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Carotid Artery Stenting - Indication and Technical Tips (Transradial vs. Transfemoral and Proximal vs. Distal Protection)


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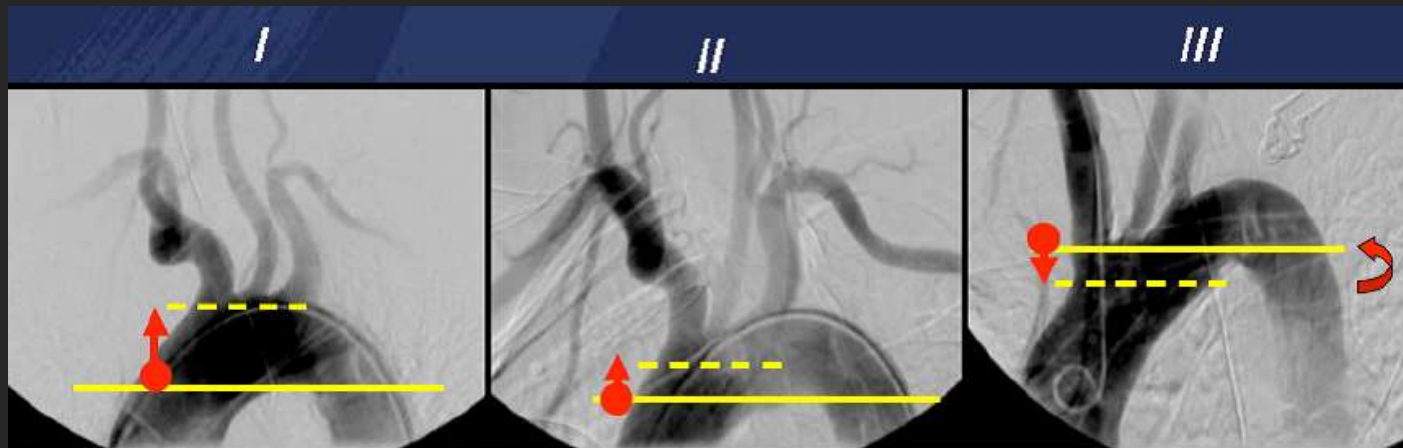


Potential conflicts of interest

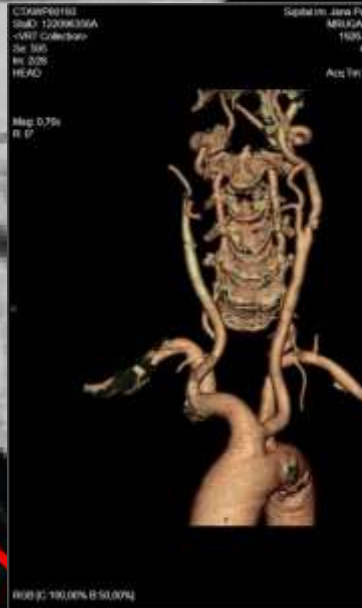
Piotr Pieniazek, MD, Ph.D.

-  **I have the following potential conflicts of interest to report.**
Consulting; Study Honoraria; Travel Expenses; Trials Involvement:
- **Boston Scientific**
 - **Abbott**
 - **Medtronic**
 - **Terumo**
 - **Cordis**
 - **Astra Zeneca**

Caniulation of CCA difficulties during CAS



Aortic arch



Bovine arch

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SMD: 131049093S
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Se: 502
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ABDOMEN

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Femoral Approach Limitations !!!

Aorto-Iliac disease or occlusion
(Leriche Syndrom)

Previous surgical bypass at peripheral field

Previous stent graft implantation

Significant obesity

Large hernia

Need prolonged stay in bed in pts with spinal pain syndrome.

Haematological disease or Coumadin therapy

A randomised comparison of transradial and transfemoral approach for carotid artery stenting: RADCAR (RADial access for CARotid artery stenting) study

■ EuroIntervention 2014;10:381-391

Zoltán Ruzsa^{1,3*}, MD, PhD; Balázs Nemes¹, MD, PhD; László Pintér², MD; Balázs Berta¹, MD; Károly Tóth³, MD; Barna Teleki³, CVT; Sándor Nardai¹, MD; Zoltán Jambrik¹, MD, PhD; György Szabó¹, MD; Ralf Kolvenbach², MD, DSc; Kálmán Hüttl³, MD, DSc; Béla Merkely¹, MD, DSc

Conclusions: The transradial approach for carotid artery stenting is safe and efficacious; however, the cross-over rate is higher with transradial access. There are no differences in the total procedure duration and fluoroscopy time between the two approaches but the radiation dose is significantly higher in the radial group, and the hospitalisation is shorter with the use of transradial access by per-protocol analysis. By evaluating the patient data according to intention-to-treat analysis we found no difference in major adverse events and hospitalisation. In both groups, vascular complications rarely occurred.

Allen's Test - Can be performed \pm Oximetry test



Peripheral vascular diseases. Edgar van Nuys Allen, MD and others with associates in the Mayo Clinic and Mayo Foundation; 2nd edition, Philadelphia, Saunders, 1955.

Allen's Test - Can be performed \pm Oximetry test



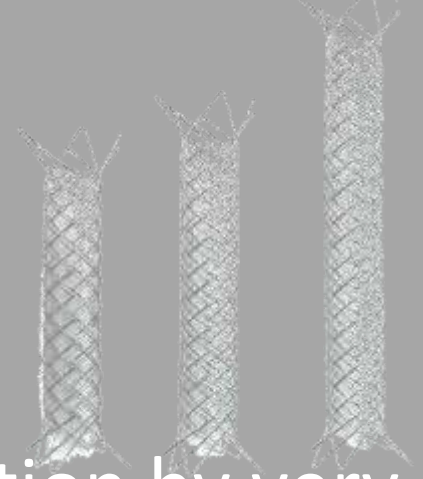
❖ We recommend that, in the presence of an abnormal AT, the RA should not be used for cardiac catheterization unless the risk of using the femoral approach is excessive. Greenwood et al. JACC Vol. 46, No. 11, 2005, 2005:2013–7

Special dedicated devices is crucial for radial access CAS

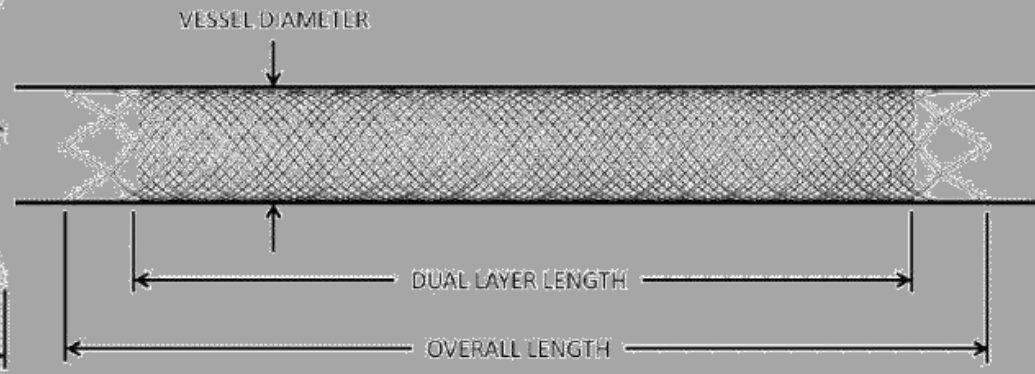
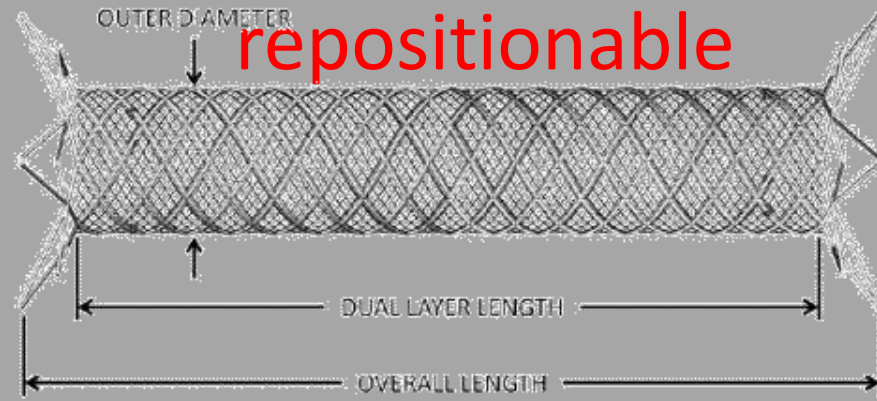


