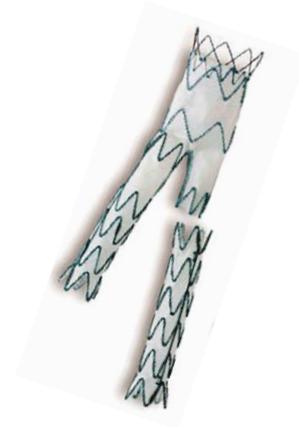
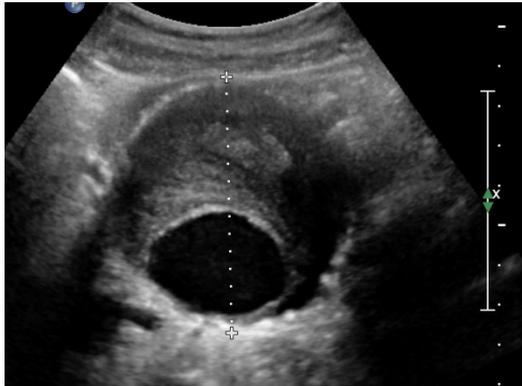


# Surveillance par écho-doppler des traitements chirurgicaux et endovasculaires des anévrismes de l'aorte abdominale



# SUIVI POST-OPÉRATOIRE

## Chirurgie conventionnelle

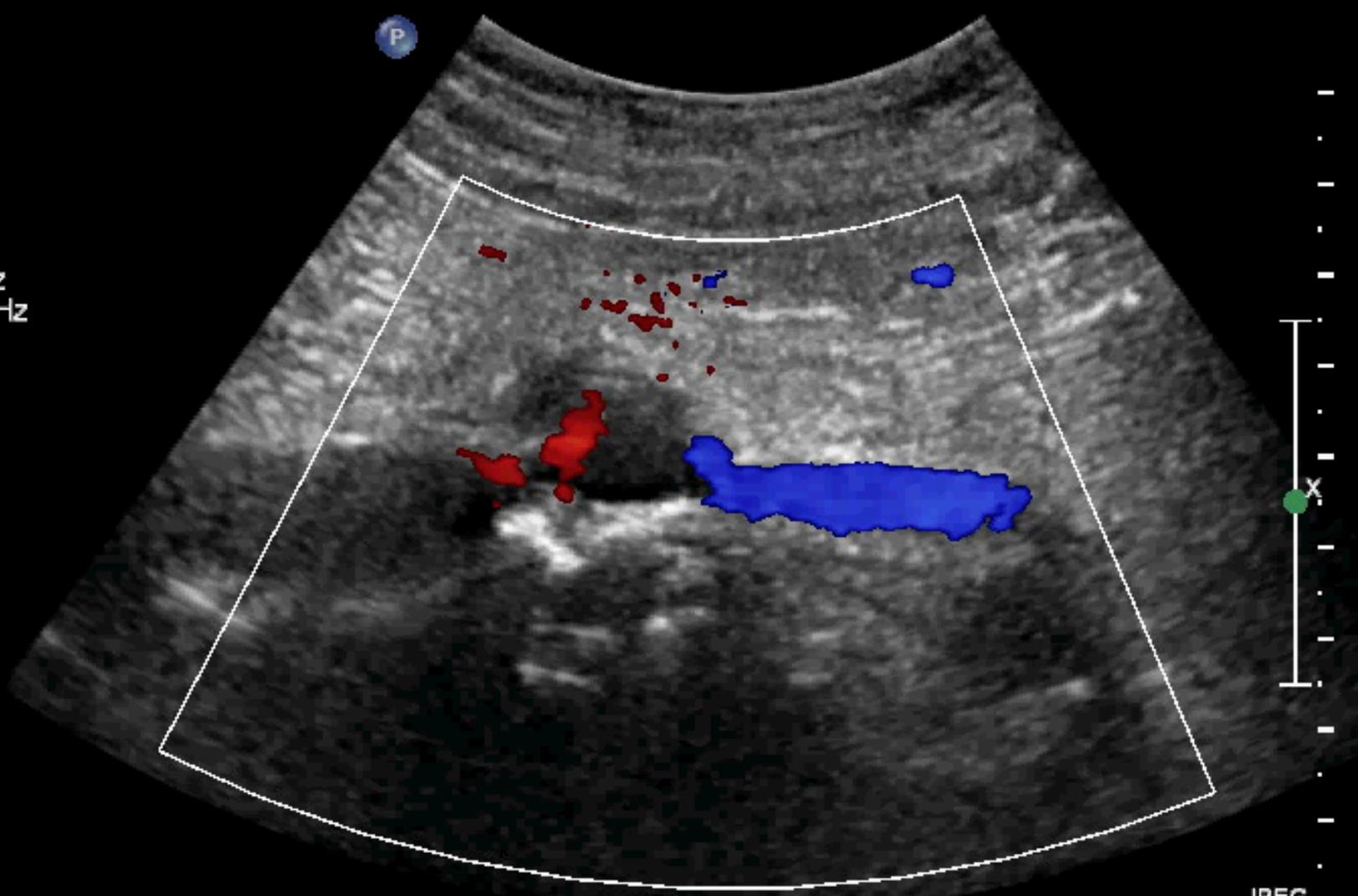
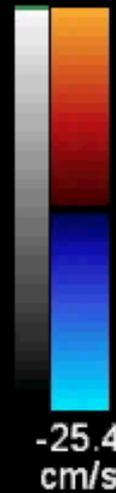
- Faux anévrismes anastomotiques
- Infection de prothèse
- Sténose ou occlusion de branche
- Autres localisations anévrismales

CI 11Hz  
RP

2D  
34%  
C 55  
P Moy  
HGén

Coul  
53%  
1982Hz  
FP 108Hz  
Moy

C3 C4  
+25.4



JPEG  
9.0

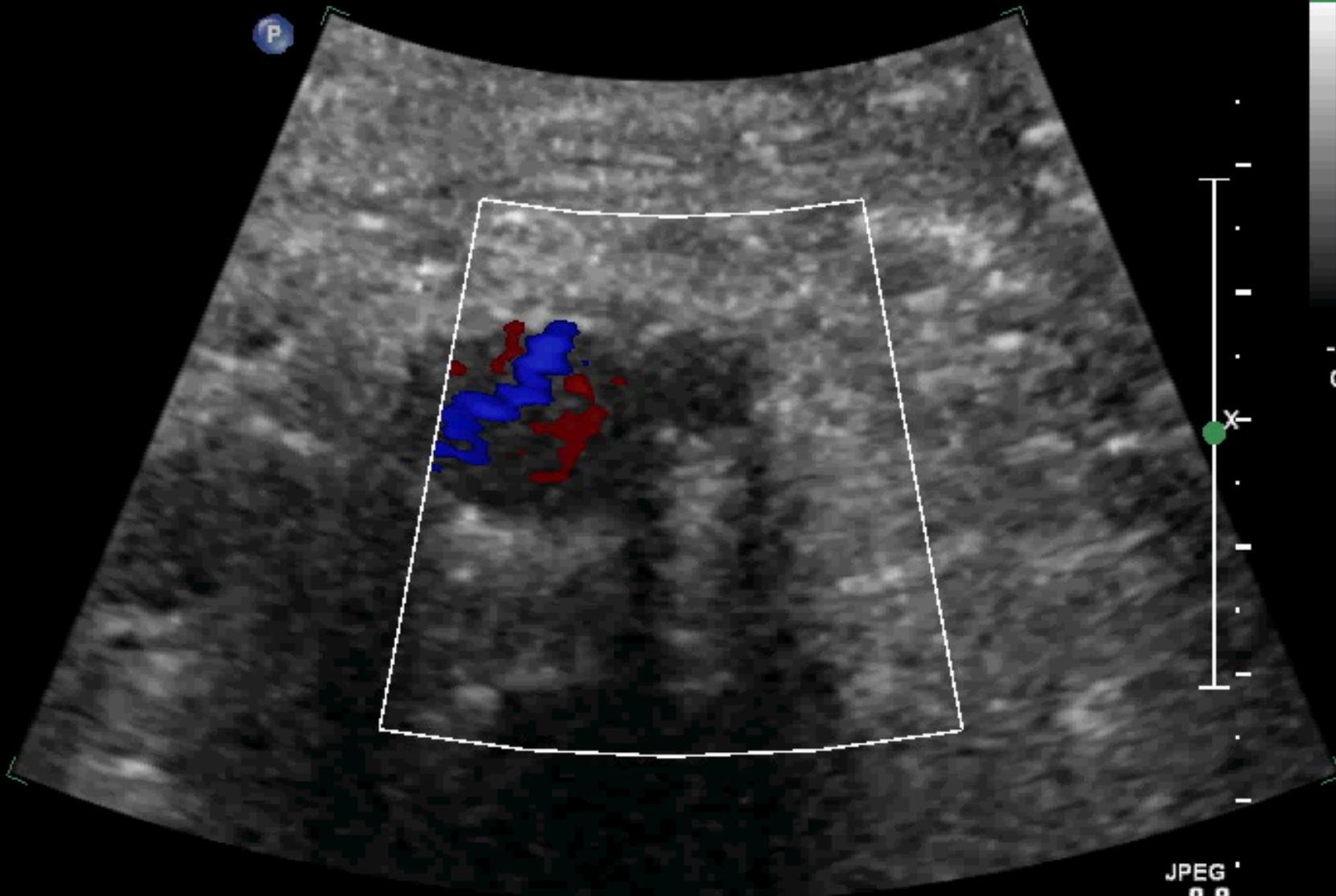
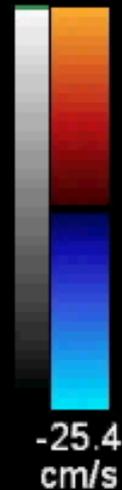
\*\*\* bpm

