

IV Curso “José Gabay” para Intervencionistas en Entrenamiento de ProEducar - SOLACI

Types and Selection of Stents and Carotid Protection Systems



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Stents en las arterias carótidas. Tipos – Diferencias. Ventajas y desventajas

Lesiones en Carótidas:
Localización

Intratorácicas:

Cervicales:

- Carótida primitiva
- Bifurcación Carotídea
- Carótida Interna



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Lesiones Intratorácicas

- Generalmente ostiales.
- Generalmente muy calcificadas.
- Generalmente con enfermedad de la arteria de origen.
- Generalmente lesiones cortas.
- Sitio exento de compresión externa.

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¿Qué se requiere de un stent?

- Precisión en el implante.
- Elevada fuerza radial.

Stent Expandible por Balón

PALMAZ Genesis™



Express™ Vascular SD/LD
 Balloon-Expandable Stents



Micro™ Elements give Express SD/LD flexibility during placement.

Macro™ Elements give Express SD/LD strength and radial support.



Micro™ Elements for enhanced Medtronic fit for better k...

RX Herculink



Medtronic RACER
 Over-the-Wire Biliary Stent System

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Stents en las arterias carótidas. Tipos – Diferencias. Ventajas y desventajas

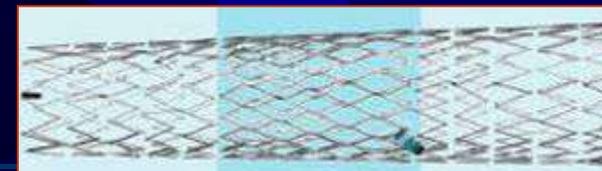
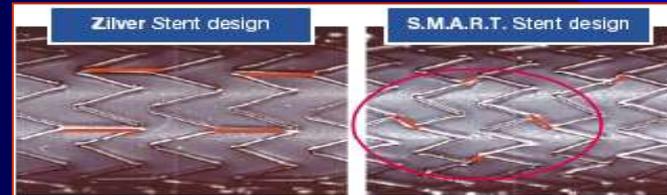
Lesiones Carotídeas Cervicales: Elección del Stent

- Propiedades mecánicas del stent.
- Características anatómicas de la arteria y la lesión.
- Preferencia personal (experiencia y familiaridad)

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Tipos de Stents

- Braided Mesh Stents (Malla entrelazada):
Carotid WallStent, Expander
- Segmented Crown Stents: Open Cell Design:
Precise, Smart, Zilver, Protegé
- Laser Cut Tube Stents: Close Cell Design:
Acculink, X-Act
- Flat Rolled Sheet: Close Cell Design:
NexStent
- Hybrid: Open and close cell design
Cristallo



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CARACTERÍSTICAS TÉCNICAS	Braided Mesh	Segmented Crown Open Cell Design	Laser Cut Tube Close Cell Design	Flat Rolled Sheet Close Cell Design
Foreshortening	Significant > 15%	Insignificant < 15%	Insignificant < 15%	Insignificant < 15%
Conformability (Tortuosity)	+	+++	-	+
Vessel Wall Adaptability (Taper)	+	+++	+	++
Scaffolding	++	+	++	++
Outward Radial Force	+	++	+++	+
Resistance to Compression	+	+	++	++
Lesion Covering	+++	-	++	++

