Update in Carotid Artery Stenting &Stroke Management

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How to choose the best therapy?

My Indications are based on anatomy

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Potential conflicts of interest

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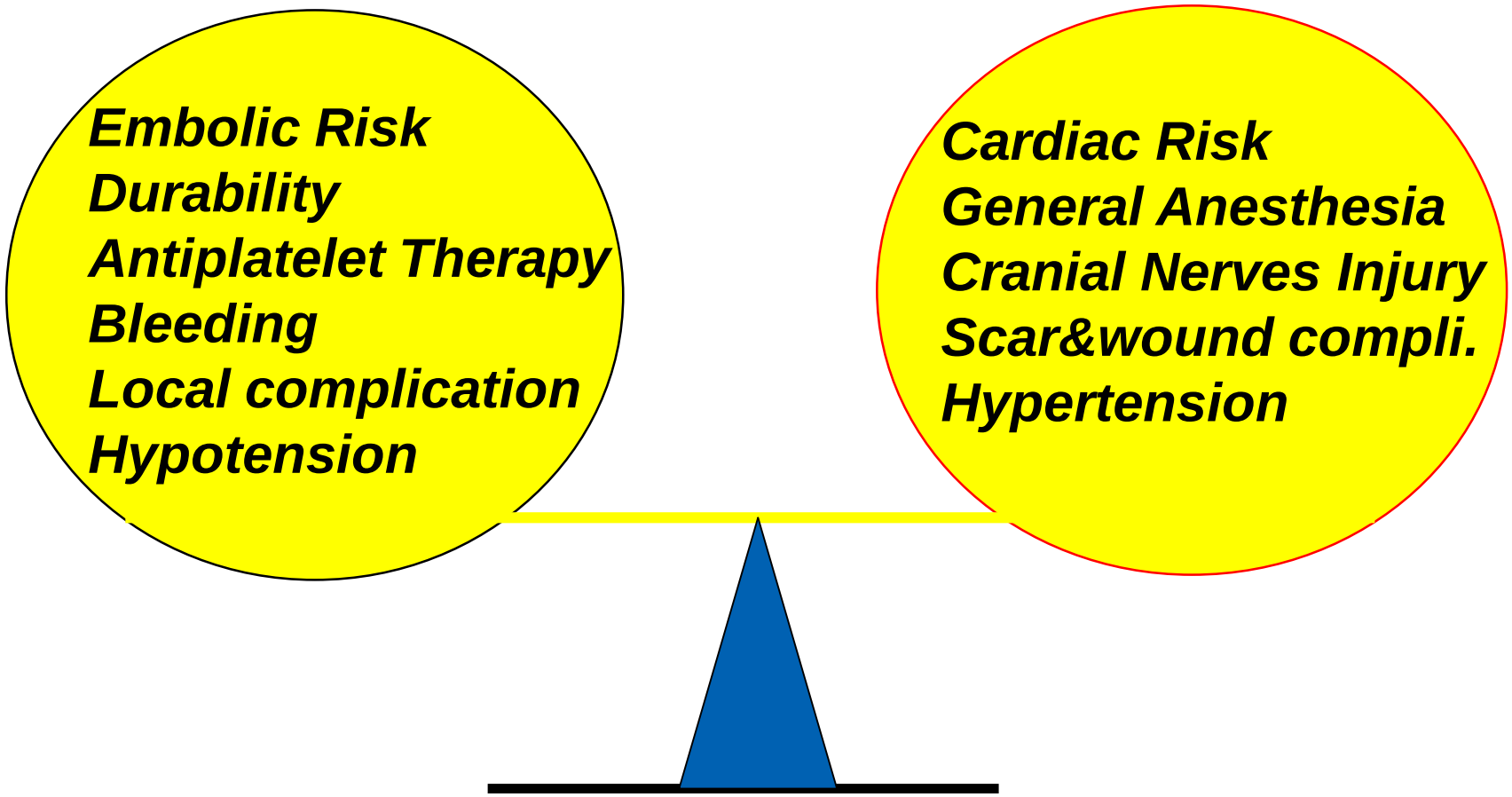
STENTING SURGERY

RISKS



Natural History
under Medical therapy

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Anatomy Factors intervene at different levels

- Learning curves effect : Access &techniques
- Results in experienced centers vs beginners
- Results in old patients as compared to younger patients: Access
- Access &Contralateral stroke
- Performance and applicability of protecting devices :
  - Lesion, landing zone
- Performance and applicability of stents
  - Maneuverability, lesion coverage
- Results according to the lesion anatomy

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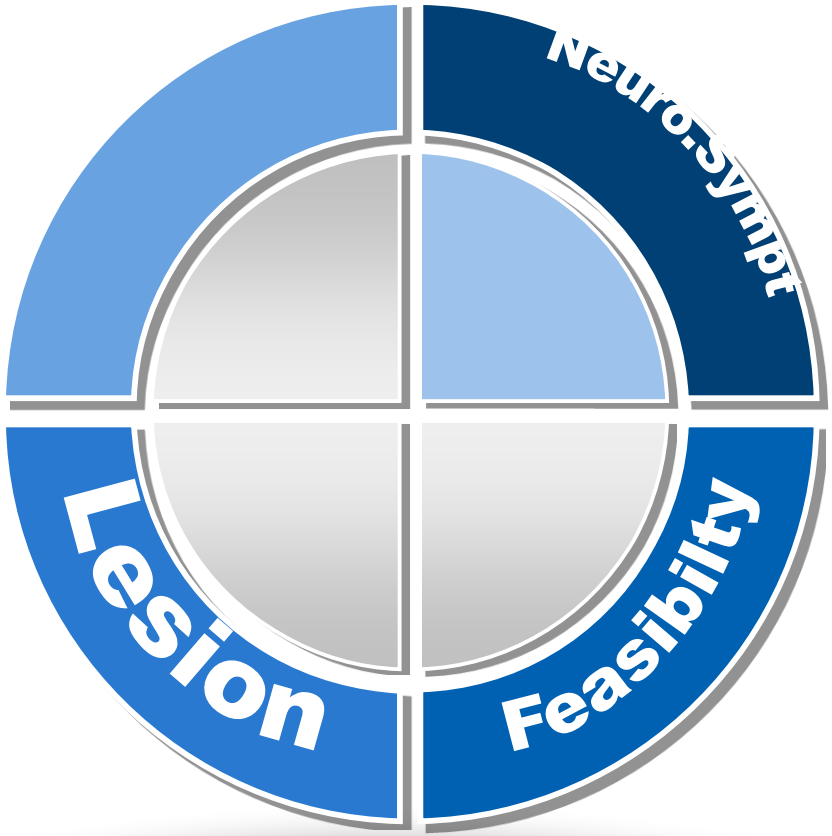
4 chapters to consider for each individual.

Age

General conditions

Patient Preference



Asymptomatic

Symptomatic

Time & Delay .

Bifurcation

Calcification

Irregular,Ulceration

Length …

Access

Protection

Stenting

Anatomy of Lesion and Carotid Access

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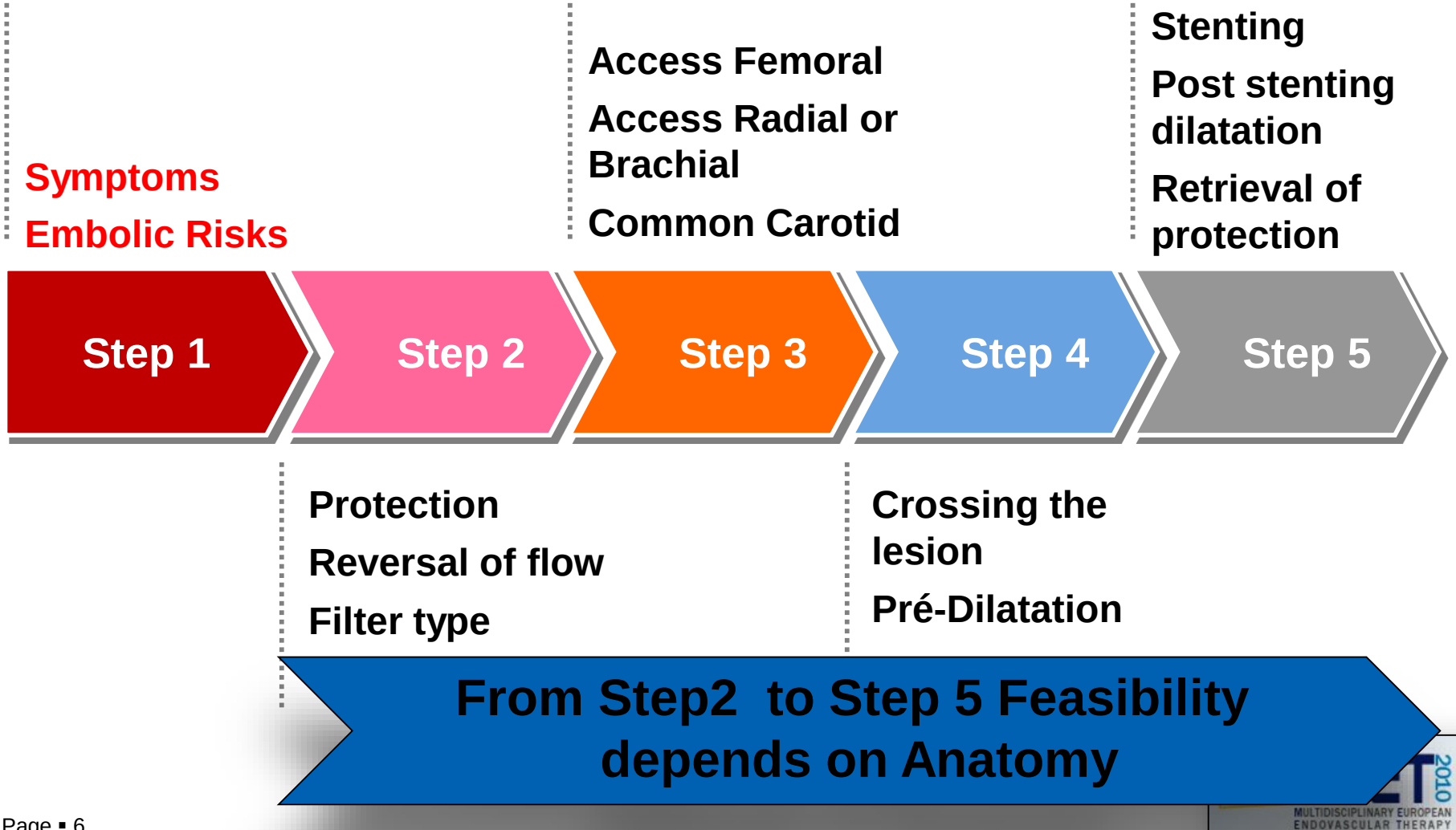
5 Steps to consider for feasibility



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Anatomy&CAS

1. **The anatomy is the main limiting factor to perform CAS**
2. **The anatomic limitations reside mainly at 2 levels**
   - **The access to the common carotid**
   - **The angulations and the nature of the carotid lesion**

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Access selection for CAS

Femoral access → Direct Puncture

Possible

Impossible

Common Access

Radial Art.