CI 20Hz  
RP

2D  
36%  
C 55  
P Moy  
HGén

Coul  
53%  
1982Hz  
FP 108Hz  
Moy

C3 C4  
+25.4



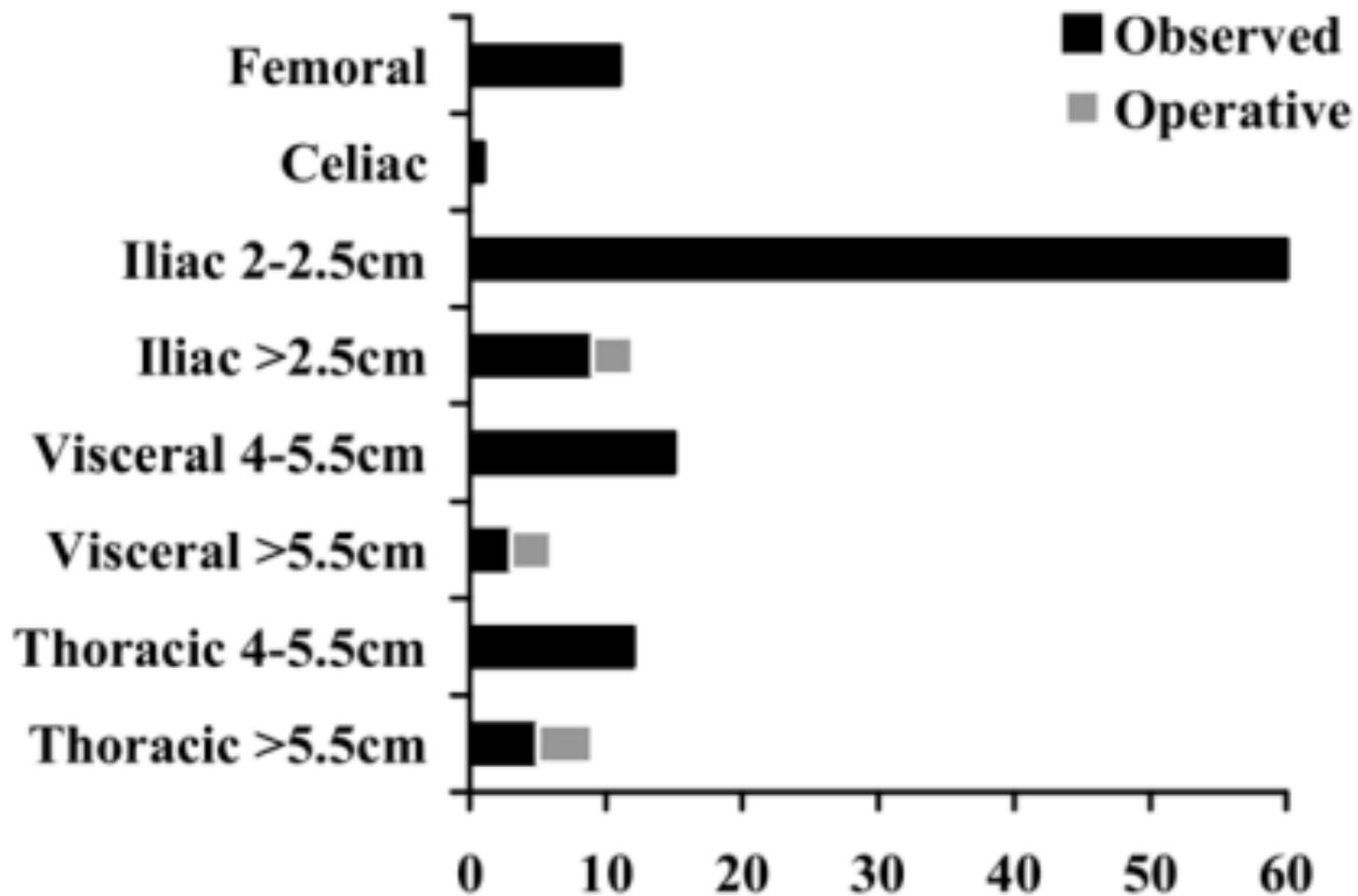
JPEG  
8.8

\*\*\* bpm

# SUIVI POST-OPÉRATOIRE

## Chirurgie conventionnelle

- 157 patients suivis en moyenne 87 mois
- 7 faux anévrysmes anastomotiques 4% (4 opérés)
- 4 occlusions de branche 2,5%
- 2 infections de prothèse 1,3%
- **Autres anévrysmes : 68 patients (43%)**



# SUIVI POST-OPÉRATOIRE

## Chirurgie conventionnelle

We suggest noncontrast-enhanced CT imaging of the entire aorta at 5-year intervals after open repair or EVAR.

Level of recommendation 2 (Weak)

Quality of evidence C (Low)

### ○ **Recommandé :**

- Scanner non injecté à 5 ans

### ○ **En pratique :**

- Echo-doppler annuel

Journal of Vascular Surgery  
January 2018

The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm

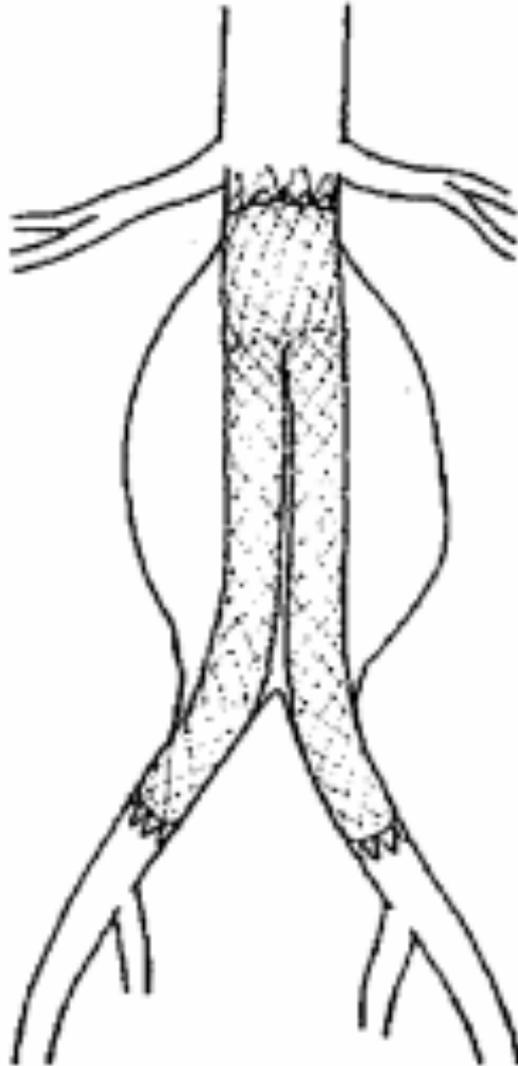


Elliot L. Chaikof, MD, PhD,<sup>a</sup> Ronald L. Dalman, MD,<sup>b</sup> Mark K. Eskandari, MD,<sup>c</sup> Benjamin M. Jackson, MD,<sup>d</sup> W. Anthony Lee, MD,<sup>e</sup> M. Ashraf Mansour, MD,<sup>f</sup> Tara M. Mastracci, MD,<sup>g</sup> Matthew Mell, MD,<sup>b</sup> M. Hassan Murad, MD, MPH,<sup>h</sup> Louis L. Nguyen, MD, MBA, MPH,<sup>i</sup> Gustavo S. Oderich, MD,<sup>j</sup> Madhukar S. Patel, MD, MBA, ScM,<sup>a,k</sup> Marc L. Schermerhorn, MD, MPH,<sup>g</sup> and Benjamin W. Starnes, MD,<sup>l</sup>  
*Boston, Mass; Palo Alto, Calif; Chicago, Ill; Philadelphia, Pa; Boca Raton, Fla; Grand Rapids, Mich; London, United Kingdom; Rochester, Minn; and Seattle, Wash*

# SUIVI POST OPÉRATOIRE

## Endoprothèses aortiques abdominales

- Croissance du sac anévrismal résiduel
- Endofuites
- Evolution anévrismale des collets
- Sténose ou thrombose



**ENDOPROTHESE AORTOBILIAQUE**

# COMPLICATIONS

- 10-20% d'endofuites → II
- 5-10% de sténose ou occlusion
- 2% de migration
- 2% de conversion
- 2% de rupture

# TRAITEMENT ENDOVASCULAIRE

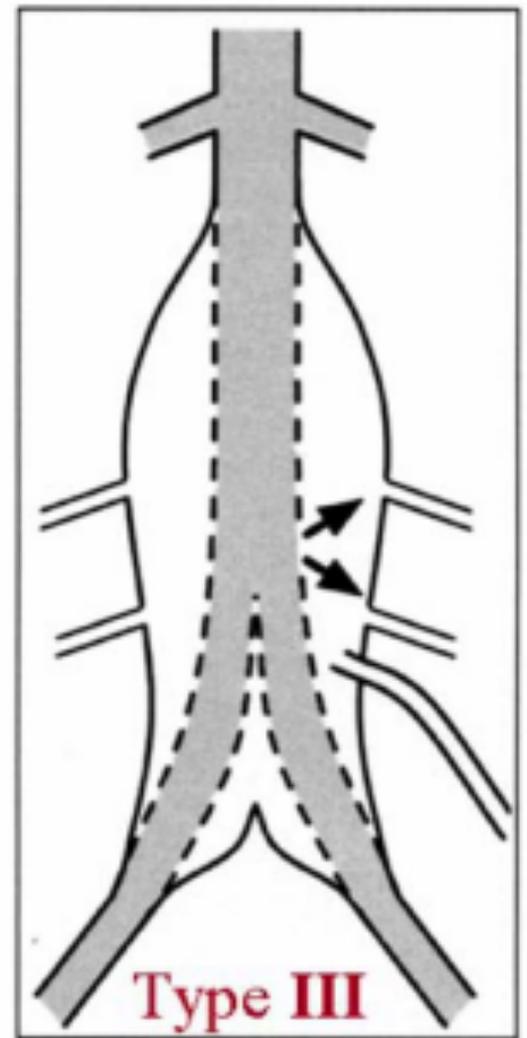
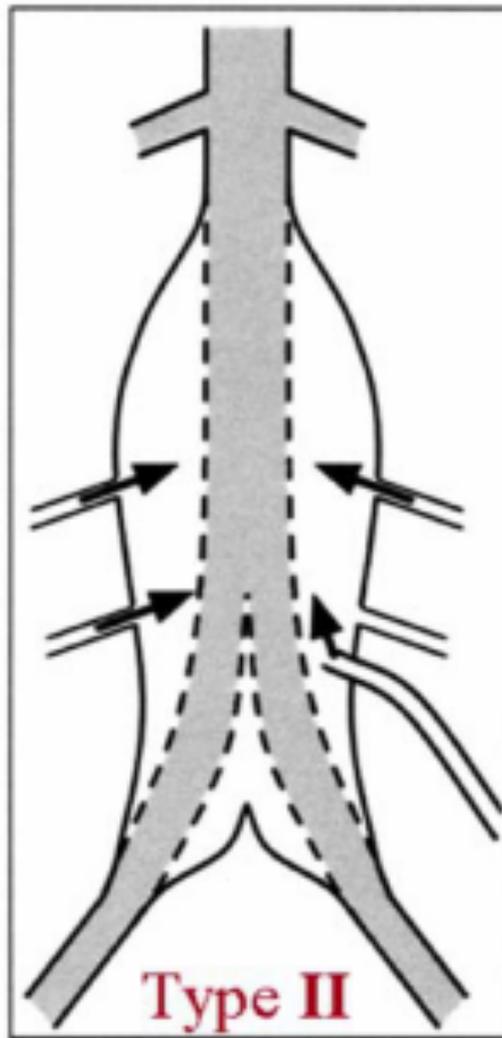
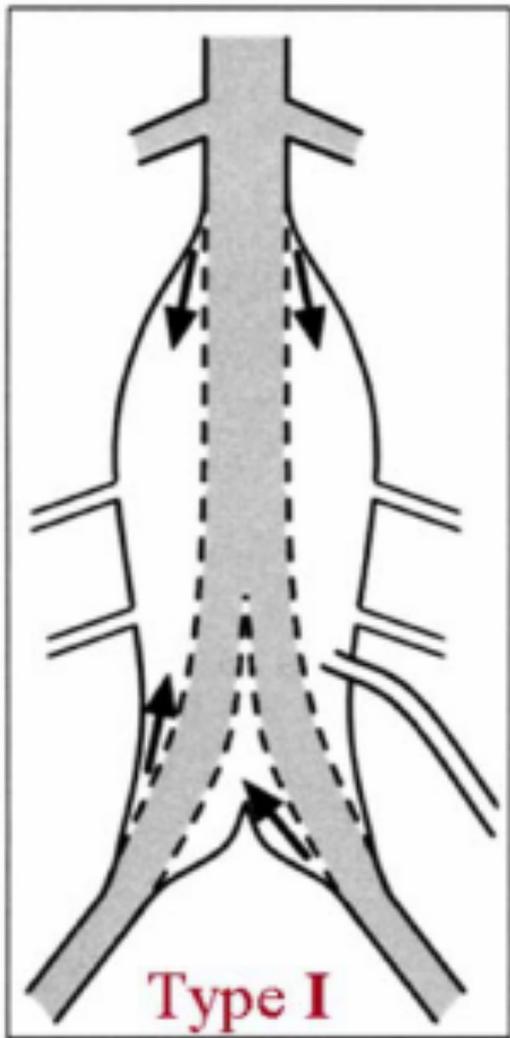
COMPLET

