CLINIQUES DE L'EUROPE

EUROPA ZIEKENHUIZEN

Bifurcation coronaire

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Cardiologie interventionnelle, revalidation cardiaque

Cliniques de l'Europe

10/2024

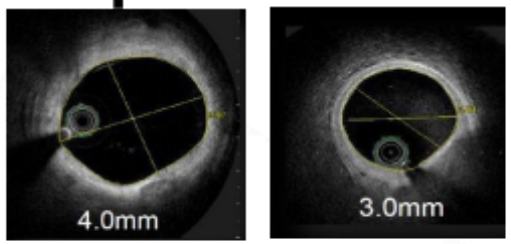
Bifurcation coronaire

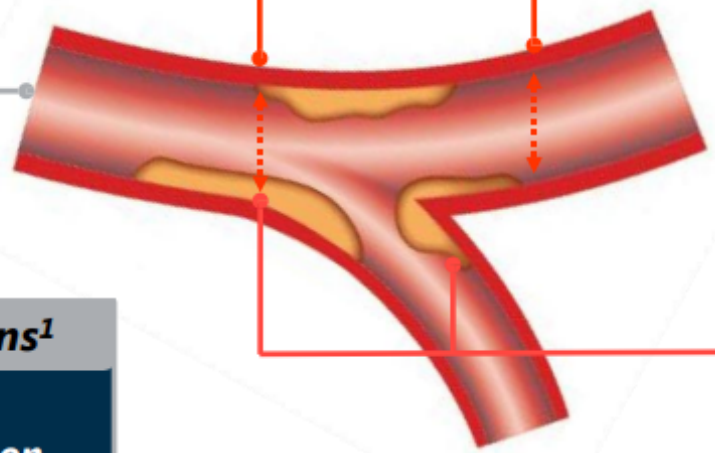
- 15-20 % des angioplasties

Each bifurcation lesion represents a unique challenge

Vessel shape and sizing[1]

- *Discrepancies in diameter between the proximal and distal references*





Procedural complications[1]

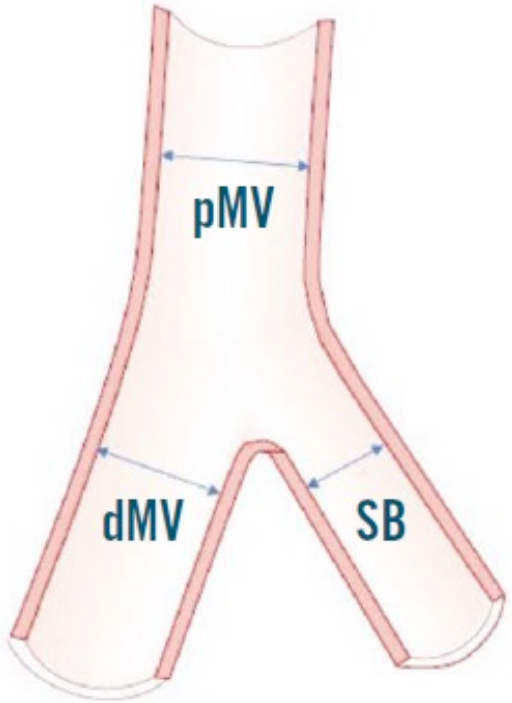
- *Plaque shift*
- *Dissection or perforation*
- *Cardiac motion*

Variations in bifurcation and lesion anatomy[1–3]

- *Side-branch patency*
- *Plaque distribution patterns*
- *Lesion composition*
- *Angle between main branch and side branch*
- *Location of affected vessel*

Terminologie

- *Proximal main vessel* (artère proximale)
- *Distal main vessel* (branche principale)
- *Side branch* (branche fille)



Loi de Finet:

diamètre proximal =
0,678 x
(diamètre distal 1+
diamètre distal 2)

Cave : maladie diffuse, occlusion, remodelage positif/négatif

Imagerie intracoronaire!! IVUS, OCT

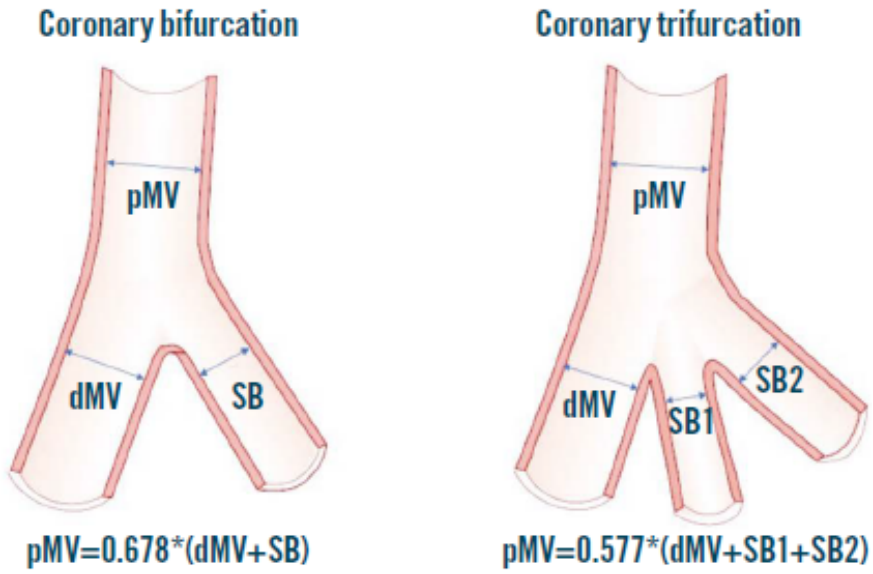
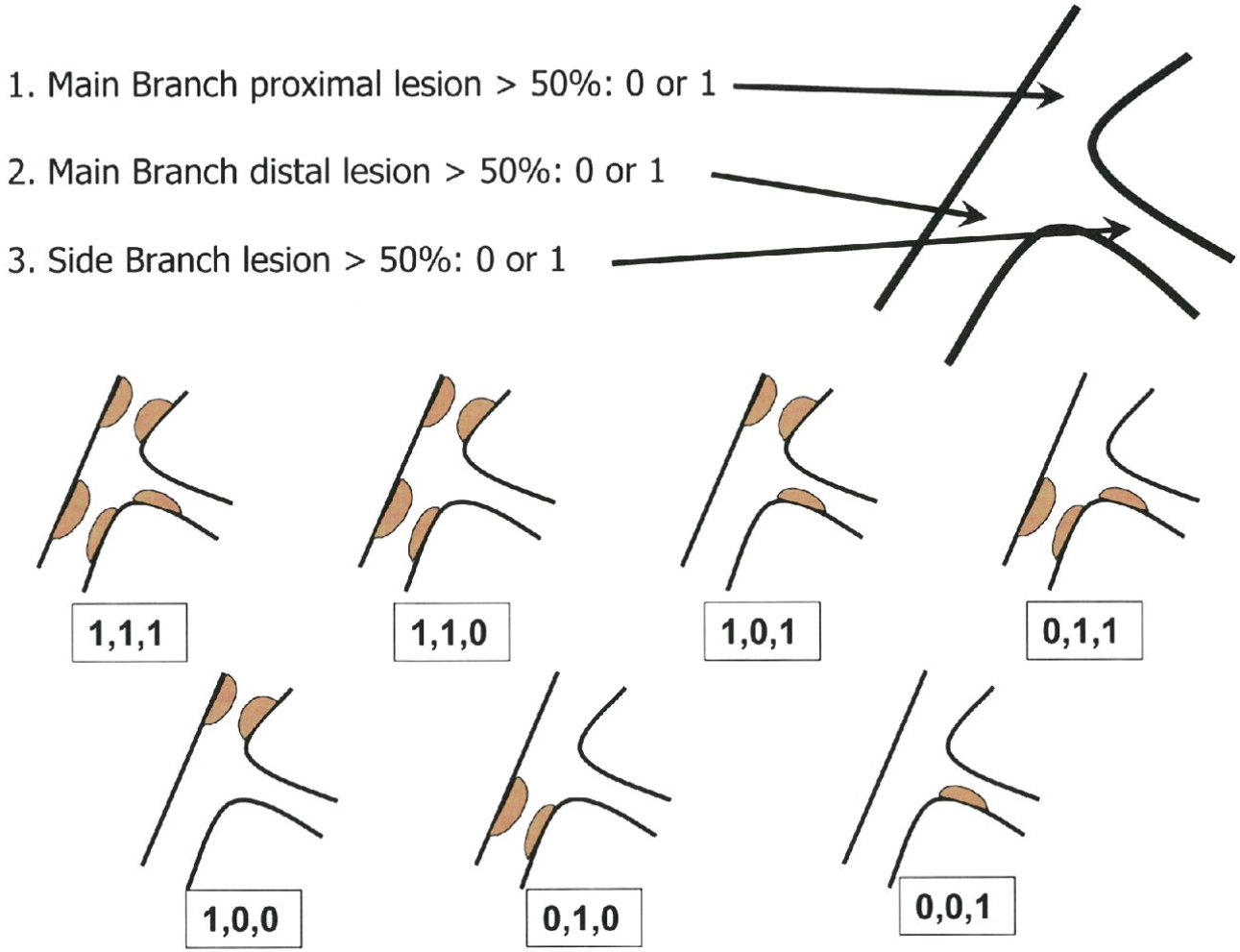


Figure 1. *Schematic representation of coronary bifurcation and trifurcation with the corresponding Finet's law formula explaining the relationship between the different segments. dMV: distal main vessel; pMV: proximal main vessel; SB: side branch*

Classification Medina



Avant la procédure

- Patient: antécédents, traitement, allergies, fonction rénale, FEVG
- Indication:
  - Preuve d'ischémie?
  - Anatomie? CT coronaire, …
- Accès vasculaire: radial ou fémoral, 6 ou 7F (pas 5!)
- Choix du guiding avec bon support (par exemple AR2 pour CD ou EBU pour IVA/Cx)
- Double anti-agrégation, héparine selon poids 70-100 IU/kg

Stratégie: 1 stent ou plusieurs?

- On peut traiter **80 %** des bifurcations avec 1 seul stent [1]
- Moins de stents = moins de risque de complications au long terme

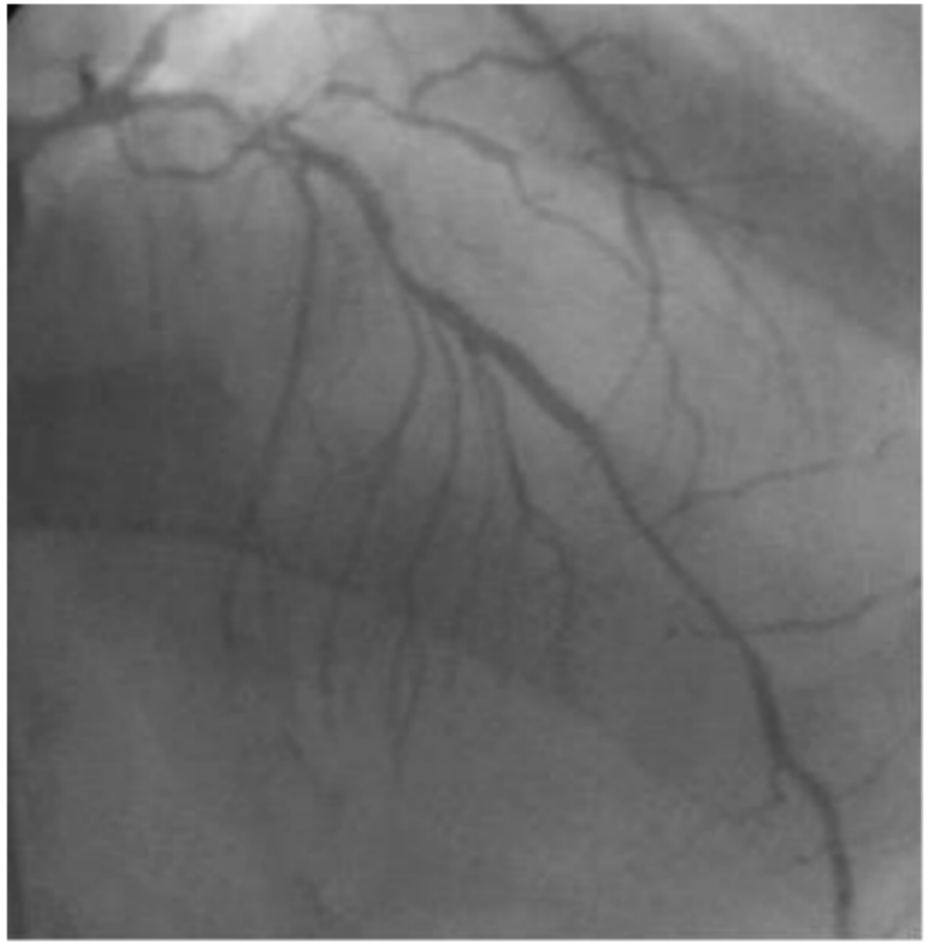
[1] EBC TWO, EBC MAIN

Stratégie: 1 stent ou plusieurs?

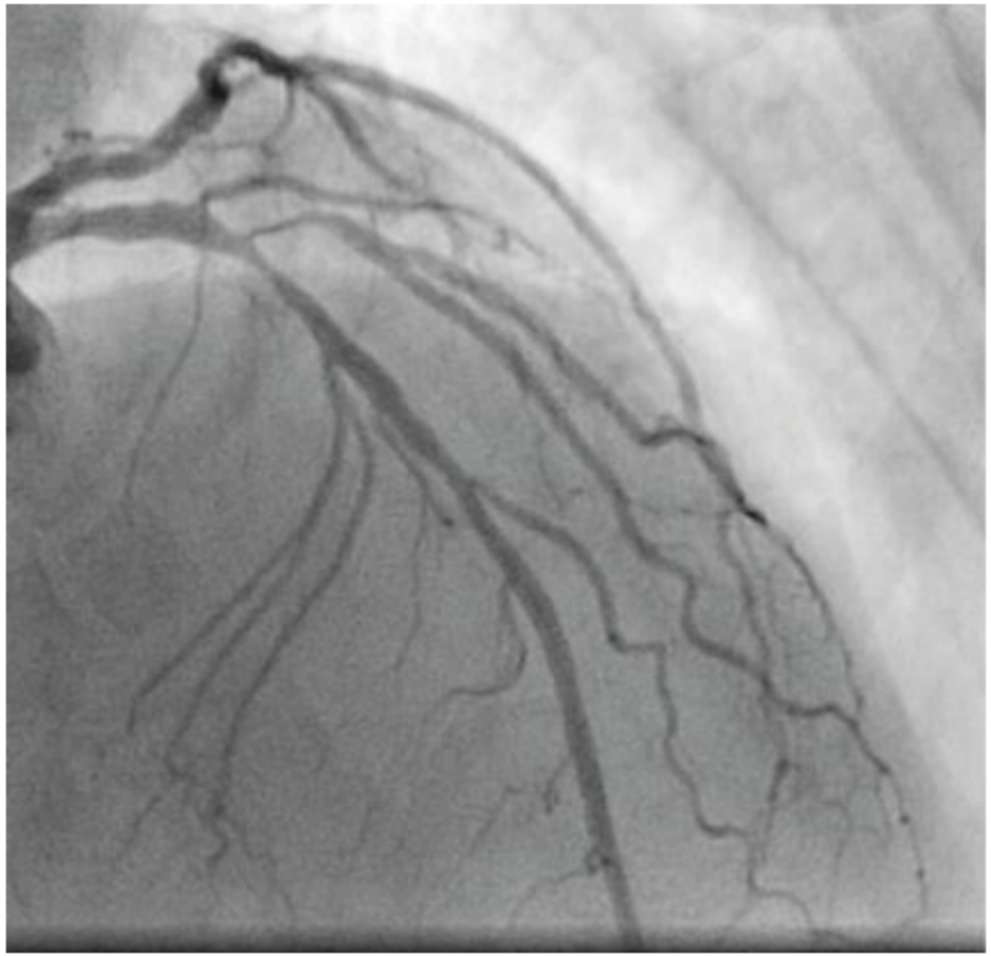
- **Provisional stenting:**
  1. 2 filaments (protéger la branche)
  2. Commencer avec 1 stent
  3. POT *(proximal optimisation technique)*
  4. Si nécessaire: ouverture des mailles et kissing balloons
  5. 2ème stent (T-And-Protrusion (TAP), culotte) seulement si dissection importante, flux ralenti TIMI < 3, angor/modification de l'ECG

- **2 stents d'emblée** si maladie diffuse dans les 2 branches de la bifurcation ou anatomie complexe
  - DK-crush, culotte, etc

