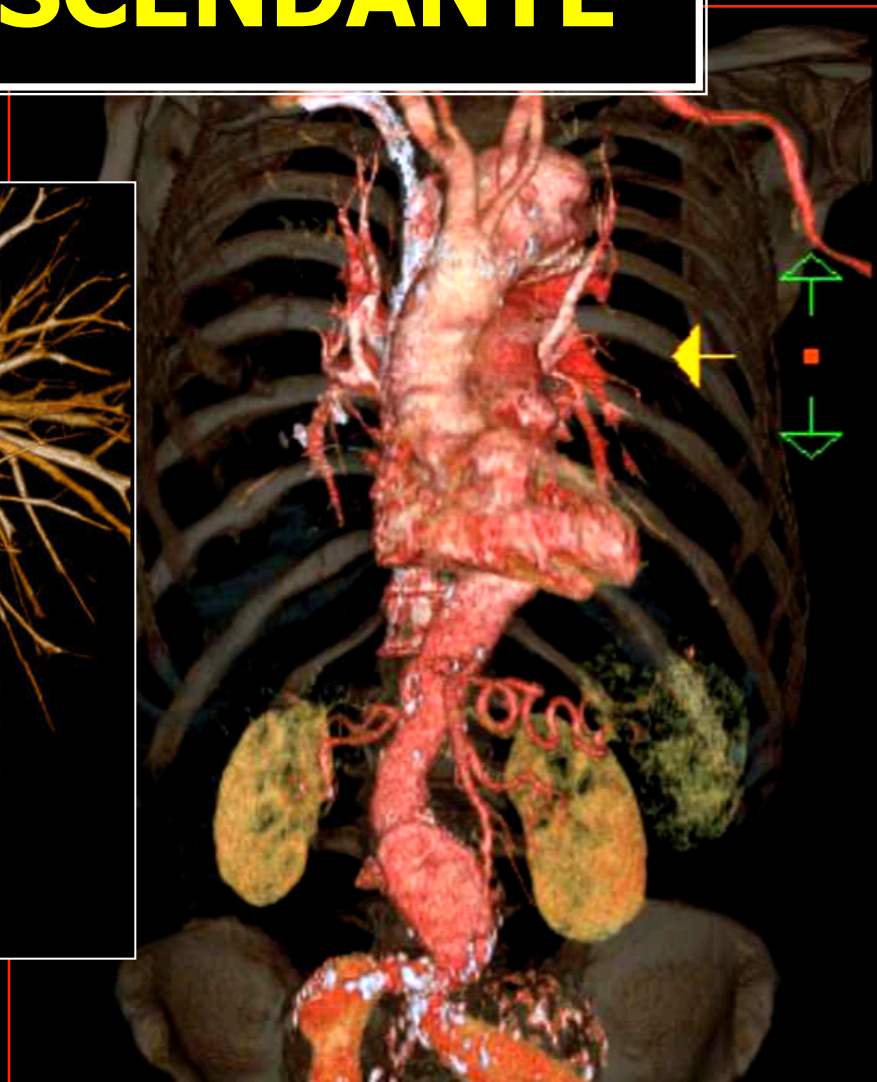
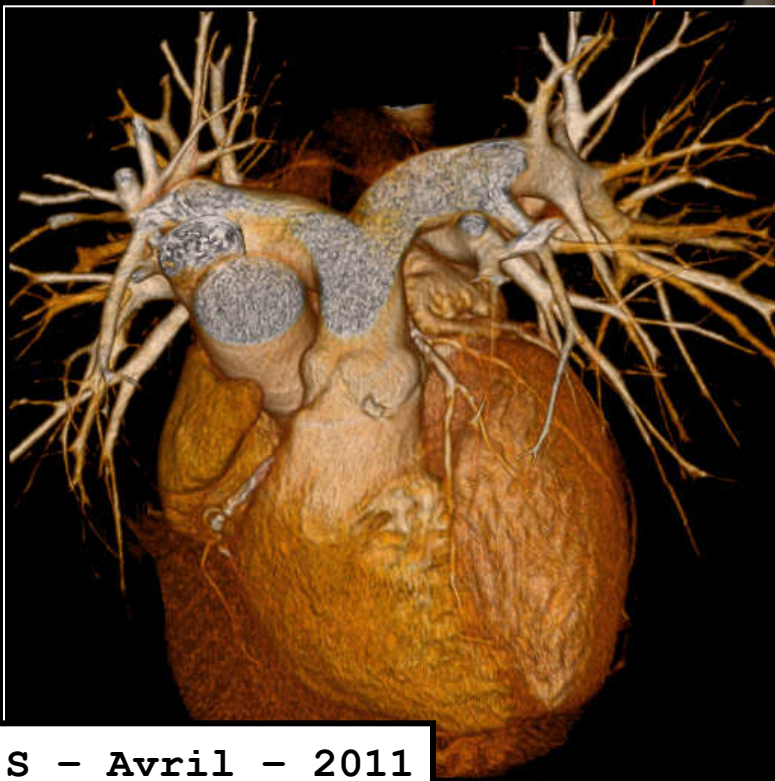


IMAGERIE VOLUMIQUE DE L' AORTE ASCENDANTE



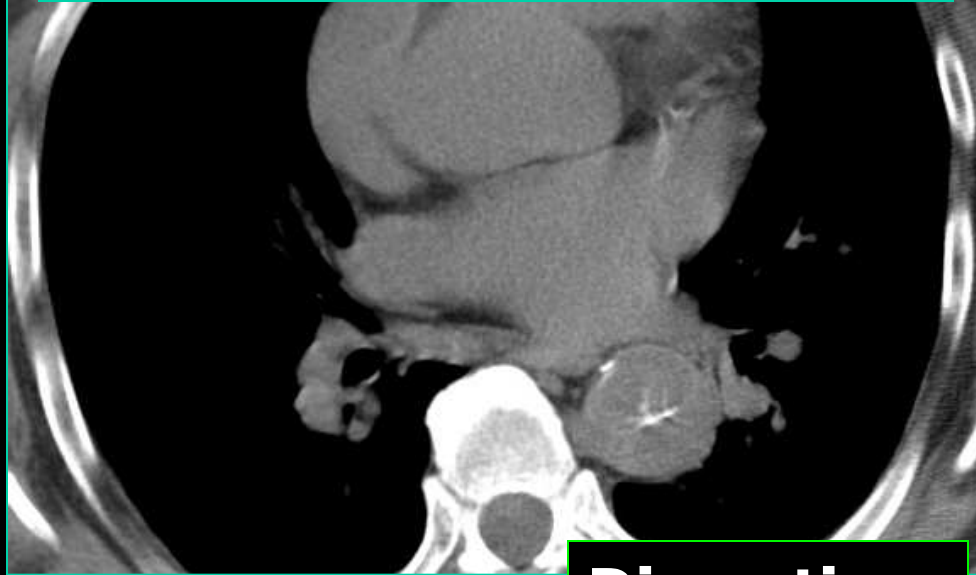
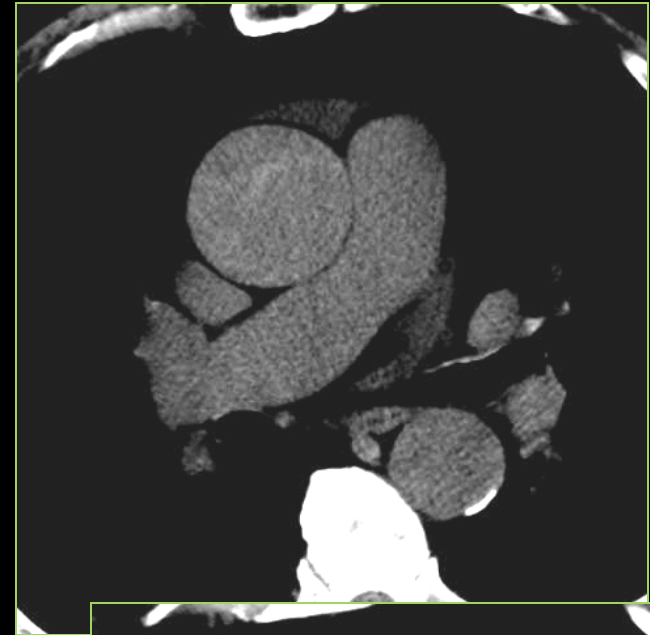
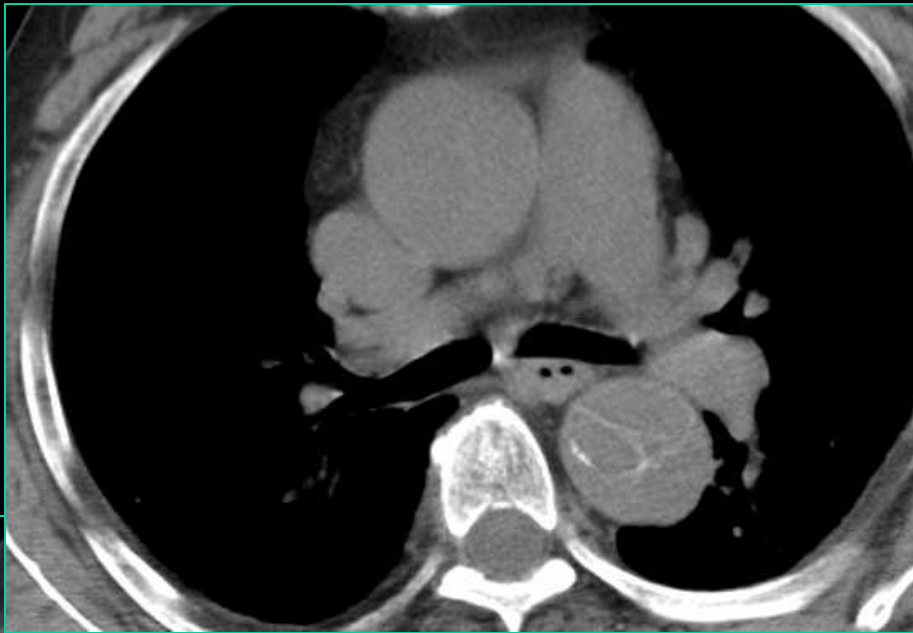
TISSIER S - Avril - 2011
Imagerie médicale
CHU Brabois
Pr. Régent

de l' aorte ascendante

aortique, Pneumothorax, pneumopathie,

Protocole CT

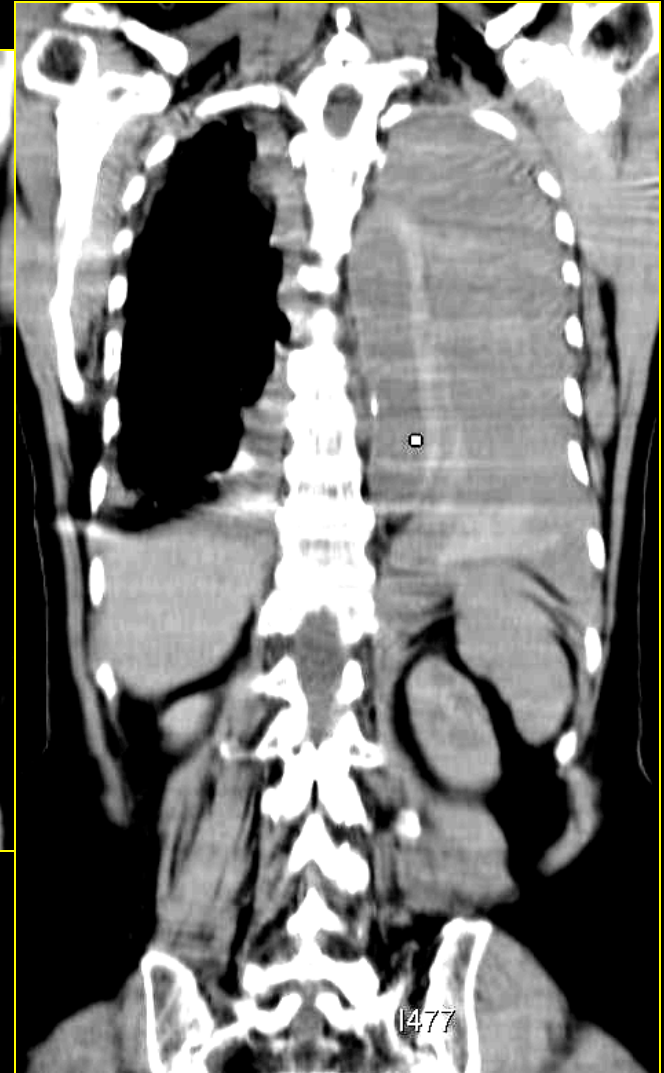
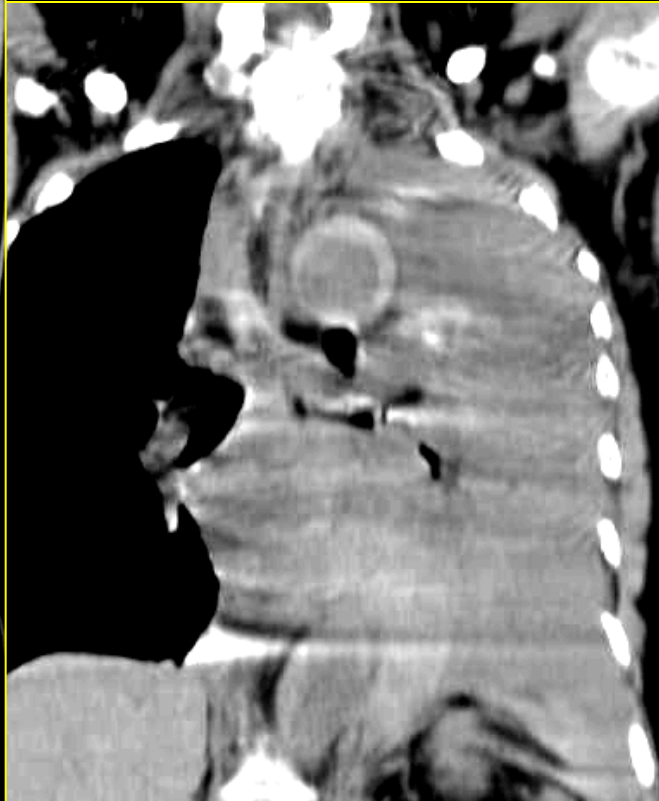
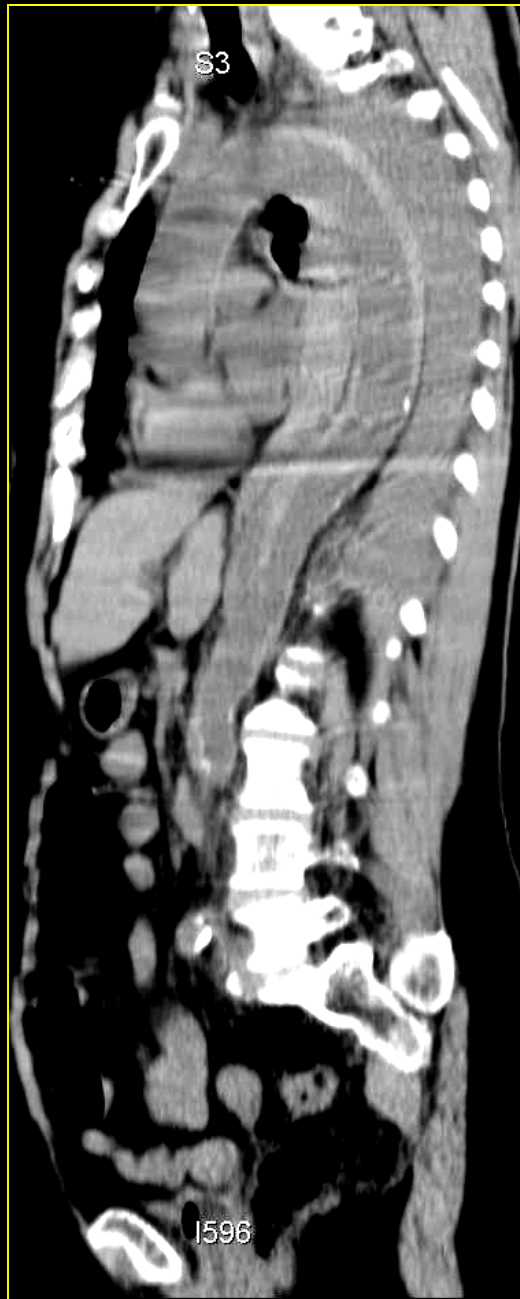
- TAP sans injection : recherche d'hématome profond, d'hématome intra-mural, diagnostic différentiel d'hématome intra-mural, diagnostic différentiel d'hématome intra-mural, diagnostic différentiel d'hématome intra-mural
 64 x 0,625 / 120 kV / automA / pitch 1,375 / indice de bruit 20 / temps de rotation 0,6 s
- Thorax + ECG : analyse de l'aorte ascendante, des coronaires et du cœur
 64 x 0,625 / 120 kV / automA / pitch 1,375 / indice de bruit 20 / temps de rotation 0,6 s
- Analyse de l'aorte ascendante, des coronaires et du cœur
 64 x 0,625 / 120 kV / 250-700 mA / temps de rotation 0,35 s
 - injecté 1,5 mL/kg de produit de contraste iodé, injecté à 4-5 mL/s, puis 40 mL de sérum physiologique
 - injection de 1,5 mL/kg de produit de contraste iodé, injecté à 4-5 mL/s, puis 40 mL de sérum physiologique
 - Région d'intérêt dans l'aorte ascendante
- CTAP : bilan d'extension de la dissection aux troncs supra-aortiques, à l'aorte abdominale et à ses branches
 64 x 0,625 / 120 kV / automA / pitch 1,375 / indice de bruit 22 / temps de rotation 0,6 s
 - dès que possible (refroidissement du tube)
 - 64 x 0,625 / 120 kV / automA / pitch 1,375 / indice de bruit 22 / temps de rotation 0,6 s



Dissection



Hématome intra-mural



Reconstructions

- Thorax sans gating :

- 1,25 / 0,9 mm
- Fenêtre standard + poumon

Parenchyme pulmonaire
Cage thoracique
Gros vaisseaux et médiastin

Env. 3500 images

- Thorax gating :

- 0,625 / 0,625 mm
- FOV adapté (≤ 25 cm)
Résolution spatiale ++
- Tout le volume : 1 phase (80%)
- Massif cardiaque : plusieurs phases

Racine de l'aorte
Coronaires
Valves cardiaques
Cœur et fonction

- CTAP « tardif »

- 1,25 / 0,9 mm
- Fenêtre standard

TASA
Aorte abdominale et branches

Post-traitement

- Aorte, TASA, coronaires :
 - MPR, MIP, VR, AVA
- Valve aortique :
 - MIP, MinIP dans le plan de la valve
 - Visualisation en mode ciné
- VG :
 - Coupes PA, GAH, GAV
 - Épanchement péricardique (hémopéricarde)
 - Visualisation en mode ciné : anomalies cinétiques
 - Fonction VG ($\pm$ VD)

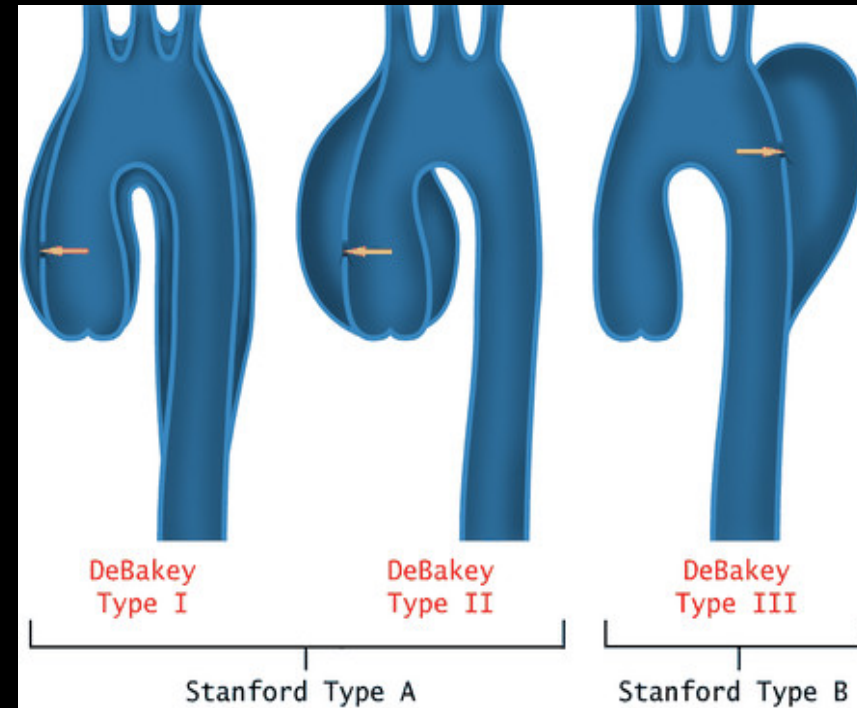
Anévrisme rompu

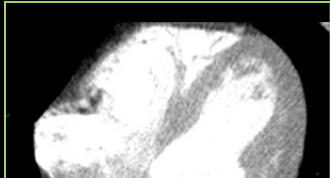
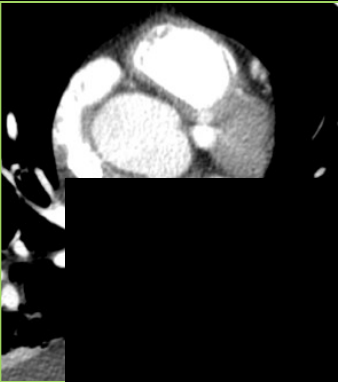
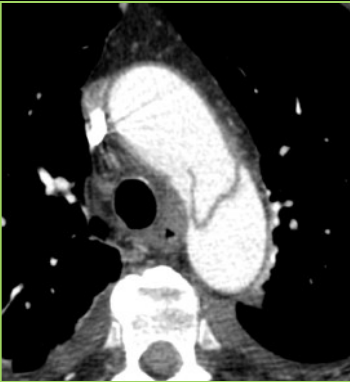


Pathologies / dissection aortique :

Éléments du bilan :

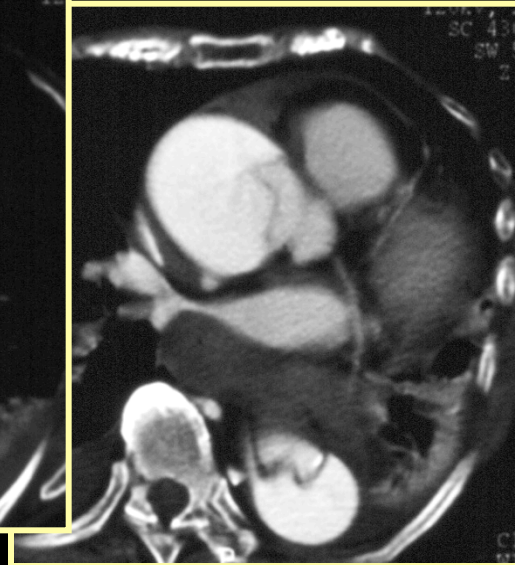
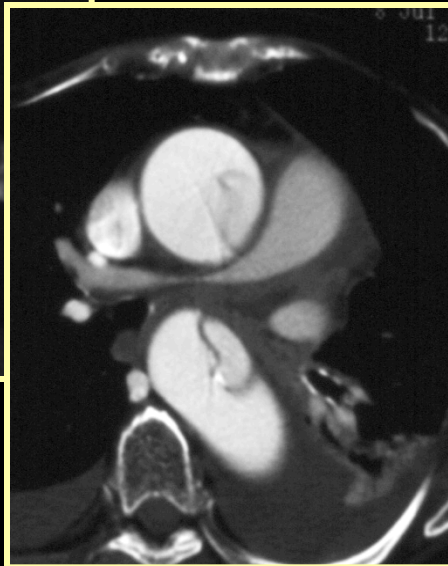
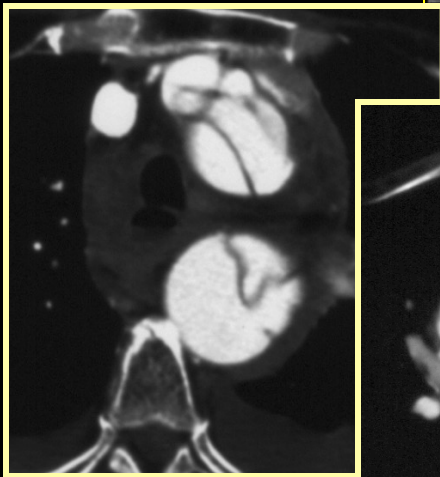
- ✓ Diagnostic positif (flap intimal)
- ✓ Étendue de la dissection et type de dissection (en fonction de la porte d'entrée)
- ✓ Atteinte de la valve aortique
- ✓ Extension aux coronaires, aux TASA, à l'aorte abdominale et à ses branches
- ✓ Signe d'atteinte viscérale (Infarctus myocardique, rénal, splénique, hépatique, mésentérique)
- ✓ Etat du faux chenal (thrombose)
- ✓ Autre anomalies associées (hémopéricarde, retentissement pulmonaire etc..)