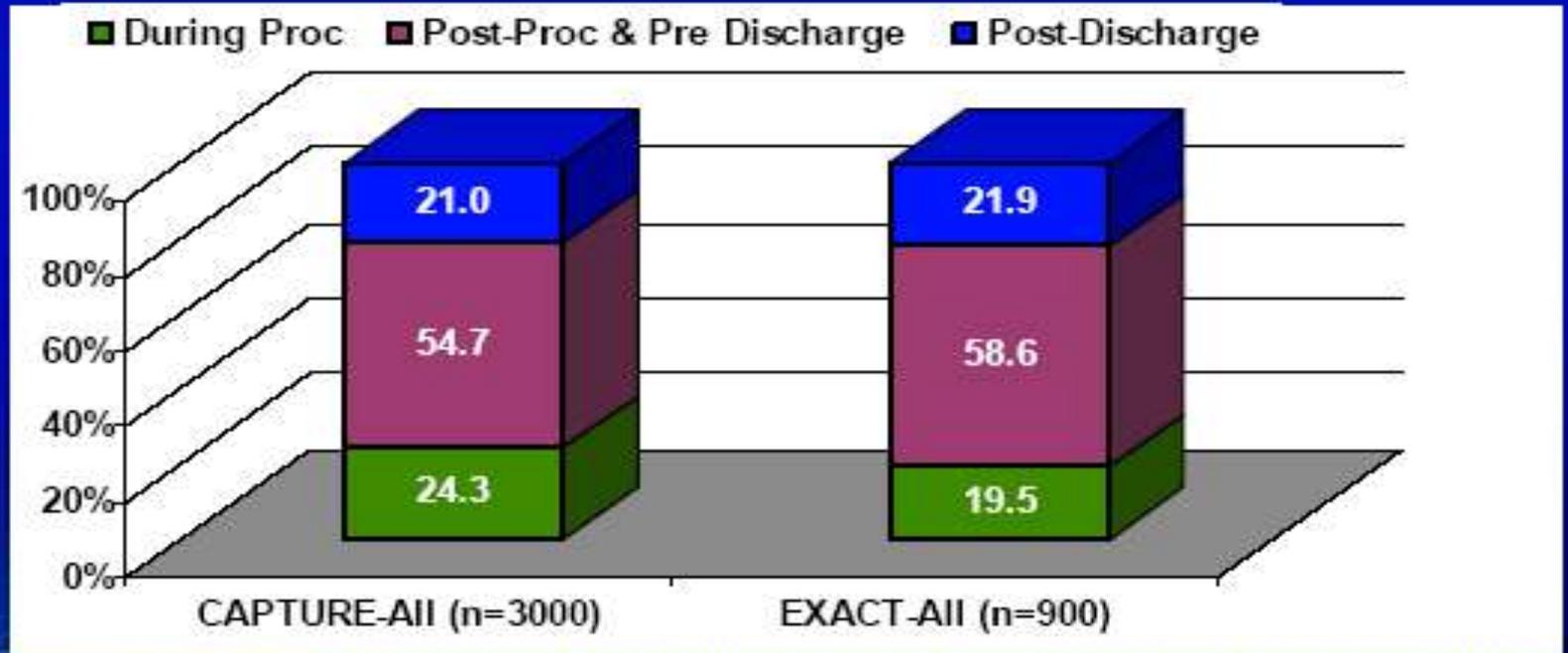
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Stents en las arterias carótidas. Tipos – Diferencias. Ventajas y desventajas



CARACTERÍSTICAS DE LA LESION	Braided Mesh	Segmented Crown Open Cell Design	Laser Cut Tube Close Cell Design	Flat Rolled Sheet Close Cell Design
Larga, blanda, no homogénea	+++	-	++	++
Corta, calcificada	+	++	+++	++
Enderezamiento del vaso	++	-	++	+
Mantener la anatomía original	-	+++	-	+
Seguir el contorno de lesiones complejas	-	+++	-	-
Prevenir el prolapso de placa	+++	-	+	++
Lesión focal en ICA/CCA	Stent Recto			
Mismatch CCA-ICA	Tapered Stent			

