

TCTAP 2024

Seoul, Korea, April 25-27, 2024

Carotid Stenting With Proximal Protection in All-comer Patients

Horst Sievert (FAAC, FESC, FSCAI)

Kolja Sievert, Stefan Bertog, Sameer Gafoor, Markus Reinartz, Bojan Jovanovic, Iris Grunwald, Anja Vogel, Pamela Ilioska, Gerhard Sell, Natalia Galeru, Judith Steffan, Heiko Burger, Andreas Zeiher, Bernhard Winkelmann, Martin Dürsch, Byung-Moon Kim, Maryam Mirzapour, Hao Zhang

CardioVascular Center Frankfurt - CVC,
Frankfurt, Germany



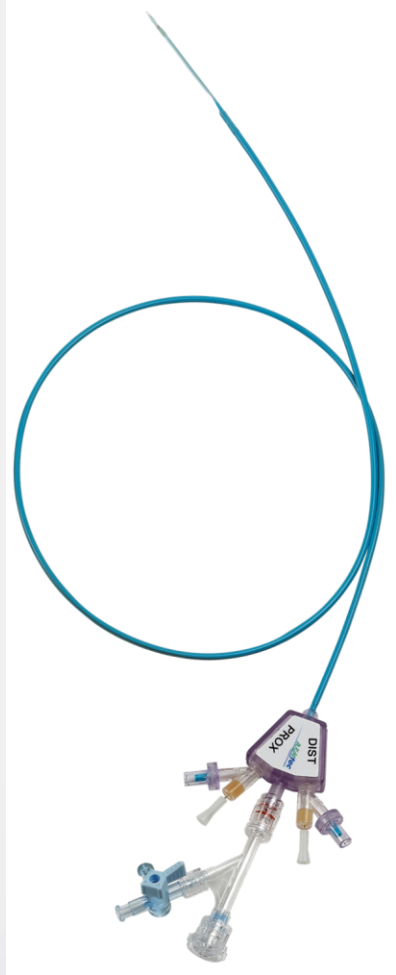
Disclosures

Physician name	Company	Relationship
Horst Sievert	Abbott, Ablative Solutions, Adona Medical, Akura Medical, Ancora Heart, Append Medical, Axon, Bavaria Medizin Technologie GmbH, BioRefine, Bioventrix, Boston Scientific, Cardiac Dimensions, Cardiac Success, Cardimed, Cardionovum, Contego, Coramaze, Croivalve, CSL Behring LLC, CVRx, Dinova, Endobar, Endologix, Endomatic, Esperion Therapeutics, Inc., Hangzhou Nuomao Medtech, Holistick Medical, Intershunt, Intervene, K2, Laminar, Lifetech, Magenta, Maquet Getinge Group, Metavention, Mitralix, Mokita, Myotec, Neurotronic, Novelrad, NXT Biomedical, Occlutech, Recor, Renal Guard, Shifamed, Terumo, Trisol, TruLeaf, Vascular Dynamics, Vectorious Medtech, Venus, Venock, Vivasure Medical, Vvital Biomed, Whiteswell, Xenter	Study honoraria to institution, travel expenses, consulting fees to institution

Stroke is the most important complication of carotid stenting

- It can be prevented by
 - Distal occlusion of the internal carotid artery followed by aspiration at the end of the procedure (Percusurge, Kensey-Nash)
 - Distal filters
 - Proximal protection (Parodi, MO.MA, balloon guides)