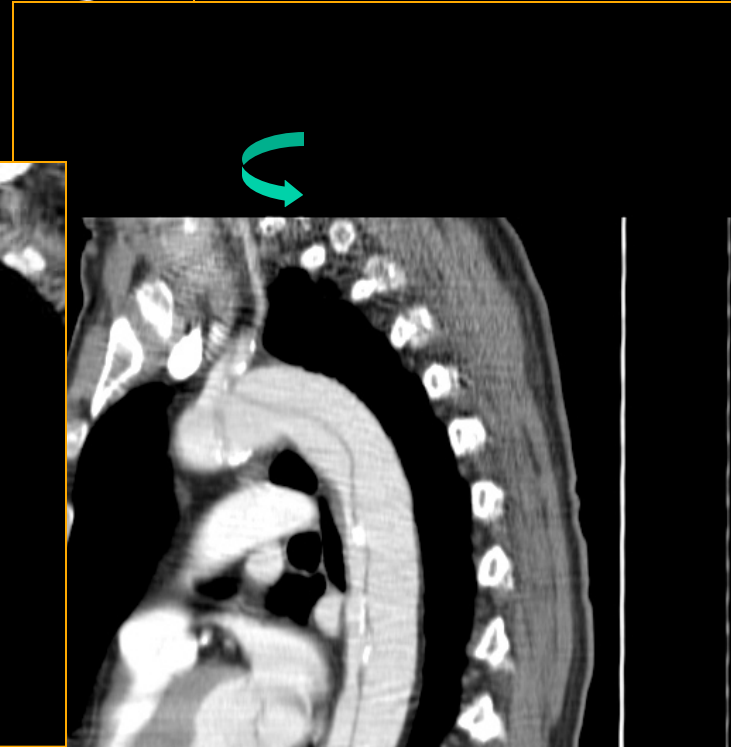
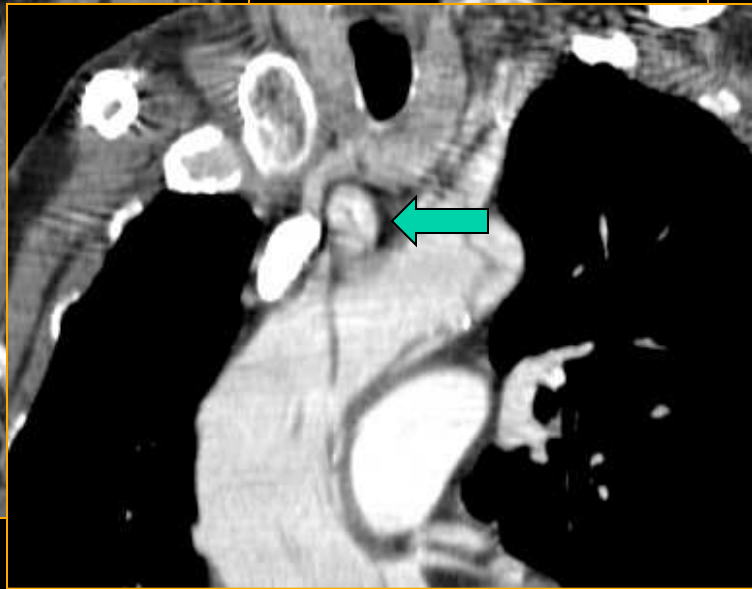
- ✓ **Signes indirects :**
 - déplacement calcifs intimaes
 - hémothorax (G) ou hémopéricarde
- ✓ **Signes directs :**
 - membrane flottante séparant les 2 chenaux
 - rehaussement différé du faux chenal
 - inversion gradient en cours d'acquisition



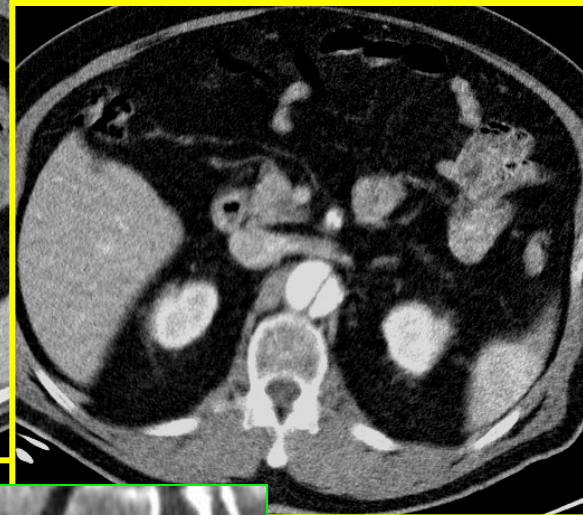
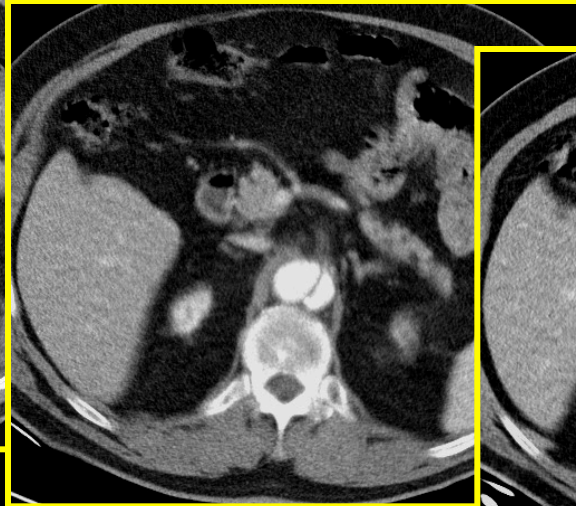
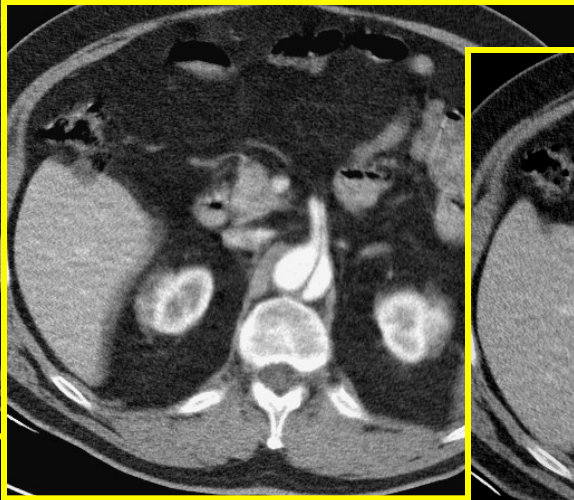
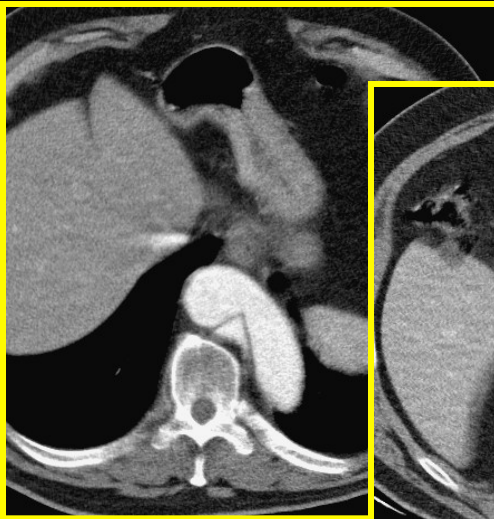


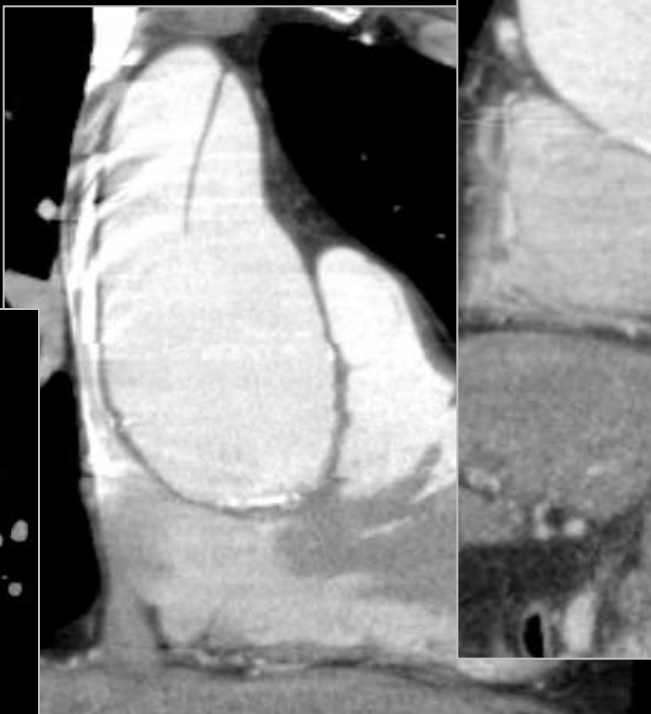
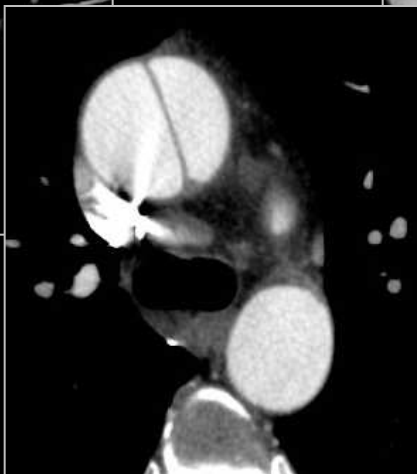
Étendue de la dissection

Extension vasculaire cervicale



Extension viscérale





26.0 cm
Ph:75% (No Filt.)

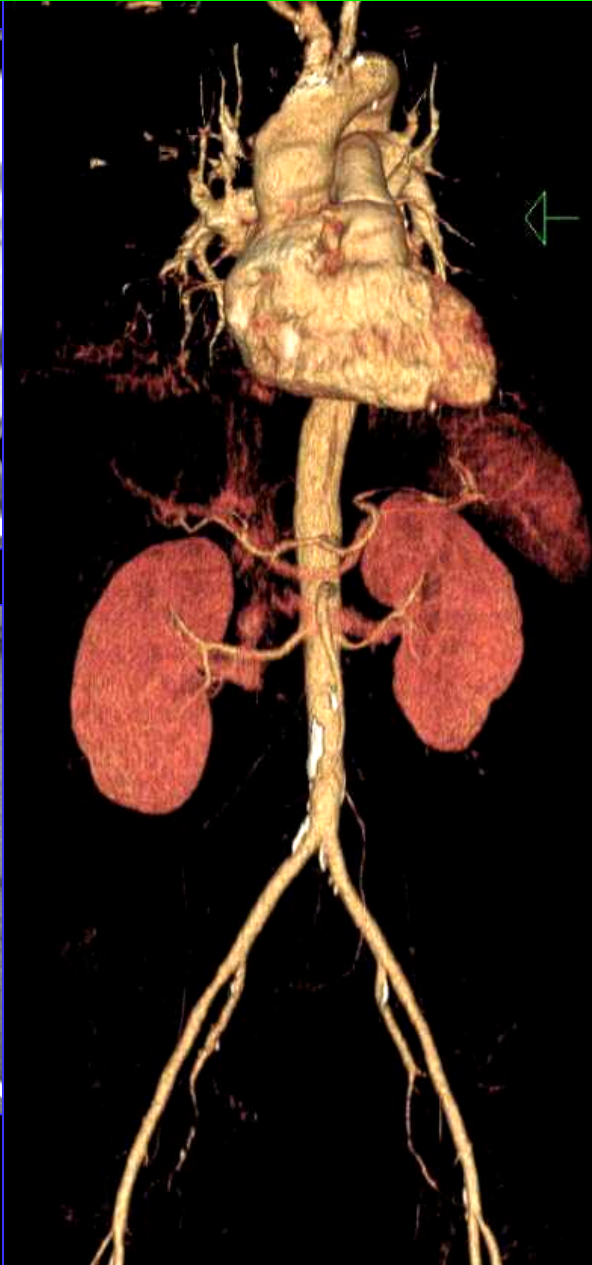
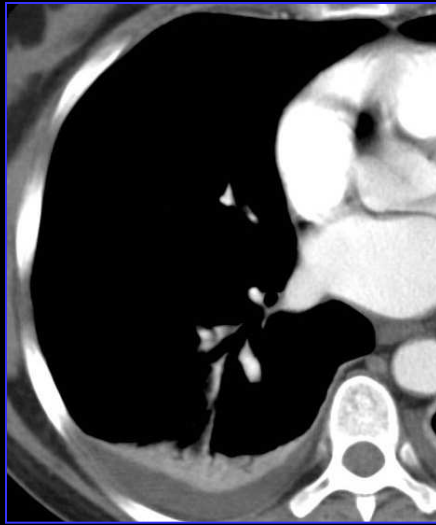
0 L

.SEC.4RDC
LTES
534 L = -255

IAR

C.4RDC

dissection post-traumatique

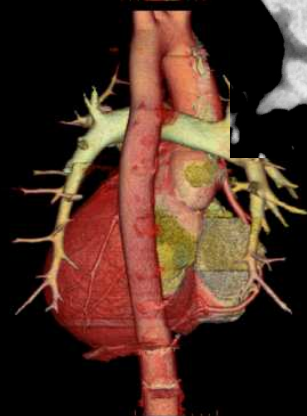
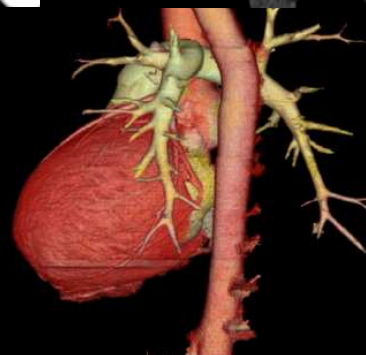
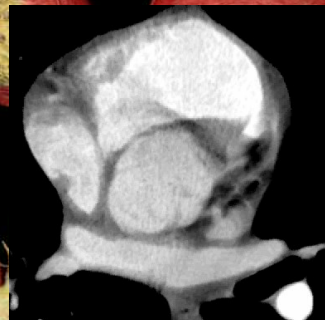
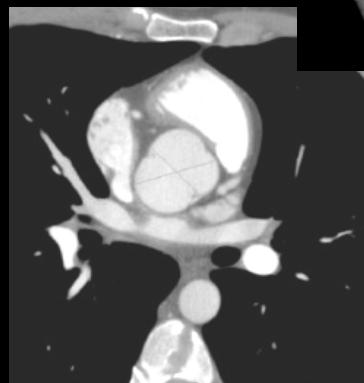
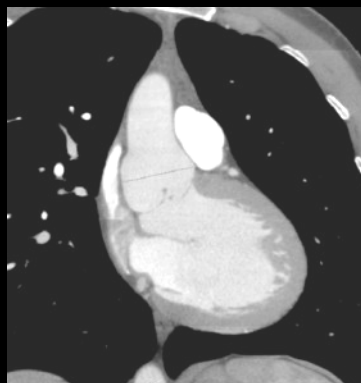
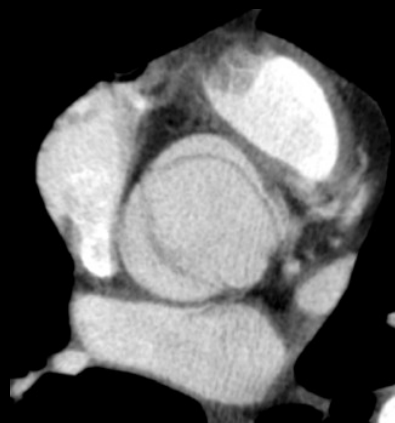
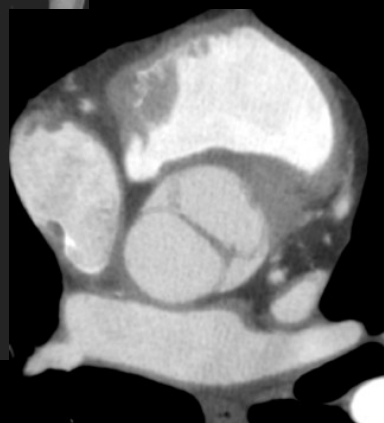
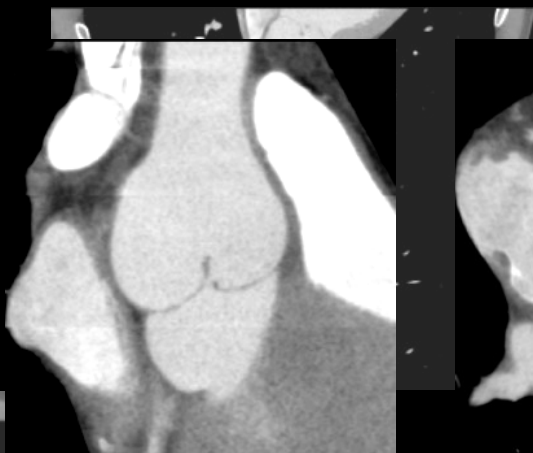


Jeune Patient

AVP 2 roues

Douleurs thoraciques

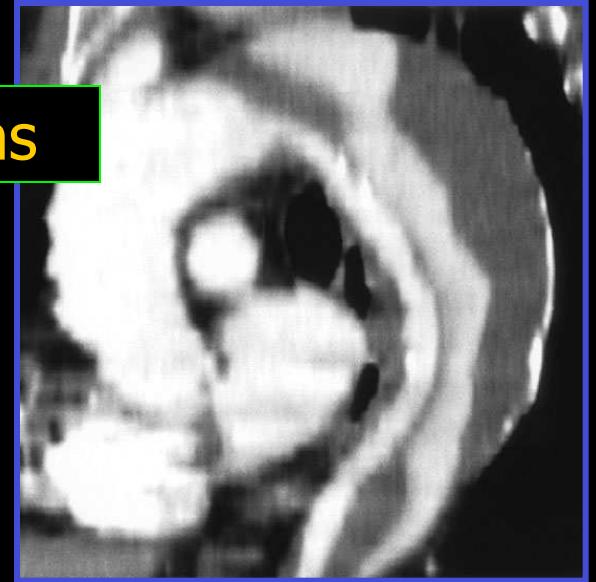
Rupture de l'isthme ?



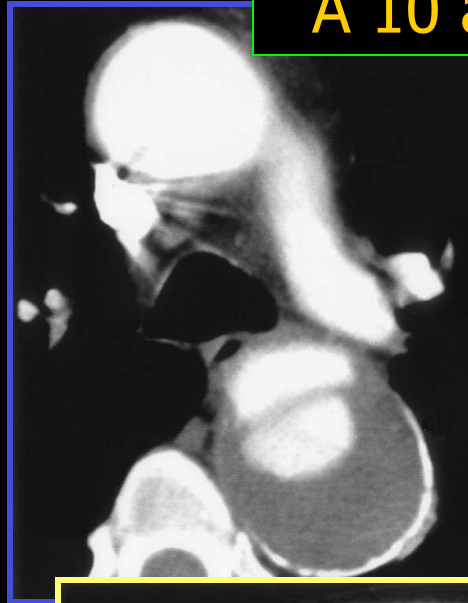
Nom du point	Moyenne (mm)	Min (mm)	Max. (mm)	Aire (mm2)
Ref.	42.4 ± 0.9	37.0 ± 0.9	46.2 ± 0.9	1414.7 ± 59.8

Évolution anévrismale

À 10 ans



TDM initiale



Évolution anévrysmale et thrombose du faux chenal

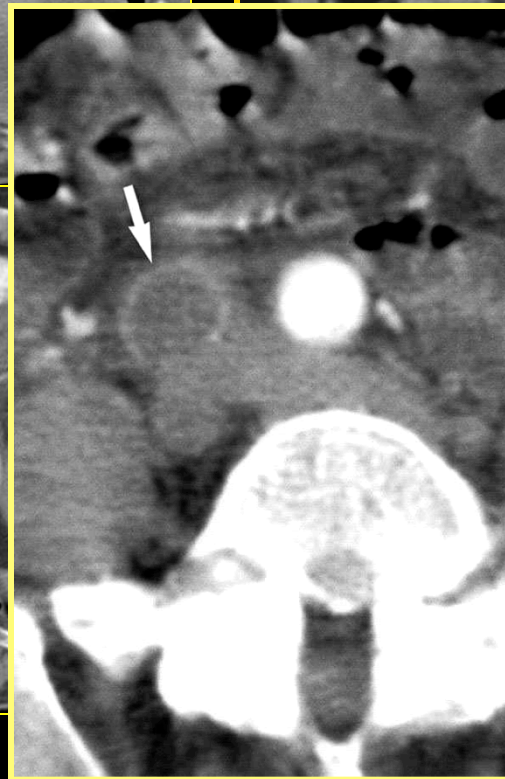
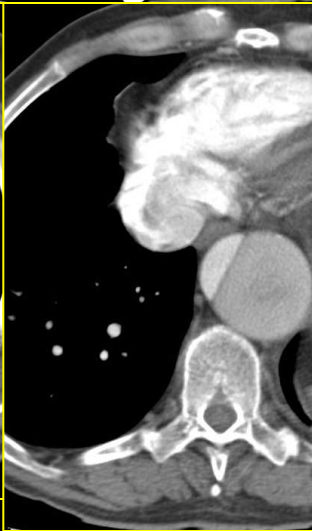
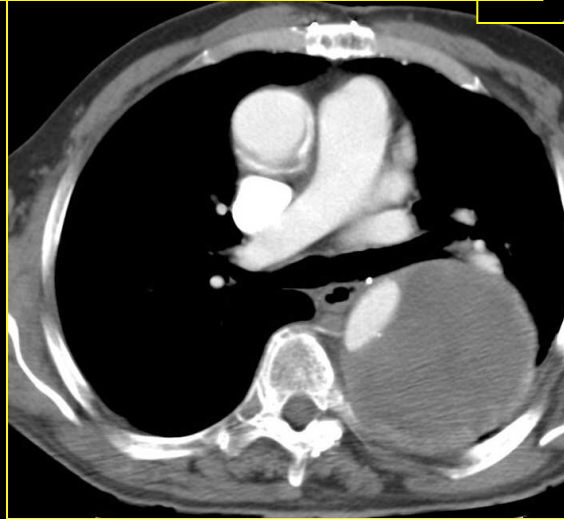
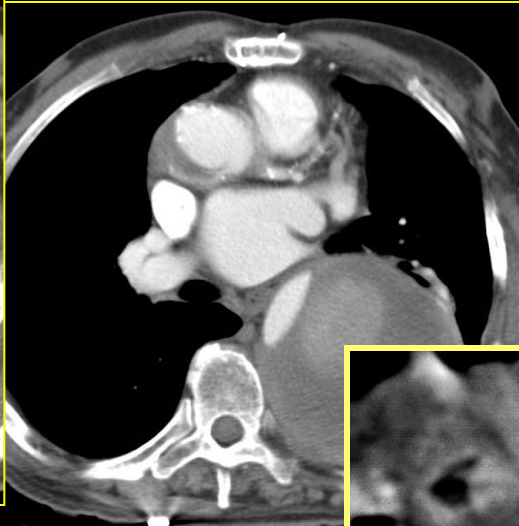
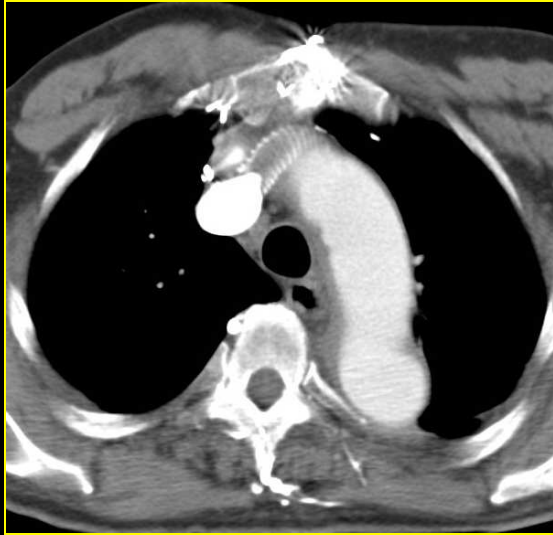
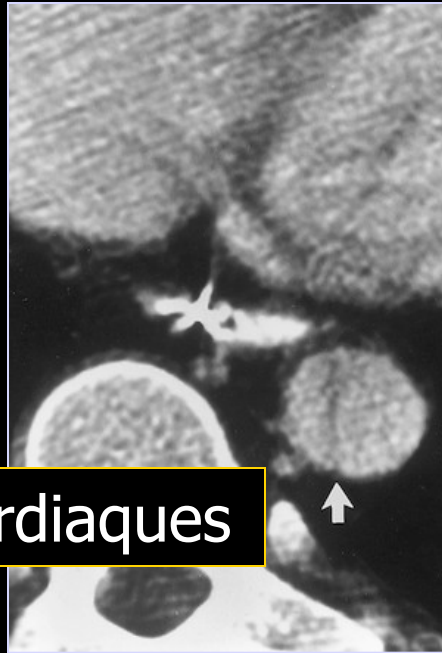
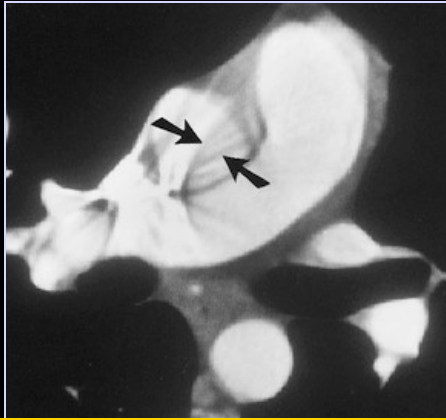
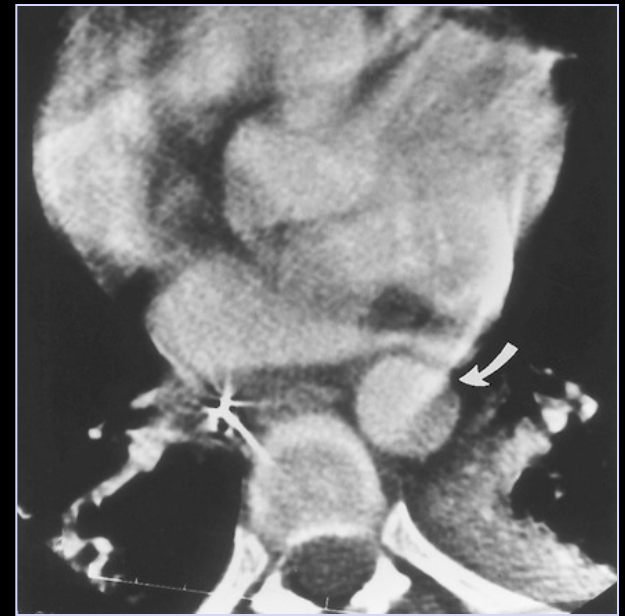