Flexible Guiding Cath 6/7F or 5F sheath, Jindo or Advantage long guide wire , Independent Filter (Spider RX or Wirion)

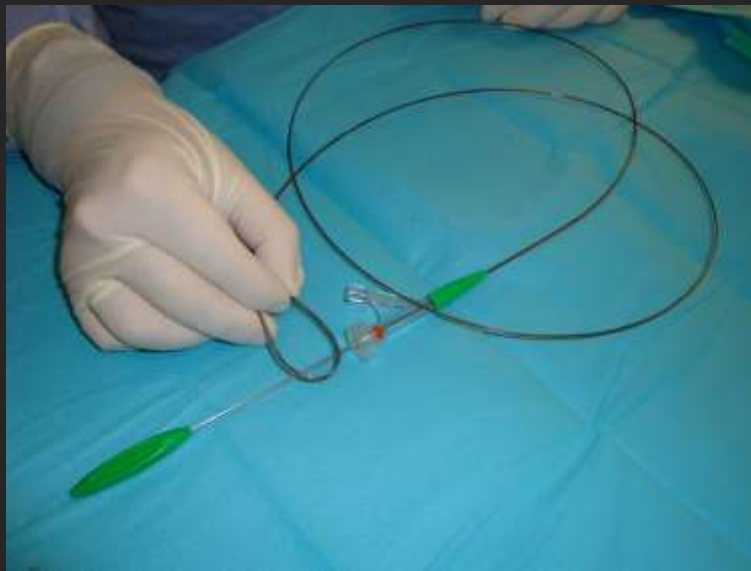
RoadSaver Carotid Stent



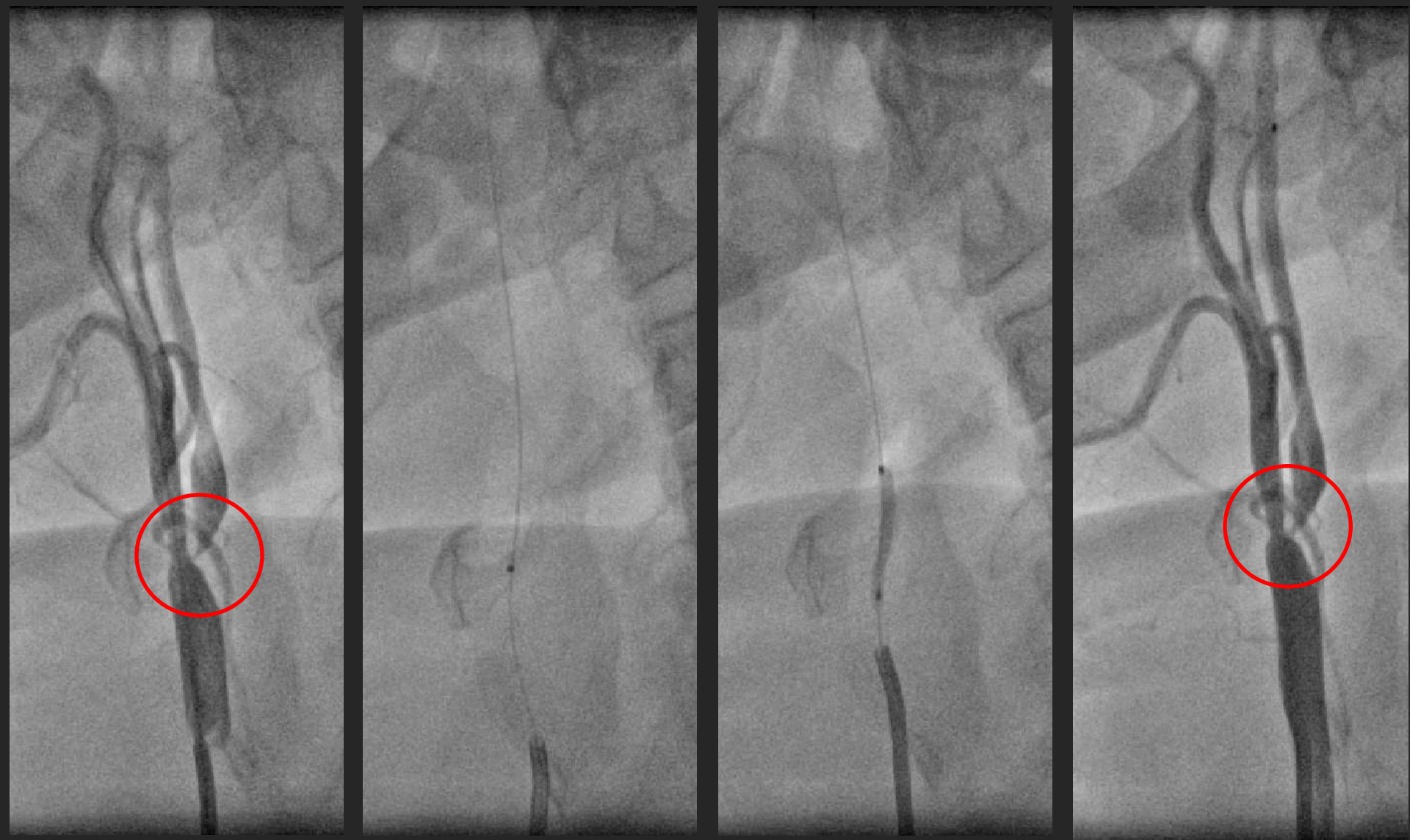
- double layer micromesh scaffold
- enabling sustained embolic protection by very tight plaque coverage
- embolic protection starts with implantation of the stent into the lesion and continues throughout the process of neointimalization
- up to 50% deployment full re-sheathable and repositionable



Roadsaver the most flexible carotid stent on the market



Radial access for CAS is always challenging procedure



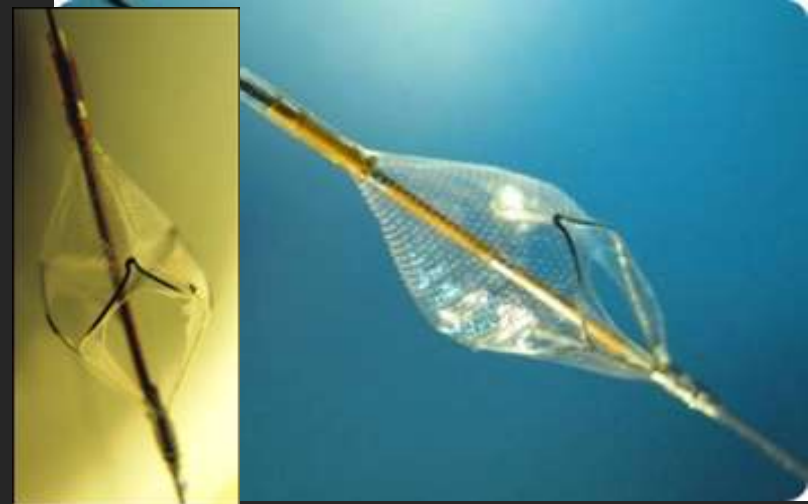
Delivery sheath required 1.5mm balloon predilatation for Spider RX placement

Roadsaver stent can be used for „Direct stenting” in all CAS procedures and should be preferred always from radial access!!



WIRION The Ultimate Solution

- The embolic filter that can be used with any guide wire
- Allows optimal filter positioning:
anywhere on the guide wire
anywhere along the vessel
- Suitable for a wide range of vessels
- Excellent deliverability
- Excellent support and stability
- Excellent visibility
- **Superior retrieval technology**
- Ready for use



Excellent feedback from
medical community!

