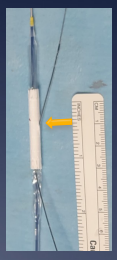
CTA 11.06.2024

- Migration
- Local dissection
- Re-coarctation



On-table aortic stent modification

- Be-Graft aortic 18x48mm
- Puncture 2cm below the proximal end
- Stent loaded two separate balloons
  - Balloons: 18x60mm and 6x20mm

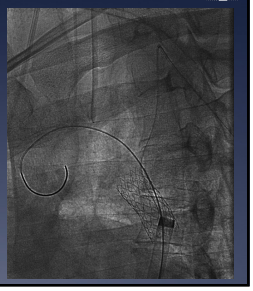


Reintervention 12.06.2024

- Access
  - LCFA-cut-down and dissection of the LCFA, 8Fr Sheath
  - Percutaneous Left brachial puncture, 5Fr Sheath
- Angiography
  - Invasive pressure gradient 50mmHg

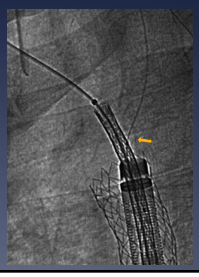
Dual rail (modified TAP) technique

- Dual wire
  - T&T wire from the left brachial to the LCFA
  - Lunderquist wire from the LCFA
  - to the ascending aorta
  - Exchange 8Fr sheath to 18F



Protected Introduction

- Introduction in 18F 60cm Check-Flo
- Rotational orientation



Deployment

T-stenting

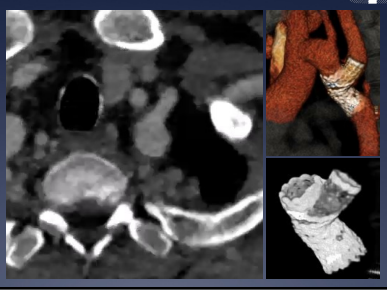
- Dilation of the side balloon
- Post-dilation of aortic stent to 22mm
- Kissing balloon
- Advanta 10x38 for LSA, dil 14mm

Final angiography

No pressure gradient!

Discharge 17.06.2024

- Normotensive
- No antihypertensive meds
- ABPI 1.0 bilaterally
- Pre-discharge CTA



Conclusion

- Endovascular repair is safe and has a high technical success rate.
- Endovascular repair with covered stents is today the preferred technique in adult coarctation due to lower morbidity.
- Open surgery is today limited to children with coarctation.
- Strict Follow-up is recommended.