Brachial Art.

Normal

Pathologic

6FShuttle

6F Shuttle
Guiding 7F

Guiding 8 or 7 F if filter

6F Shuttle

8F Introducer if flow Reversal

9F Introducer if flow reversal

Closing
Angioseal 8F
Perclose

Manual
Compression

Starclose
For Closing

The access to the common carotid is difficult or impossible

- **Aorto-iliac disease or occlusion ► radial or brachial approach,Direct ?**
- **Aortic arch diseased or type II , III, or bovine arch ► selection of new guiding catheter, Direct?**
- **Diseased or stented common carotid ostium ► use of braided hydrophilic sheath**

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Indications for Trans-Radial CAS

- **Bilateral Aorto-iliac Disease**
- **Failure of femoral route**
- **Hostile Neck + Cervical approach impossible**
- **Bovine Arch for left carotid stenosis**

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Mr Can. Tandem Left Carotid stenosis

67 years old man

Prior inferior MI 1997

Larynx cancer treated with surgery ,chemotherapy and radiotherapy 2001.

Cancer recurrence in 2003 treated with surgery and jawbone resection.

Minor stroke in November 2007.

Echo-Doppler revealed :

Right common carotid occlusion

Severe Left common carotid stenosis

Less severe left internal carotid stenosis

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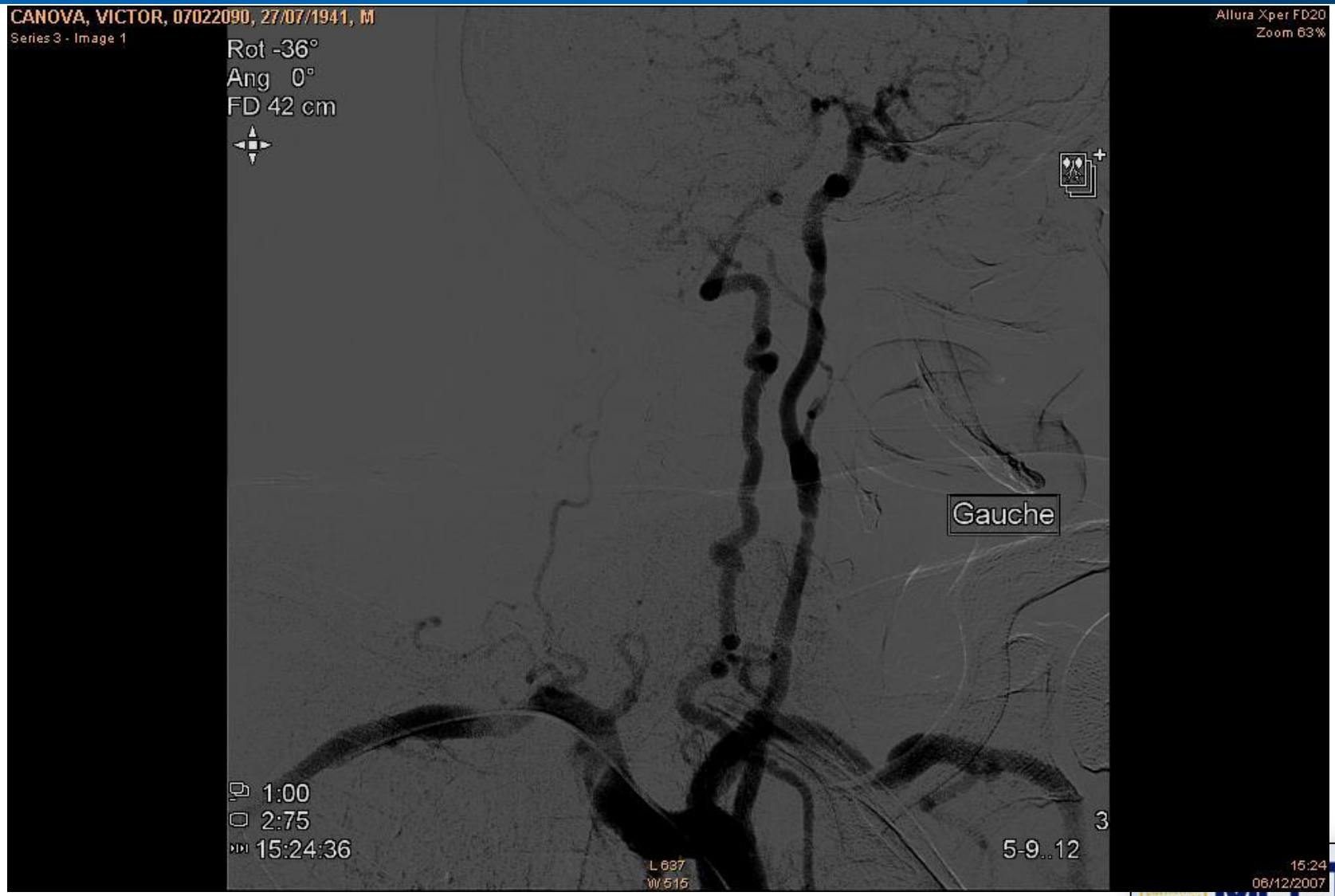
Right common carotid occlusion



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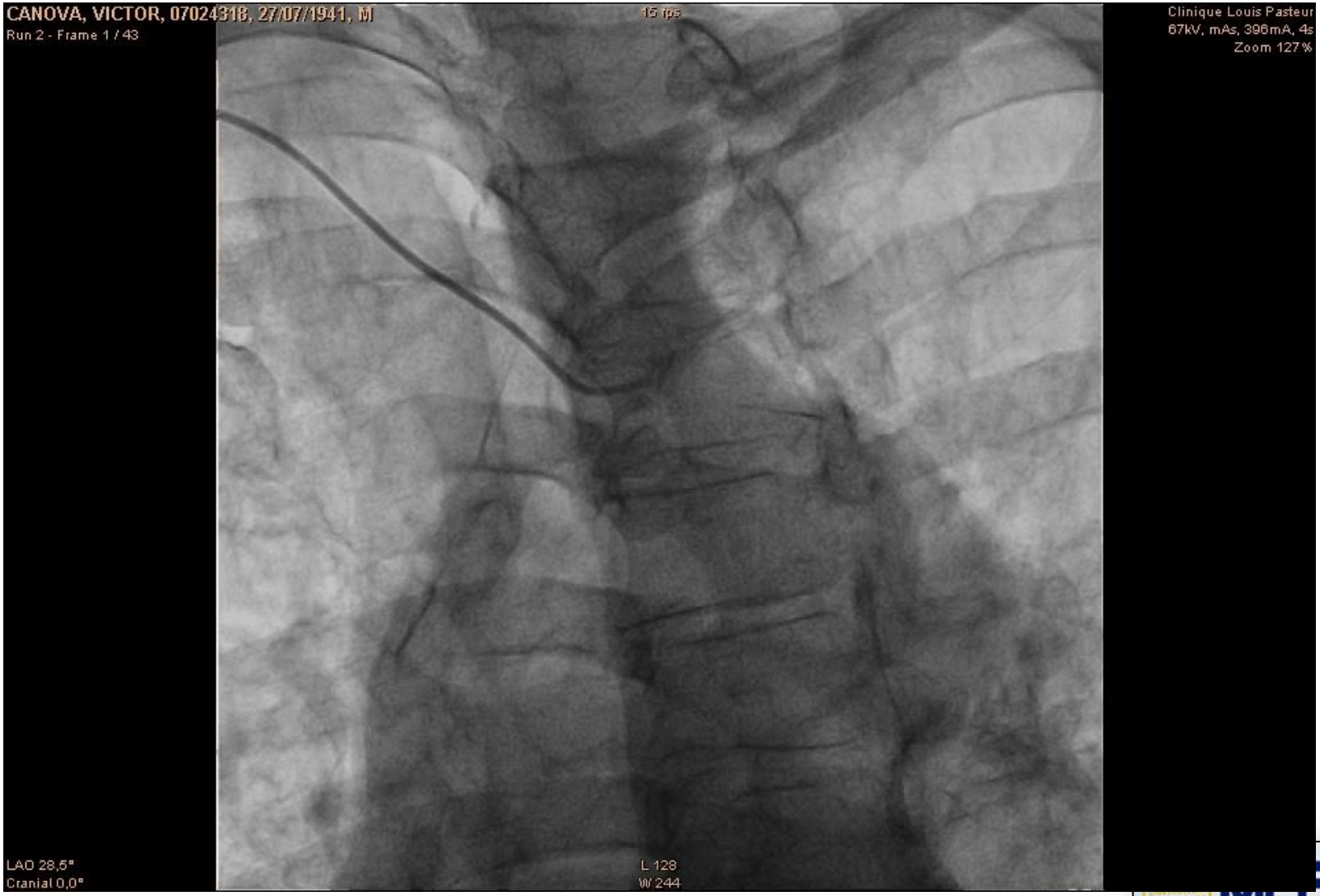
2/Left CC access : 5 F right Judkins catheter