Calibre

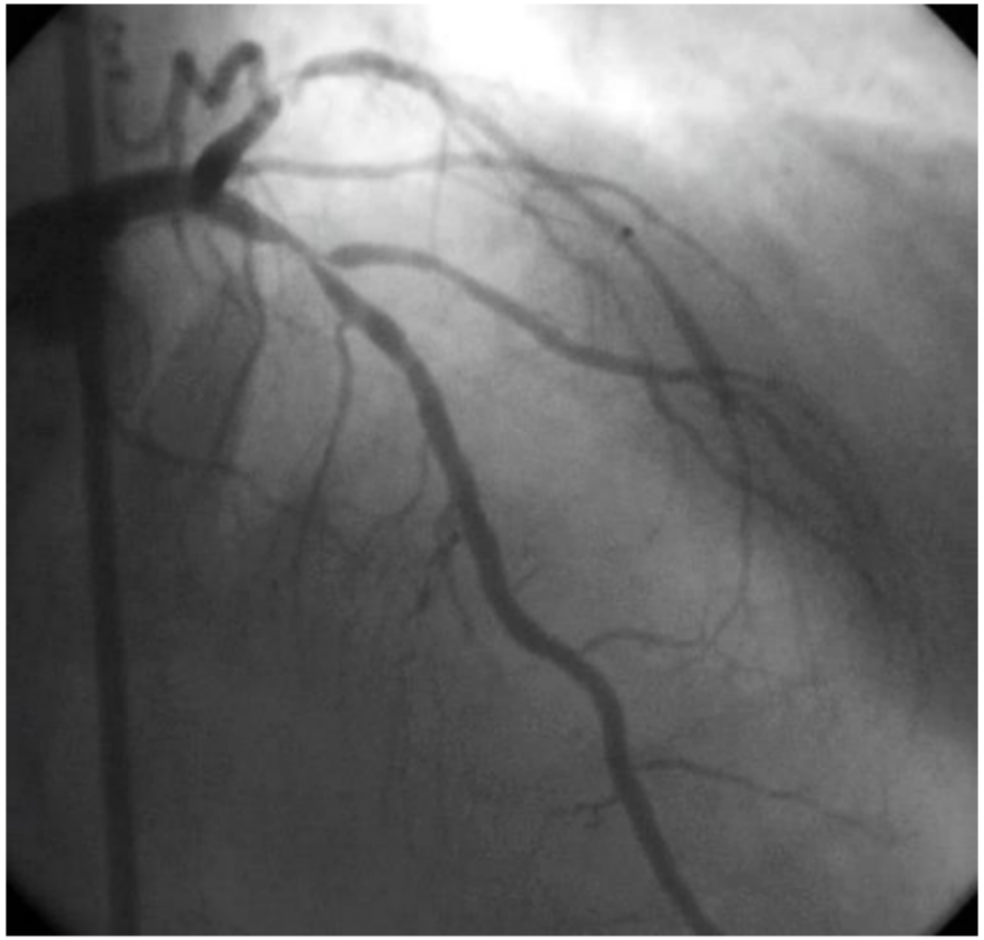


Petite diagonale, grêle ➔ provisional

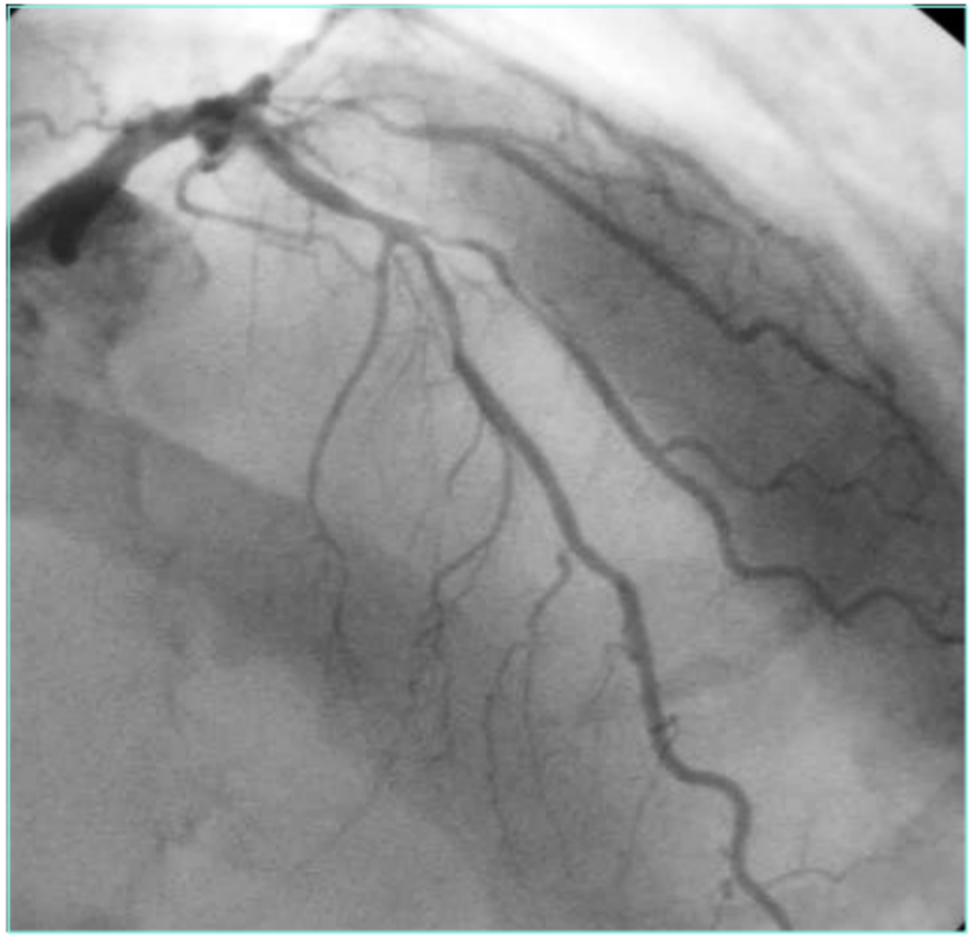


2 stents?

Maladie focale vs diffuse



Maladie ostiale ➔ plutôt provisional



Long segment malade ➔ 2 stents

Anatomie

- Angle difficile avec risque de perdre la diagonale

Choix du stent (diamètre)

- Choix du stent selon segment distal (en aval de la bifurcation)
- Suivi par POT: *proximal optimisation technique*
  - Postdilatation du segment proximal souvent avec un ballon non compliant pour adapter (augmenter) le diamètre et l'apposition

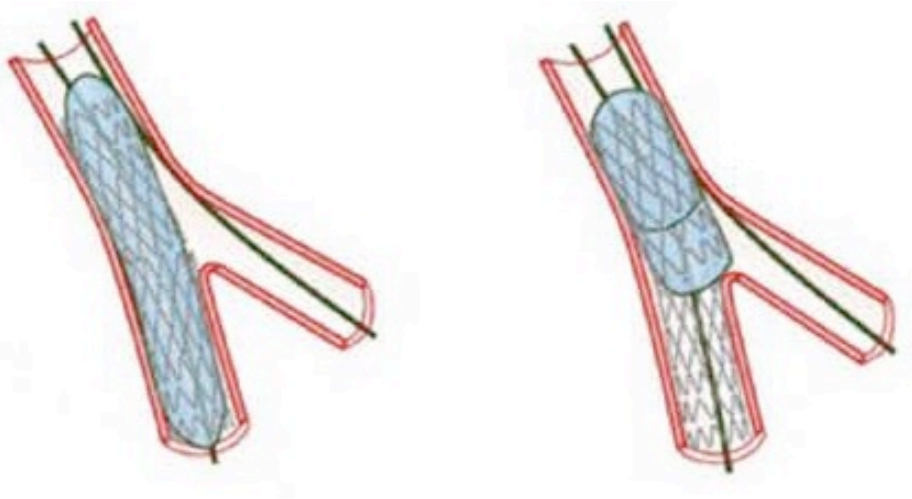


Table 3. Compliance charts for common DES platforms.

DES platform	Nominal size range for each platform	Minimal expansion diameter (according to manufacturers' chart)	Maximal overexpansion diameter with appropriately sized postdilatating balloon (on-label use)
XIENCE Skypoint[1]	2.0-3.0 mm	2.05 mm (for 2.0 mm stent @ 8 atm)	3.75 mm
XIENCE Skypoint[1]	3.5-5.0 mm	3.36 mm (for 3.5 mm stent @ 8 atm)	5.75 mm
Onyx Frontier[2]	2.0-2.5 mm	1.89 mm (for 2.0 mm stent @ 7 atm)	3.00 mm
Onyx Frontier[2]	2.75-3.0 mm	2.50 mm (for 2.75 mm stent @ 7 atm)	4.00 mm
Onyx Frontier[2]	3.5-4.0 mm	3.20 mm (for 3.5 mm stent @ 7 atm)	5.00 mm
Onyx Frontier[2]	4.5-5.0 mm	4.10 mm (for 4.5 mm stent @ 7 atm)	6.00 mm
SYNERGY XD[3]	2.25-2.75 mm	2.05 mm (for 2.0 mm stent @ 8 atm)	3.50 mm
SYNERGY XD[3]	3.0-3.5 mm	3.05 mm (for 3.0 mm stent @ 8 atm)	4.25 mm
SYNERGY XD[3]	4.0 mm	3.88 mm (for 4.0 mm stent @ 8 atm)	5.75 mm
SYNERGY MEGATRON[3]	3.5-5.0 mm	3.18 mm (for 3.5 mm stent @ 8 atm)	6.00 mm
Ultimaster Nagomi[4]	2.0-2.5 mm	1.84 mm (for 2.0 mm stent @ 7 atm)	3.50 mm
Ultimaster Nagomi[4]	2.75-3.0 mm	2.56 mm (for 2.75 mm stent @ 7 atm)	4.50 mm
Ultimaster Nagomi[4]	3.5-4.5 mm	3.26 mm (for 3.5 mm stent @ 7 atm)	6.25 mm
Orsiro Mission[5]	2.25-3.0 mm	2.31 mm (for 2.25 mm stent @ 8 atm)	3.5 mm
Orsiro Mission[5]	3.5-4.0 mm	3.56 mm (for 3.5 mm stent @ 10 atm)	4.5 mm

[1]Abbott; [2]Medtronic; [3]Boston Scientific; [4]Terumo; [5]BIOTRONIK. DES: drug-eluting stent

Imagerie intracoronaire (IVUS, OCT)

- Mesurer le diamètre dans les différents segments
  - Choix des ballons/stents
- Evaluer l'anatomie/calcification
- Evaluer le résultat
  - Apposition?
  - Dissection?

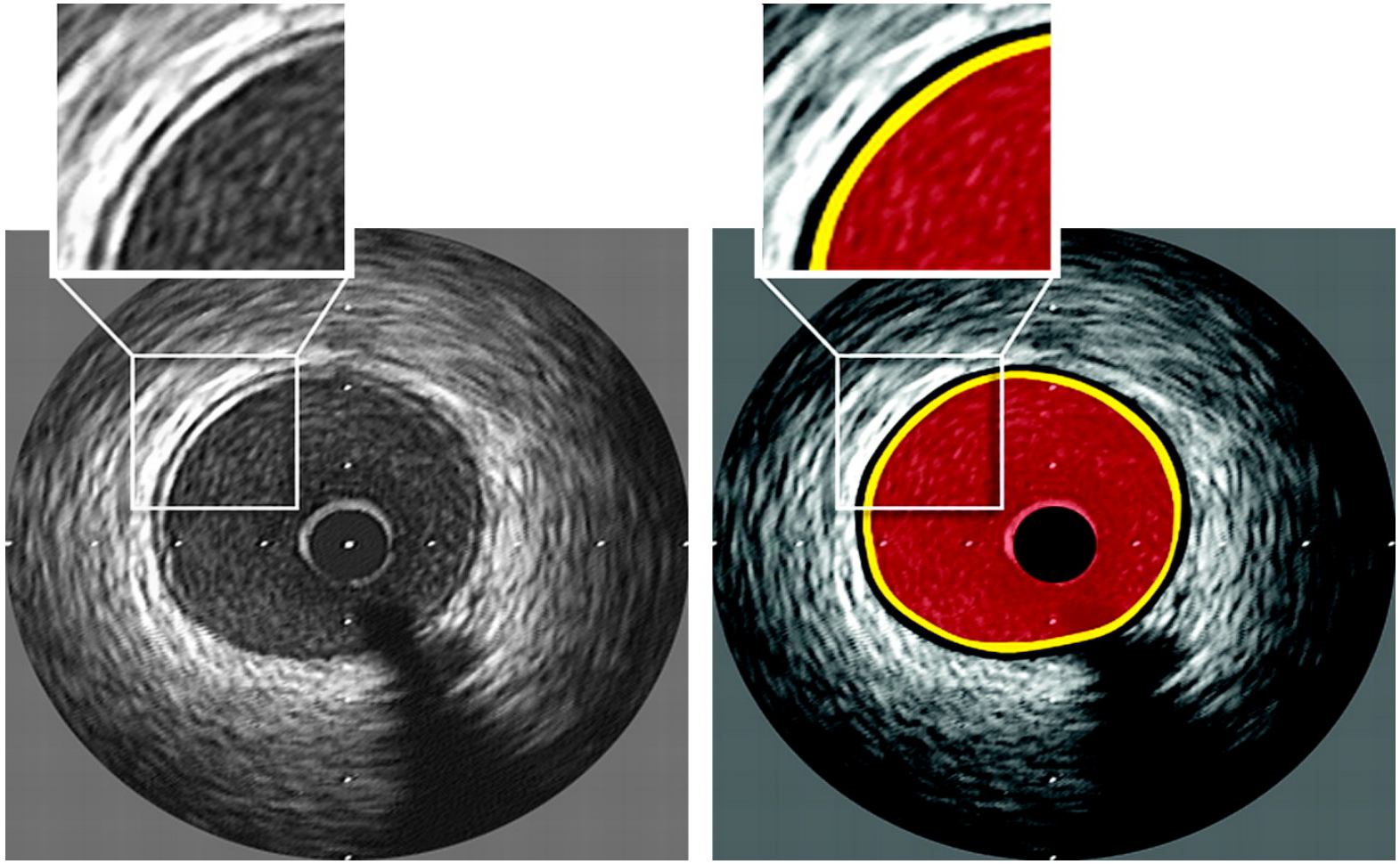
Imagerie intracoronaire

- IVUS : intravascular ultrasound
  - Echographie endocoronaire
  - Ondes ultrasonores de 20 à 40 MHz
  - Résolution axiale 50-150 µm ⇔ profondeur de pénétration 5-6 mm
  - *Boston scientific, Volcano (Philips)*
- OCT : optical coherence tomography
  - Tomographie par cohérence optique
  - Lumière proche de l'infrarouge
  - Résolution axiale 10-20 µm ⇔ profondeur de pénétration 1-2 mm
  - *Abbott*

IVUS

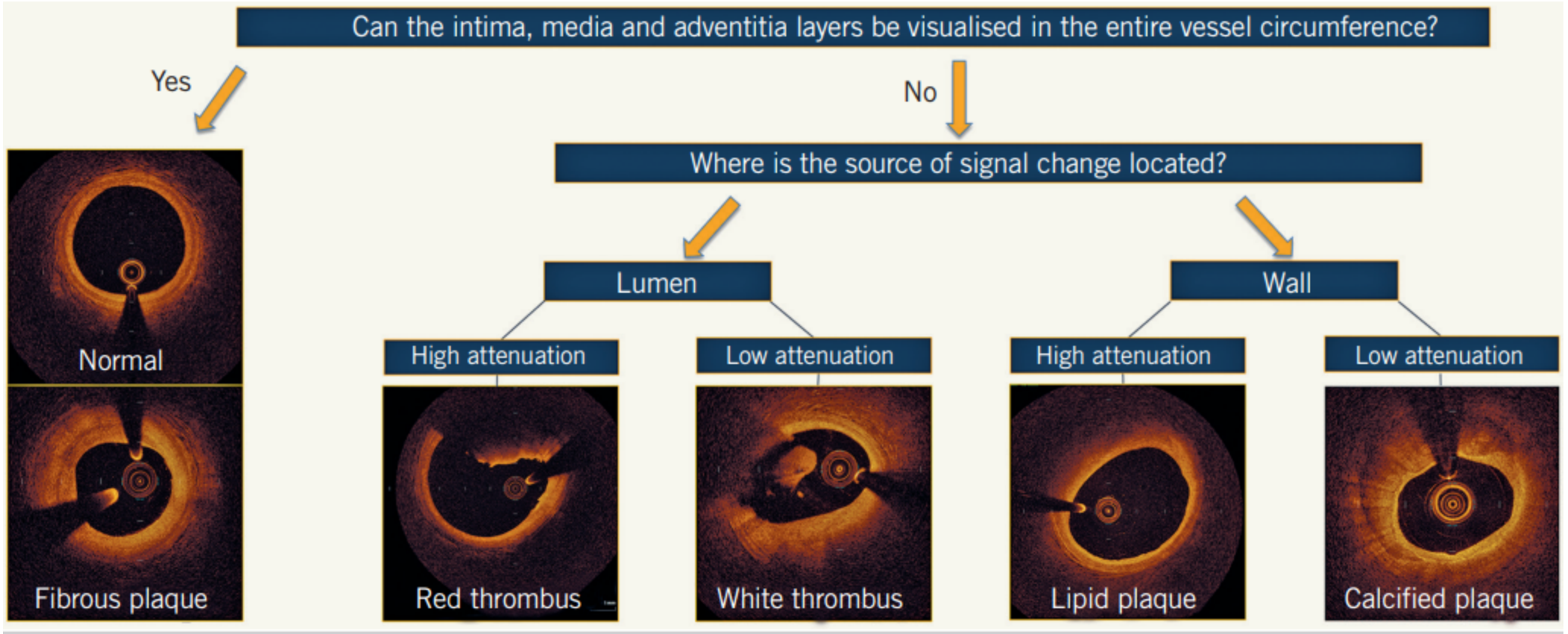
Paroi coronaire :

