What can we learn from imaging target vessels after complex EVAR?

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Critical Issues 2024
Copenhagen/Malmö

DISCLOSURES

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Bridging Stents in Fenestrated and Branched Endovascular Aneurysm Repair: A Systematic REVIEW

Ann Vasc Surg 2021; 73: 454–462

Luca Mezzetto,[1] Lorenzo Scorsone,[1] Roberto Silingardi,[2] Stefano Gennai,[2] Gabriele Piffaretti,[3] Alessandro Mantovani,[4] Ruth L. Bush,[5] Stephan Haulon,[6] and Gian Franco Veraldi,[1]
Modena, Italy, Houston, Texas, and France

Results: 19 studies were included with 2,796 patients and 9556 TV; 4,797 renal arteries (50.2%), 4,174 visceral arteries (43.6%), and undefined TV ($n = 585$; 6.1%) were bridged. Balloon-expandable stent-grafts (B-EXP) were used in 40.9% and self-expandable (S-EXP) in 22.7% and undefined stents in 36.3%. The included studies had quality assessment scores ranging between 11/15 and 15/15, with high grade of accordance on reporting general results, but a low grade of accordance on reporting detailed data. Despite study heterogeneity, high-volume analysis confirmed a higher rate of complication in renal arteries than visceral arteries, 6% (95% CI 4–8) vs. 2% (95% CI 1–3), respectively. The rate of reinterventions was similar, 3% (95% CI 2–4) and 2% (95% CI 1–3). S-EXP versus B-EXP stent complication was 4% (95% CI 2–7) vs. 3% (95% CI 2–5), respectively.

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Conclusions: This systematic review underlines the low grade of accordance in reporting detailed data of bridging stents in F/B-EVAR. Renal TVs were more prone to complications, with an equivalent reintervention rate to visceral TVs. As to B-EVAR, the choice of B-EXP over S-EXP is still uncertain.

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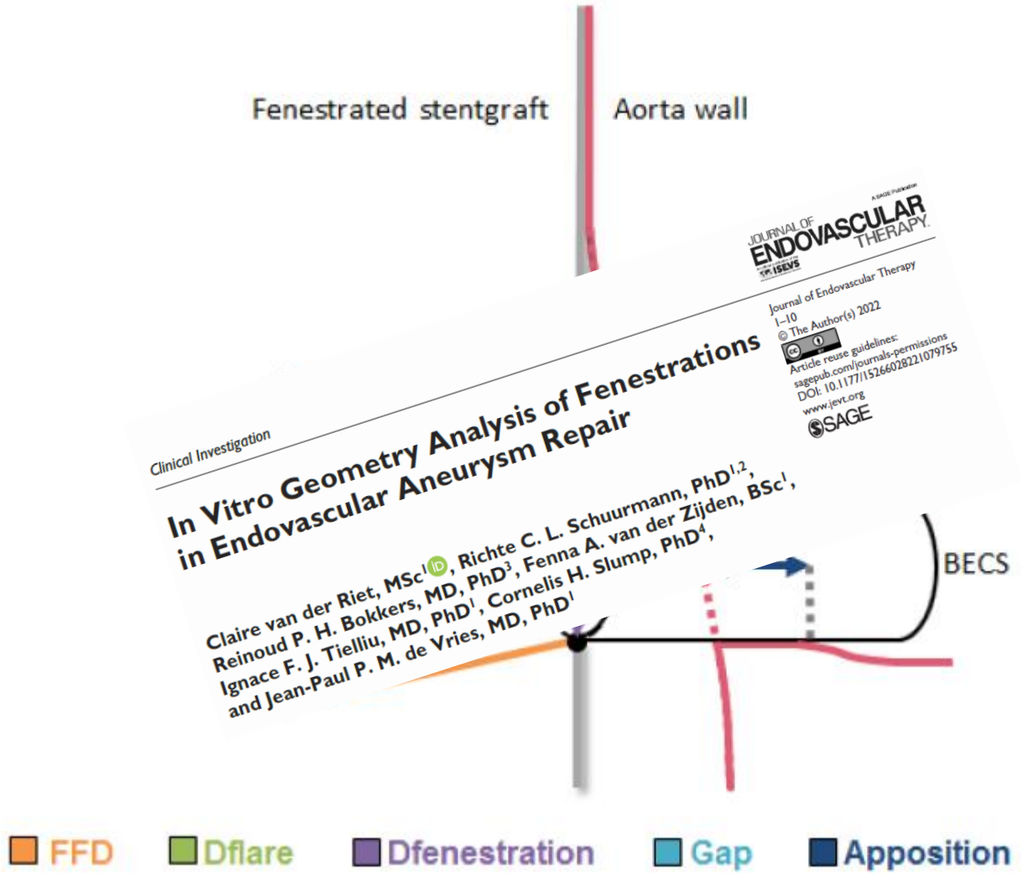
Mixture of BECS used

Mixture of causes for reintervention

No detailed determination of BECS geometry/ integrity

3D geometric analysis of the entire Advanta V12 bridging stentgraft



Three-Dimensional Geometric Analysis of Balloon-Expandable Covered Stents Improves Classification of Complications after Fenestrated Endovascular Aneurysm Repair

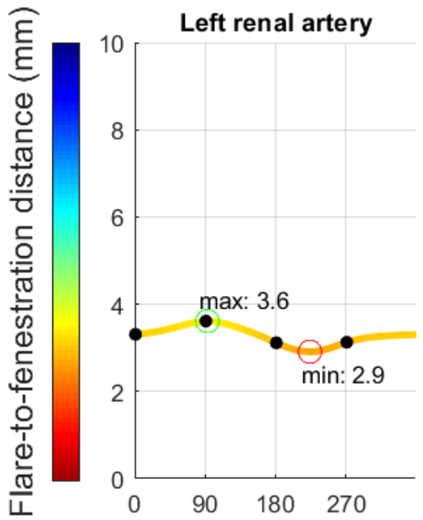
Claire van der Riet [1,*], Richte C. L. Schuurmann [1,2], Eric L. G. Verhoeven [3], Athanasios Katsargyris [3], Ignace F. J. Tielliu [1], Timothy Resch [4], Reinoud P. H. Bokkers [5] and Jean-Paul P. M. de Vries [1]

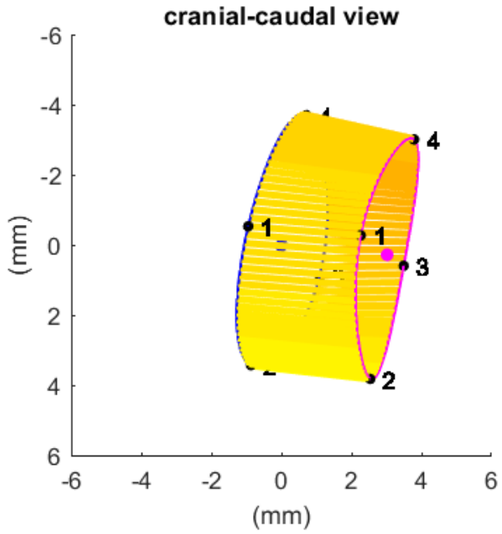
J. Clin. Med. **2022**, *11*, 5716. https://doi.org/10.3390/jcm11195716