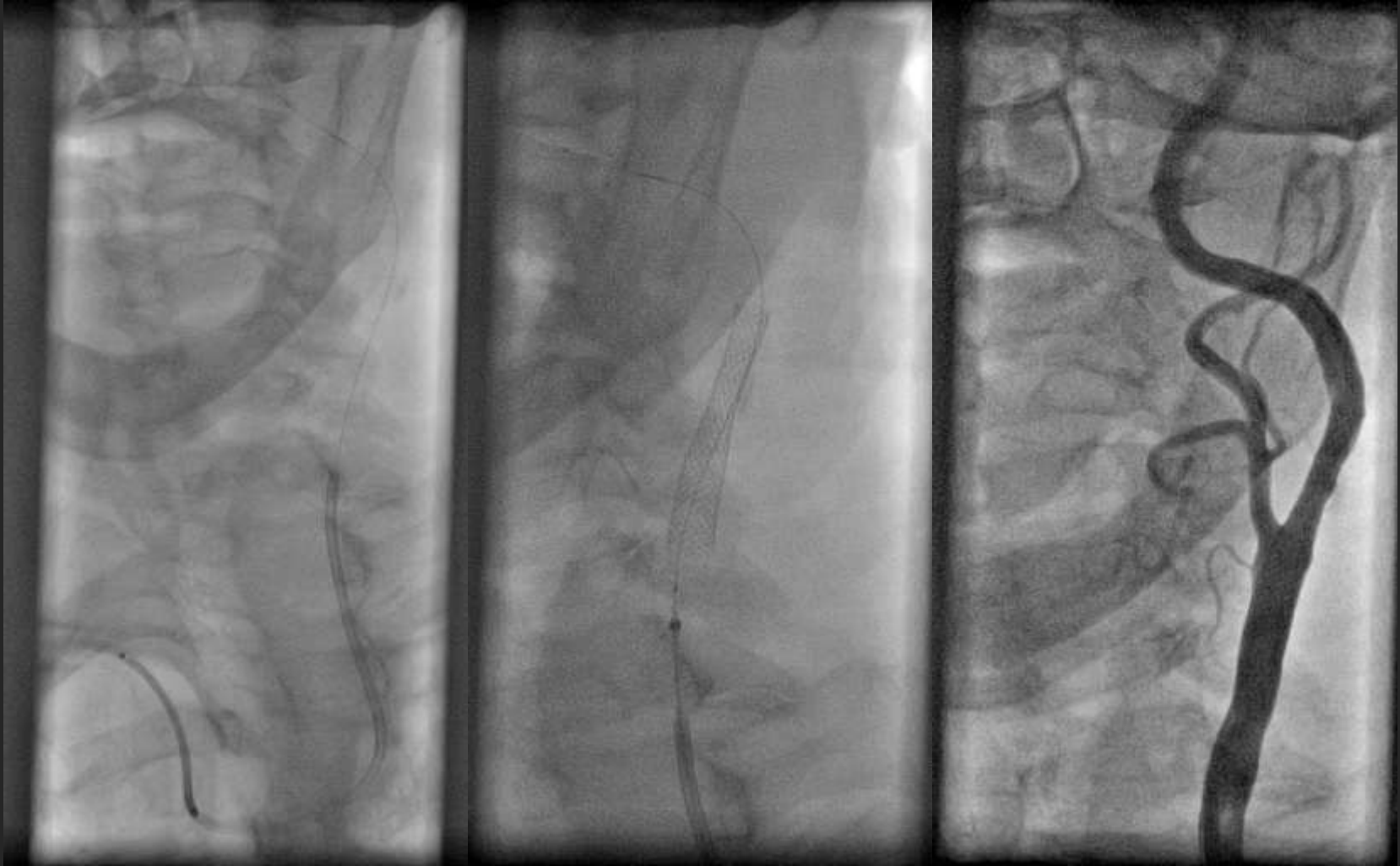
- ✓ Optimal wall apposition
- ✓ Strong capturing ability

Bovine Arch – not a problem with CAS from right radial access



Wiron Filter : very easy to cross the lesion with coronary 0.014" wire

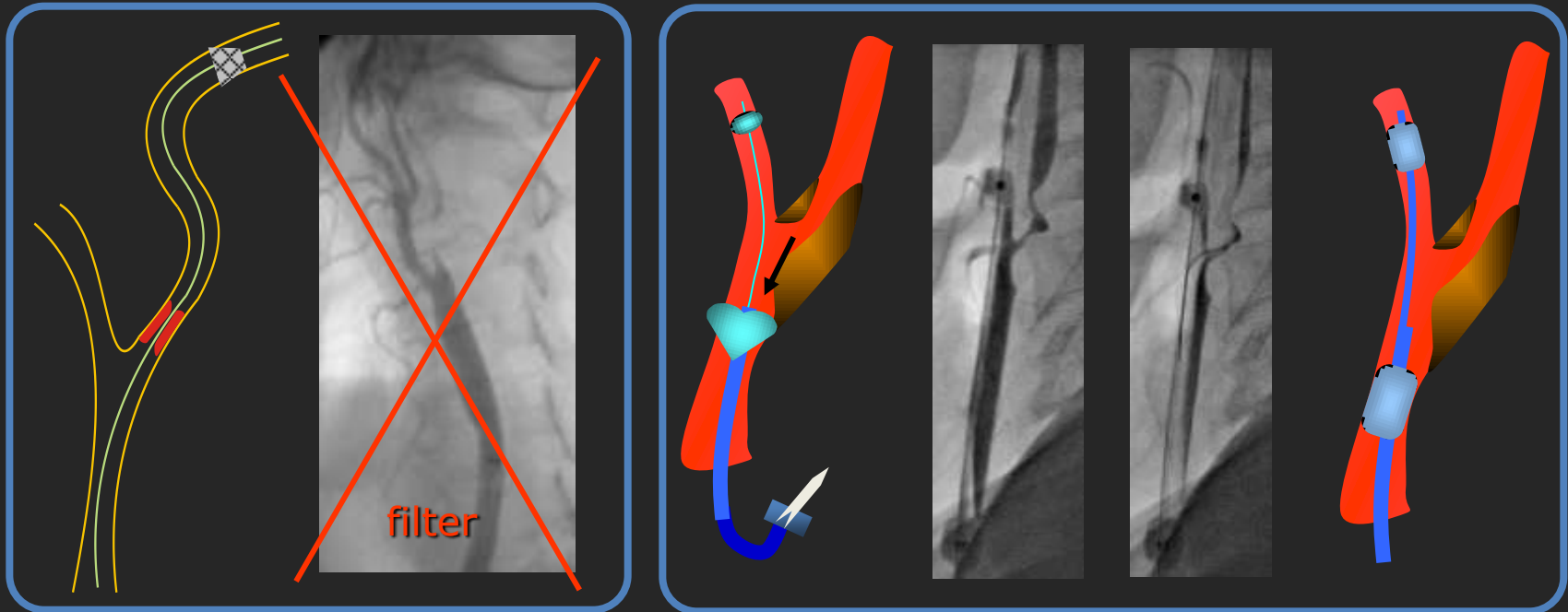
Bovine Arch – not a problem with CAS from right radial access



Conic soft tip facilitates easy advancing retriever **across the stent**

		Transradial	Transfemoral
Drugs	Pre-procedural	· ASA + Clopidogrel	· Aspirin + clopidogrel
	Peri-procedural	NaHeparin 50 IU/kg	NaHeparin 100 U/kg
	Antispasmodic cocktail	· 2,5 mg Verapamil · 200 µg NTG · 5000 IU of Heparin	
Puncture		· Special transradial sheath (6F, 11 cm) · Modified Seldinger technique	· 19 gauge needle · 0.035" J wire - Transfemoral sheath · Modified Seldinger technique
Aortography		- Simmons 1 of Pig tail	- Pig tail
Cannulation of the carotide arteries		-Simmons 1 5F catheter -Exchange technique over 260 cm Starter or Jindo wire -XF40 Guiding 7F	- HN1, JR4 5F catheter - Exchange technique over 260 cm Starter or Amplatz wire - 90 cm 6F sheath
Guidewire and EPD		Filter wire	Filter wire or MOMA
Sheath removal		Immediately after the procedure	Closure device in all cases
Pressure bandage		Elastic tourniquet for 6 hours (non occlusive bandage !)	Elastic tourniquet for 2 hours
Monitoring		Immediate	6 h after the procedure

Proximal flow reversal or flow blockage : why so important ?