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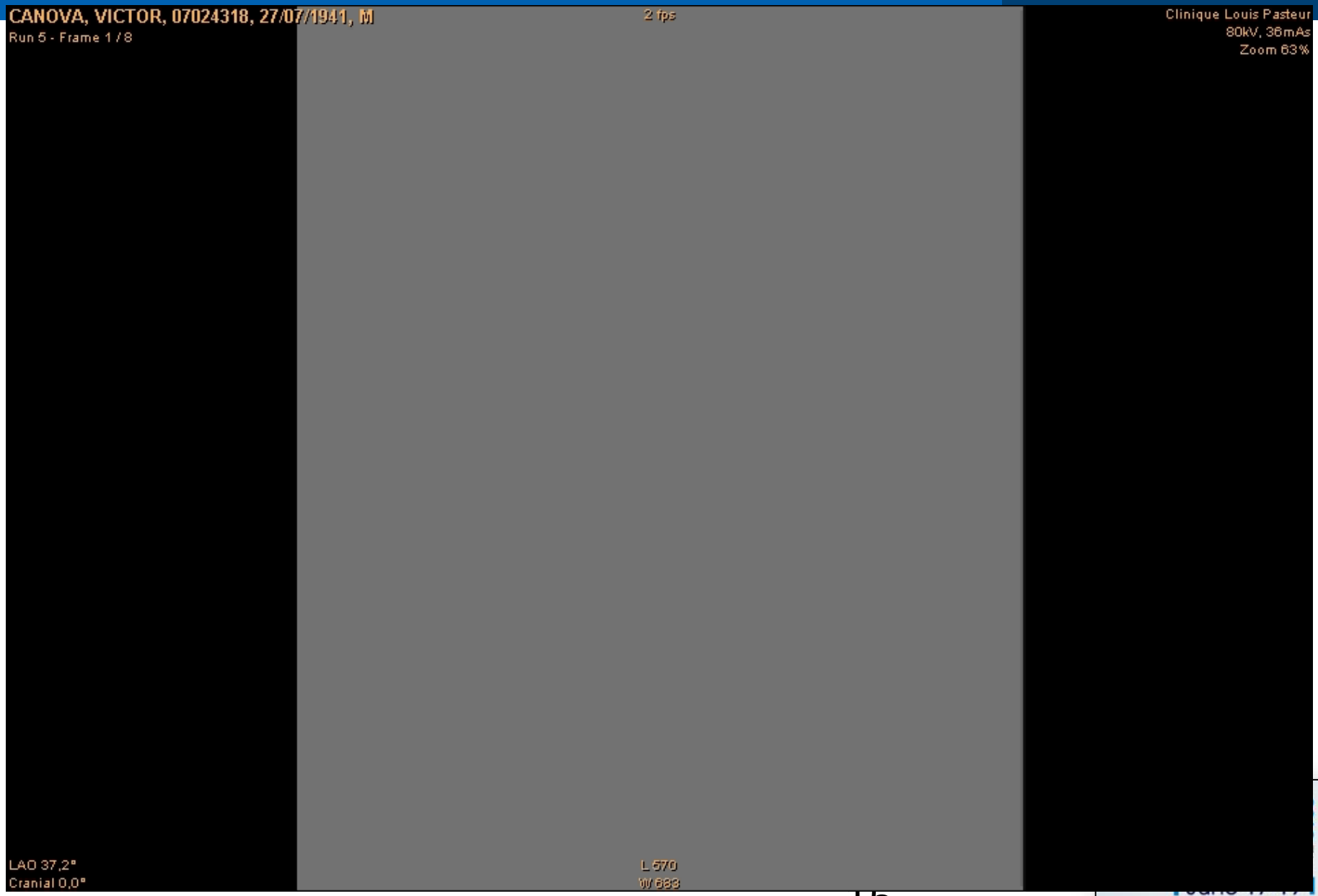
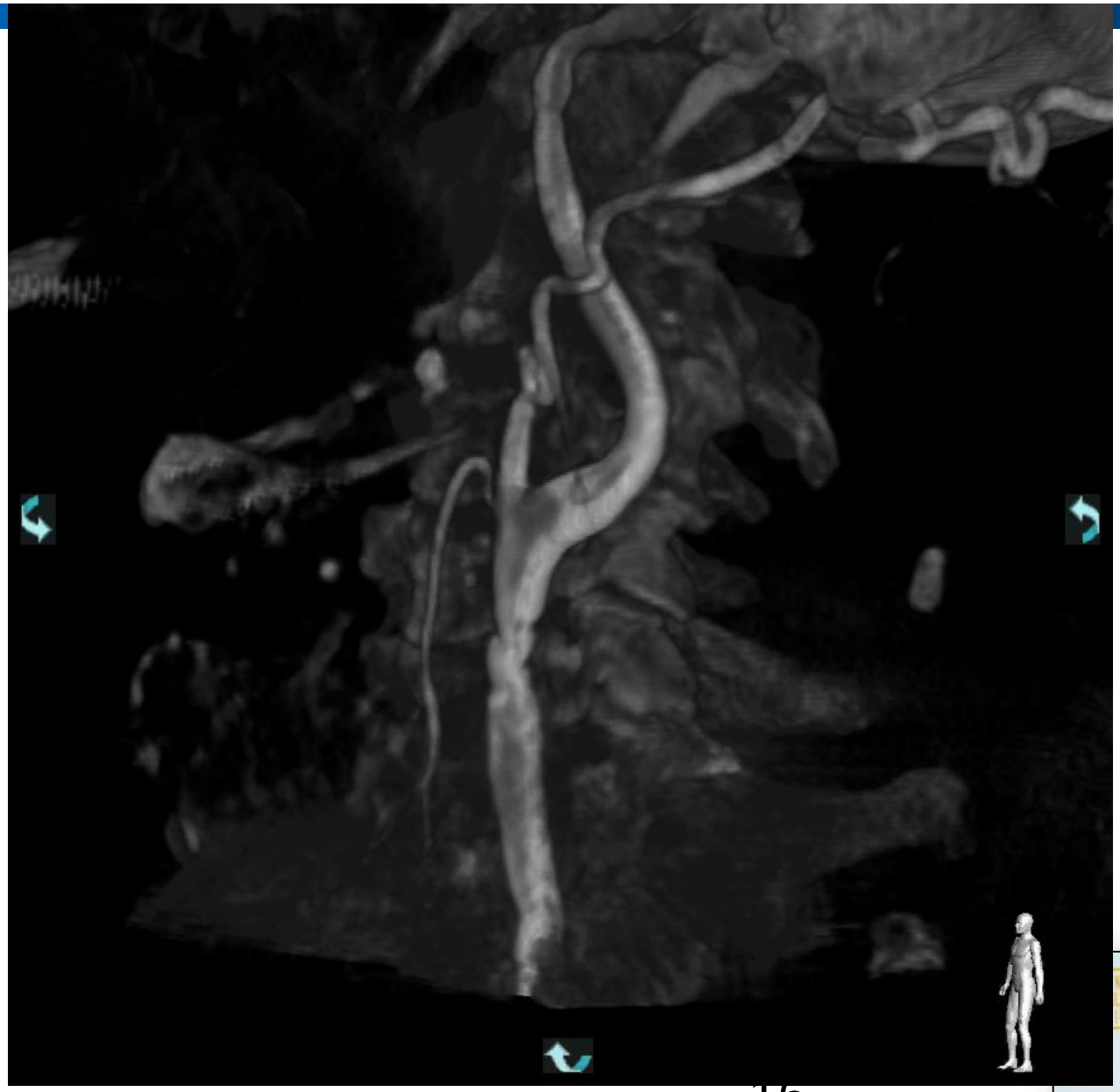
3 / Selective left CC injection





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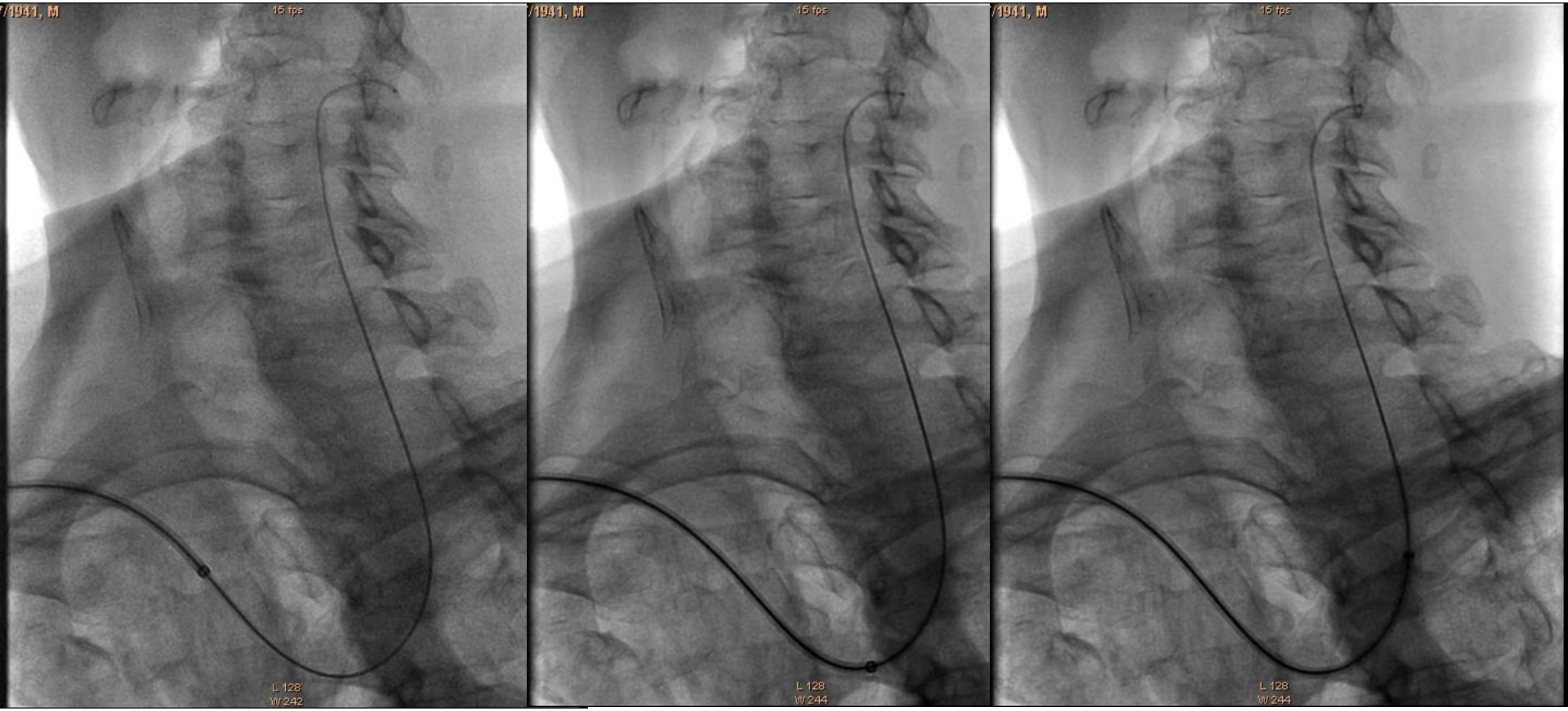
Placement of 6F 90 cm braided introducer over the extra stiff guidewire.