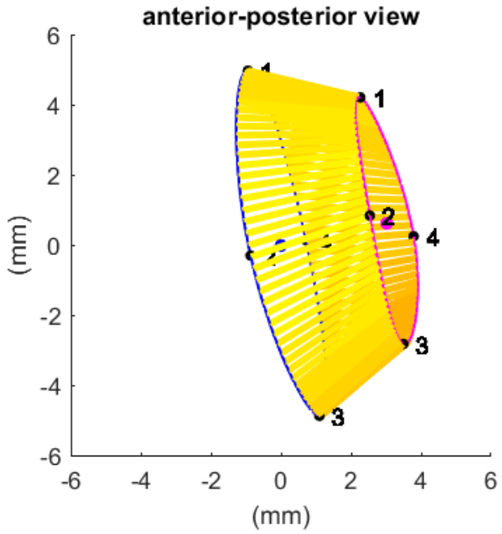
- 279 FEVAR patients (2012 – 2017) → 683 Advanta V12 BECS
- Median imaging follow-up 21 (1 – 45) months
- 649 (95%) uncomplicated

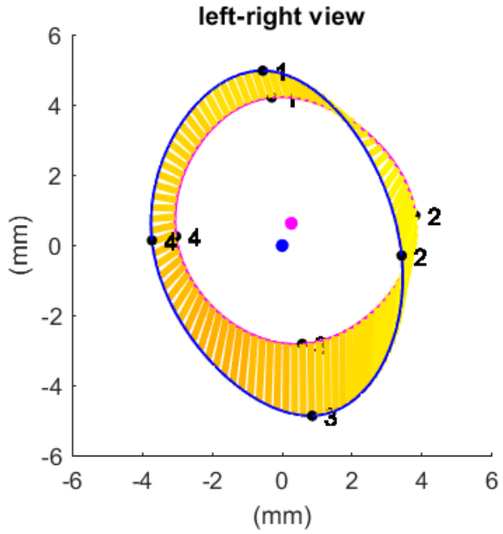
Uncomplicated Advanta V12 left renal artery (1/ 649)

Follow-up at 1 months





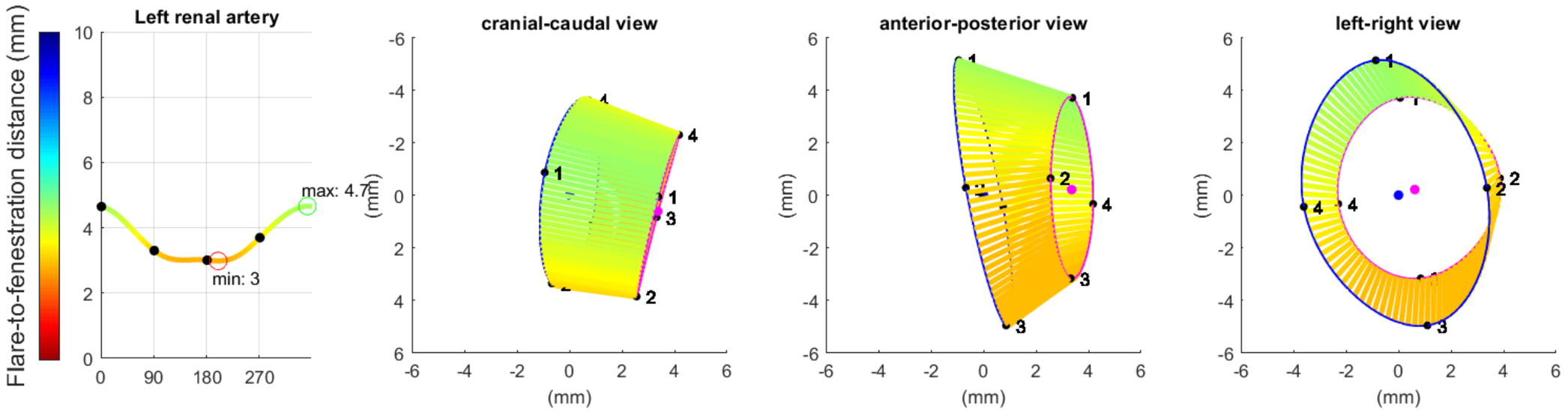




Flare Geometry Analysis	Min Diameter Fenestration	Max Diameter Fenestration	Min Dflare	Max Dflare	Gap	BECS apposition	Flare-to-fenestration ratio	D-ratio
mm	6.9	7.2	7.2	10.2	1.0	29.4	1.24	0.71

Uncomplicated Advanta V12 left renal artery (1/ 649)

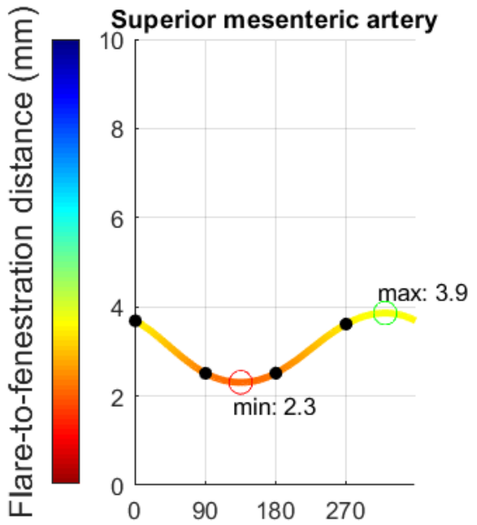
Follow-up at 40 months

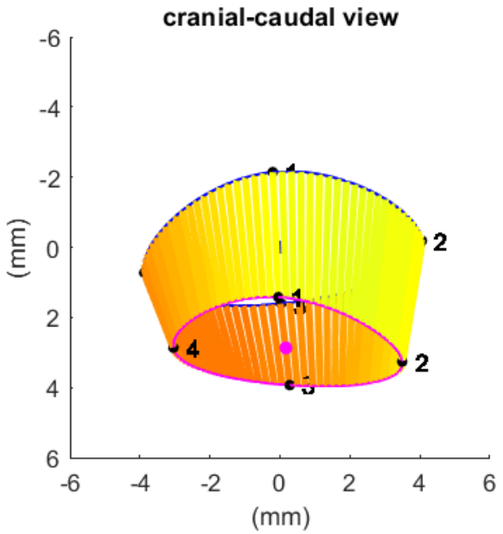


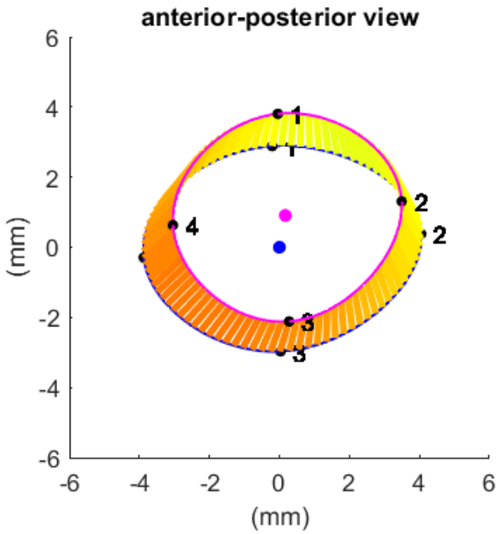
Flare Geometry Analysis	Min Diameter Fenestration	Max Diameter Fenestration	Min Dflare	Max Dflare	Gap	BECS apposition	Flare-to-fenestration ratio	D-ratio
mm	6.3	6.9	7.1	10.5	1.0	28.2	1.32	0.68