=

PROCEDURE

+

SURVEILLANCE



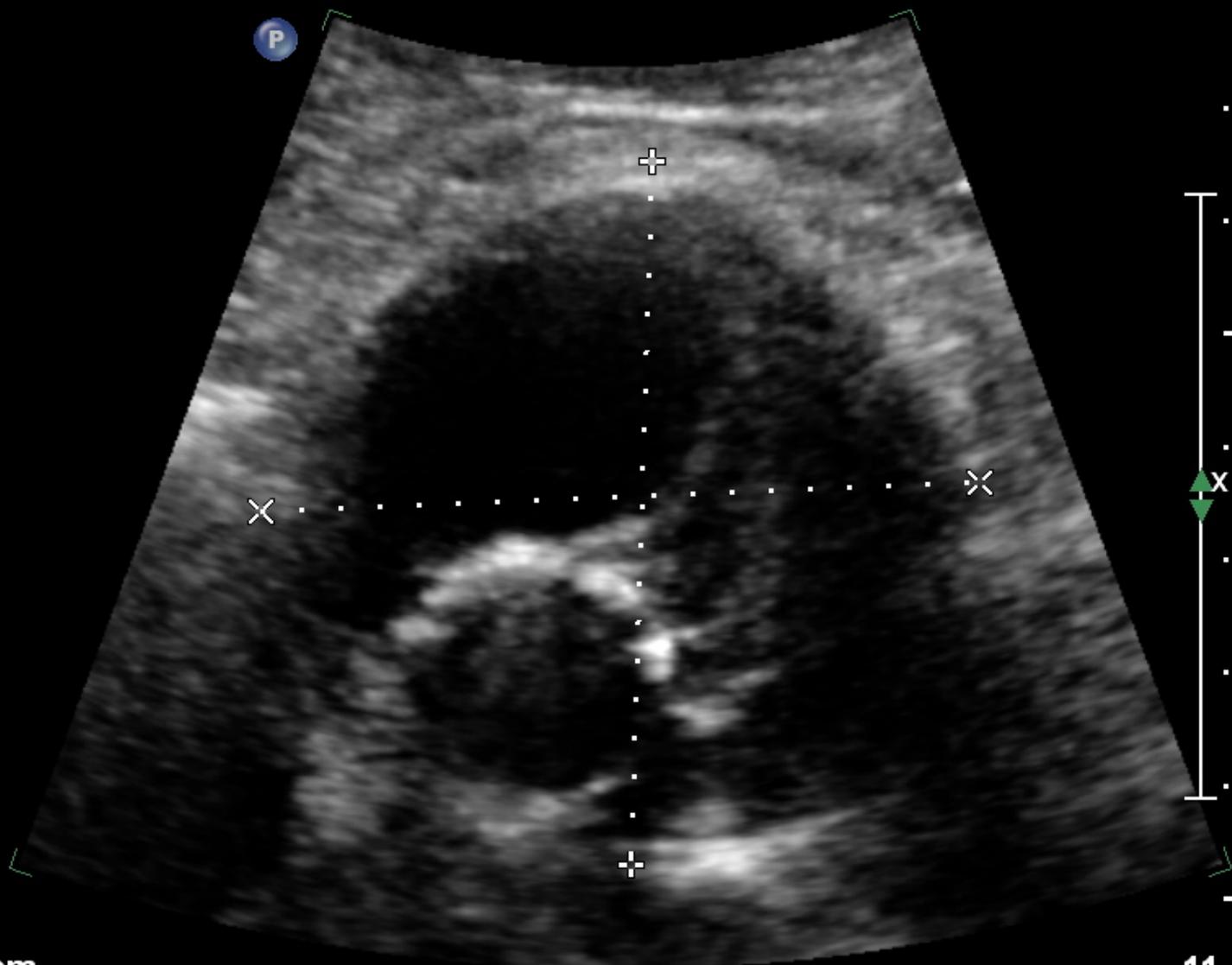
# ETAPE I : SAC ANÉVRISMAL

- Mesure du diamètre maximal du sac  
→ ÉLÉMENT CAPITAL DU SUIVI
- Pulsatilité
- Thrombus

CI 54Hz  
RV

2D  
36%  
C 48  
P Bas  
HGén

C2



+ Dist 6.24 cm

x Dist 6.28 cm

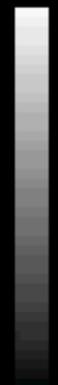
26221220121210

C5-2/ARFS

AGC C2

CI 30Hz  
10cm

2D  
42%  
C 55  
P Moy  
HRés



- 0

- 5



X

JPEG - 10  
\*\*\* bpm



CI 38Hz  
10cm

AGC

C2

2D  
47%  
C 55  
P Moy  
HRés

A0

P

- 0

X- 5



JPEG - 10  
\*\*\* bpm

CI 28Hz

RV

Z 1.4

2D

40%

C 55

P Bas

HGen

C3



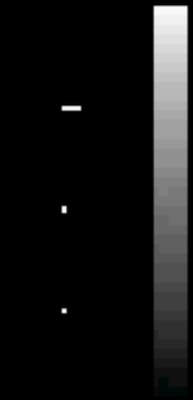
JPEG

\*\*\* bpm

CI 41Hz  
RV

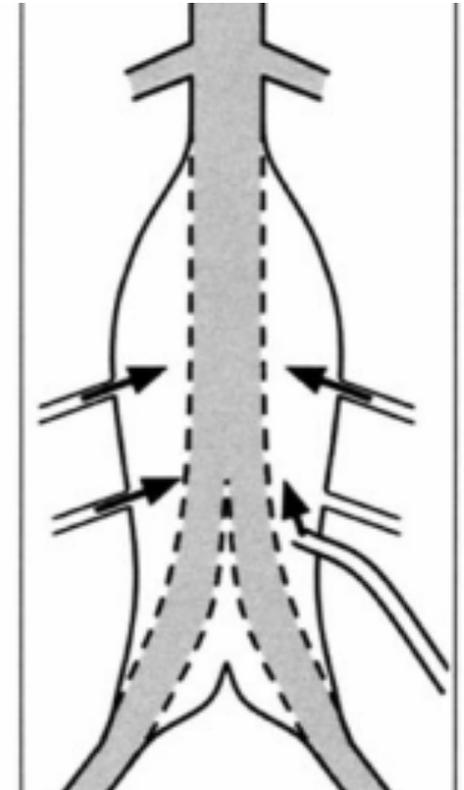
C2

2D  
33%  
C 48  
P Bas  
HGén



# ETAPE 2 : ENDOFUITES

- Type : directe (I, III) ou indirecte (II)
- Porte d'entrée et de sortie
- Vitesse maximale
- Spectre
- Mode B, couleur, puissance, pulsé
- +/- Contraste (Sonovue®/ Bracco)

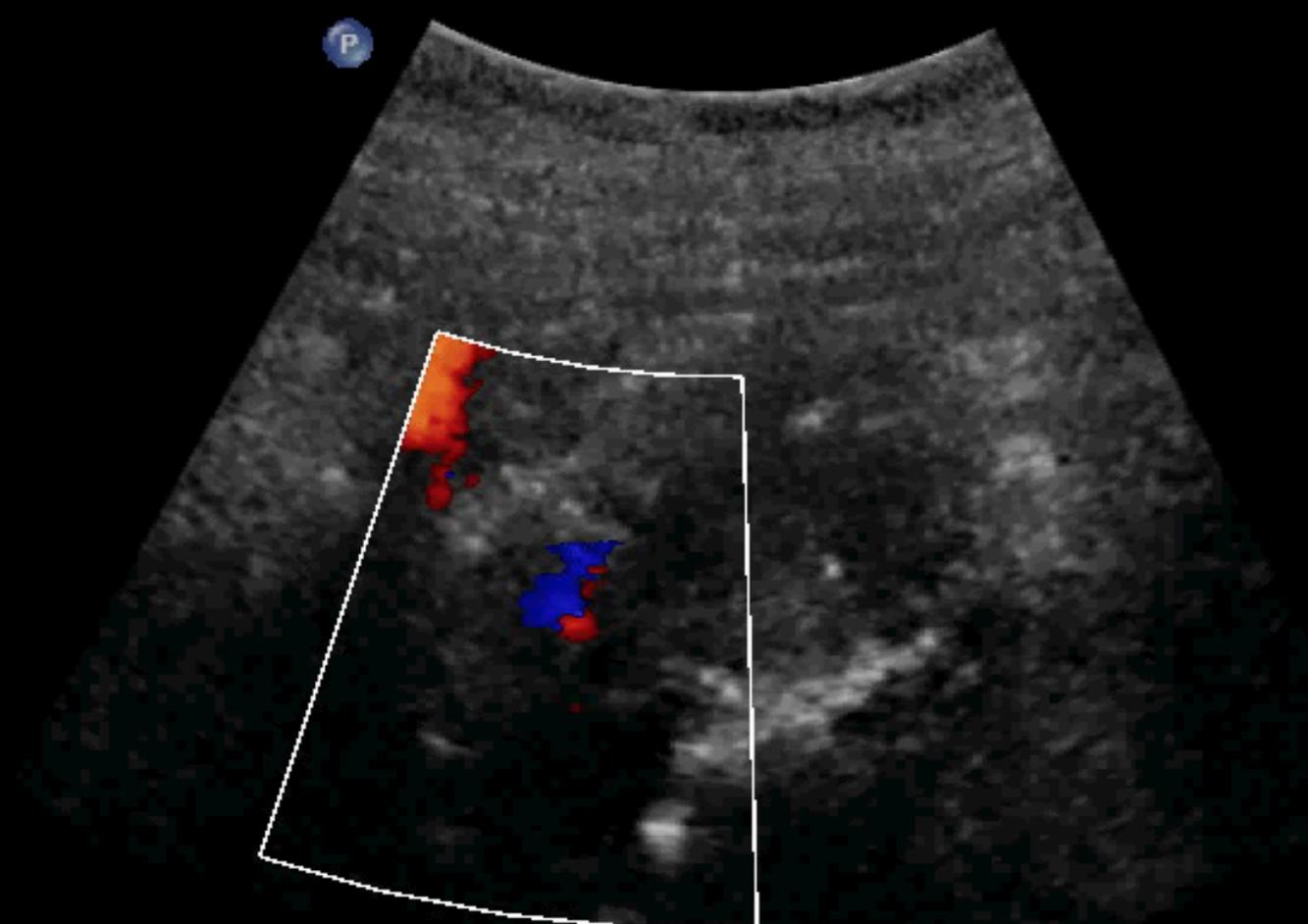
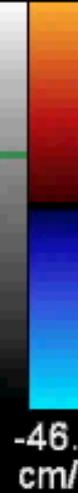