- Intima
- Media
- Adventitia



BMJ online 2009

OCT



Interaction entre la lumière et les globules rouges ➔ rinçage par produit de contraste est réalisé durant le retrait du cathéter

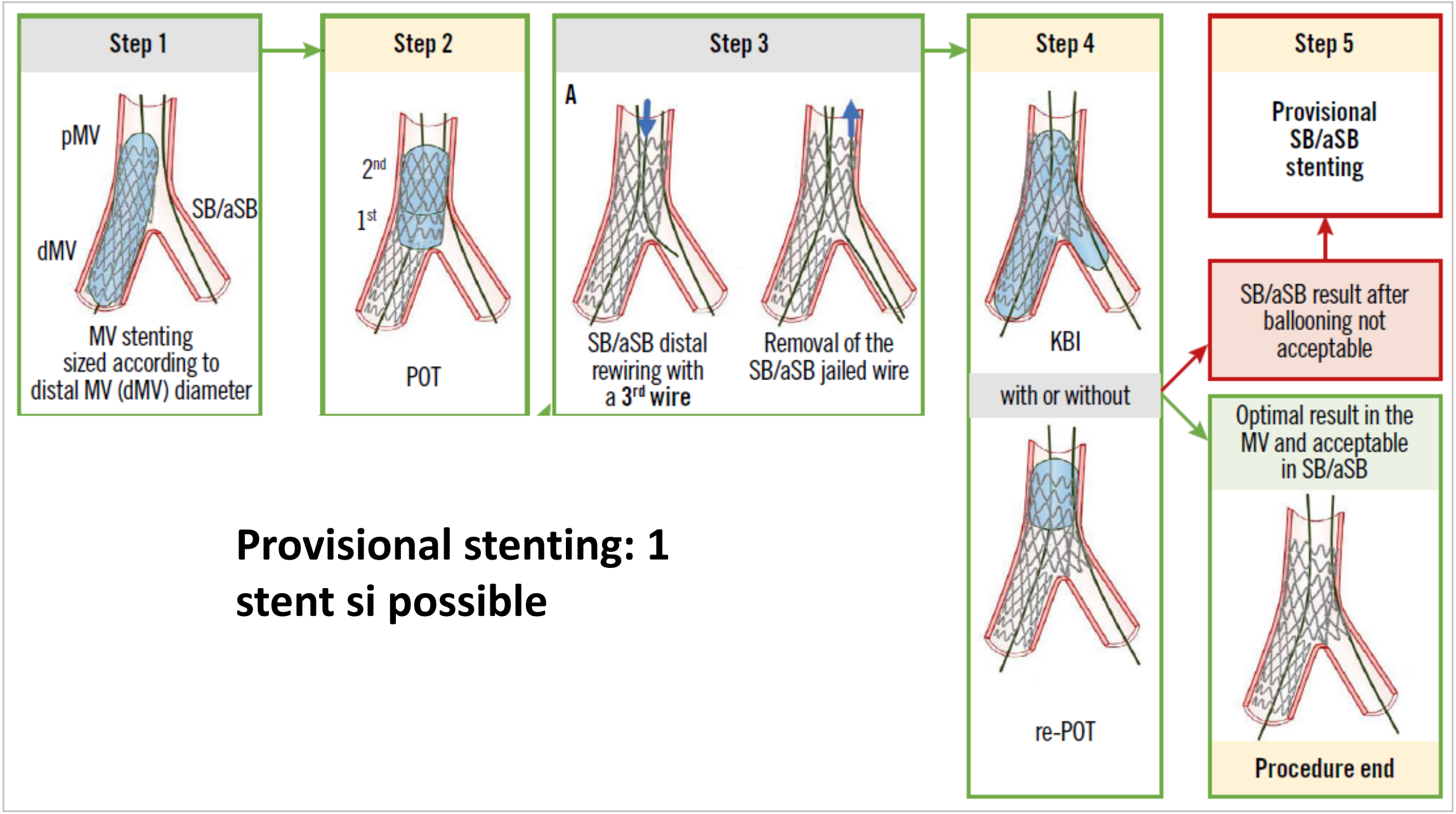
Ali et al. Eurointervention 2021

ESC guidelines CCS 2024

Intracoronary imaging guidance by IVUS or OCT is recommended when performing PCI on anatomically complex lesions, in particular left main stem, true bifurcations, and long lesions.[866,337,810,840,841]

Predilatation

- Calcification importante?
  - Ballons semicompliants et non compliants, ballon scoreflex, cutting balloon
  - Rotablateur, athérectomie orbitale
  - Lithotrypsie intracoronaire (shockwave)
- Predilatation de chaque branche n'est pas toujours nécessaire (risque de dissection avec nécessité d'implanter un 2ème stent)

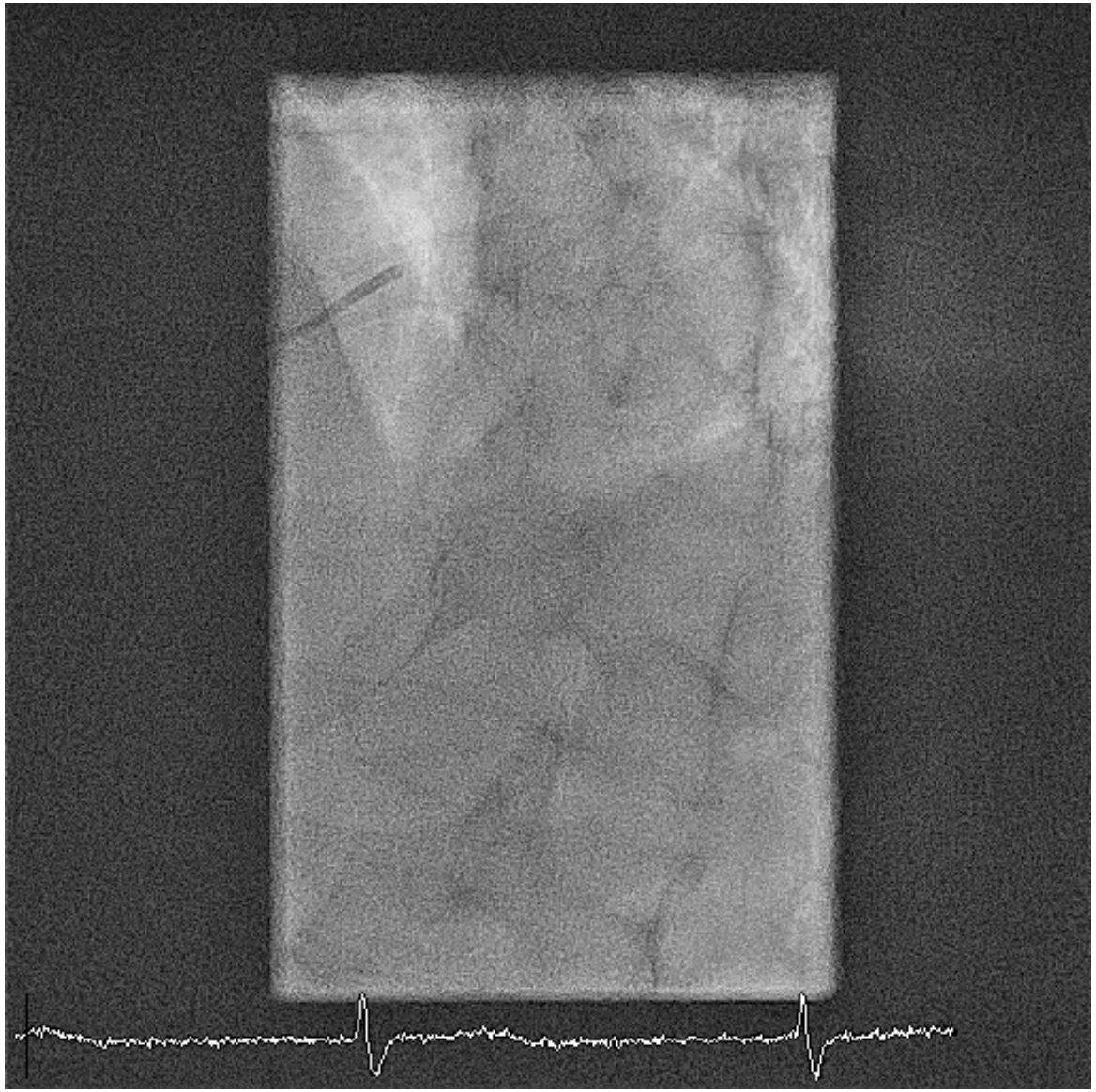


Provisional stenting: 1 stent si possible

Cas clinique: provisional stenting

Angor
Echo stress positif

Comorbidités ++
(dialyse, diabète, artérite des membres inférieurs)

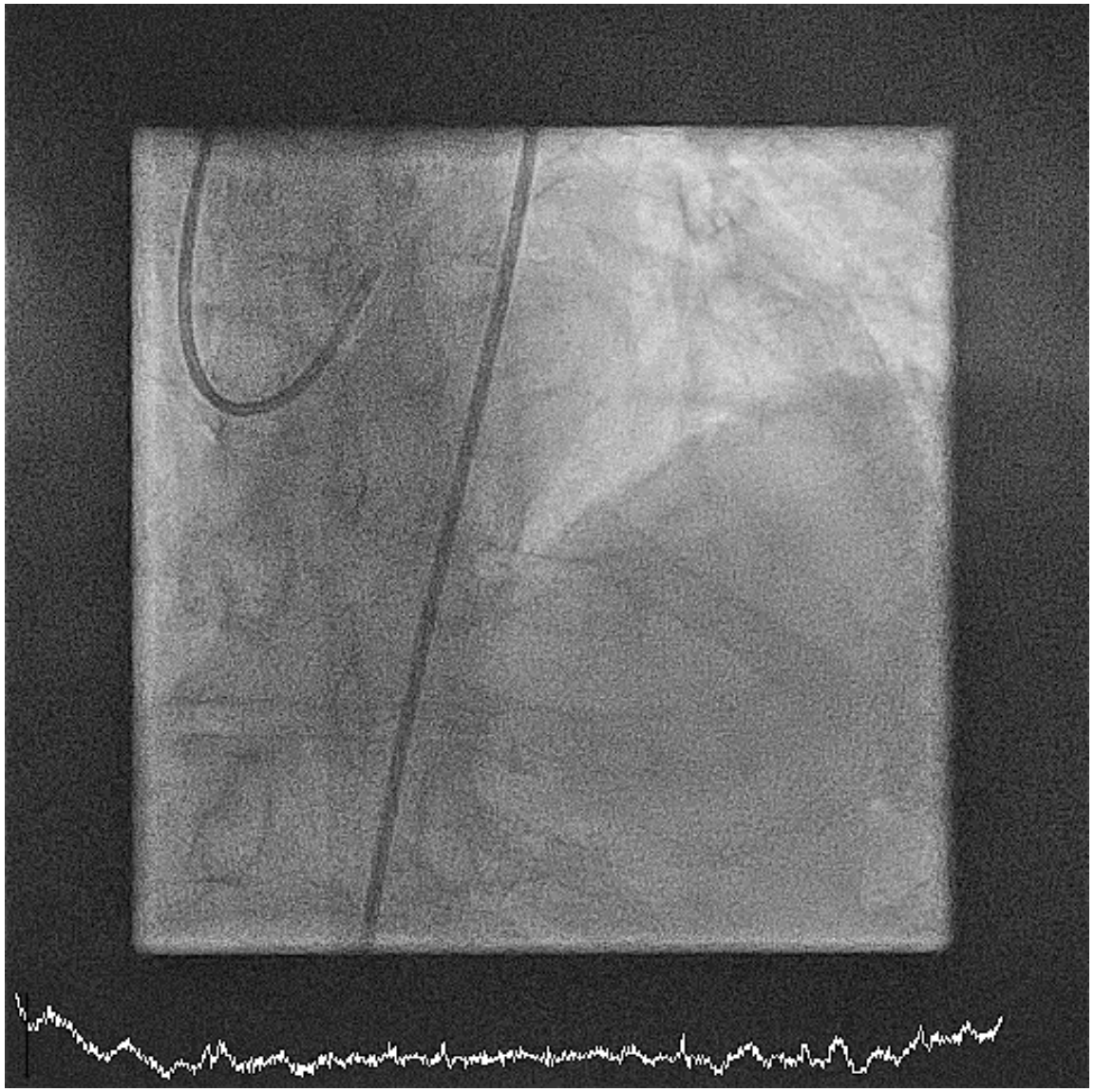


Lésion serrée dans l'ostium de la Cx

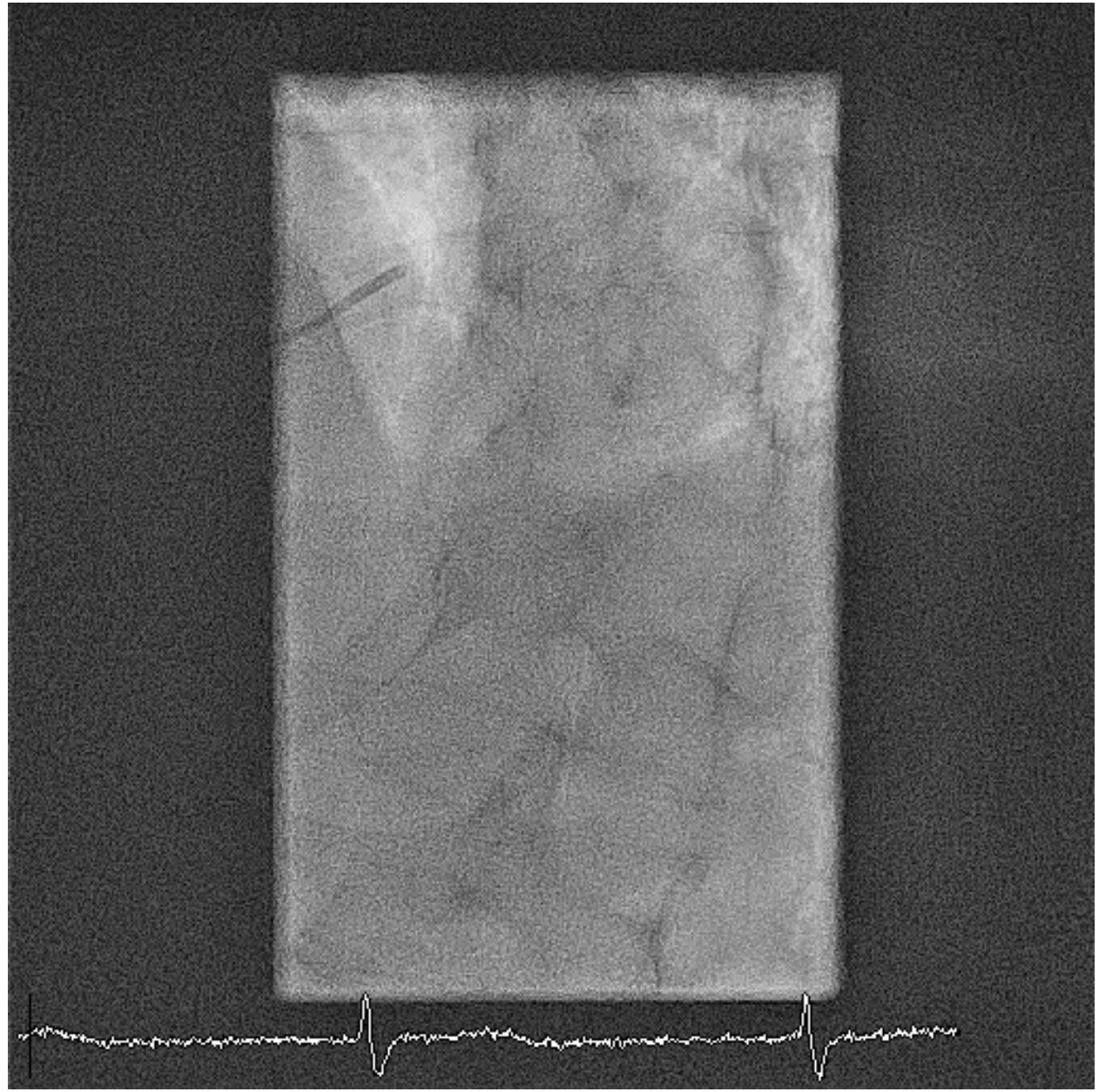
Plaque dans le tronc commun et l'IVA ostiale avec sténose modérée