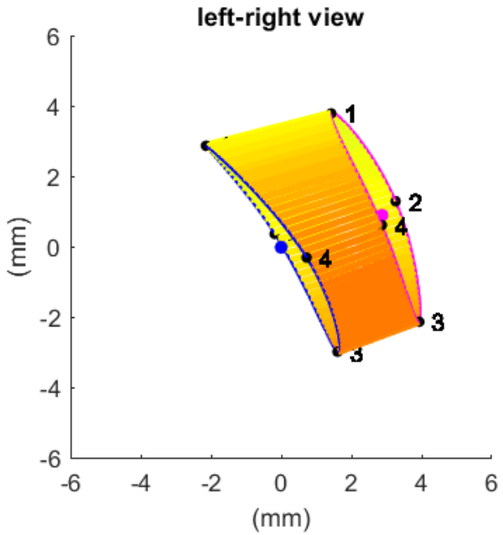
Uncomplicated Advanta V12 in the SMA (1/ 649)

Follow-up at 2 months





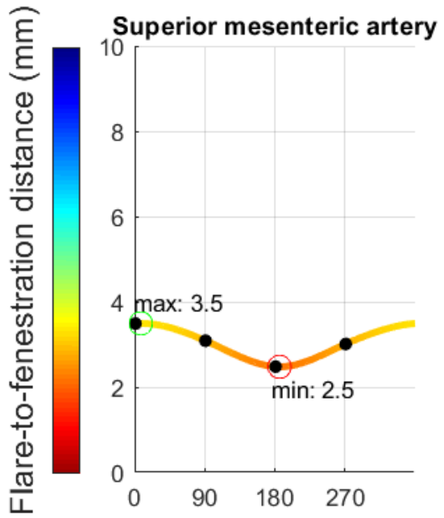


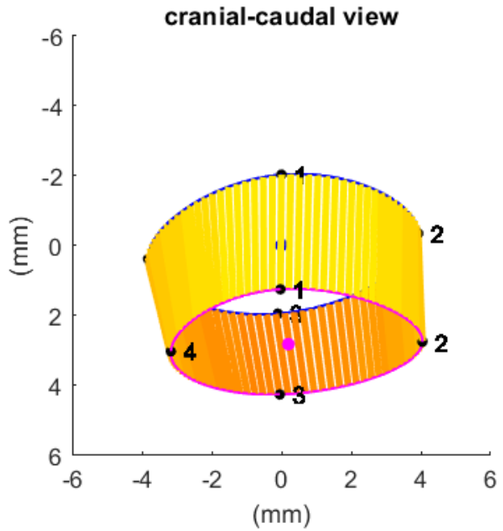


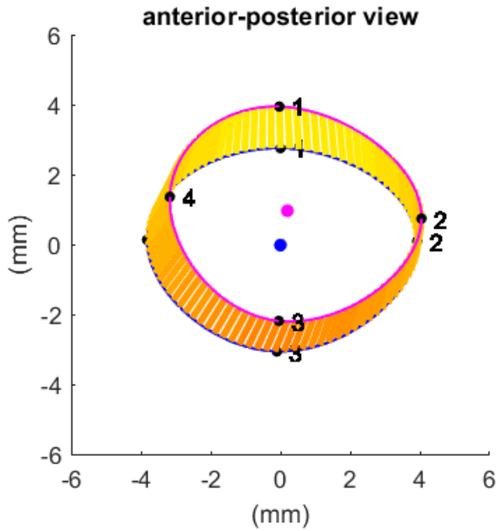
Flare Geometry Analysis	Min Diameter Fenestration	Max Diameter Fenestration	Min Dflare	Max Dflare	Gap	BECS apposition	Flare-to-fenestration ratio	D-ratio
mm	6.3	6.6	6.8	8.0	0.0	16.2	1.2	0.87

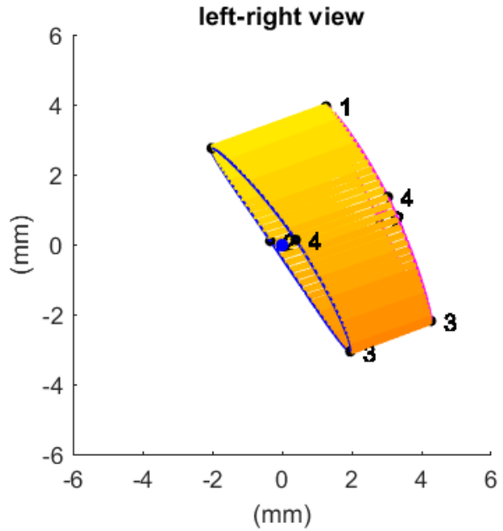
Uncomplicated Advanta V12 in the SMA (1/ 649)

Follow-up at 48 months









Flare Geometry Analysis	Min Diameter Fenestration	Max Diameter Fenestration	Min Dflare	Max Dflare	Gap	BECS apposition	Flare-to-fenestration ratio	D-ratio
mm	6.7	7.3	6.9	7.8	0.0	17.1	1.1	0.89