CI 23Hz  
RP

2D  
29%  
C 55  
P Moy  
HGén

Coul  
57%  
3600Hz  
FP 198Hz  
Moy

C2 C4  
+46.



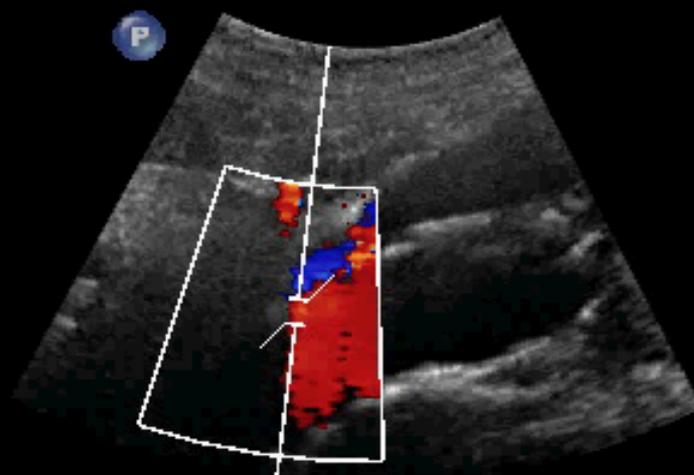
29461620121031

C5-1/OPTIMAL Aorta

CI 23Hz 38°  
RP

2D  
29%  
C 55  
P Moy  
HGén

Coul  
57%  
3600Hz  
FP 198Hz  
Moy



DP  
64%  
FP 150Hz  
VE4.0mm  
E3  
2.3MHz  
4.3cm

C2 C4  
+46.2



-  
-100  
-  
-cm/s  
-  
-100  
-  
-200

JPEG

6.6s

\*\*\* bpm

CI 14Hz  
D1

2D  
83%  
C 40  
P Moy  
GénC

C2



JPEG  
9.0

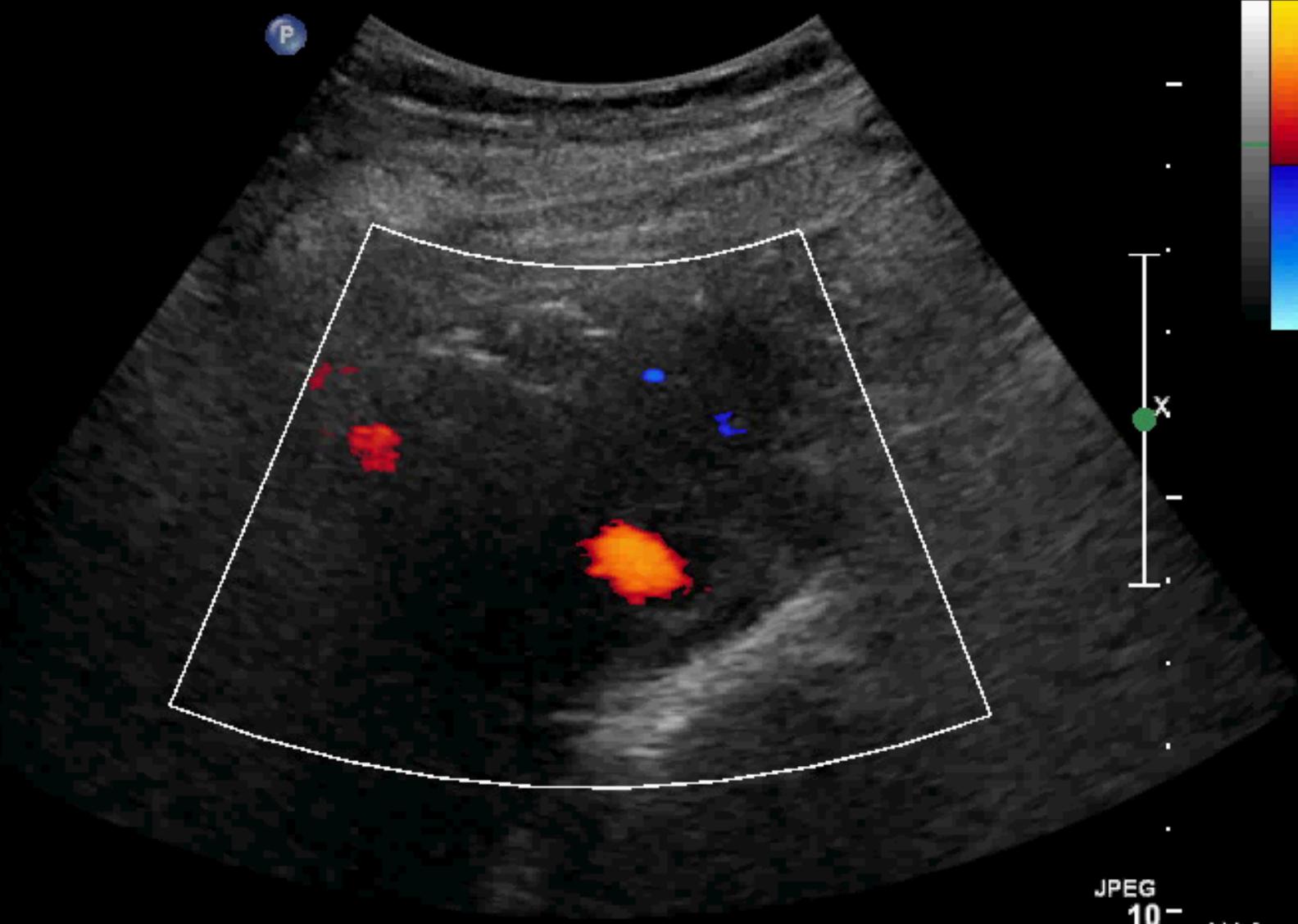
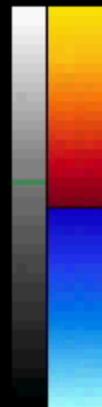
\*\*\* bpm

