

DES de Radiodiagnostic – Cours de Spé
09/02/2018

Radiologie Interventionnelle

Techniques d'embolisation et indications spécifiques

Fabrice Deprez, MD, MSM, EBIR

Radiologue interventionnel
CHU UCL Namur, site Godinne

POUR LES NOTIONS DE BASES...

DES de Radiodiagnostic – Cours de base
05/02/2016

Abords percutanés non vasculaires en Radiologie Interventionnelle

Fabrice Deprez

Radiologue interventionnel
CHU Godinne

<http://www.uclimaging.be/ecampus/ecampus.htm>

DES de Radiodiagnostic – Cours de Spé
14/02/2017

Techniques modernes de guidage en RI

Fabrice Deprez

Radiologue interventionnel
CHU UCL Namur, site Godinne

INFOS UTILES



BSR Section Meeting Interventional Radiology

Walking dinner: 19h00-20h00

Scientific program:

- 20h00-20h15: **Results of the survey and discussion “New trends for the IR section”**: Dr. F. Deprez, Dr. T. De Beule

- 20h15-21h00: **Vascular session:**

Chemoembolisation vs radioembolisation: your experience concerning patient selection

- 21h00-22h00: **Non-vascular session:**

Percutaneous punctures: new guidance devices, tools and possibilities

! Next meeting in April 2018
! Via BSR mailing list



European Board of Interventional Radiology

[IR Curriculum & Syllabus](#)[European Trainee Forum](#)

EBIR

[General Information](#)[EBIR Examination Council](#)[How to apply - General](#)[How to apply - IRSA](#)[How to prepare for the EBIR](#)[EBIR Australia/New Zealand](#)[Contribute to the EBIR](#)[CVIR](#)[ESIRonline](#)[CIRSE Guidelines](#)[Subspecialty Status for IR](#)[IR Patient Safety Checklist](#)[Job Announcements](#)[Drugs and Doses App](#)[UEMS IR Division](#)

CERTIFIED EXPERTISE - The European Board of Interventional Radiology

The European Board of Interventional Radiology has been running its successful course for 5 years now. To date, over 400 interventional radiologists hold this coveted qualification, and the number is steadily increasing. Examinations are always fully booked long before they take place.

Why take the EBIR?

Built on the pillars of scientifically proven assessment techniques, high-quality material and a dedicated steering committee, the examination has asserted itself as the internationally valued IR qualification that it set out to be.

Career Development

EBIR holders improve their career development, whether they take the examination right at the beginning of their tenure or further down the road. Employers can expect not only firm knowledge of the contents of the **European Curriculum and Syllabus of Interventional Radiology** which serves as the comprehensive guideline for the exam, but also certain skill sets and additional valuable competencies confirmed by trainers or supervisors.

Free movement

Supplemental to any national qualifications, the EBIR also aims to facilitate the free movement of IRs across Europe and even globally.



European Board of Interventional Radiology



2017 UEMS-CESMA recognition

European Curriculum and Syllabus
for Interventional Radiology

First Edition

2013

Cardiovascular and Interventional Radiological Society of Europe

CIRSE

European
Curriculum
and Syllabus
for Interventional
Radiology

Second Edition

2017



CIRSE



European Board of Interventional Radiology

IR Curriculum & Syllabus

European Trainee Forum

EBIR

General Information

EBIR Examination Council

How to apply - General

How to apply - IRSA

How to prepare for the EBIR

Recommended reading

Recommended online lectures

Sample questions and cases

EBIR Australia/New Zealand

Contribute to the EBIR

CVIR

ESIRonline

CIRSE Guidelines

How to prepare for the EBIR

The European Board of Interventional Radiology is based on the European Curriculum and Syllabus for Interventional Radiology.



Recommended reading

Recommended lectures from CIRSE events and courses on ESIRonline

Sample questions and cases

INFOS UTILES: CIRSE GROUP MEMBERSHIP !

100 Group Memberships **offered** through the IR section of the BSR

→ 15-20 reserved for « Juniors » / Radiologists in training !

How to get your *free* CIRSE Membership?

! You must be a BSR member

! Send an email to both your French and Flemish representatives:

Tom de Beule (tom.debeule@azstlucas.be) and Fabrice Deprez (fabrice.deprez@uclouvain.be)

- including all required contact information
- your status “junior” (in training radiologist).

Advantages:

- 1- CVIR Journal free access
- 2- CIRSE/ECIO/GEST congresses reduced fees
- 3- ESIR Online education full access
- 4- EBIR appliance
- 5- CIRSE opportunities



Techniques d'embolisation et indication spécifiques

1. Concept, indications générales et sélections des patients
2. Techniques d'embolisation et matériaux disponibles
3. Coûts et remboursements
4. OncoRI: chimio-embolisation (TACE), radio-embolisation (TARE/SIRT), embolisation portale (+/- sus-hépatique)
5. Embolisation prostatique, fibromes utérins et autres indications actuelles (pré-op tumoral, épistaxis, varicocèle/v.utérines...)
6. Futur / indications émergentes (hémorroïdes, bariatrique) ?

1- EMBOLISATION: CONCEPTS

- Embolisation = occlusion vasculaire
- Buts: hémorragies, (pseudo)anévrismes / MAV/FAV, dévascularisation tumorale (+/- action locale additionnelle)
- Embolisations proximales vs distales
- Sous guidage RX (c-arm CBCT) (>>> US: pseudoanévrisme AFC R/thrombine)
- Abord vasculaire par cathétérisme (>>> ponction directe)
- Complications:
 - Liées à la ponction et au cathétérisme
 - Liées au produit de contraste iodé / liées aux RX
 - Spécifiques: ISCHEMIE et EMBOLISATION non dirigée !

1- EMBOLISATION: HEMORRAGIES

- Potentiellement TOUT ce qui saigne peut s'emboliser
- Indications: saignements ACTIFS → démontrés par imagerie idéalement
- Conseil: **TOUJOURS réaliser un CT injecté multiphasique AVANT EMBOLISATION !**
 - Le CT multiphasique est nettement plus sensible que l'artério non sélective (= validation de l'indication), en particulier en phase portale/tardive
 - CT non injecté (1^{ère} phase): DD blush contraste vs autres hyperdensités sur les phases suivante + détection occasionnelle du « caillot sentinelle »
 - Le CTA permet le plus souvent d'identifier l'artère responsable du saignement et ses connexions anatomiques (! Variantes) = gain de temps et efficacité
 - On n'embolise que les hémorragies artérielles avec blush visible à l'artério sélective (exception éventuelle: bassin polytrauma – visée hémodynamique)
 - (exception au CT préalable: TIPPS pour hémorragie sur varices gastro-oesophagiennes et épistaxis)

2- EMBOLISATION: TECHNIQUES ET MATÉRIAUX

Types d'embolisation:

- Proximale
- Distale
- Tissulaire

Agents d'embolisation:

Coils, plugs
Collagène (Spongel)

Onyx (34)

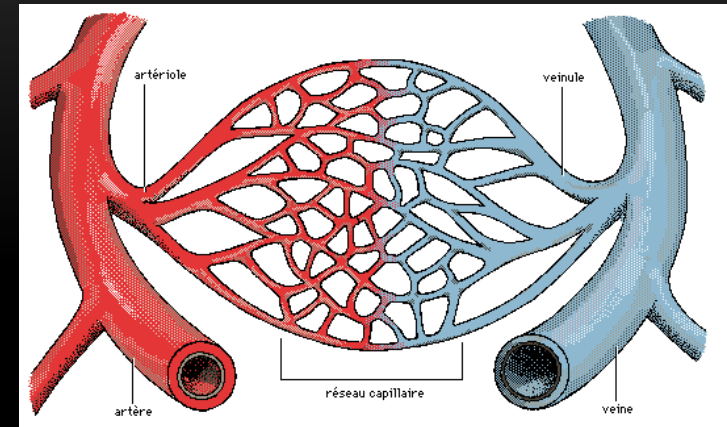
n-butyl 2-cyanoacrylate (NBCA) + Lipiodol (2:1)

Onyx (18)

Poudre de collagène (Hemostat)

n-butyl 2-cyanoacrylate (NBCA) + Lipiodol (10:1)

Micro-particules (40-1000 μm)

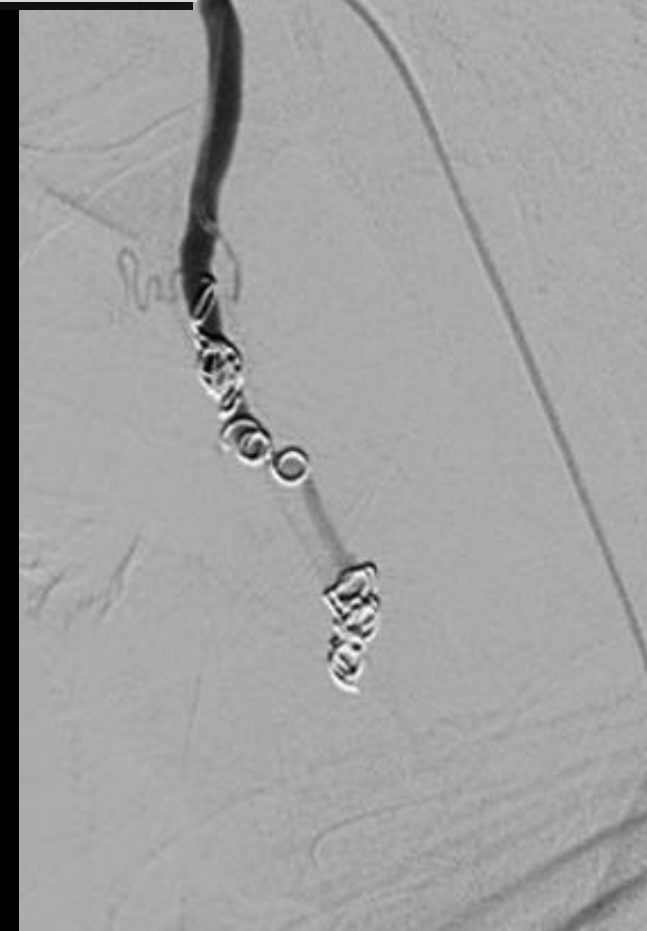


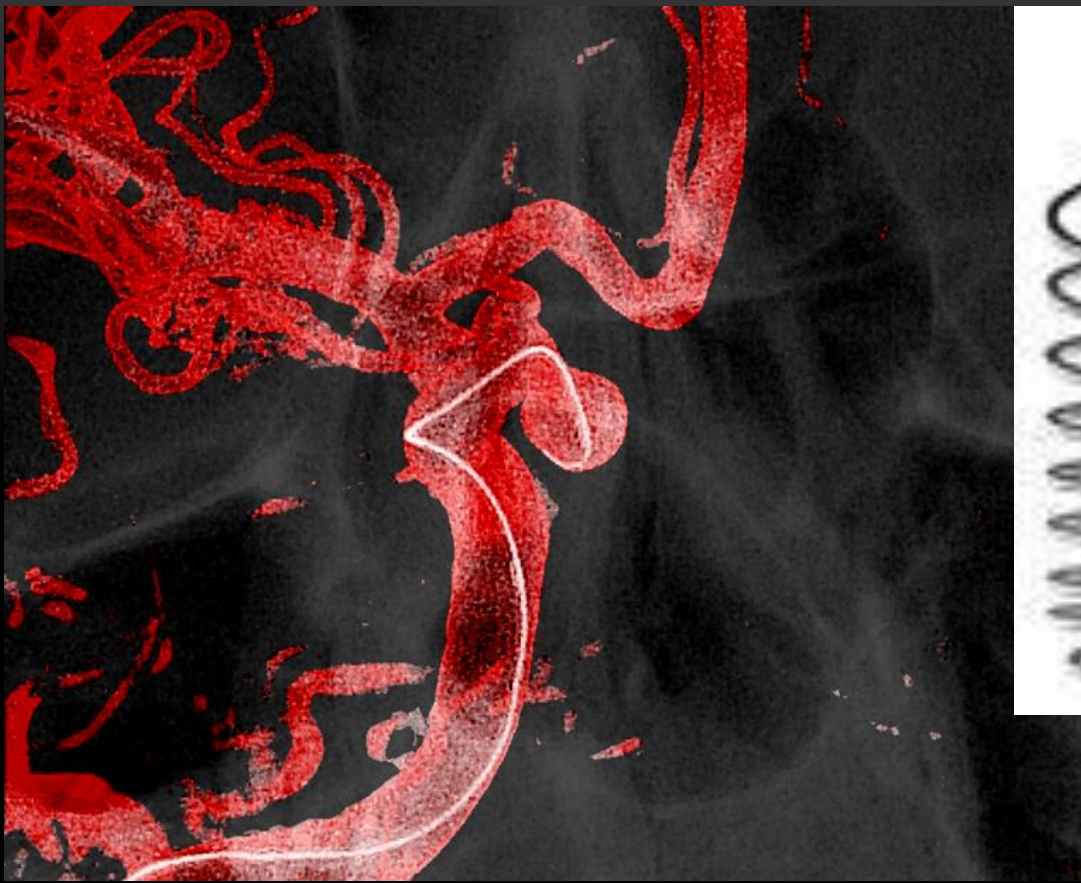
! Variation: selon débit sanguin, selon taille matériel, flux libre vs bloqué

Embolisation de l'artère thyroïdienne supérieure (coils)

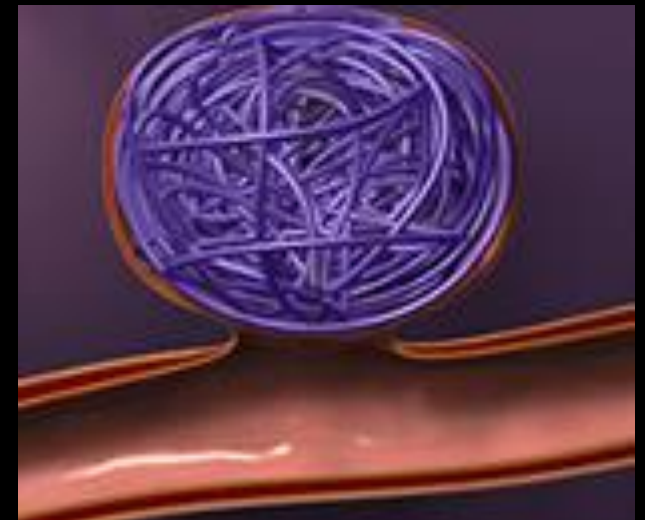
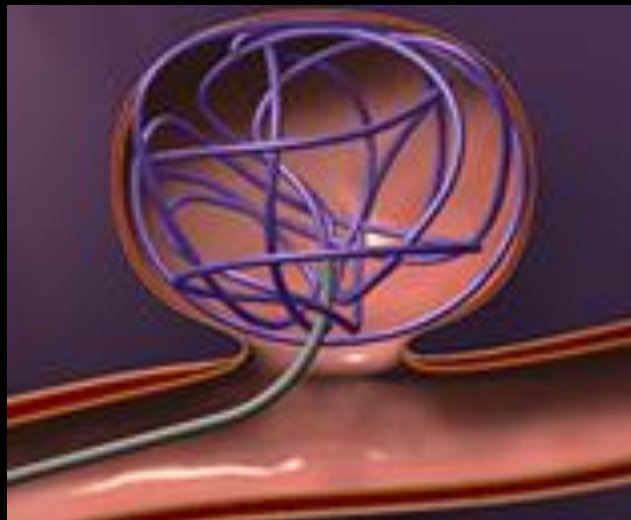
35-100 €

250-450€ (détachables)





> 1000 € (neuro, détachables)





Hydro-coils (poussables ou détachables)

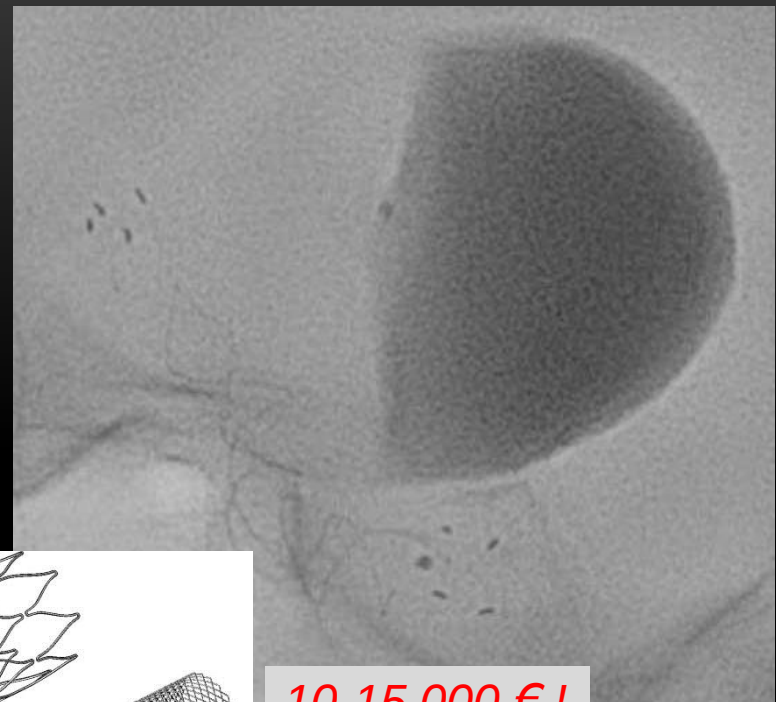
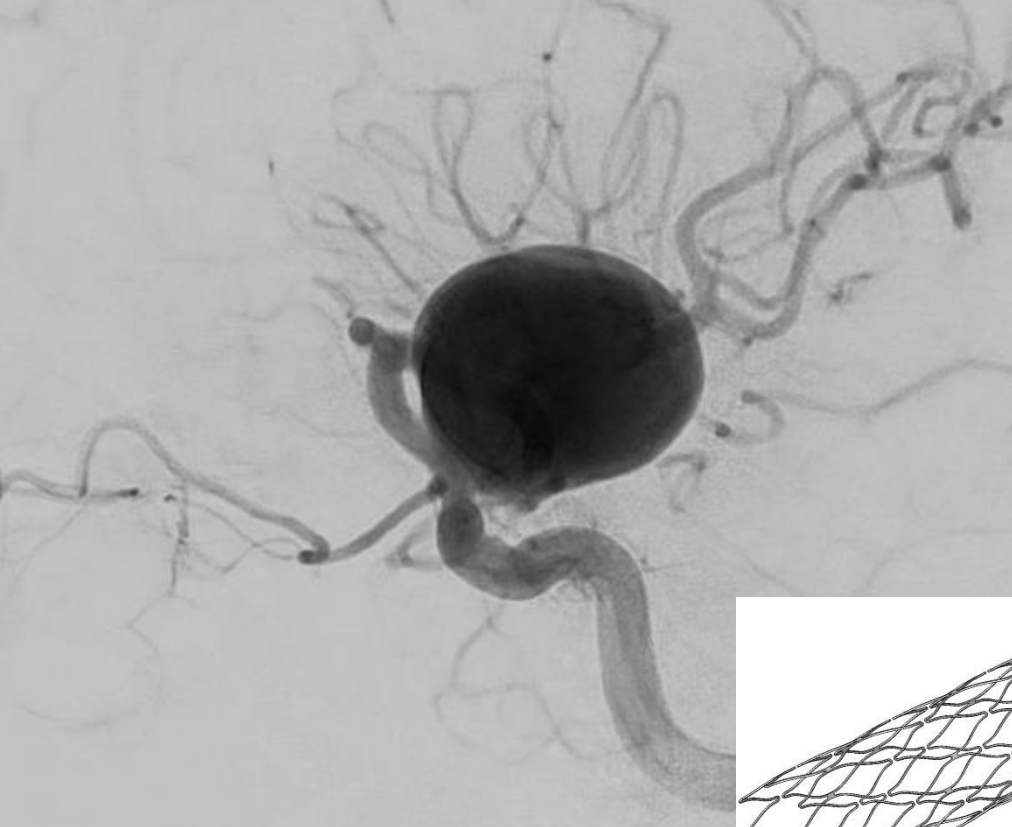
Pre-Expansion