Proximal Protection during carotid stenting

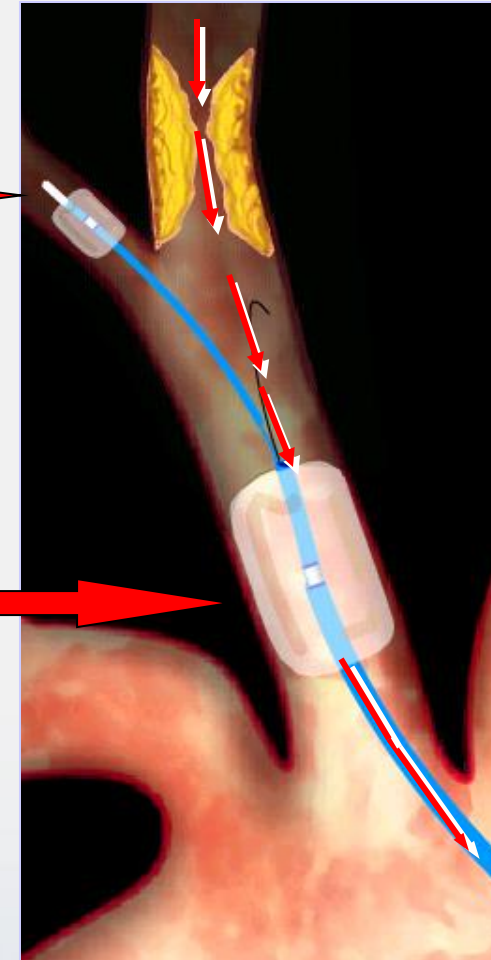


MO.MA

**External carotid
balloon**

**Common carotid
balloon**

Aspiration of
Debris with Syringe



Multiple studies have shown
that proximal occlusion is
more effective than filters!

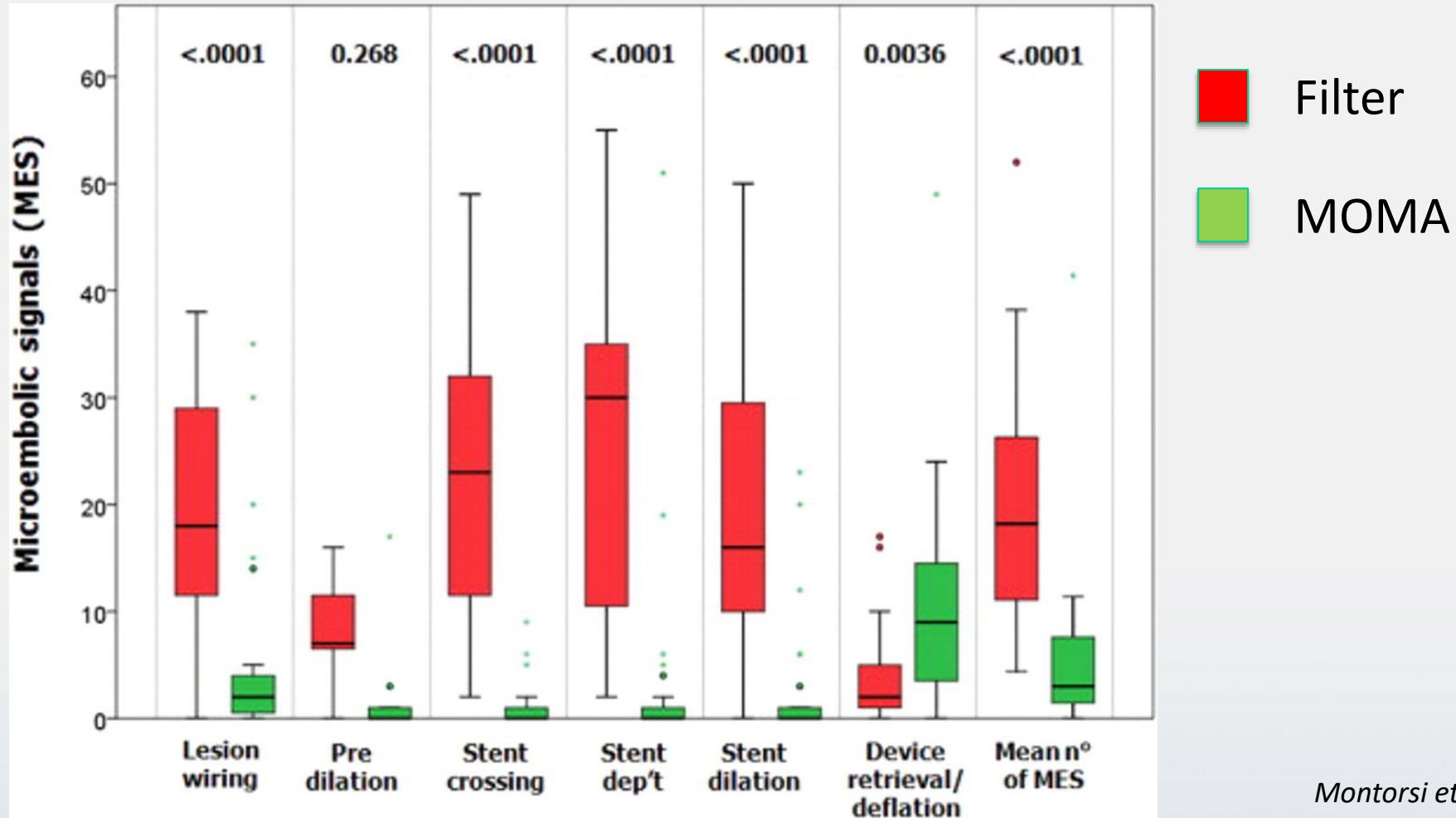
Significant Less Microemboli Signals During Different Phases of Carotid stenting