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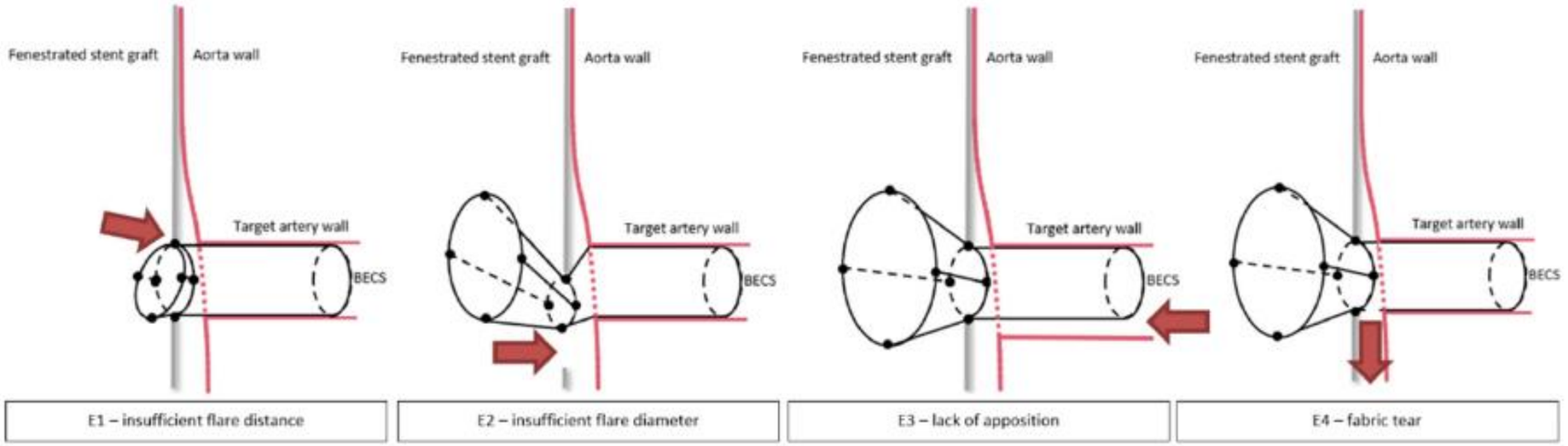
J. Clin. Med. **2022**, *11*, 5716. https://doi.org/10.3390/jcm11195716

- 279 FEVAR patients (2012 – 2017) → 683 Advanta V12 BECS
- Median imaging follow-up 21 (1 – 45) months
- 649 (95%) uncomplicated
- 34 (5%) complicated
  - 2 during FEVAR
  - 5 without CTA to determine geometry
  - 27 Advanta V12 with CTA to determine geometry

Endoleaks (E1 – E4)



N = 5 N =2 N =1 N =1

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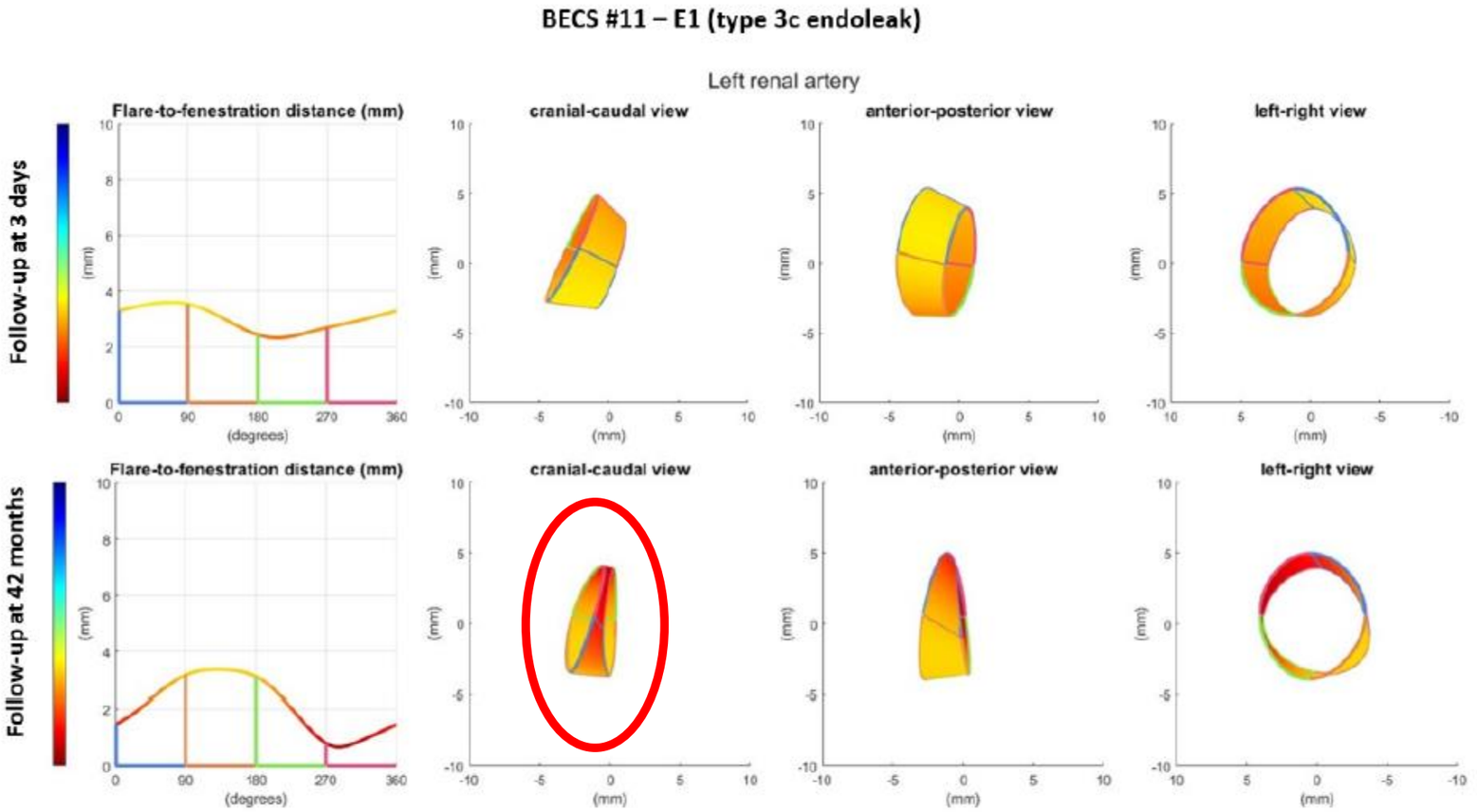
Endoleak E1 (needed proximal extension)



Follow-up	Shortest FFD (mm)	Minimum Dflare (mm)	Maximum Dflare (mm)	Minimum Dfenestration (mm)	Maximum Dfenestration (mm)	Gap (mm)	Apposition (mm)
3 days	2.3	8.3	10.3	8.3	10.0	3.0	8.0
42 months	0.7	7.8	9.0	7.0	7.9	2.1	7.2