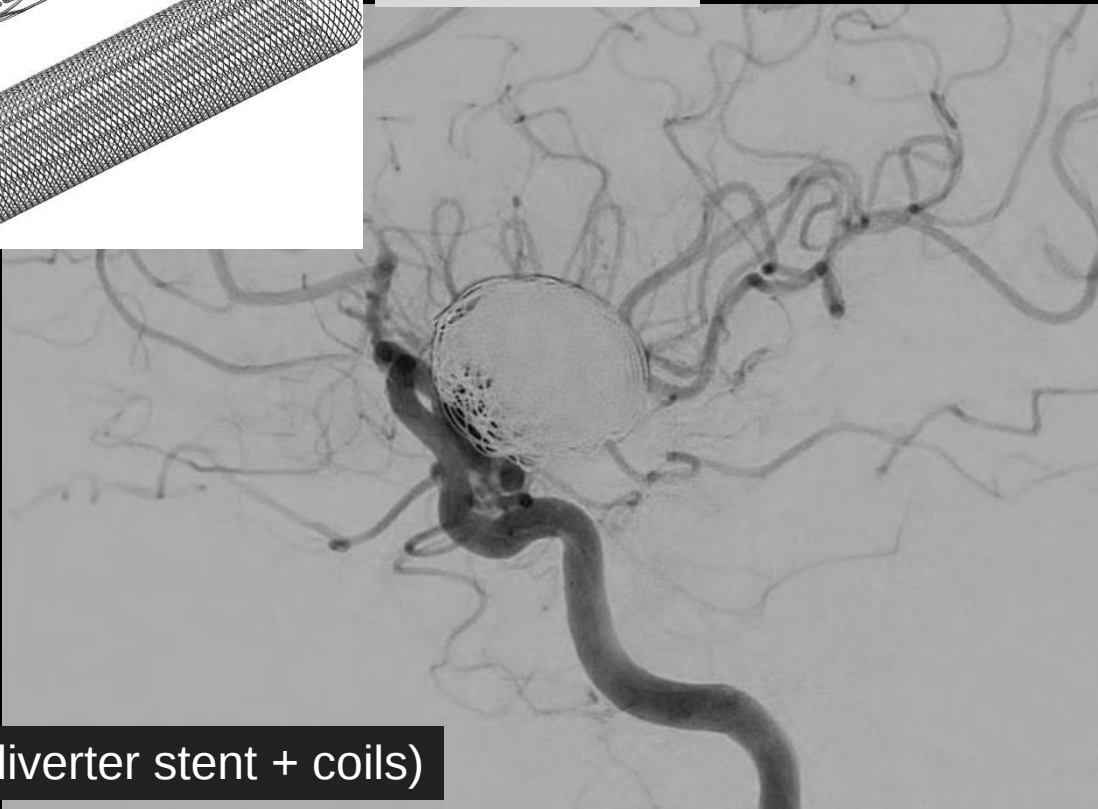
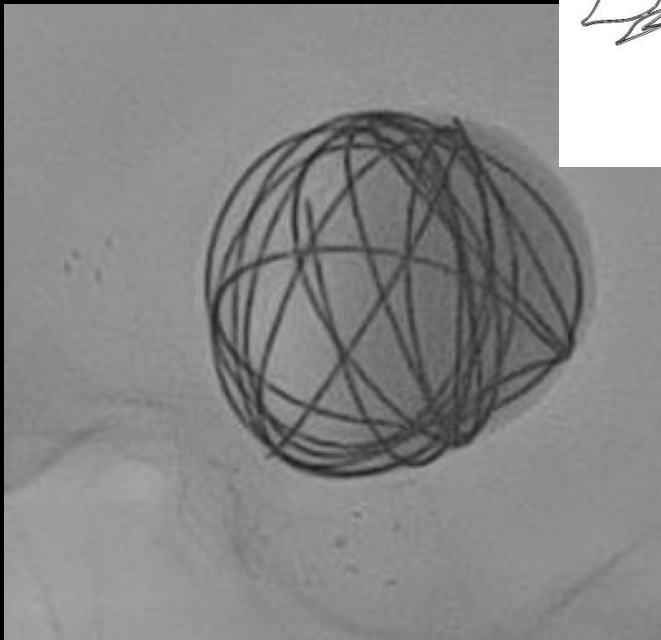
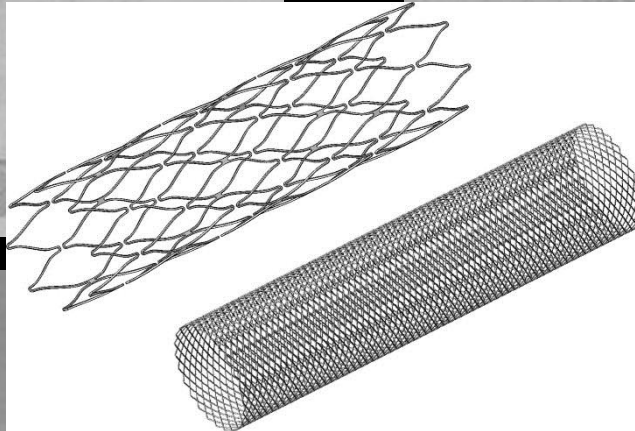
Post-Expansion



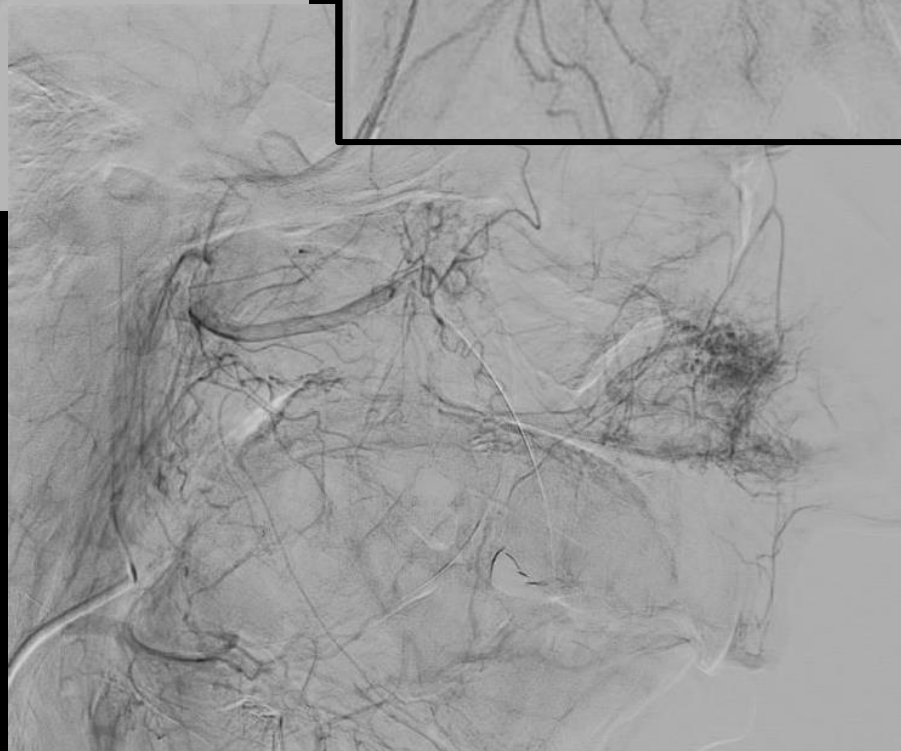
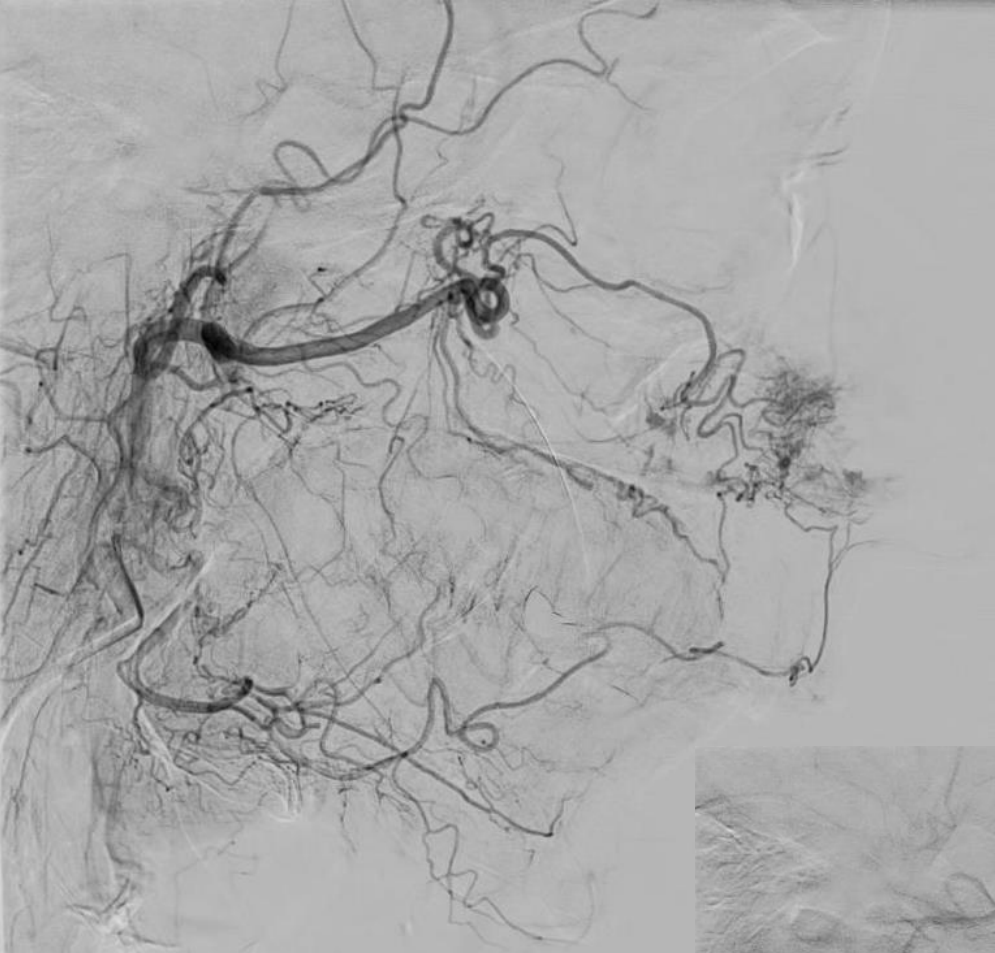
450 € (détachables)



10-15.000 €!



Embolisation d'un anévrisme cérébral (flow diverter stent + coils)



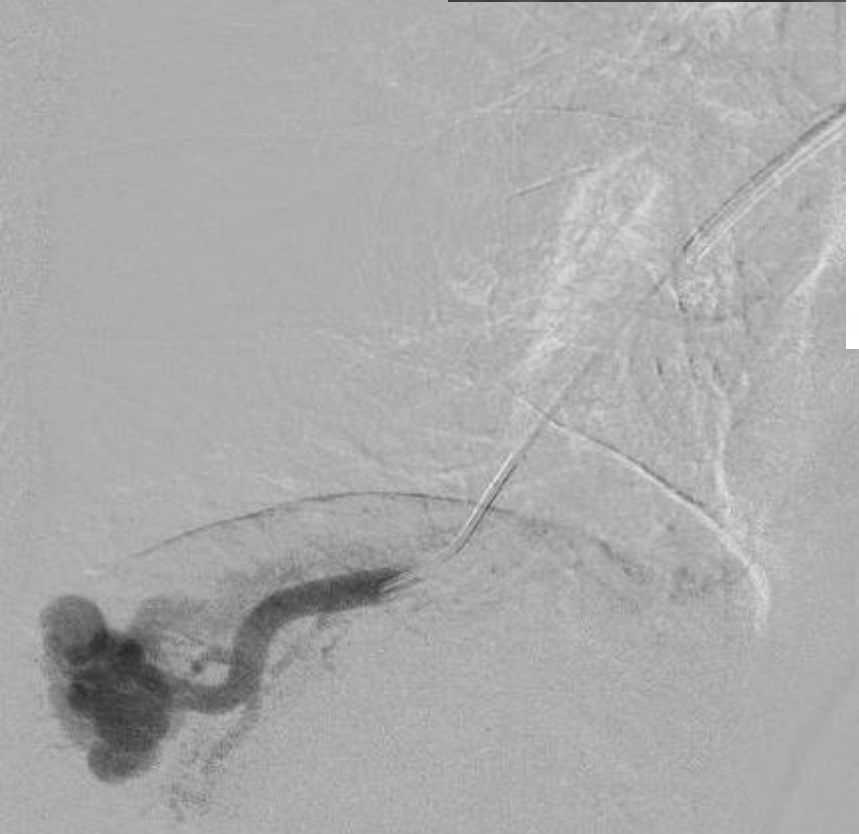
250 €



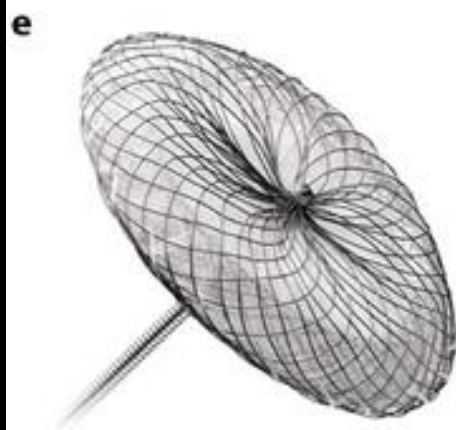
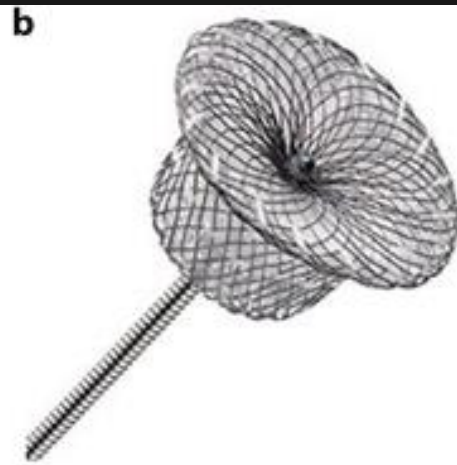
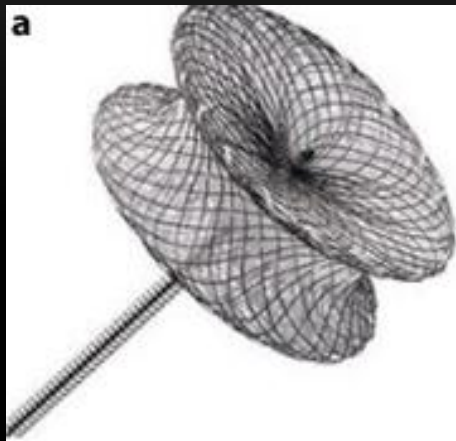
Embolisation d'épistaxis - a.sphénopalatine (μ -particules)