CI 10Hz  
RP

C2 C6

**2D**  
28%  
C 55  
P Moy  
Gén

**CPA**  
58%  
1000Hz  
FP 60Hz  
Moy



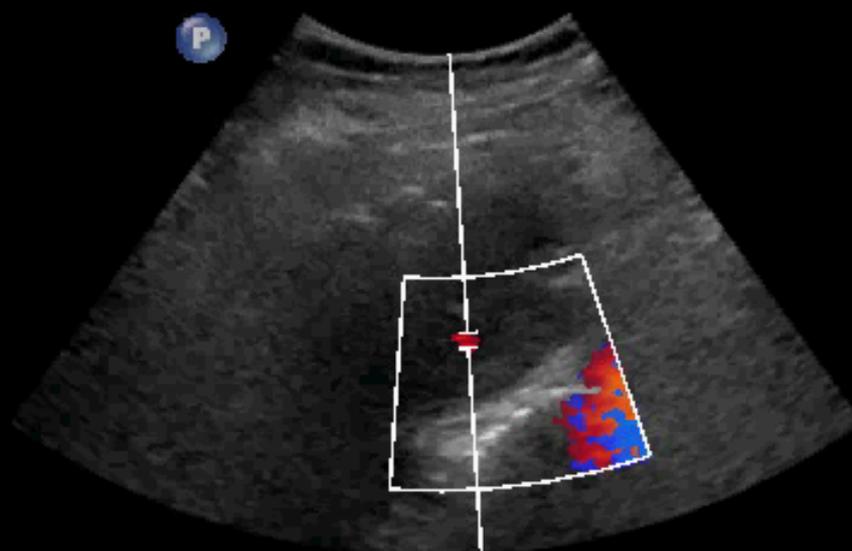
C2 C6

CI 6Hz  
RP

2D  
48%  
C 55  
P Moy  
Gén

CPA  
64%  
1000Hz  
FP 60Hz  
Moy

DP  
40%  
FP 50Hz  
VE3.0mm  
E3  
2.3MHz  
5.8cm



-60  
-40  
-20  
-cm/s  
-20  
-40  
-60  
bpm

JPEG

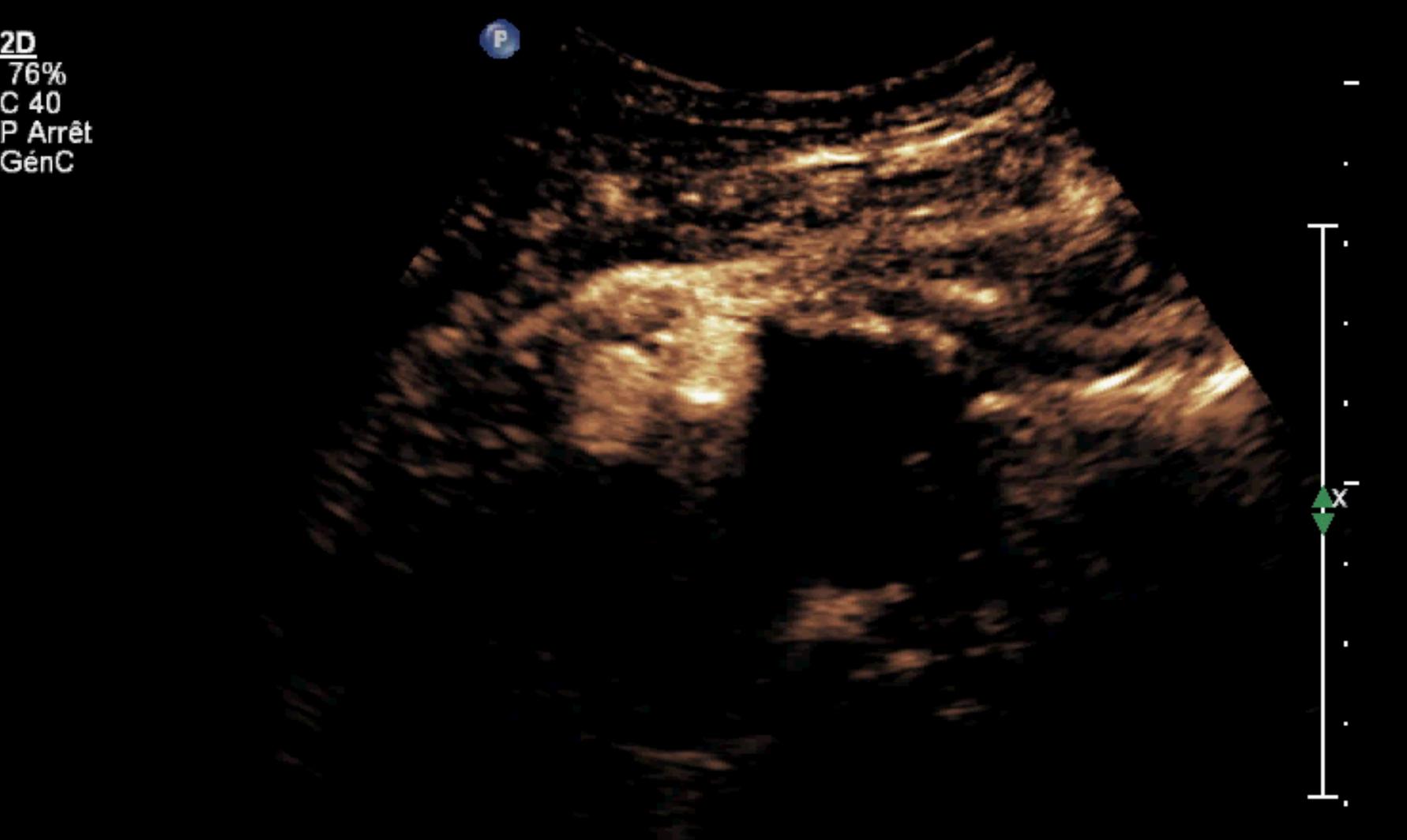
6.6s



CI 20Hz  
D1

2D  
76%  
C 40  
P Arrêt  
GénC

C2

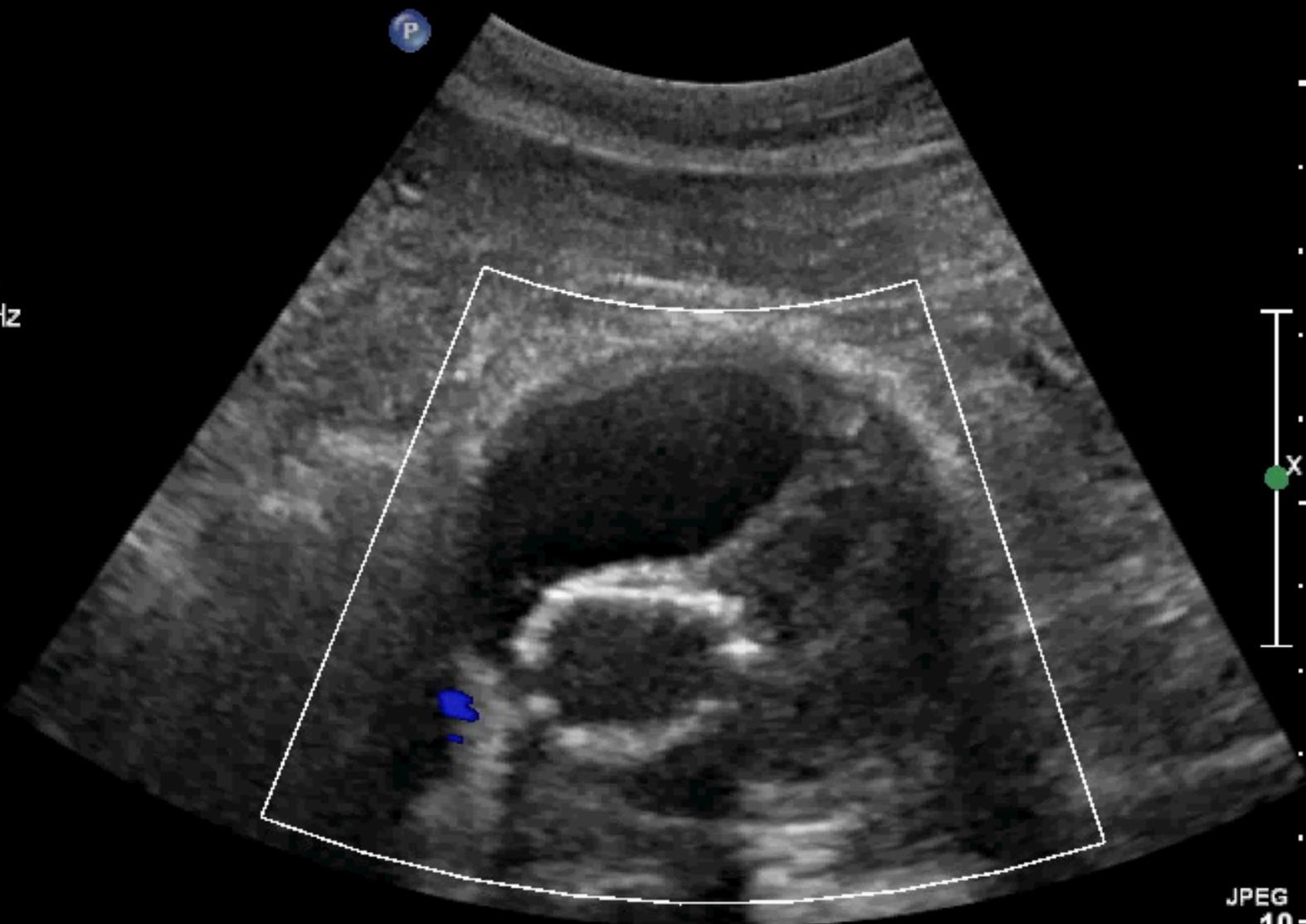
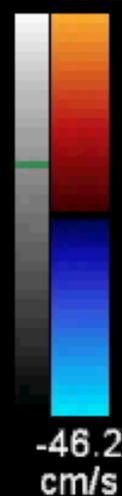