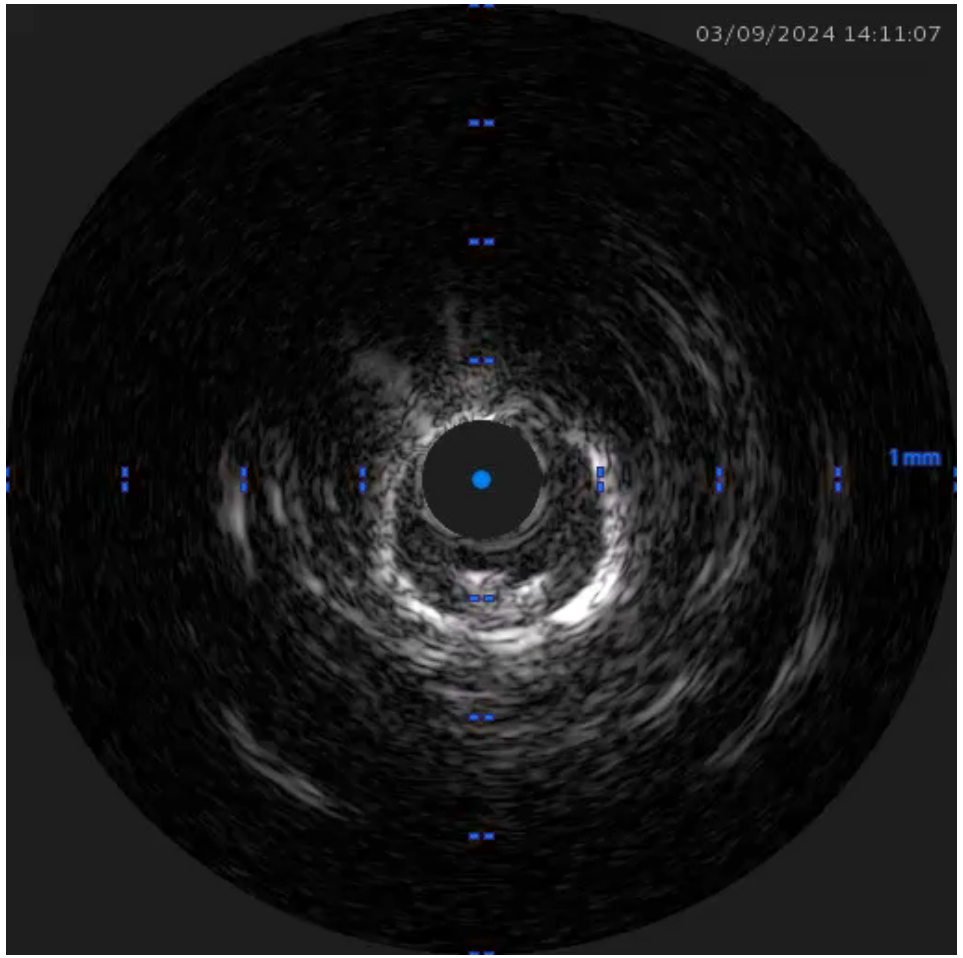
Calcification importante

Maladie distale

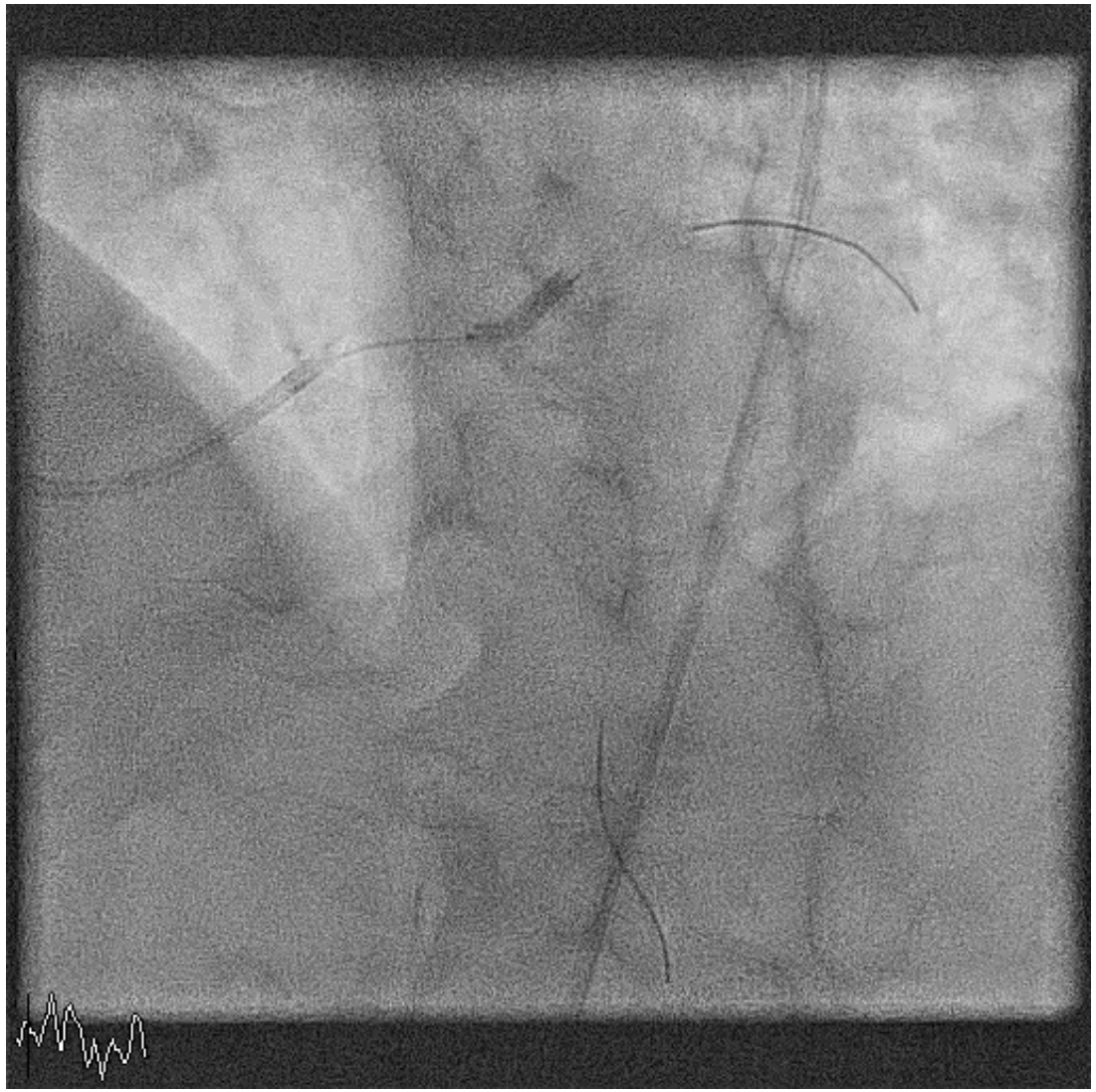


Calcification importante

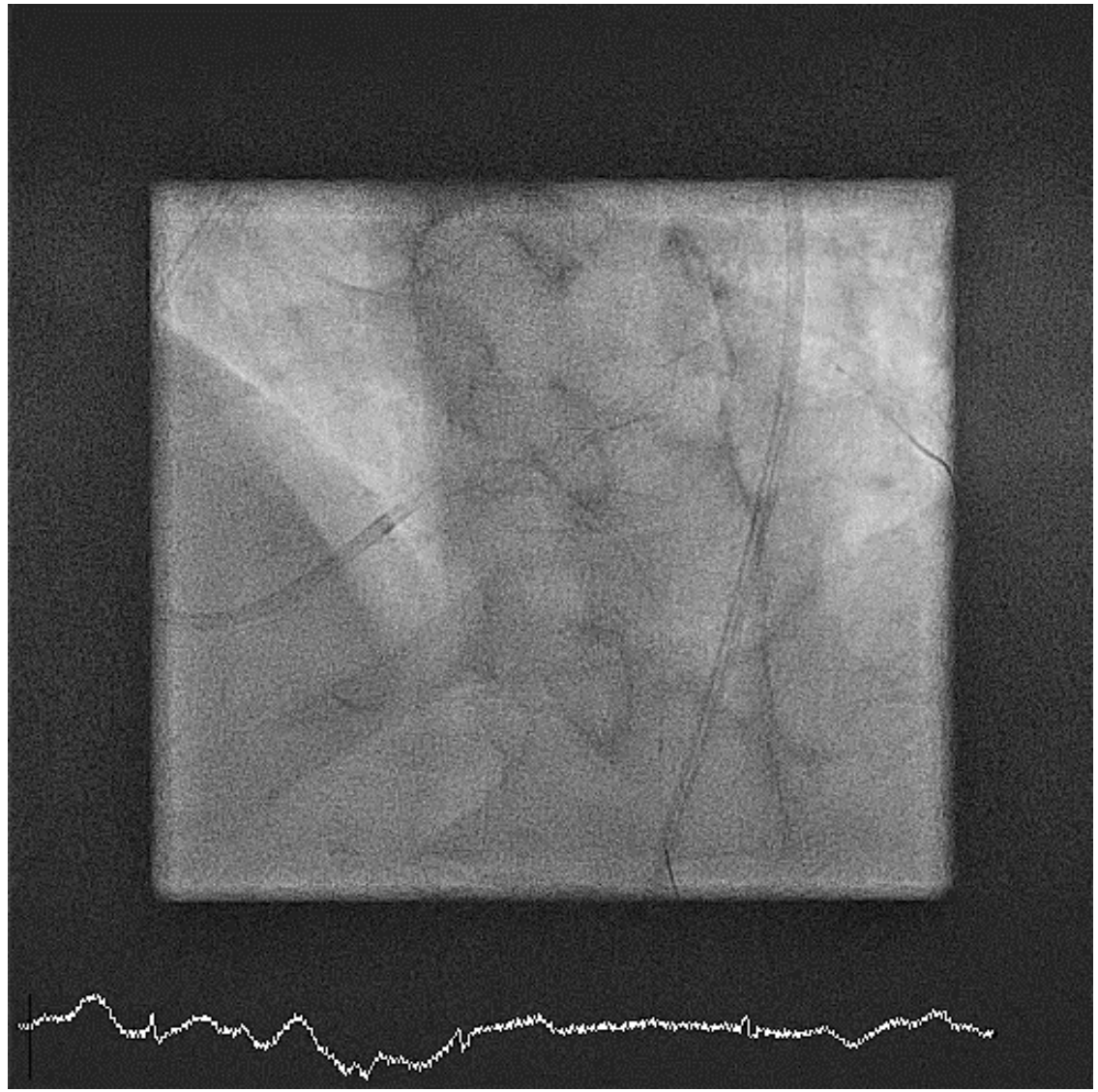



03/09/2024 14:11:07
1mm

Predilatation
aggressive ballon
compliant + scoreflex

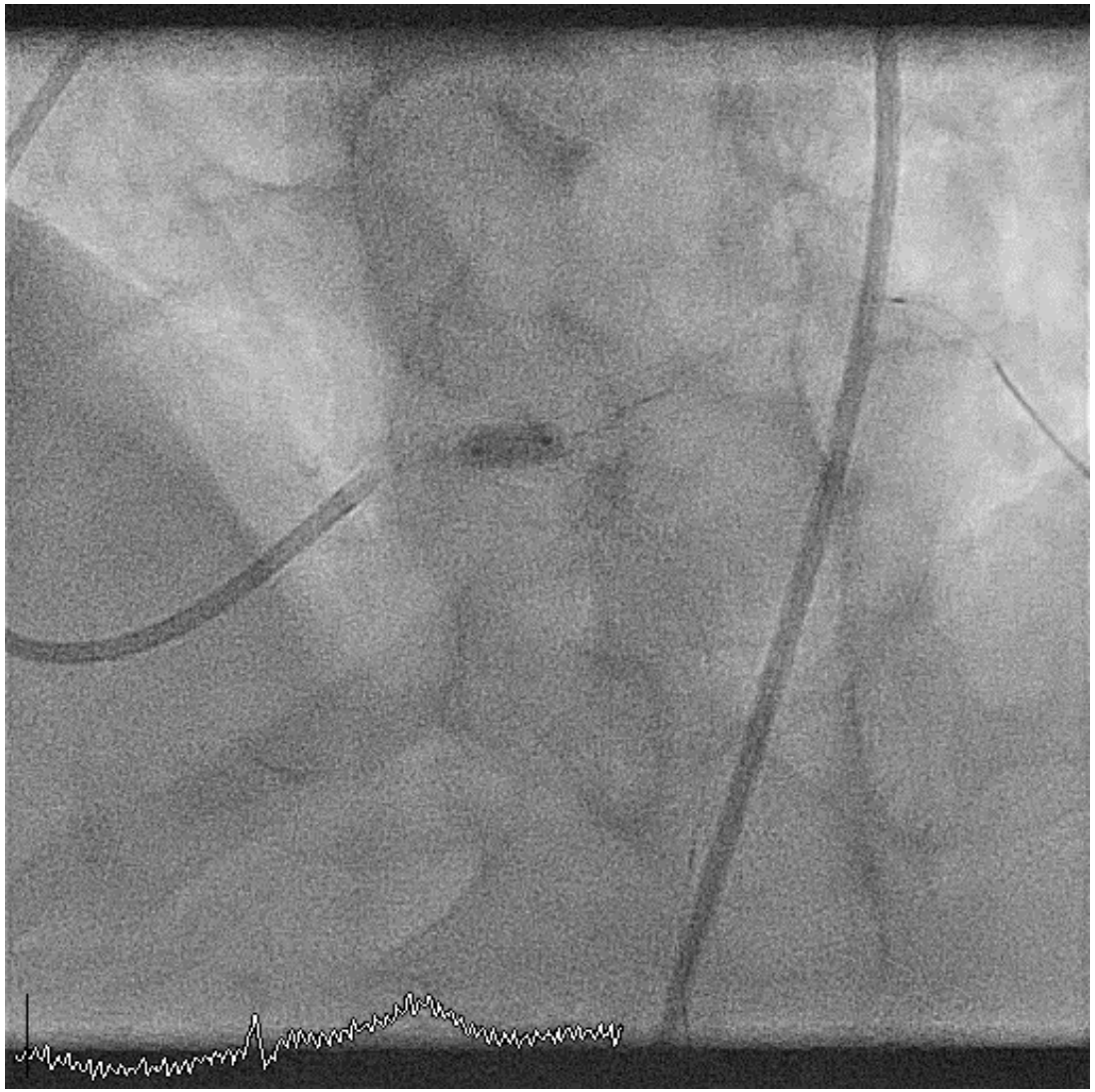


Stent TC vers Cx 3,5x23 (xience skypoint)