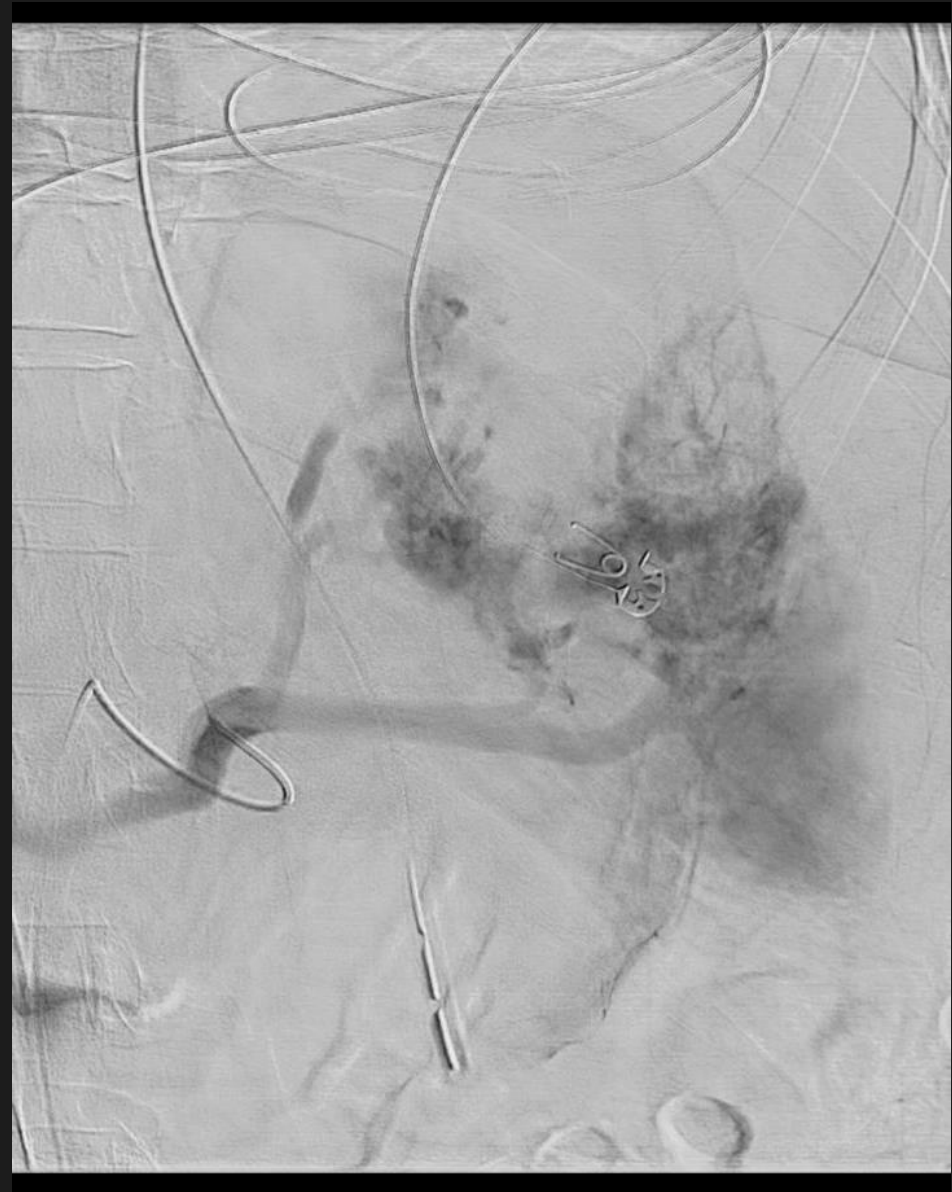


650 €

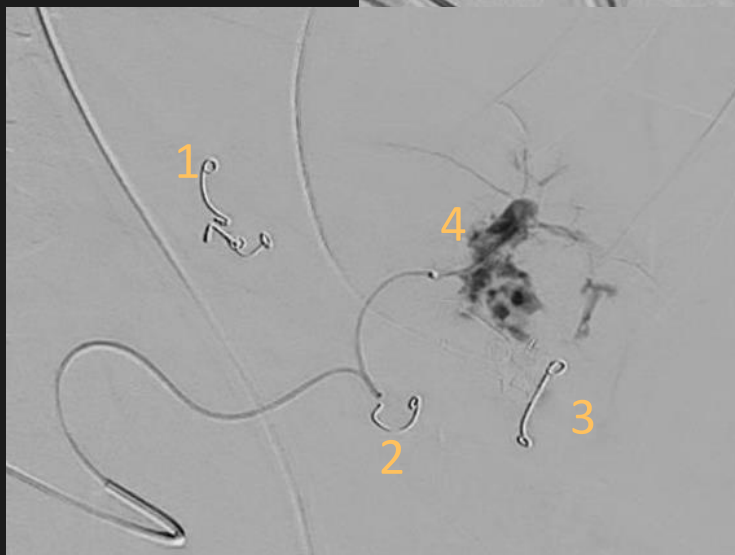


Embolisation d'une MAV pulmonaire (Amplazer plug)

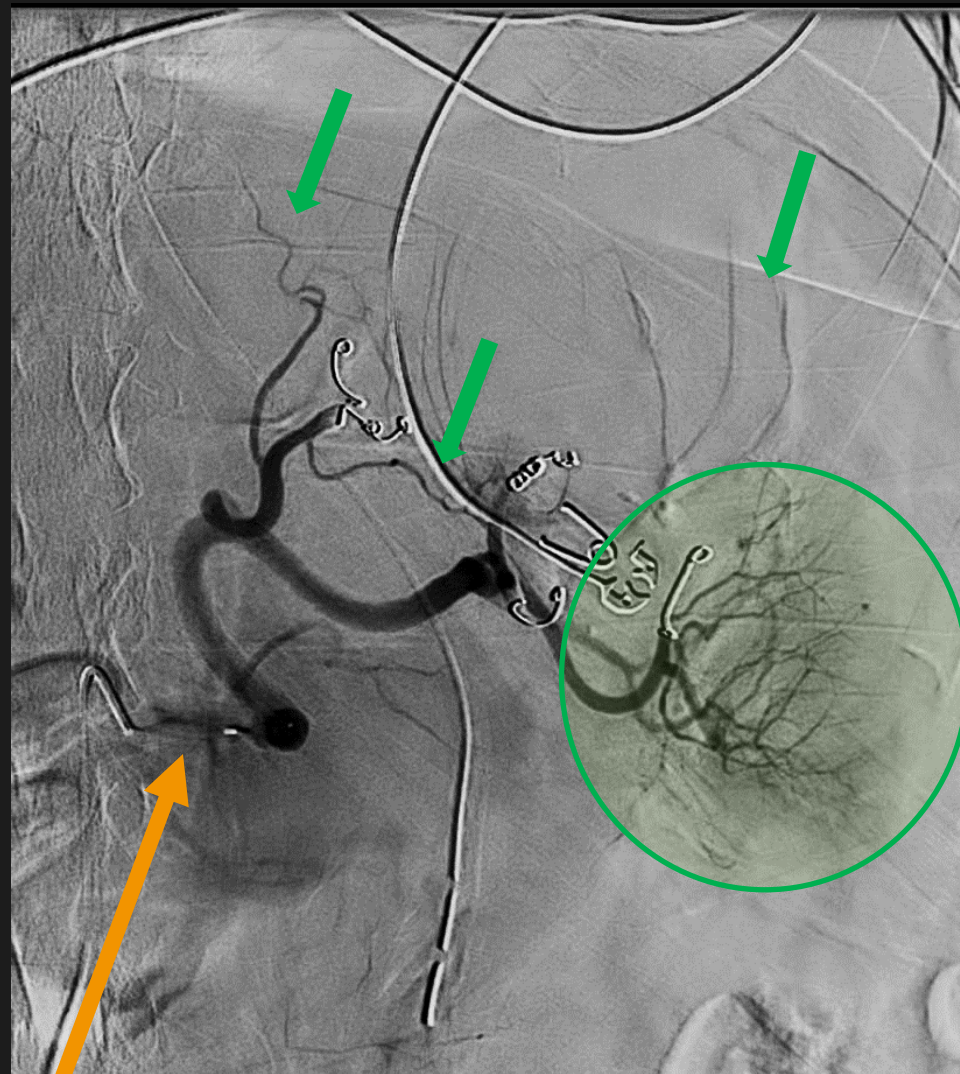
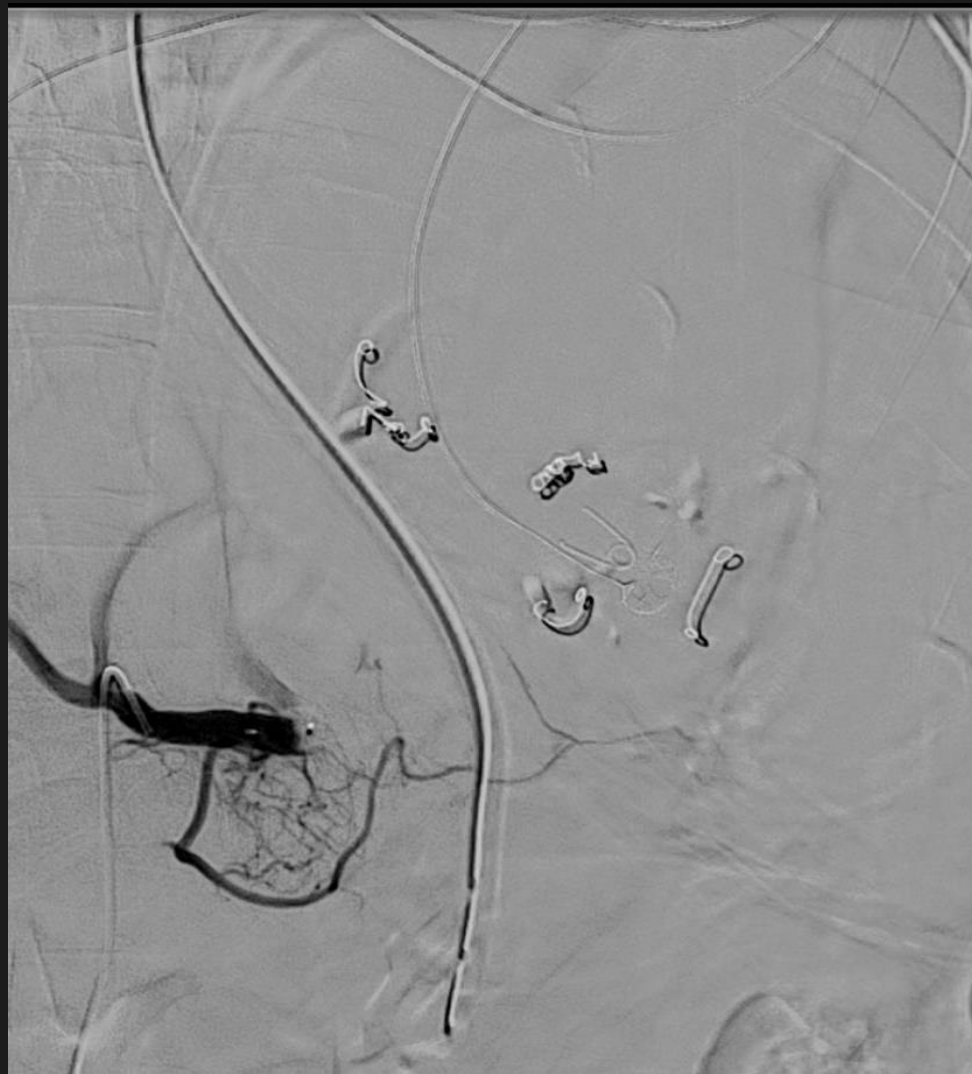




Embolisation d'un trauma splénique avec multiples blush



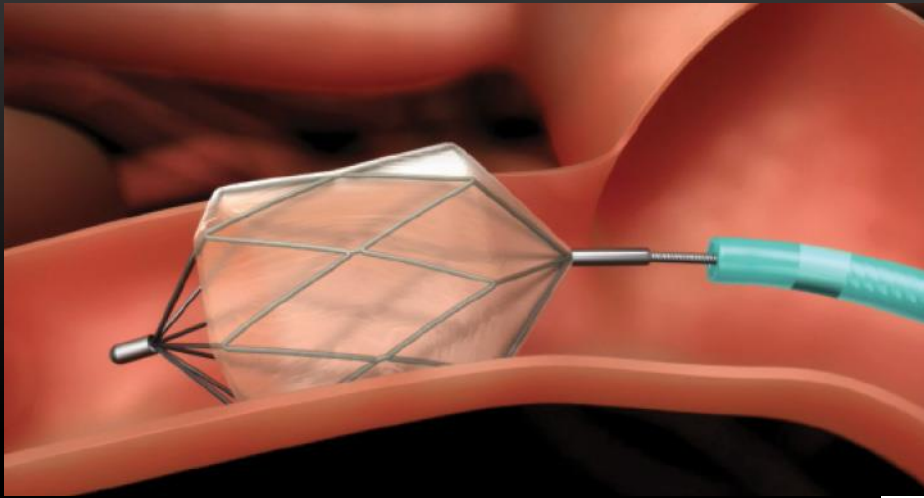
μcoils 0,018 poussables



Plug 8mm

Embolisation splénique: proximale ou distale ?

- Embolisation **distale**: risque ++ de **nécrose** → **abcédation**
- Embolisation **proximale**: suffit, en théorie... Reprise très compliquée (via la gastrique gauche) ?
- **Eviter les agents d'embolisation distale**: PVA, particules, glue...
- BUT: conserver du tissu splénique fonctionnel (éviter l'asplénie et ses complications: infections, vaccins...) si possible ?
- *Ma préférence*: embolisation mixte
 - «Sub»-embolisation *distale* par μ coils des branches présentant de larges blushs (absence de tissus viables en aval)
 - Embolisation *proximale de sécurité* par *plug* ou coils compactés



850 €

Diamètres: 3-5-9 mm

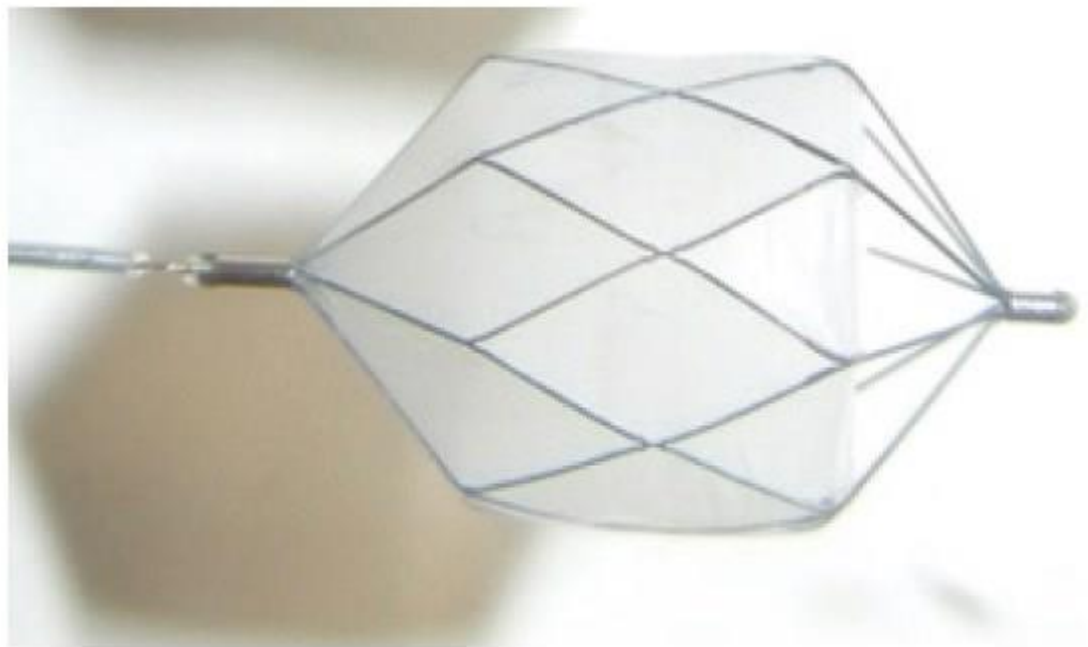
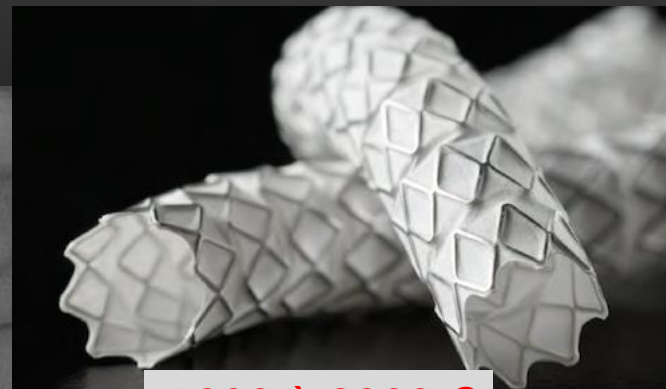
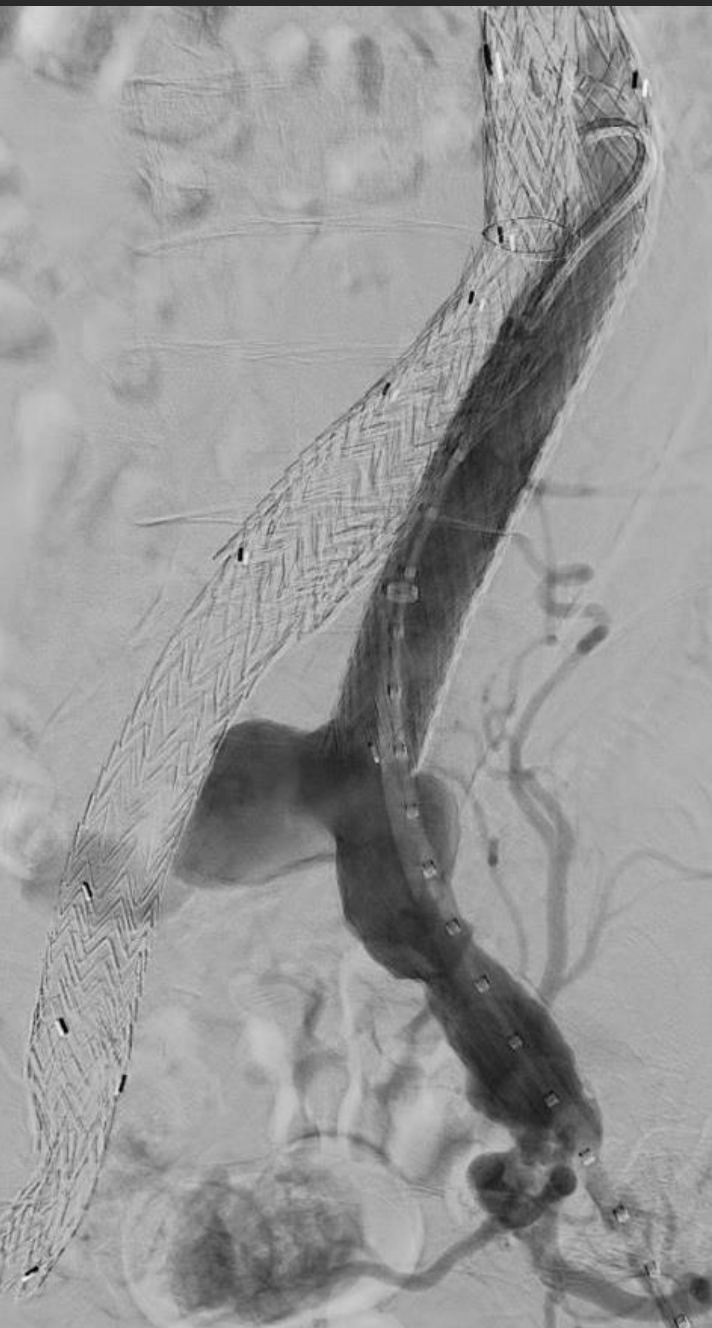
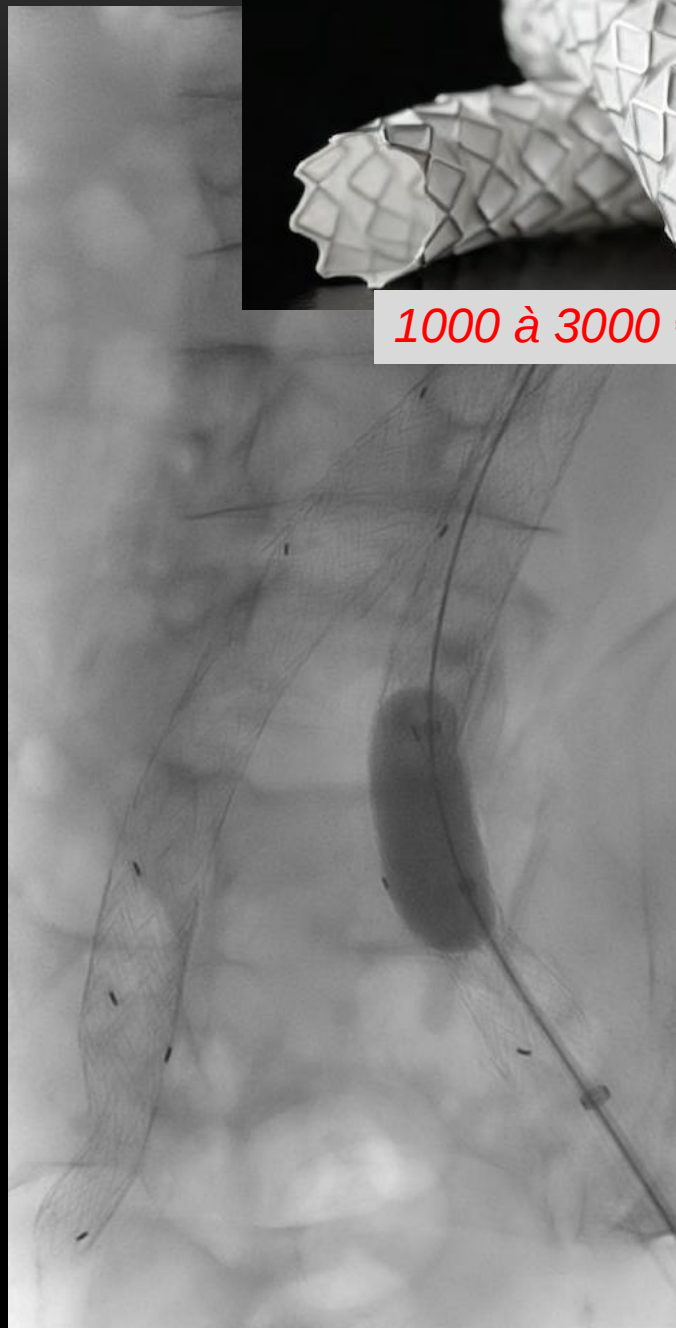