	Filter Group	MO.MA Group	p Value
Sheath placement-protection device placement	20 ± 15	18 ± 10	NS
Wiring of the stenosis	25 ± 22	2 ± 3	< 0.0001
Stent deployment	73 ± 49	11 ± 19	< 0.0001
Balloon dilation	70 ± 31	12 ± 21	< 0.0001
Retrieval of the protection device	14 ± 15	19 ± 15	NS
Total	196 ± 84	57 ± 41	< 0.0001

Data are mean values ± SD or n (%).

Abbreviations as in Table 3.

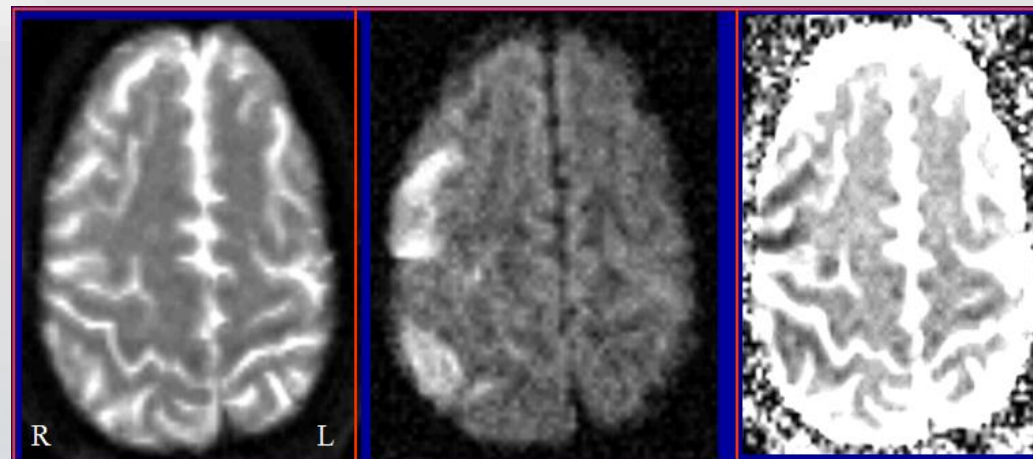
Less Microemboli Signals During Different Phases of Carotid stenting



Montorsi et al. JACC 2011

Less and smaller MRI lesions with proximal protection compared to filter

	DWMRI Subgroup	
	<i>MO.MA</i>	<i>Filter</i>
# new lesions	7	38
# pts with new lesions	14.2%	42.8%