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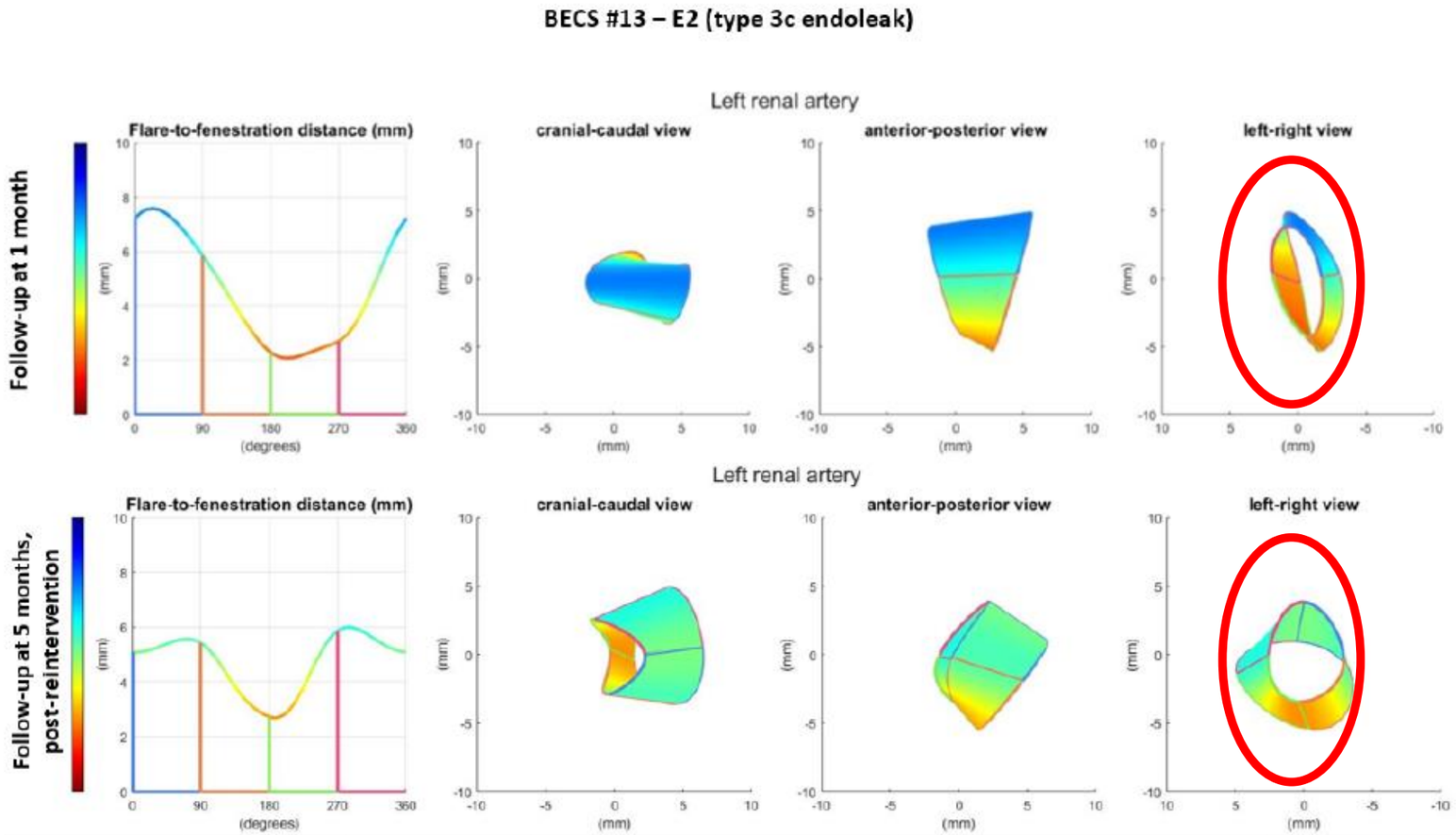
Endoleak E2 (needed PTA at flared end)



Follow-up	Shortest FFD (mm)	Minimum Dflare (mm)	Maximum Dflare (mm)	Minimum Dfenestration (mm)	Maximum Dfenestration (mm)	Gap (mm)	Apposition (mm)
1 month	2.1	3.1	10.8	4.7	8.6	1.0	12.2
5 months	2.7	7.6	8.6	5.8	7.9	3.0	42.1

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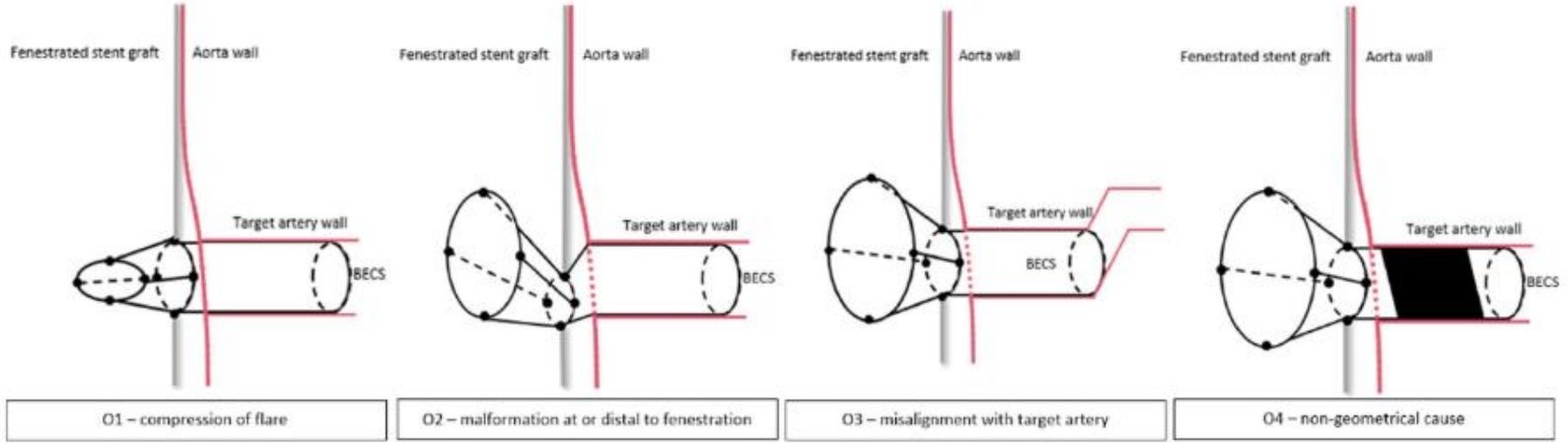
Obstructions (O1 – O4)