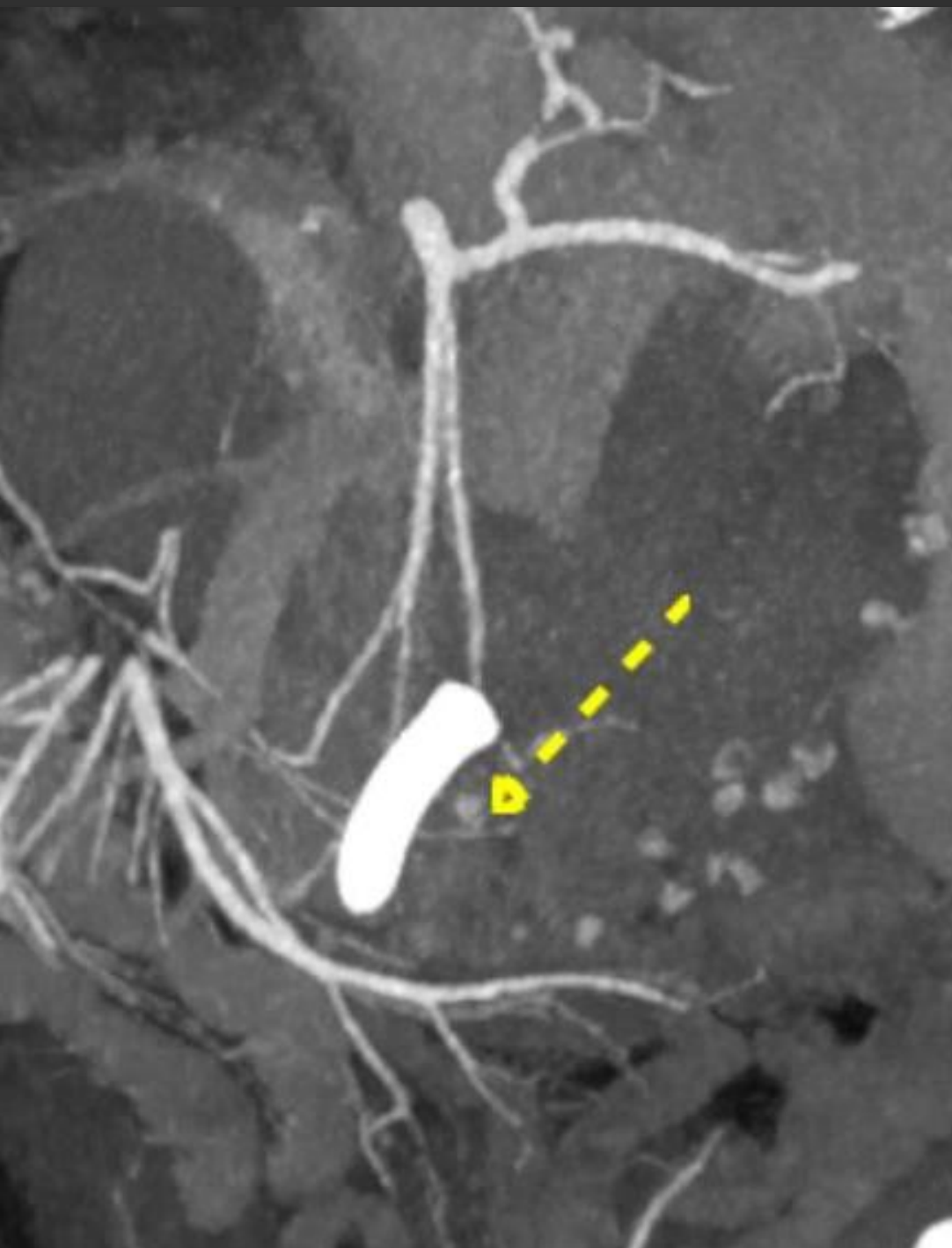
Figure 1. The MVP™ plug, composed of nitinol and covered by a PTFE membrane at the proximal portion, is designed for immediate vascular occlusion. Reprinted with permission from Medtronic.



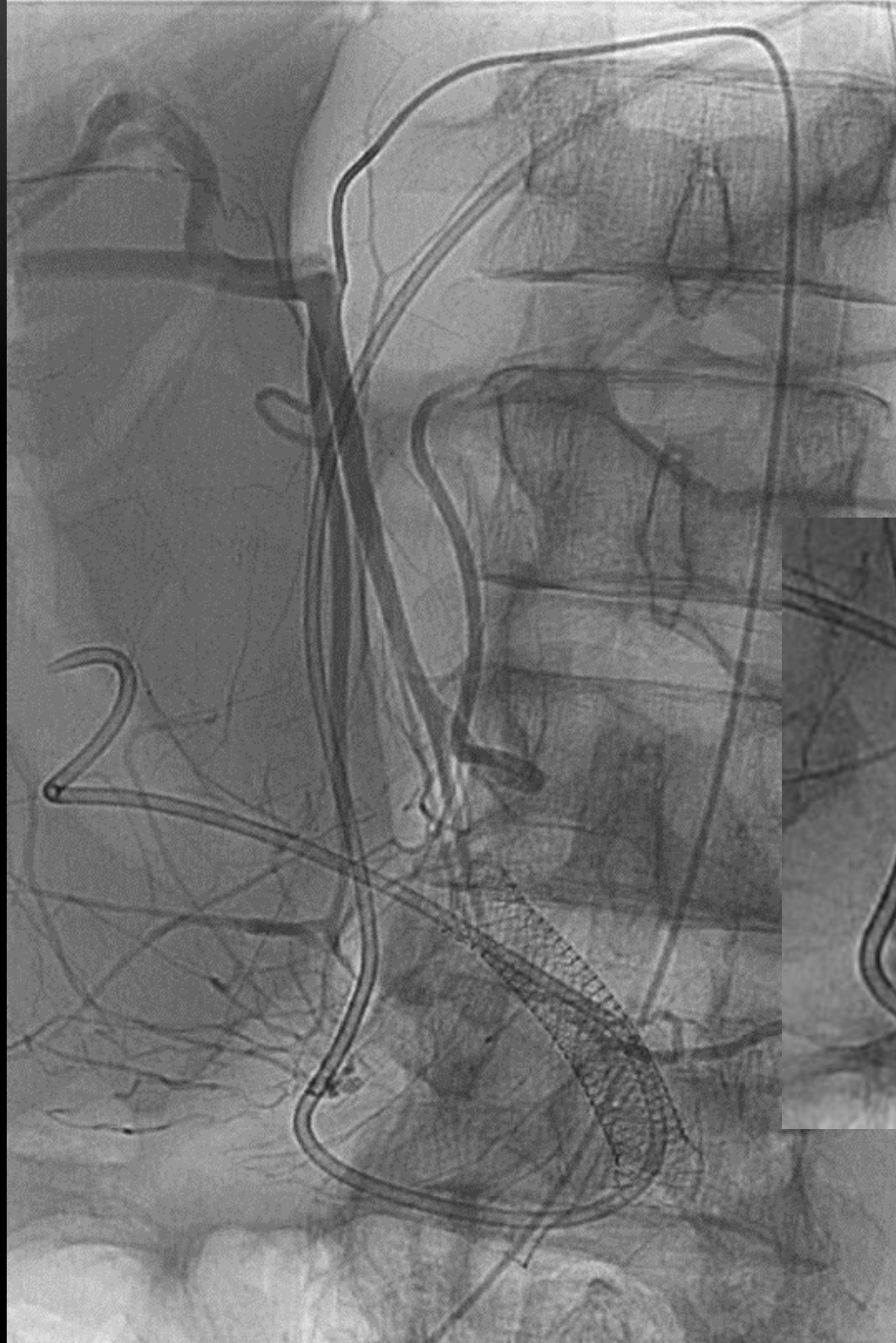
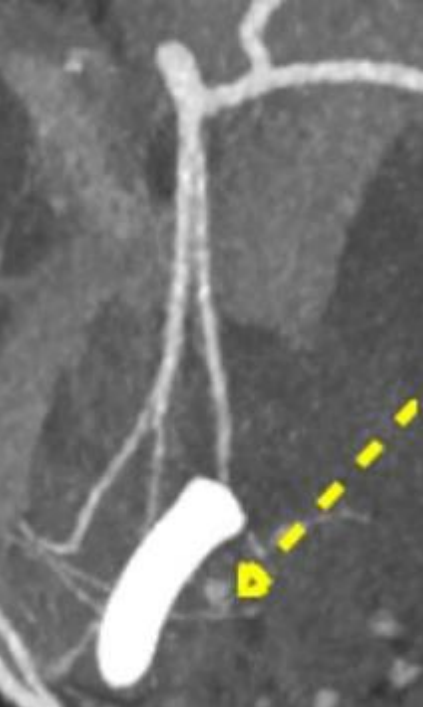
1000 à 3000 €

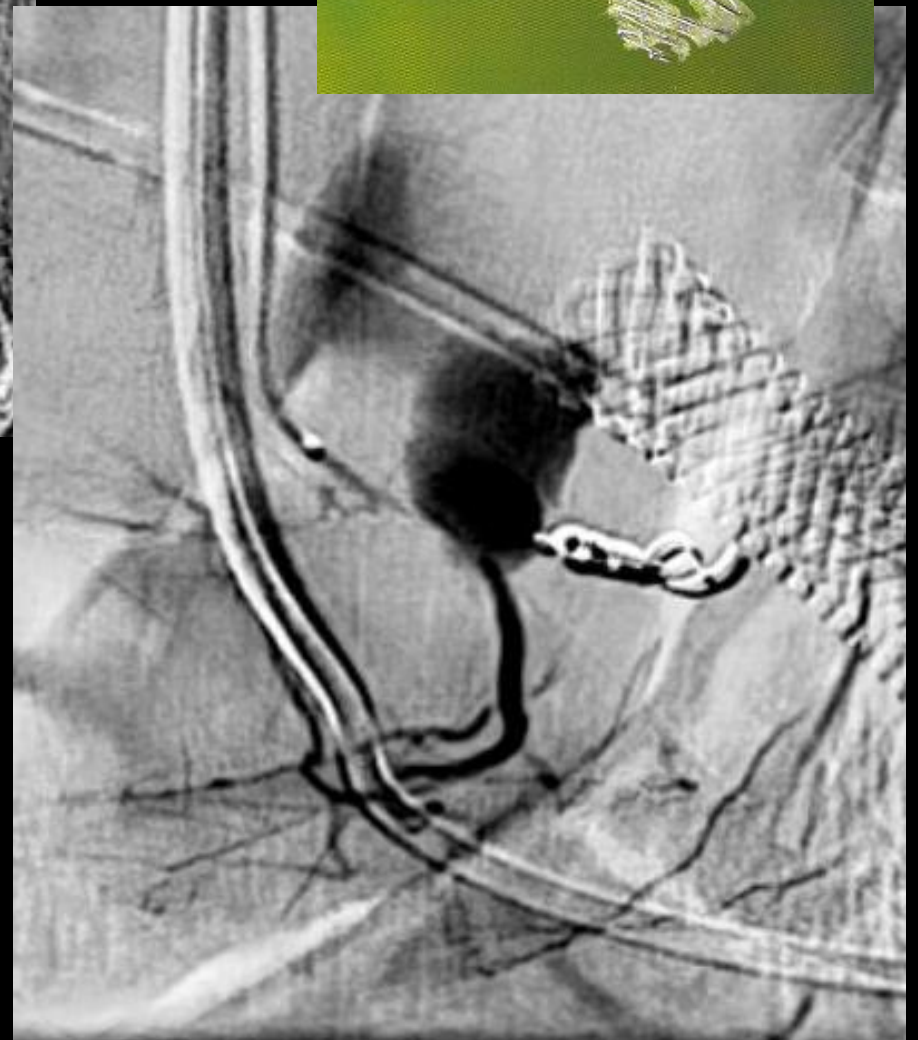
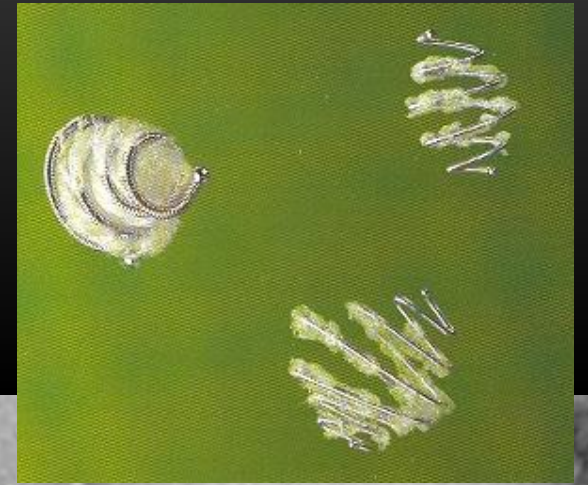
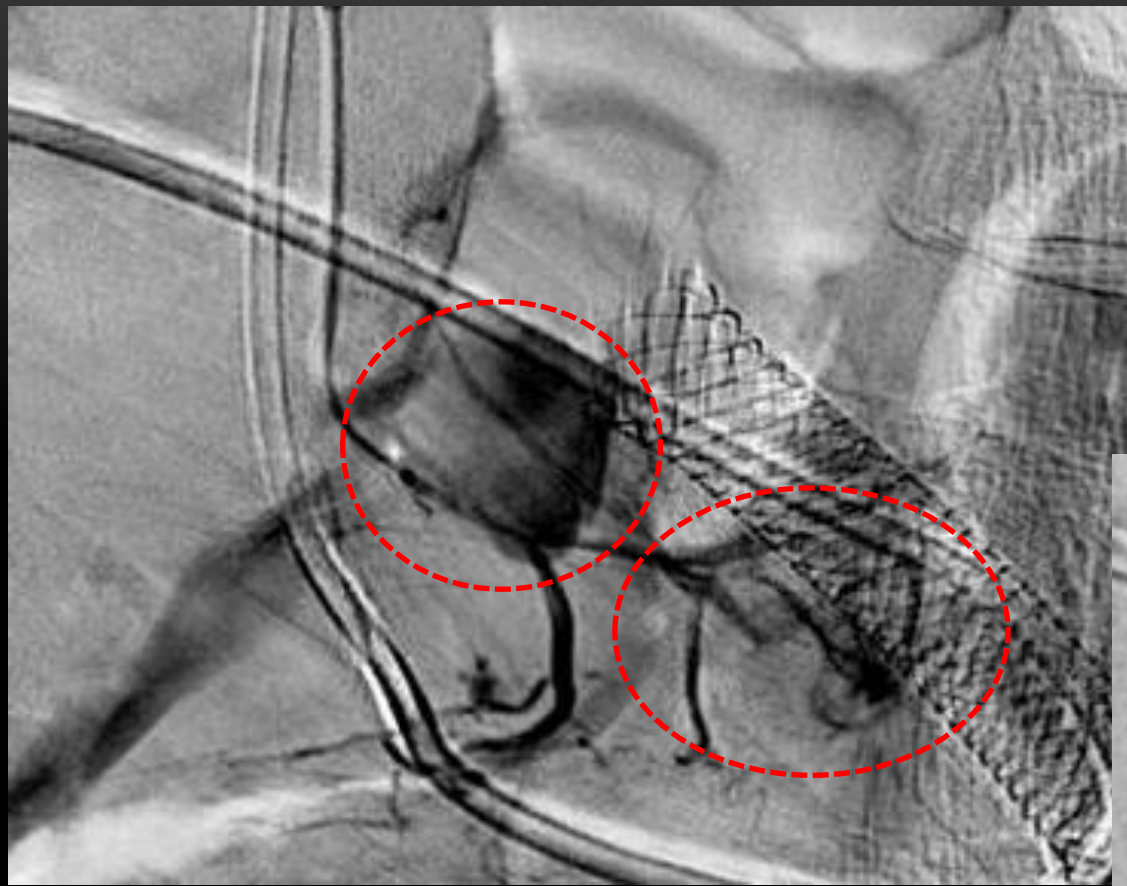