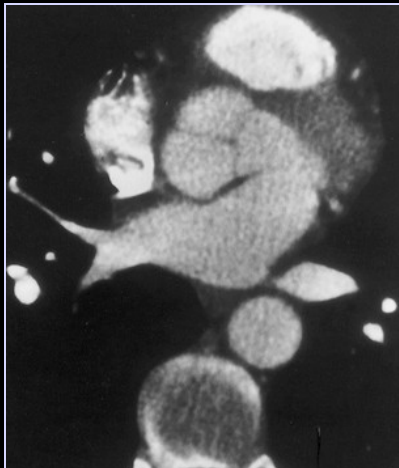
Image piège de pseudo-dissection



Artéfacts cinétiques cardiaques



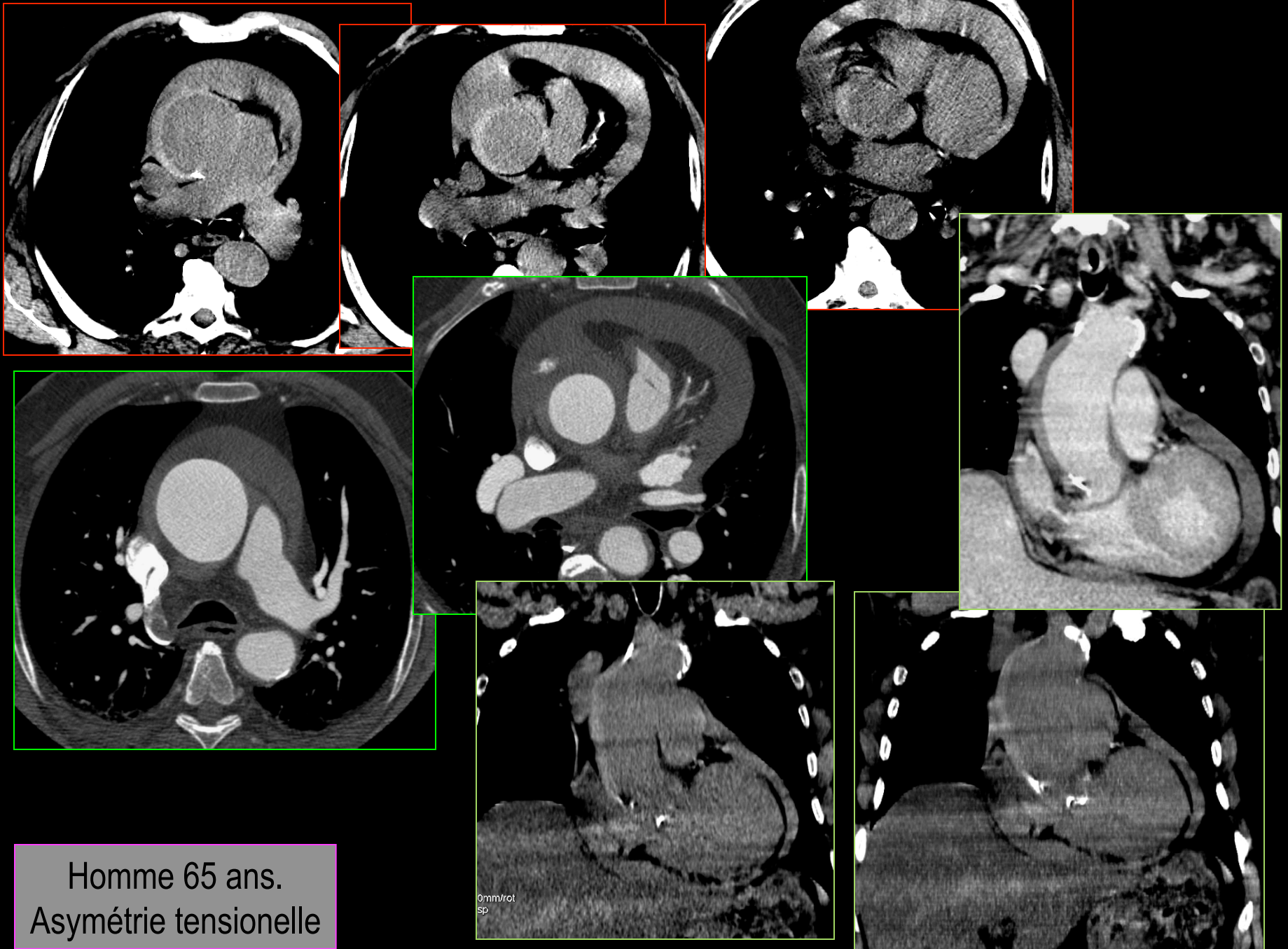
Athérome simple

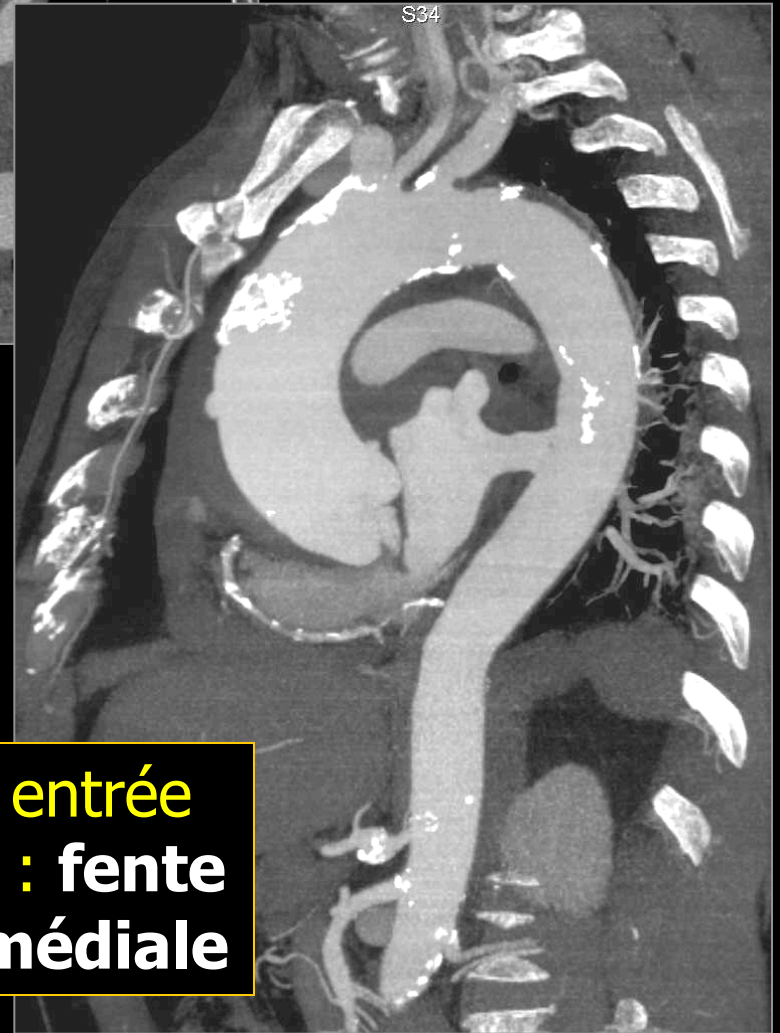
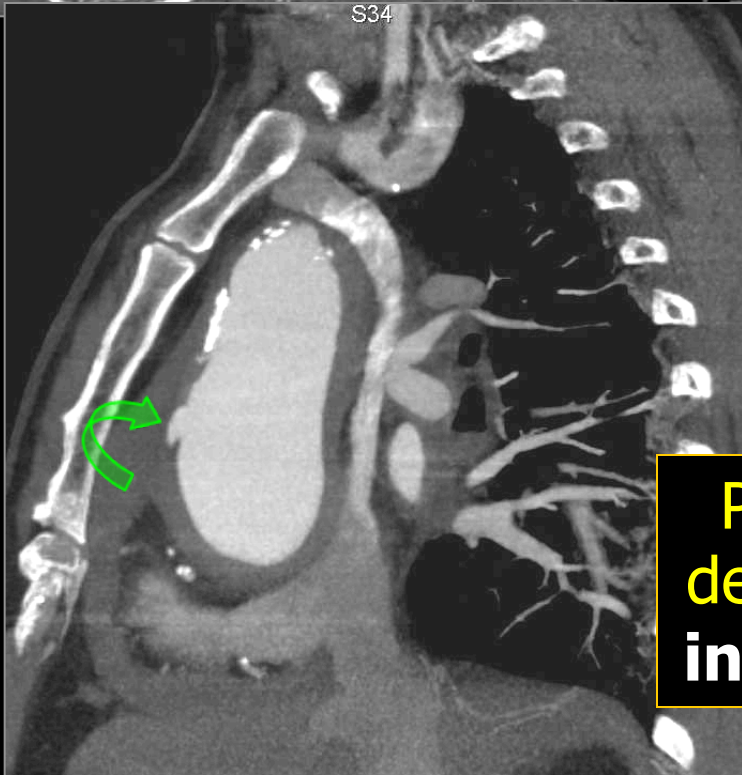
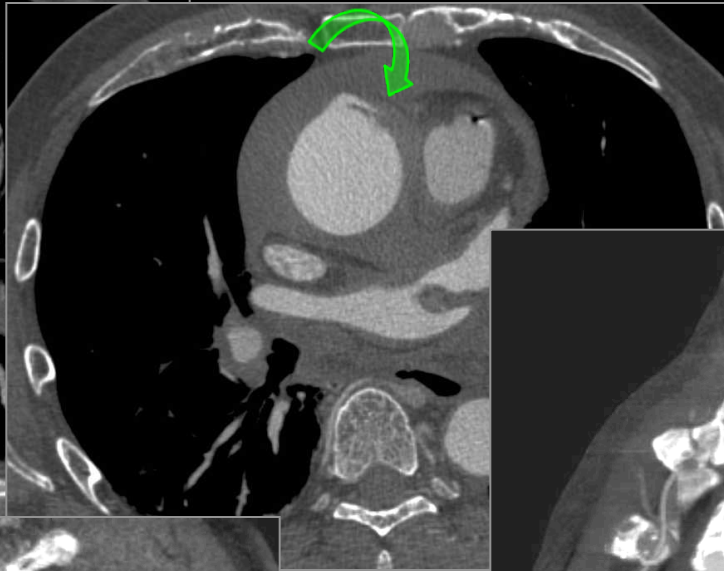


Valves sigmoïdes

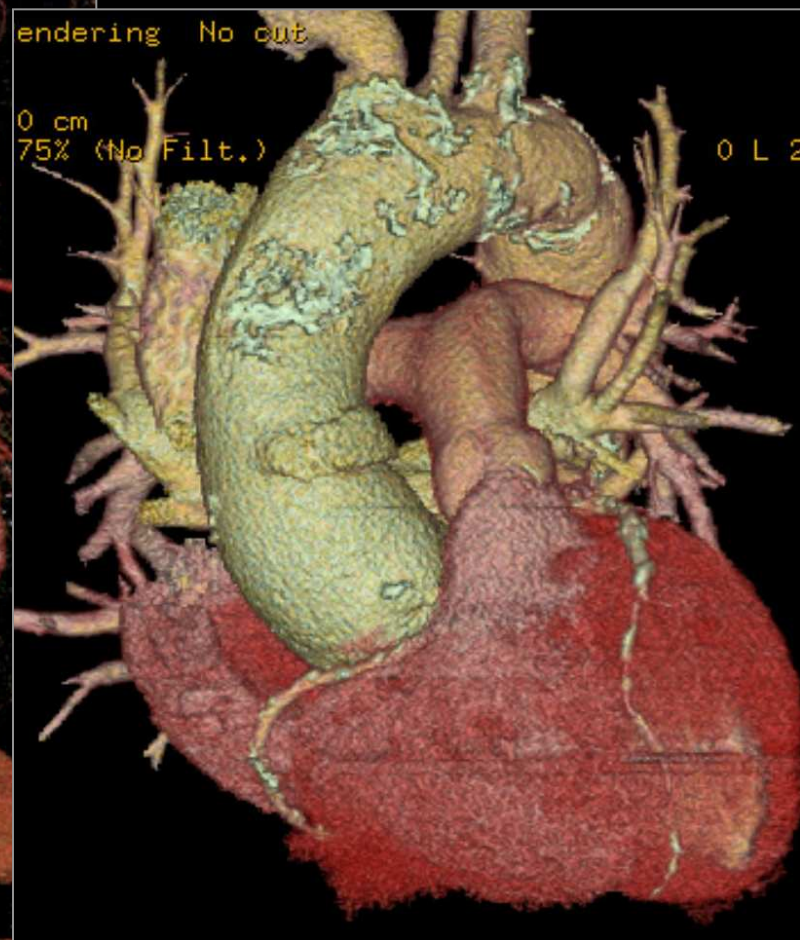
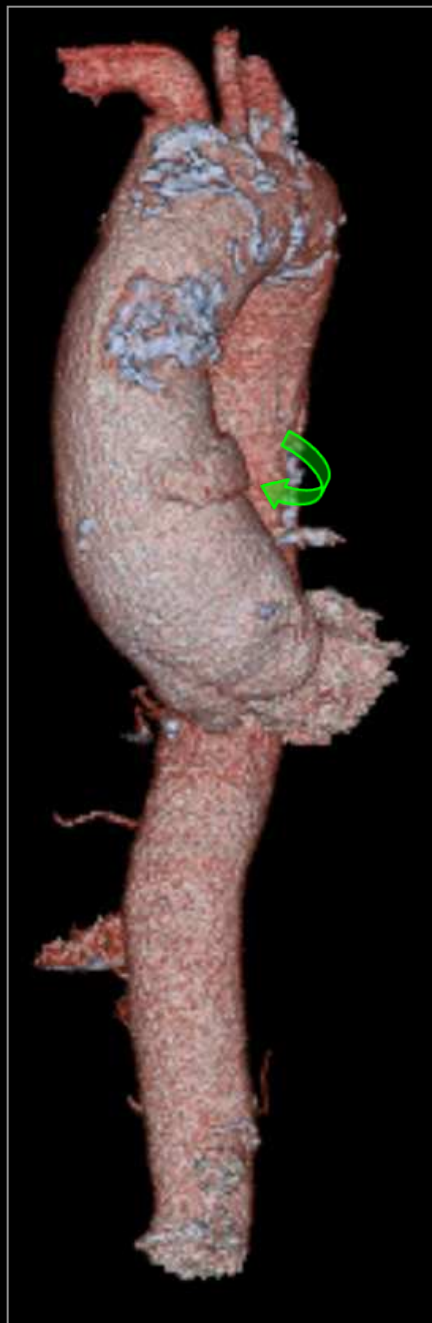
Solution :
synchronisation ECG







Porte d'entrée
de l' HIM : fente
intimo-médiale



DFOV 25.0 cm
STND Ph:10% (No Filt.)



M = 960 L = 86

I

Oblique phase 60%

S

MEYER ROBERT

A: 21.5 (col)



M = 960 L = 86

I

Oblique phase 50%

S

MEYER ROBERT

A: 69.6 (col)

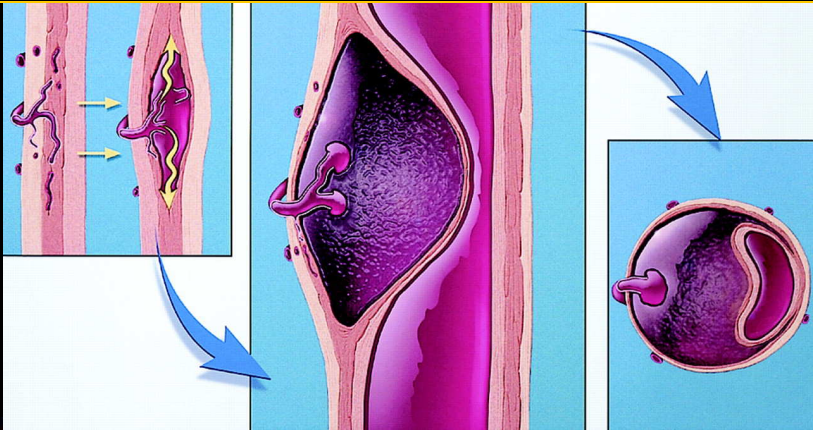
DFOV 25.0 cm
STND Ph:50% (No Filt.)



M = 960 L = 86

I

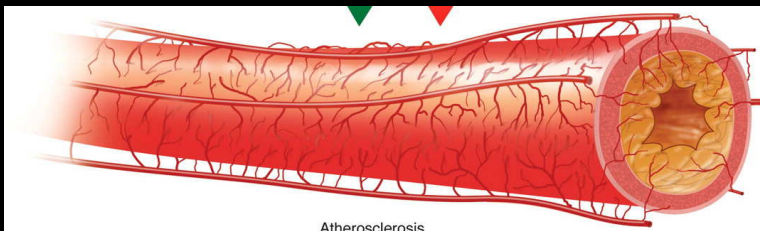
Hématome intra-mural aortique



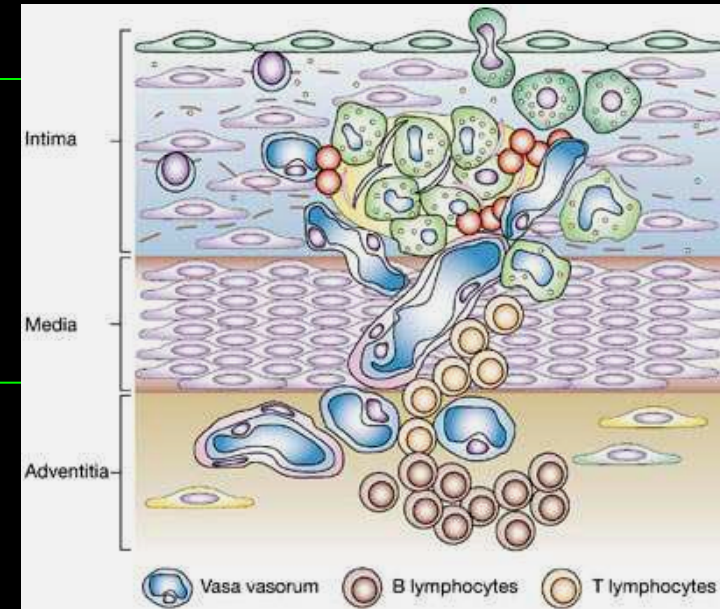
Hématome non circulant clivant la paroi aortique survenue en l'absence de porte d'entrée, variation de la dissection classique. Prévalence masculine , âge moyen 65 ans
FdR identifié dans 50% des cas ; l'HTA

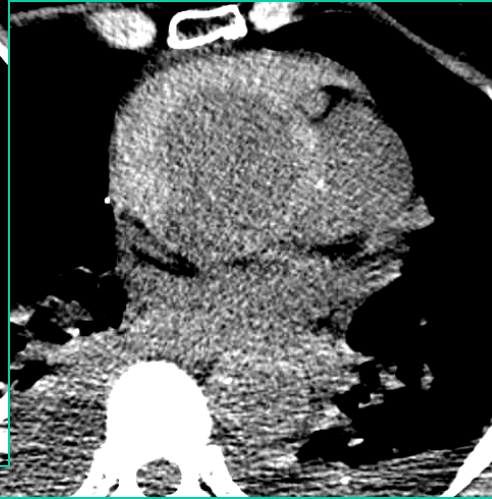
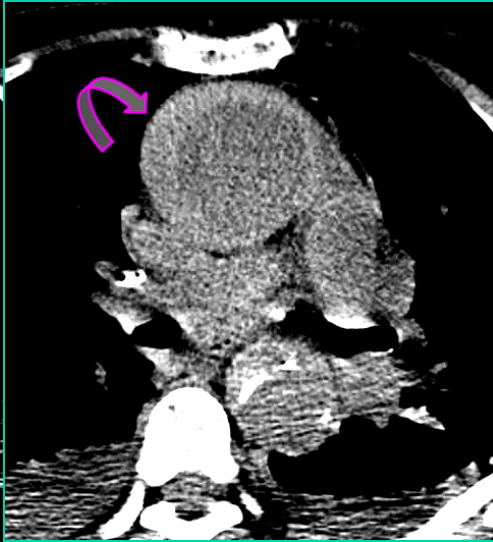
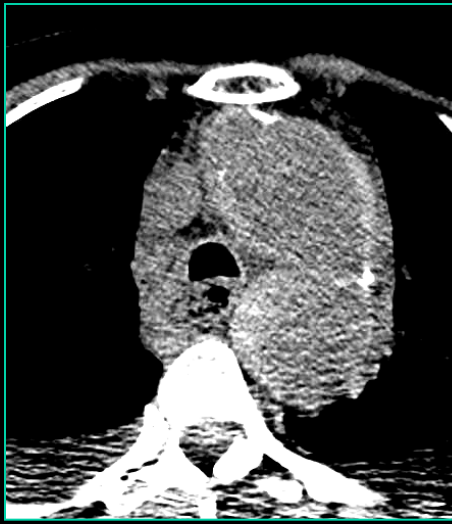


Hématomes liés à une rupture des vasa-vasorum (Vaisseaux des vaisseaux). Le processus de clivage siègerait contrairement au dissection aortique standard dans une couche plus externe.



Atherosclerosis



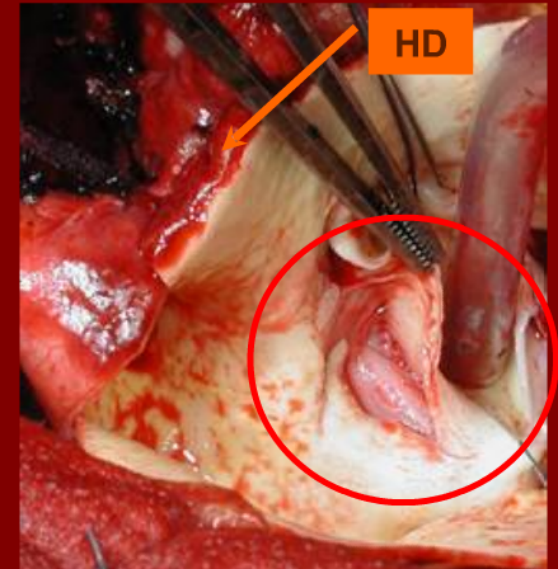


L' hématome intra-mural :
Correspond à l' infiltration hématique intra-murale, prenant la forme d' un croissant plus ou moins étendu spontanément hyperdense pariétal aortique



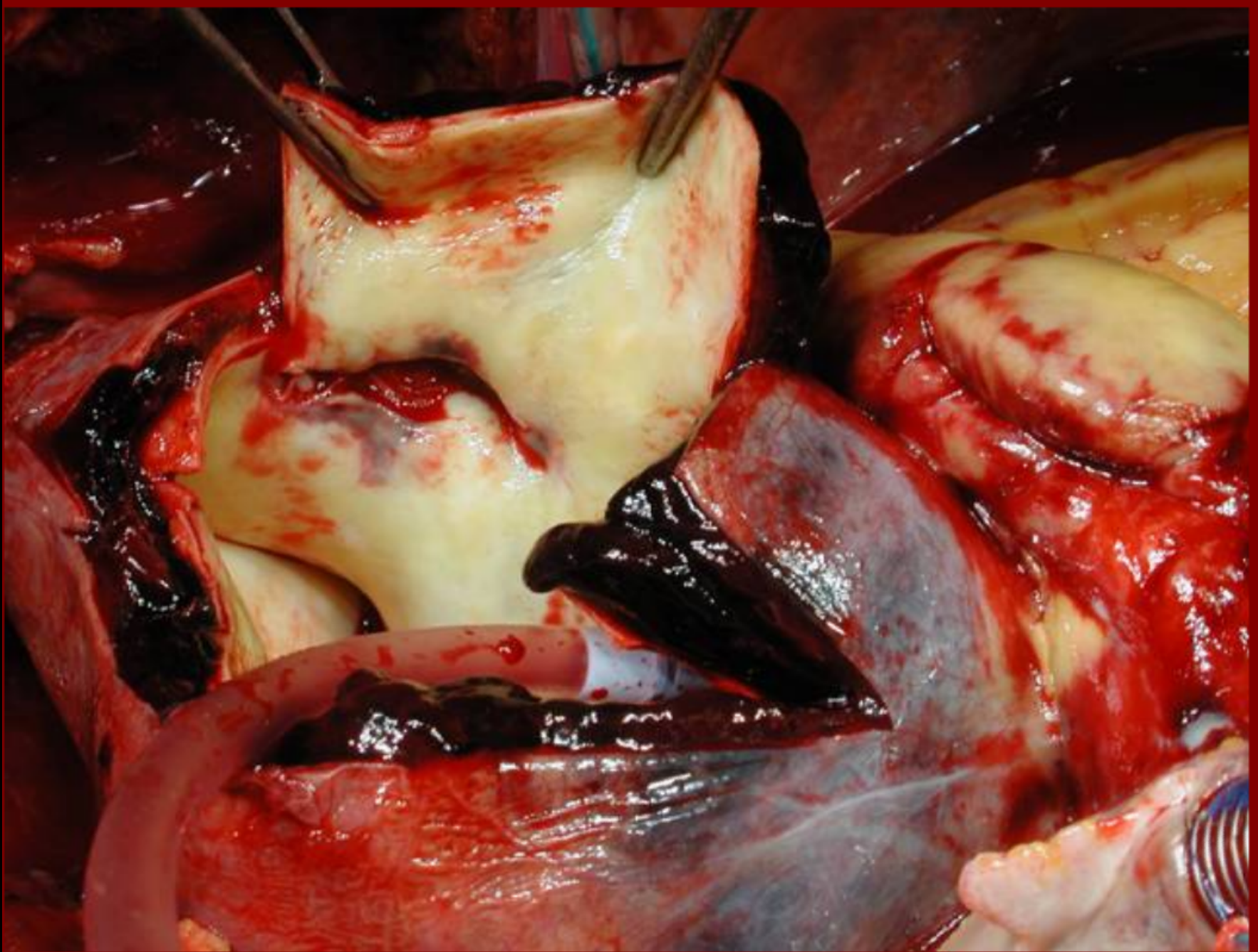
❖ Les premiers à remettre en cause la physiopathologie même de l'HD telle qu'elle était historiquement établie furent les chirurgiens : les données per-opératoires montrent l'existence de ruptures intimo-médiales à l'origine de l'hématome, avec extension antérograde ou rétrograde du clivage (*Cambria, Journal of Vascular Surgery, juin 2002*).