CAPTURE 3000 vs. EXACT 900: Timing of Stroke



The majority of strokes occur post-procedure and before discharge

Preliminary Results

“Free cell area” based analysis

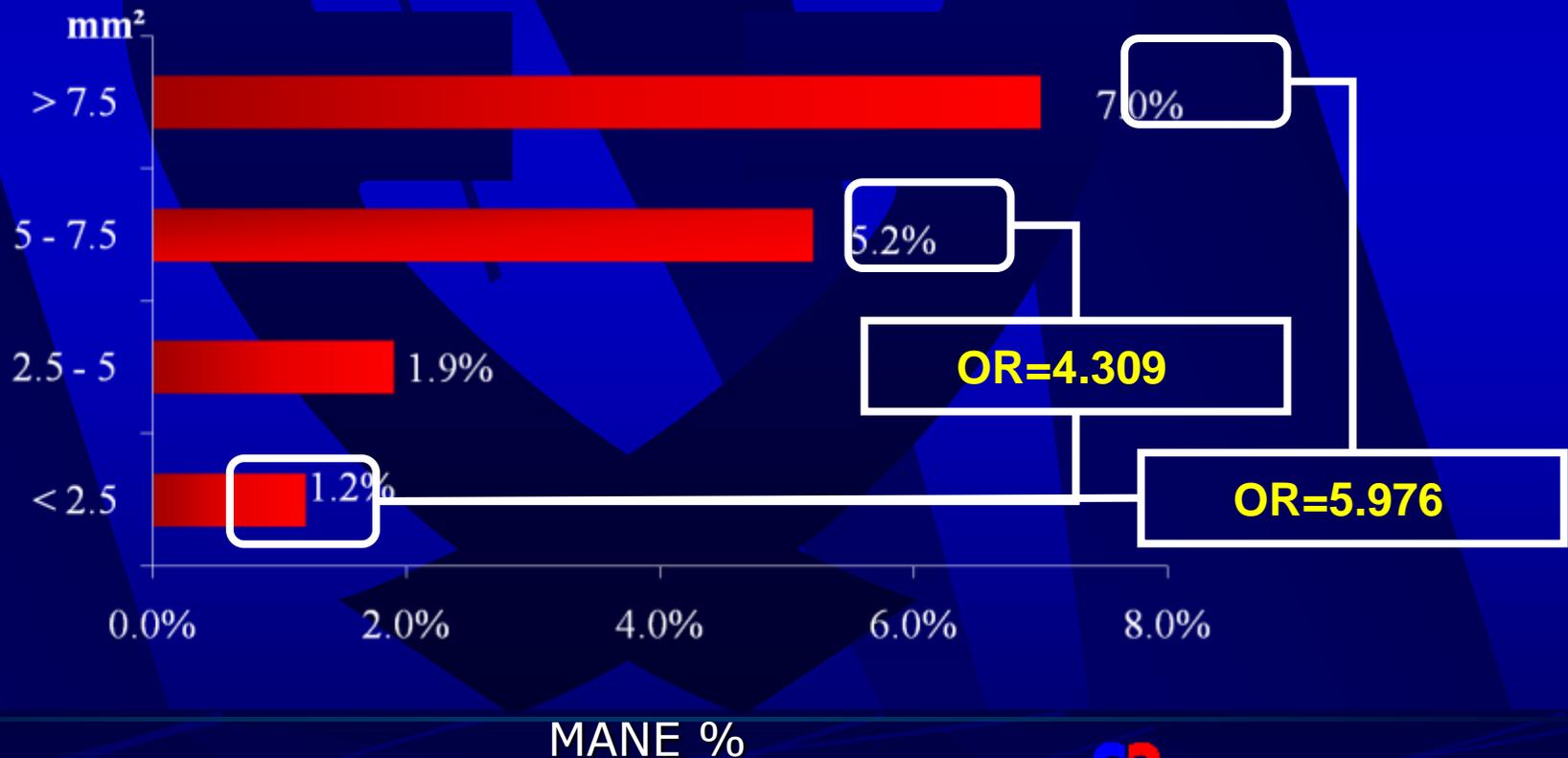


“Free cell area” based analysis

Post-procedural neuro events:
Symptomatic population

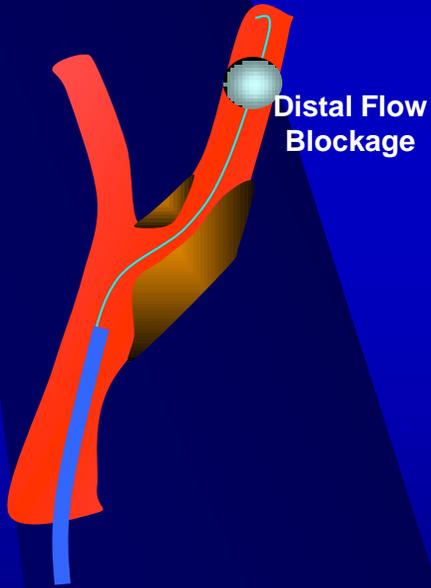
Open cell

Closed cell



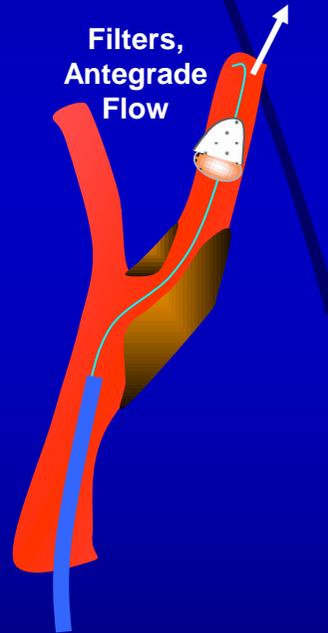
Cerebral Protection Strategies

Distal Flow Blockage
by ICA Occlusion



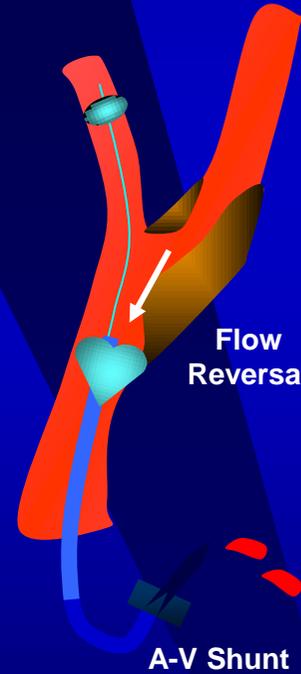
Guardwire Plus
Twin One

Distal ICA
Filtering



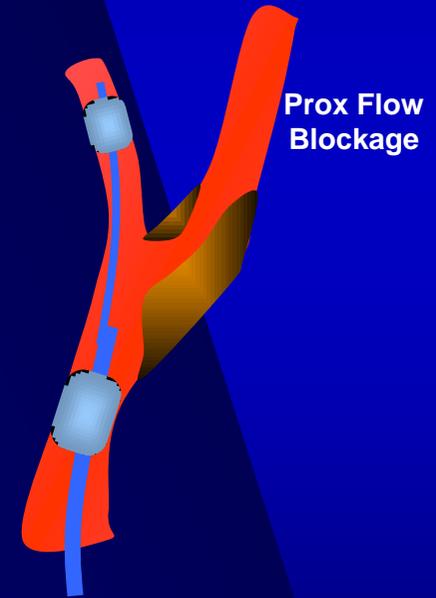
Filters

Flow Reversal by CCA
and ECA Occlusion



Gore device

Proximal Flow
Blockage by CCA
and ECA
Occlusion



MOMA

Cerebral Protection Devices & Personal Experience

- **Distal Occlusive Balloon:**

Theron System.

GuardWire Plus. PercuSurge™. Medtronic.

Twin One. Mynvasis

- **Filters:**

Filter Wire EZ™. Boston Scientific.

Angioguard™. Cordis J&J.

Spider™

Accunet™. Abboth

EmboShield™. Abboth.

Rubicon. Boston Scientific.

Others.

- **Reversal Flow and Flow Blockage:**

PAES®. Parodi Anti-Embolism System. Gore

MOMA. Medtronic.

Distal Occlusive Balloons

✱ Advantages:

Low profile.

Block all possible particles embolization after crossing

✱ Disadvantages:

Stop ICA flow while inflated (~ 4-5% intolerance)

Particles dislodgement when crossing.

Potential distal trauma. (dissection or spasm where the balloon is inflated).