CI 8Hz  
RP

2D  
34%  
C 55  
P Moy  
HGén

Coul  
53%  
3600Hz  
FP 198Hz  
Moy

C2 C4  
+46.2



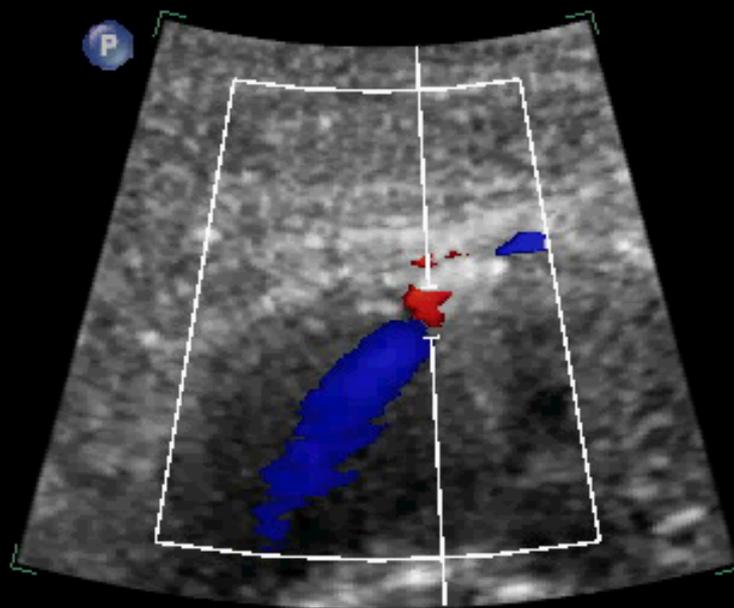
57111220101108

C5-1/OPTIMAL Aorta

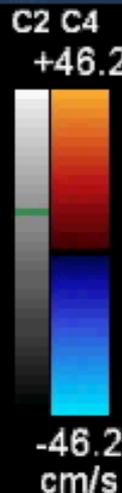
CI 29Hz  
RP

2D  
34%  
C 55  
P Moy  
HGén

Coul  
53%  
3600Hz  
FP 198Hz  
Moy



DP  
52%  
FP 130Hz  
VE4.0mm  
E3  
2.3MHz  
3.9cm



-80  
-cm/s  
-80  
-160  
\*\*\* bpm

JPEG

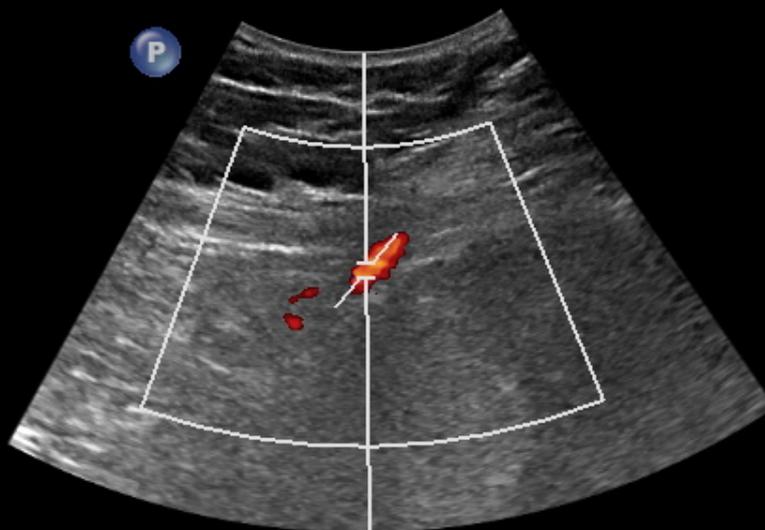
6.6s

CI 12Hz 40°  
RP

2D  
35%  
C 55  
P Moy  
Gén

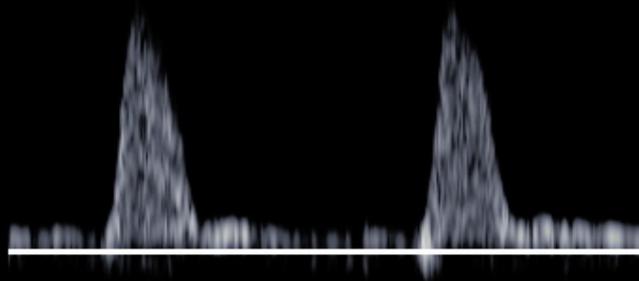
Coul  
55%  
1816Hz  
FP 99Hz  
Moy

AMI



DP  
40%  
FP 50Hz  
VE3.0mm  
E3  
2.3MHz  
4.1cm

C2 C4  
+25.4

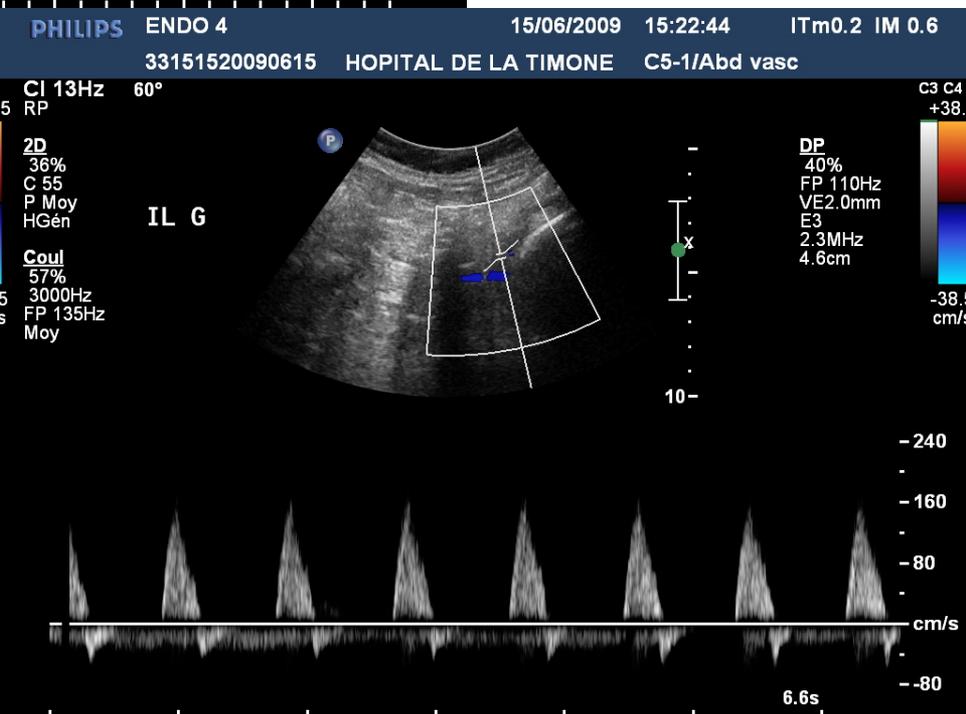
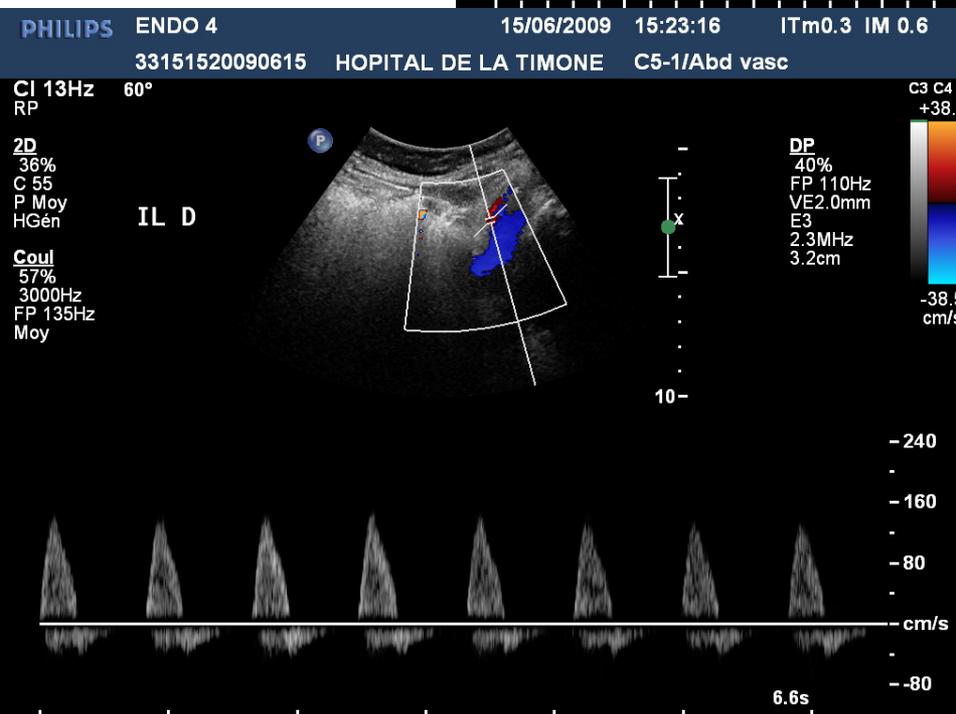
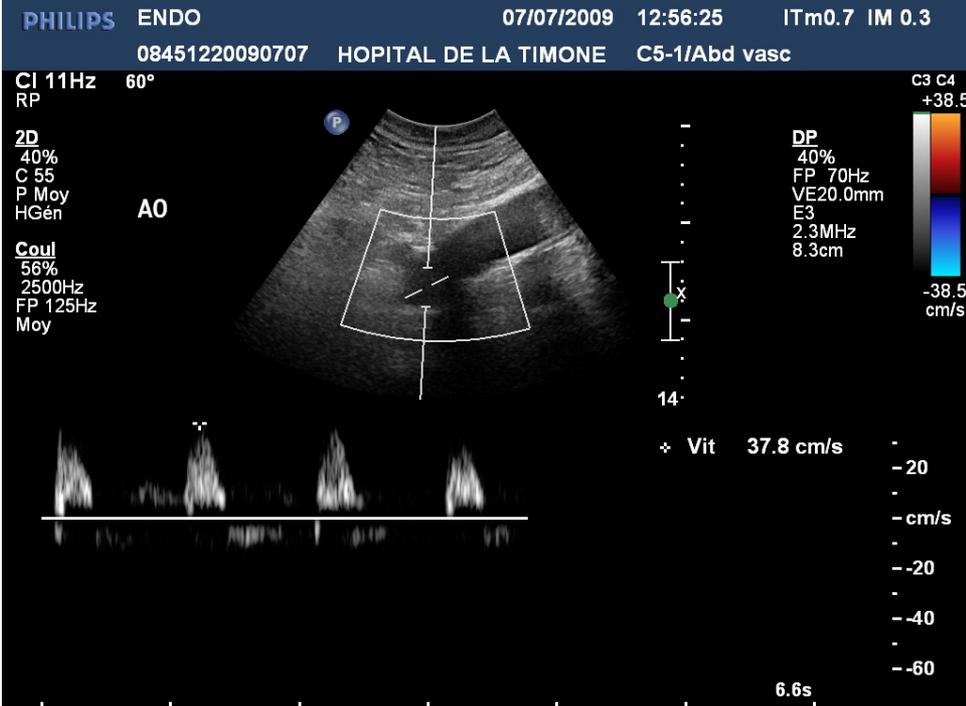