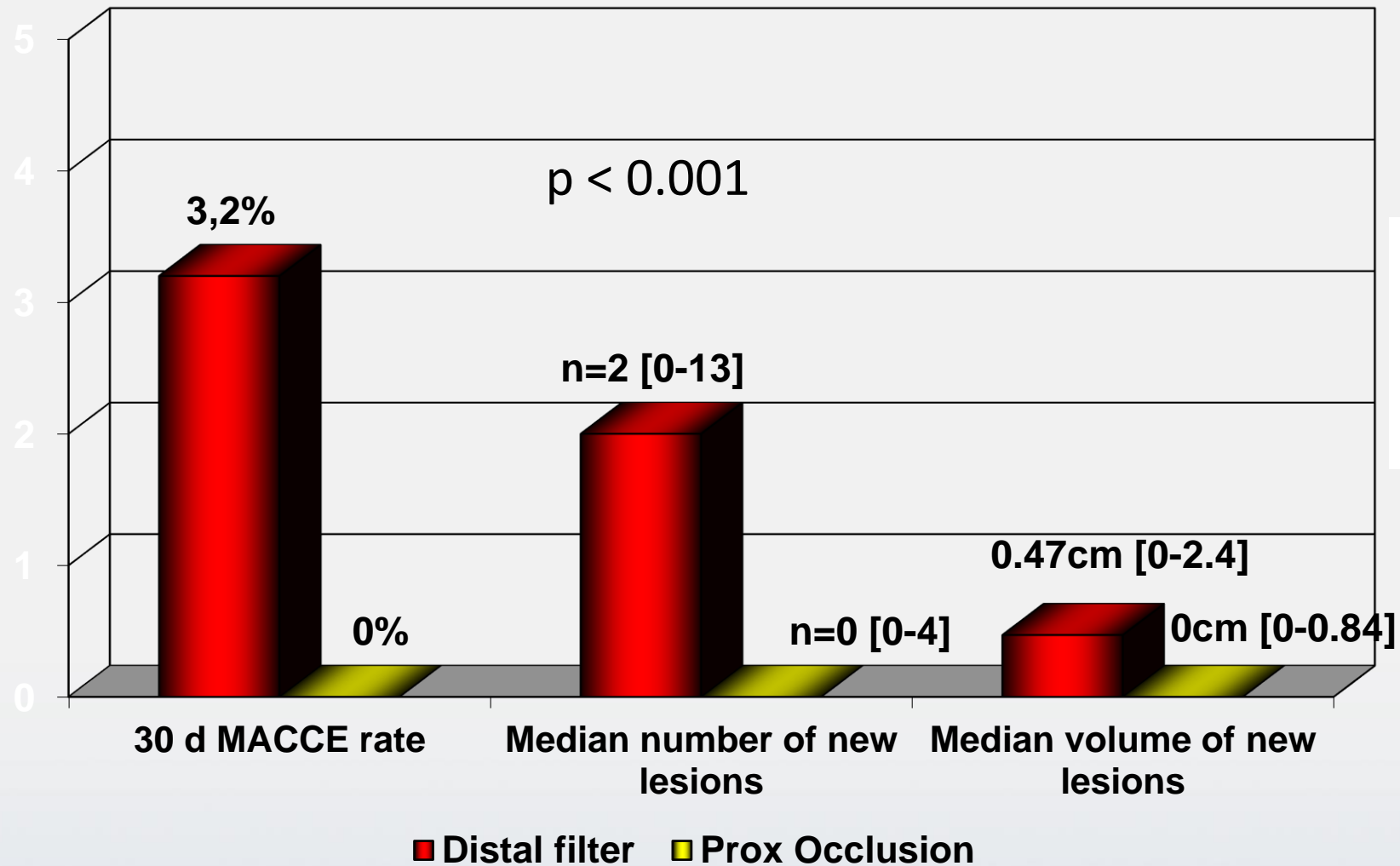
T2

DWI

ADC

Montorsi et al. JACC 2011

Lower MACCE rate and less and smaller MRI lesions with proximal protection compared to filter