Saline flush can embolize particles through the EC.

Wire's lack of support (Guardwire plus).

Not friendly to use (Guardwire plus)

Stenting without protection (TwineOne)

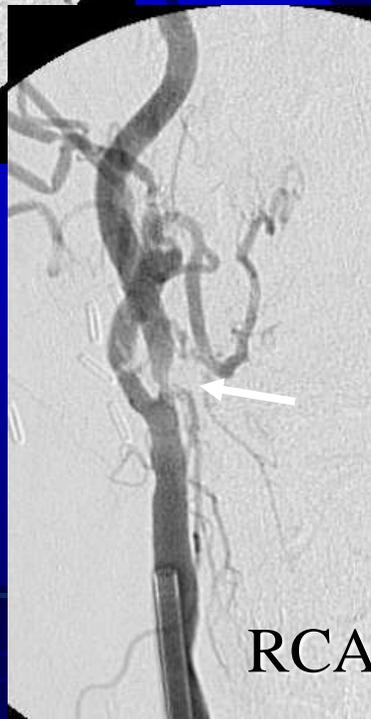
Distal Occlusive Balloons

Not Good Candidates:

- **Contralateral occlusion or critical stenosis.**
- **Willis' Circle abnormalities.**
- **Subtotal obstructions**
- **Tortuous ICA.**
- **High or intracranial lesions.**
- **Beginners.**



LCA

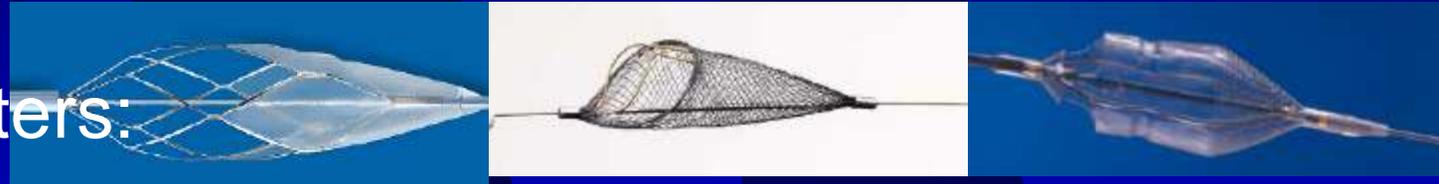


RCA



Filter Devices

- Over-the-wire Filters:



Advantage: easy to cross tight lesion and curves with bare wires.

Disadvantage: more steps for using.

- On-the-wire Filters:

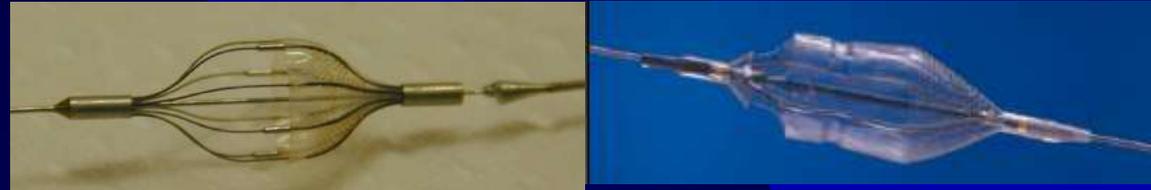


Advantage: One step positioning

Disadvantage: Difficult to cross very tortuous vessel or tight lesions.

Filter Devices

- Concentric Filters:



Disadvantage: they need an straight landing zone. More rigid.

- Eccentric Filters:



- Self Centering Filters:



Advantage: shorter straight landing zone. More flexible. Better artery wall appositioning.

Filter Devices

✱ Advantages:

Maintain the ICA flow.

Easy to use.

Profile ?.