-80  
-40  
-cm/s  
-40

6.6s

# ETAPE 3 : ENDOPROTHÈSE

- Diamètre des collets
- Perméabilité : sténose, thrombose
  - IPS

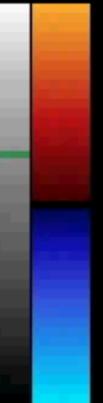


CI 19Hz  
RP

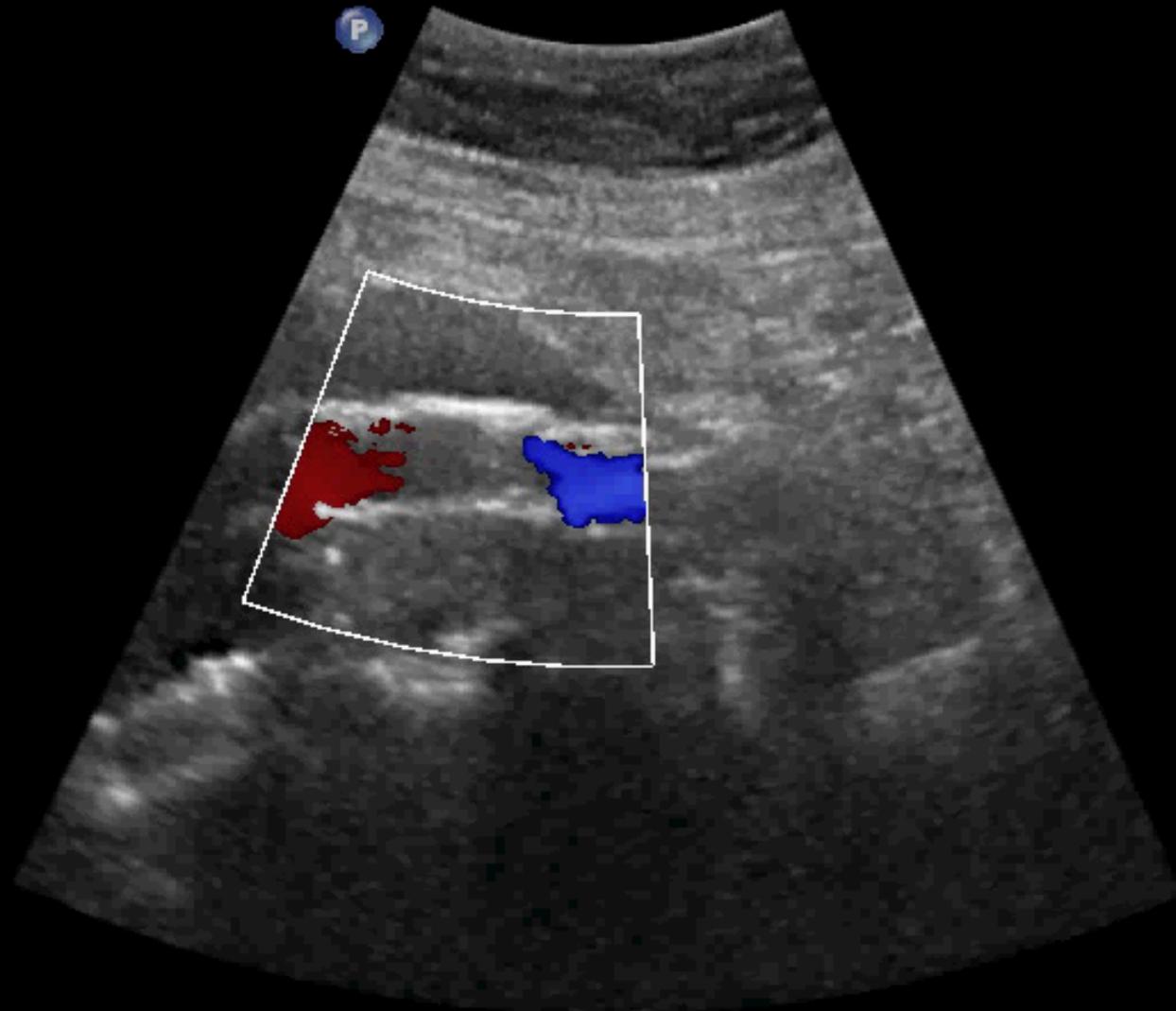
2D  
41%  
C 55  
P Moy  
HGén

Coul  
57%  
3300Hz  
FP 181Hz  
Moy

C2 C4  
+46.2



-46.2  
cm/s



JPEG  
11

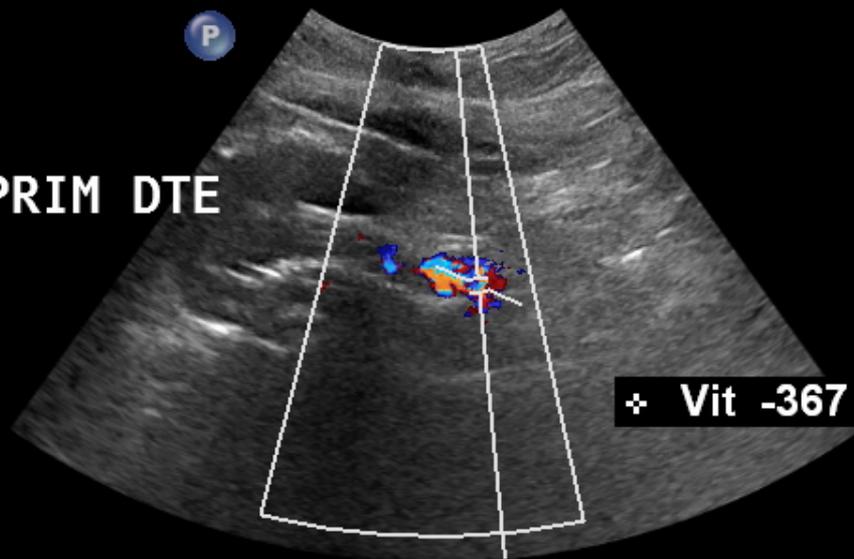
\*\*\* bpm

CI 10Hz 60°  
RP

2D  
39%  
C 55  
P Moy  
Gén

Coul  
52%  
1440Hz  
FP 93Hz  
Moy

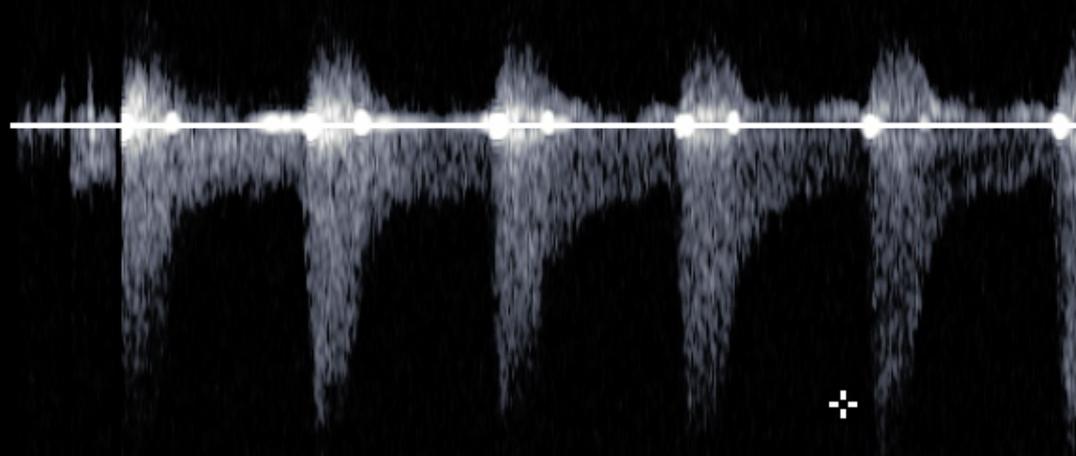
ILI PRIM DTE



✦ Vit -367 cm/s

DP  
64%  
FP 80Hz  
VE3.0mm  
E3  
2.3MHz  
5.1cm

C2 C4  
+18.5



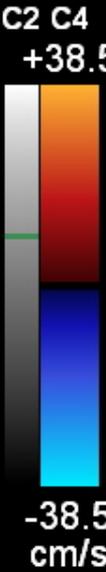
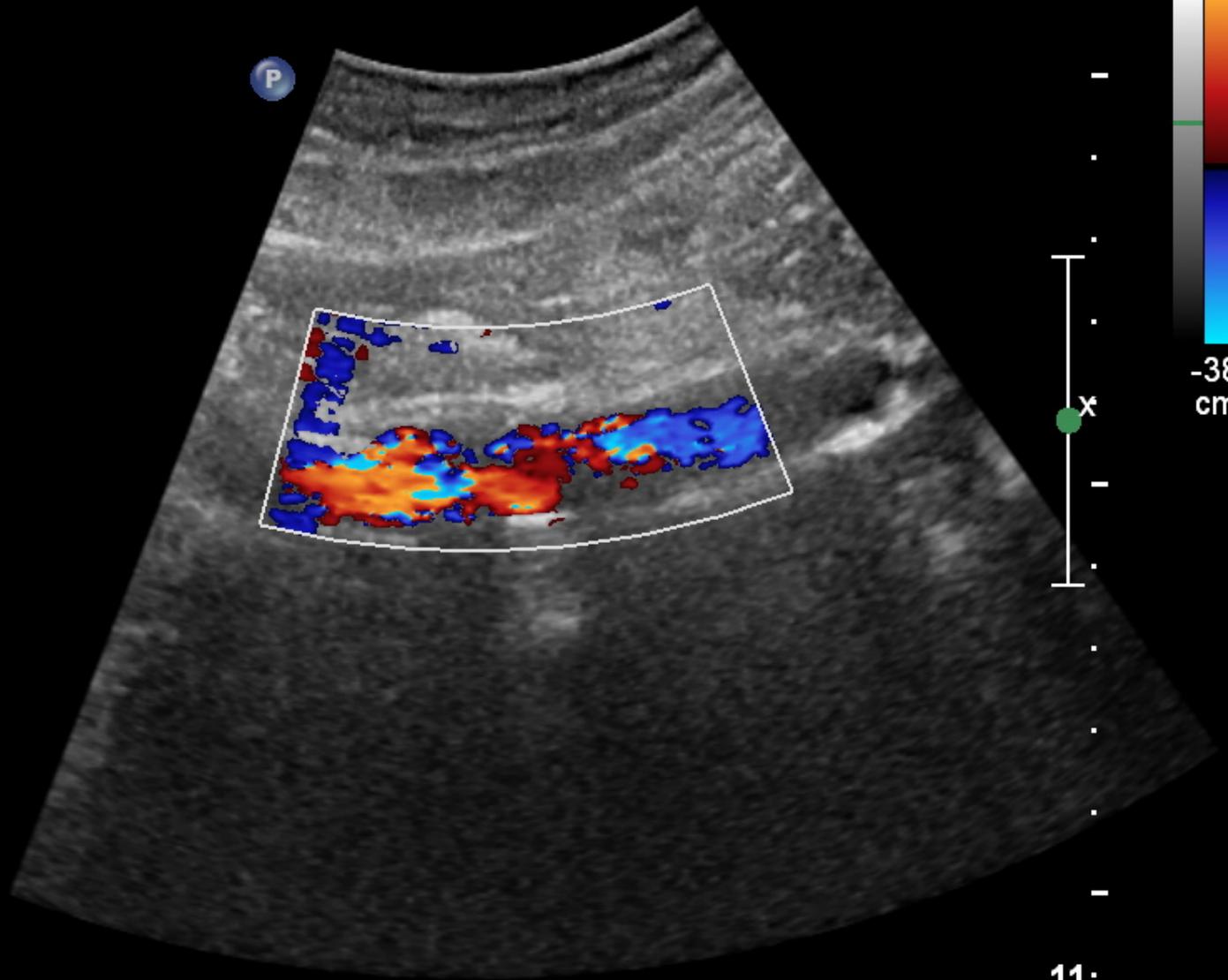
-1.0  
-m/s  
-1.0  
-2.0  
-3.0  
-4.0  
-5.0