❖ Les progrès de l'imagerie ont par la suite permis la détection de telles lésions. Yoshida fut le premier radiologue à employer le terme de « porte d'entrée » dans sa description de l'HD (*Yoshida et al, Radiology, août 2003*).

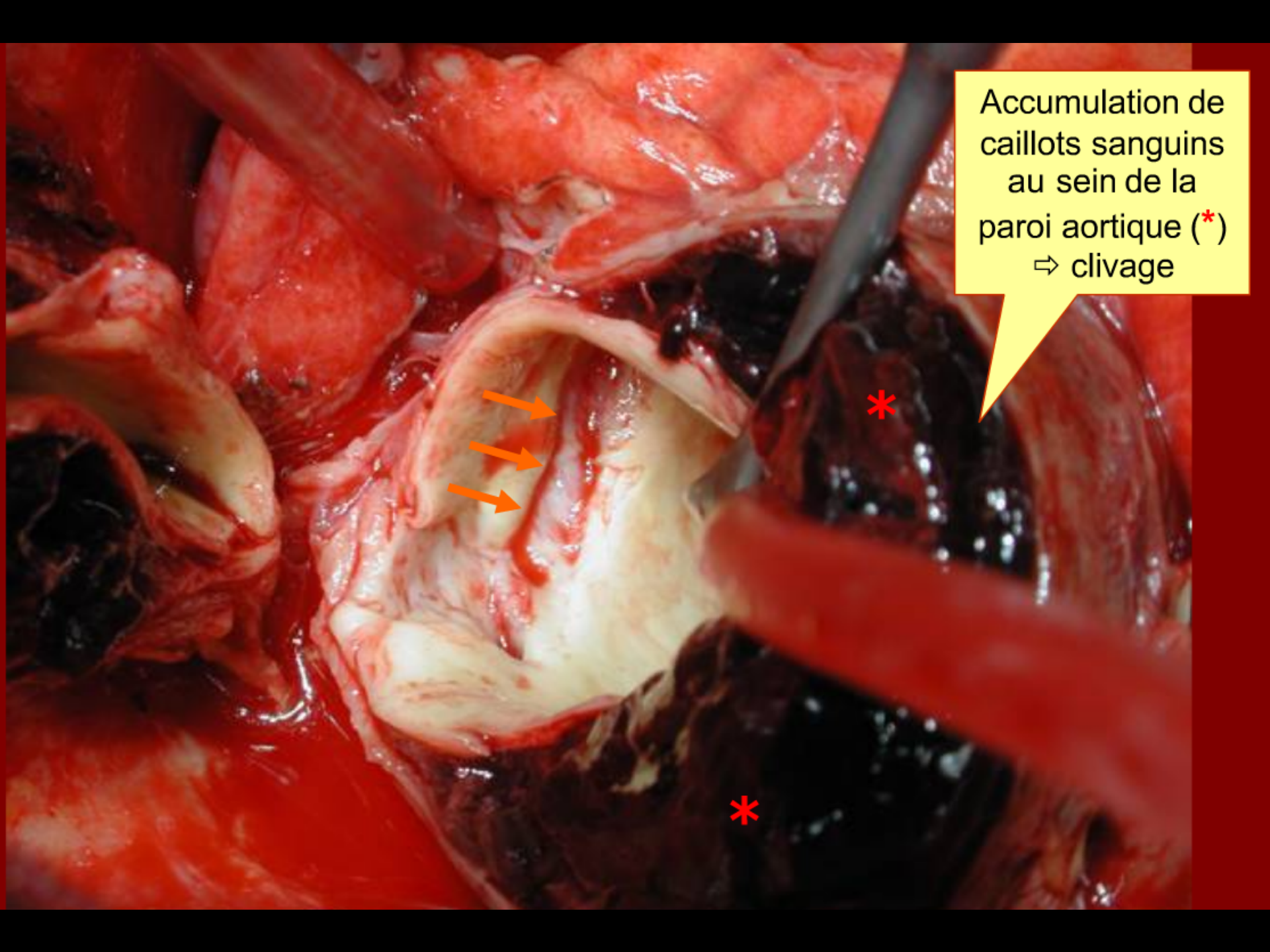


4 aspects à rechercher

- l'hyperdensité hématique intramurale
- L'ulcère
- La fente intimo médiale
- L'arrachement d'ostium



HD de type A opéré en urgence



Accumulation de
caillots sanguins
au sein de la
paroi aortique (*)
⇒ clivage

This is an intraoperative photograph showing a surgical dissection of the aorta. The aortic wall is partially opened, revealing internal structures. Three orange arrows point to a longitudinal tear or dissection in the aortic wall. To the right of the dissection, there is a large, dark, clotted area representing accumulated blood clots. Two red asterisks (*) mark specific areas: one on the dark clotted region and another on a lower part of the same region. Surgical instruments, including forceps and a retractor, are visible around the incision site.

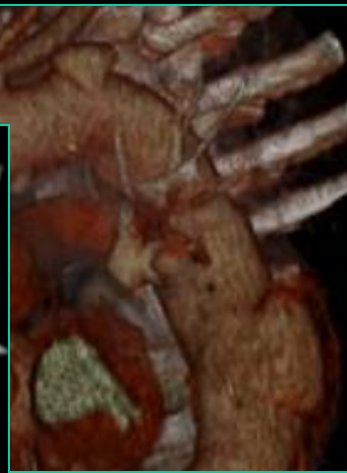
*

*

L'ulcère :

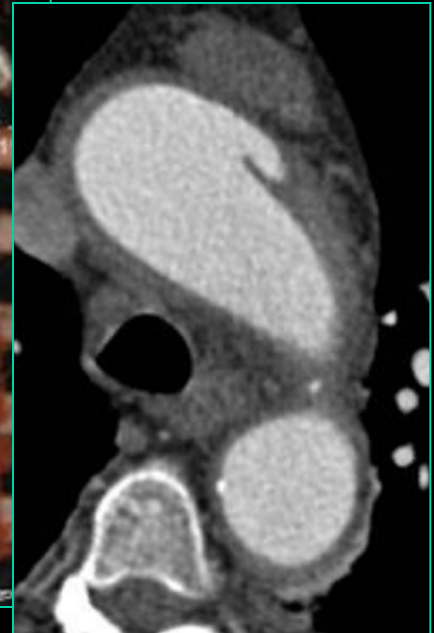
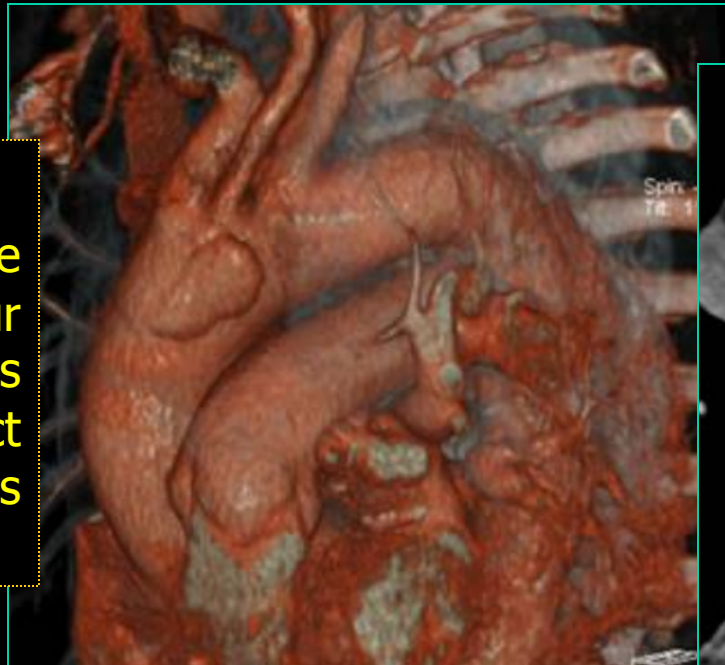
Correspond à une image d'addition de forme arrondie à collet large, située dans la paroi aortique.

Il s'agit du type de lésion le plus fréquemment retrouvé.



La fente intimo-médiale :

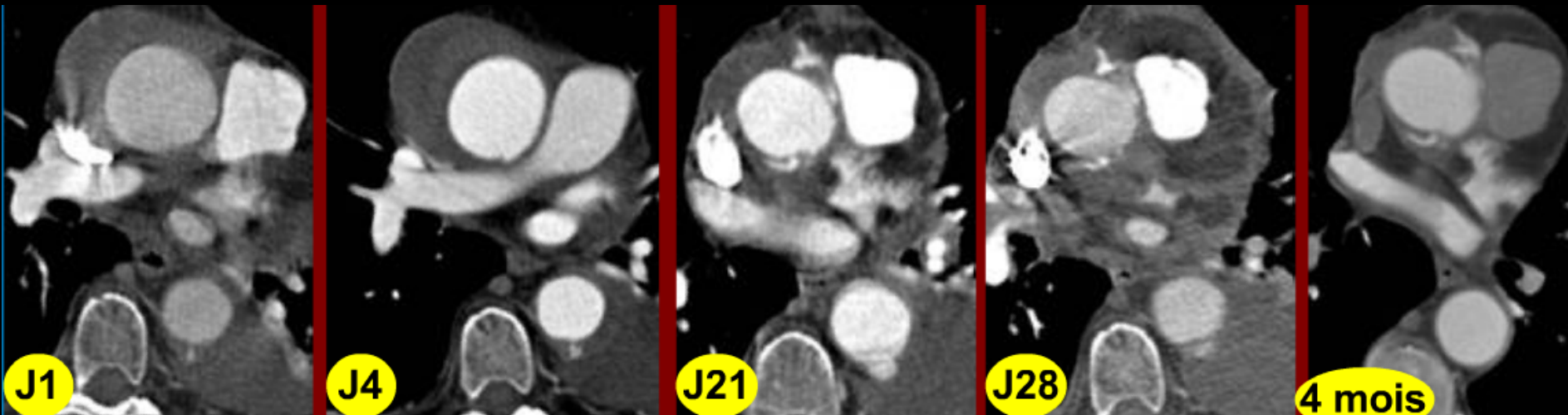
Correspond à une image spiculaire ou arrondie, visible sur plusieurs niveaux de coupes successifs, lui conférant un aspect grossièrement linéaire sur les reformations.

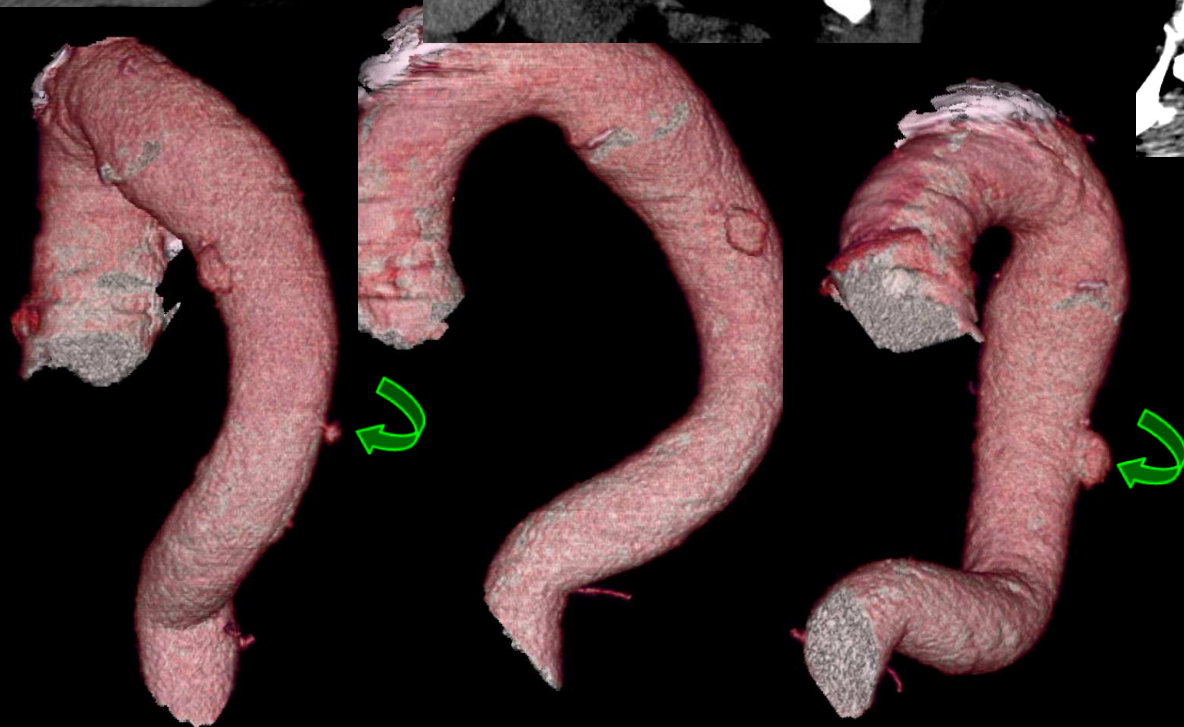
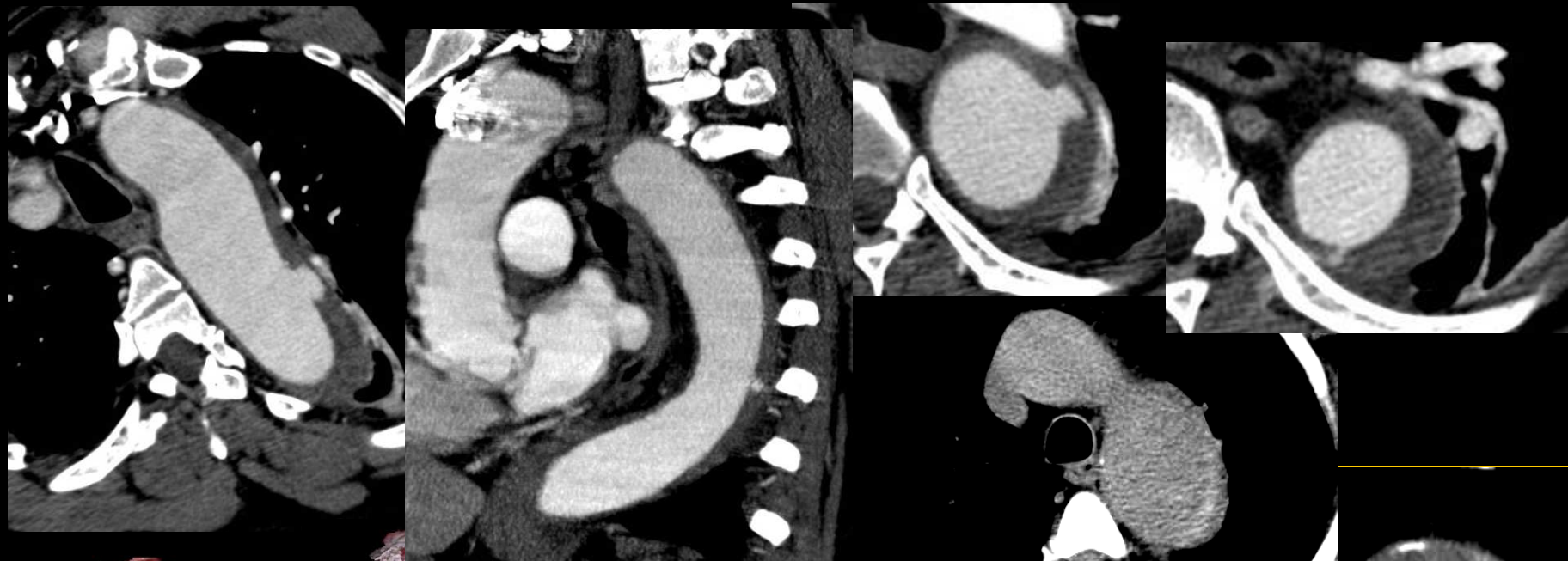


L'arrachement d'ostium :

Correspond à une image d'addition punctiforme, ronde située entre la lumière aortique circulante et une collatérale étirée (le plus souvent une intercostale).

Cette lésion présente une évolution rapide dans le temps et parfois diagnostiquée à un stade plus évolué, sous la forme d'une image ulcériforme, voire d'une dissection localisée.





Porte d'entrée
de l'HIM :
Ulcère
(arrachement
ostial associé)



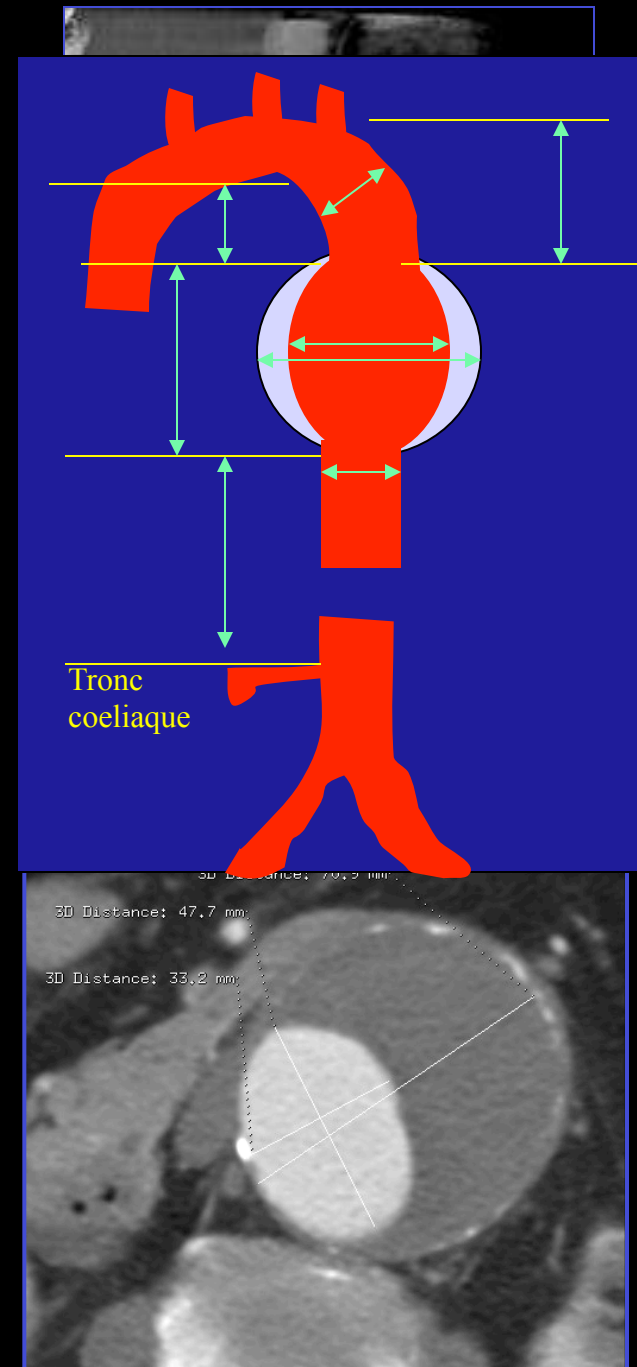
Porte d'entrée de
l' HIM : Fente intimo-
mediale

(image en lobe d'oreille)

Pathologies / anévrisme aortique :

Éléments du bilan :

- ✓ Diagnostic positif
- ✓ Localisation et étendue;
- ✓ Présence d'un thrombus mural
- ✓ Distance par rapport aux branches viscérales
- ✓ Mensurations (notamment en cas d'endo-prothèse) : lumière max et min de l'anévrisme, du thrombus mural, hauteur, etc...
- ✓ complications : syndrome fissuraire, instabilité ou rupture

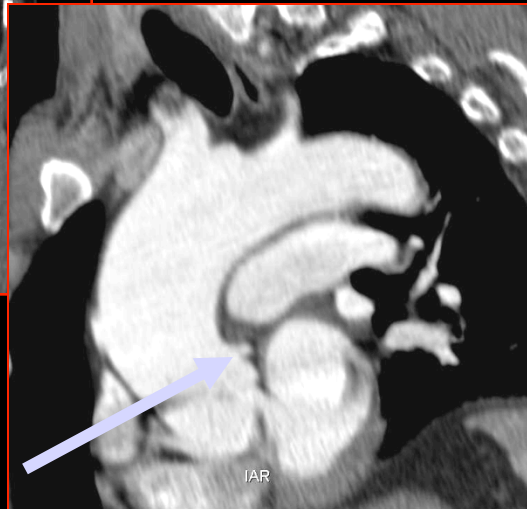


Anévrisme de l'aorte ascendante

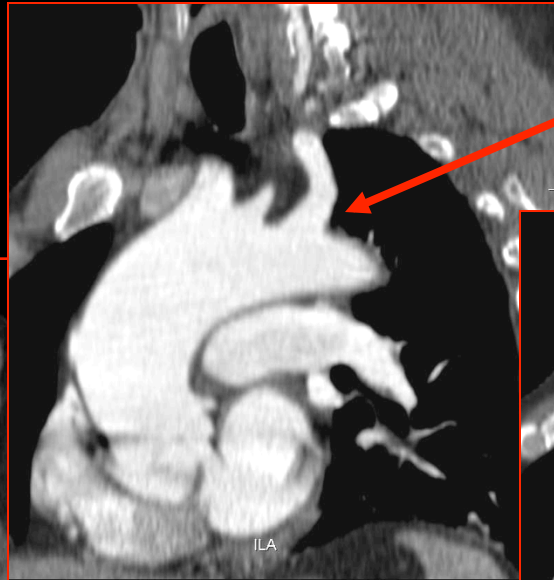
MPVR



Analyse
des ostia
coronaires



Meilleure analyse des rapports
entre l'anévrisme et chacun
des vaisseaux supra aortiques

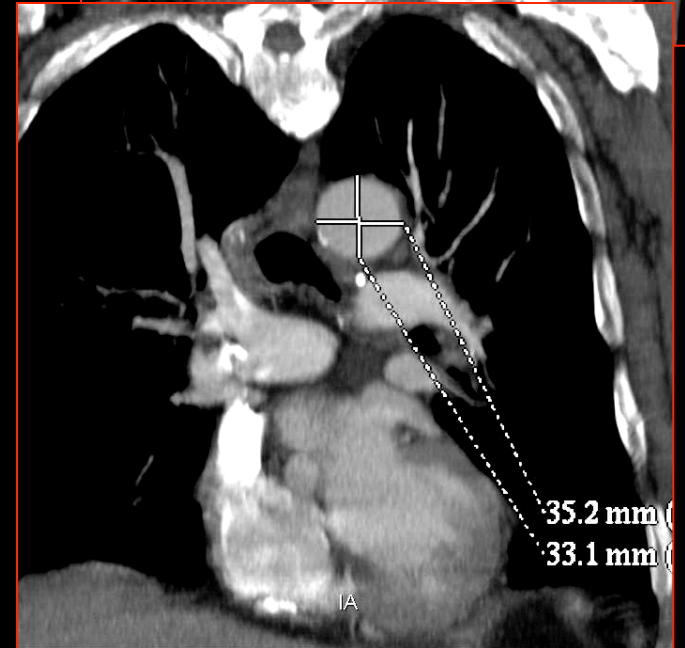
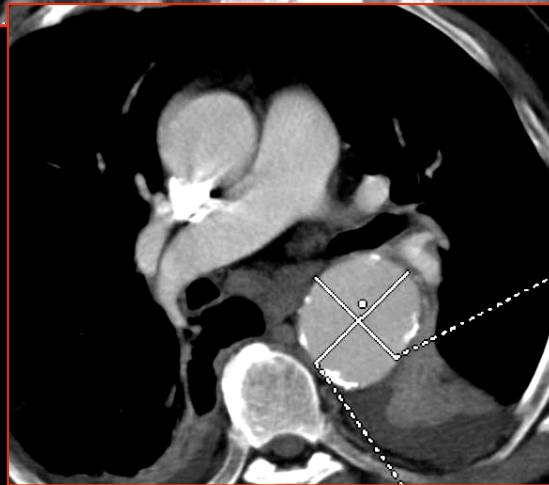
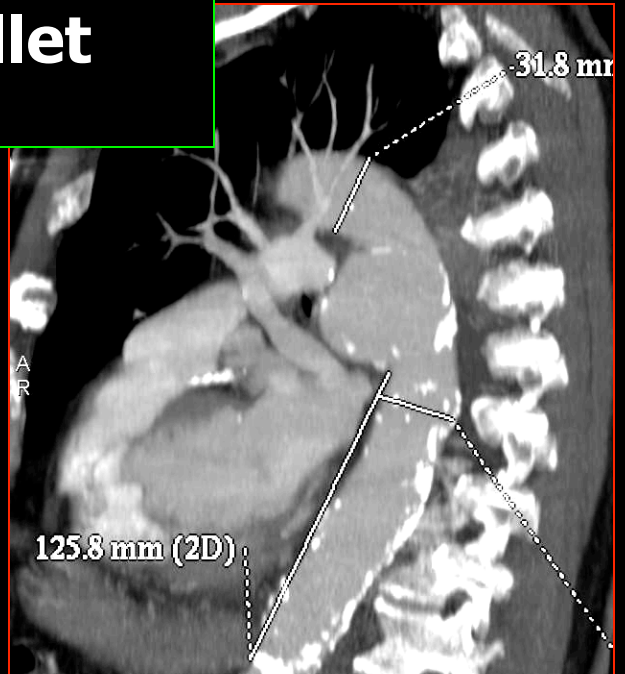