✱ Disadvantages:

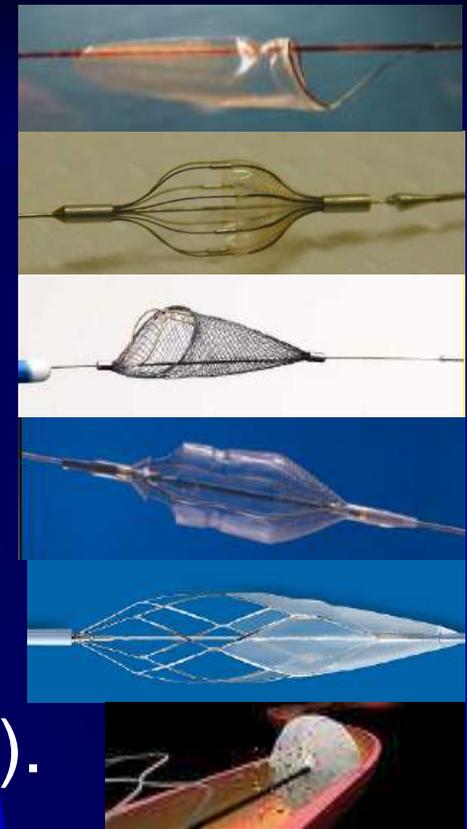
Allow small particles flow ($\pm 80-120 \mu\text{m}$).

Particles dislodgement when crossing.

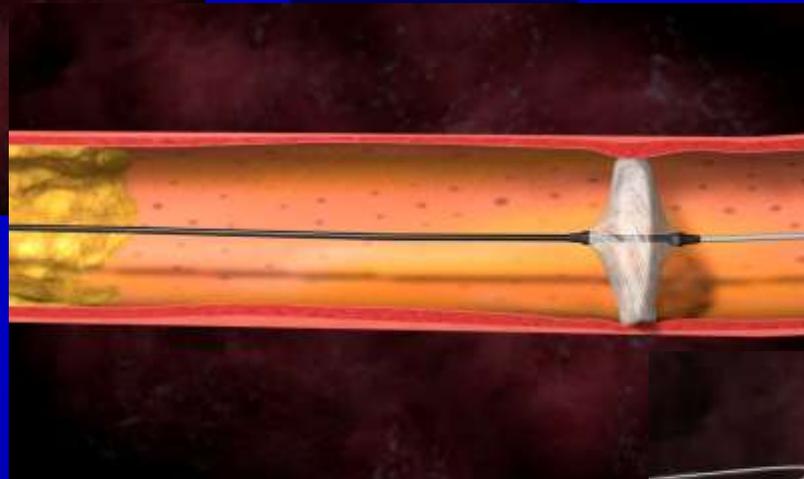
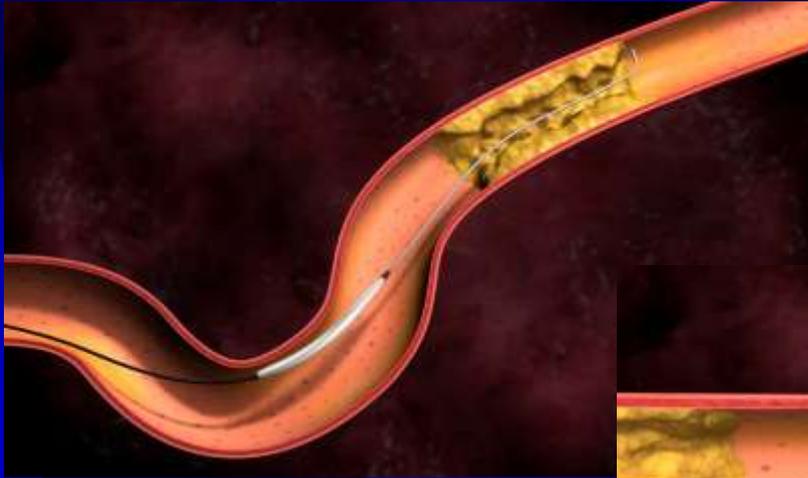
Potential trauma at distal landing zone. (*dissection or spasm where the filter is deployed*).

Profile ?.

Flexibility ?