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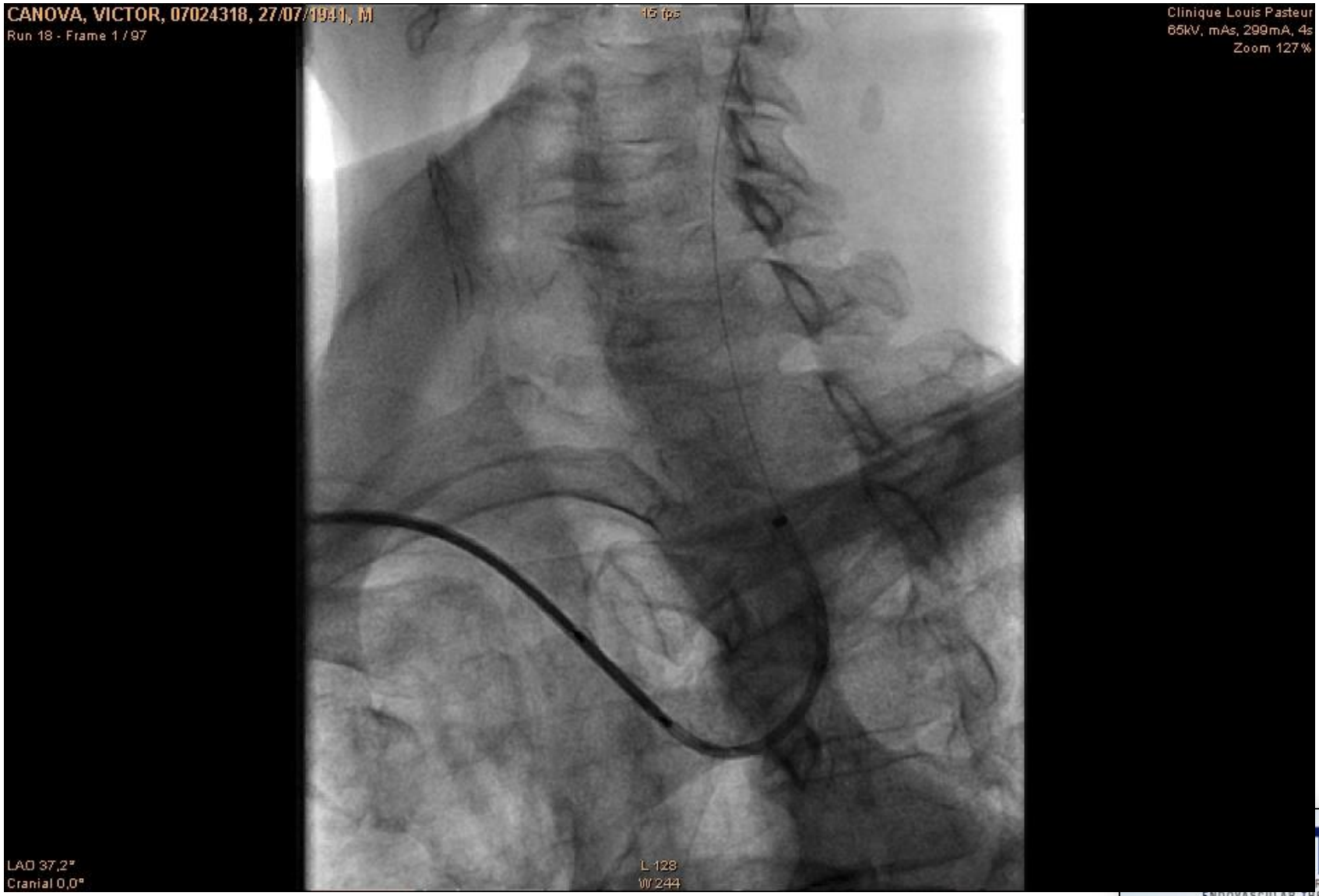
8/Direct Stenting :Placement of a stent



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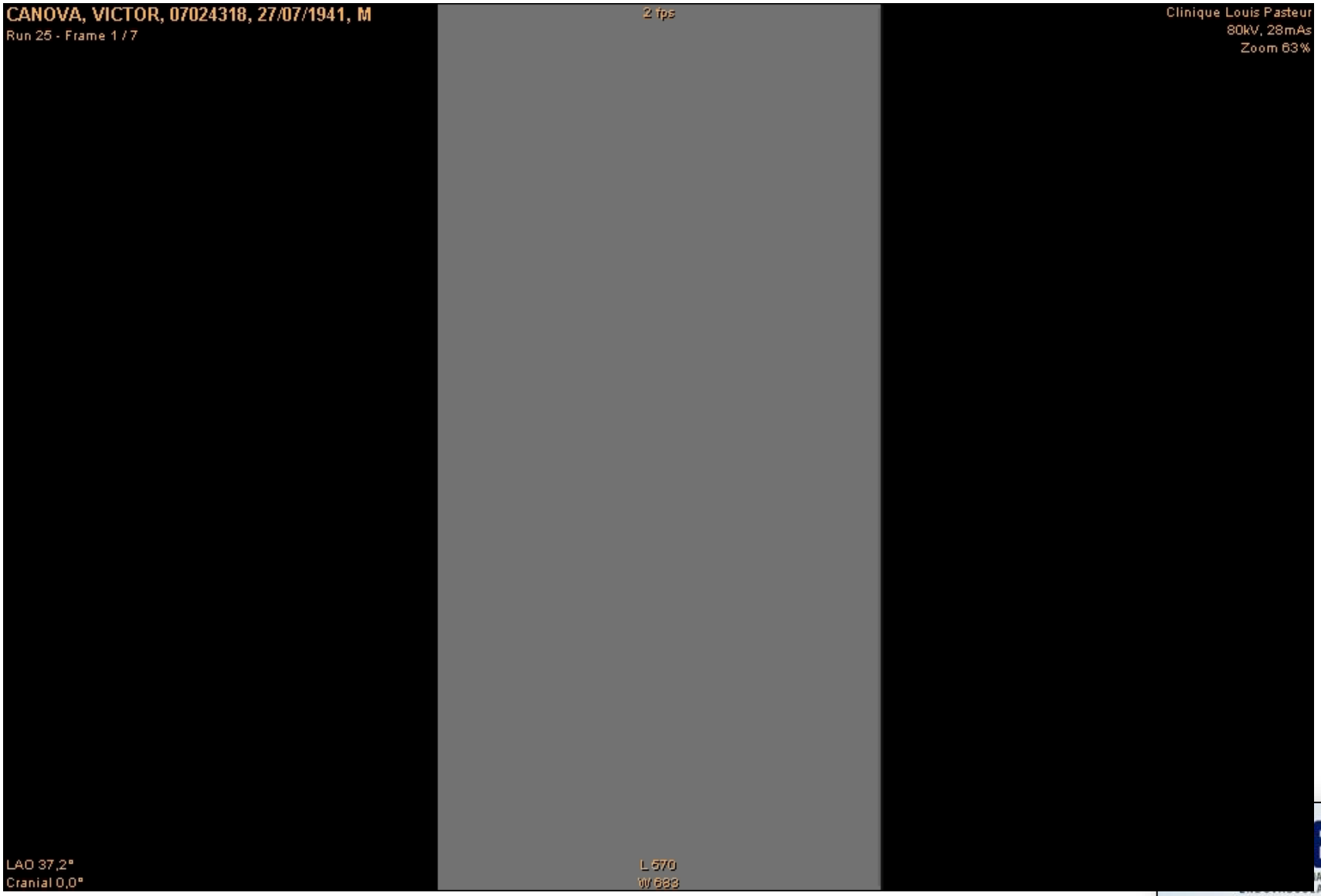
12 / Final Result