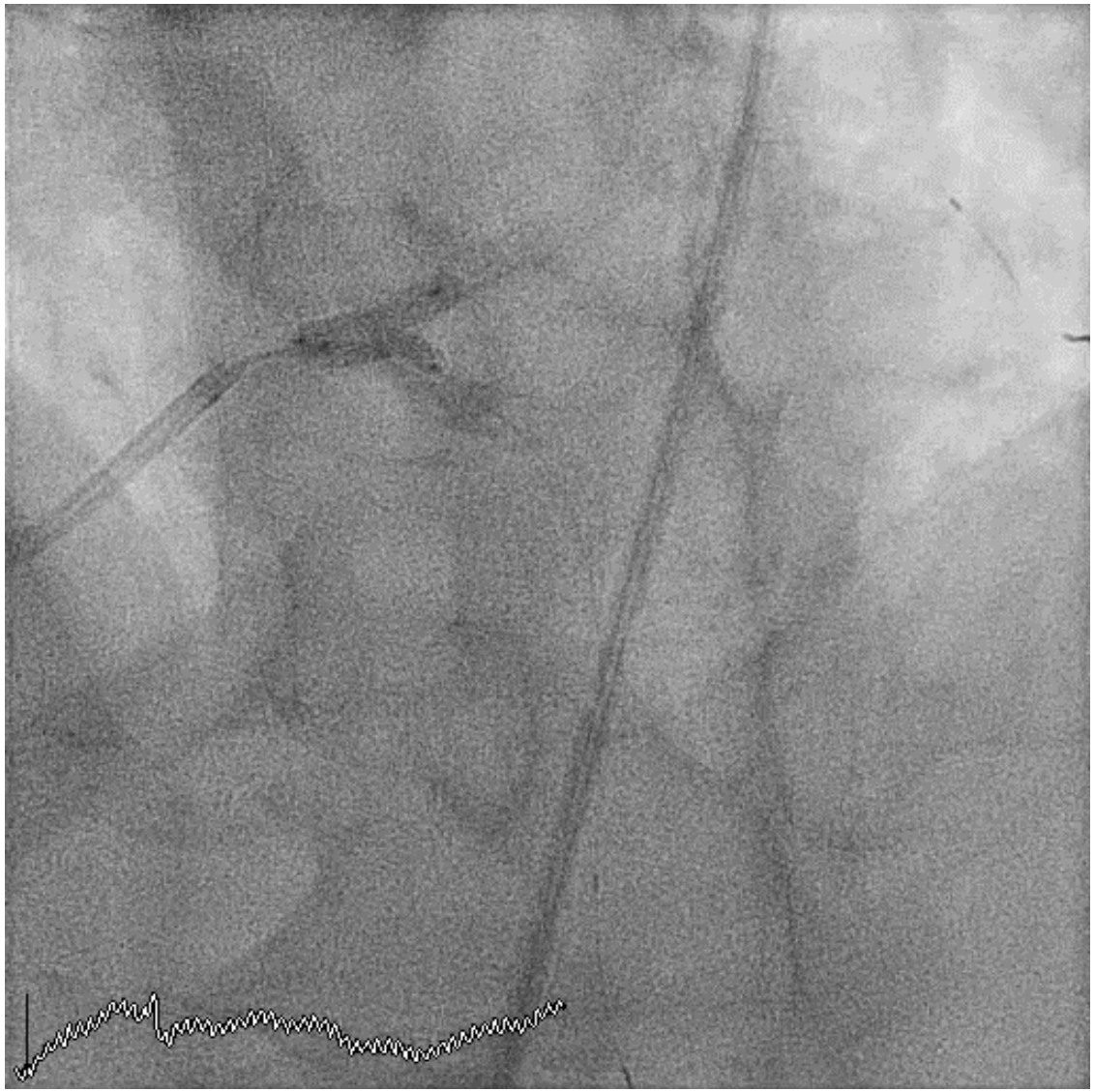


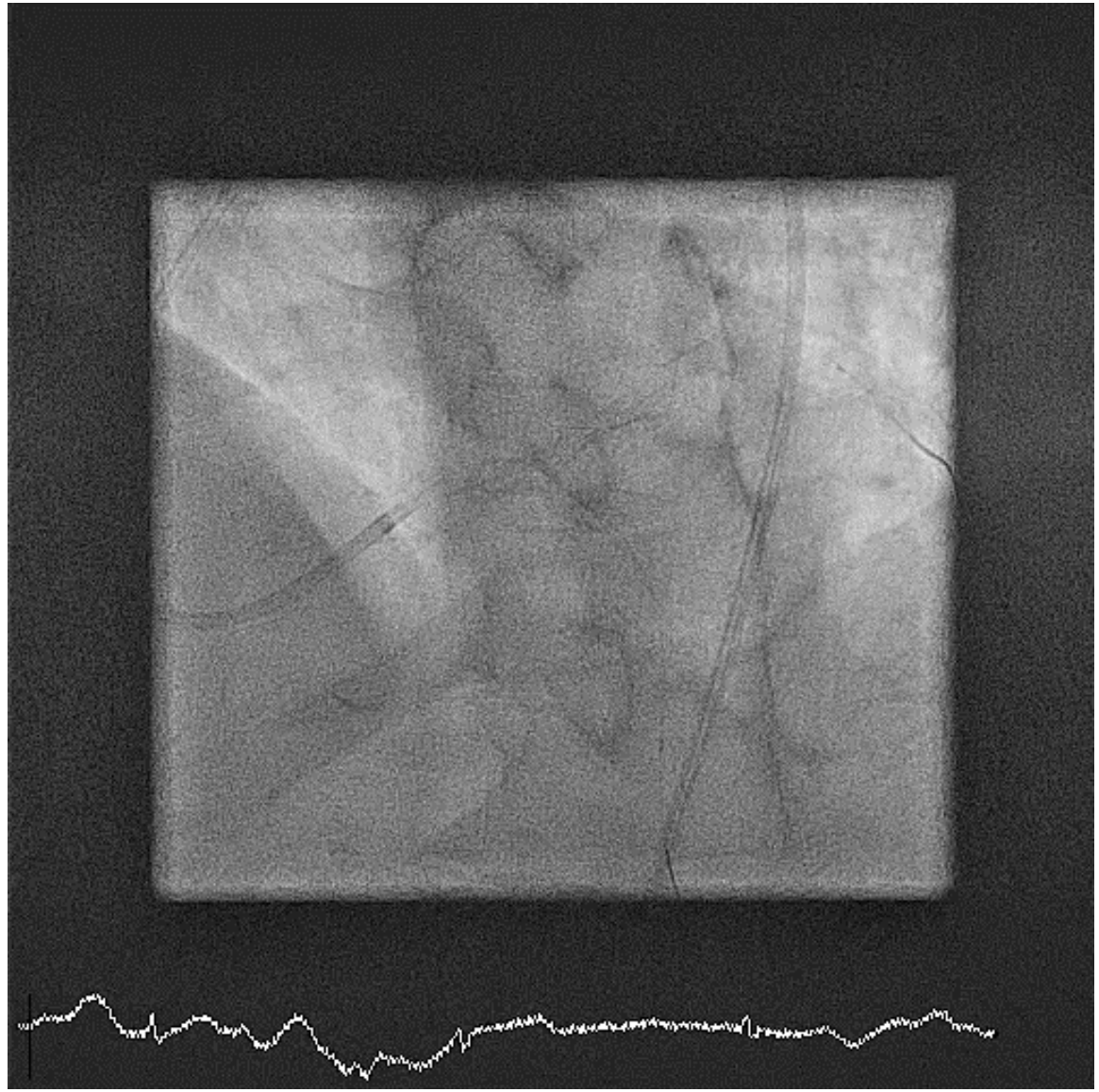
POT
Proximal optimisation technique

Ballon NC 4,5x8



Ouverture des mailles et kissing balloons



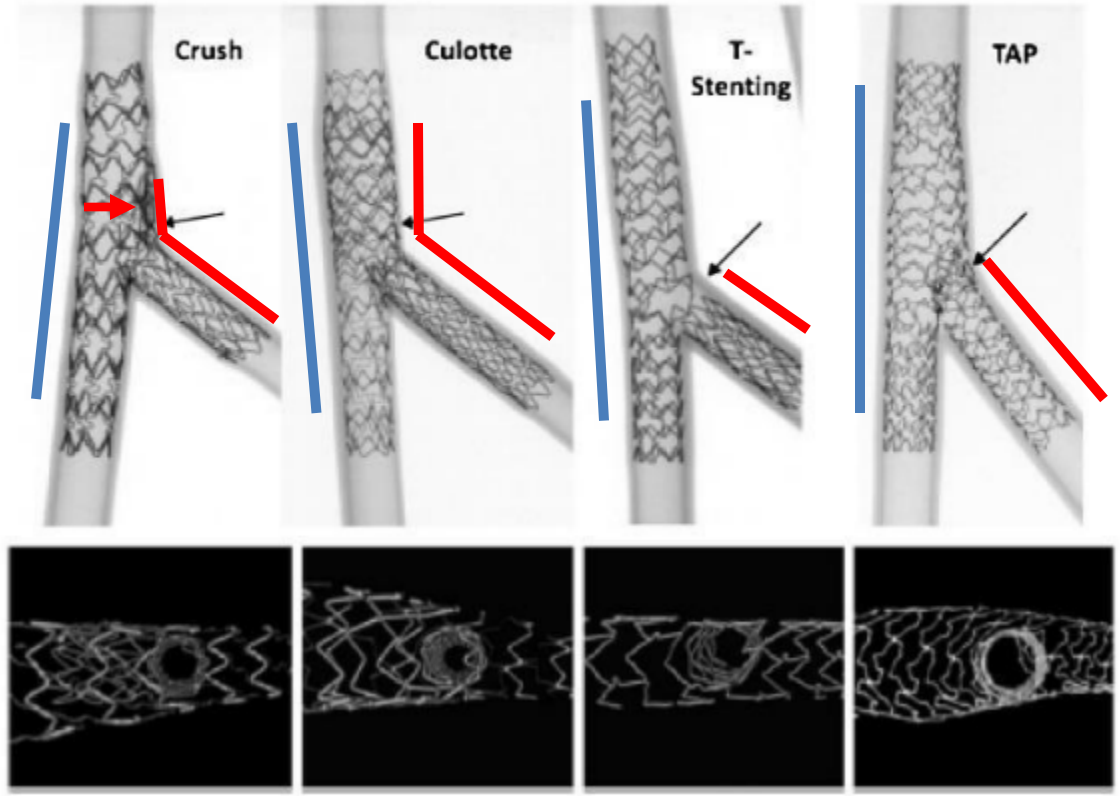


Stratégies à 2 stents

- TAP : T-and-Protrusion
- Culotte
- DK crush
- Etc

- Choix selon l'anatomie, l'angle, le diamètre, etc
- *Provisional stenting* avec besoin d'un 2ème stent: TAP ou culotte

Curr Cardiol Rep (2015)