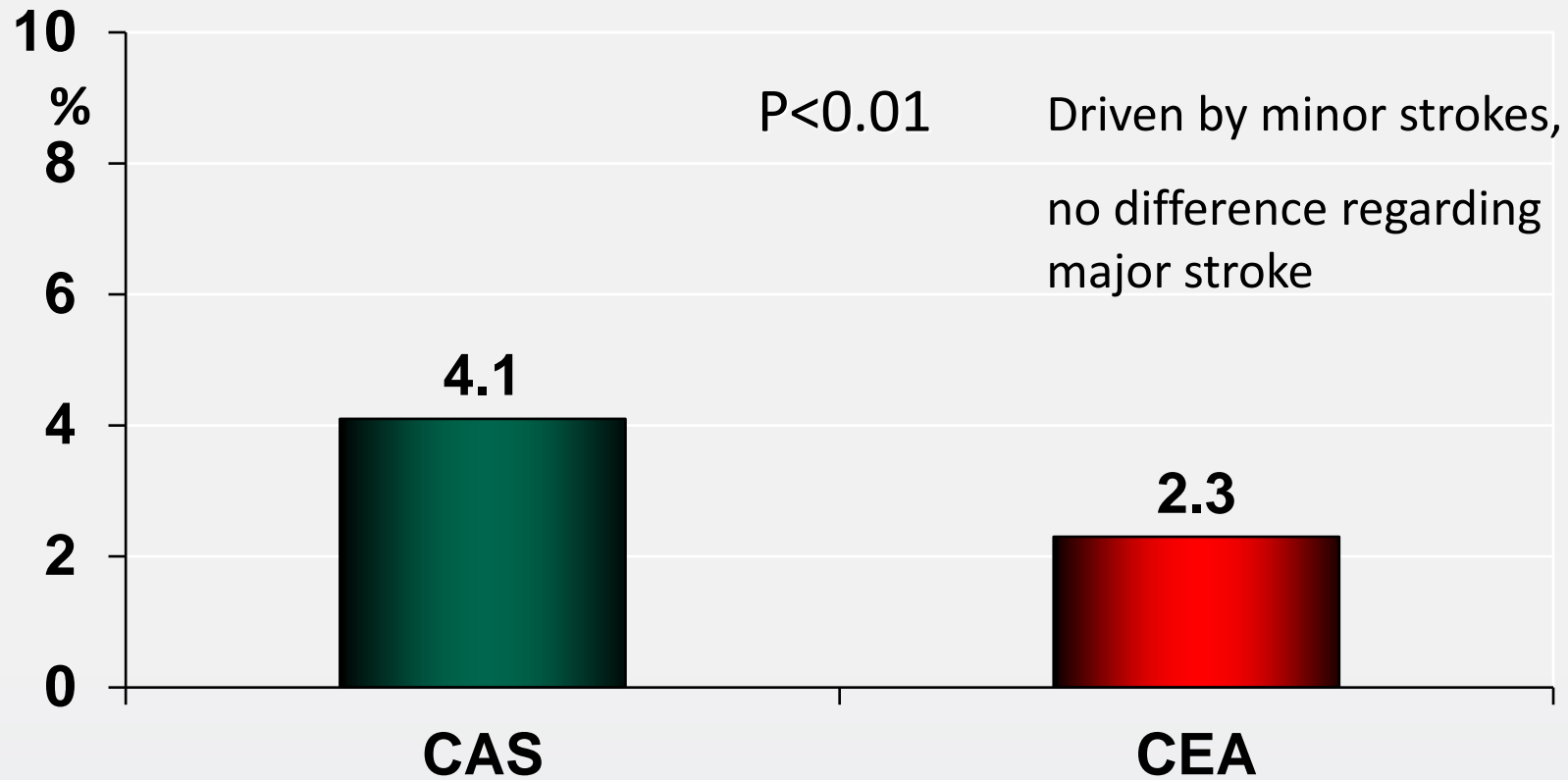


- 62 consecutive patients
- Prospective, randomized

For comparison

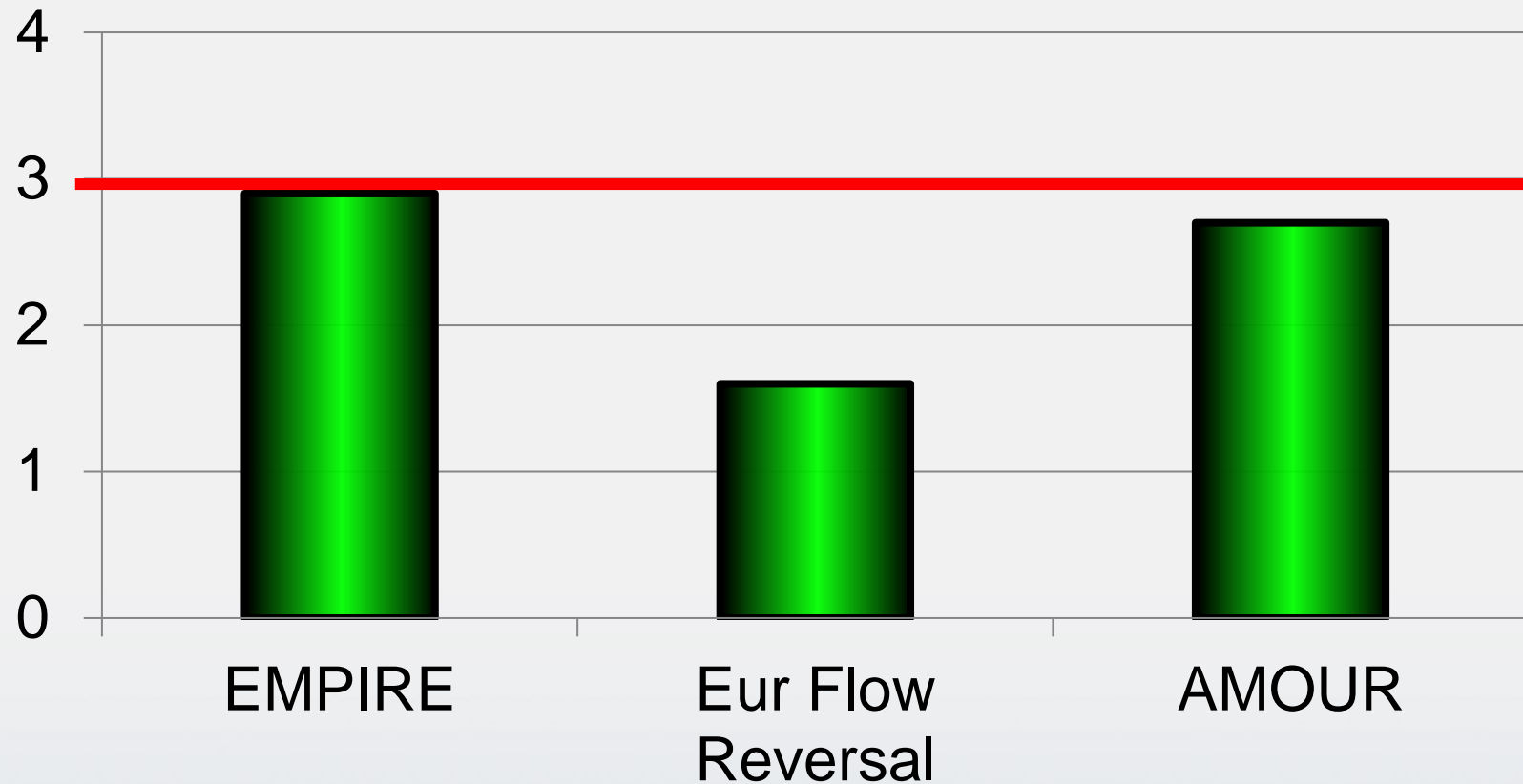
CREST

30 Day Results: Stroke



In all trials using proximal protection the stroke rate was lower than in CREST!

Prospective controlled registries with proximal occlusion have 30-day **death/stroke** rates < 3.0 %



Bersin RM et al: A meta-analysis of proximal occlusion device outcomes in carotid artery stenting.