N = 2 N = 6 N = 1 N = 6

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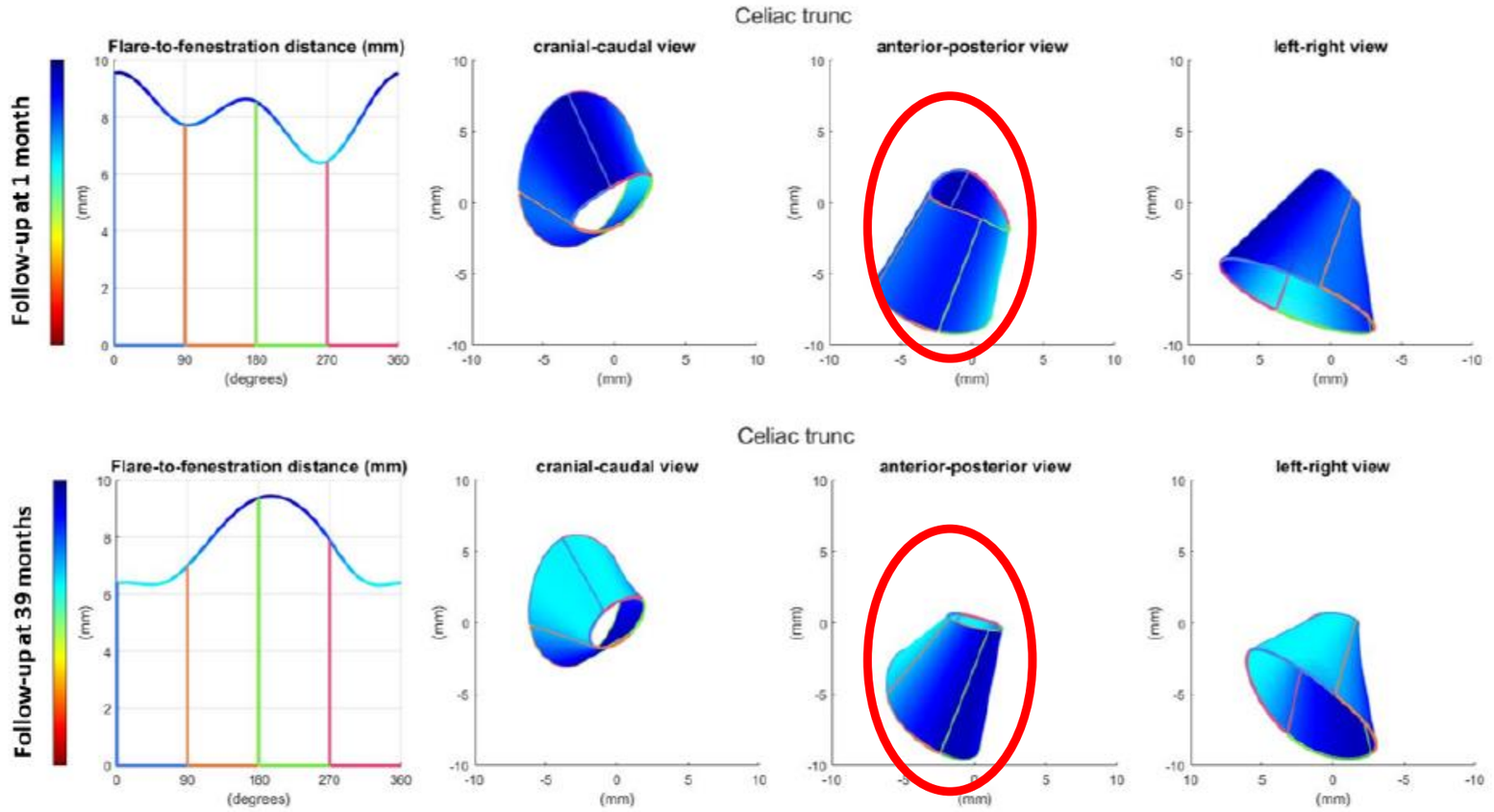
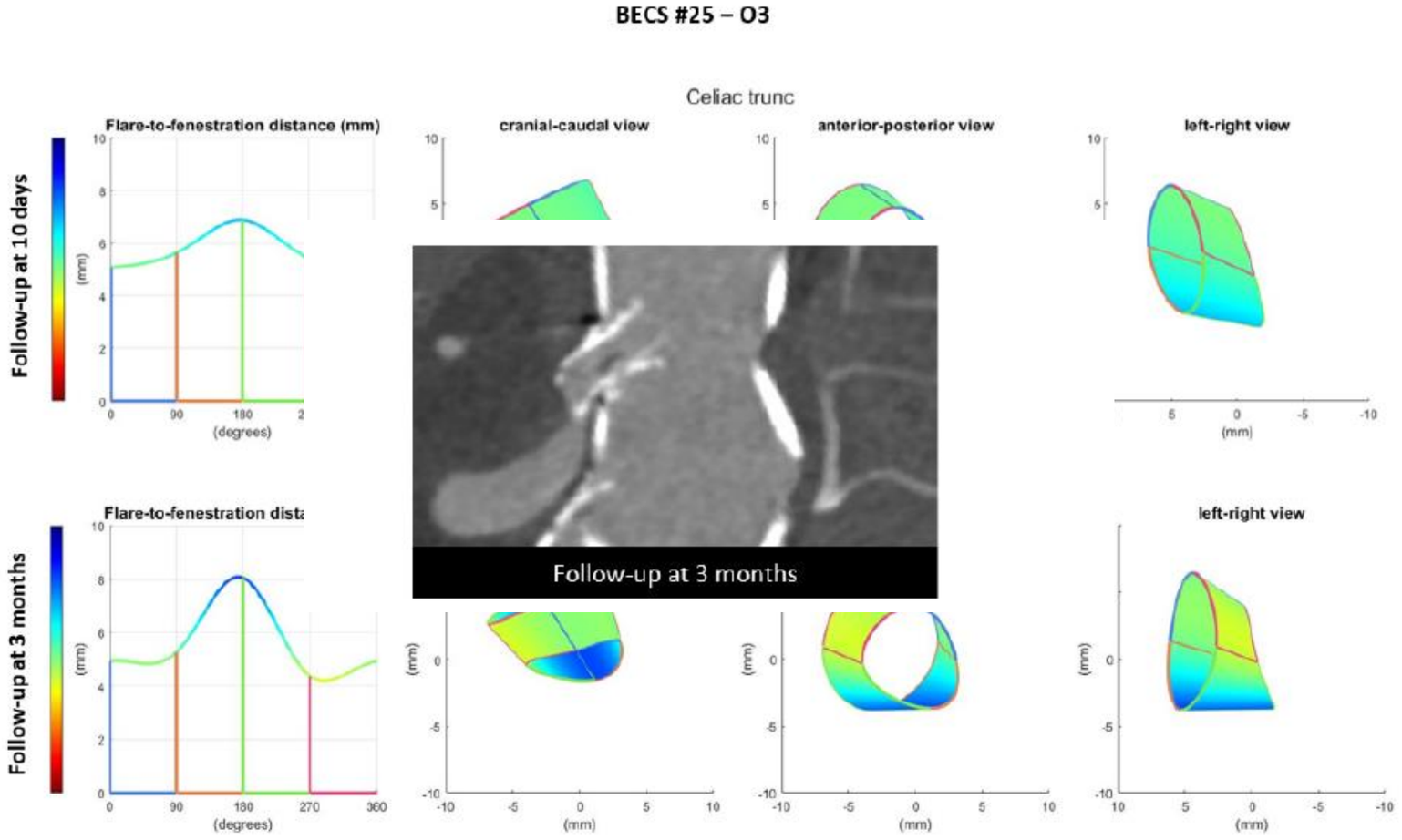
Obstruction O2 (needed PTA at fenestration)



Follow-up	Shortest FFD (mm)	Minimum Dflare (mm)	Maximum Dflare (mm)	Minimum Dfenestration (mm)	Maximum Dfenestration (mm)	Gap (mm)	Apposition (mm)
1 month	6.4	8.4	11.8	4.4	6.9	0	19.1
39 months	6.3	7.8	11.3	2.7	4.7	0	16.3