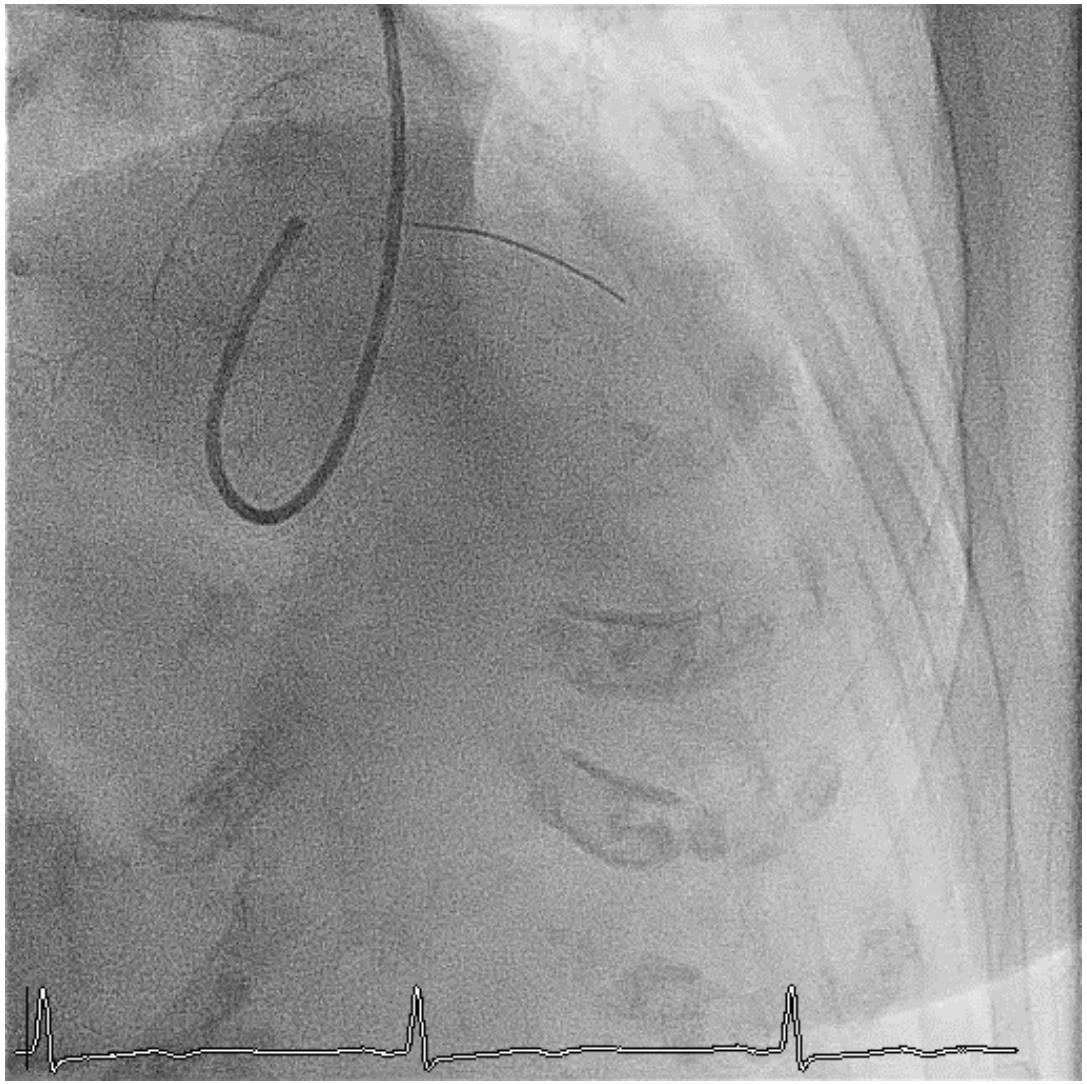


Cas clinique 1

Femme 75 ans

Angor stable

Coroscanner pathologique

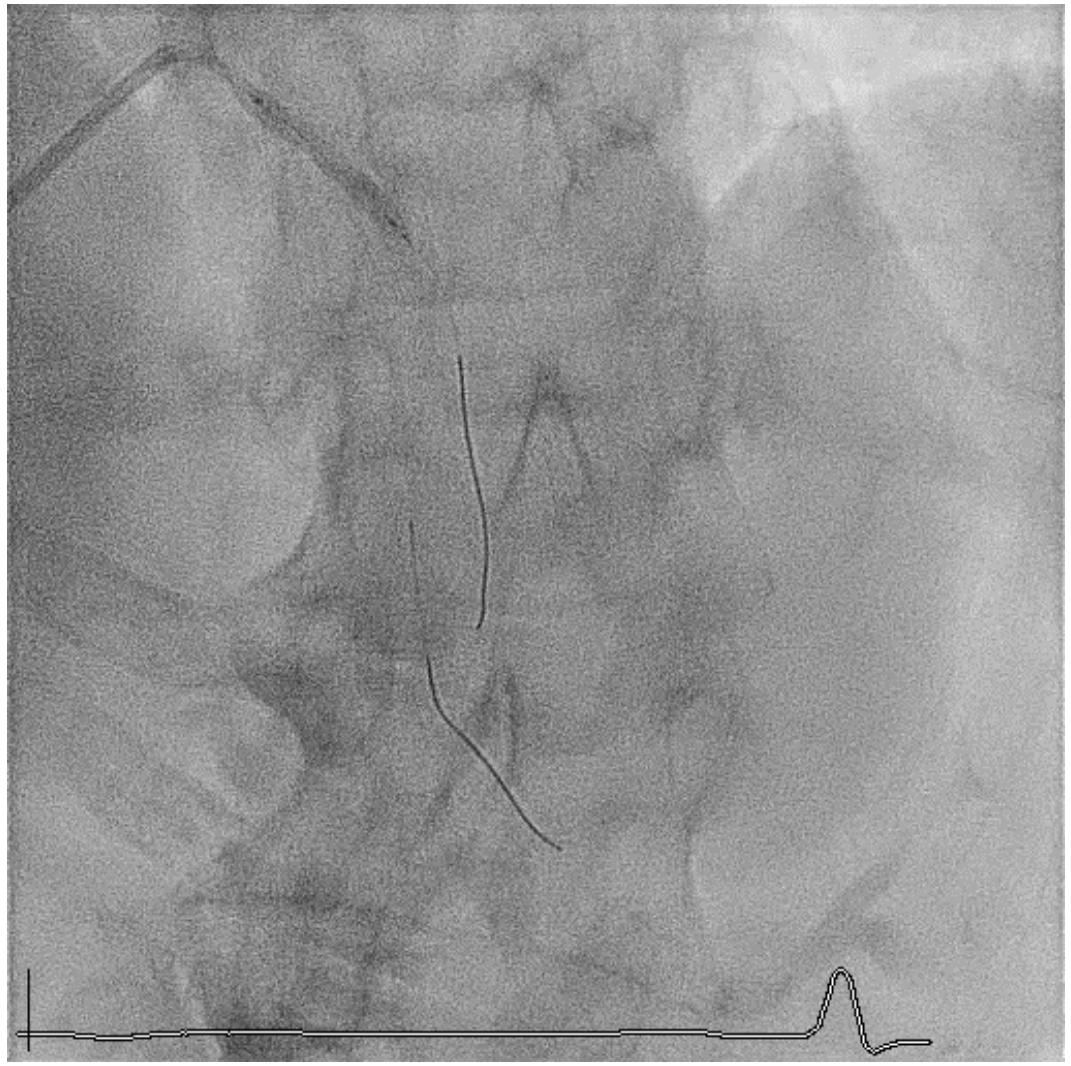


IVA proximale

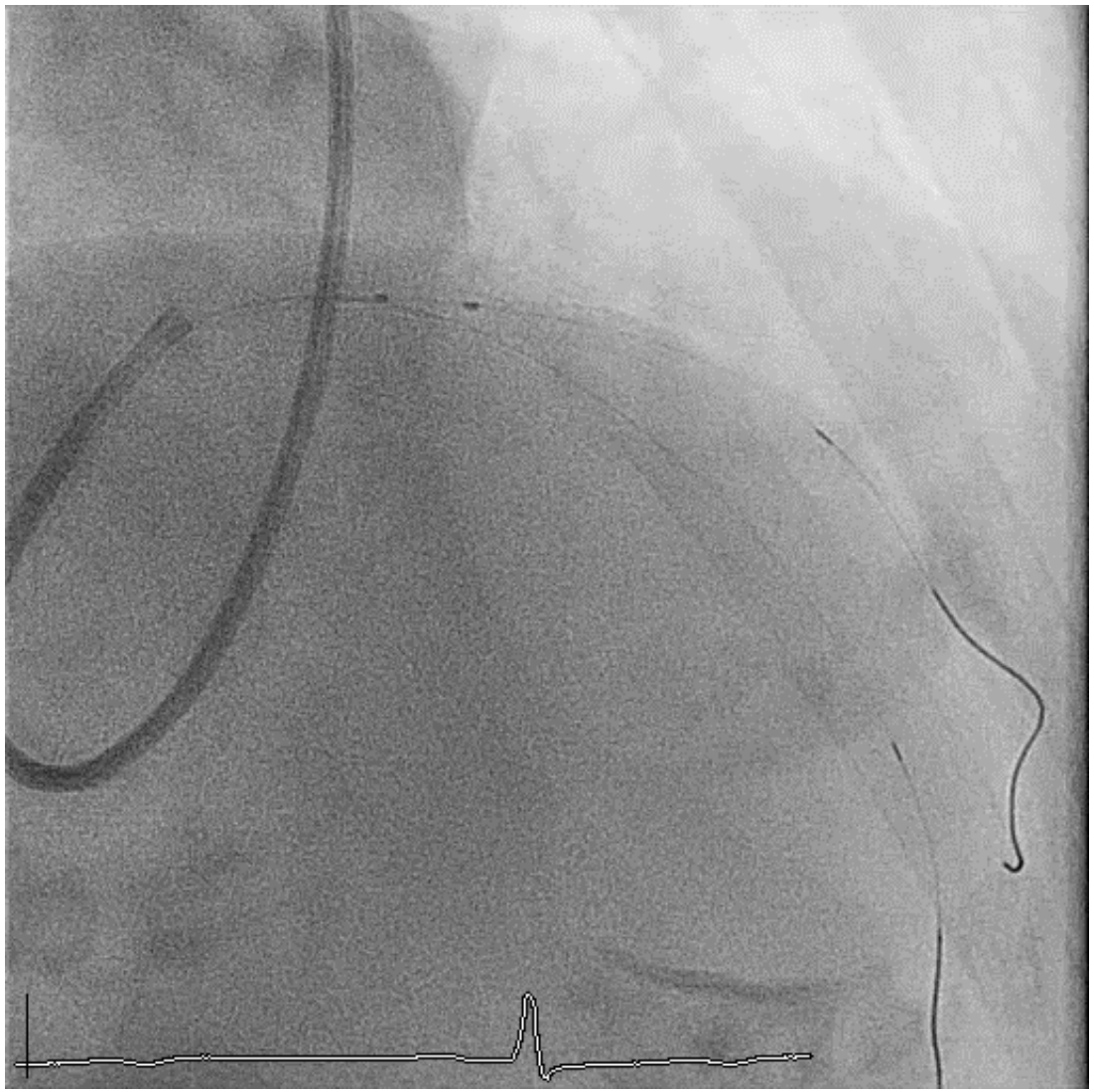
Medina 0-1-1

FFR pathologique IVA + D1

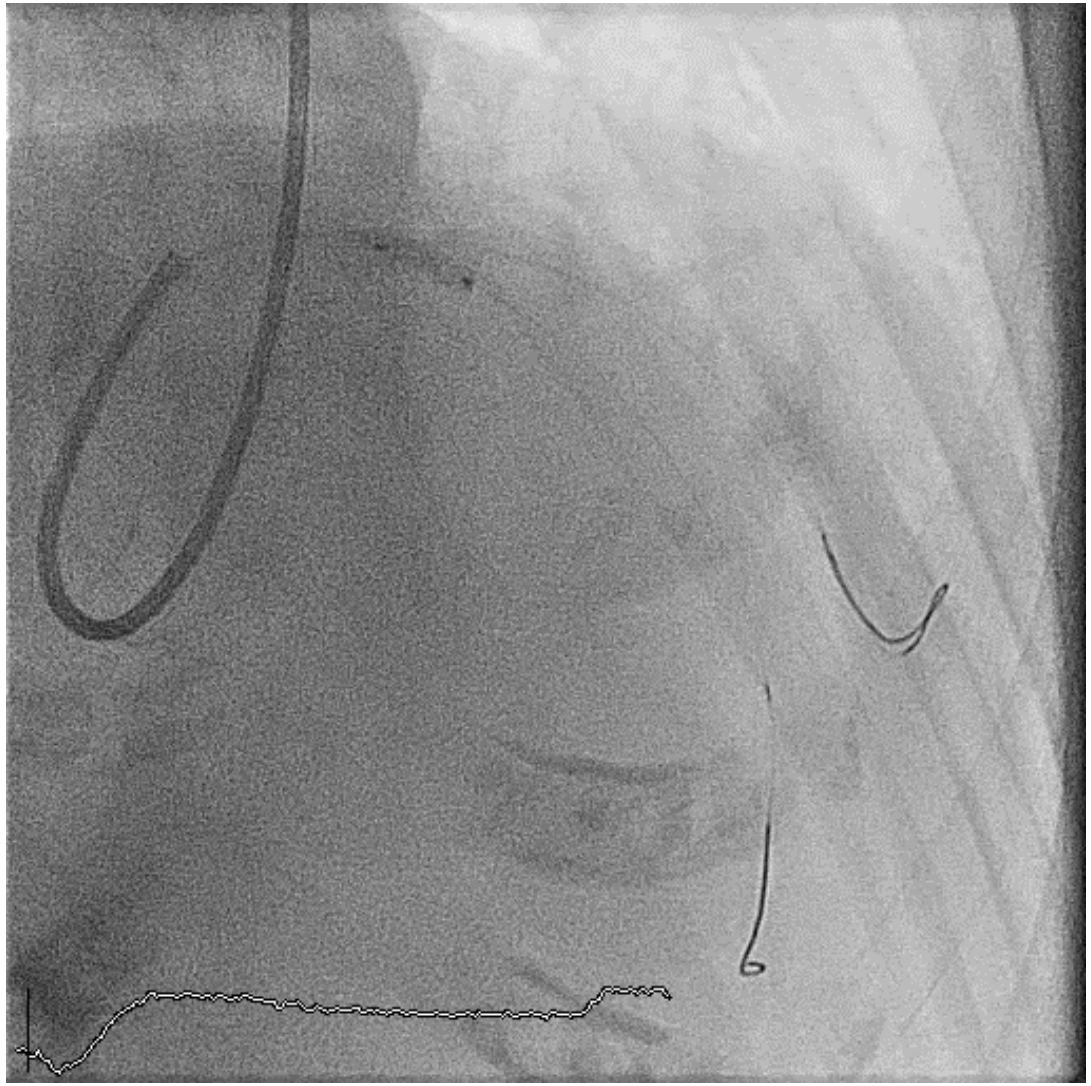
Direct stenting IVA
vers D1 3,0x22 Orsiro
Mission