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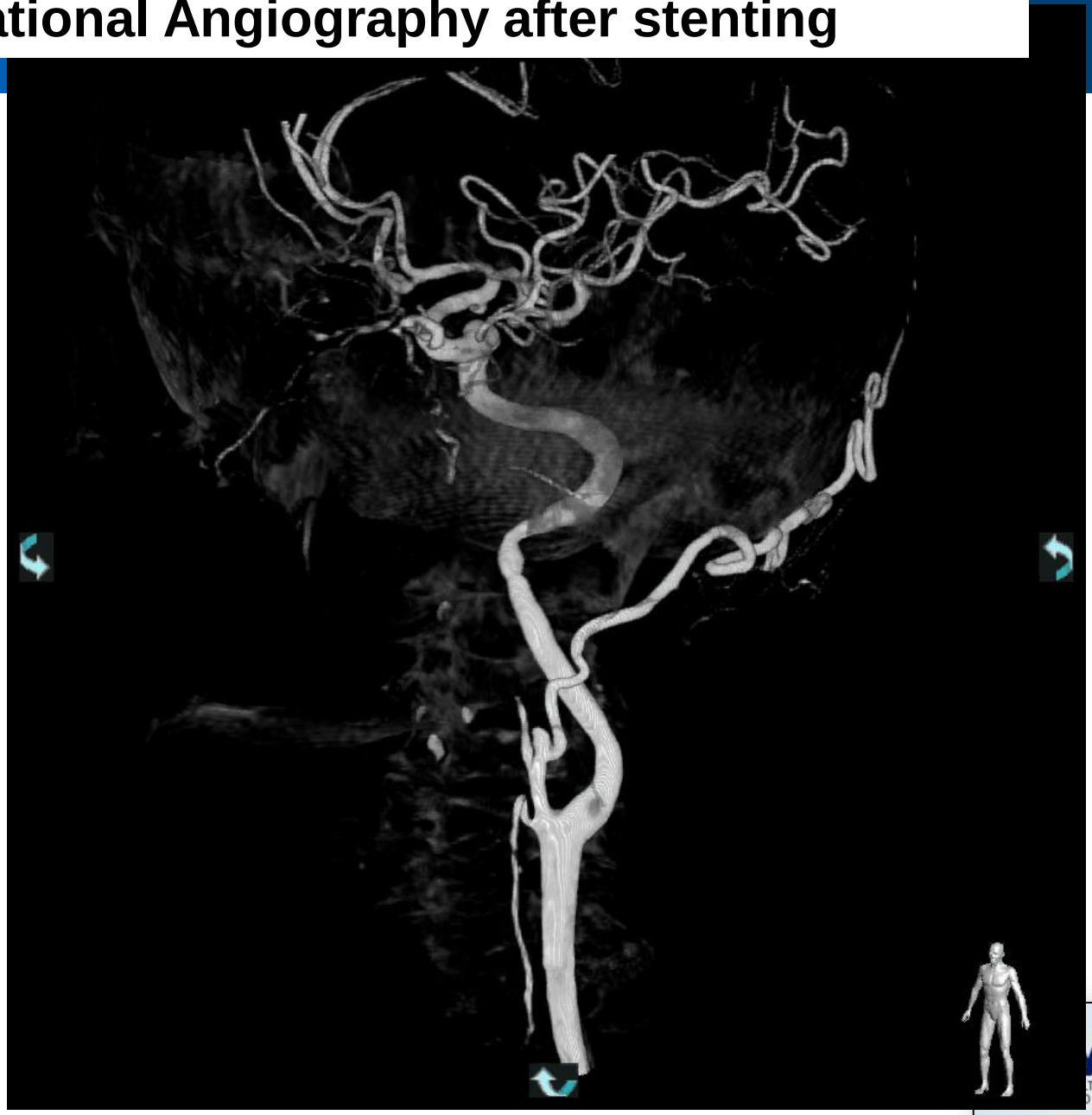
3D Rotational Angiography after stenting



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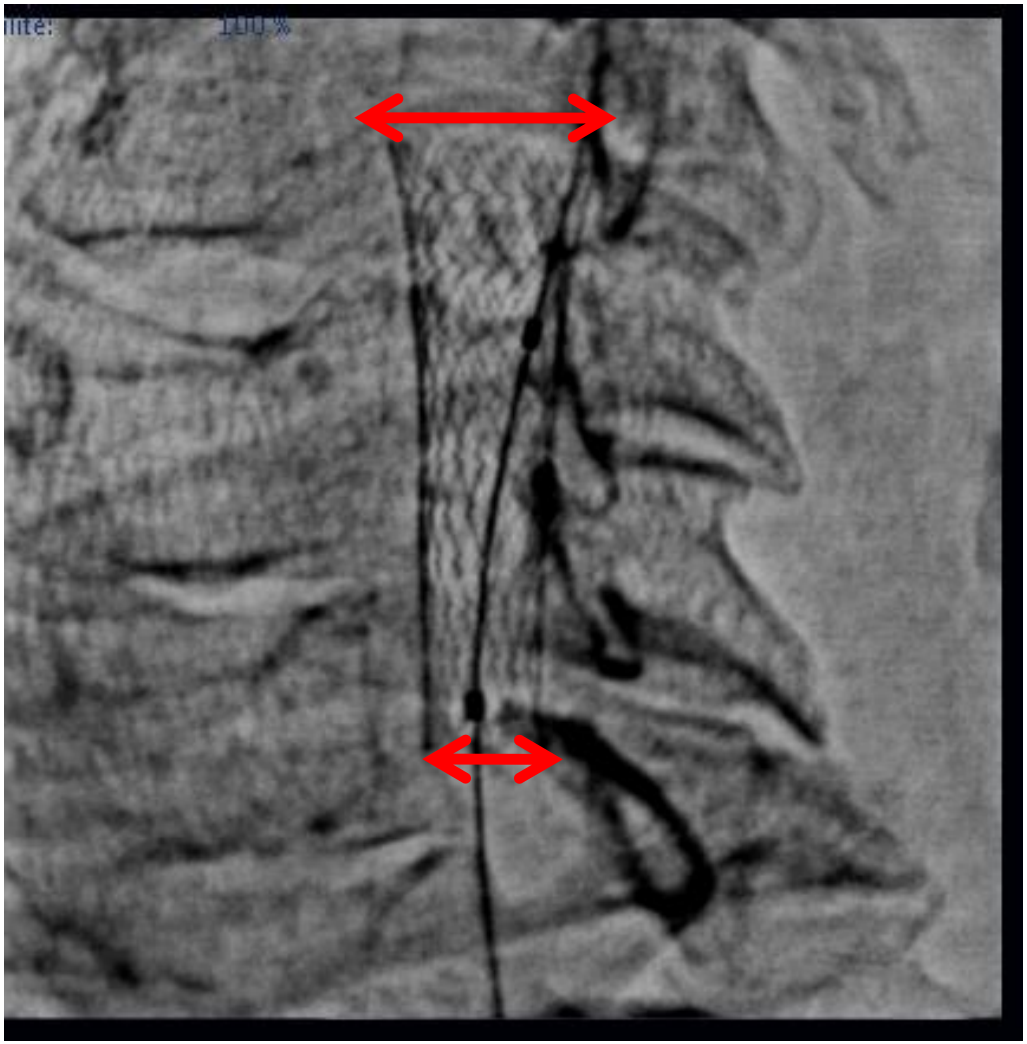
Stent boost after Post-stenting Dilatation