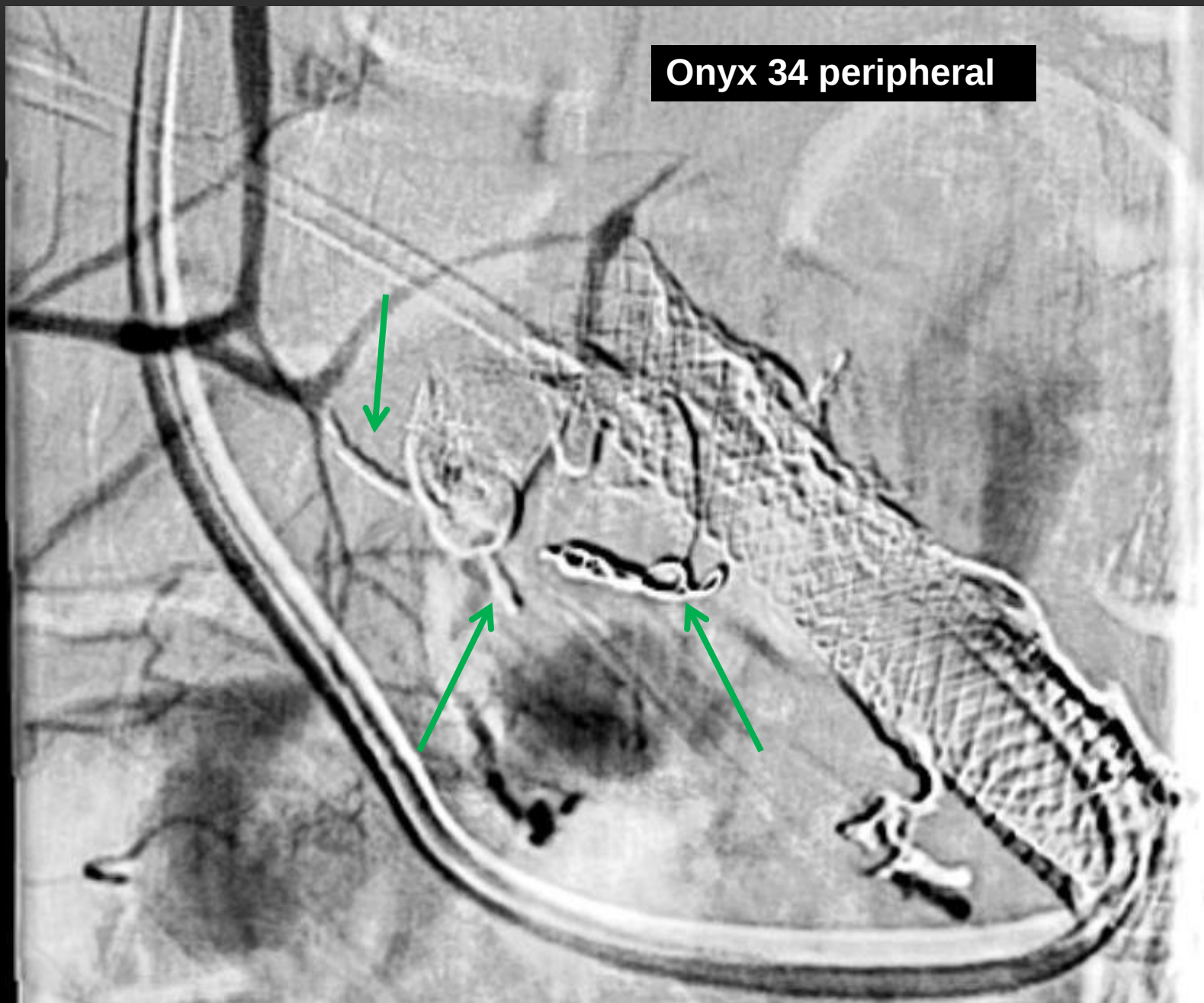
Extension d'une endoprothèse Ao-iliaque par stent couvert



Pseudoanévrisme d'une branche gastro-duodénale (post ERCP)



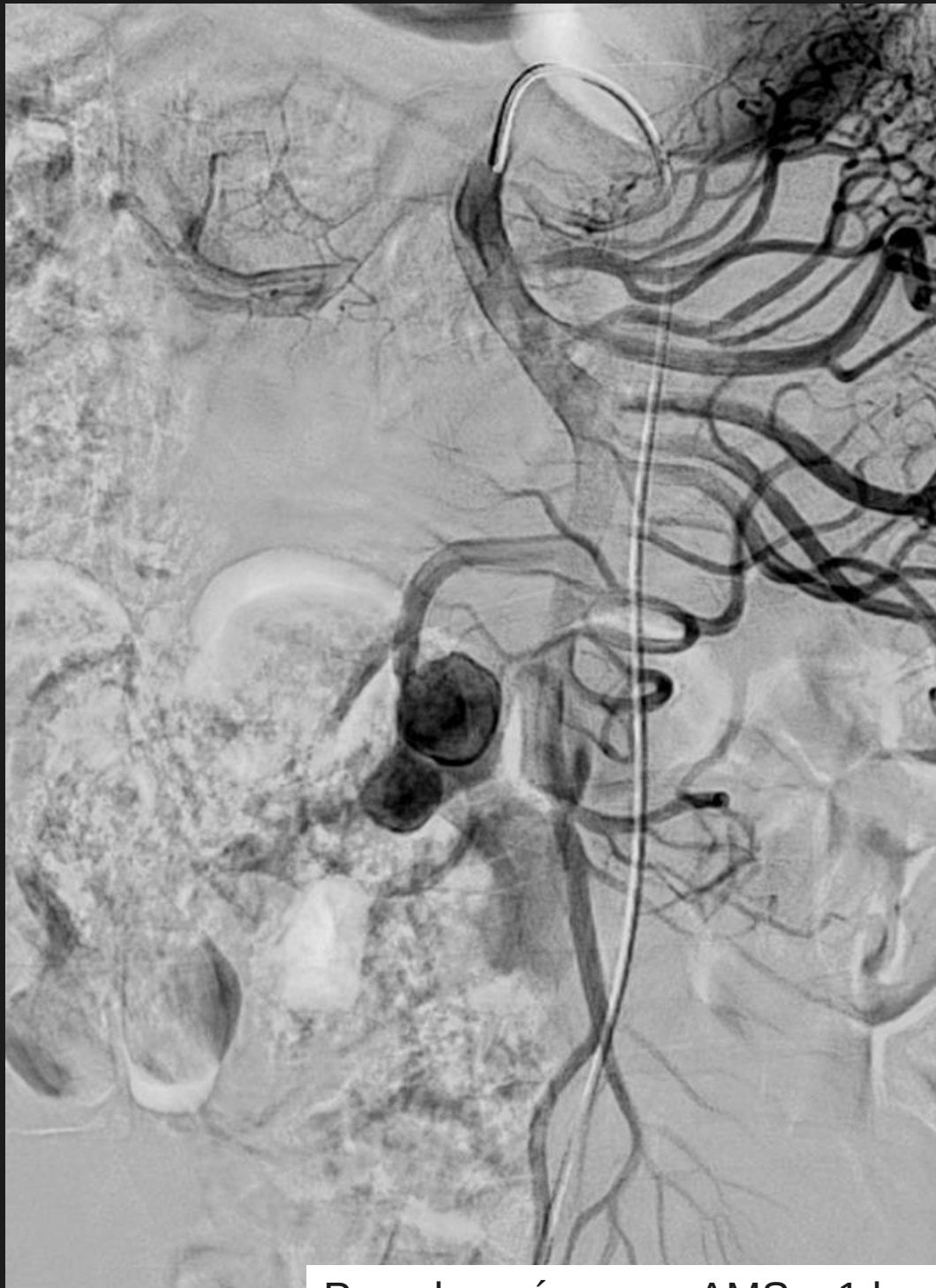




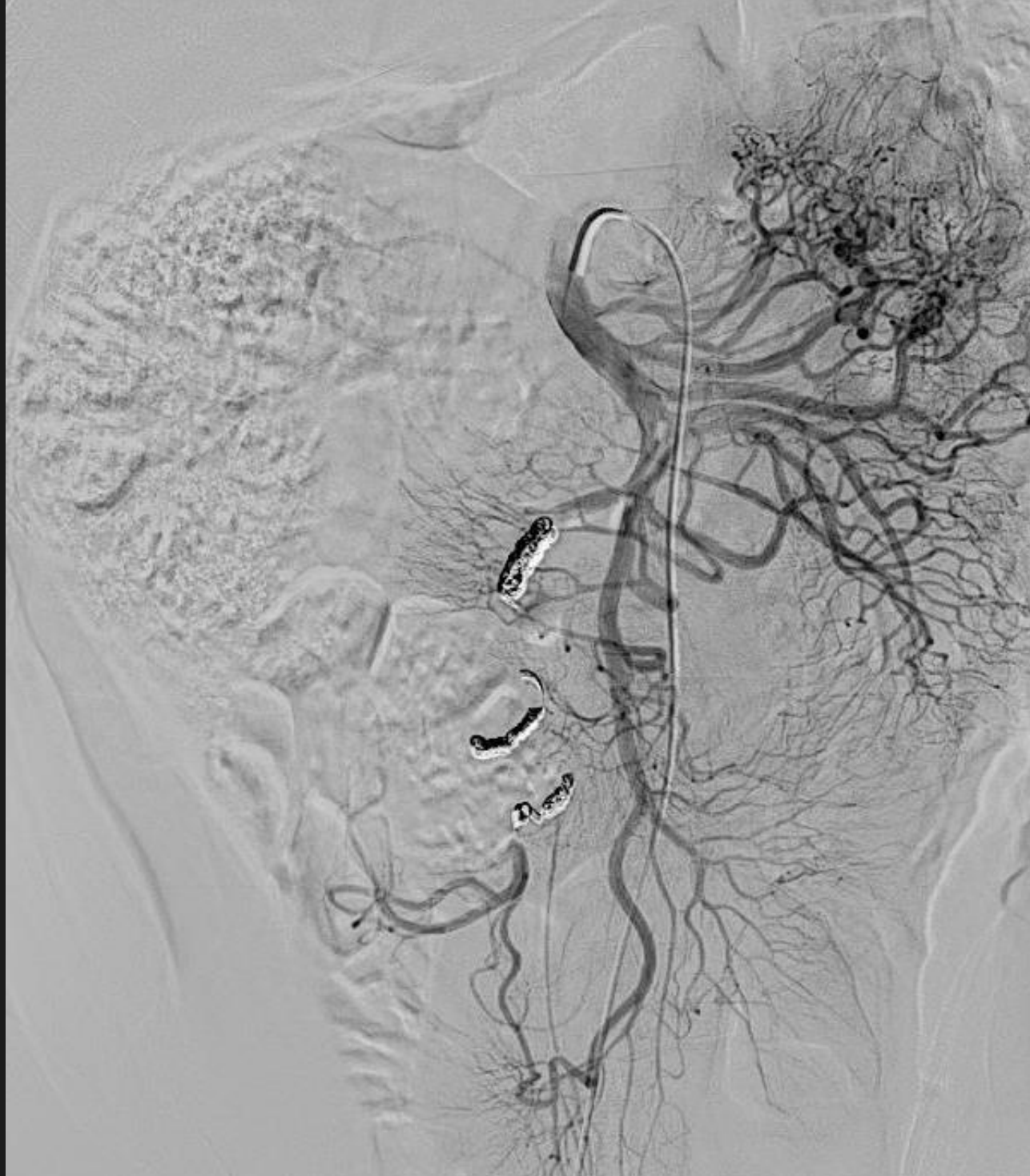
650 € / 1,4cc

Pseudo-anévrismes vs anévrismes

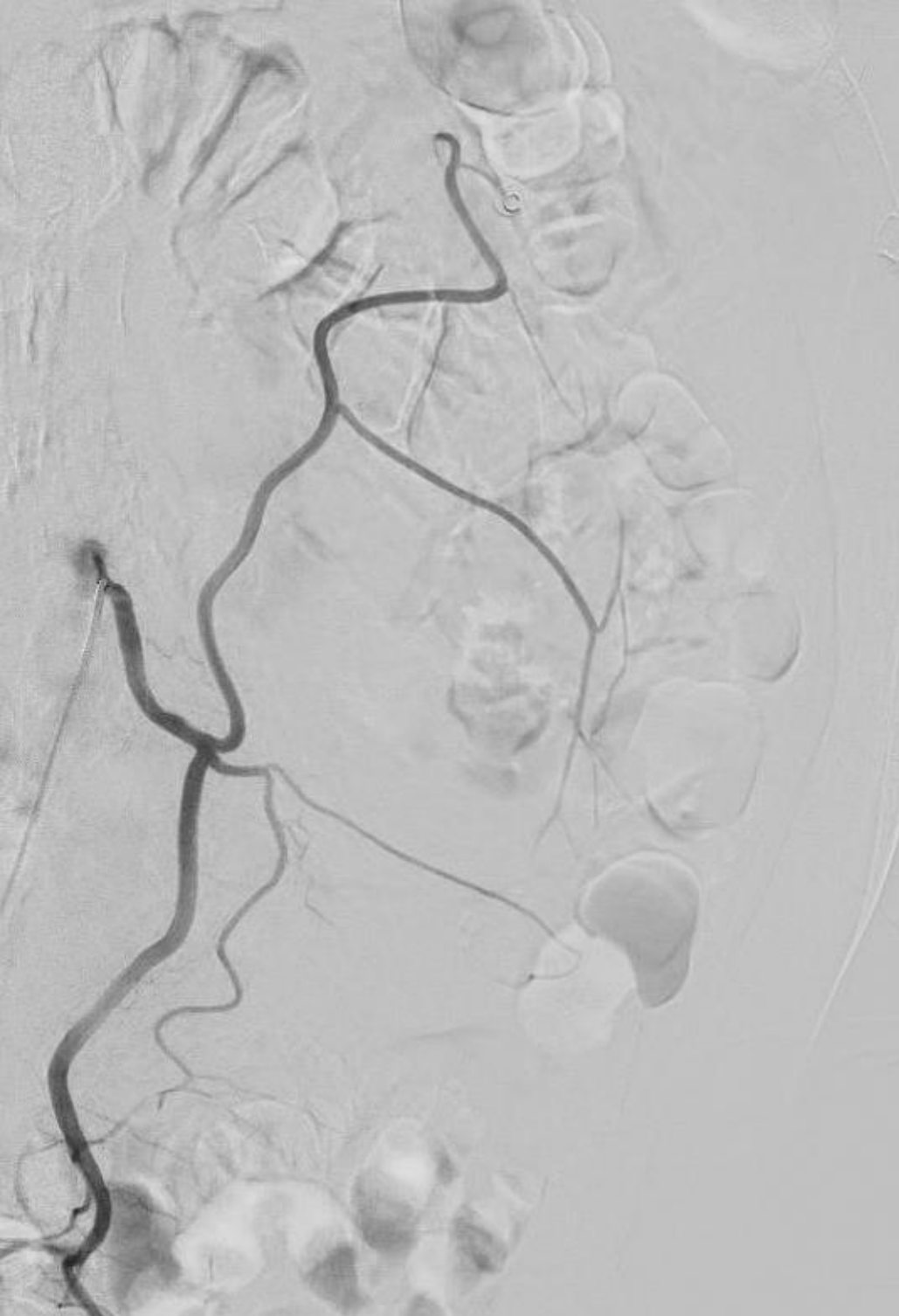
- PAS de paroi réelle (rupture intima et média)
 - Embolisation: « **en sandwich** »
= artère afférente ET efférente ! (+++ réseau vicariant, type splanchnique)
 - Coils, plugs et/ou Onyx
 - Variantes:
 - Thrombose par injection de thrombine (AFC)
 - Exclusion par stent couvert (! Si mycotique)
- Paroi artérielle conservée
 - Embolisation: **de l'anévrisme**
= préserver l'artère porteuse si possible
 - Si sacciforme: coils
 - Si fusiforme: stent couvert