Catheter Cardiovasc Interv 2012

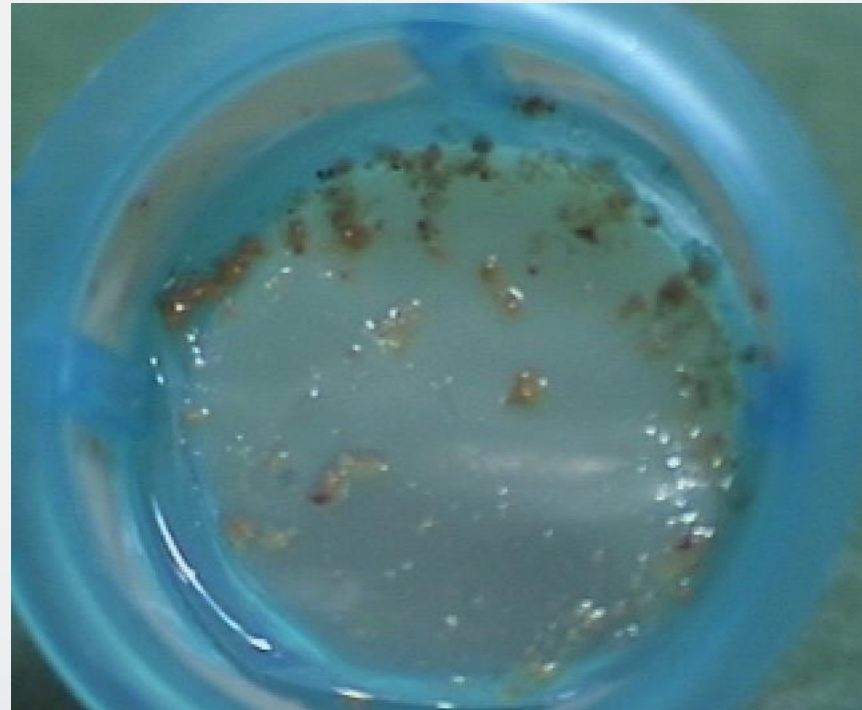
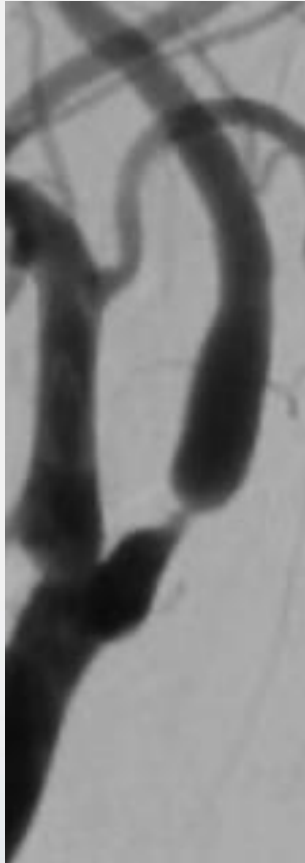
- 2,397 patients
- six independent databases
- MOMA and Gore Flow Reversal
- 30-day major adverse clinical events
 - stroke, myocardial infarction, and death
- Results:
 - Stroke 1.71%
 - myocardial infarction 0.02%
 - Death 0.4%
 - Composite primary endpoint 2.25%