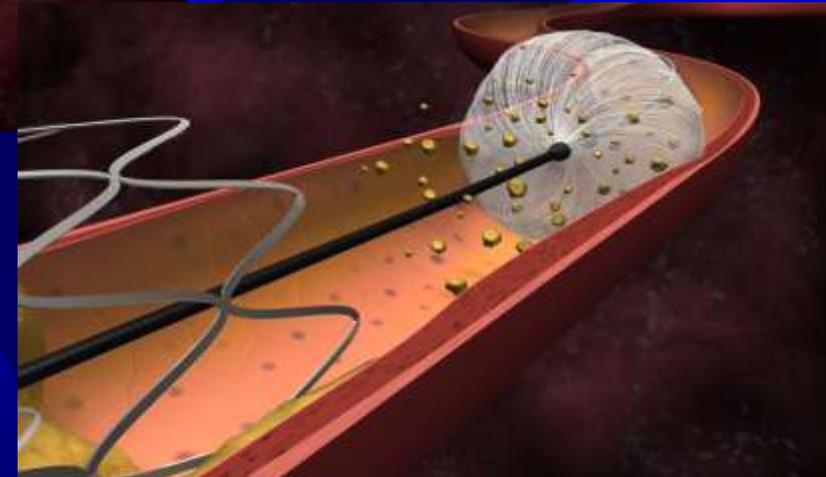


EPIC FiberNet[®] EPS



Fiber-based filter conforms to asymmetrical vessels

No delivery system required
with a crossing profile
1.7 to 2.9 F



Particle entrapment as
small as 40 μm



Protection Devices Differences



✿ Reversal Flow / Flow Blockage Systems :

✿ Advantages:

Lesions are crossed under protection.

No particles embolization through ECA.

✿ Disadvantages:

Can not be well tolerated (*contralateral disease, Willis circle abnormalities*)

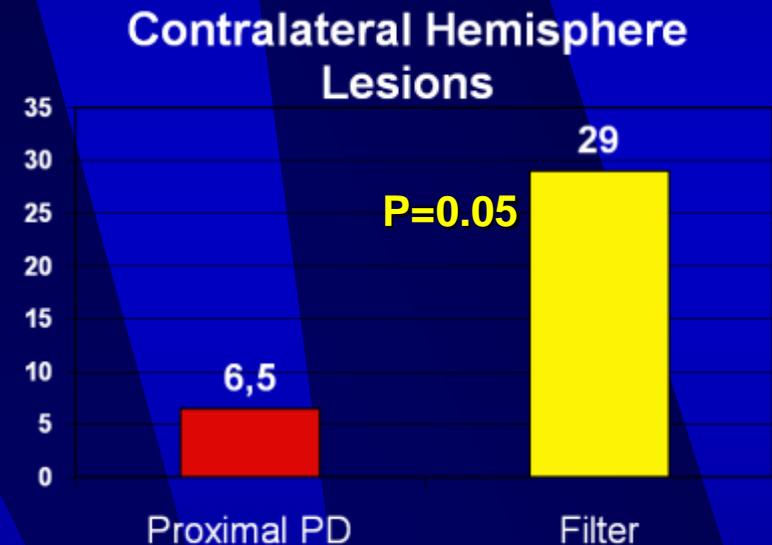
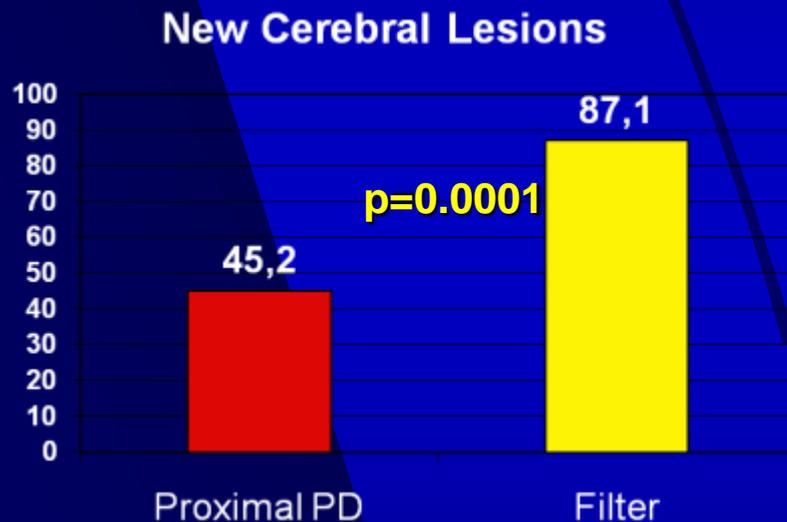
Difficult to use at bifurcational lesions.