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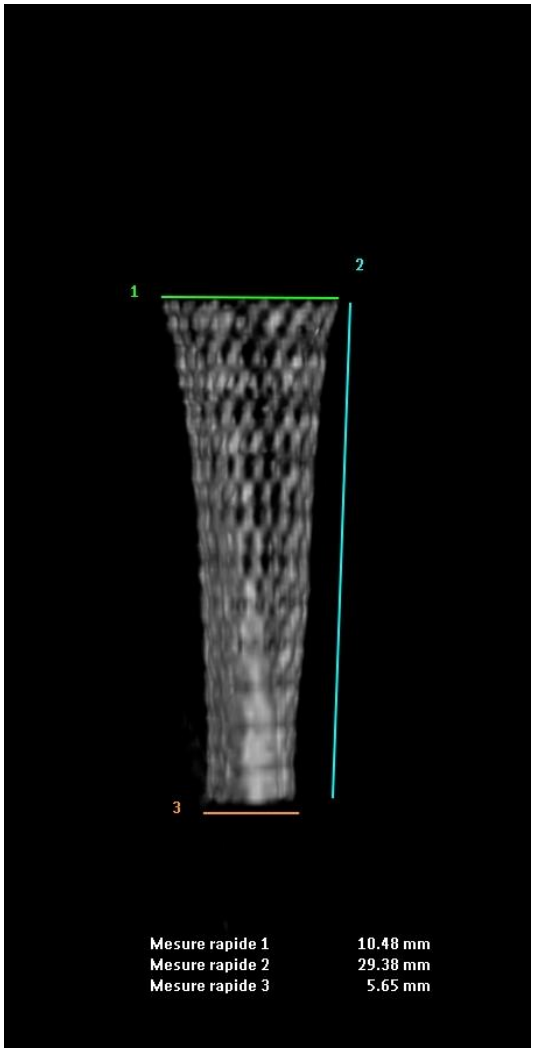
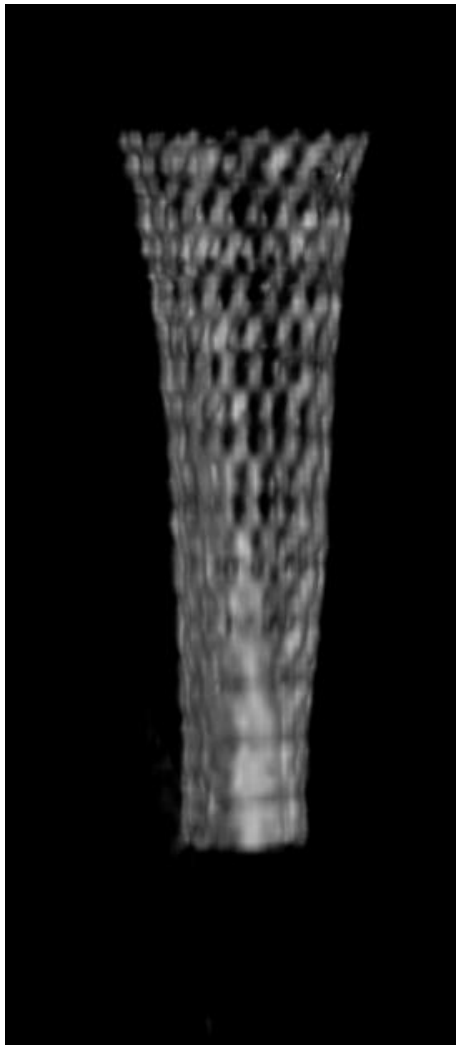
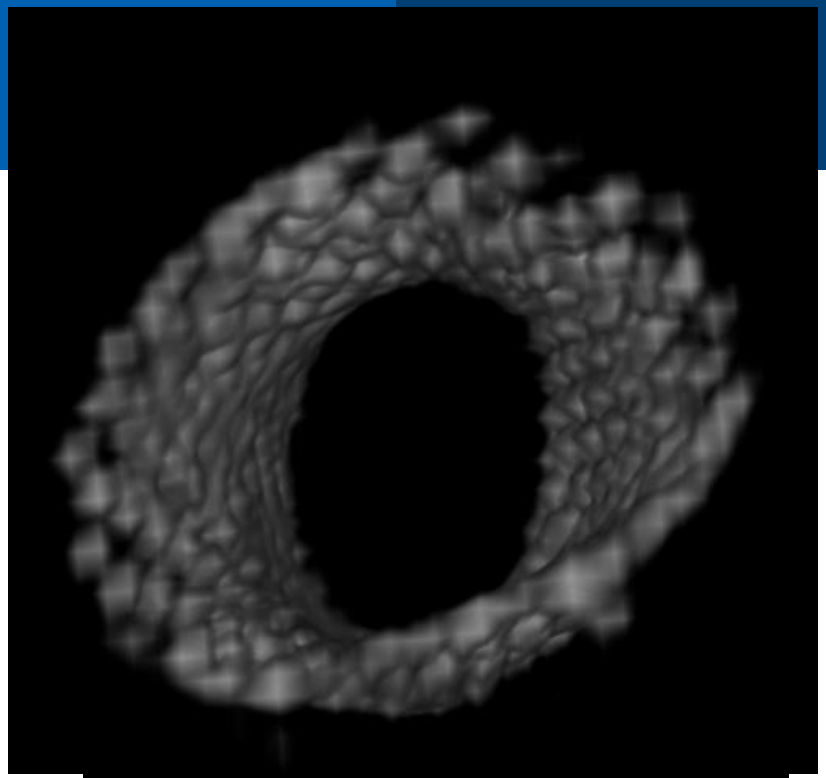
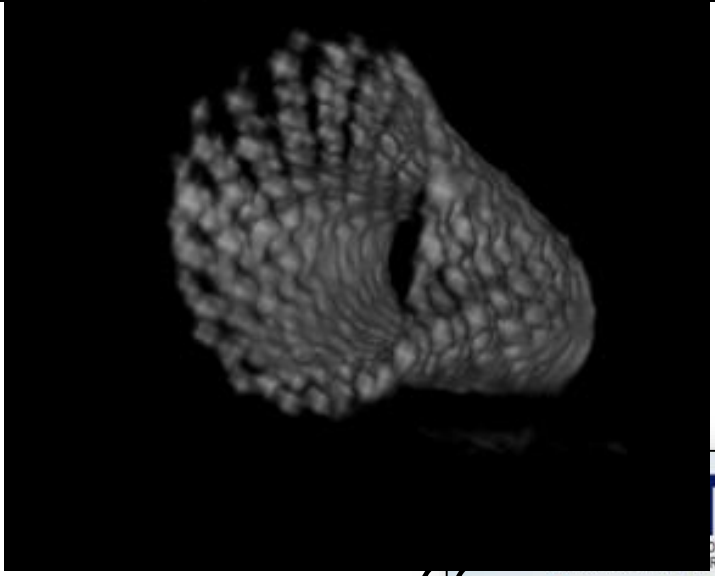
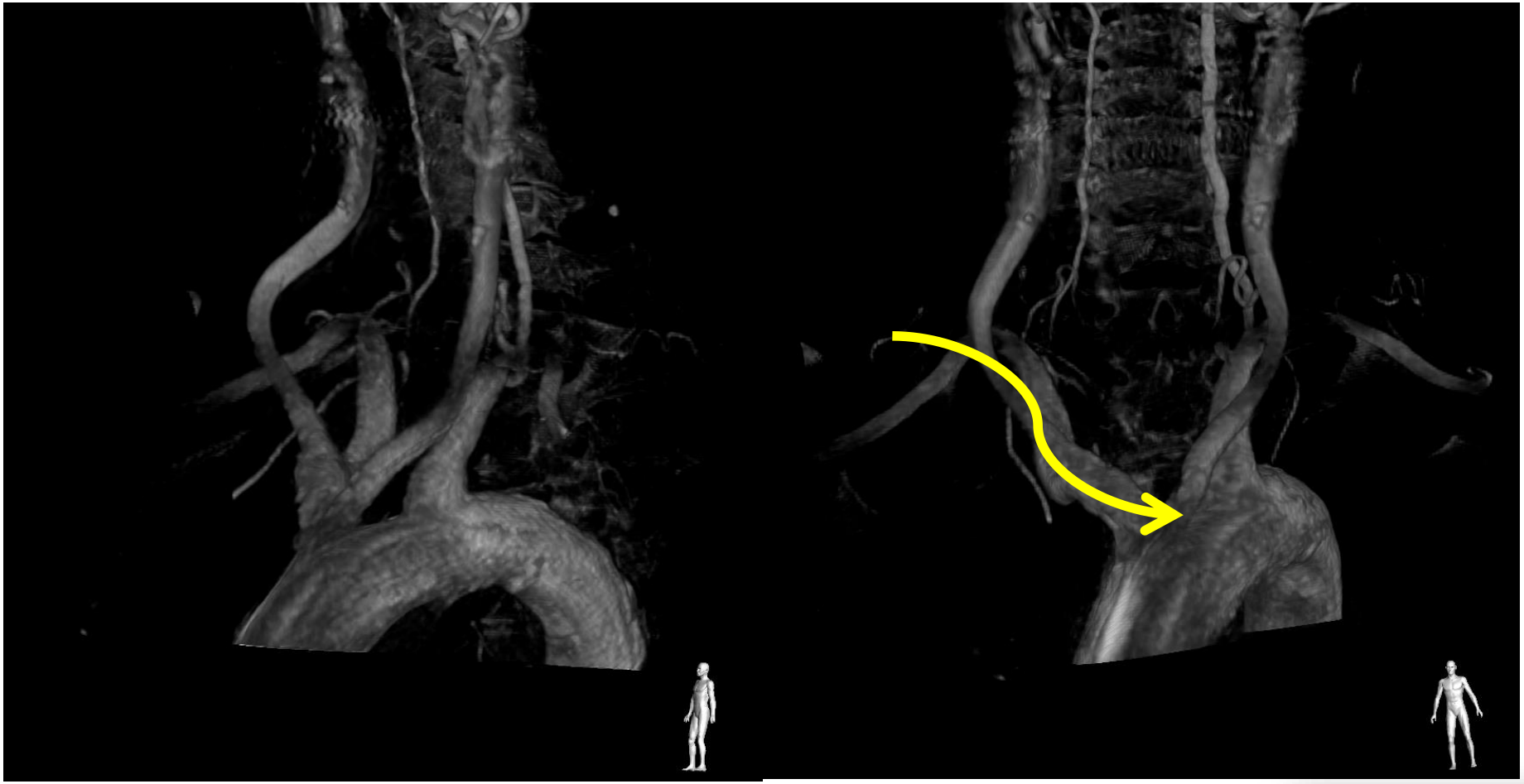

1
2
3
Mesure rapide 1 10.48 mm
Mesure rapide 2 29.38 mm
Mesure rapide 3 5.65 mm







Bovine Arch : 2 directions



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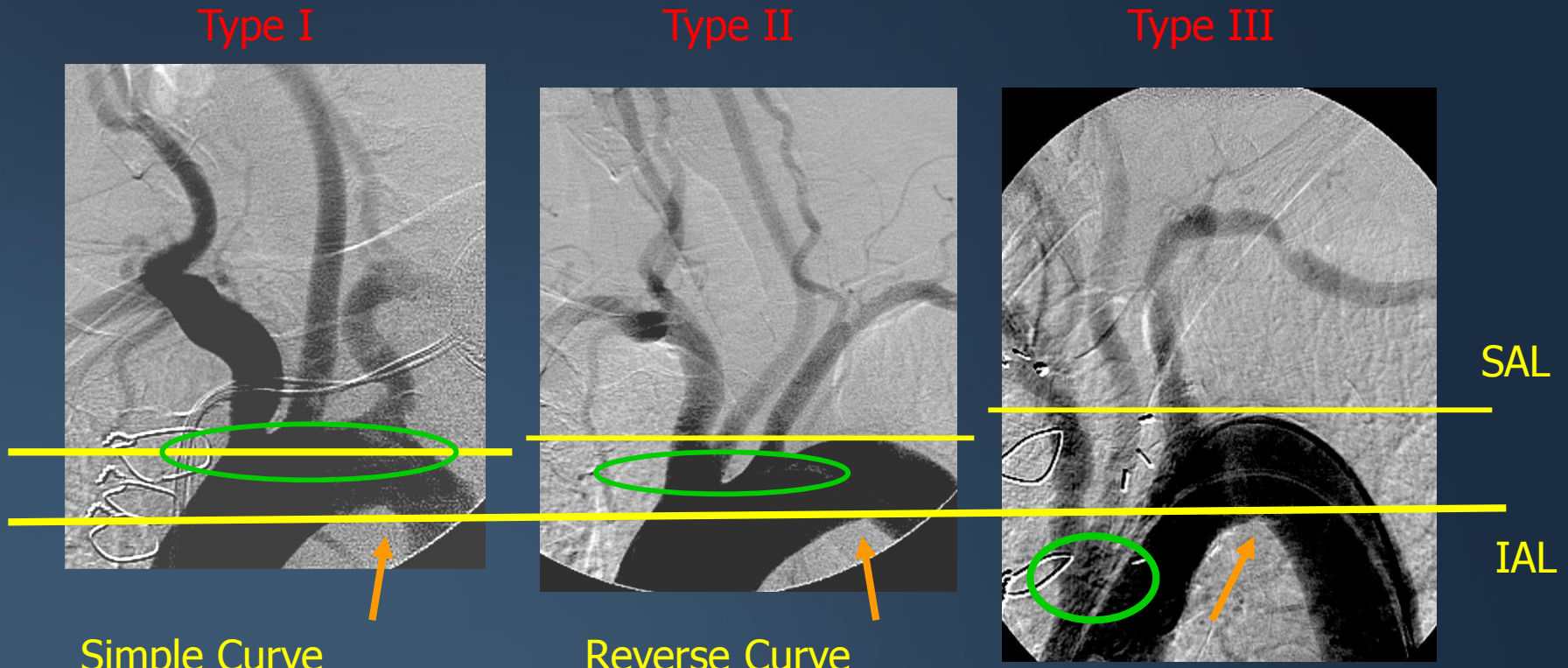
Type 2 arch : 2 directions in 2different planes

CCA Access
Aortic Arch Types (Myla 1996)