Proximal Protection (MO.MA)

- Advantages
 - Complete block of distal flow
 - Protects against emboli of all sizes
 - Full protection during all steps of the procedure
 - Lesion crossing, pre-dilatation, stent implantation, post-dilatation
- Potential Disadvantages
 - "more complex" to use than distal filter?
 - Intolerance in some patients
 - Contraindicated in contralateral occlusions and "isolated hemisphere"?

Due to the potential disadvantages, most operators use distal filter for "low risk carotid stenoses" and proximal protection for "high risk stenoses"

However, it is difficult to predict which stenosis has a low risk for emboli



Also,
proximal protection
is not really complex!

Which one is more complex?

- Filter
 - Access to ECA
 - Sheath
 - Filter → ICA
 - Pre-dilatation
 - Stent
 - Post-dilatation
 - Filter retrieval
 - Final angio
- Prox Occlusion
 - Access to ECA
 - "Sheath" (MOMA)
 - Balloon → ECA
 - Pre-dilatation
 - Stent
 - Post-dilatation
 - Aspiration
 - Final angio

When do you feel save?

- Filter
 - Access to ECA
 - Sheath
 - Filter → ICA
 - Pre-dilatation
 - Stent
 - Post-dilatation
 - Filter retrieval
 - Final angio
- Prox Occlusion
 - Access to ECA
 - "Sheath" (MOMA)
 - Balloon → ECA
 - Pre-dilatation
 - Stent
 - Post-dilatation
 - Aspiration
 - Final angio

If proximal occlusion is good
for complex high risk lesions ...

... it should also be good for
simple low risk lesions

So why not ...

- ... to use proximal protection in all patients?
- In complex and simple lesions?
- In patients without or with contralateral occlusion?

Evaluation of proximal protection devices during carotid artery stenting as the first choice for embolic protection

Marius Hornung, MD; Stefan C. Bertog, MD; Jennifer Franke, MD; Dani Id, MD; Iris Grunwald, MD; Horst Sievert*, MD

CardioVascular Center Frankfurt, Frankfurt, Germany

CVC Frankfurt

- 207 consecutive patients (regardless of anatomy)
 - No periprocedural stroke
 - One stroke after discharge due to stent thrombosis
 - 30 day stroke rate 0.5%
- Since 2015 only one periprocedural stroke in >800 cases
 - In that case MOMA was not kept in position during intervention

Tips and Tricks:

- Do it fast
 - You do not need more than 4 min occlusion time
- Leave the proximal hub of the MOMA open so that you have continuous backflow during the entire procedure
 - Blood loss is usually less than 100 ml
- Make sure that you have 100% protection
 - Not only the external carotid artery but also all side branches have to be occluded!

You need complete occlusion!