Mensurations
pré
opératoires



Anévrisme sacciforme à large collet

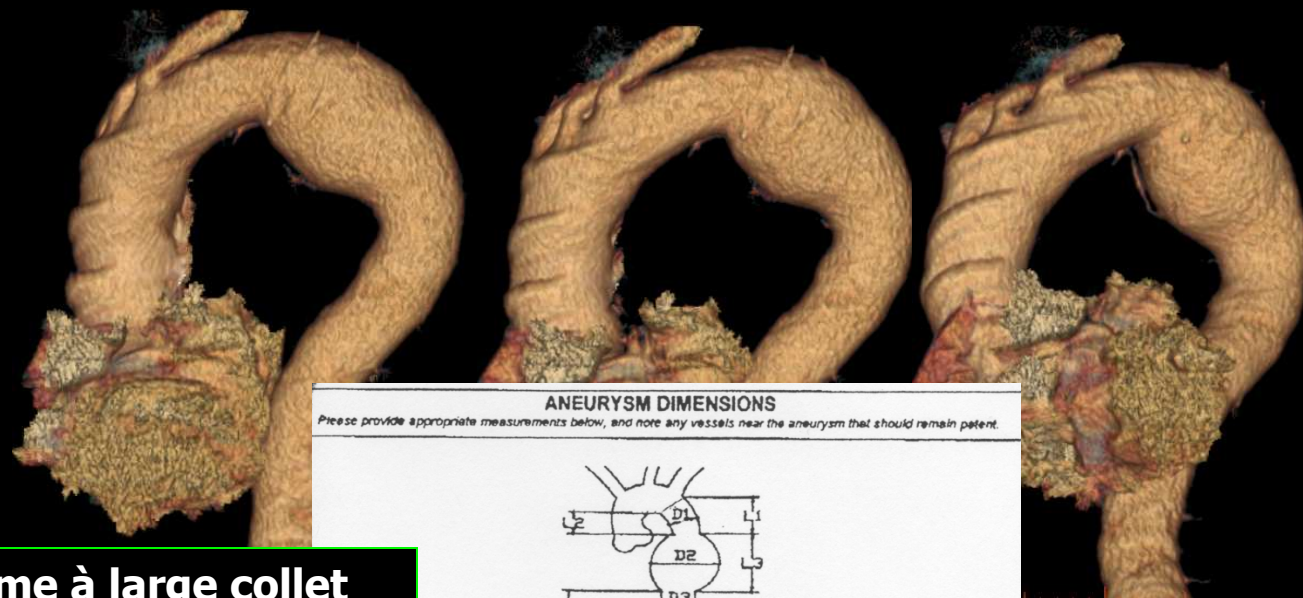
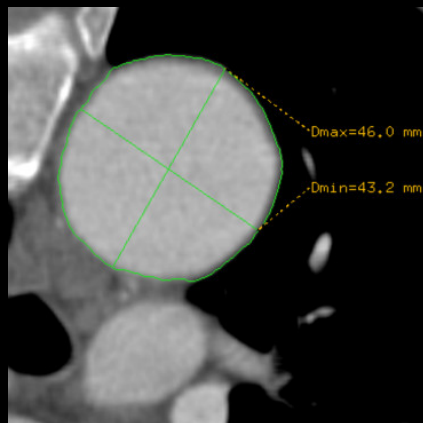
Acquisition sans gating



(A10011512038)

S

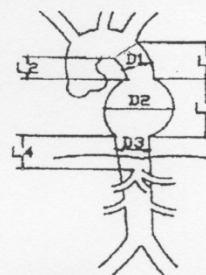
ection



Anévrisme sacciforme à large collet
Acquisition avec gating

ANEURYSM DIMENSIONS

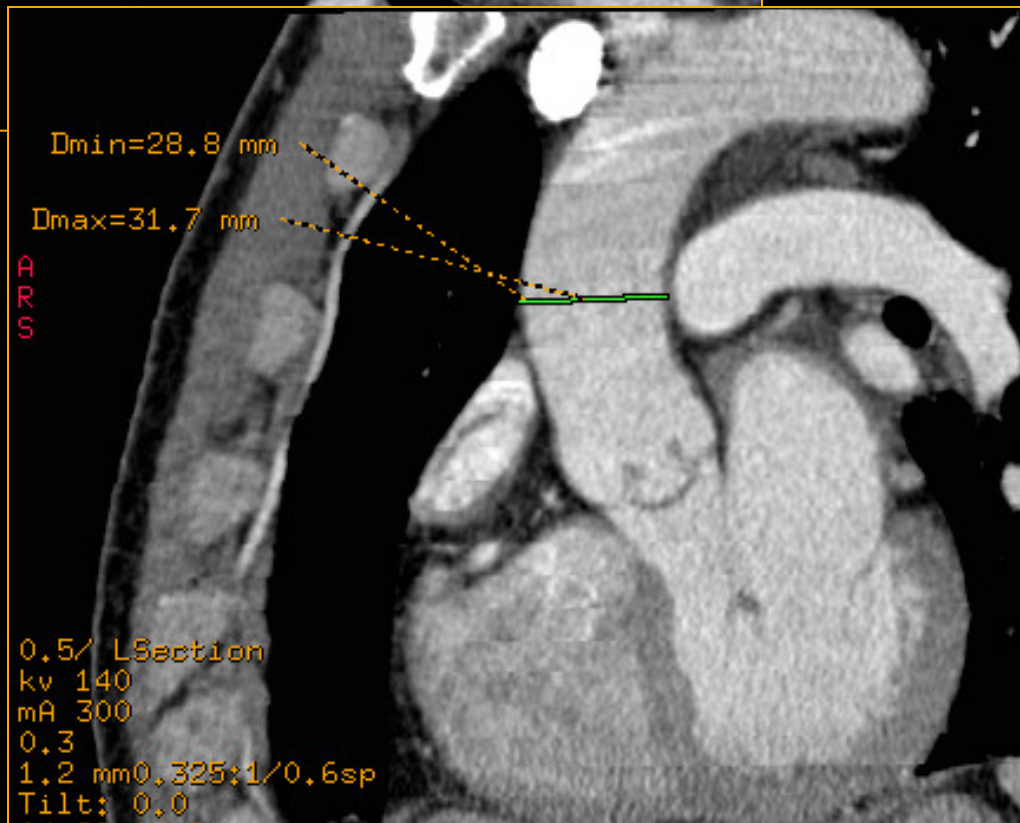
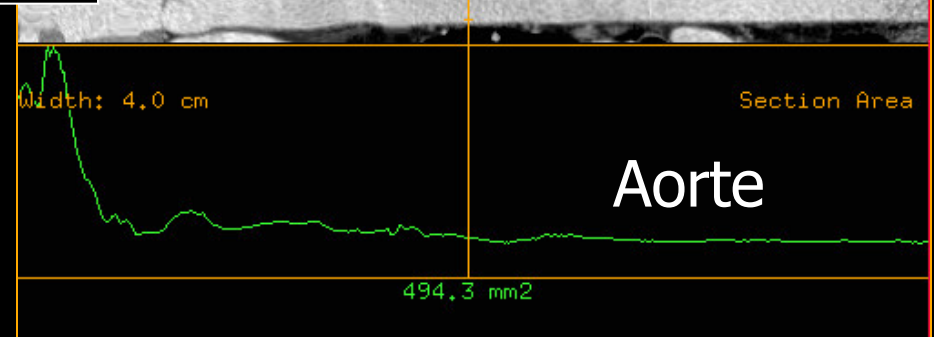
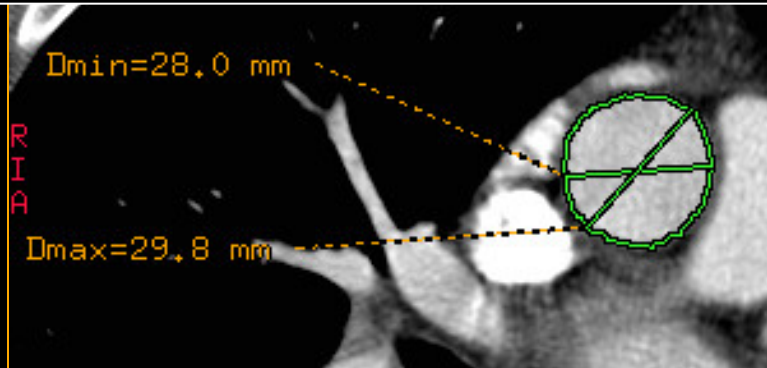
Please provide appropriate measurements below, and note any vessels near the aneurysm that should remain patent.

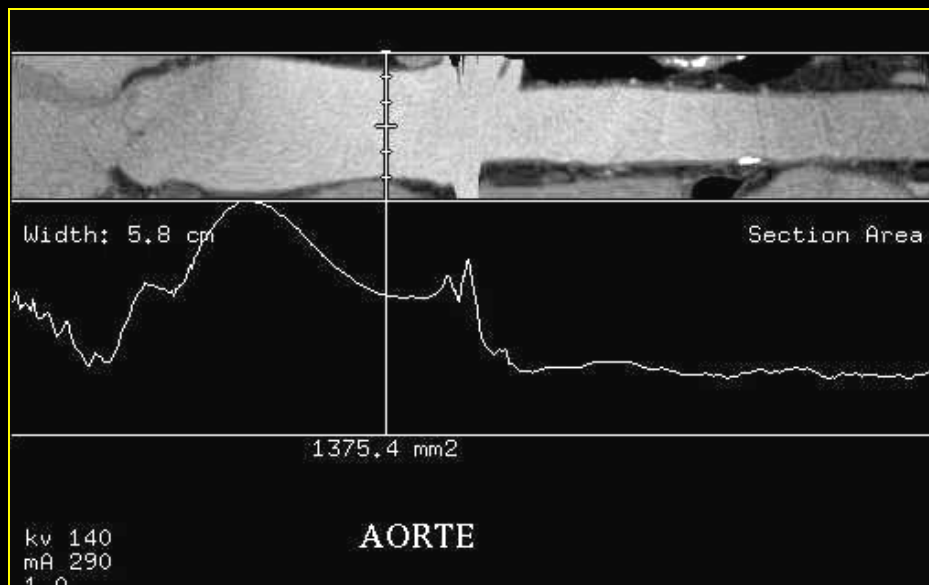


L1 _____ Posterior proximal neck length
L2 _____ Anterior proximal neck length
L3 _____ Aneurysm length
L4 _____ Distal neck length

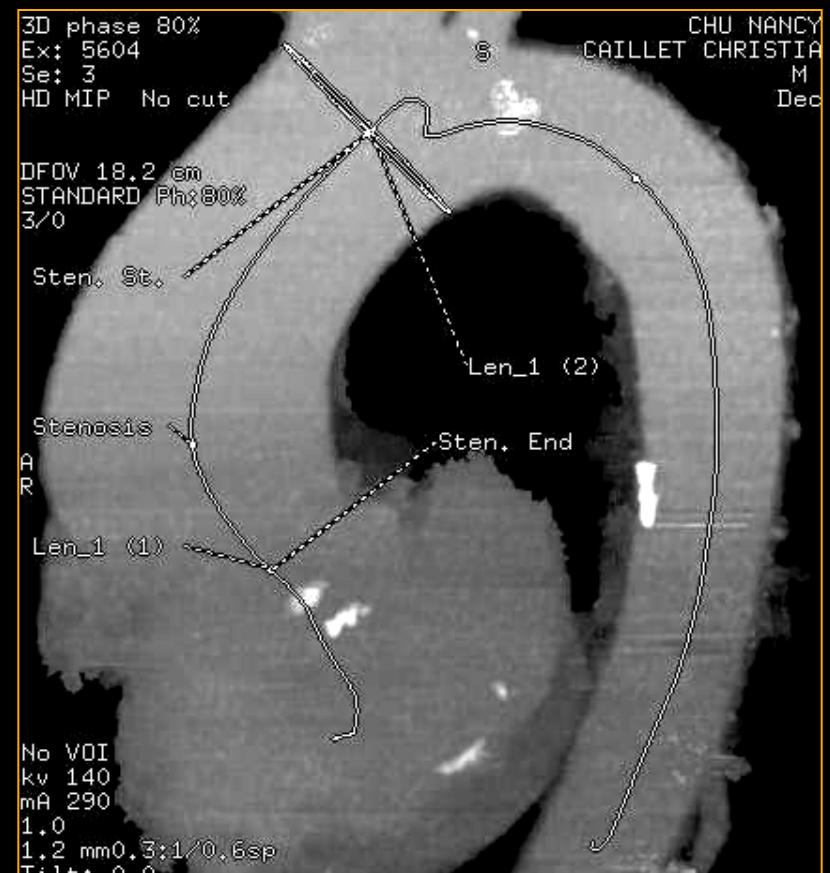
D1 _____ Proximal neck diameter
D2 _____ Aneurysm diameter
D3 _____ Distal neck diameter

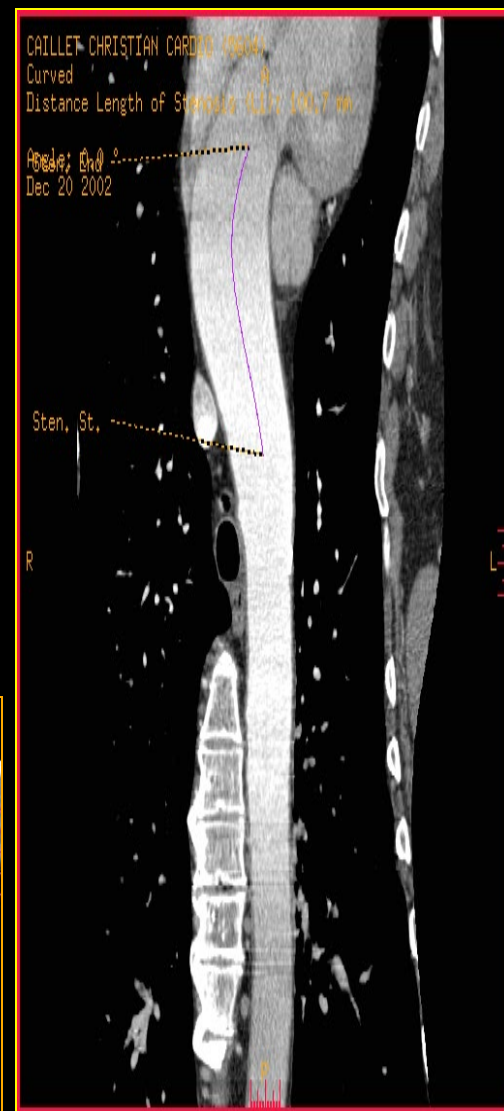
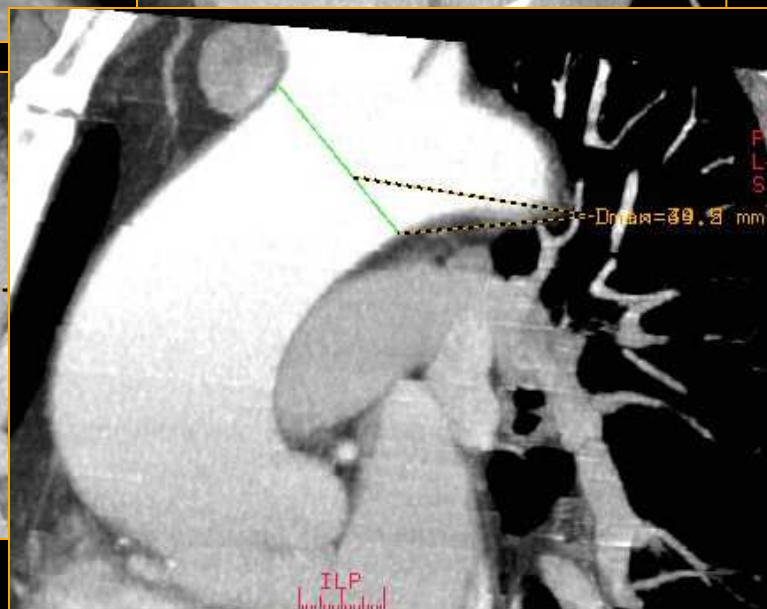
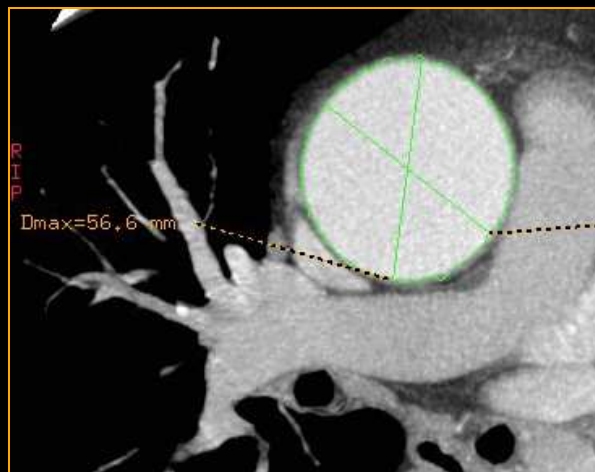
aorte ascendante avec synchronisation ECG

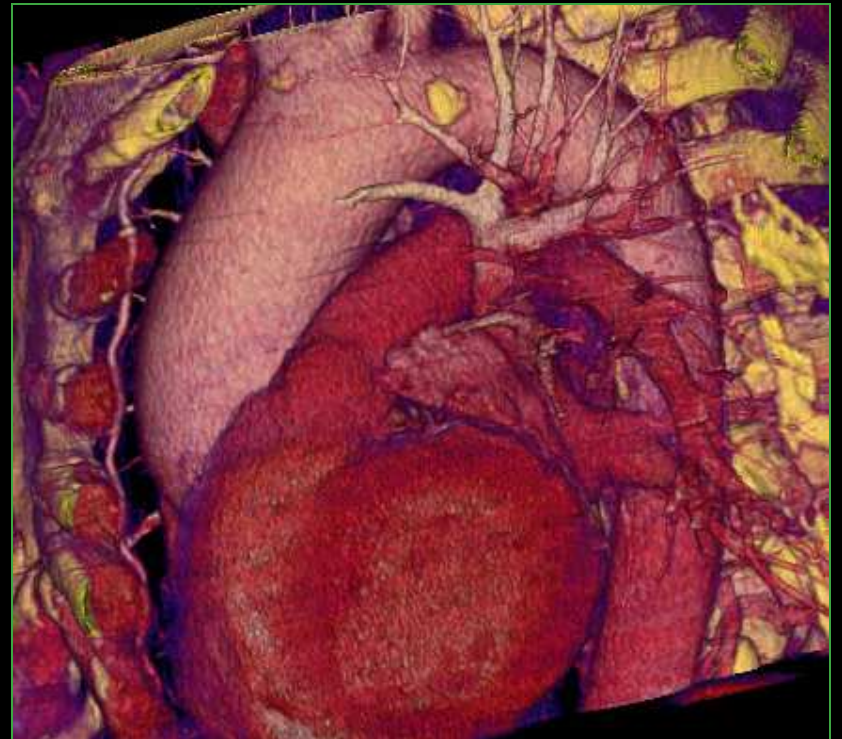
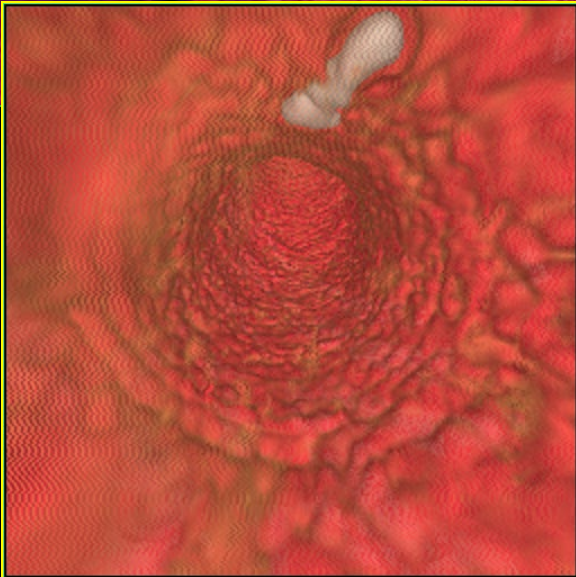
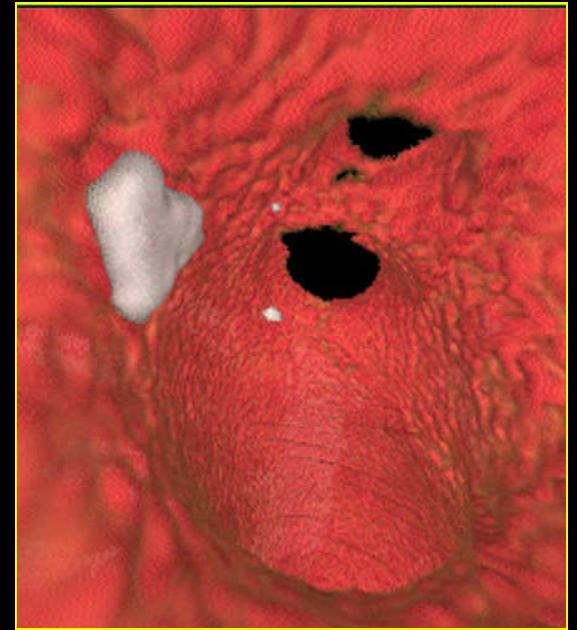
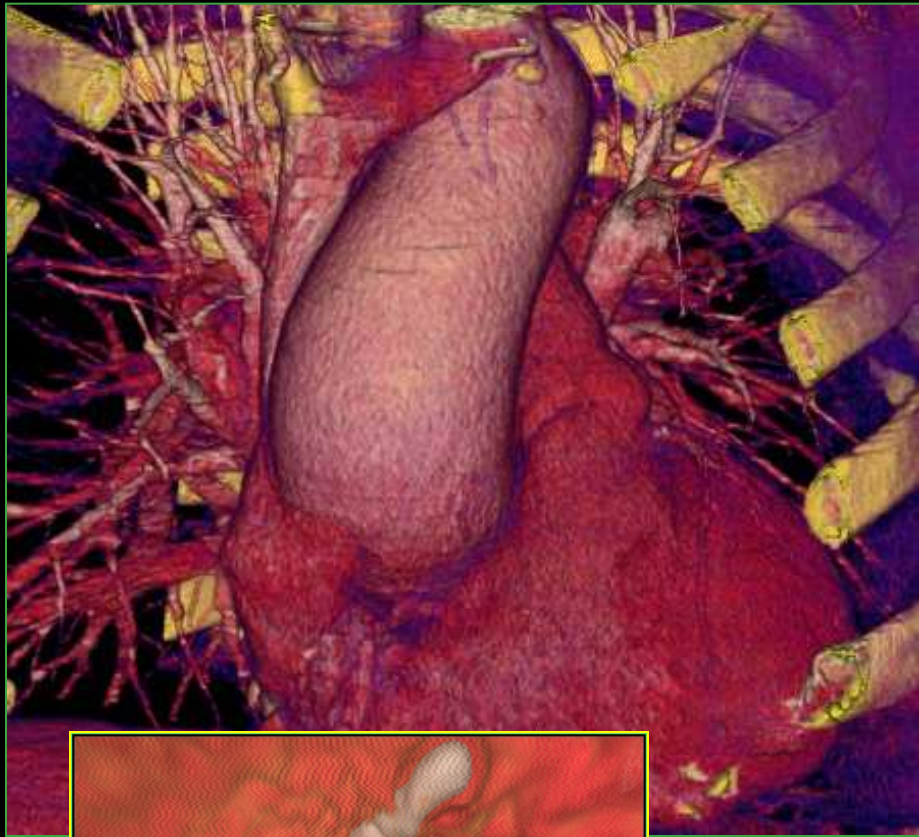




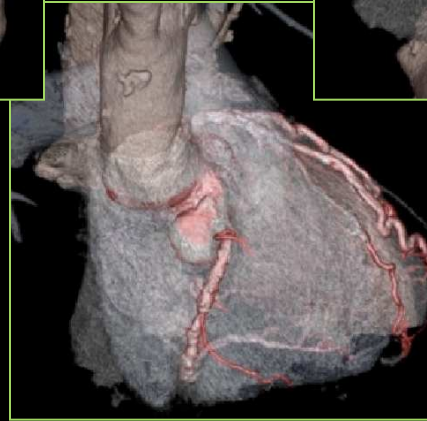
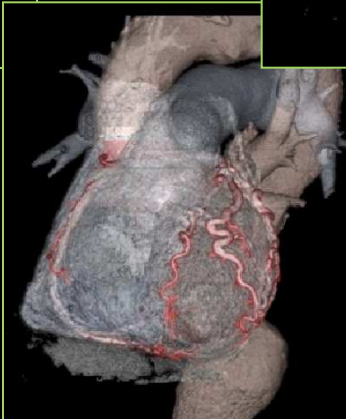
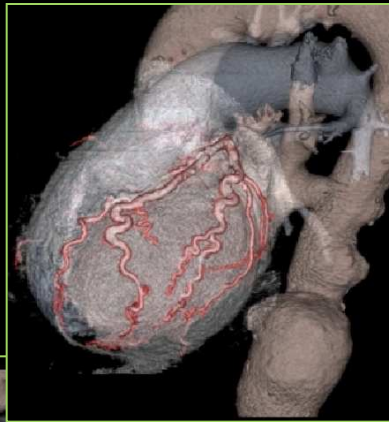
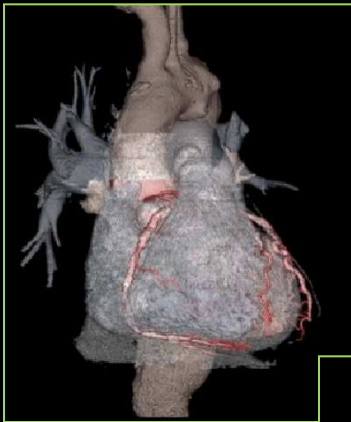
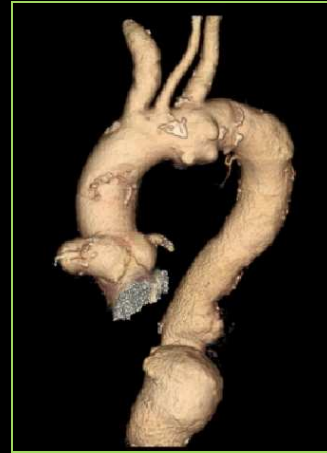
Nom de la mesure	Segment
L1 (Length of Stenosis)	100.7 mm
L2 (Length between Start and Max of stenosis)	71.0 mm
L3 (Length between Max and End)	29.7 mm
Len_1 (Longueur 1)	100.7 mm
Nom de la mesure	Volume