Pseudo-anévrysme AMS – 1 br.afférente, 2 br.efférentes

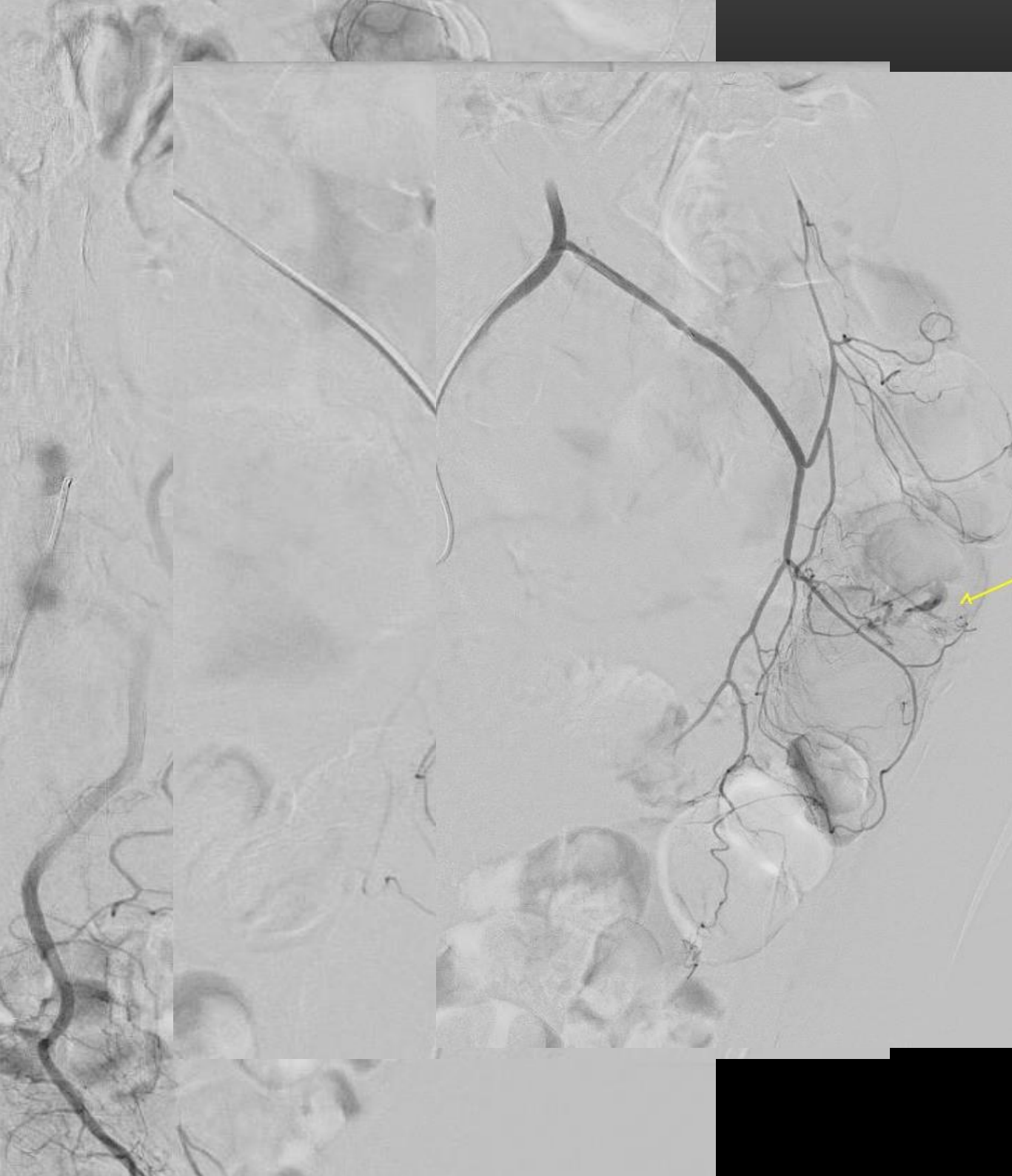


« Sandwich » - coils poussables + détachables



Hémorragie sigmoïdienne (diverticule)

μ coils + Onyx 34







100 € / 1mL



160 € / 10 mL

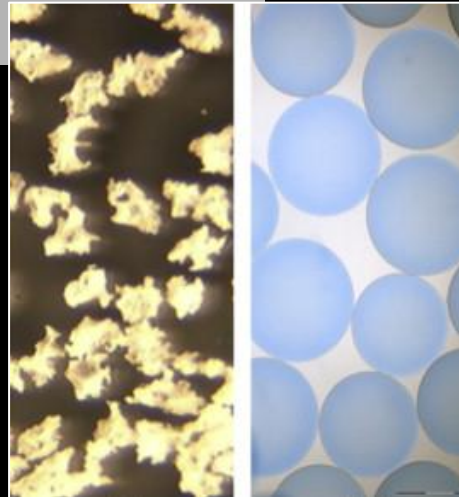


5-10€ (bloc) à 25€ (poudre)



PVA

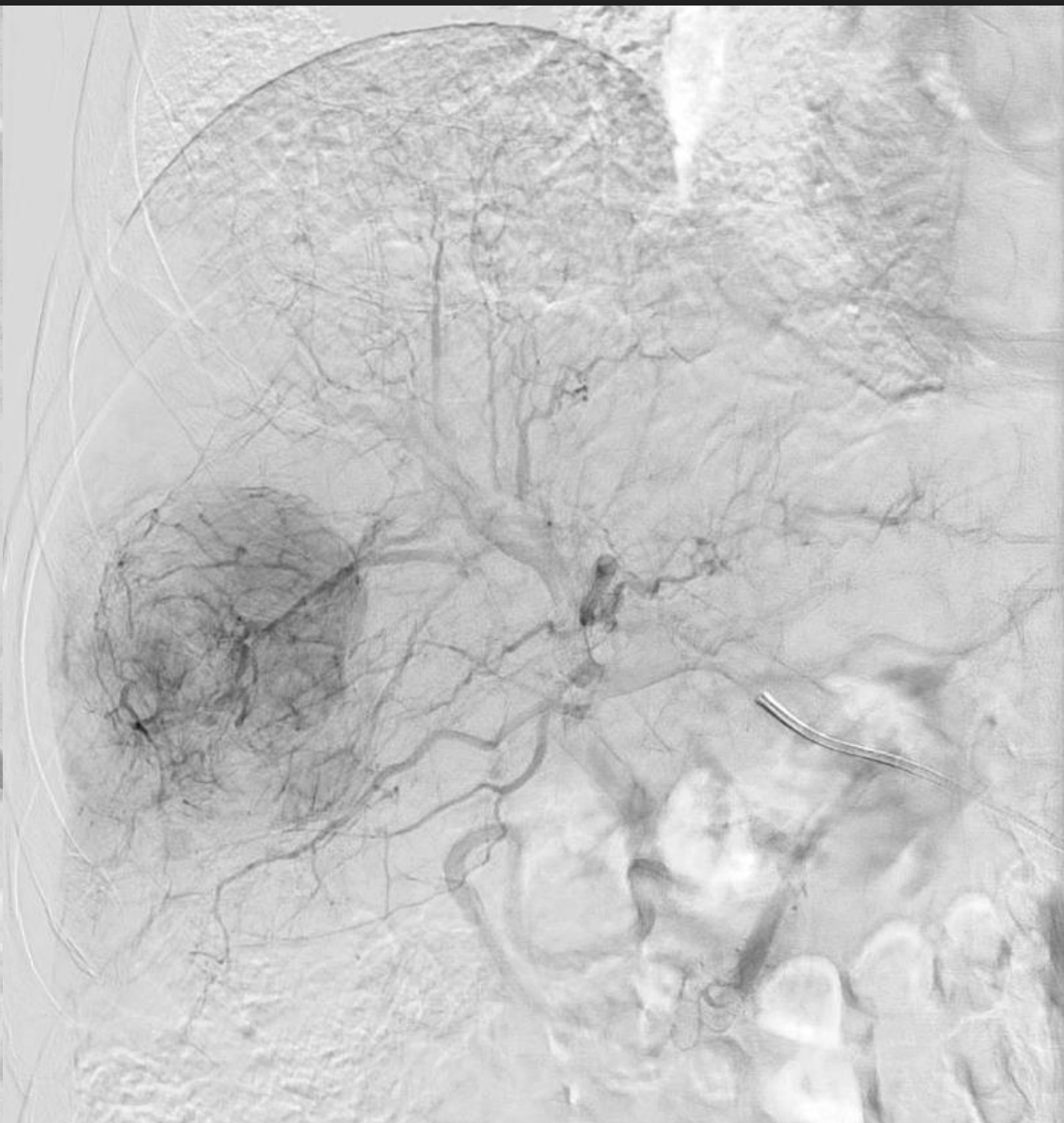
100-150 €

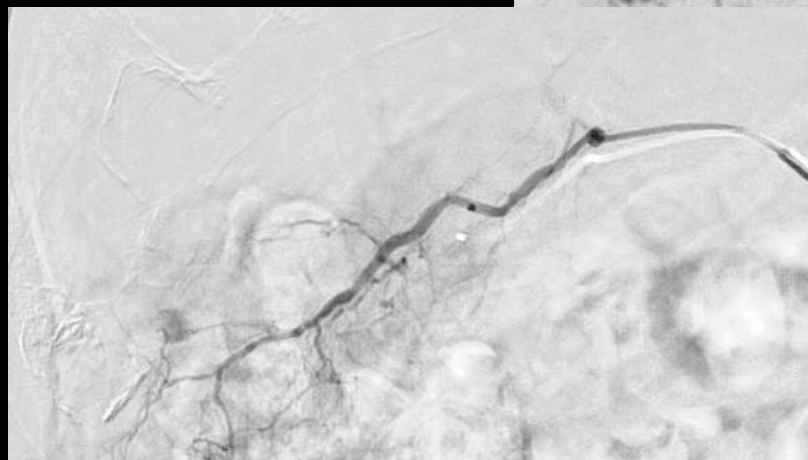
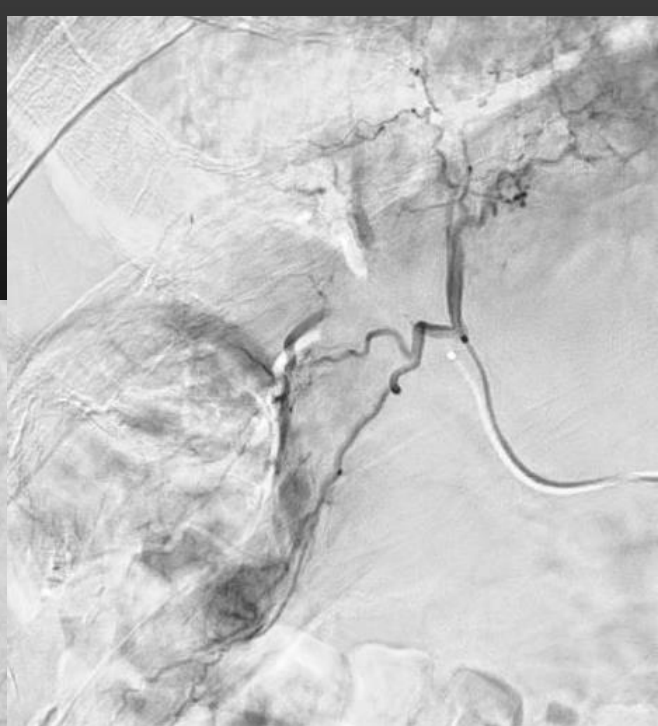
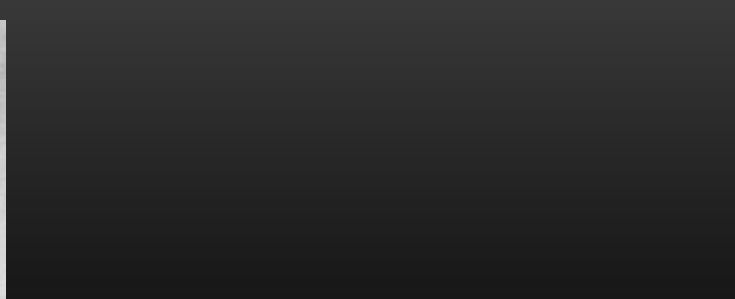


250 €

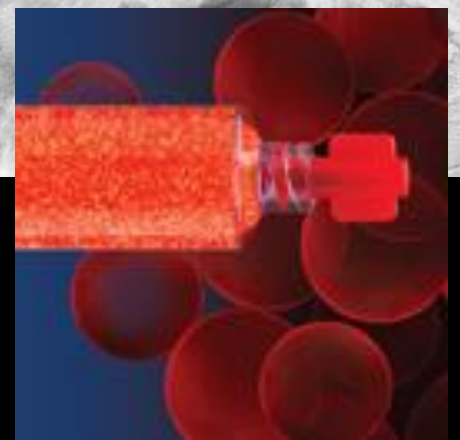
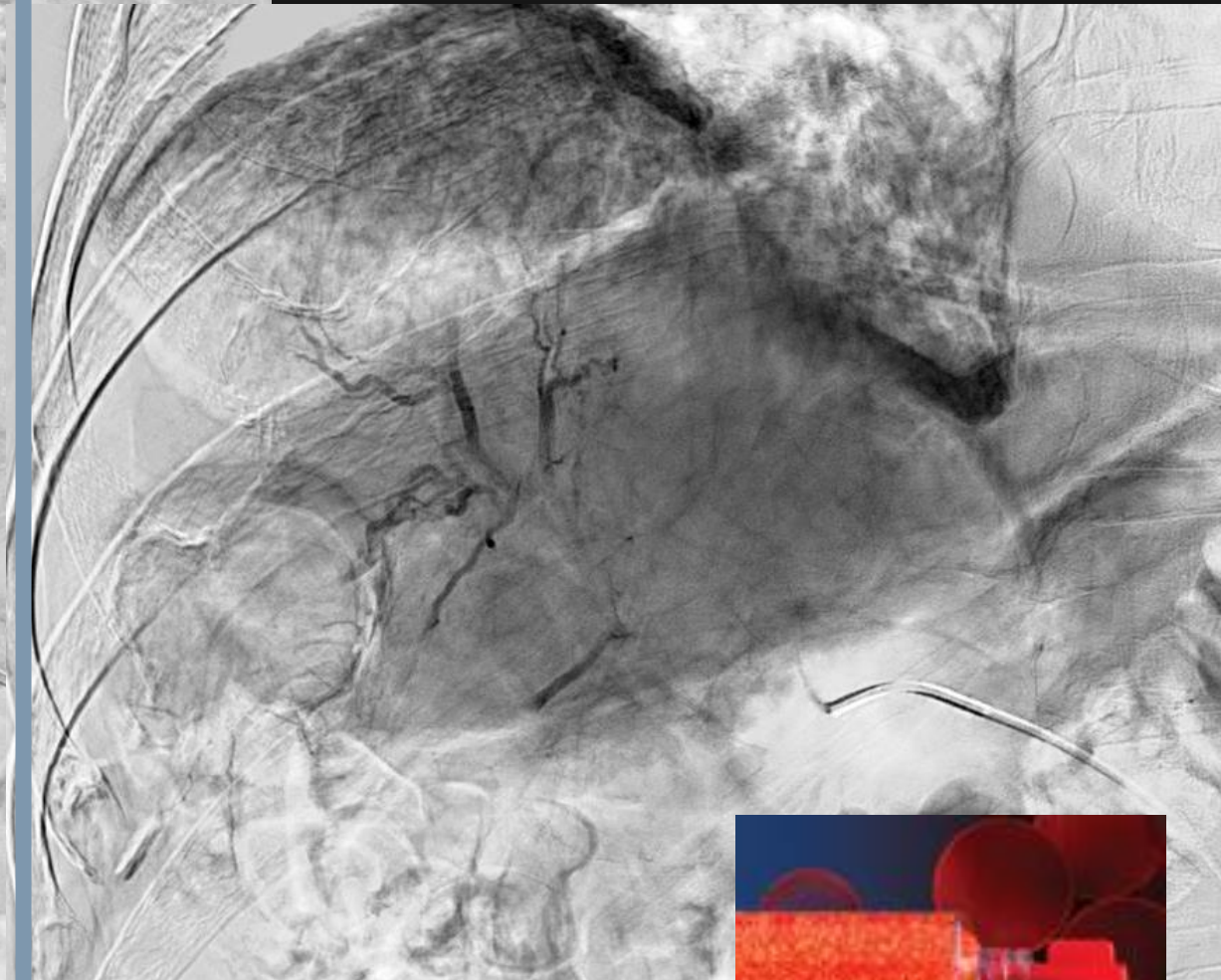
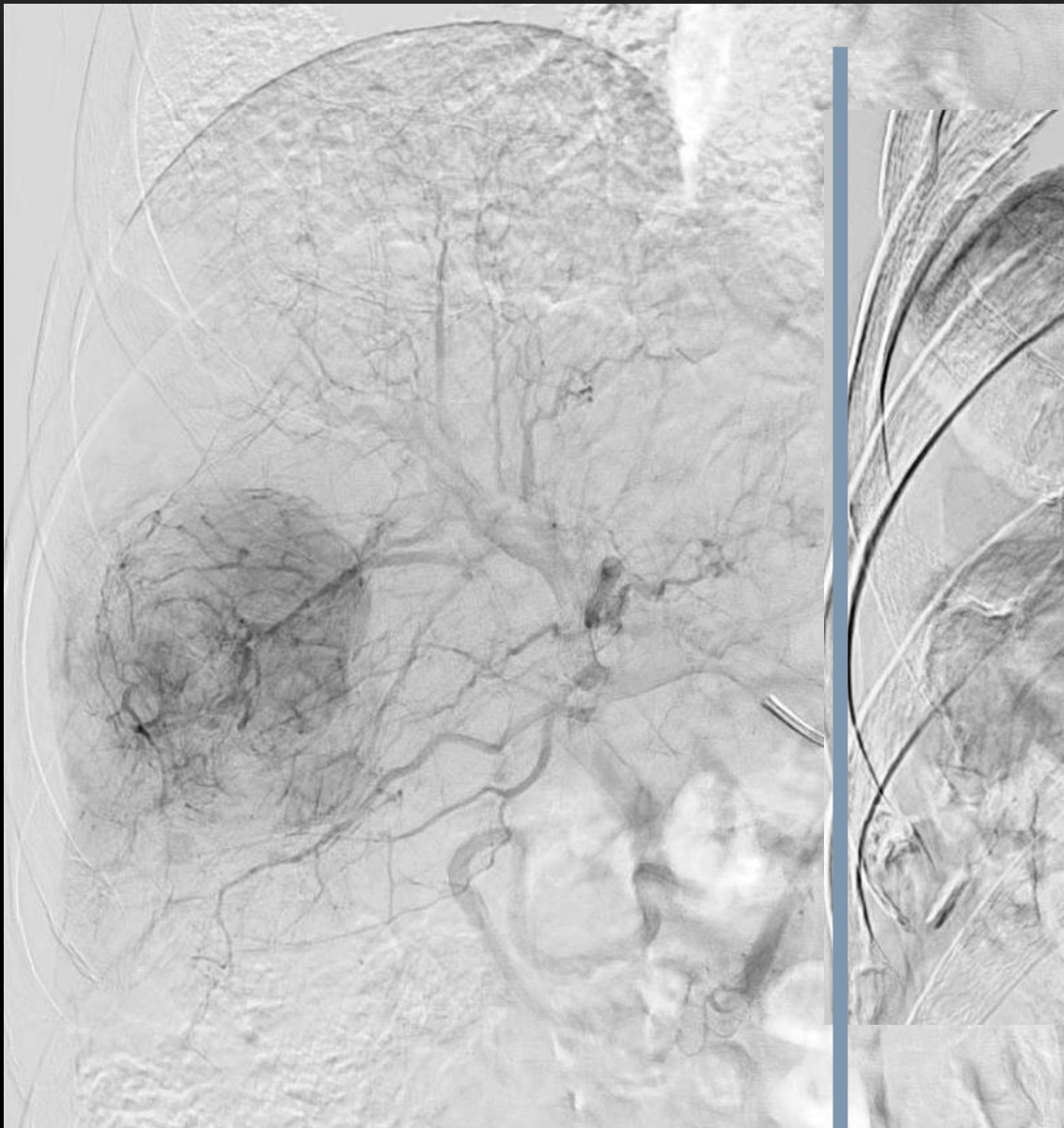
Microsphères