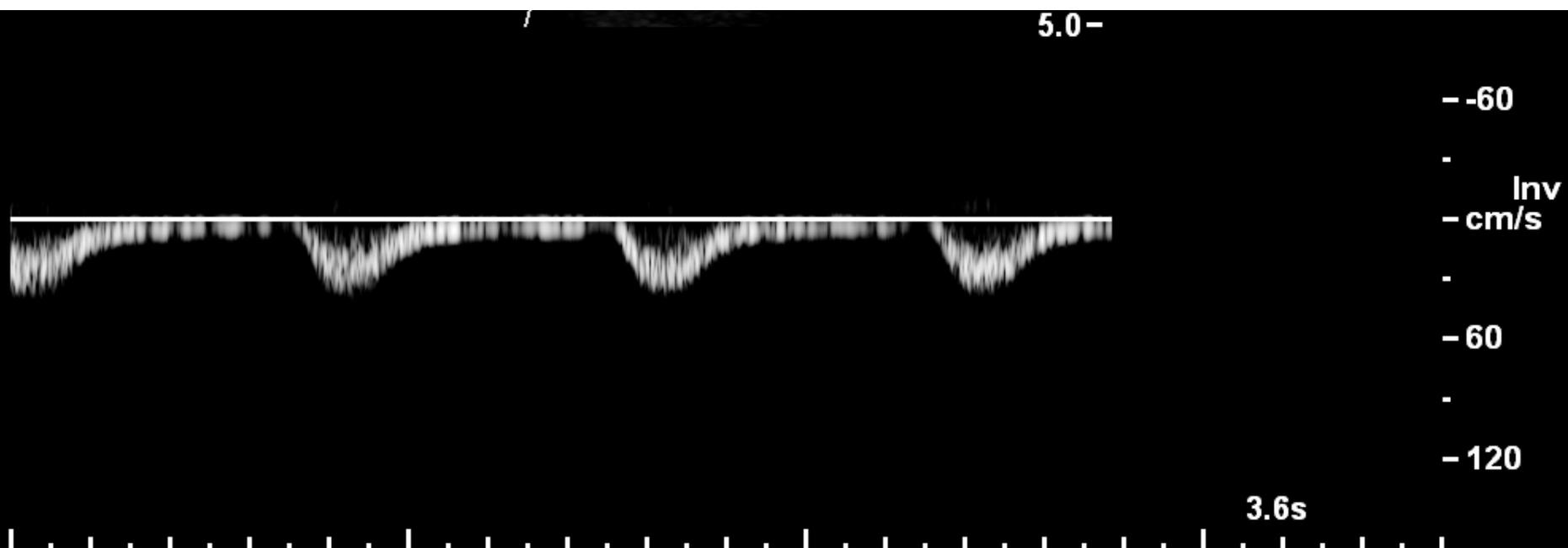
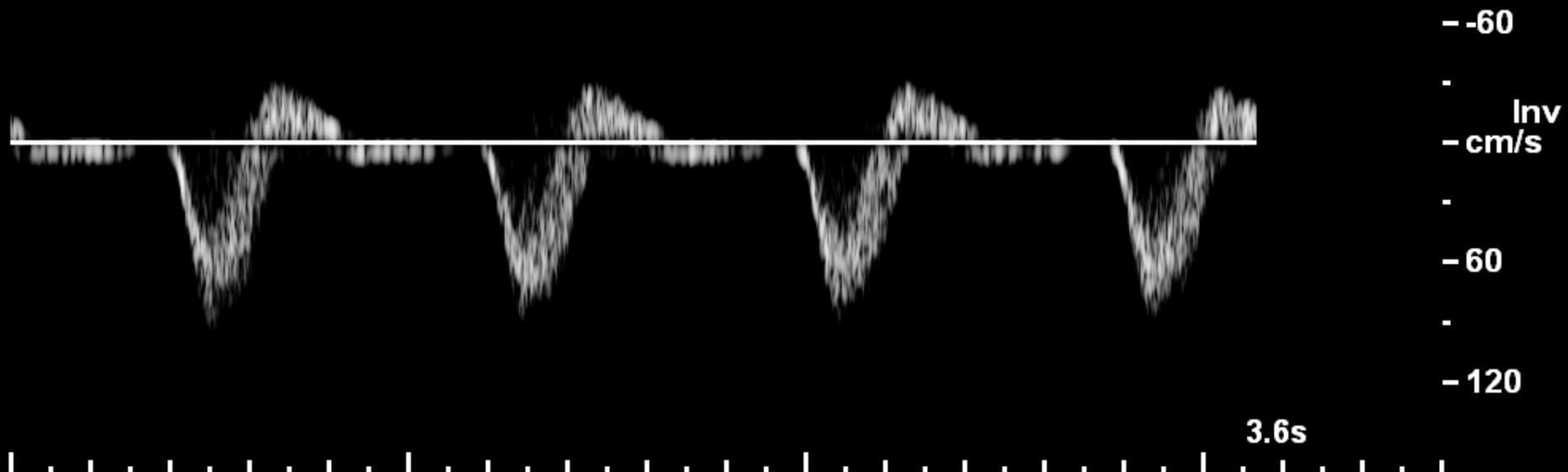
6.6s

**CI 14Hz**  
RP

**2D**  
41%  
C 55  
P Moy  
HGén

**Coul**  
62%  
3000Hz  
FP 165Hz  
Moy





# ECHO DE CONTRASTE

- Suspicion d'endofuite :
  - Augmentation du diamètre du sac  $\geq 5\text{mm}$
  - Plages anéchogènes ou hypoéchogènes dans le thrombus
  - Pulsatilité du sac anévrismal
- Référence si contre-indication au scanner ou IRM
- En complément d'un scanner

# ECHO – META ANALYSE

Mirza et al., Eur J Vasc Endovasc Surg 2010

- Echo-doppler standard :
  - 21 études, 2601 patients
  - Sensibilité **77%** (95% CI 64-86%)
  - Spécificité **94%** (95% CI 88-97%)
  
- Echo-doppler de contraste :
  - 7 études, 288 patients
  - Sensibilité **98%** (95% CI 90-99%)
  - Spécificité **88%** (95% CI 78-94%)

# Modalités de surveillance

## Calendrier de suivi des patients ayant une endoprothèse aortique - 2009

	En dehors du contrôle angiographique réalisé en fin de procédure, <b>En post-opératoire immédiat ou dans les 30 jours qui suivent l'implantation</b>	En l'absence d'endofuite, de détérioration de la prothèse ou d'évolutivité de l'anévrisme, <b>Aux 6<sup>ème</sup> et 12<sup>ème</sup> mois post-opératoires, puis annuellement</b>
Radiographie de l'abdomen sans préparation sous 3 incidences (face, profil, trois-quarts)	Indispensable	/
Examen tomodensitométrique après injection de produit de contraste	Indispensable (avec acquisitions précoce et tardive), sauf si impossible	Indispensable (avec acquisitions précoce et tardive), sauf si impossible
Imagerie par Résonance Magnétique	Si scanner impossible	Si scanner impossible (avec radiographie de l'abdomen sous 3 incidences)
Echographie-Döppler vasculaire	Si scanner et IRM impossibles	Si scanner et IRM impossibles (avec radiographie de l'abdomen sous 3 incidences)

# SVS 2018

We recommend baseline imaging in the first month after EVAR with contrast-enhanced CT and color duplex ultrasound imaging. In the absence of an endoleak or sac enlargement, imaging should be repeated in 12 months using contrast-enhanced CT or color duplex ultrasound imaging.

Level of recommendation 1 (Strong)

Quality of evidence B (Moderate)

If a type II endoleak is observed 1 month after EVAR, we suggest postoperative surveillance with contrast-enhanced CT and color duplex ultrasound imaging at 6 months.

Level of recommendation 2 (Weak)

Quality of evidence B (Moderate)

If neither endoleak nor AAA enlargement is observed 1 year after EVAR, we suggest color duplex ultrasound when feasible, or CT imaging if ultrasound is not possible, for annual surveillance.

Level of recommendation 2 (Weak)

Quality of evidence C (Low)

If a type II endoleak is associated with an aneurysm sac that is shrinking or stable in size, we suggest color duplex ultrasound for continued surveillance at 6-month intervals for 24 months and then annually thereafter.

Level of recommendation 2 (Weak)

Quality of evidence C (Low)

If a new endoleak is detected, we suggest evaluation for a type I or type III endoleak.

Level of recommendation 2 (Weak)

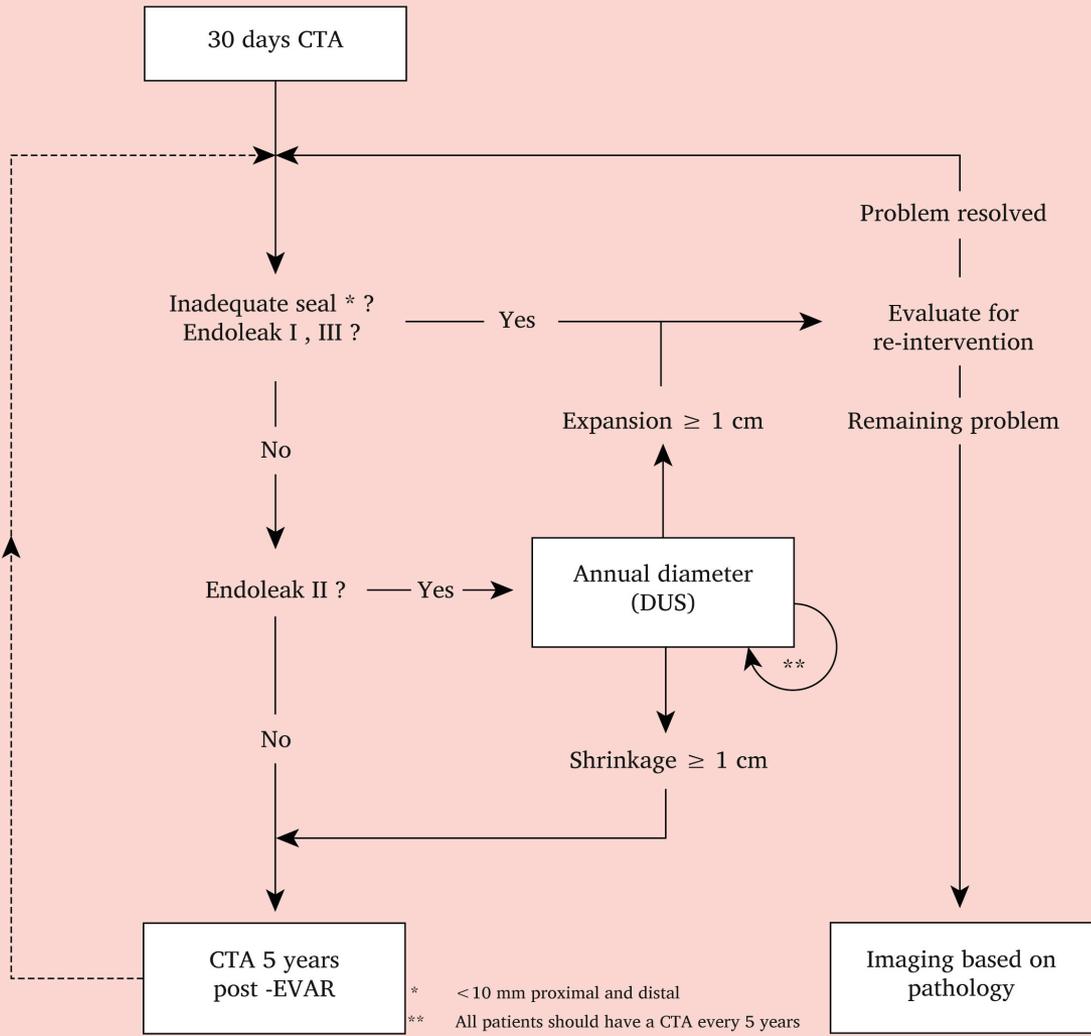
Quality of evidence C (Low)

We suggest noncontrast-enhanced CT imaging of the entire aorta at 5-year intervals after open repair or EVAR.

Level of recommendation 2 (Weak)

Quality of evidence C (Low)

# ESVS 2019



\* < 10 mm proximal and distal  
 \*\* All patients should have a CTA every 5 years

# CONCLUSIONS

- Suivi d'une chirurgie conventionnelle :
  - Pas de consensus
  - Anastomoses et autres localisations anévrismales
- Suivi d'un traitement endovasculaire :
  - Place grandissante de l'écho
  - Mesure du diam max du sac anévrismal résiduel
  - Calendrier précis

MERCI