Simple Curve
Catheters HN1

Telescopic Access

Guide Cath or Sheath

Reverse Curve
Catheters SM 2

Serial Stiffening

Guide Cath or Sheath

Reverse Curve
Catheters SM 2

JCL XB 4.0 & Saad

Guide catheter

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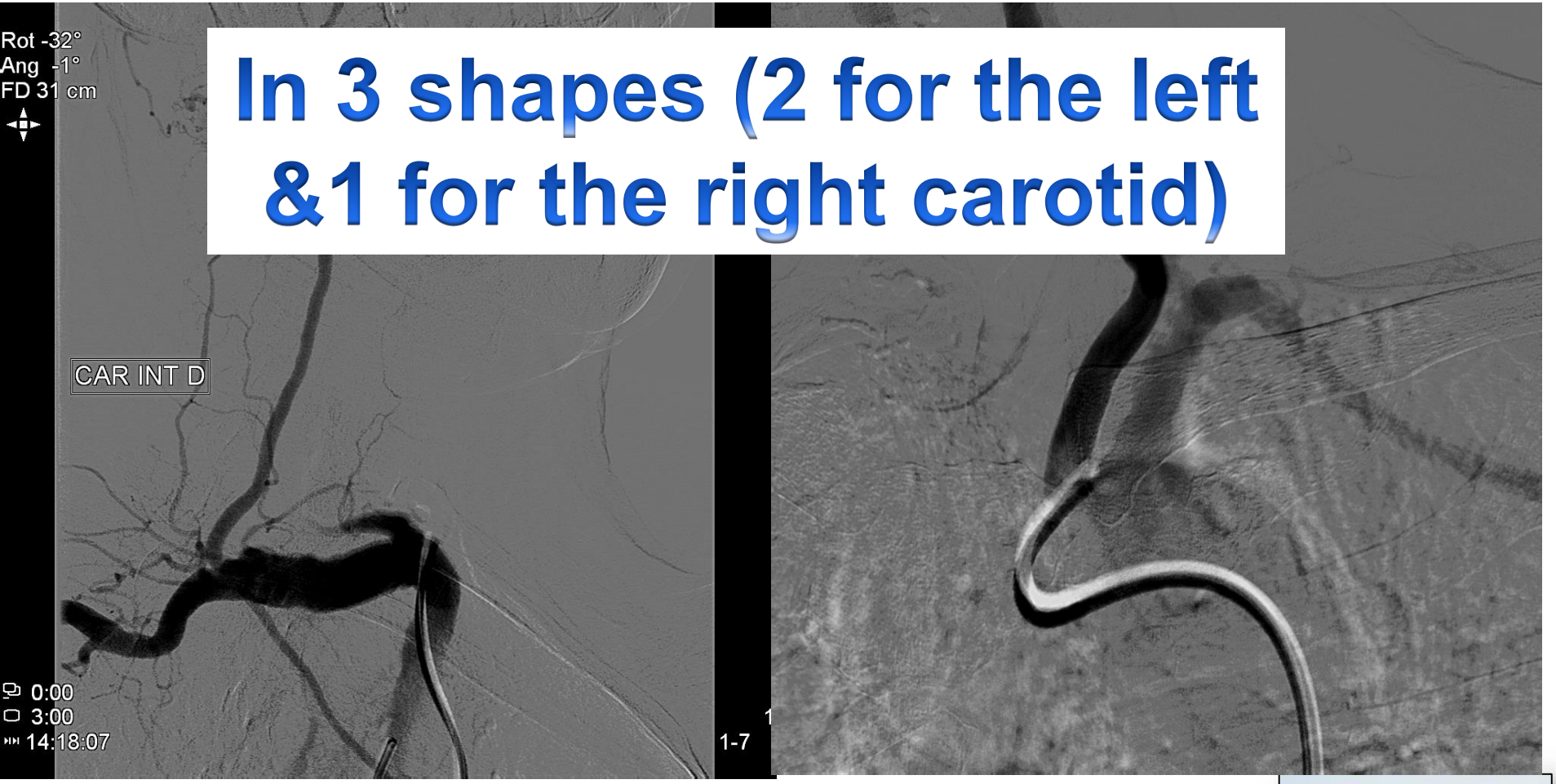
Saad Left Guiding Catheter



In 3 shapes (2 for the left &1 for the right carotid)

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Anatomy

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TORTUOSITY : LEFT CAROTID ARTERY STENOSIS

BEFORE ANGIOPLASTY

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Angulations+ severe eccentric stenosis

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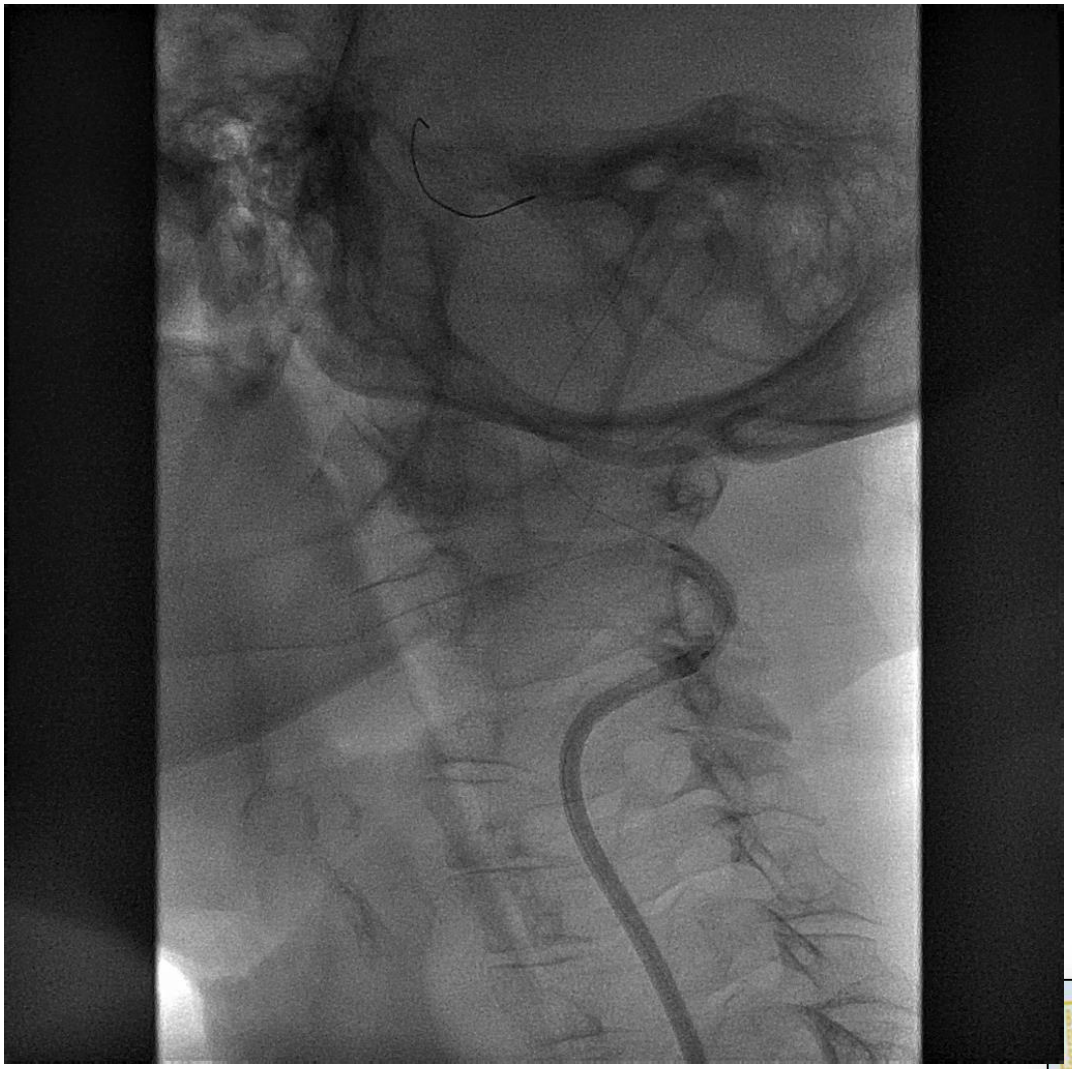
Saad catheter for pre-dilatation without protection



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Anatomic Factors : Protection & Devices

- **Anatomic Factors for Protection**
  - **Filters : Landing Zone& Safe Retrieval**
  - **Flow reversal: External Carotid & exchange Possible**
- **Anatomic Factors For Stenting**
  - **Navigability across the curves**
  - **Lesion coverage :Length, Bifurcation,Tortuosity**
  - **Conformability**
  - **Crossing (Balloons, Retrieval Device)**

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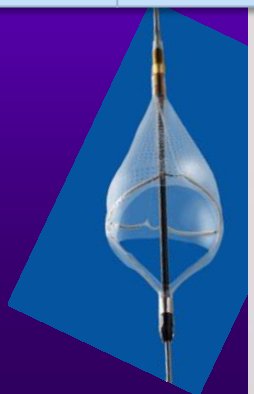
Caractéristiques des systèmes de protection

DEVICE	Vessel Size (mm)	Crossing Profile (Inches/French)
FiberNet	3.5 mm – 7.0 mm	2.4 – 2.9 F
Angioguard XP	4.5 – 7.5 mm	3.2 - 3.9 F
FilterWire EZ	3.5 – 5.5 mm	3.2 F
Emboshield Pro	2.5 – 7.0 mm	2.8 – 3.2 F
RX AccuNet	3.25 – 5.0 mm	3.5 – 3.7 F
SpiderFX	3.0 – 7.0 mm	3.2 F
GuardWire	3.0 – 5.5 mm	2.8 F
Emboshield Nav 6	2.5 – 7.0 mm	3.2F