- Protection works before the lesion is approached
- Backflow or stop flow prevents antegrade escape of debris
- Tight & tortuous lesions can be treated
- Guidewire of choice
- Protection system placed in the CCA & not in ICA (ICA is prone to vasospasm!)
- Proximal protection systems are easy to remove after procedure
- During filter retrieve, however, severe complications do occur

Tailored CAS: Protocol for Patient- and Lesion-Specific Selection of the Neuroprotection System and Stent Type



General direct stenting strategy

Soft/thrombus-containing plaque or a severe string-sign lesion in a symptomatic patient (Fig. 1A1, 1B, 1E)

Soft/thrombus-containing plaque or a severe string-sign lesion in a symptomatic patient with access vessel (severe iliofemoral atherosclerosis) or target vessel anatomy precluding the use of proximal NPD (e.g., severe ECA stenosis or diffuse CCA disease or severe CCA stenosis at the bifurcation)

Severe ICA angulation/tortuosity at bifurcation or severe calcifications (Fig. 1D)

Soft/symptomatic lesion coexisting with a severe ICA angulation/tortuosity

Severe calcifications on CT angiography

Non-severe echogenic or fibrotic/partly calcified asymptomatic lesion

Bilateral ICA stenosis (Fig. 1A)

Severe ICA/CCA diameter mismatch

Lack of optimal landing zone for a filter (Fig. 1B, 1D)

Lack of femoral access

Critical stenosis (particularly if symptomatic) + contralateral ICA/CCA occlusion (Fig. 1C)

Predilate only if very tight or highly calcified lesion according to duplex ultrasound, CTA, and angiography.

- (1) Use a proximal NPD (flow reversal if (non-critical) ECA stenosis or severe angulation that precludes the use of a (one-piece) proximal flow blockade system); if no ECA stenosis/tortuosity, either of the 2 proximal systems can be used.
- (2) Use a closed-cell stent (cobalt-alloy braided in a straight segment; nitinol if tortuous).

Use an independent-wire filter with 1.25- to 1.5-mm balloon dilation prior to filter delivery or a 6-F-compatible distal occlusion system.

Use an open-cell stent.

Consider a hybrid (open-cell/closed-cell/open-cell) stent.*

Consider cutting balloon predilation; avoid aggressive postdilation.

- (1) Use a distal NPD (Fig. 1A2).
- (2) Use open- or closed-cell stent (depending on the target segment tortuosity).

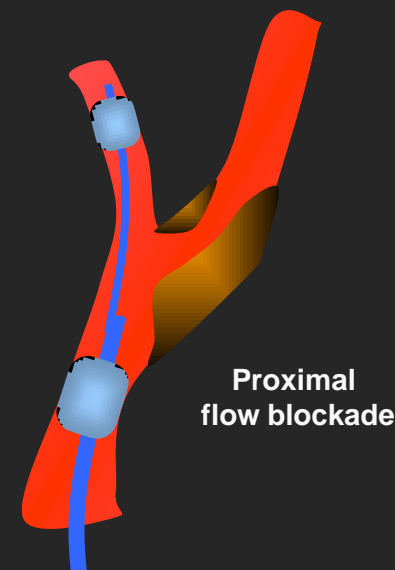
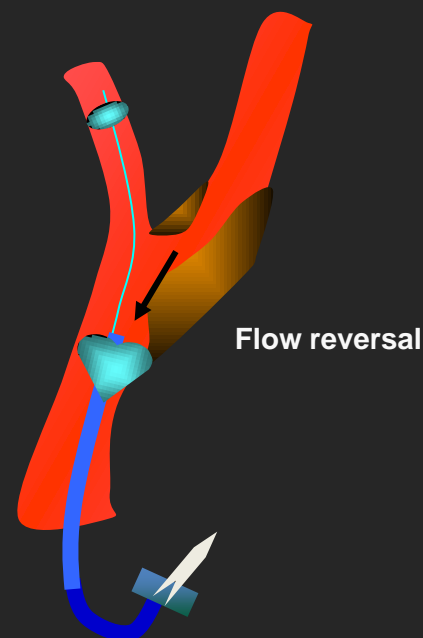
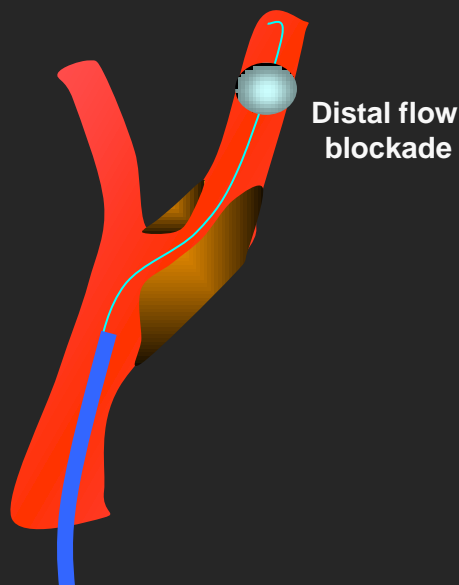
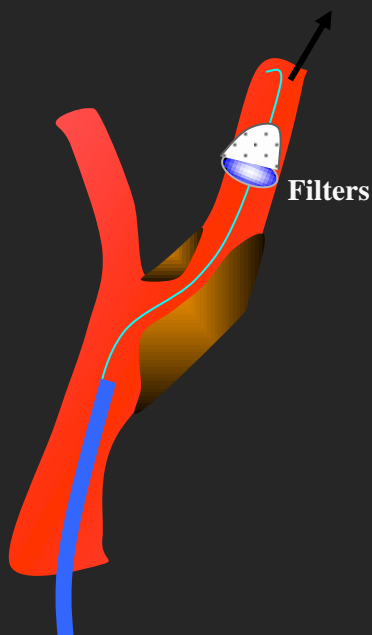
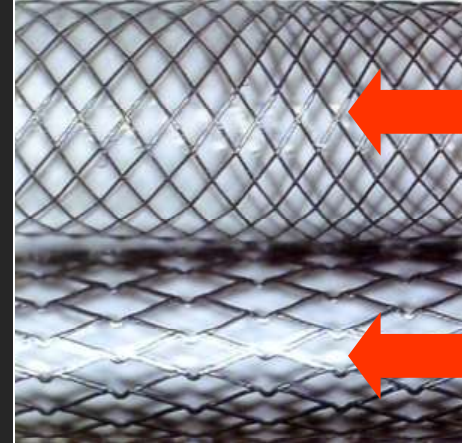
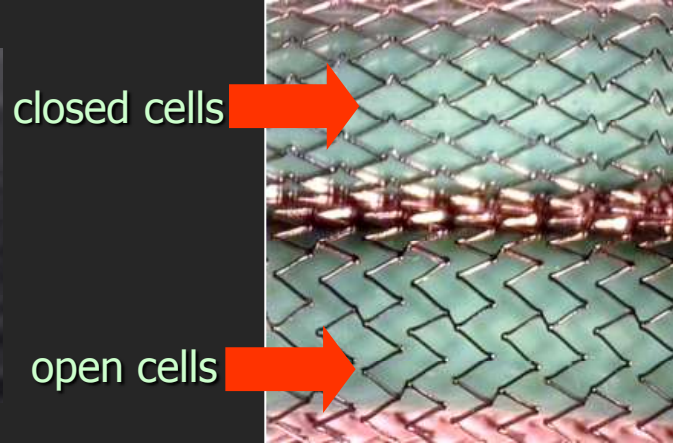
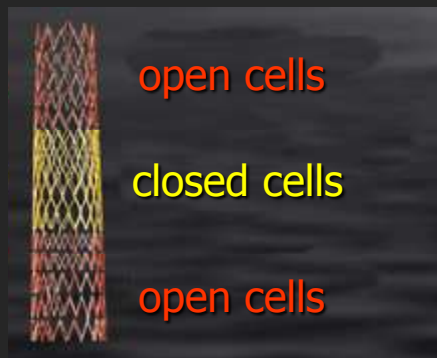
- (1) Consider treating the less severe lesion with distal NPD first.
- (2) If the contralateral lesion is tight/soft/symptomatic, treat it under proximal NPD (within a few days).

Consider using a tapered (nitinol) stent.

Use a proximal NPD; if not applicable (no femoral access, diffuse iliofemoral atherosclerotic disease, or severely angulated arch), use a distal occlusion system.