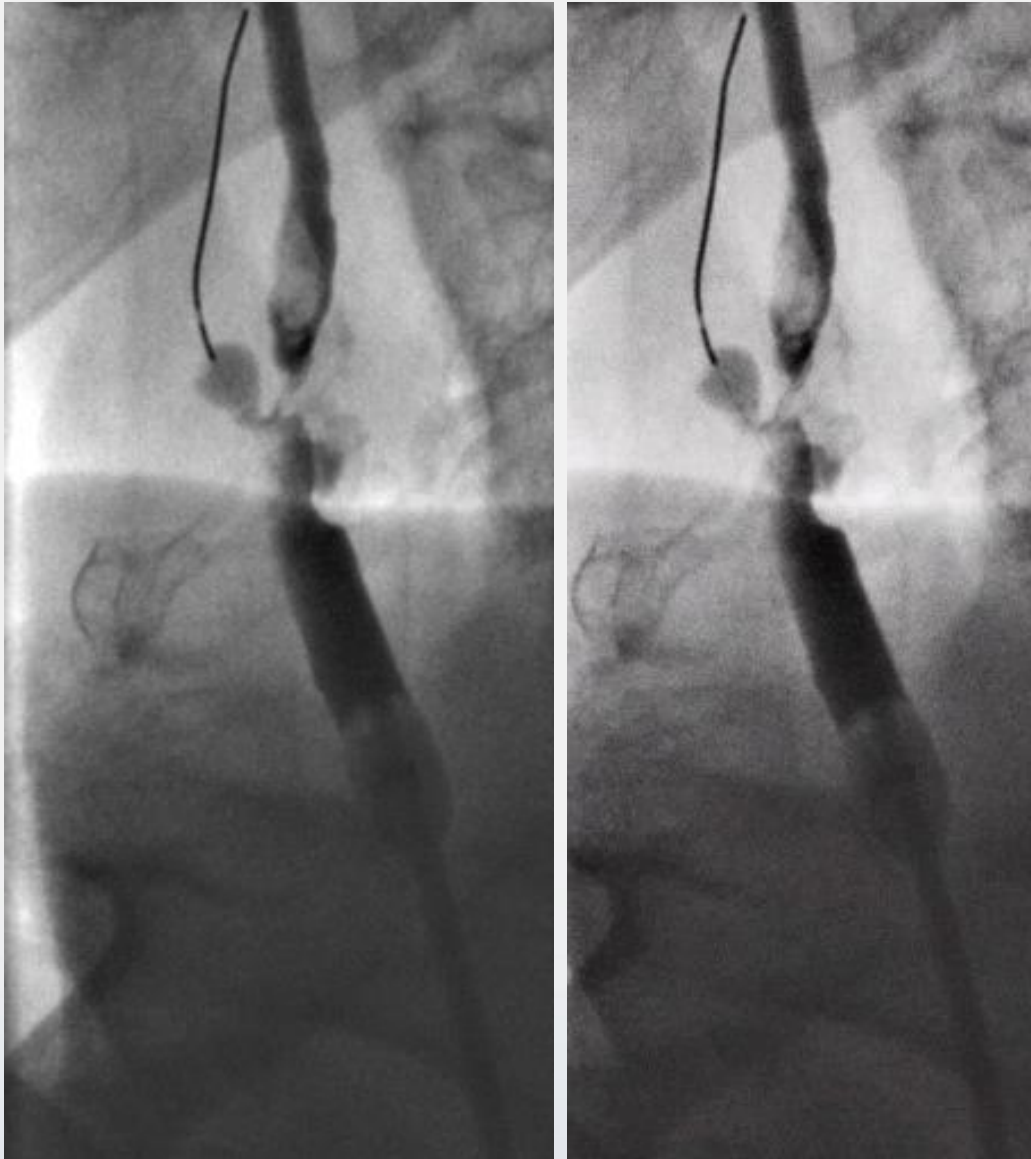
You need complete occlusion



- Tight bifurcation stenosis
- Thrombus in the Internal Carotid Artery



- Both occlusion balloons are inflated ...
- ... but there is persistent flow into the Internal Carotid Artery !
 - zero protection!



- Occlusion balloons re-positioned
- Both occlusion balloons are inflated again
- Complete protection

What if the suprathyreoid artery
can not be occluded?

Apply continuous suction on the MOMA guide
during the entire procedure

What if the external carotid artery
is occluded?

Use a single balloon tipped
guiding catheter



Occlusion intolerance?

- Just do it faster
- 2 wire technique:
 - Cross the lesion with 2 parallel wires
 - One wire already has the balloon on it, the other one has the stent on it
 - After balloon dilatation, remove the first wire together with the balloon
 - Then insert the stent over the second wire
- Or do it stepwise
 - Aspirate and deflate the MOMA between the steps

Proximal protection ...

- ... can be used in all carotid stent cases
- Contralateral occlusion and isolated hemisphere is **not** a contraindication
- It results in a very low complication rate
- It should be used as first choice during carotid stenting