J. Clin. Med. **2022**, *11*, 5716. https://doi.org/10.3390/jcm11195716

Obstruction O3 (needed distal extension)



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Fractures (F1 – F4)

F1.	One single strut fracture;	N = 1
F2.	Multiple single strut fractures;	N = 1
F3.	Transverse linear BECS fracture without displacement;	
F4.	Transverse linear BECS fracture with displacement.	N = 1

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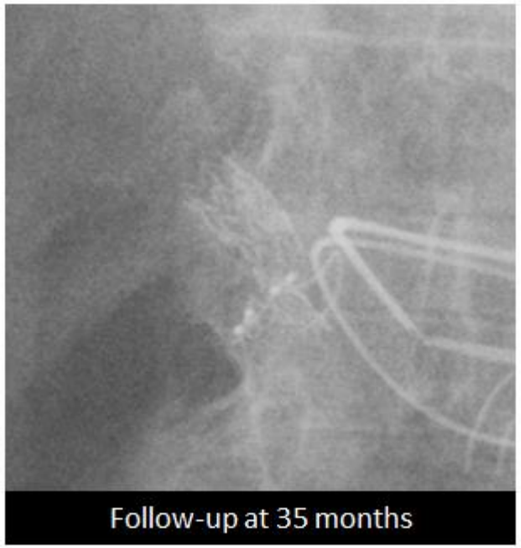
Cause of fracture (F4)

Migration of main body and stent fracture of Anaconda endograft, 3 years post-EVAR.

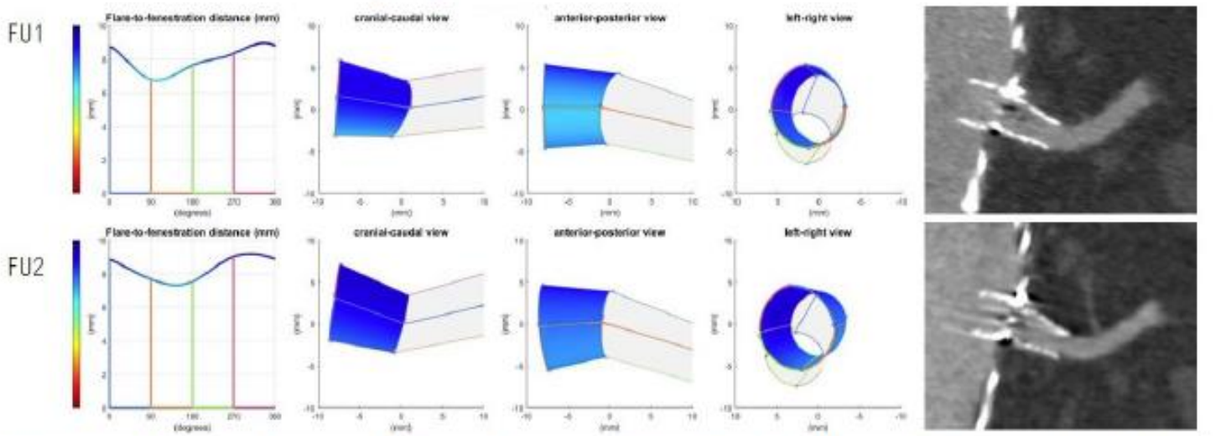


Three-dimensional geometric analysis of Viabahn VBX bridging stent grafts in fenestrated endovascular aortic repair: A multicentre, retrospective cohort study

F. Fouad et al, JEVT 2024, accepted for publication.

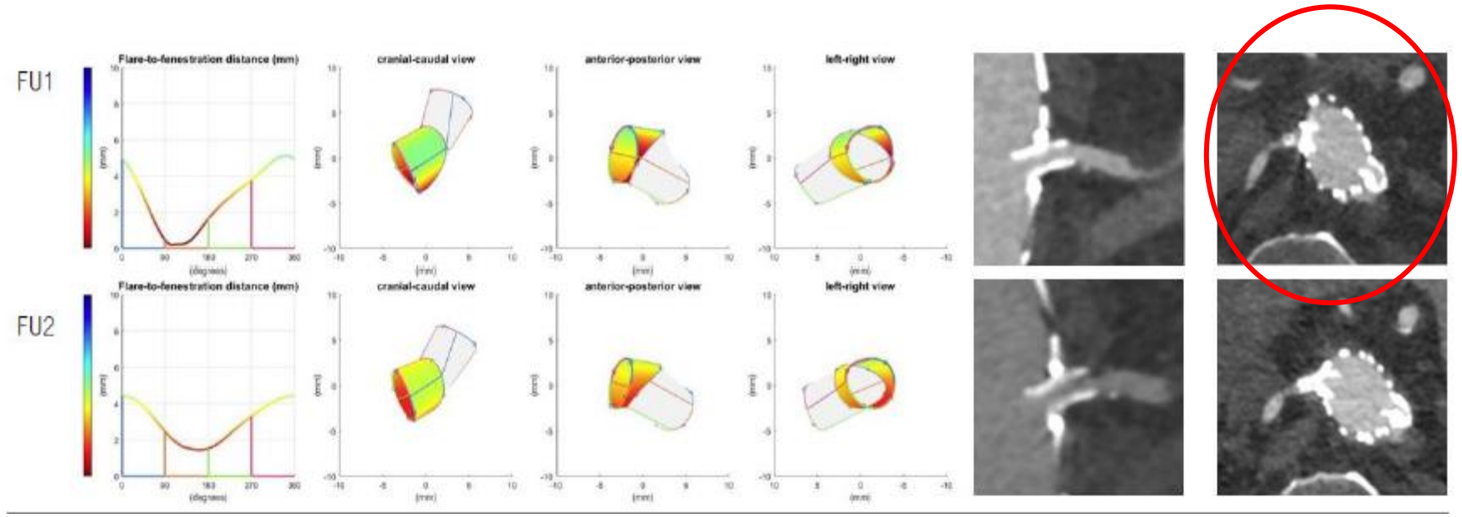
- 43 FEVAR patients → 90 VBX
- Median imaging follow-up 14 (13 - 15) months
- 87 (97%) uncomplicated