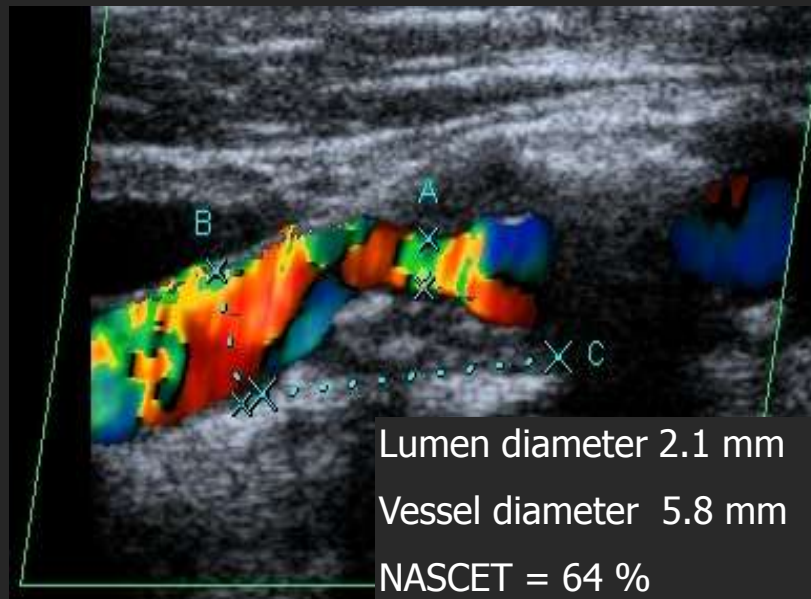
Use a transradial or brachial approach with a 6-F-compatible filter or distal occlusion system.

- (1) Consider proximal NPD (document collateral supply via the basilar and posterior communicating artery(-ies) on TCD).
- (2) If proximal NPD excluded, use an independent-wire filter with 1.25 to 1.5-mm balloon predilation prior to filter delivery (Fig. 1C).
- (3) Use a closed-cell stent.

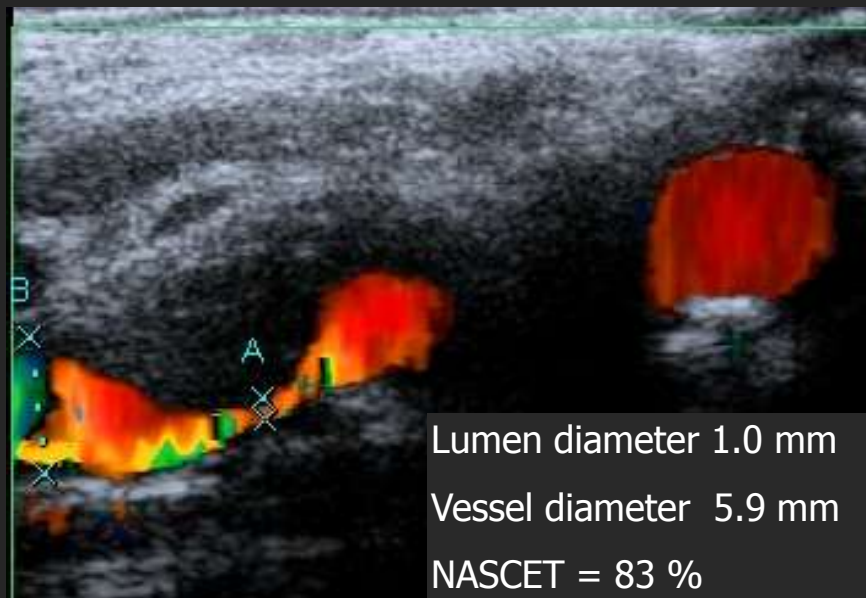
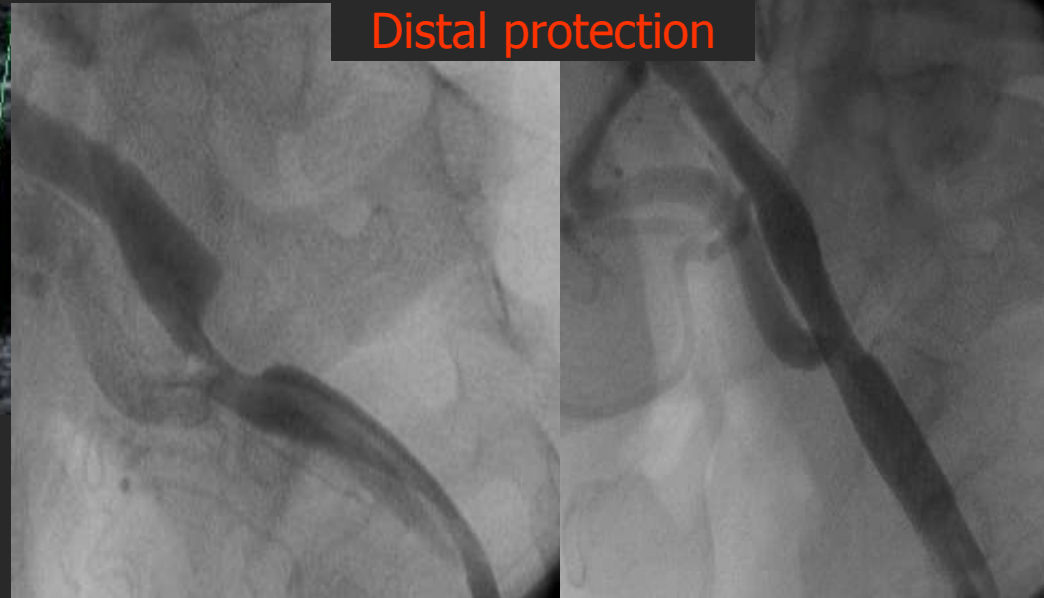


Neuroprotection device and stent selection
(should be) driven by plaque morphology!

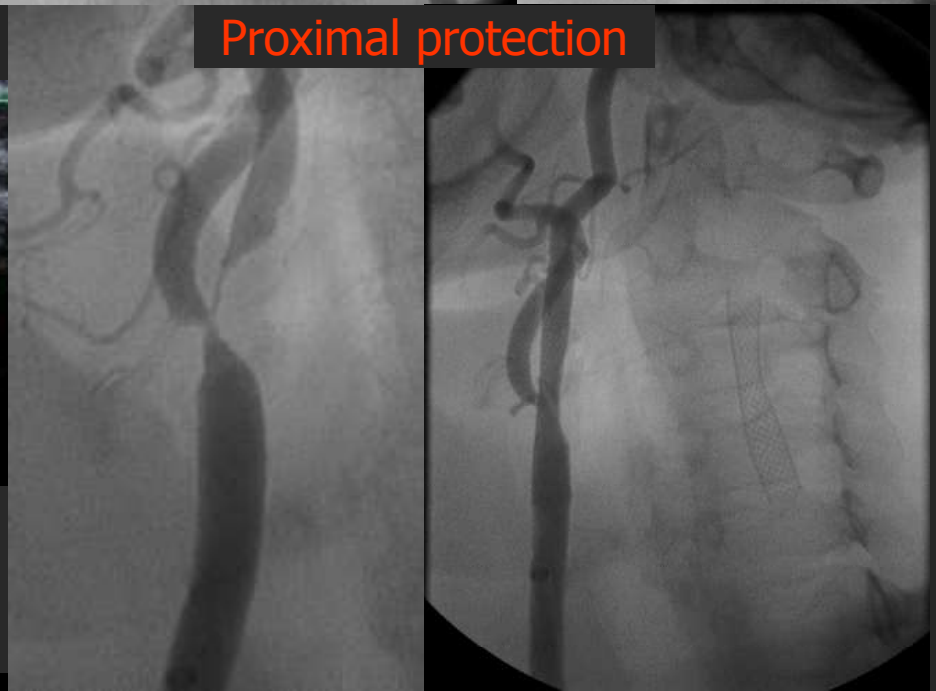
Our approach: PATIENT-AND-LESION-TAILORED NEUROPROTECTED CAS



Distal protection



Proximal protection



Proximal endovascular occlusion for carotid artery stenting: results from a prospective registry of 1,300 patients.

Stabile E et al

Invasive Cardiology Laboratory, Cardiology Division, Clinica Montevergine, Via Mario Malzoni 1, Mercogliano, Italy.
geko50@hotmail.com

RESULTS: The 30-day stroke and death incidence was 1.38% (n = 19). Operator experience, symptomatic status, and hypertension were found to be independent predictors of adverse events.

J Am Coll Cardiol. 2010 Apr 20;55(16):1661-7.

Carotid artery stenting according to 'tailored-CAS' algorithm is associated with low complication rate: data from on-going TARGET-CAS registry.

Materials and methods: Between 2002 and 2010, we performed 1176 CAS in 1081 patients [pts, age 38-86y, mean 66.3±8.4y, 51.5% symptomatic (S)] according to 'tailored-CAS' algorithm

Results: Thirty-day complications rate (death/any stroke/MI) was 2.38%. Age >75y was a predictor of death (p=0.015). The presence of prior neurological symptoms was a predictor of death/stroke (p=0.030).