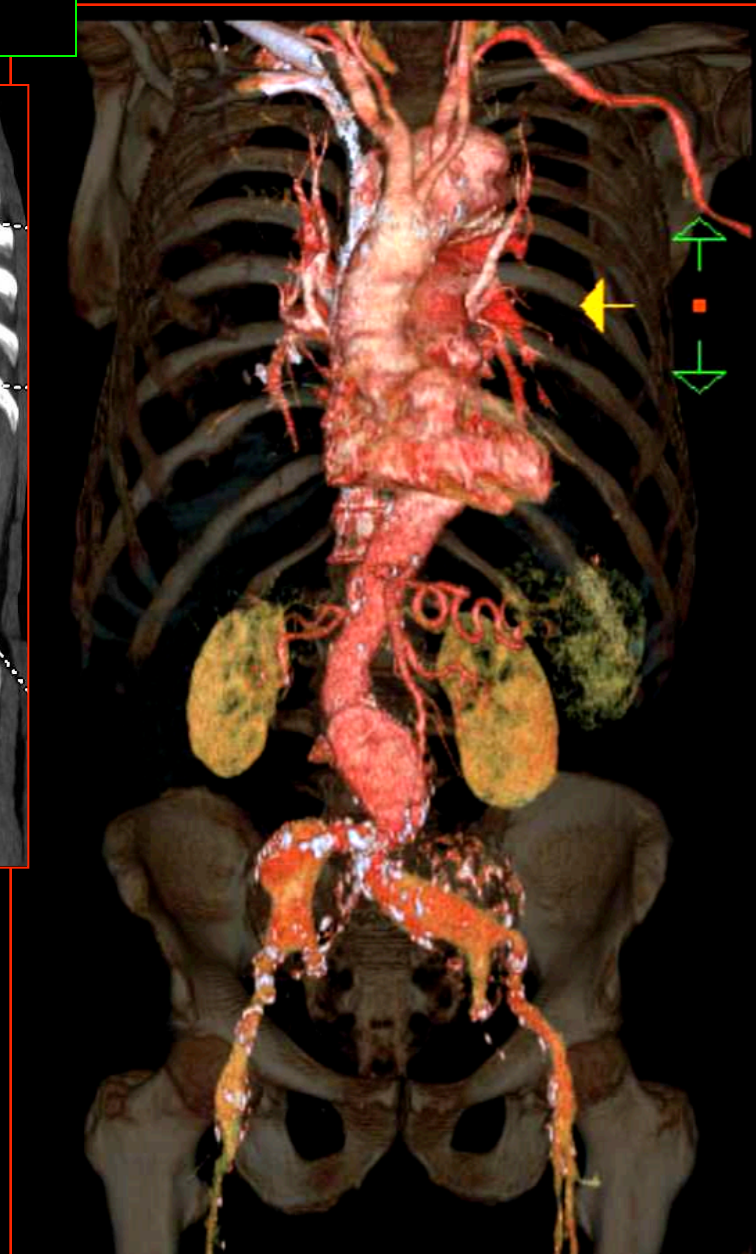
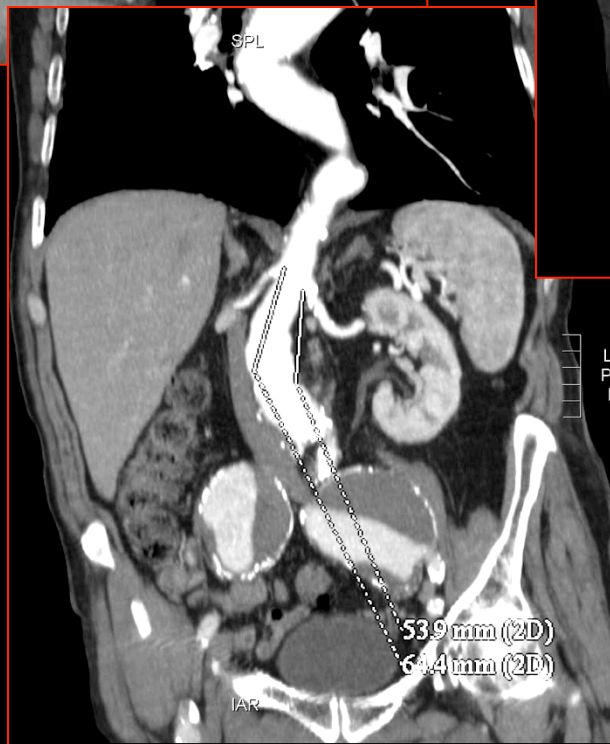


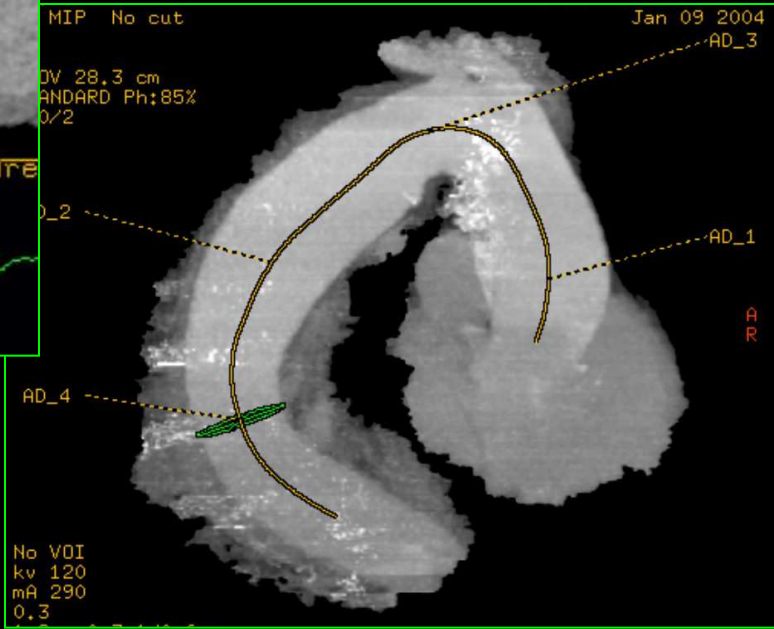
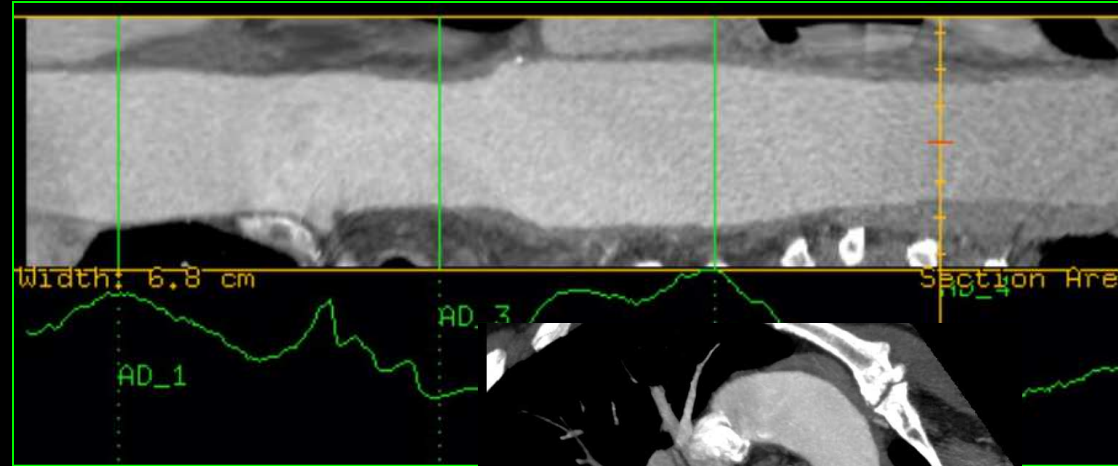
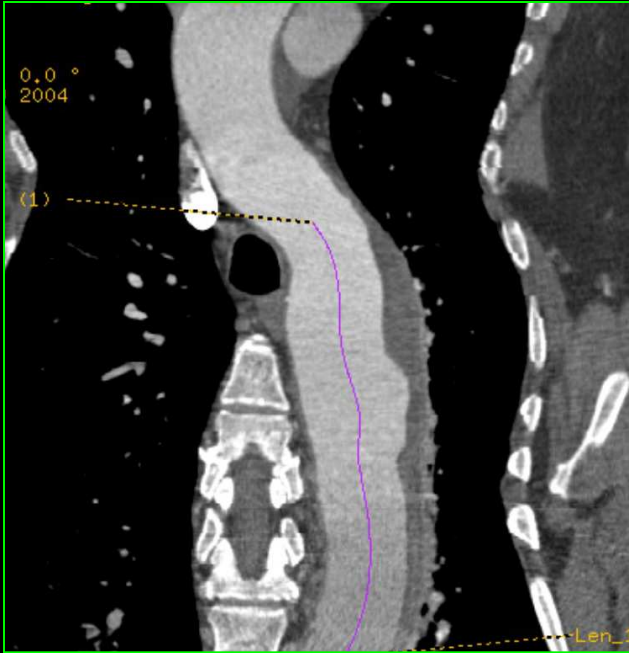
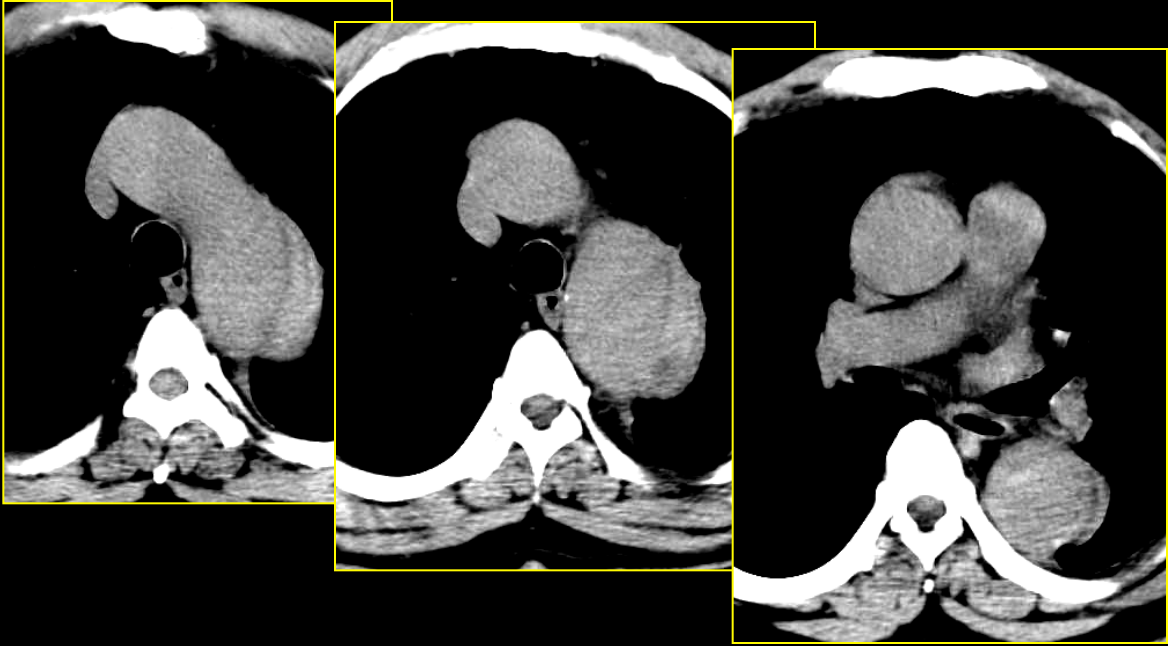


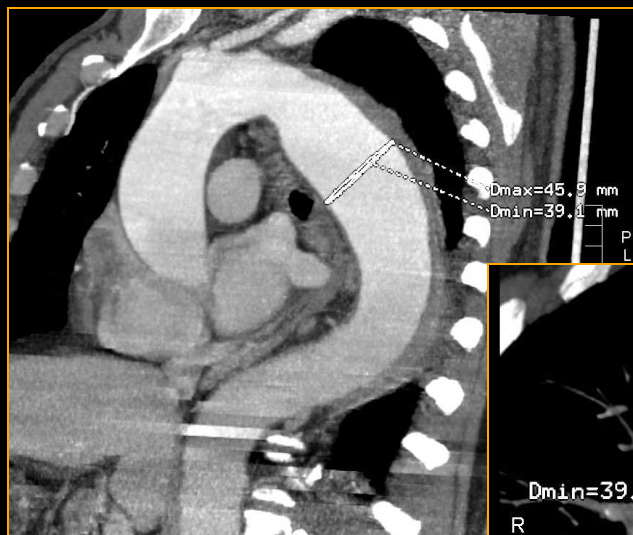
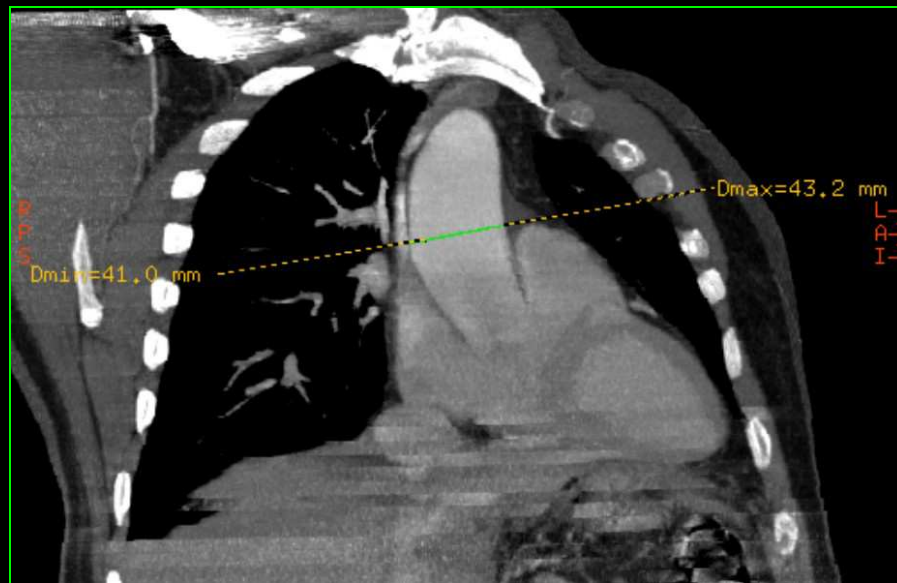
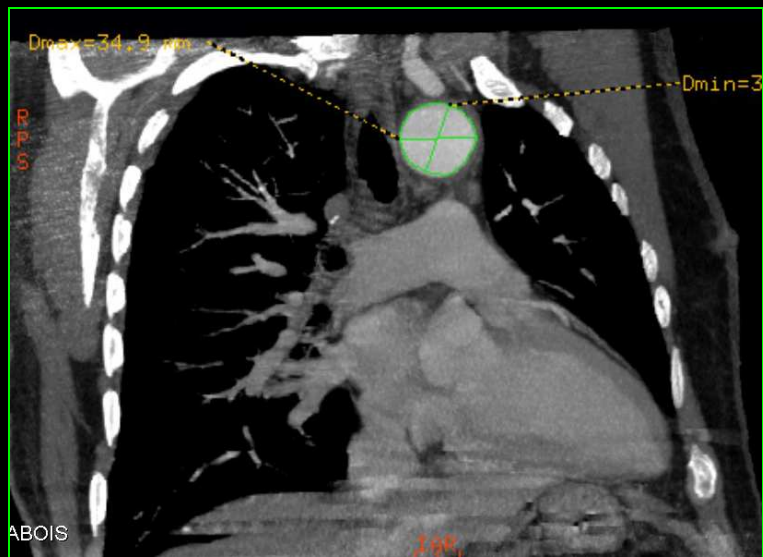
Aneurismes aortiques multi focaux



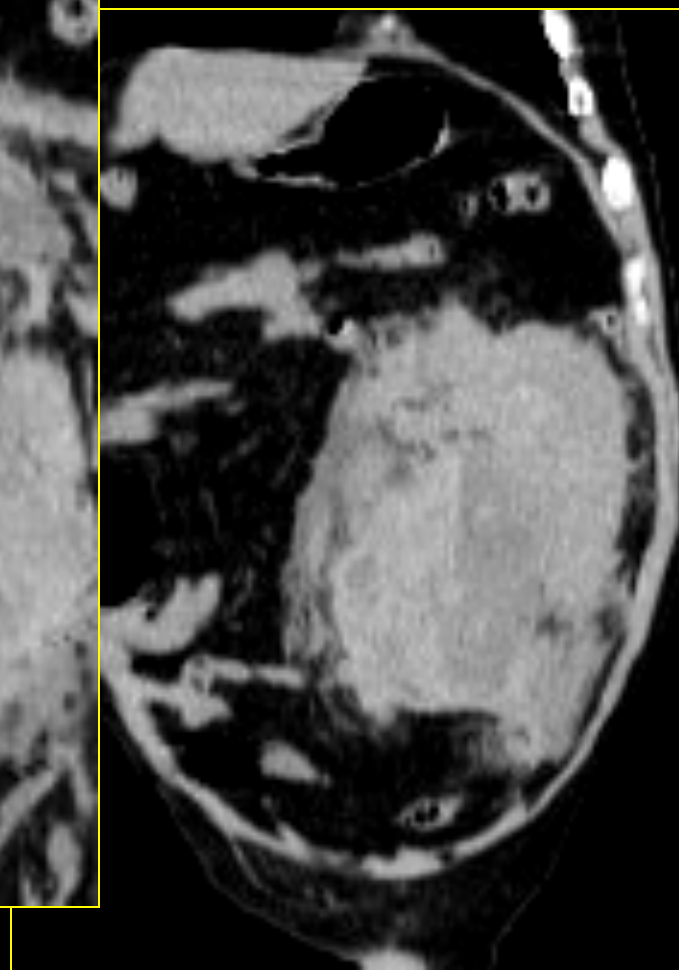
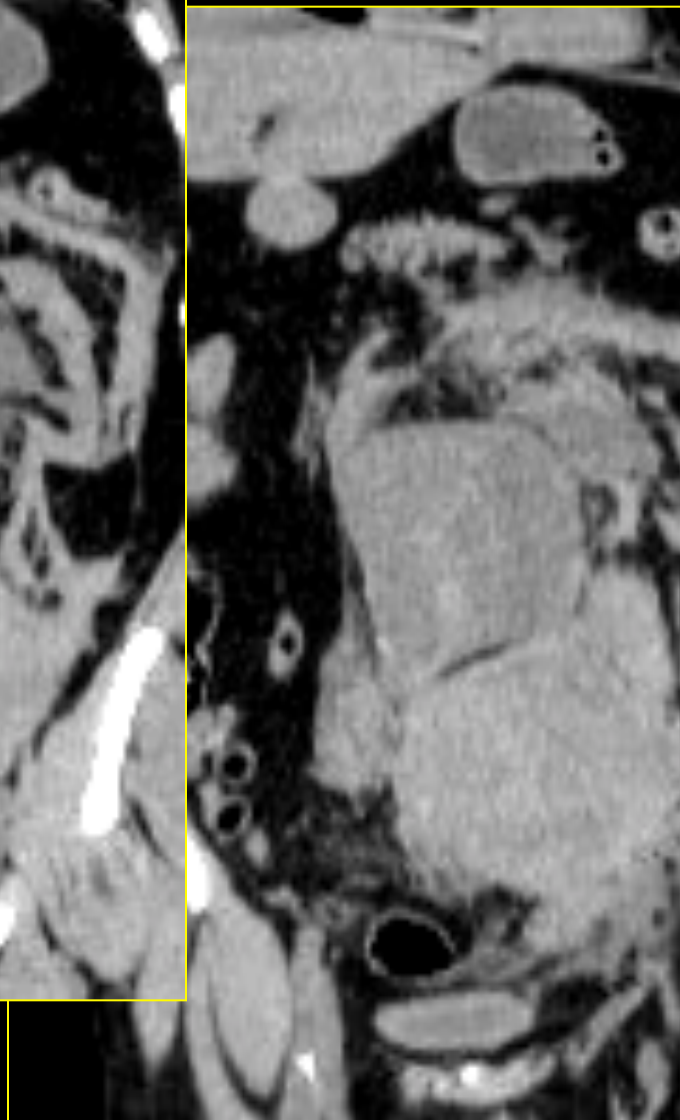
Maladie ectasiente de l'aorte

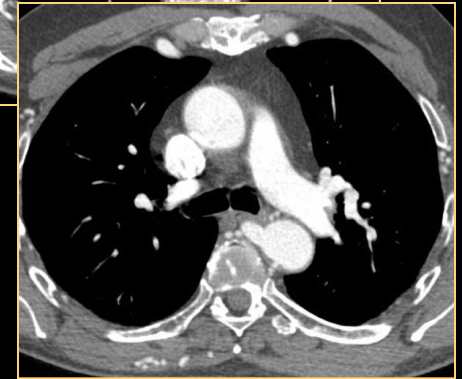
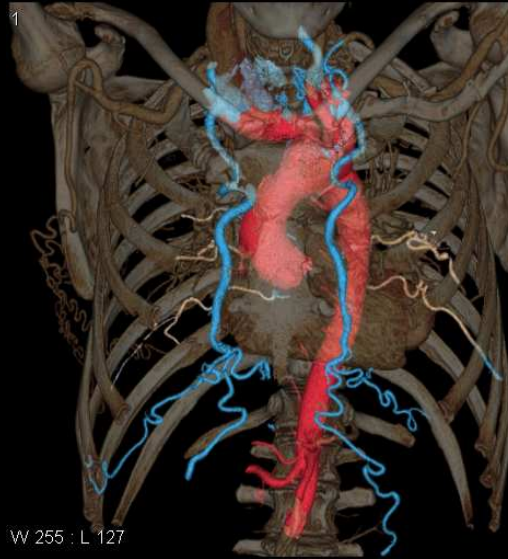
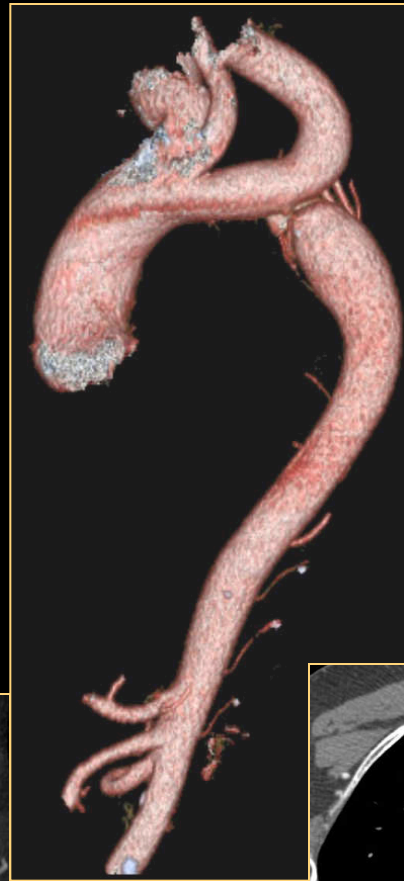
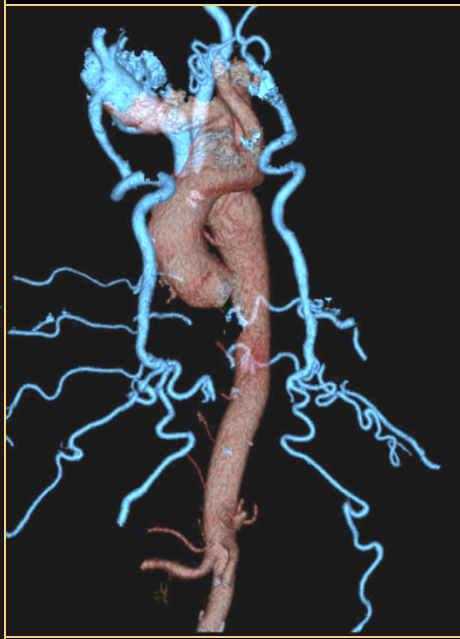






Anévrisme rompu (rare en intra-thoracique)





Coarctation de l'aorte

Pathologies / anévrisme inflammatoire :

✓ Evolution fibro-inflammatoire

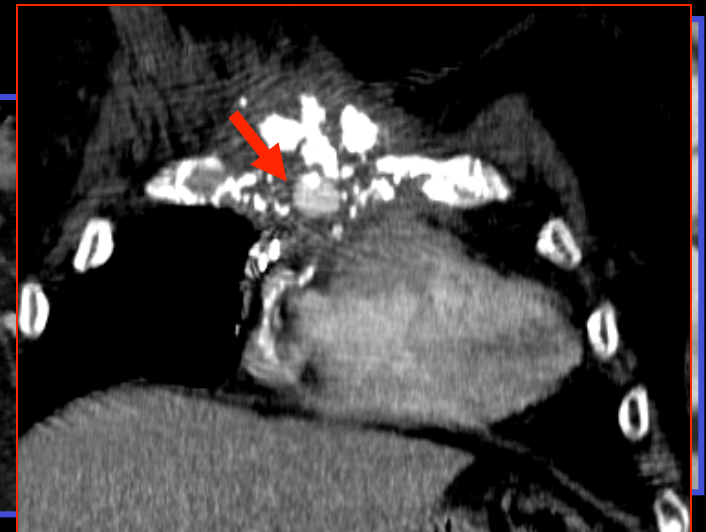
- Réaction allergique locale à certains composants de la plaque d'athérome
- Clinique : douleur, perte poids, fièvre