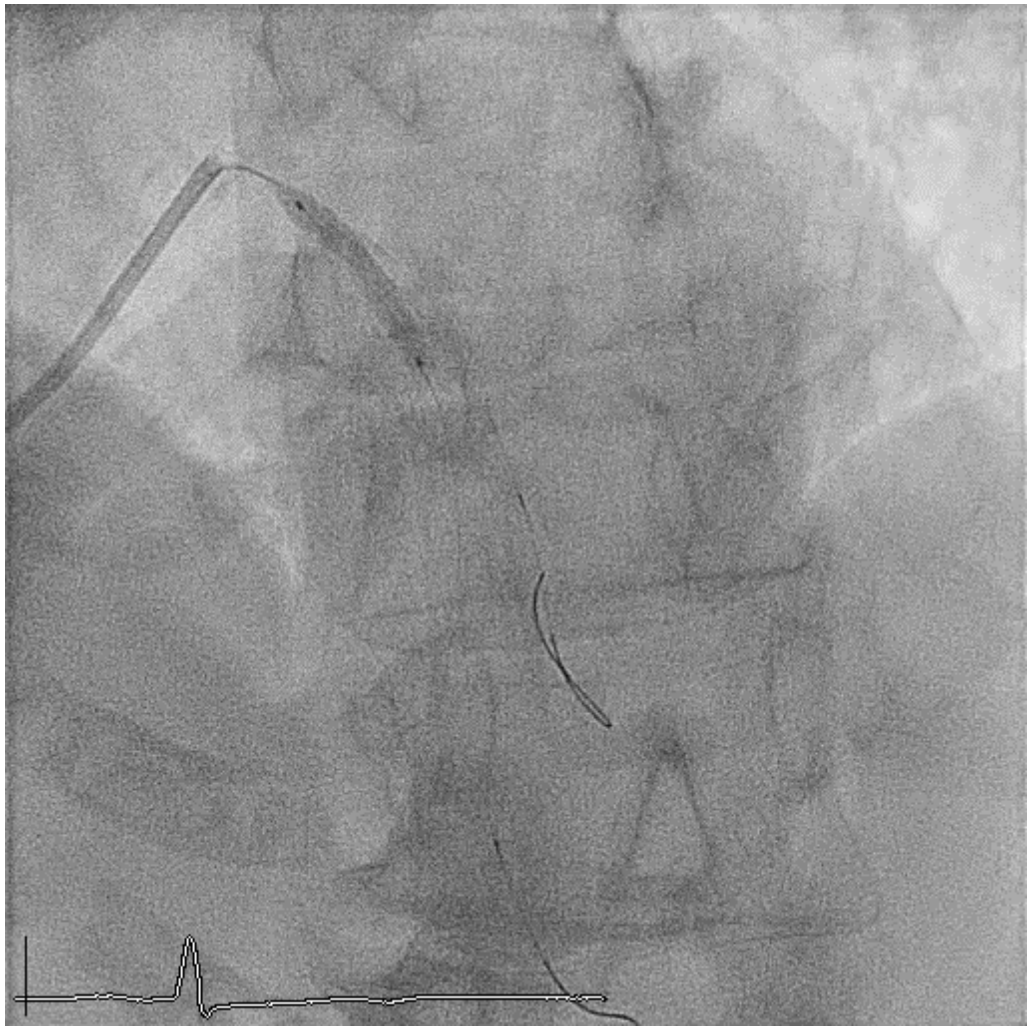
POT 3,5 NC



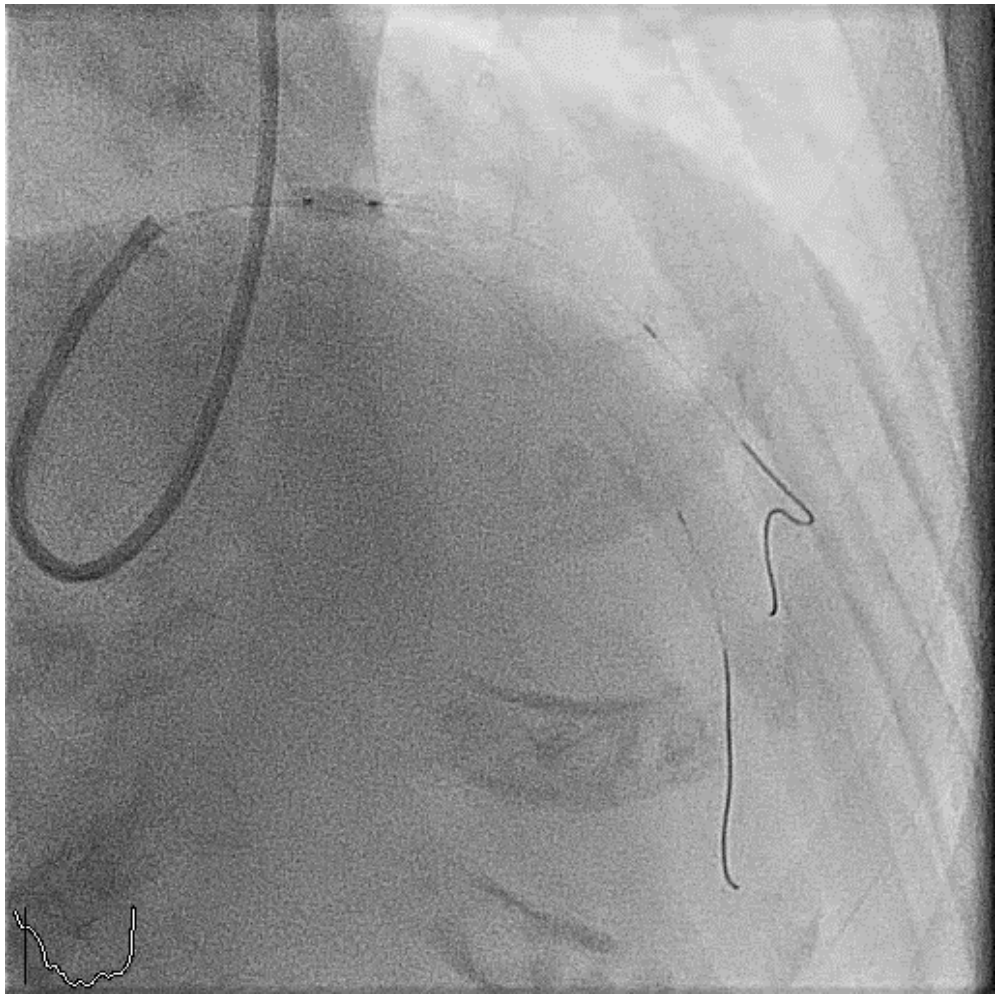
Ouverture des mailles



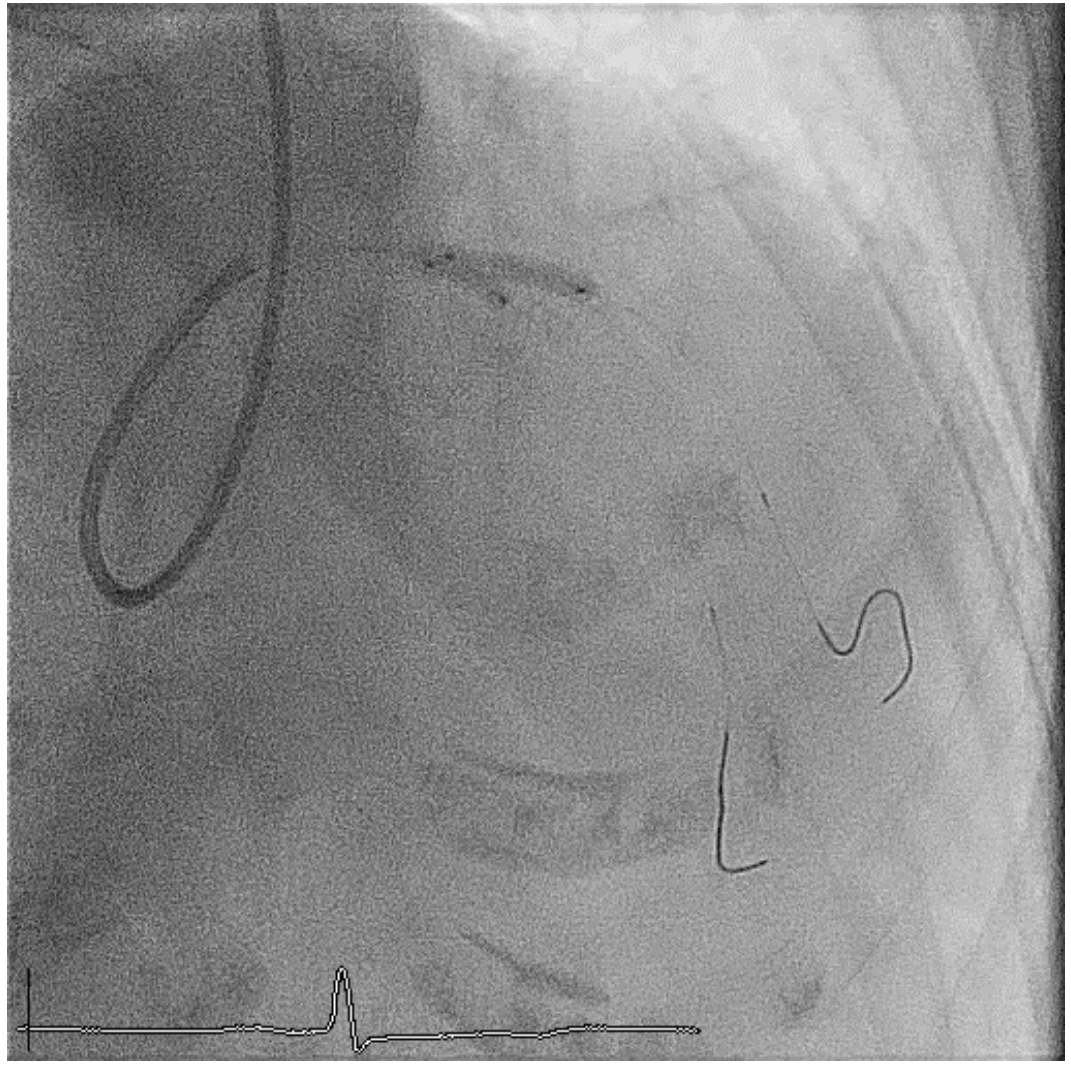
Stent 2 IVA 3,0x22
Orsiro Mission



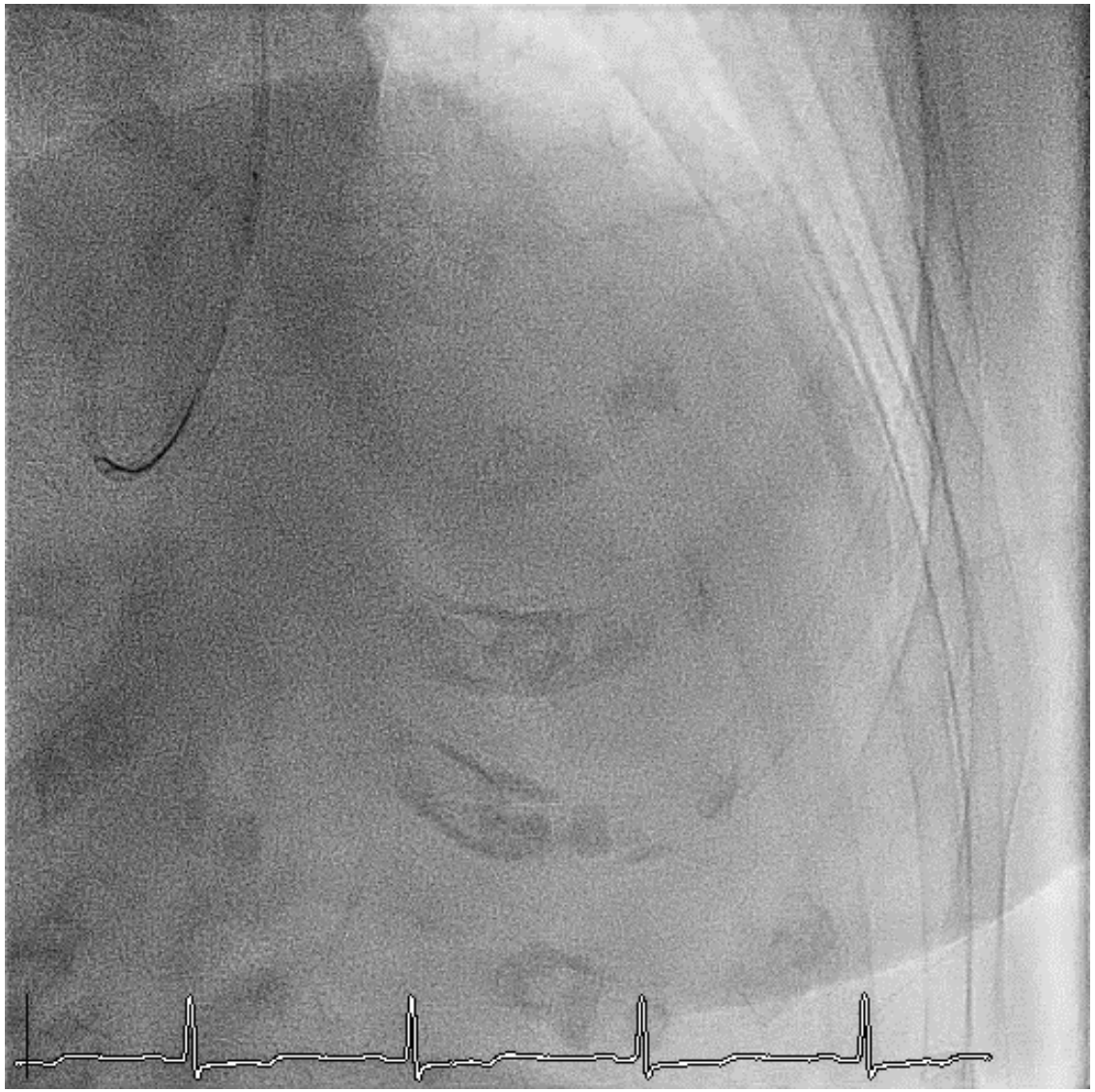
rePOT



Ouverture des mailles et kissing balloons



Résultat final

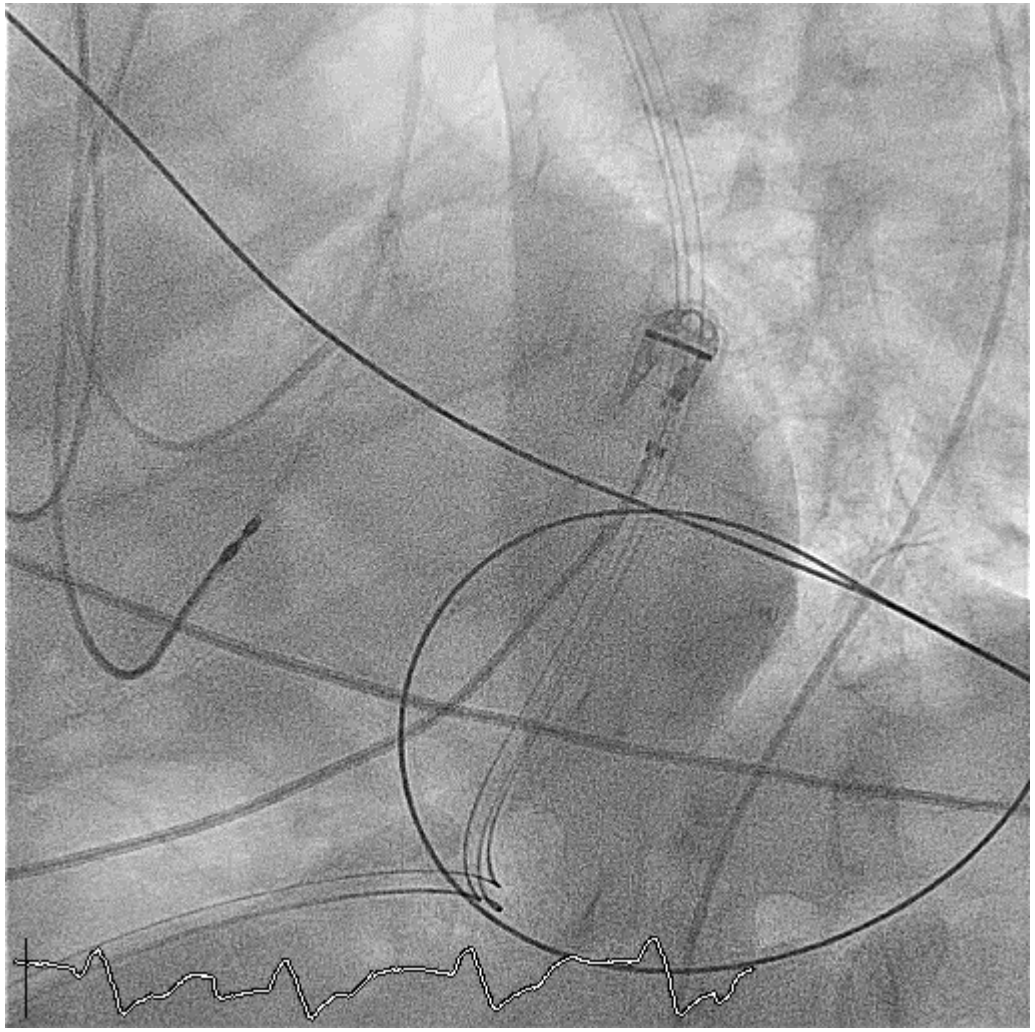


Cas clinique 2

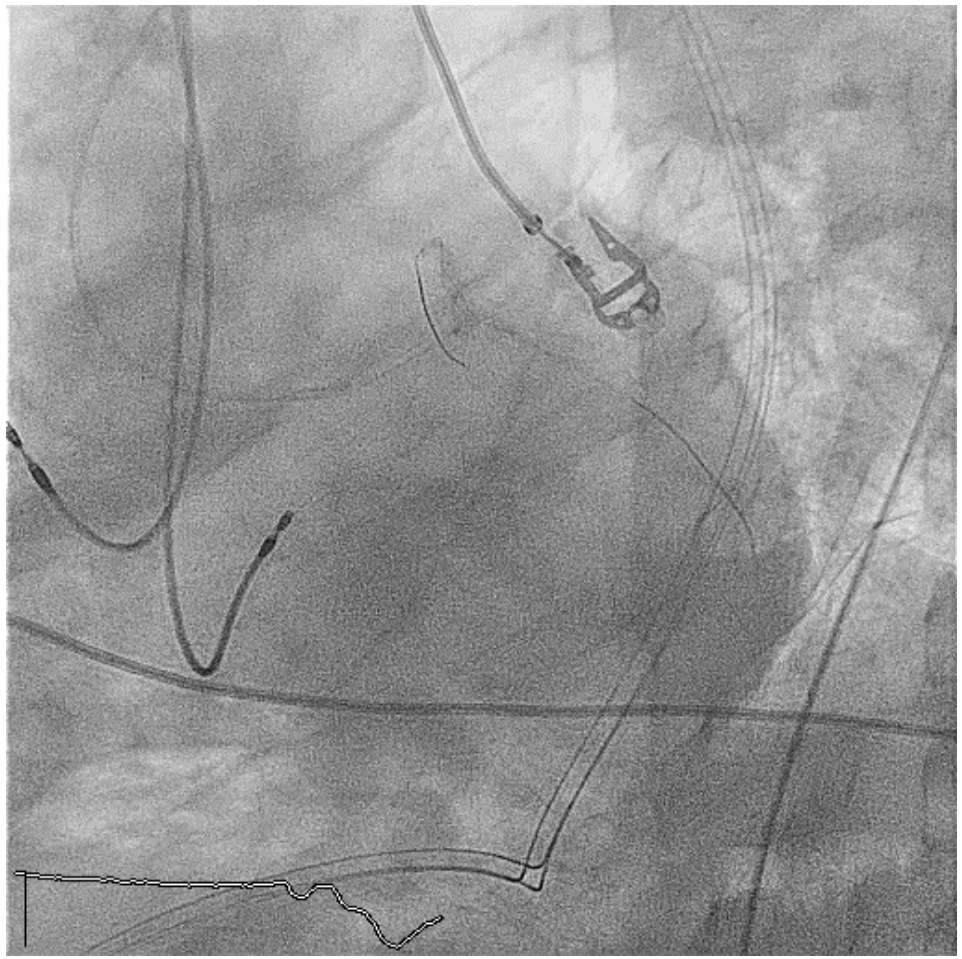
- H 86 ans
- Cardiopathie ischémique
- Insuffisance rénale
- Admis aux soins intensifs

pour NSTEMI, OAP,

choc débutant

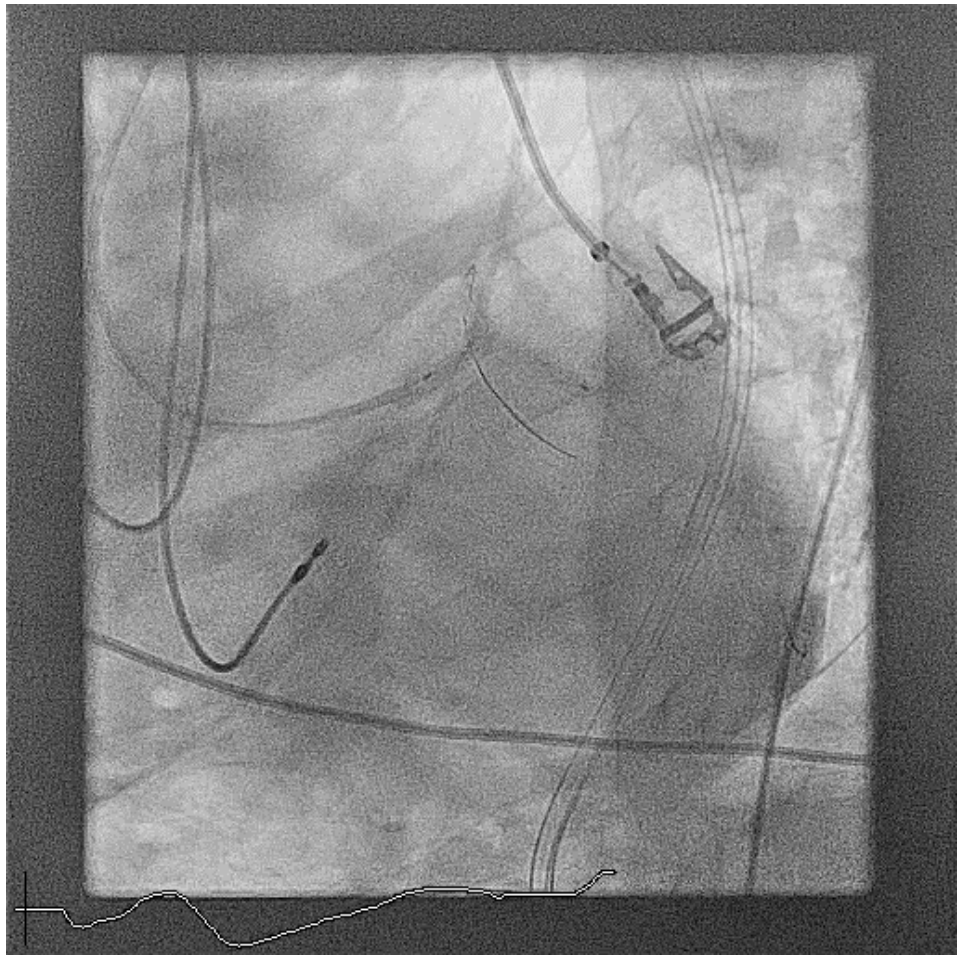


Predilatation Cx et IVA au ballon compliant 2,5

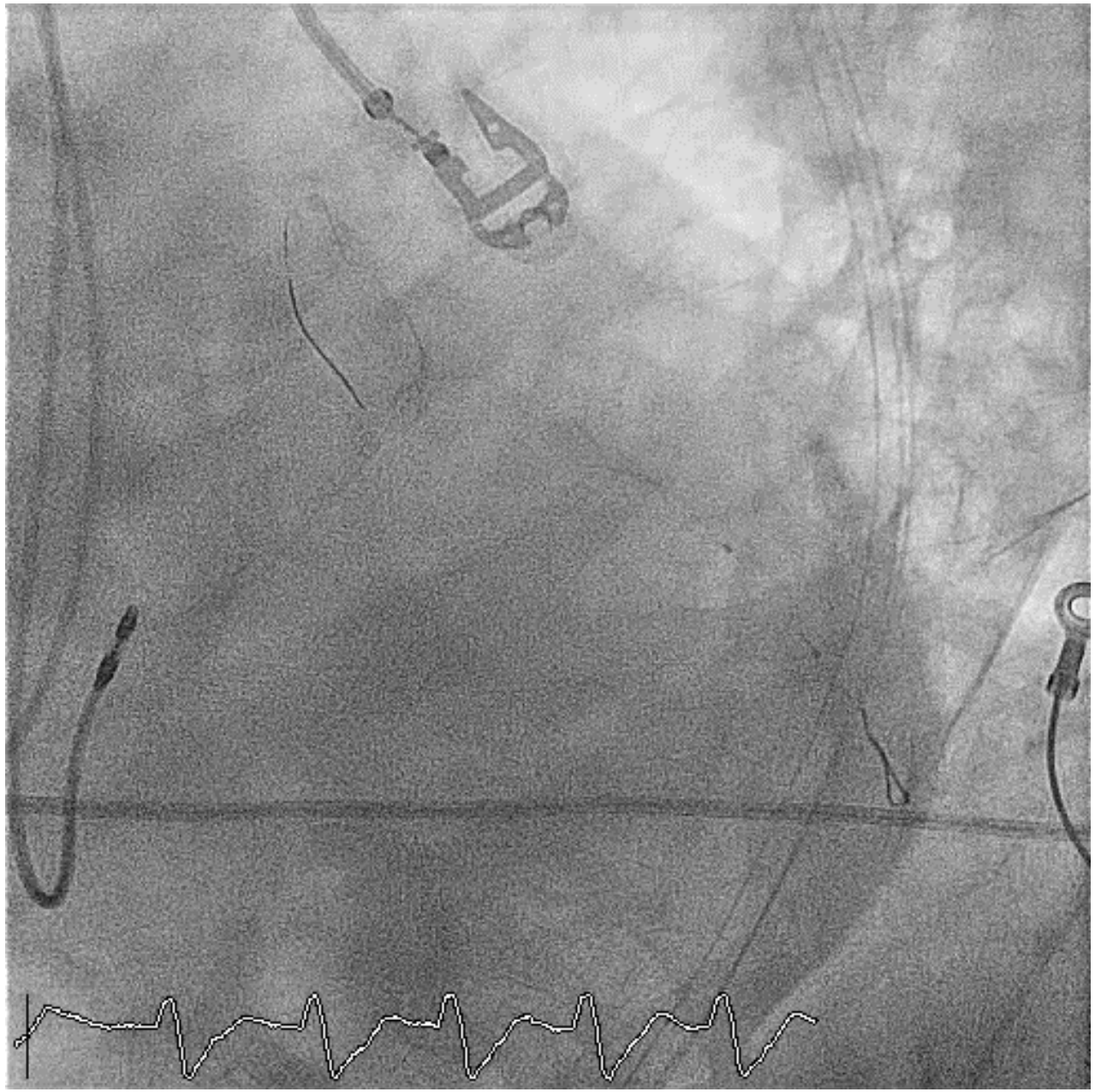


Stent Cx Xience 3,0x33

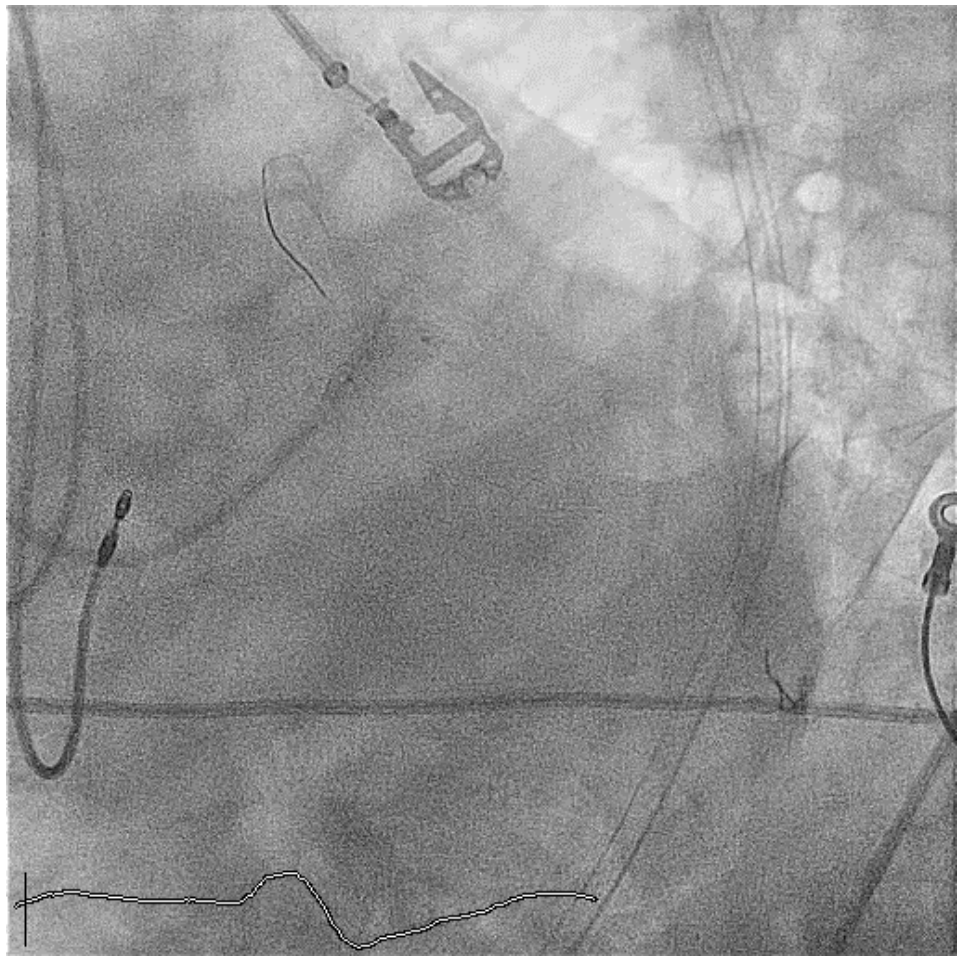
Suivi par POT 4,0 NC et ouverture des mailles