P Pieniazek et al., Kardiologia. 2012;70(4):378

What does **high risk** lesion mean ????



long filiform
irregual contra
lateral ICA
occlusion



symptomatic
ICA occlusion



thrombus containing
lesion



lesion after
radiotherapy

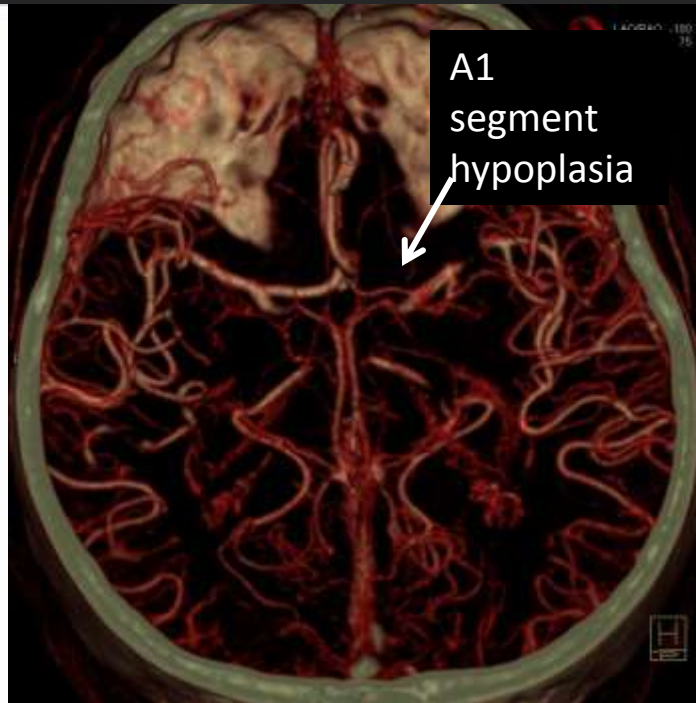
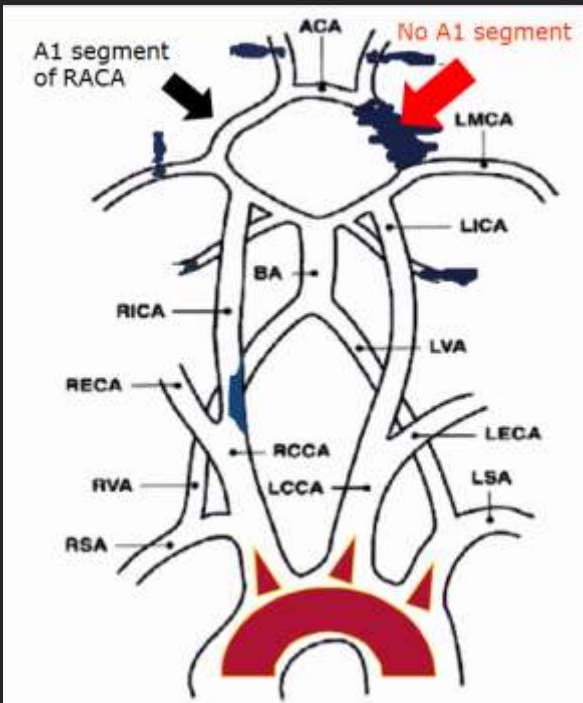


huge plaque
burden



CCA / ICA tight
stenosis

How to predict proximal protection intolerance



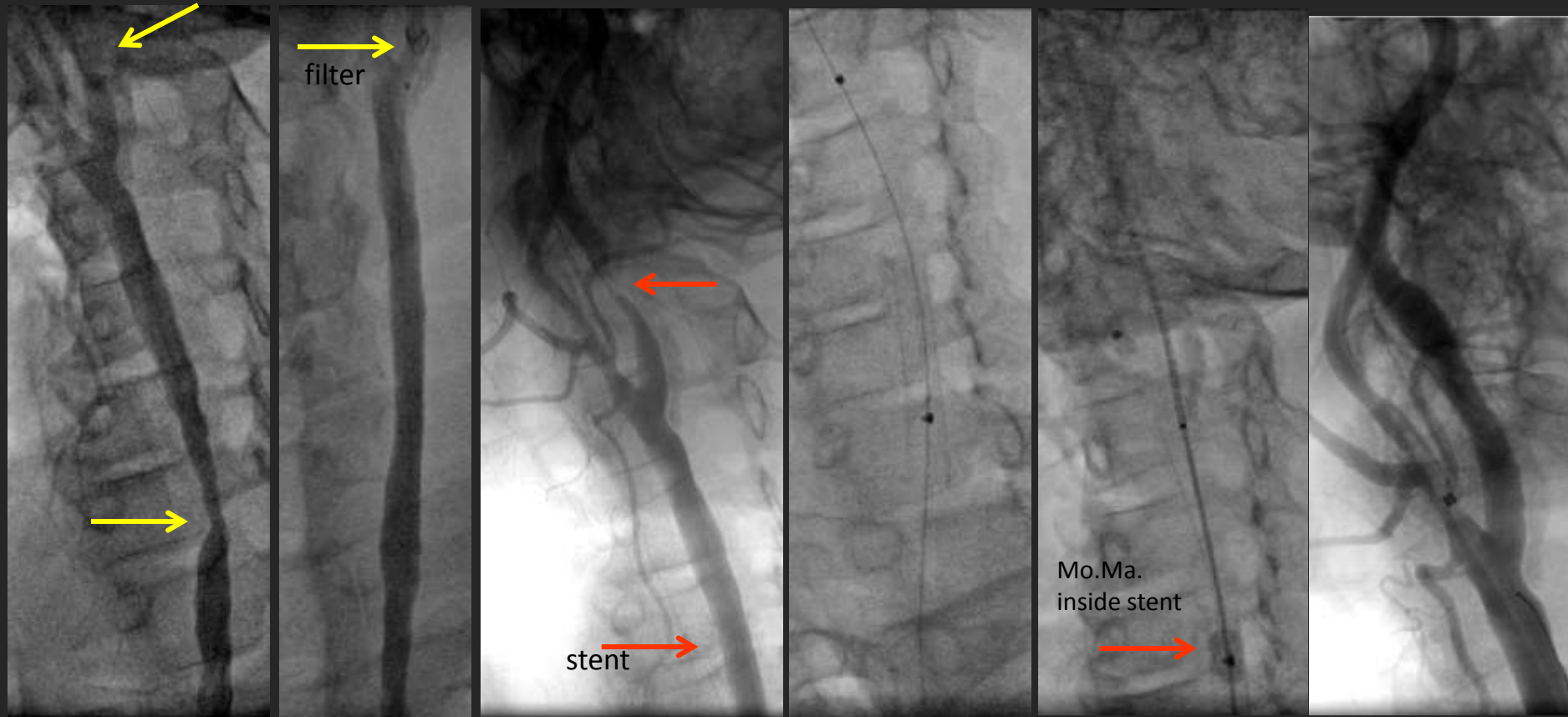
How to predict proximal protection intolerance

52 yo pt.: Symptomatic spontaneous RICA dyssection



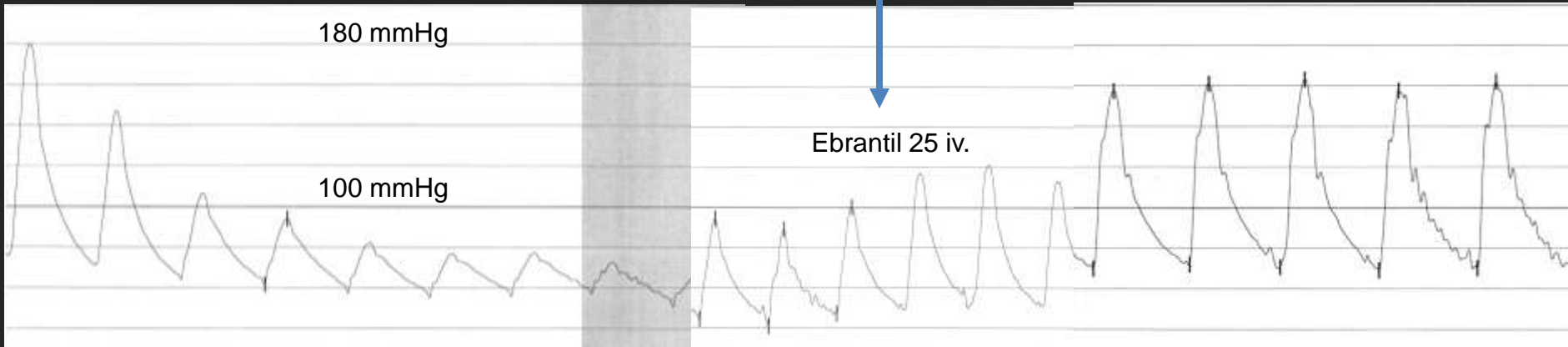
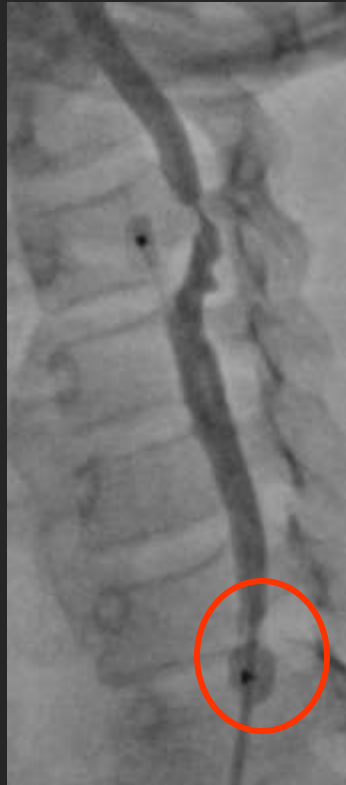
IVUS verification of wire position + proximal protection + close cell stent without postdilatation !!!!!