✓ Infiltration tissulaire péri-aortique

- ++ antéro-latérale
- Bien limitée ou infiltrant
- Rehaussement : variable plutôt tardif

✓ Adhérences : VCI, TD, uretères, psoas

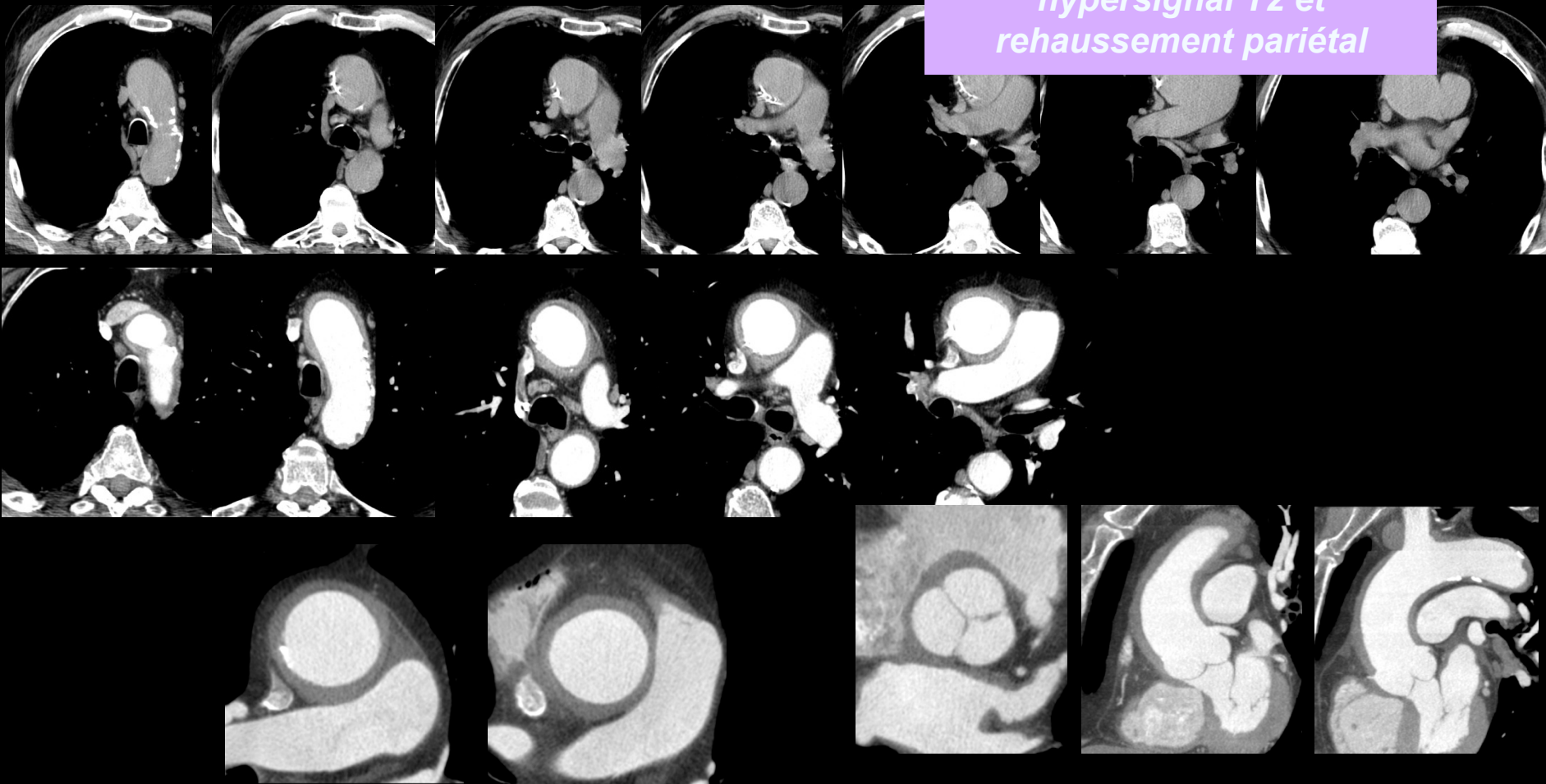
✓ TTT : corticoides / chirurgie



Patient 60 ans
Dilatation de l'aorte ascendante
Douleur thoracique
=> Dissection ?

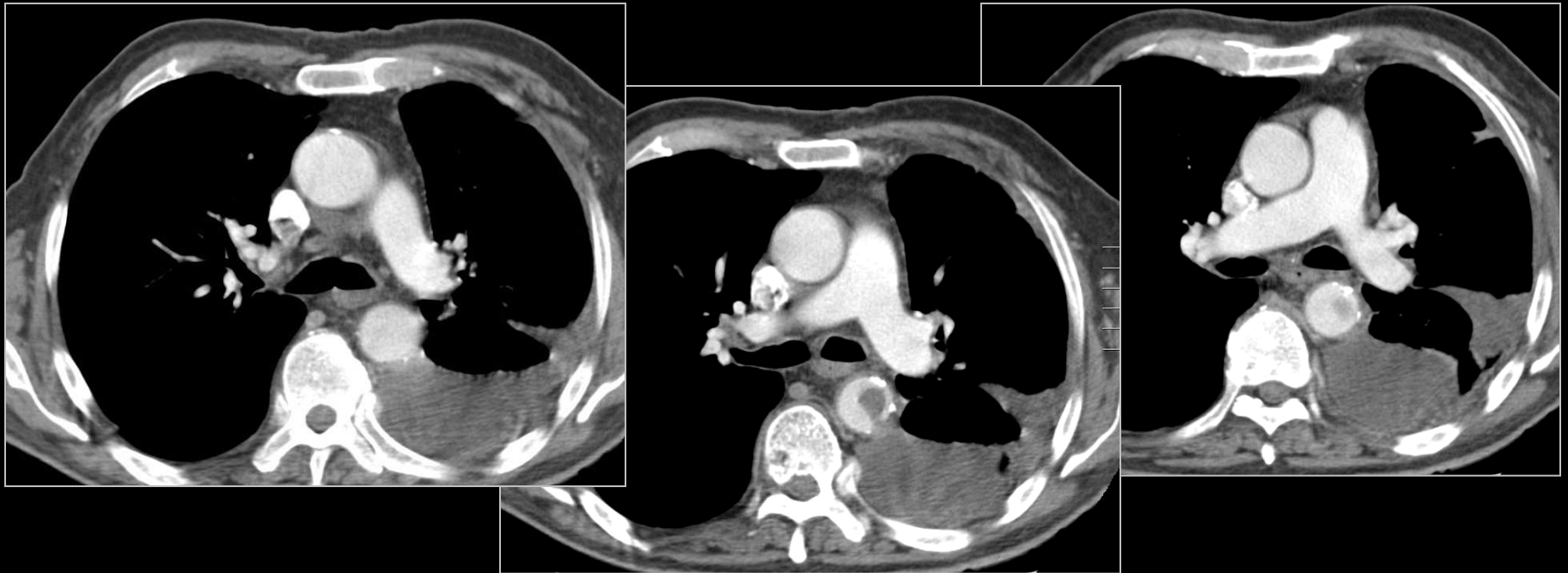
Aortite

Temps tardif :
Rehaussement pariétal
ou IRM:
hypersignal T2 et
rehaussement pariétal

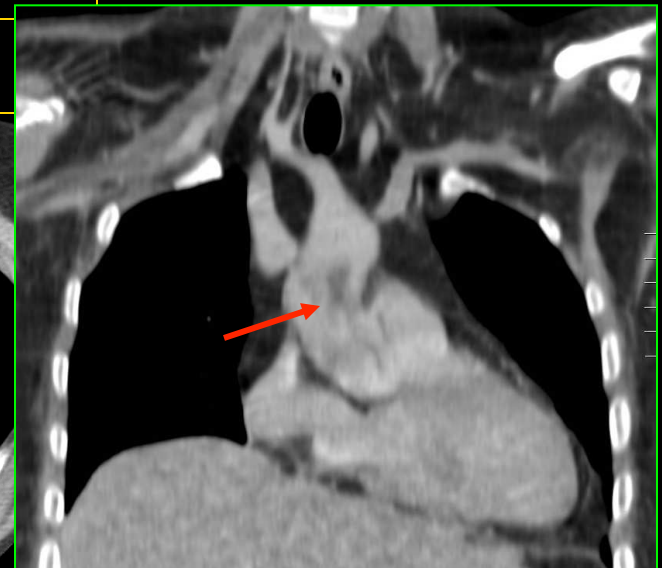
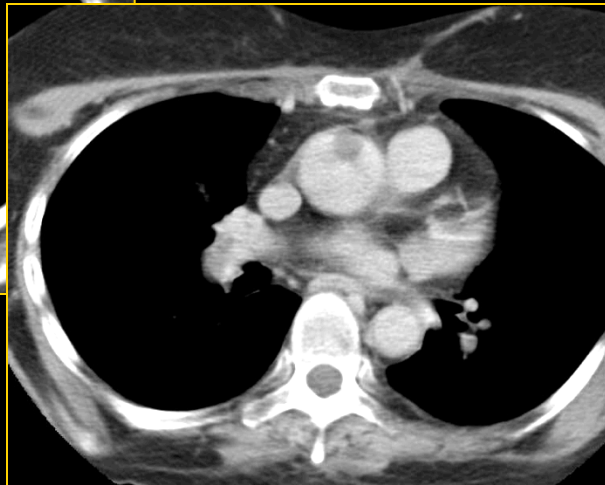
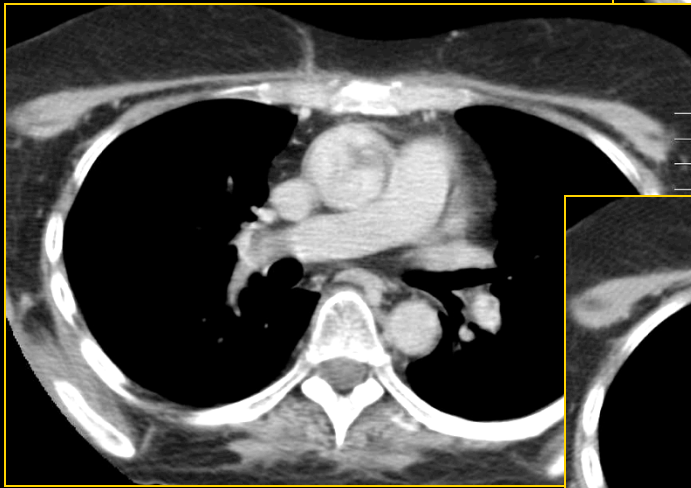
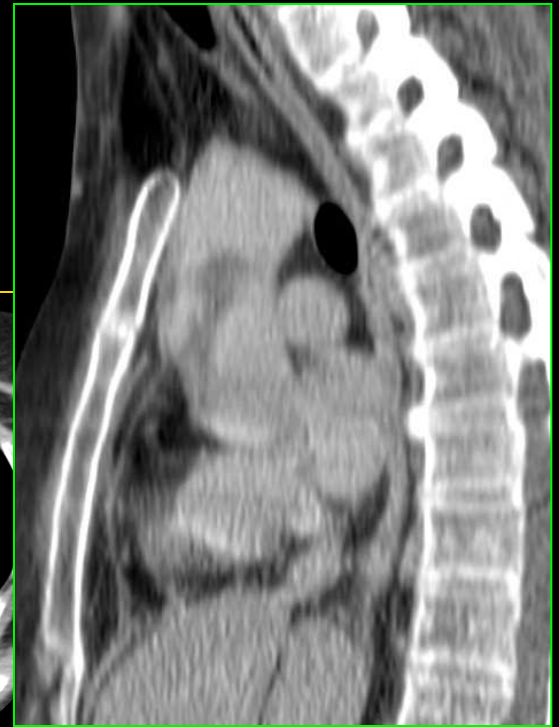
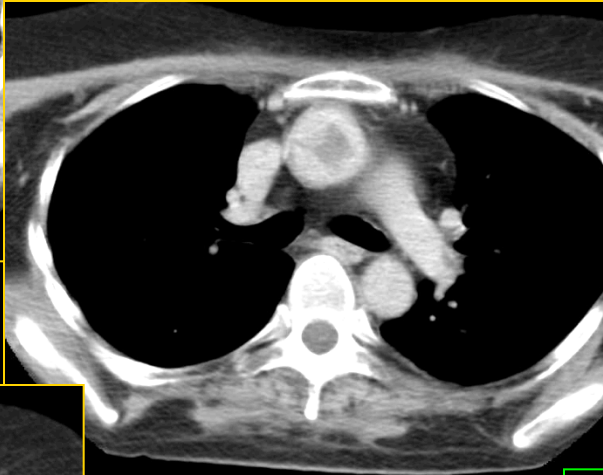
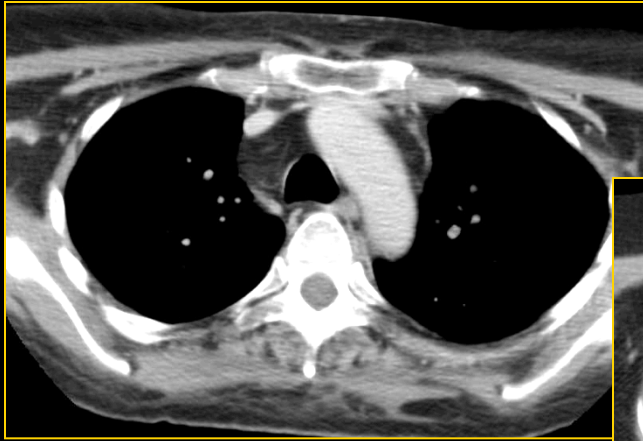


Pathologies / thrombus aortique

- ✓ thrombus aortique **cruorique**
- ✓ contexte de plaque athéromateuse
 - ulcérée
 - ou protrusive
 - thrombus anévrysmal
- ✓ **intra-cavitaire cardiaque** (Trouble du rythme)

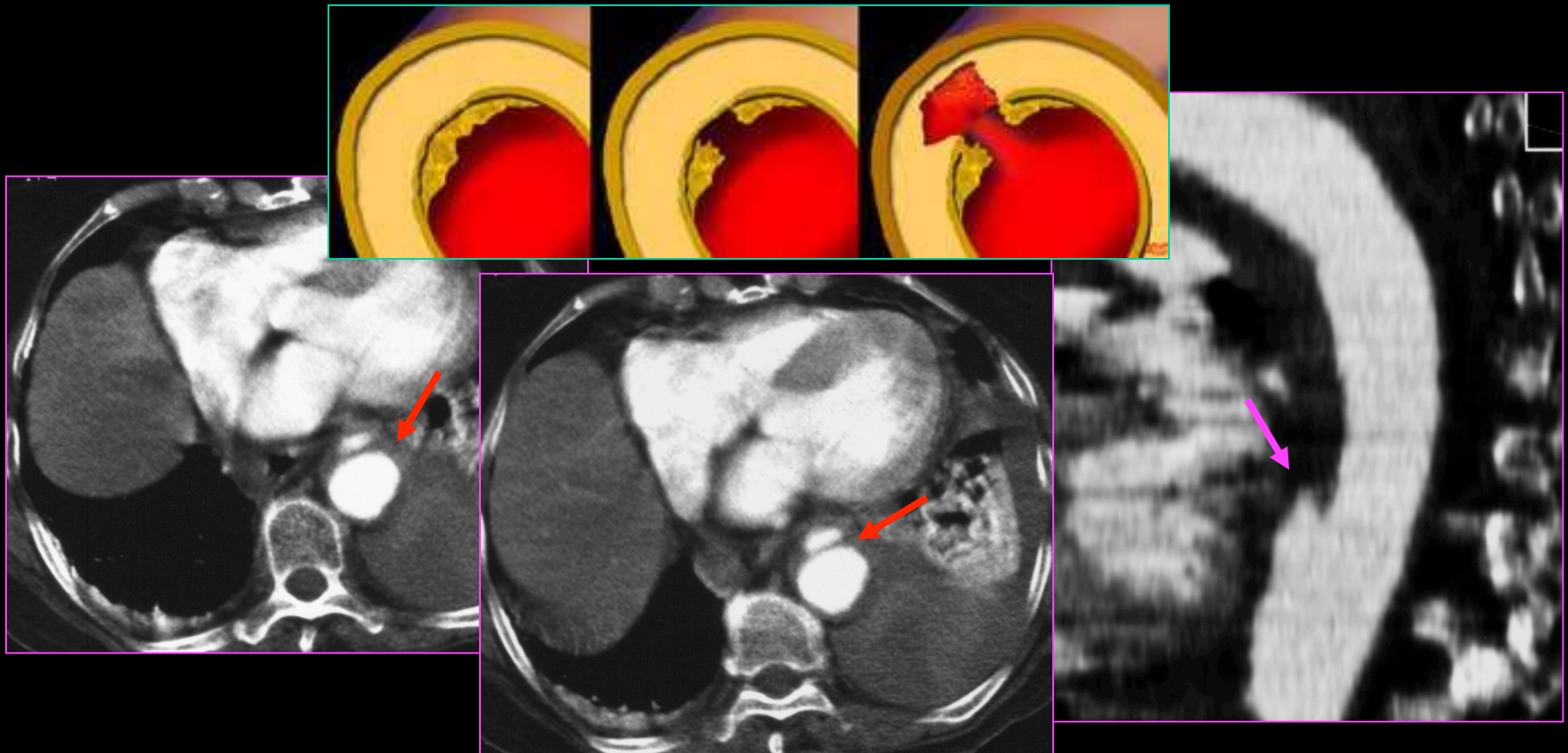


Thrombus de l'aorte ascendante



Ulcère athéromateux pénétrant

- ✓ ulcération localisée d'une plaque athéromateuse , en général de l'aorte thoracique
- ✓ aspect de flap intimal en coupes axiales
 - intérêt de reformations multiplanaires

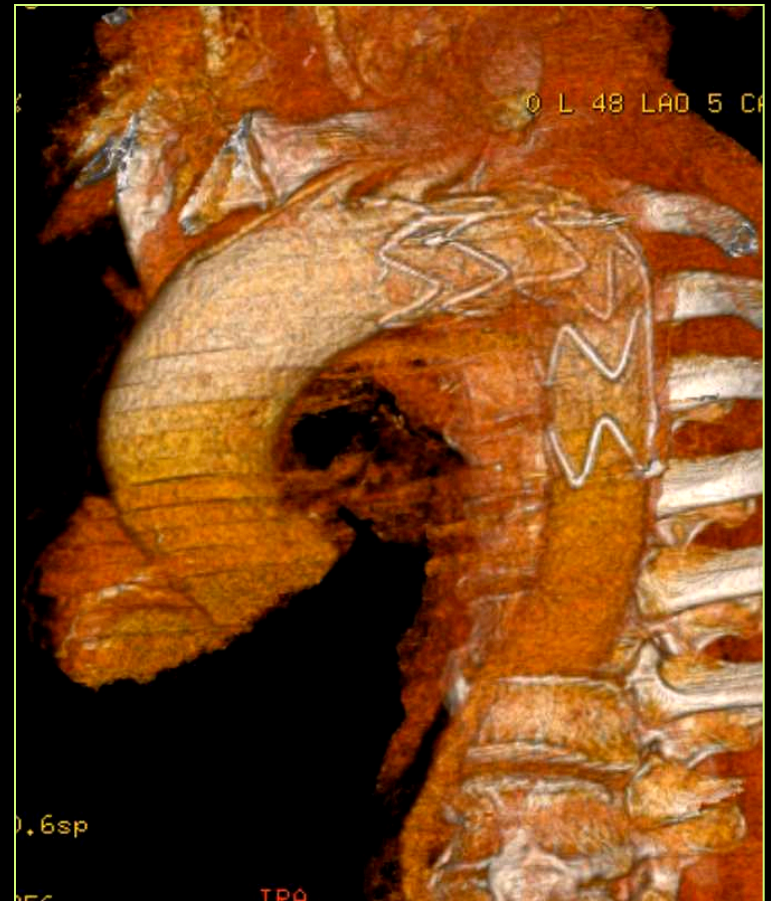


Pathologies / Aspect post-opératoire

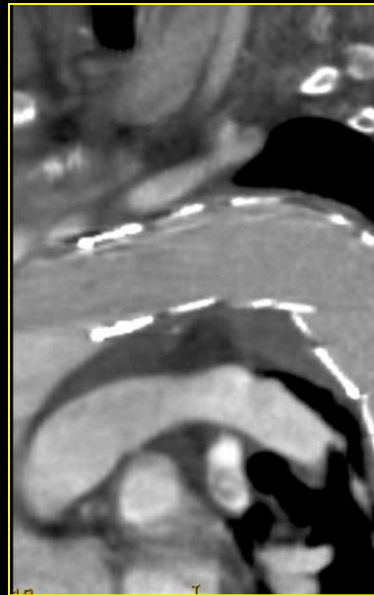
- ✓ place majoritaire dans le suivi évolutif / post thérapeutique
 - traitement chirurgicaux
 - traitement endo-luminaux

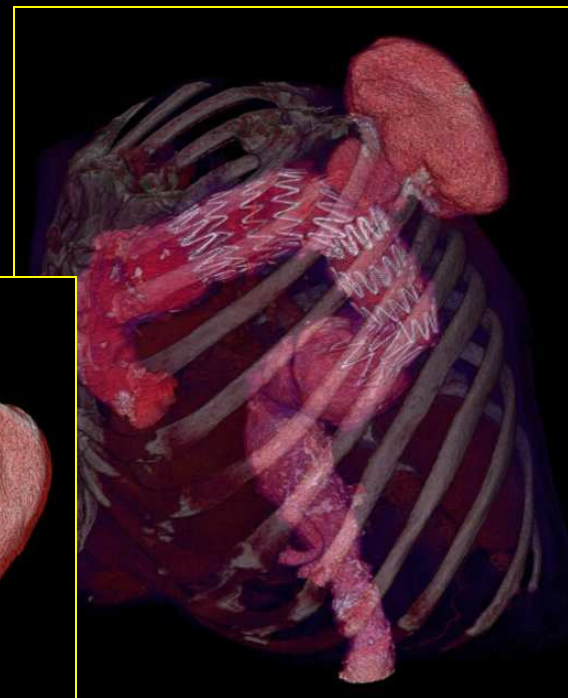
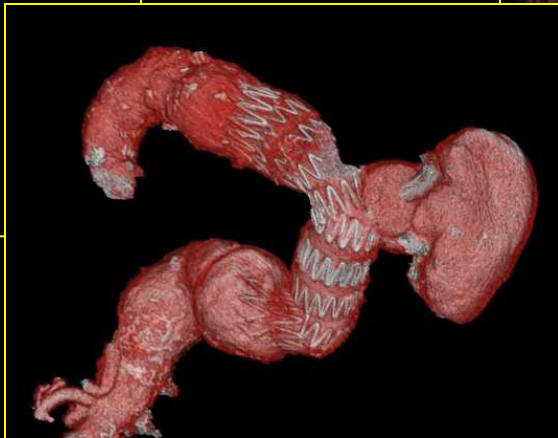
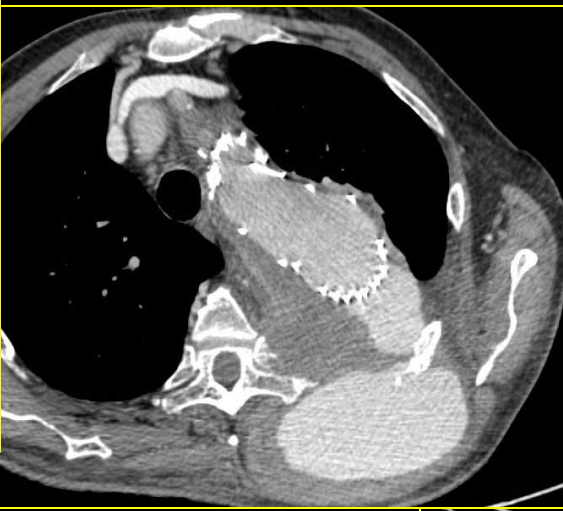
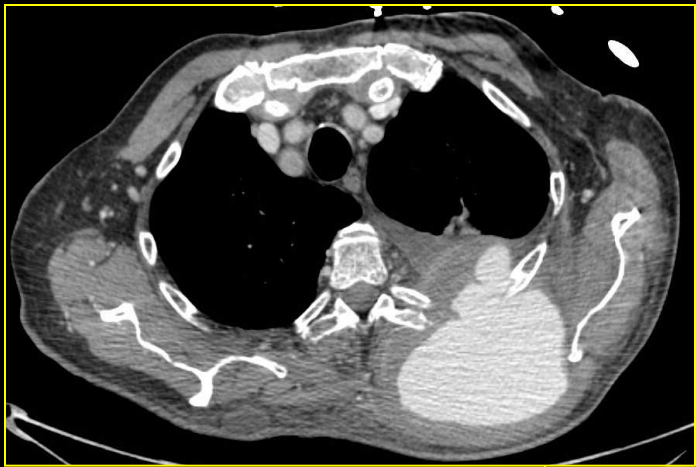
Endoprothèse sur rupture isthmique

La reformation volumique donne un meilleur aperçu de la prothèse métallique, et de sa position