Essai d’implanter un 2ème stent dans l’IVA ostiale (TAP) MAIS …

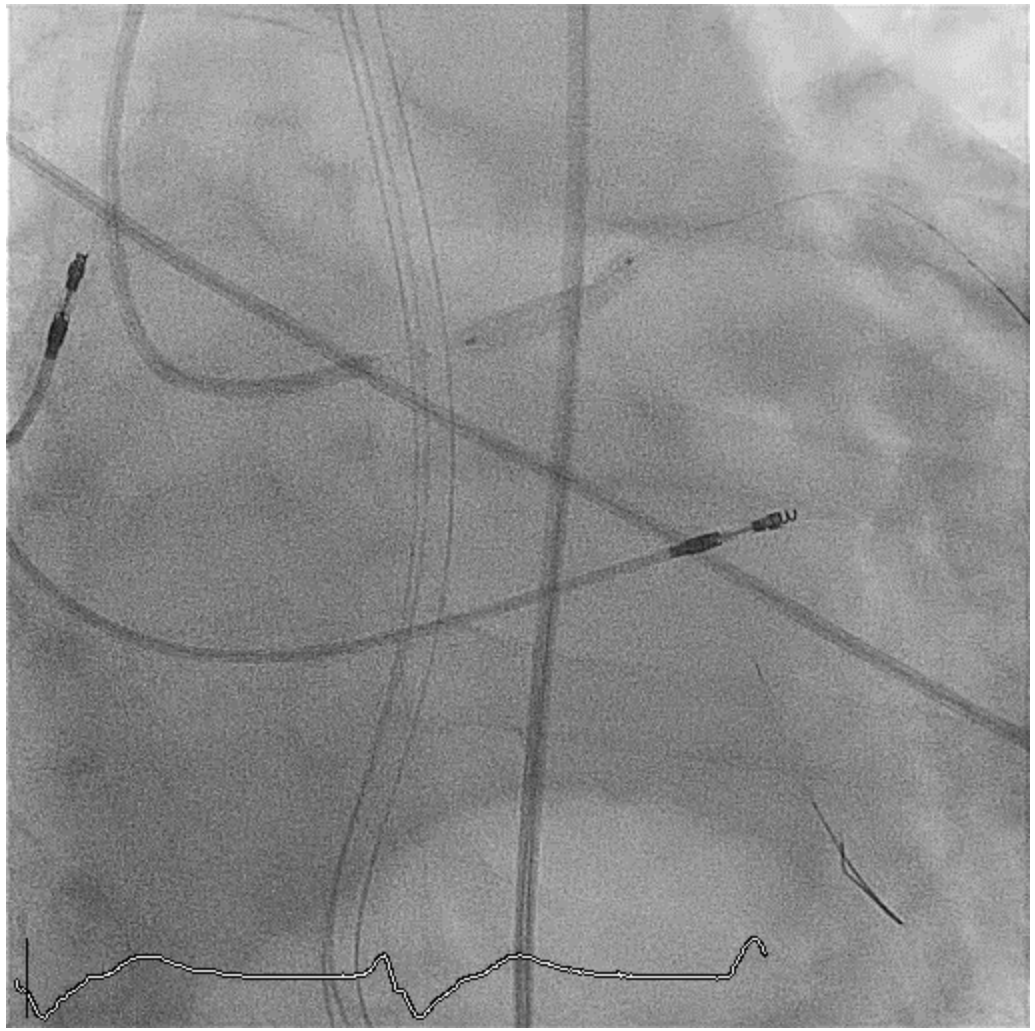


Ecraser le stent avec ballon dans la Cx

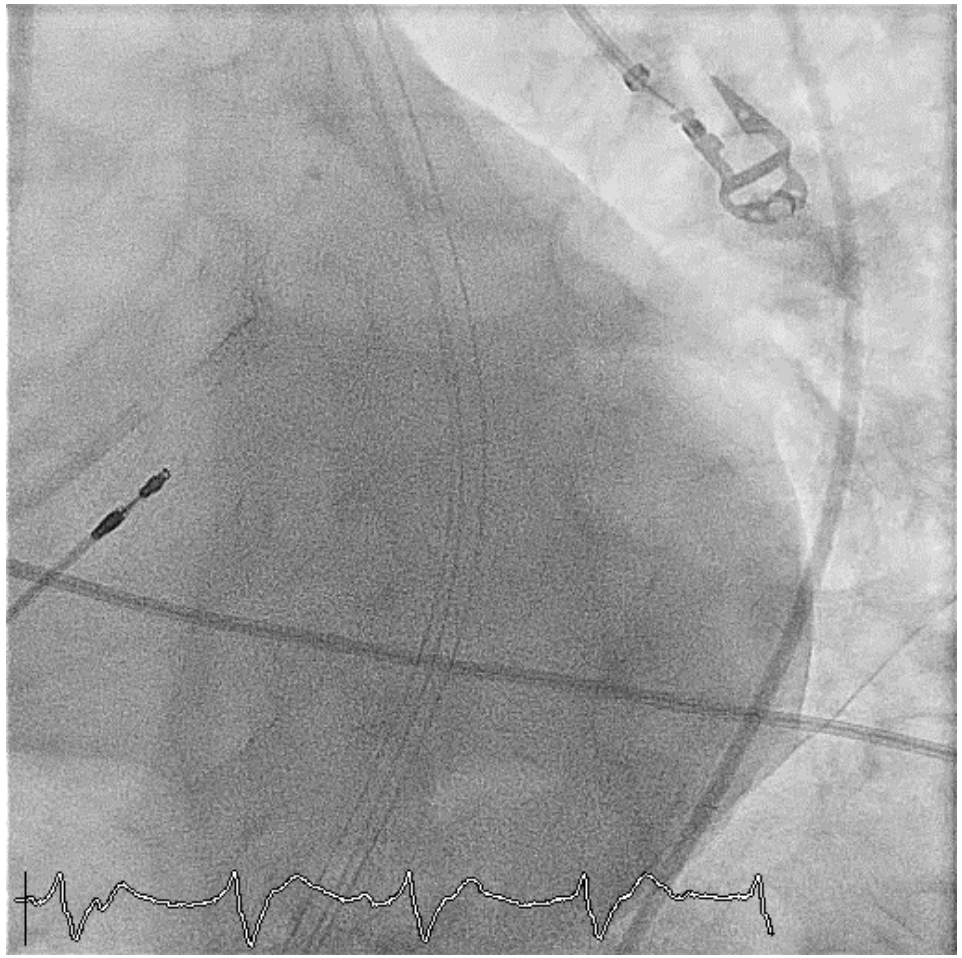


Nouveau stent TC vers IVA 2,75x23 (culotte)

Puis POT, ouverture des mailles vers Cx et kissing balloons



Résultat final

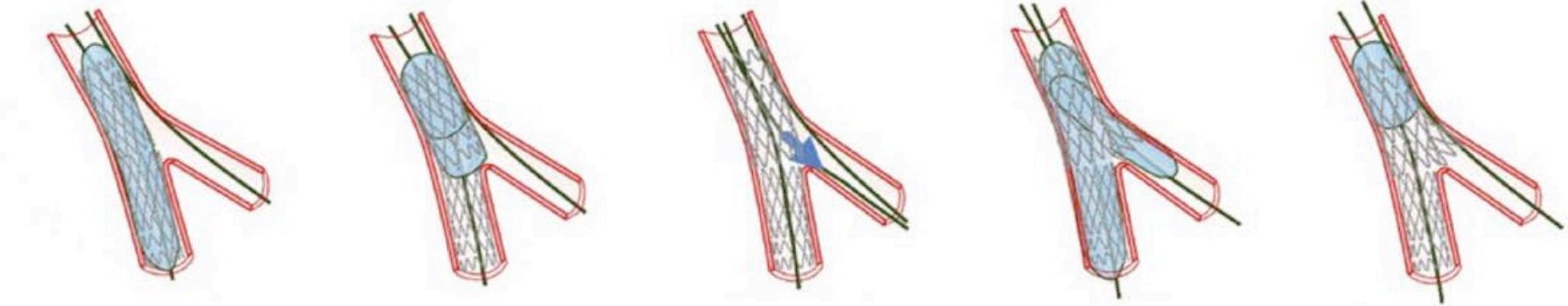


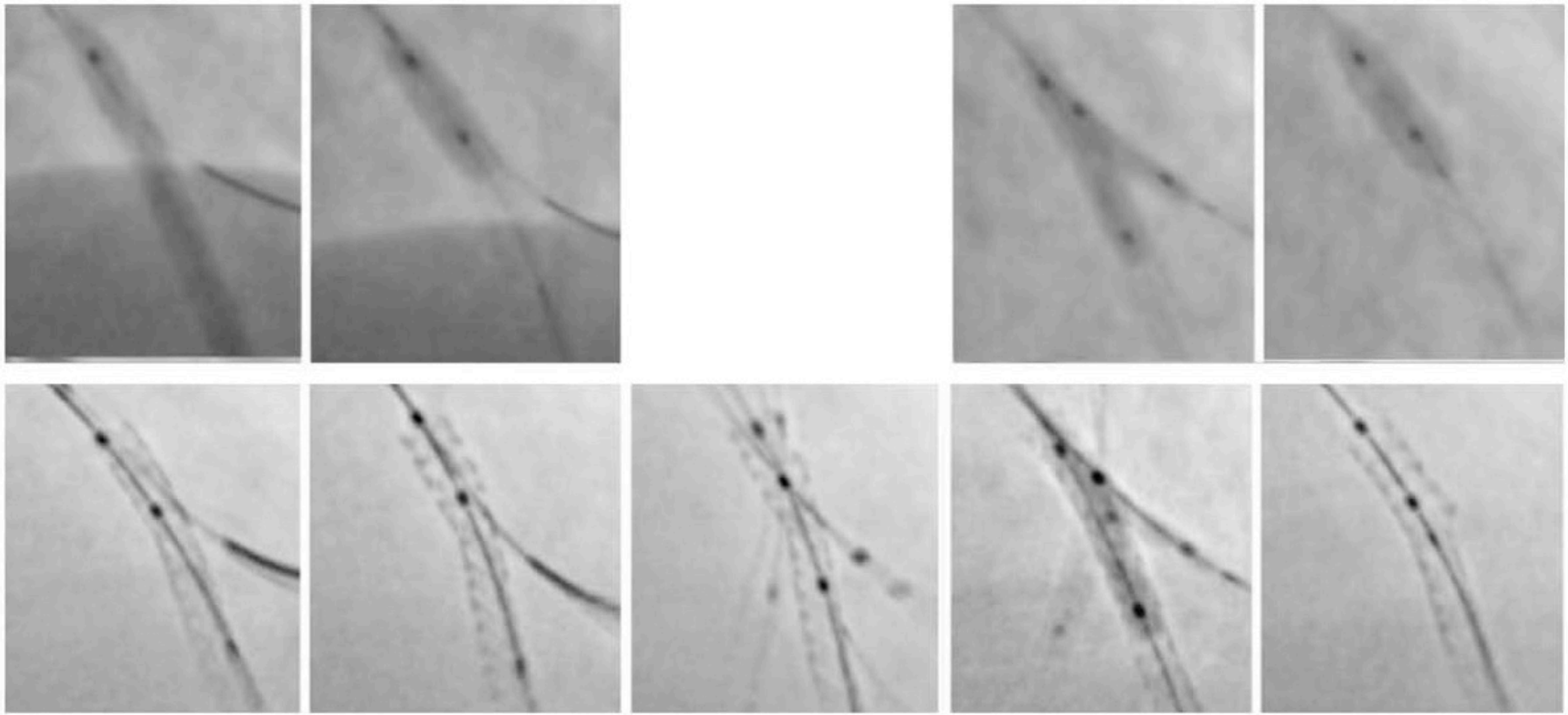
Résultat

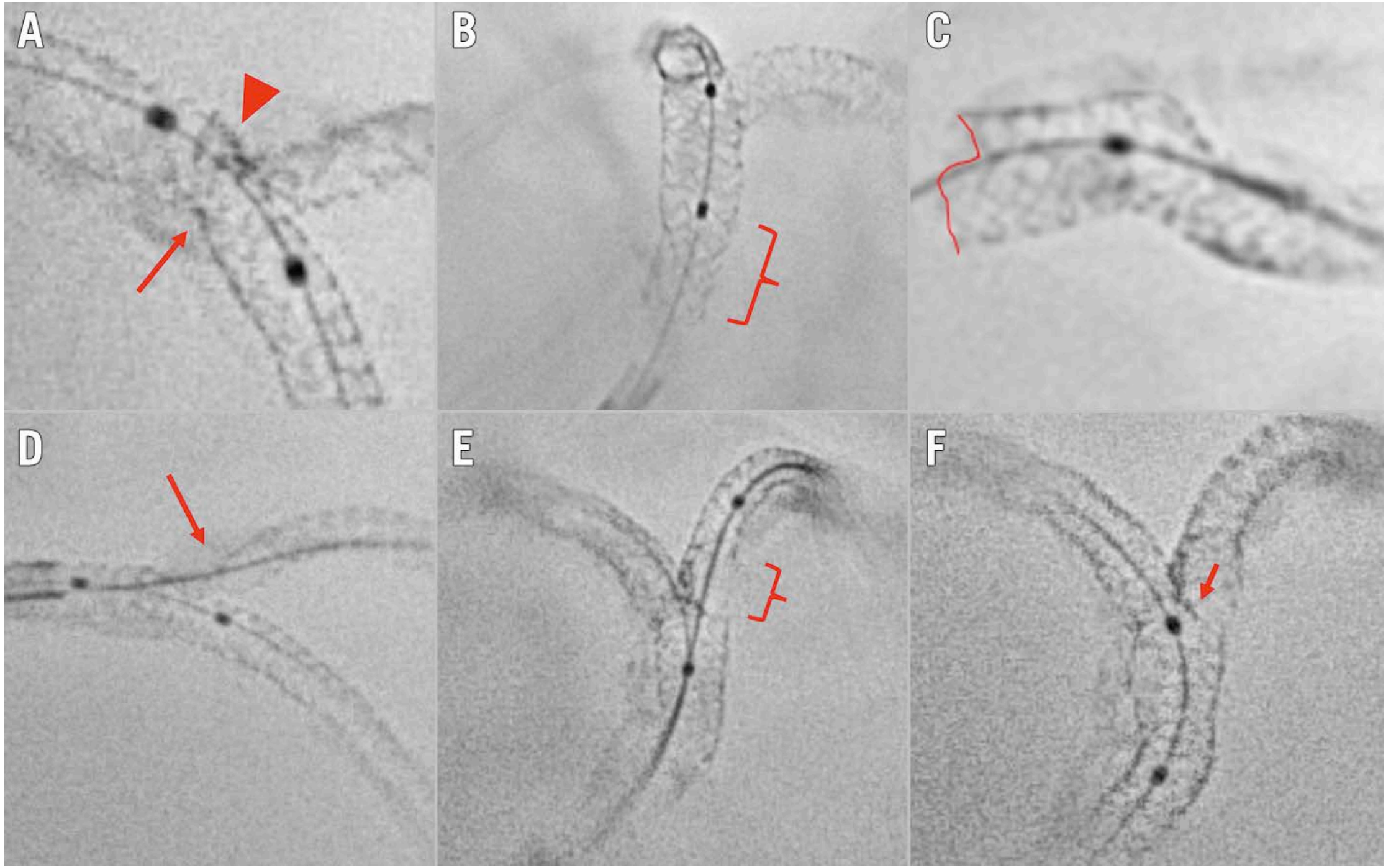
- Stent(s) ouvert et bien apposé contre la paroi
  - Postdilatation et surtout POT!! Haute pression
- Flux normal TIMI 3, pas de complications (dissection, etc)

Evaluation du résultat

- Angiographie
- Imagerie **IVUS** ou **OCT**
- *Stent enhancement tools*: **Stentboost**






A
B
C
D
E
F