Pt 49y with LICA and LCCA stenosis. **Always** make **angio** also **CCA** before proximal EPD insertion: **First stage** Filter protected LCCA stenting. **Second stage** Mo.Ma protected LICA stenting.



Don't believe ultrasographer check always CCA

Slow 'restitution' of ICA flow under BP control...



might reduce risks of 'bombarding' the brain with sudden and rapid ICA flow !!

CREST Study

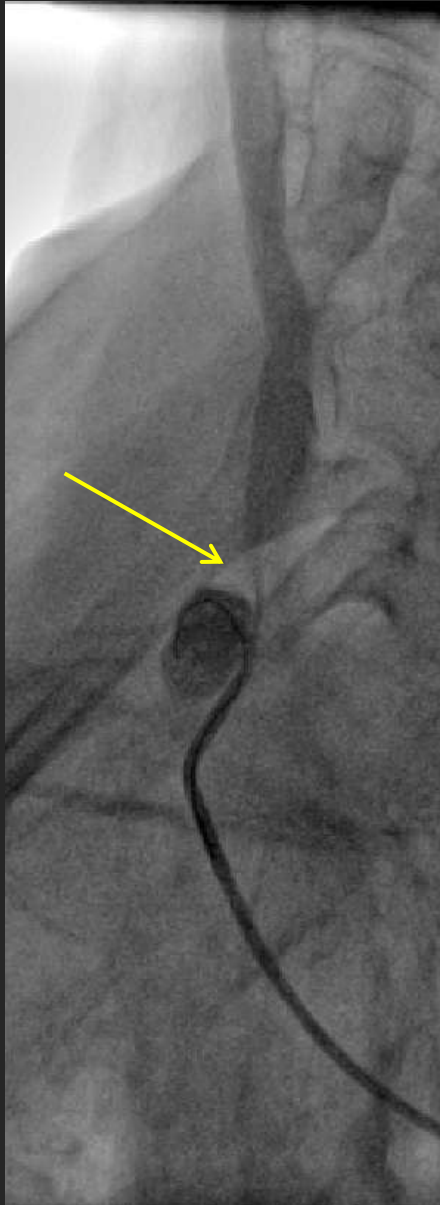
Target CAS Study

P.Pieniazek et al. 2012

	CAS (N = 1262)	Complications at 30 days	CAS procedures (1176) N (%)	p
Death	9 (0.7±0.2)	Death	7 (0.59)	0.6
Stroke				
Any	52 (4.1±0.6)	Any stroke	21 (1.79)	<0.001
Major ipsilateral	11 (0.9±0.3)			
Major nonipsilateral	0			
Minor ipsilateral	37 (2.9±0.5)			
Minor nonipsilateral	4 (0.3±0.2)			
Myocardial infarction	14 (1.1±0.3)			
Any periprocedural stroke or postprocedural ipsilateral stroke	52 (4.1±0.6)			
Major stroke	11 (0.9±0.3)	Major stroke	1 (0.08)	<0.006
Minor stroke	41 (3.2±0.5)	Minor stroke	20 (1.70)	<0.022
Any periprocedural stroke or death or postprocedural ipsilateral stroke	55 (4.4±0.6)			
Primary end point (any periprocedural stroke, myocardial infarction, or death or postprocedural ipsilateral stroke)	66 (5.2±0.6)	Death/any stroke/MI	28 (2.38)	<0.001

Tailored CAS strategy is associated with a lower outcome than CAS procedure performed with only one type of stent and one distal NPD device use!!

Pt. 70 y.o. – history of radiation therapy of jaw cancer 10 y ago



**CEA –
contraindicated**

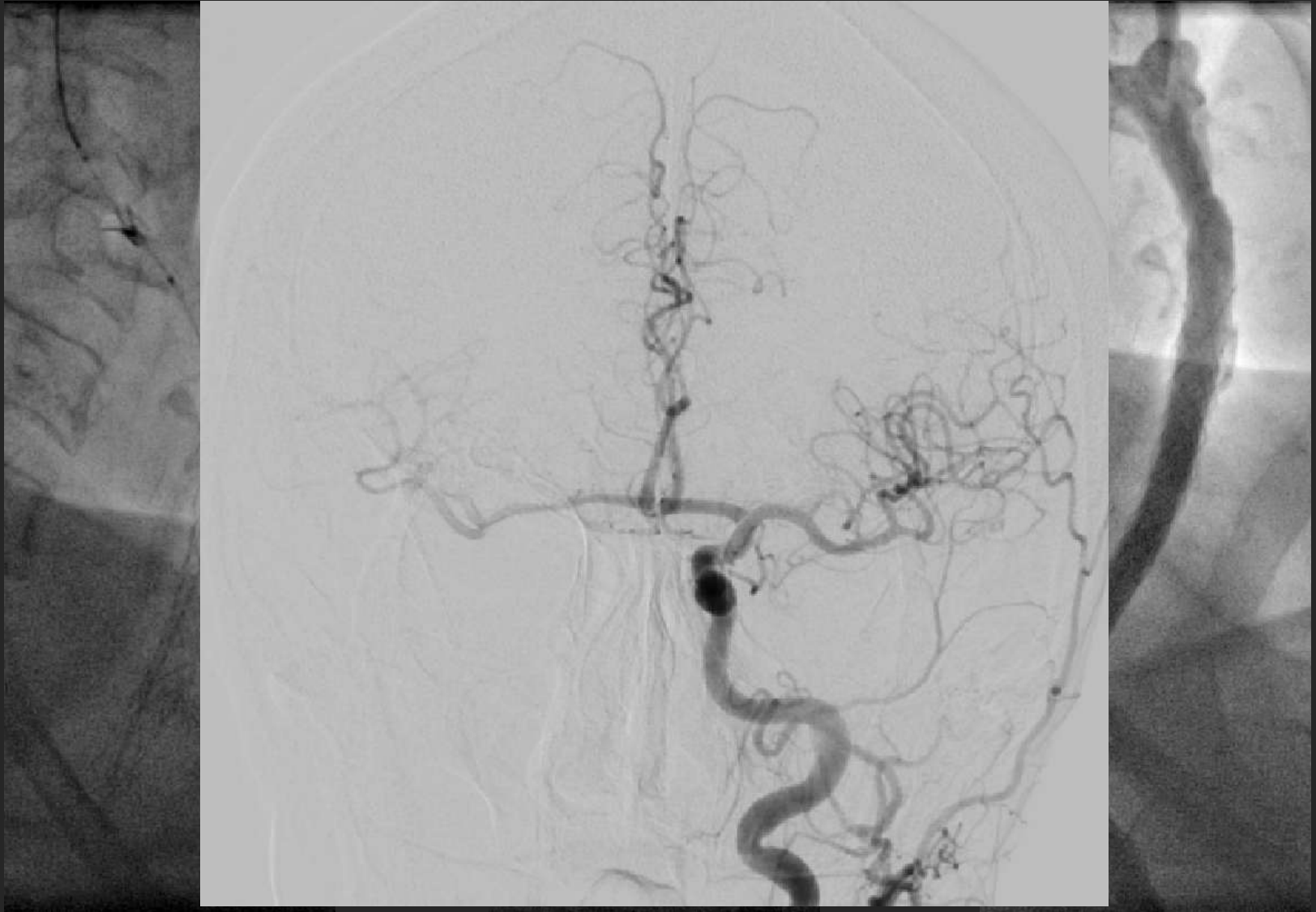
**CAS – high risk
for distal
embolization !!!**

XXI technology !!!!!!!