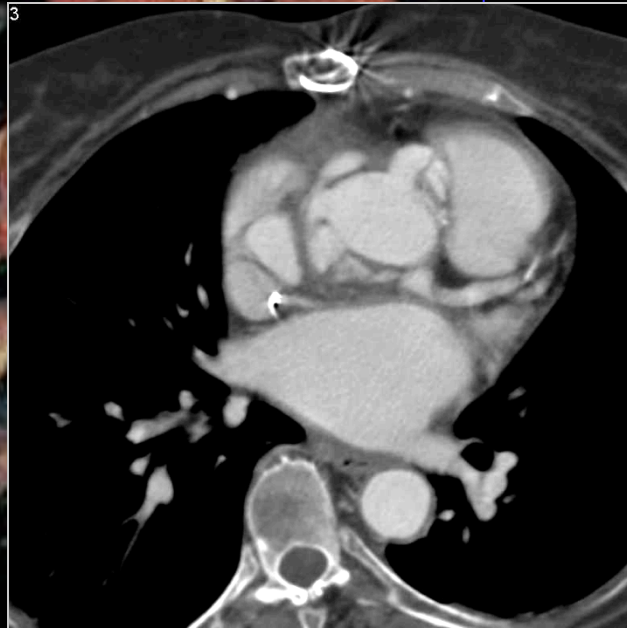
Contrôle après endoprothèse



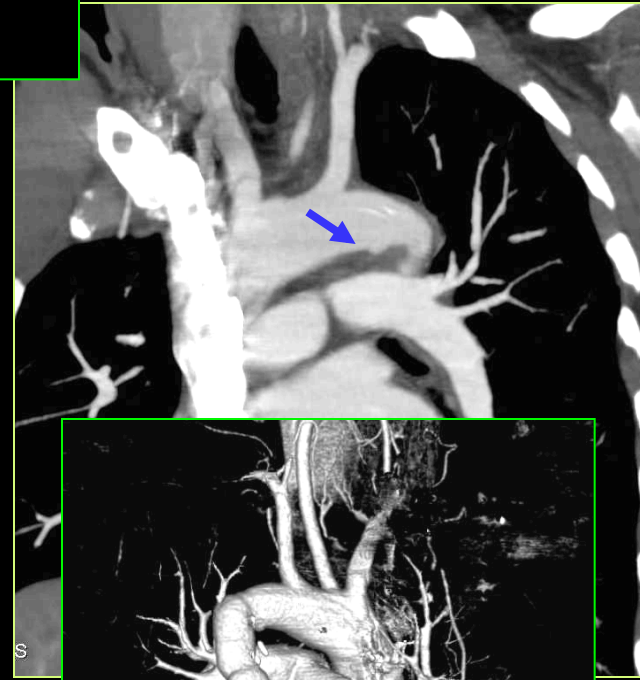
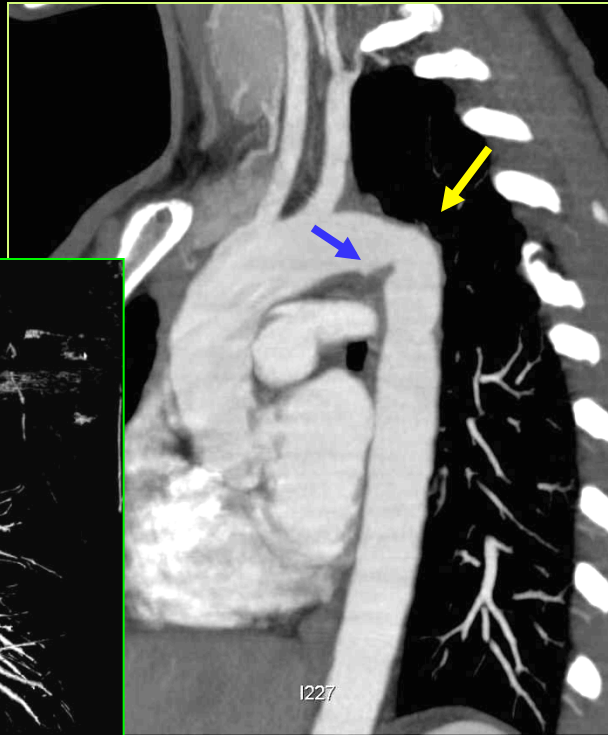


Faux anévrisme inter endoprothétique

Re-circulation exo-prothétique



Anévrisme anastomotique débutant et plicature de prothèse aortique sur rupture isthmique



- ✓ **Largeur des détecteurs (400 mm)**
- ✓ **acquisition thoracique en synchronisation ECG, en collimation de 0,625 mm en l'espace de 10 sec.**

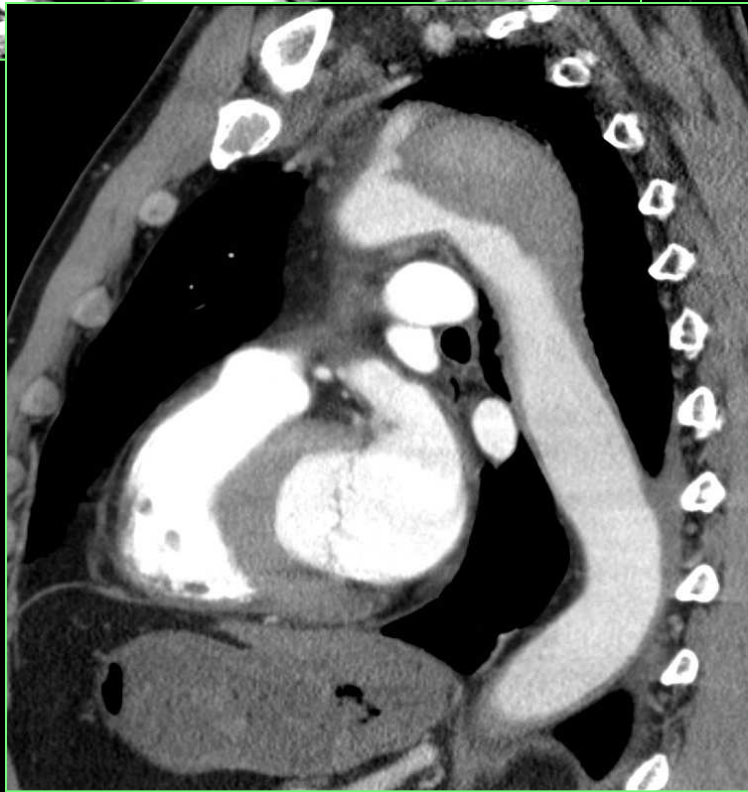
→ « *Triple Rule Out* »

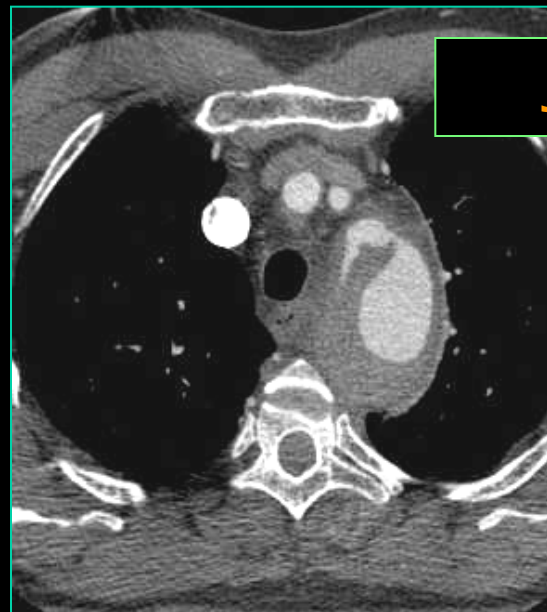
→ *examen diagnostique sur toutes les structures thoraciques :*

- *Plèvre*
- *Poumon*
- *Artères pulmonaires*
- *Aorte*
- *Artères coronaires*
- *Myocarde*

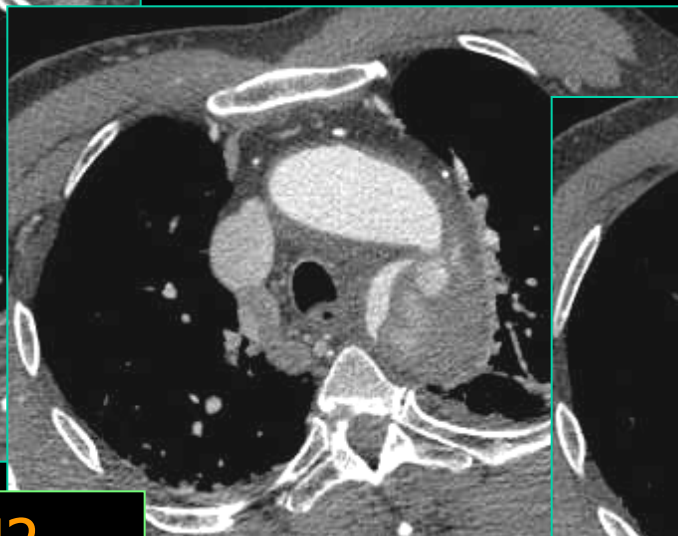
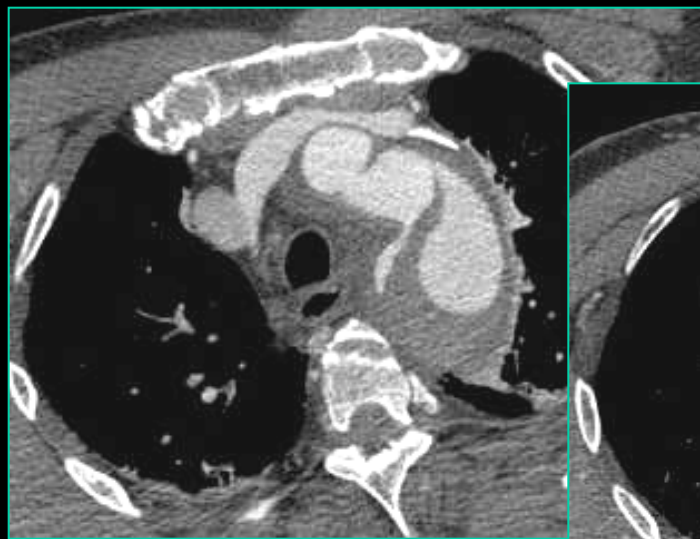


J0



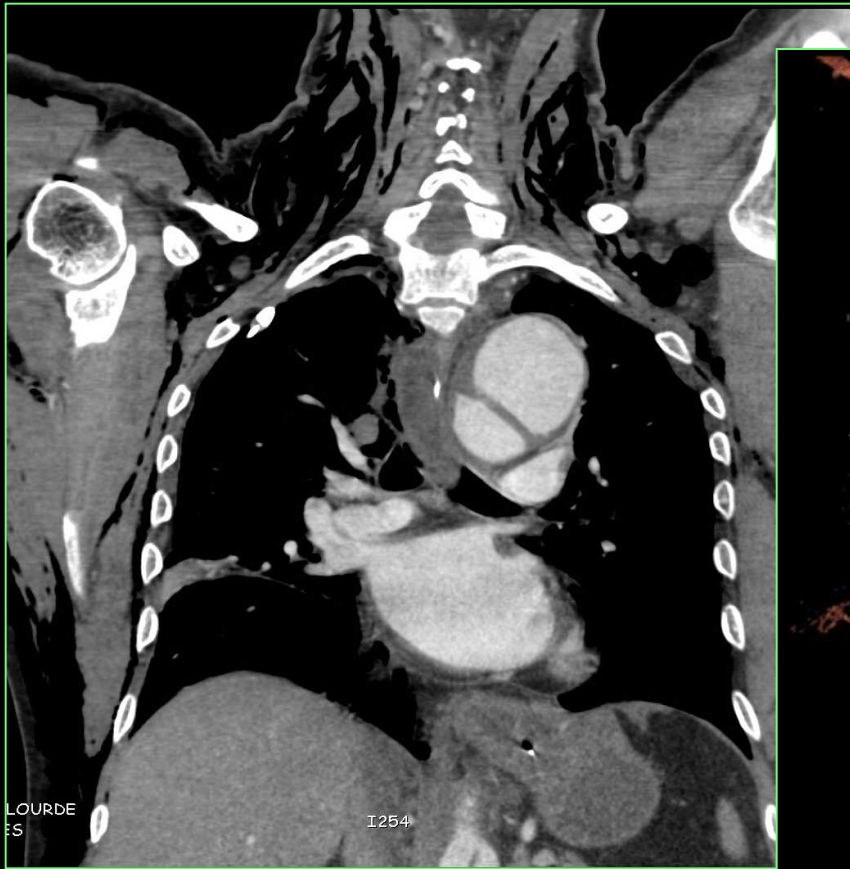


J1



J2





Post-opératoire



IRM dans la pathologie aortique

- Avantages:
 - Absence d'irradiation
 - Pas d'utilisation de PCI
 - Étude « dynamique »
- Inconvénients:
 - Durée de l'examen
 - Difficultés de surveillance
 - Résolution spatiale - bonne que CT

IRM sans Gd avec ECG

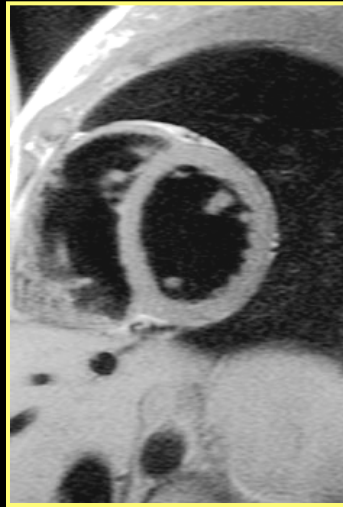
- Séquences « ciné »
 - FIESTA
 - 30 phases / cycle
- Séquences « statiques »
 - FSE sang noir
- Séquences de flux
 - contraste de phase
 - Mesures de vitesse et de débit

IRM avec Gd

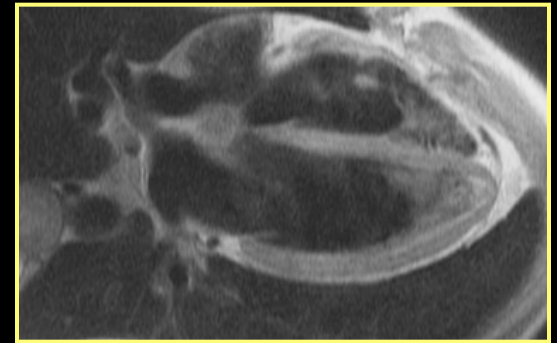
- Séquences angiographiques avec injection
 - Épaisseur de coupe (2,4/-1,2)
 - Déclenchement automatique (aorte descendante) ou « à la vue »
- Séquences de perfusion



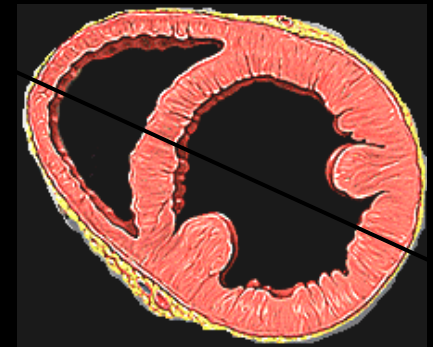
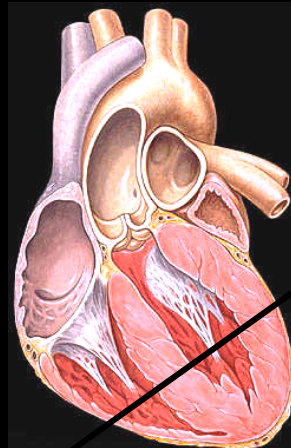
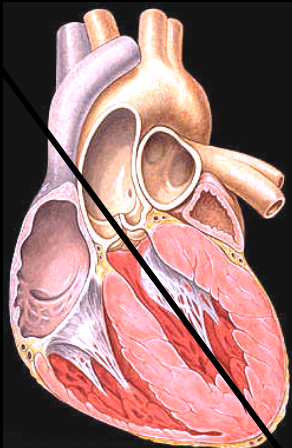
Grand axe vertical



Petit axe



Grand axe horizontal
(4 cavités)

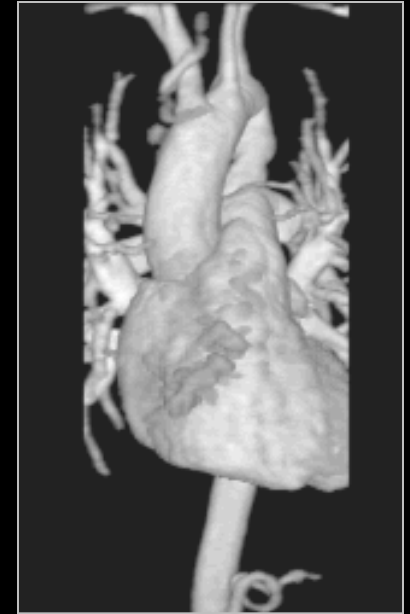


Fiesta



Coarctation aortique

3D Gad-DTPA



Contraste de phase

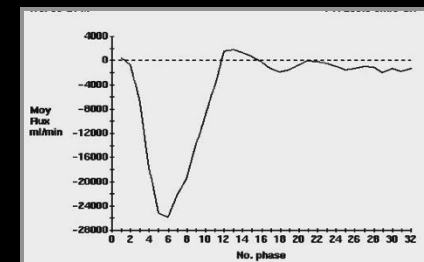
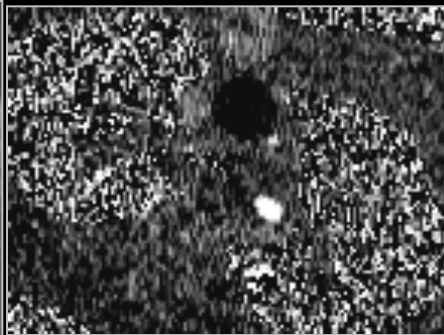
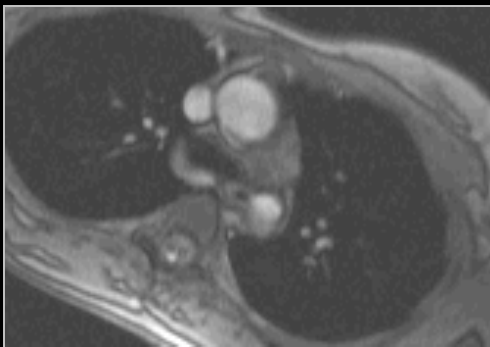
Surface (cm^2)

X

Velocité (cm/s)

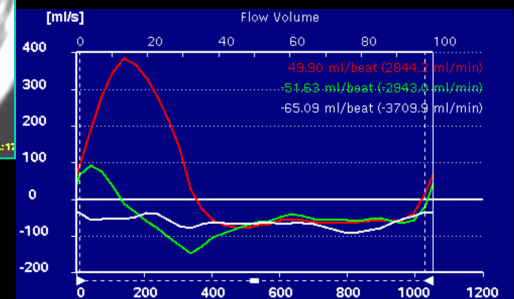
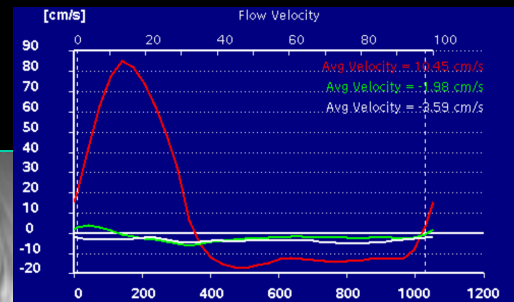
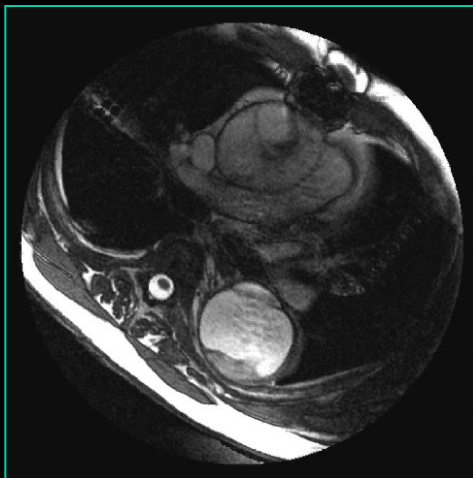
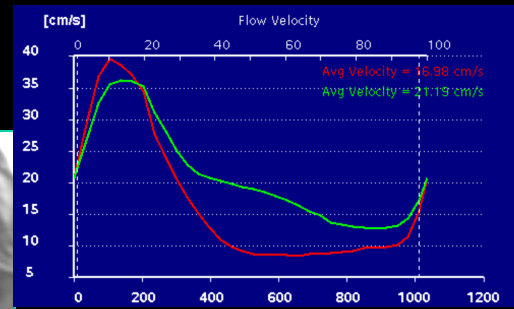
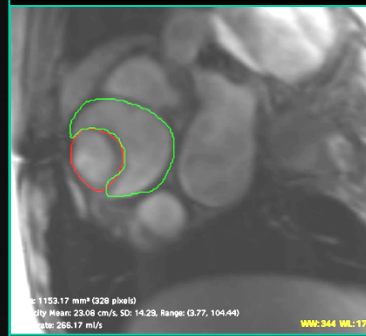
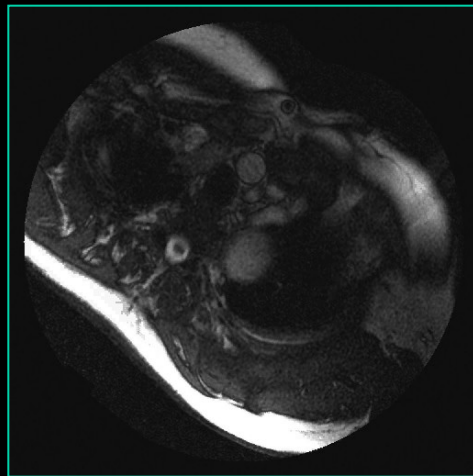
=

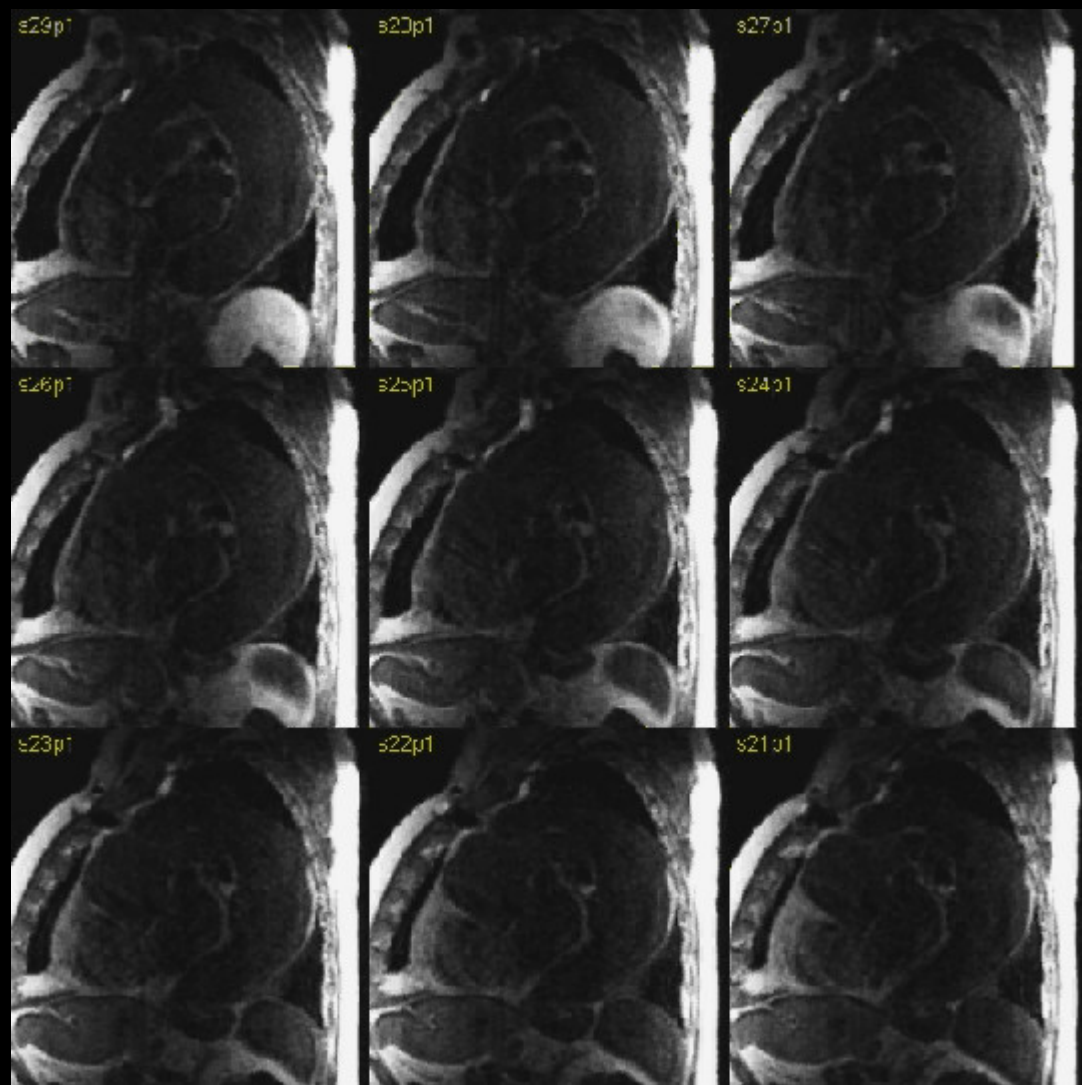
Flux (cm^3/s)



Surface min. : 1 cm^2

Vélocité max. : 3 m/s





En résumé

**Δ SCA = avis
cardiologique**

	CT	IRM
DAo	+++	+
EP : angio	+++	+
EP : perfusion	+	+++
Coronaires	++	+
Fonction VD - VG	+++	+++
Poumons - Plèvre	+++	+
Viabilité myocardique	+	+++