Uncomplicated

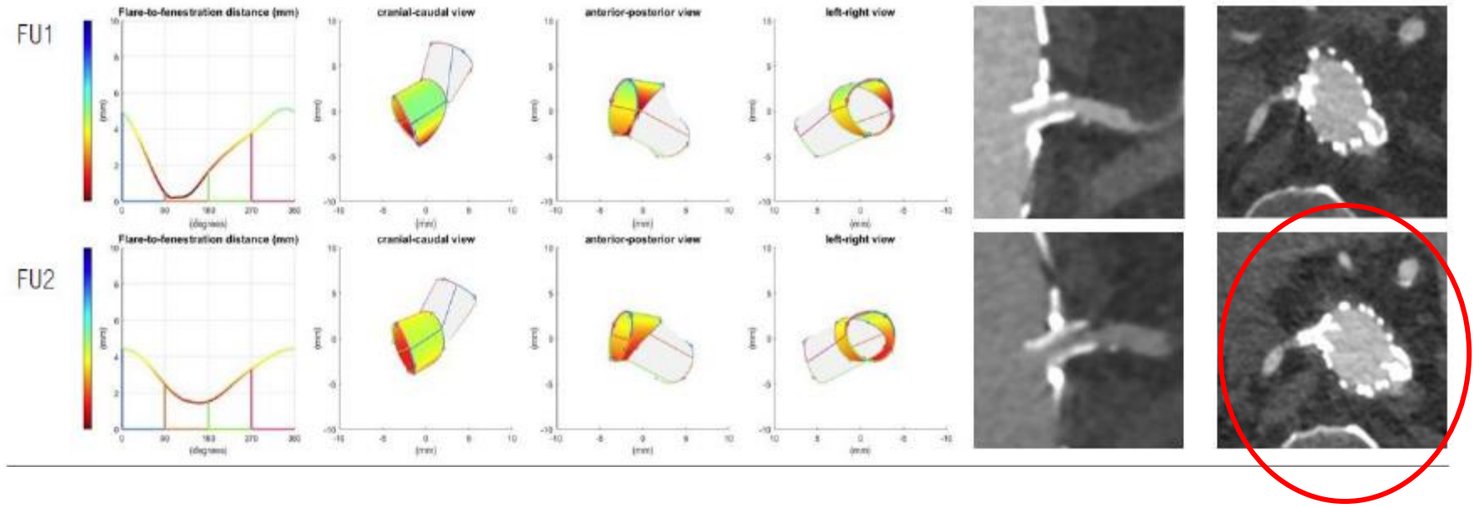


Time	Min FFD	Mean FFD	Max FFD	D-flare	D-fenestration	Flare angle	D-ratio	Apposition
FU1	6.7	7.9	9.0	9.3	7.5	21	1.23	12.2
FU2	7.3	8.3	9.2	9.5	7.2	38	1.31	12.2

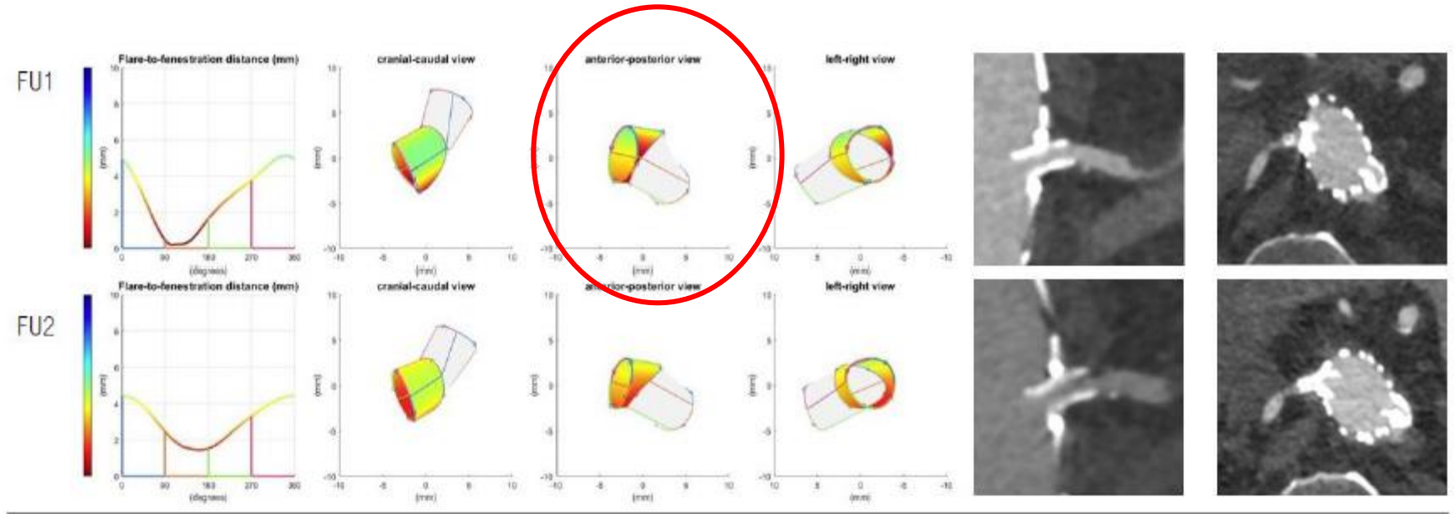
Complicated with endoleak at first post-FEVAR CT



Complicated with endoleak and progression AAA at follow-up CT



In retrospect type E1 endoleak at first post-FEVAR CT



Daily practice: geometrical analysis as additional tool in case of endoleak post-FEVAR

BECS geometrie meting FEVAR

Patiënt nummer: XXXXXXX

Analyse datum: 18-3-2024

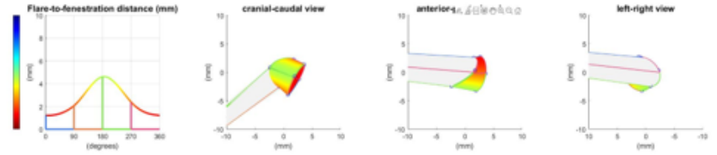
Gedaan door: Richte Schuurmann

Vraagstelling

pte behandeld voor een TAAA in 3 tempi. Verklaring voor groot endoleak? Lijkt meest waarschijnlijk op basis van een EL3c vanuit de RRA.

Geometrie analyse

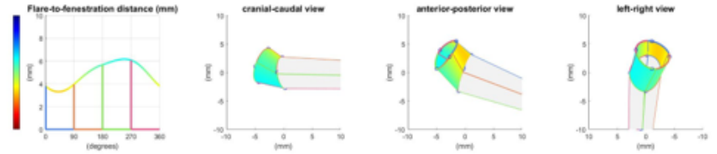
Right renal artery



Rechter nierarterie:

Minimal flare-to-fenestration distance = 1.2 mm
Diameter flare = 5.9 mm
Diameter fenestration = 5.9 mm
Diameter Distaal = 4.3 mm

Left renal artery



Linker nierarterie:

Minimal flare-to-fenestration distance = 3.3 mm
Diameter flare = 6.0 mm
Diameter fenestration = 6.0 mm
Diameter Distaal = 3.6 mm

Conclusions

Majority of BECS post-FEVAR (Advanta V12, VBX) had uneventful course

In complicated cases standard CTA doesn't determine the cause of endoleak / complication

3D geometrical analysis of BECS classifies complications in Endoleaks, Obstructions, Fractures (or combination)

Facilitates true course of problem and guides targeted reintervention

Should be added in post-FEVAR CTA follow-up