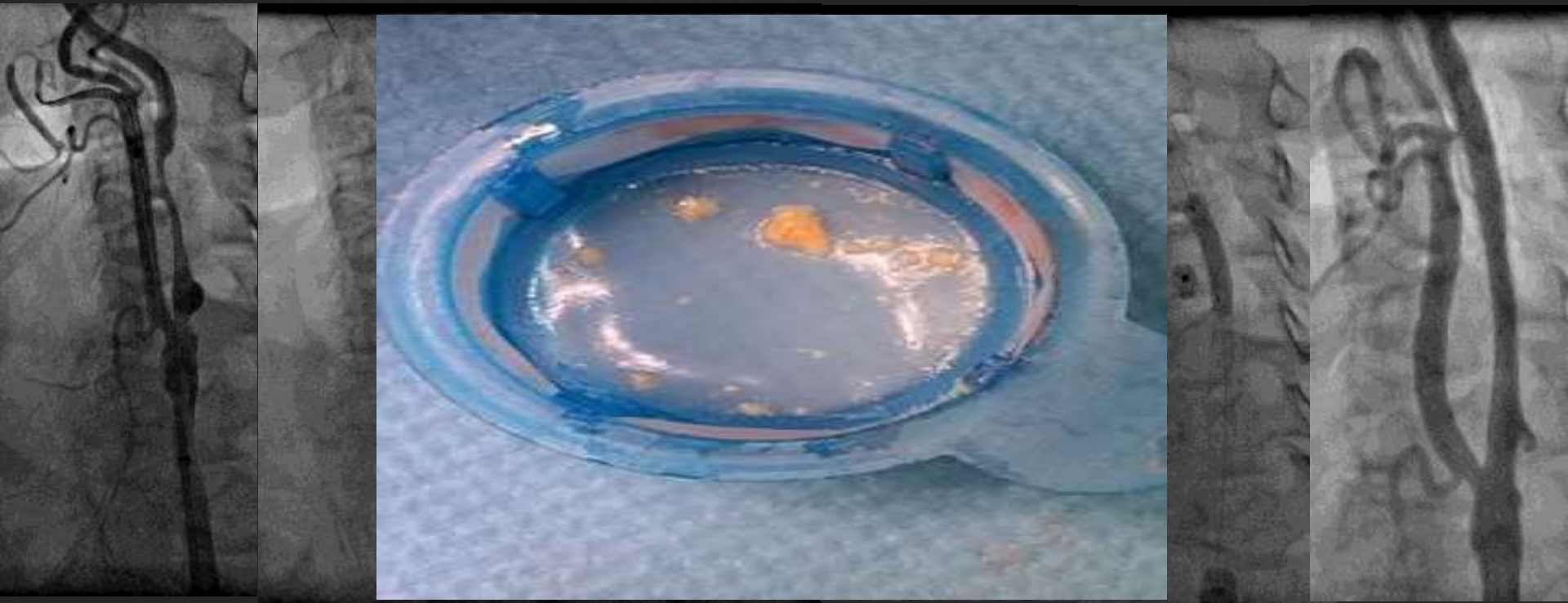
MESHSTENT –Roadsaver optimal strategy for safe CAS procedure



Uncomplicated CAS procedure with Roadsaver stent implantation

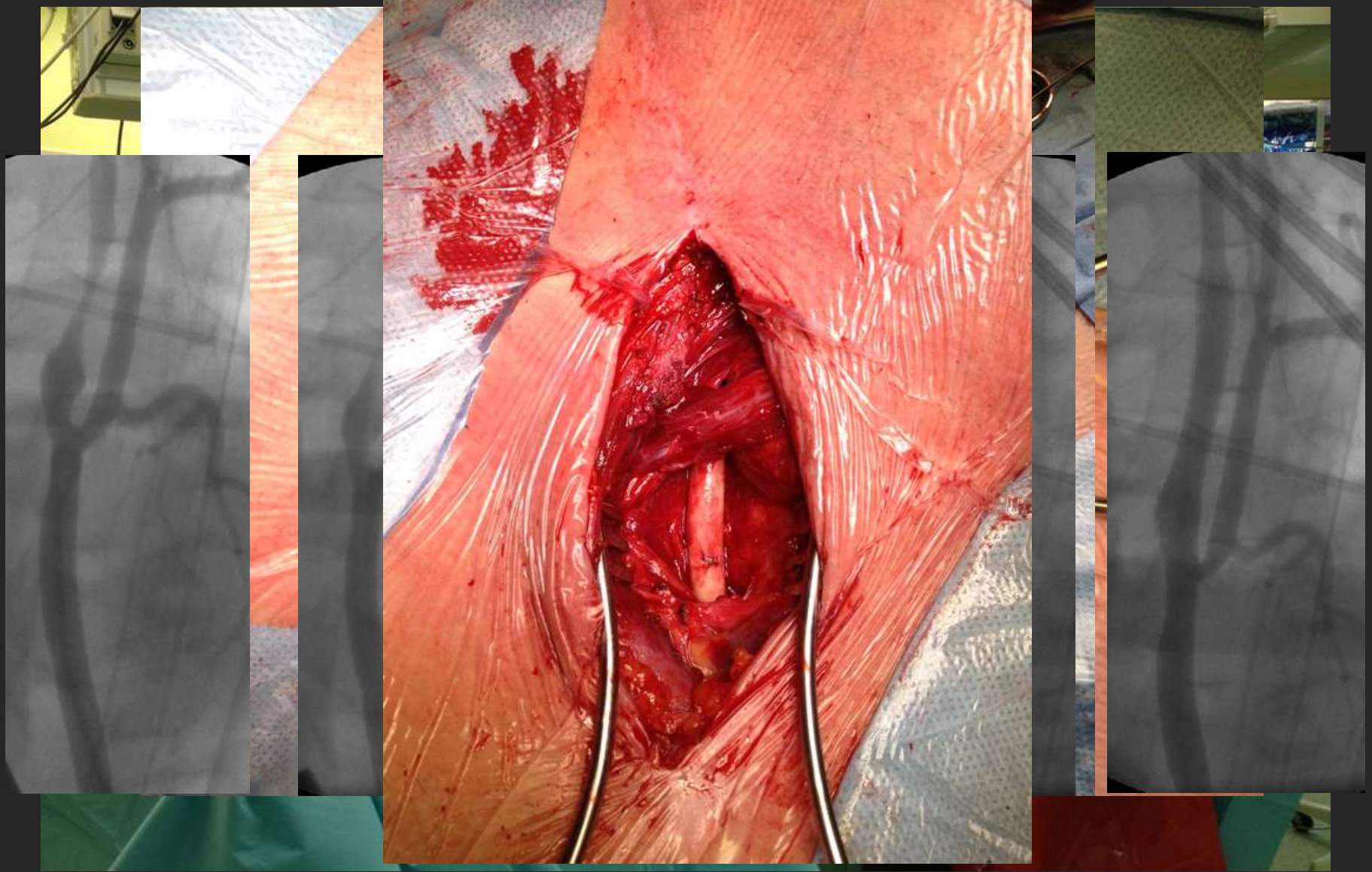


Long asymptomatic LICA lesion with huge plaque burden



The safest option for CAS procedure in 2015 -
Mo.Ma + Roadsaver stent

**HYBRID CAS PROCEDURE IN PTS WITH RESTENOSIS AFTER CEA :
DIRECT SURGICAL ACCESS TO LCCA !!!!!!
STENT INPLANTATION UNDER DISTAL PROTECTION.**



Conclusion

- ❖ A novel treatment strategies for CAS are tested.
- ❖ Transradial access is the only option for patients with PAD, aortic arch anomaly and carotid atherosclerosis.
- ❖ Proximal protection (Mo.Ma) and micromesh stents should be used whenever possible in high risk patient/lesion to maximize the benefit of neuroprotection in CAS.
- ❖ In 2015 each operator performing CAS should be trained in proximal neuroprotection used according to present data from registries, trials and meta analyses .