Potential dissection, spasm or trauma where the balloon is inflated.

Look unfriendly to use.

Proximal Protection vs. Filter: The PROFI Trial

Diffusion-weighted MRI evaluation
CAS Ptes randomized to PPD (31) vs. Filter D (31)



PPD vs. Filter:

The number (median [range]: 0 [0 to 4] vs. 2 [0 to 13]), p=0.0001

The volumen (0 [0 to 0.84] cm³ vs. 0.47 [0 to 2.4] cm³), p=0.0001

Proximal Protection vs. Filter: The PROFI Trial

Diffusion-weighted MRI evaluation
CAS Ptes randomized to PPD (31) vs. Filter D (31)

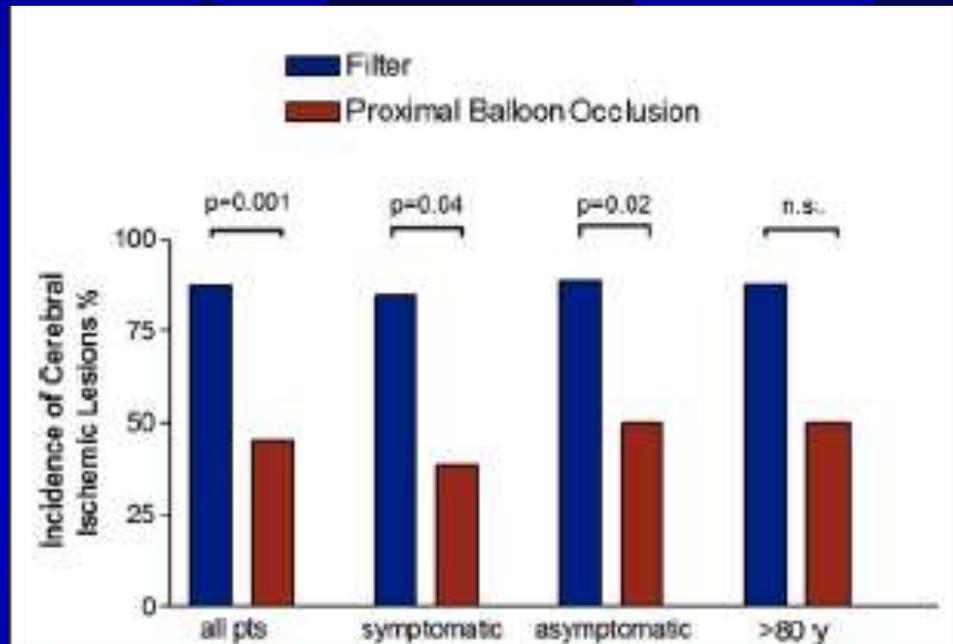


Figure 2 Incidence of New Ischemic Lesions in Patients With Filter Protection Versus Proximal Balloon Occlusion

In addition, symptomatic patients, asymptomatic patients, and patients >80 years of age are displayed.

Conclusiones

- No existe un stent ni un sistema de protección ideal para todos los casos.
- Distintos stents y SPs tienen distintas características en las que sobresalen sobre los demás.
- Distintas lesiones requieren priorizar distintas características del stent y del SP a utilizar.
- La disponibilidad de distintos tipos de stents y SPs, su correcta elección en cada paciente debería mejorar la seguridad de la angioplastia carotídea.



Thank you for your attention