Sélection du système de protection

Asymptomatique

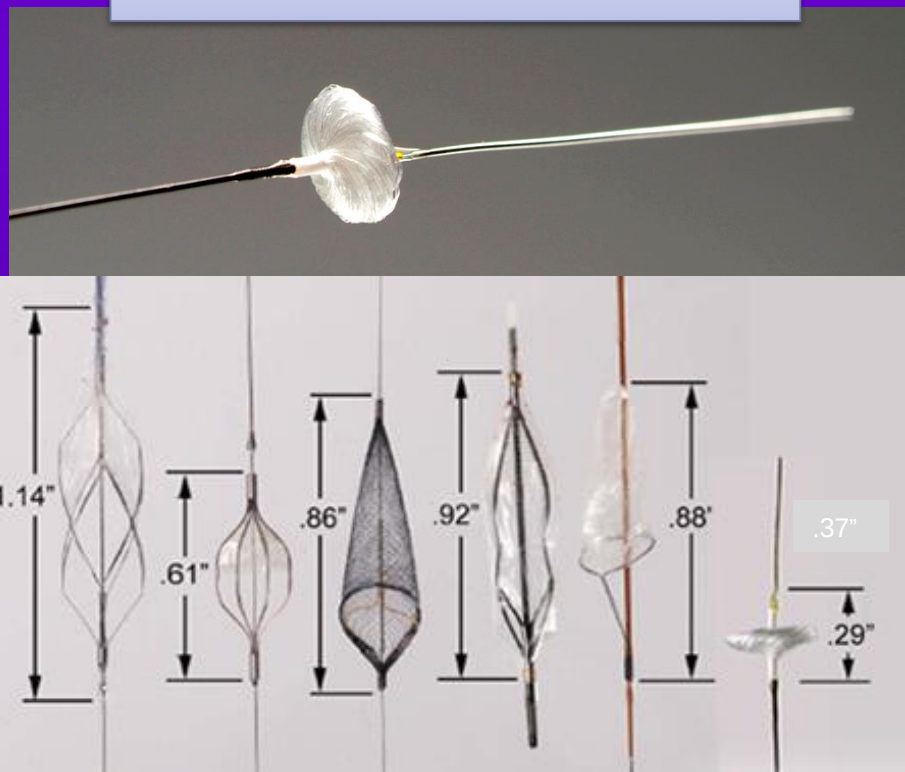
Filtre de protection

- Artère Distale
  - ≤5mm : Easy Boston, Spider Rx EV3
  - >5mm: Emboshield, Angioguard
- Franchissement
  - Simple: Easy Boston
  - Difficile: Emboshield Abbott
  - Très Difficile: Spider RX
  - Echec: Chirurgie ou ►

Symptomatique

Inversion du Flux

Filtre de protection type Fibernet Invatec



Sélection du stent

Type	Stents à cellules ouvertes			Mixte	Stents à cellules fermées		
Nom Comp	**Precise** Cordis	**Acculink** Abbott	**Protege** EV 3	**Crystallo** Invatec	**Wallstent** BSC	**Adapt** BSC	**Xact** Abbott
Sympto.	+	-	±	++	+++	+++?	+++
Asymp.	+++	++	++	+++	+	++	++
Bifurc.	++	+++	+++	++	+++	+	±
Ulcérée	++	-	++	++	+++	++?	+++
Calcifiée	++	+	++	++	+	++	+++
Courte	+++	++	+++	+++	-	++	+++
Longue	++	++	++	++	+++	++	+
Irr/Coni.	+	+++	+++	+++	+++	++	+++
Resténos	+++	+++	+++	+++	+++	+++	+++
Radique	++	-	++	+++	+++	-	+++

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IN CONCLUSION

- **Some anatomic limitations have found today new solutions**
  - **Trans-radial CAS**
  - **New guiding catheter**
  - **Trans-cervical approach with percutaneous closing**
  - **Improvement of device characteristics**
- **Other anatomic limitations still exist and require new solutions, and new developments**

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Thank YOU


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APRIL, 28-30*, ROMA
* Dates to be confirmed.
3

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Catheter selection

Catheters	Left	Right
Simmons (Sidewinder)		
I	+	+++
II	++	+++
III	+++	++
IV	+++	++
Hinck/Berenstein	++	+++
Headhunter		
I	+	+++
II	+++	+
Bentson		
JB1	+	+++
JB2	+++	++
JB3	+++	+
Mani	+++	++
Vitek	++	+++

Catheter selection & width of the aorta

CATHETERS SHAPE	AORTA TYPE		
	SMALL	STANDARD	LARGE
SIMMONS			
I	+++		
II	+	+++	+
III		++	+++
IV		++	+++
HINCK	+	+	+
HEADHUNTER			
I		++	
II			++
BENTSON			
JB1	+	++	
JB2		+++	
JB3			++
VITEK	+	+++	+

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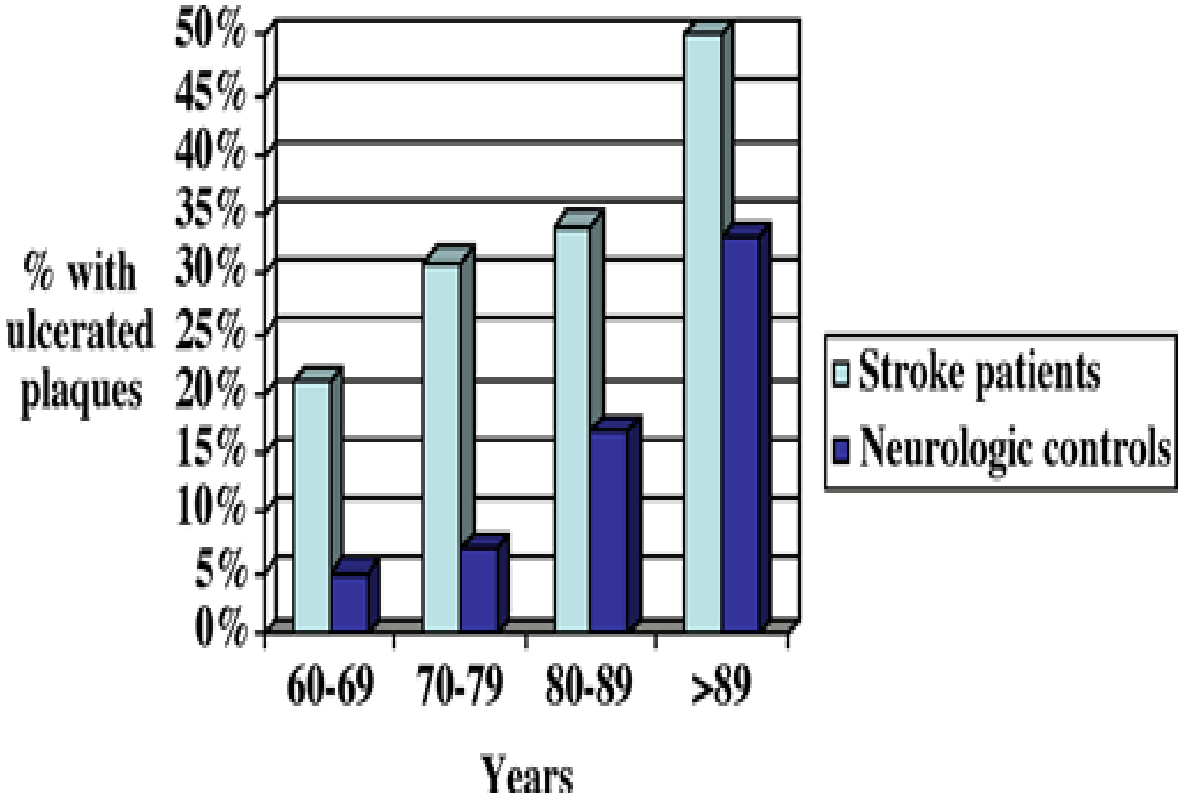

Figure 1. Prevalence of aortic atheroma according to age (6)

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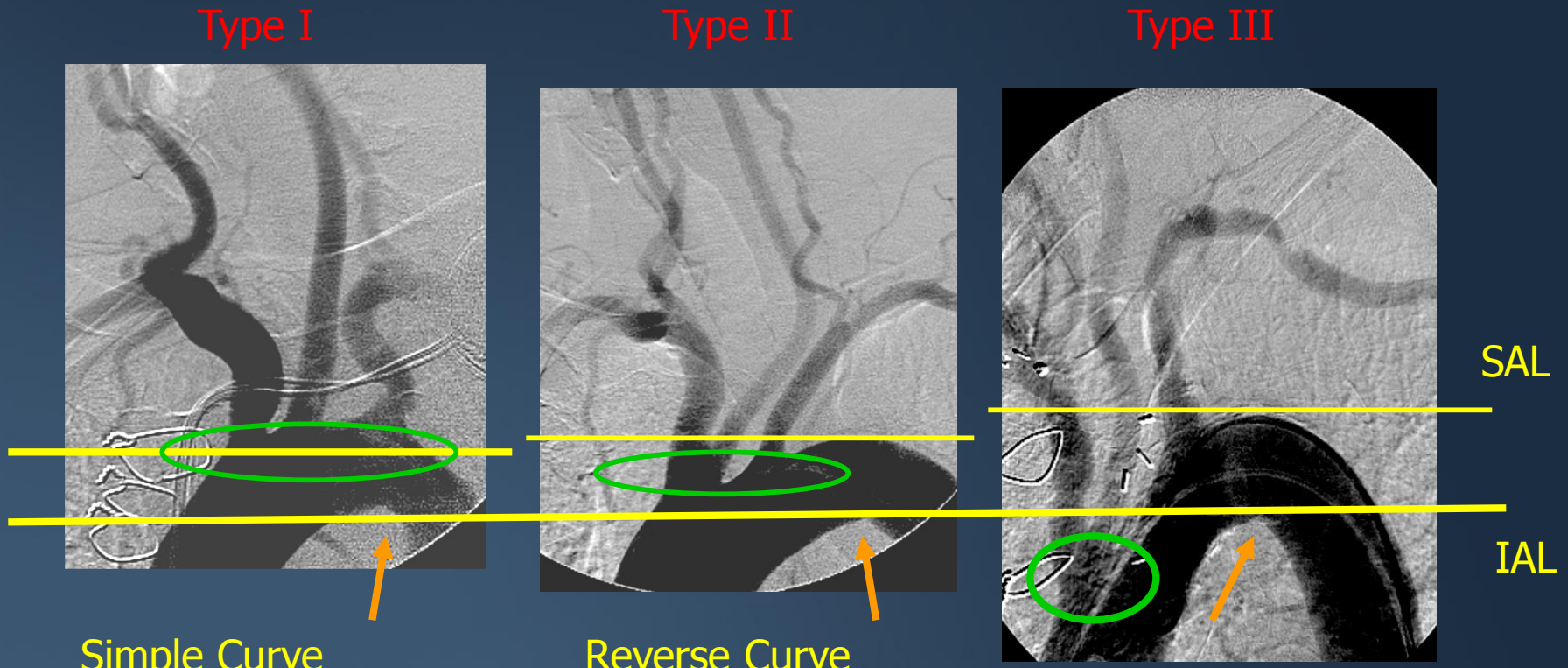

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