**DEB-Tace (Drug Eluting Beads)
300-500µm + 75mh doxorubicine**



950 €

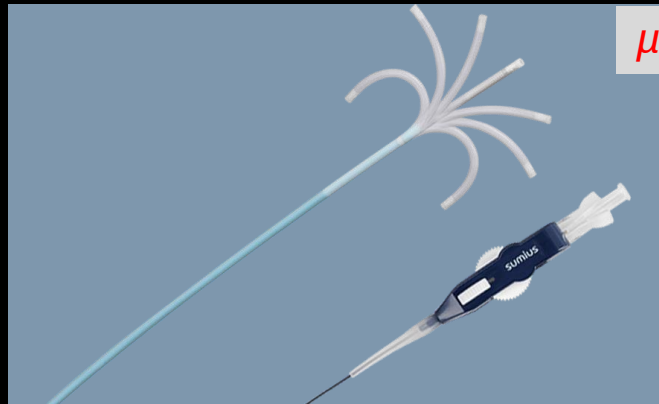


Micro-cathéter: 220-300 €
Micro-guide: 0 €(inclus) - 70 à 200€

Intro: 10-15€
Cathéter: 30 €



μKT anti-reflux 2500 €



μKT directionnel 1000 €

μKT à ballon occlusif 1000 €



3- EMBOLISATION: COUTS ET REMBOURSEMENTS

- 589131/42 Embolisation face / thorax / abdo 1600 468.75€ + G3
Matériel 161490/501: KT + matériel d'embolisation **671,55€ !! forfait**
- 589411/22 Embolisation membre 468.75€
Matériel 161512/23: KT + matériel d'embolisation **309,95€ !! forfait**
- 589116/20 Embolisation encéphalique ou médullaire 1445,31€ + G6
Matériel 161512/23: KT + matériel d'embolisation **illimité pour tout le matériel**

! Non cumulable avec :

589050-61 : PTA-stenting artériel

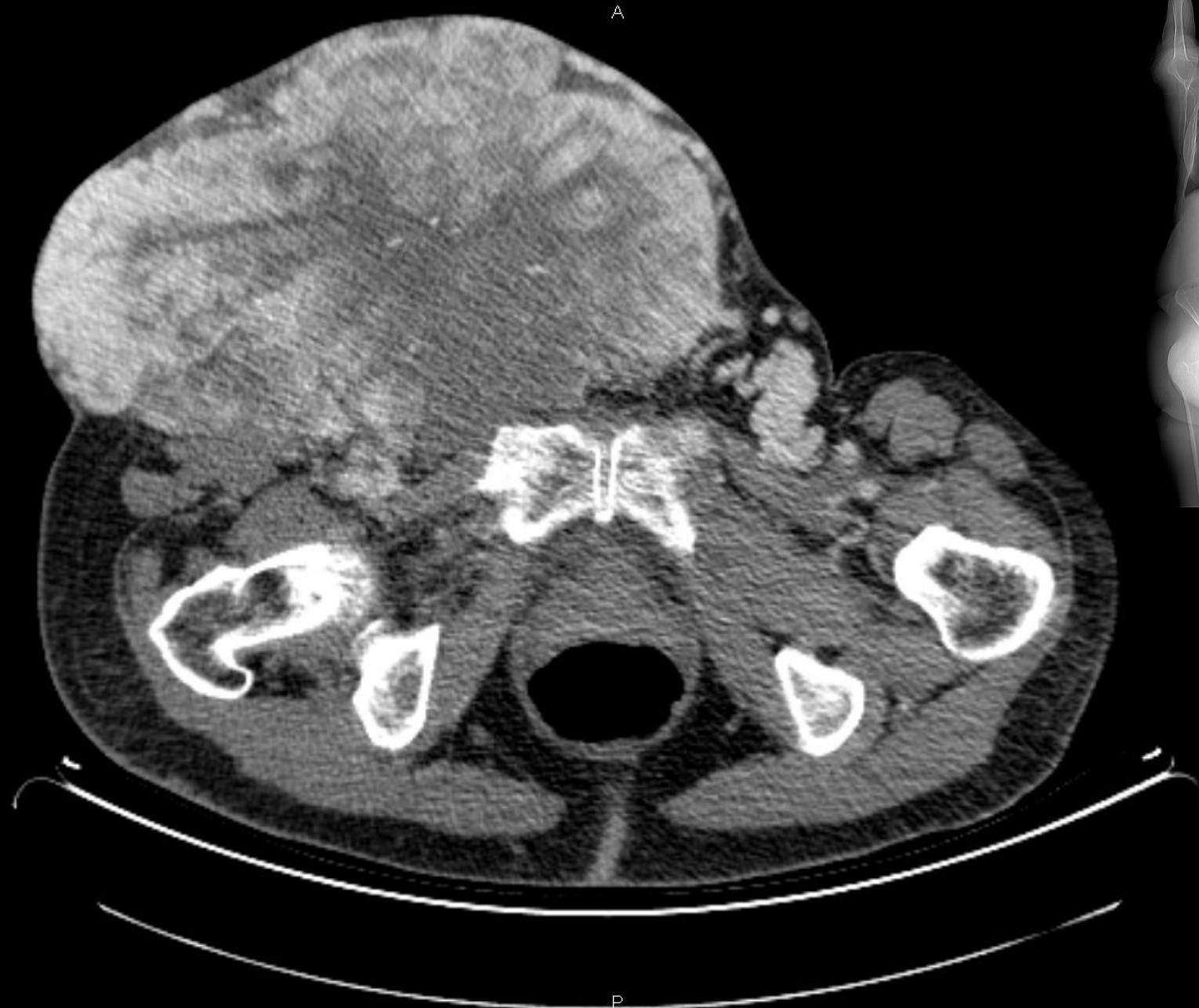
589175-86: Recanalisation par fibrinolyse ou recanalisation mécanique

Et entre eux...

4- EMBOLISATION: ONCO-RI

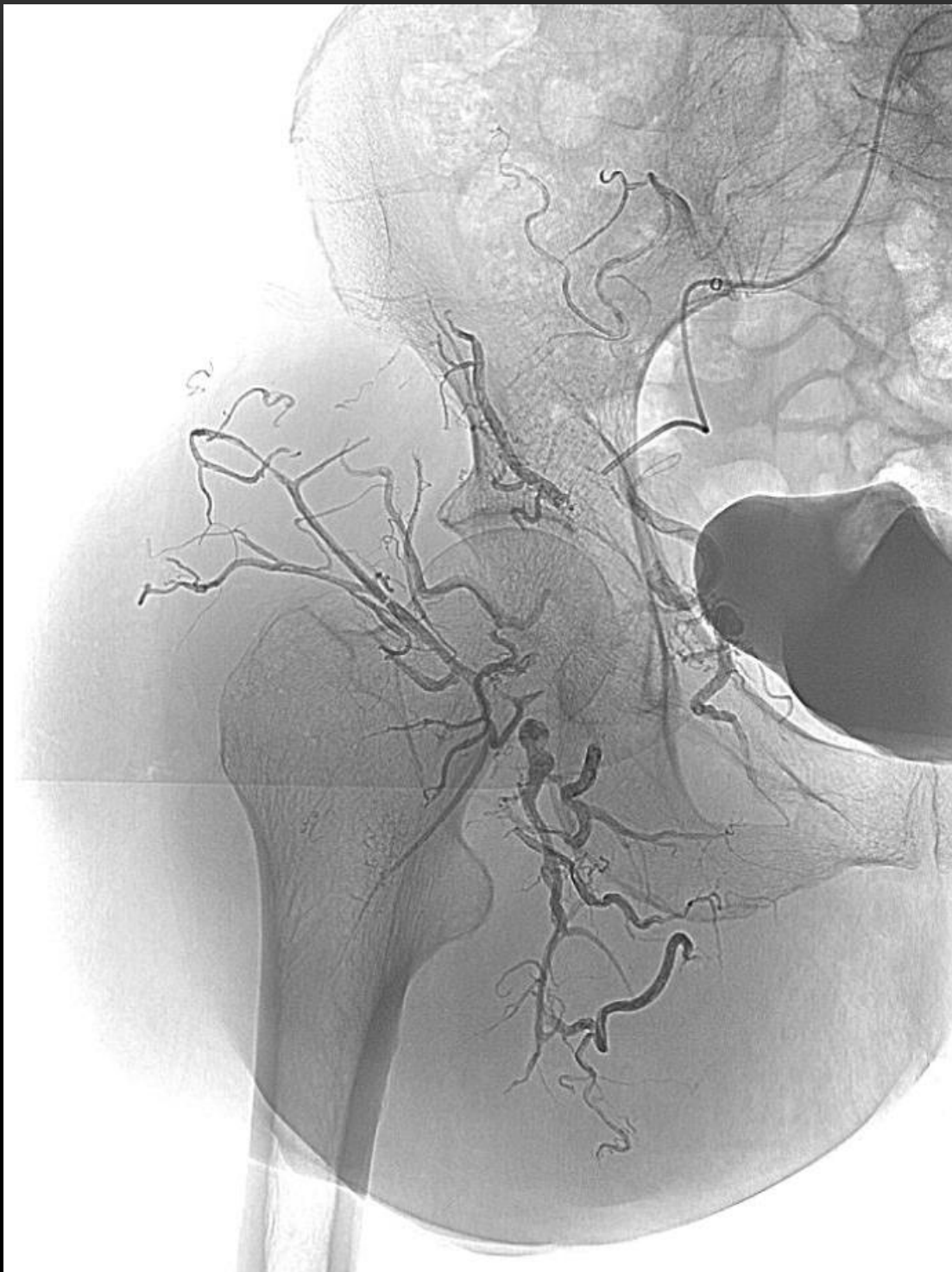
- Embolisation simple
 - Hémorragie
 - Nécrose tumorale (HCC)
 - Pré-exérèse chirurgicale
- Chimio-embolisation : c-TACE vs DEB-TACE
- Radio-embolisation : SIRT/TARE
- Embolisation portale droite (+/- veine sus-hépatique droite)

EMBOLISATION PRE-CHIRURGIE



Embolisation pré-op d'un sarcome de la cuisse (Onyx 34)





Onyx 34 L (6cc) – 21cc tot

4 x 2500 €!

CHIMIO-EMBOLISATION (TACE)

- Indications:

1. **Carcinomes hépatocellulaires (CHC)**

Doxorubicine

- A. Au stade précoce (BCLC A - Barcelona Clinic Liver Cancer A) :
 - en attente de transplantation hépatique ;
 - en association au traitement par radiofréquence pour les tumeurs de plus de 3 cm de diamètre.
- B. Au stade intermédiaire (**BCLC B**): en 1ere ligne → **indication principale de la TACE**.
- C. Au stade avancé (BCLC C) pour des cas sélectionnés.

2. **Métastases hépatiques**

Irinotecan

- A. **Tumeurs endocrines** : si symptomatiques et/ou évolutives sous traitement médical.
- B. **Cancer colorectal** : si évolutives sous ChT systémique, sans maladie extra-hépatique évolutive.
- C. **Mélanome choroïdien** : en 1ere ligne si pas de maladie extra-hépatique évolutive.

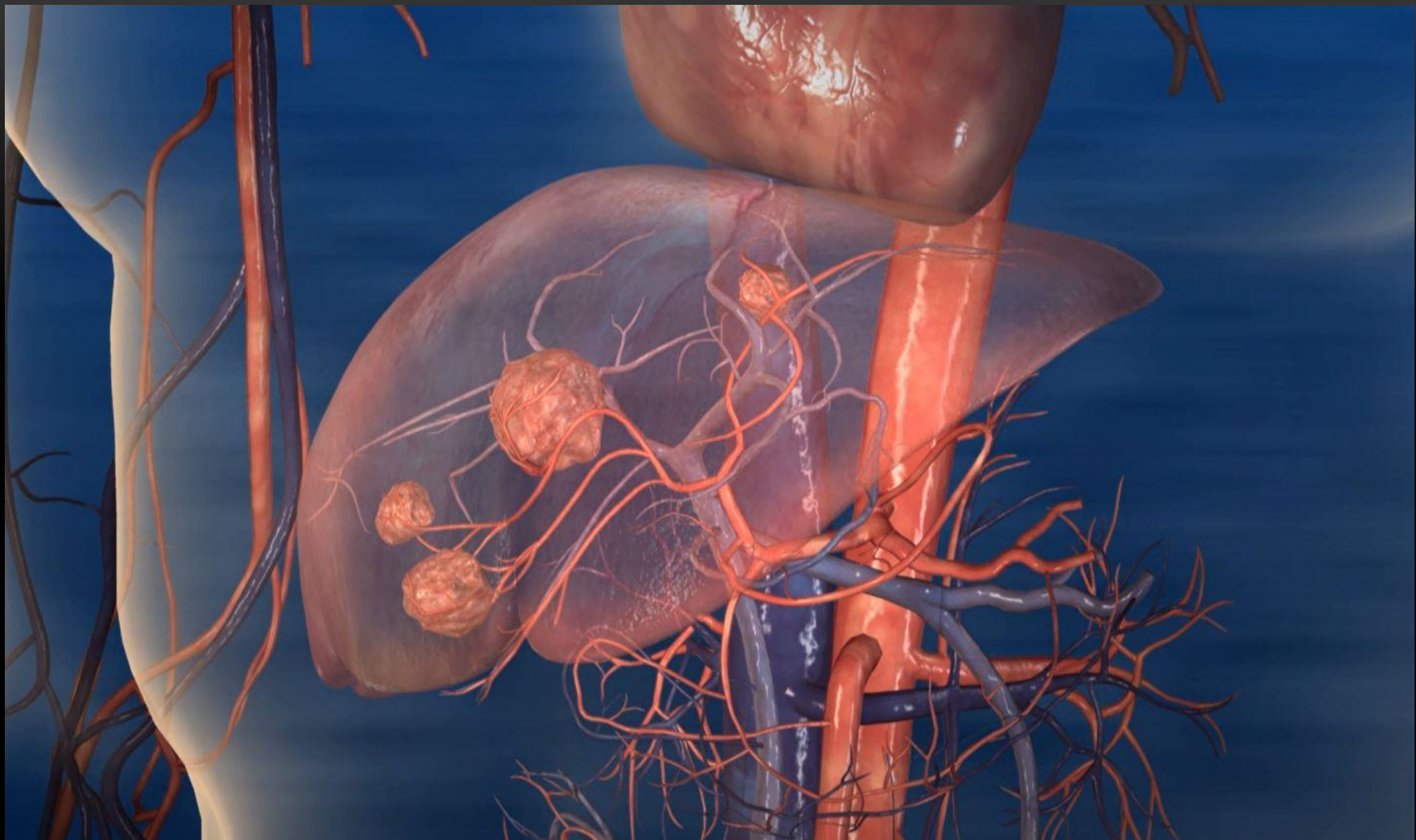
- Techniques:

1. **C-TACE**: Conventional Trans-Arterial ChemoEmbolization (Lipiodol)

→ France, USA

2. **DEB-TACE**: Drug-Eluting Beads TACE (100-700 µm)

→ Belgique



Vascularisation:

Hépatique

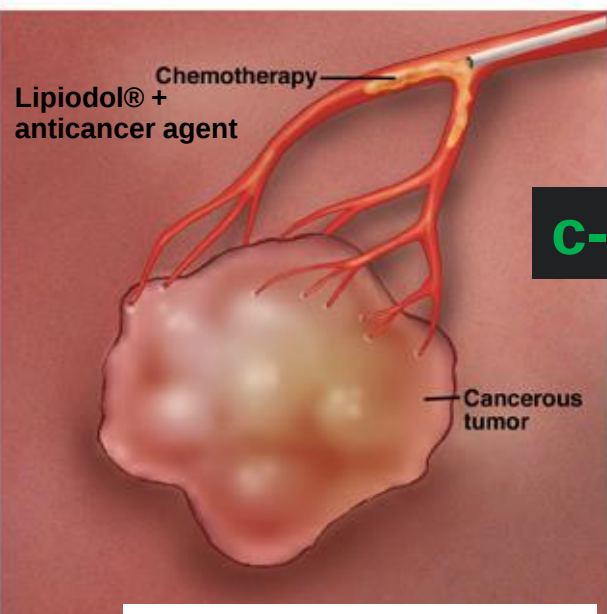


V.Porte >> A.Hépatique

Métastatique / HCC



A.Hépatique >> V.Porte



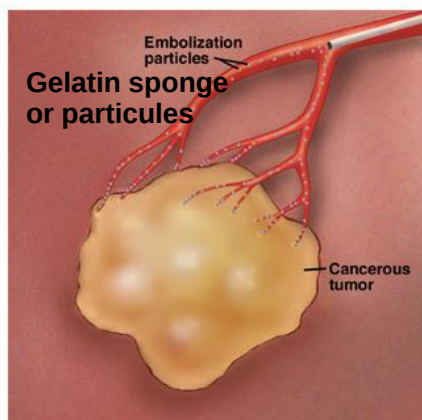
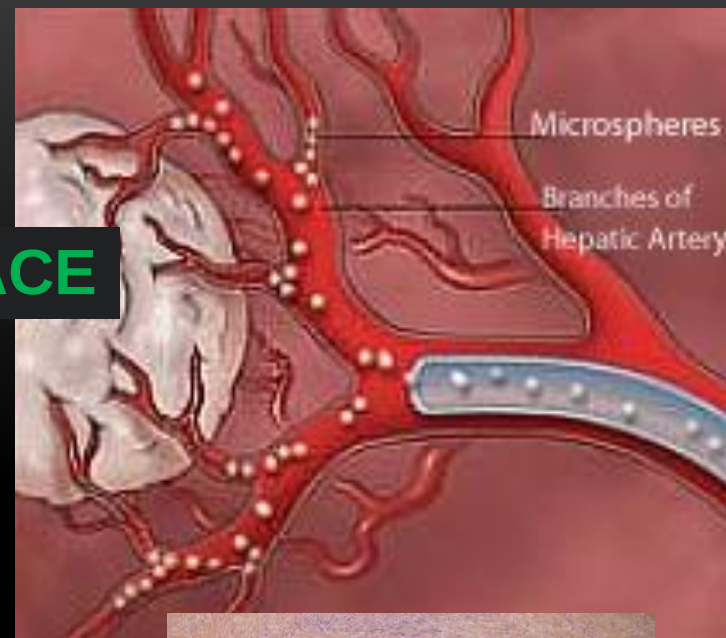
c-TACE

DEB-TACE

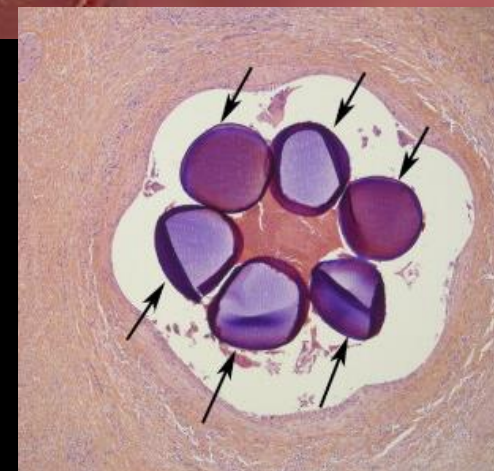
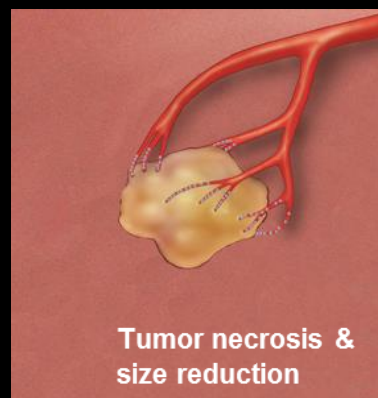
Chemotherapeutic drug
→ cytotoxic effect on tumor cells

+

Embolization of small blood vessels
→ slow-down of tumor growth & necrosis



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Efficacité: cTACE = DEBTACE
Tolérance: cTACE << DEBTACE

- **Contres-indications**

Absolues

- **Insuffisance hépatocellulaire** : en l'absence de cirrhose ou Child B $\geq$ 8 si cirrhose
- **Envahissement massif** des deux lobes hépatiques
- **Absence de flux portal hépatopète intra-hépatique** si TACE non sélective (thrombose portale intra- et/ou extra-hépatique complète, flux portal hépatofuge, TIPSS fonctionnel)
- Propres à l'anti-mitotique utilisé

Relatives

- Insuffisance rénale (GFR < 30 ml/min)
- Troubles de l'hémostase
- Cirrhose: si varices digestives non traitées à risque de saignement élevé.
- Pathologie des voies biliaires (obstruction, endoprothèse) et anastomose bilio-digestive.
- Sévères comorbidités

- Complications

1. **Syndrome post-embolisation: fièvre + douleurs** → >50% des TACE non sélectives.

↑ si absence de cirrhose

↓ si TACE sélective

R/ AINS, anti-D+ (morphiniques)

2. **Insuffisance hépatocellulaire** (+/- 15% des cas)

↑↑ si envahissement tumoral important et/ou cirrhose

3. Complication infectieuse (0 à 3% des cas)

↑ si anomalies biliaires, anastomose bilio-digestive

↑ si DEB-TACE à la doxorubicine en l'absence de cirrhose (?)

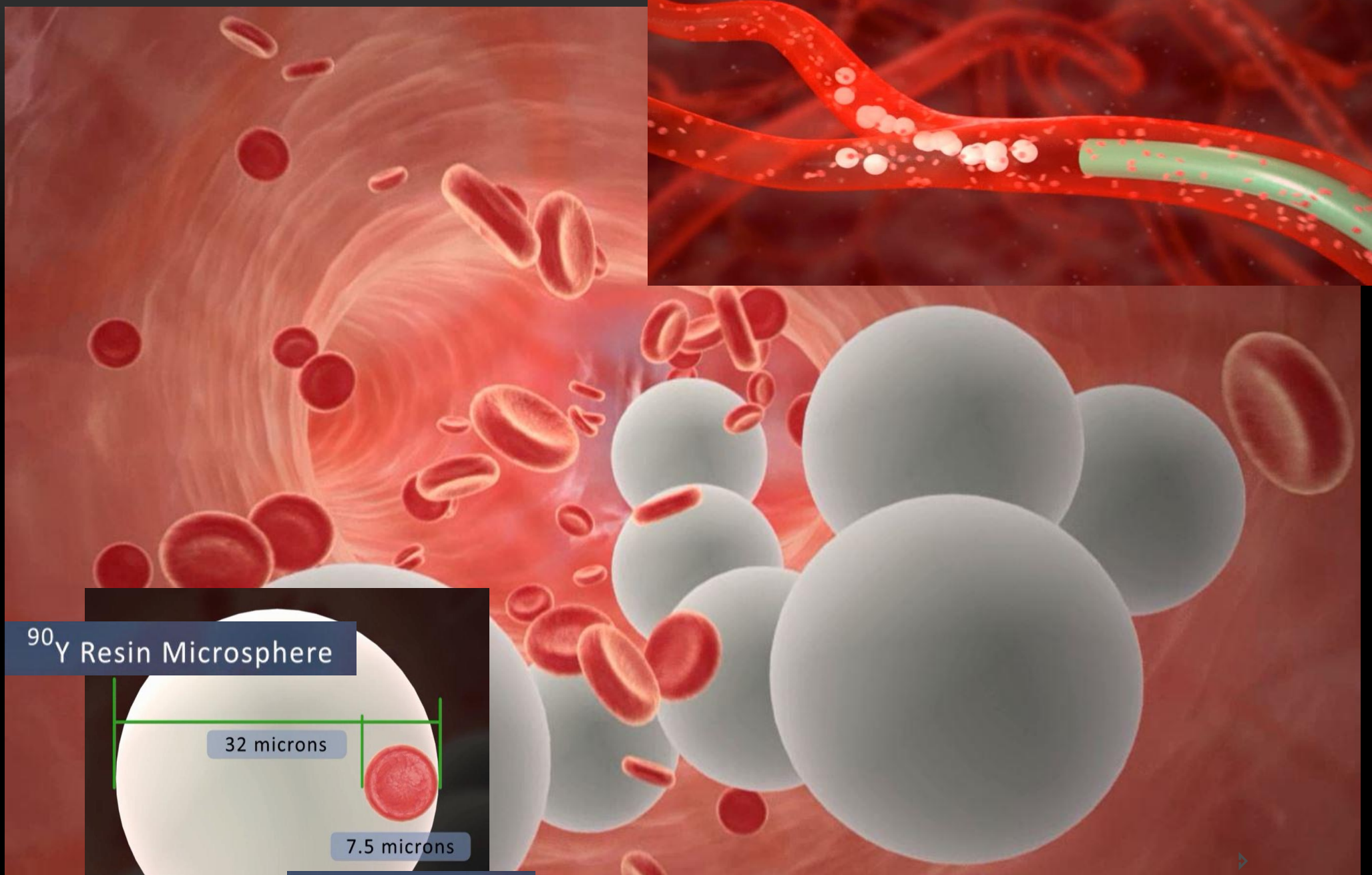
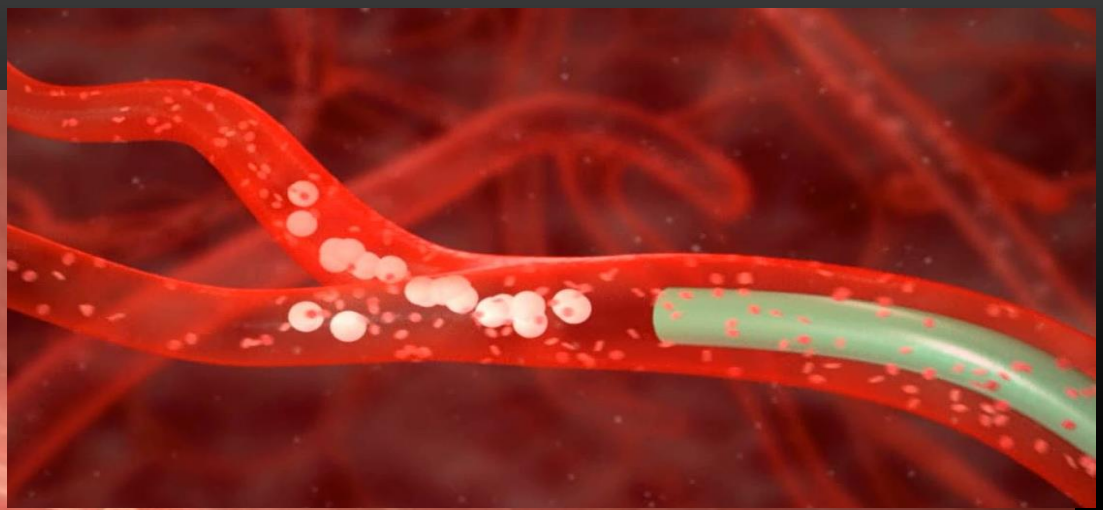
4. Autres complications mineures (peu fréquentes): hématome au point de ponction fémoral, insuffisance rénale (post injection iode), effet secondaire de la chimiothérapie (e.g. alopecie...).

- En l'absence de complications, **l'hospitalisation dure (48h à) 72 h.**

- Nécessite souvent **plusieurs séances** de TACE

RADIO-EMBOLISATION (SIRT - Y⁹⁰ / TARE)

- *Selective Internal Radiation Therapy (SIRT) ou Trans Arterial RadioEmbolization (TARE)*
- Principe:
Embolisation de μ sphères radioactives (Yttrium 90) au sein des tumeurs hépatiques
Yttrium 90 = **émetteur β** , $\frac{1}{2}$ vie = 2,6j
- Indication:
Métastases hépatiques (colorectales, neuroendocrines, autres...) et HCC
- Technique: en minimum 2 temps
 1. « Work-up »
 2. Radio-embolisation



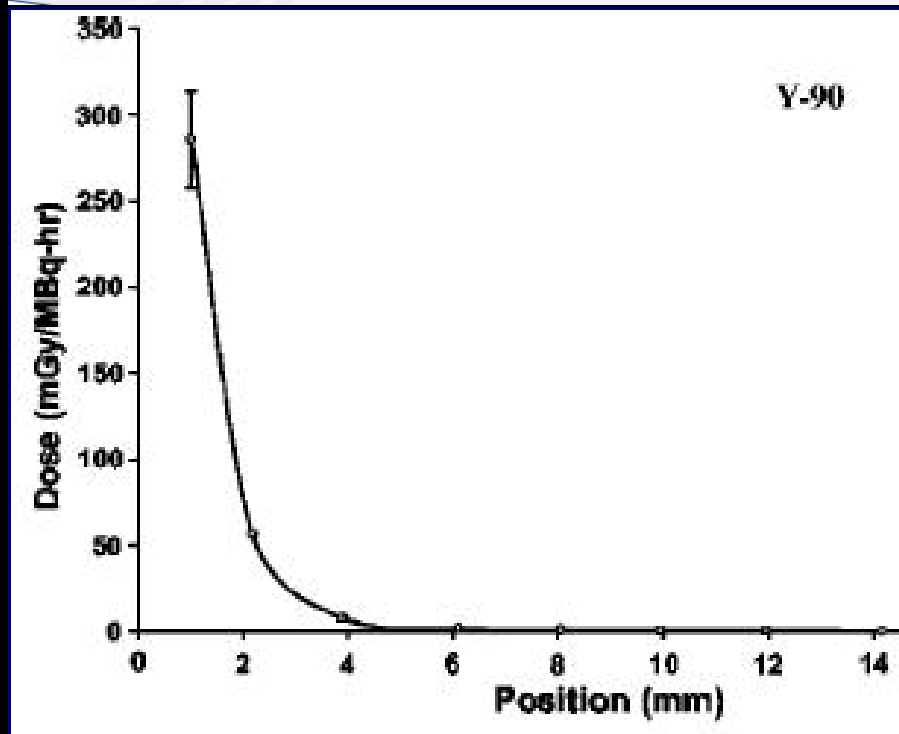
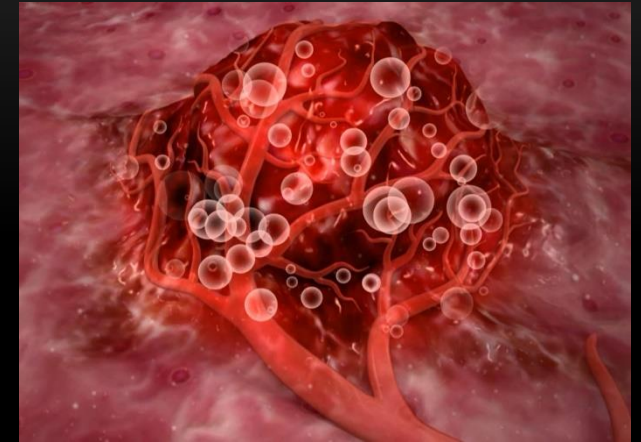
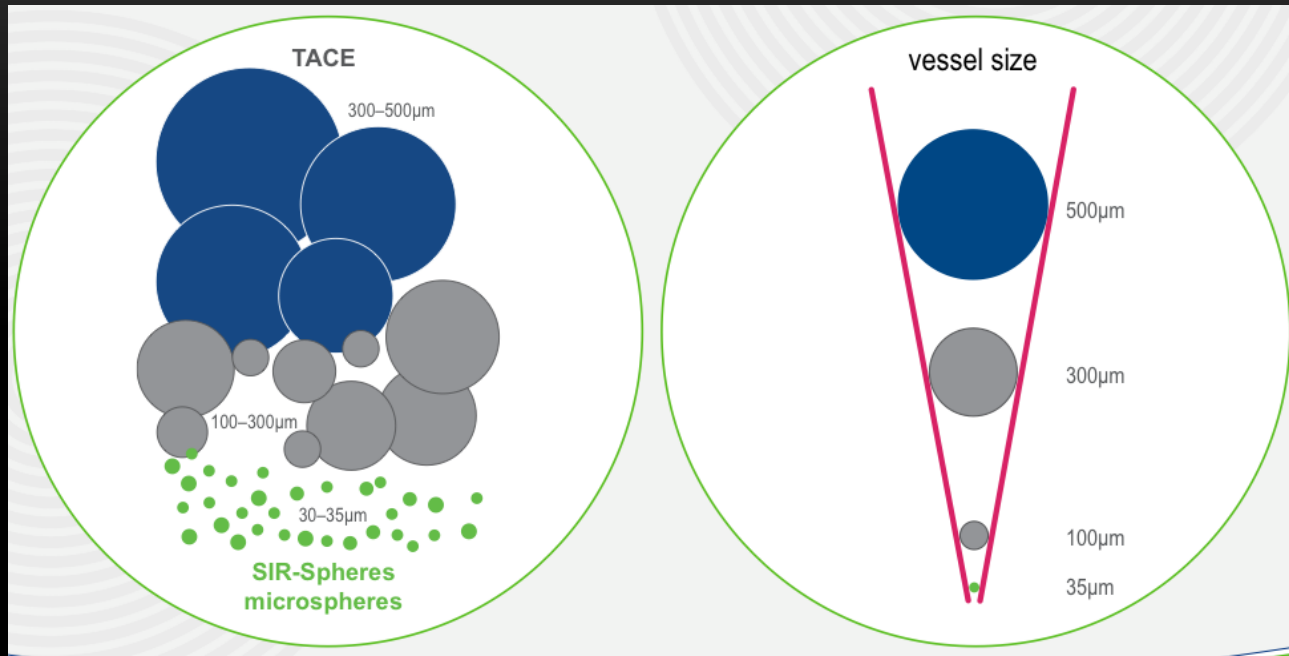
^{90}Y Resin Microsphere

32 microns

7.5 microns

Red Blood Cell

Comparaison de la taille des SIR-SPHERES avec celles des DEB-TACE



- Micro-sphère de **35µm** chargée d'**Yttrium 90**:
 - pénétration tumorale ++
 - irradiation locale avec une grande énergie
- Diffusion tissulaire moyenne du **rayonnement β**:
 - 2.5 mm (maximum: 11 mm)
 - patient (quasiment) non irradiant !

2 types de μ -spheres à l'yttrium-90 actuellement sur le marché:

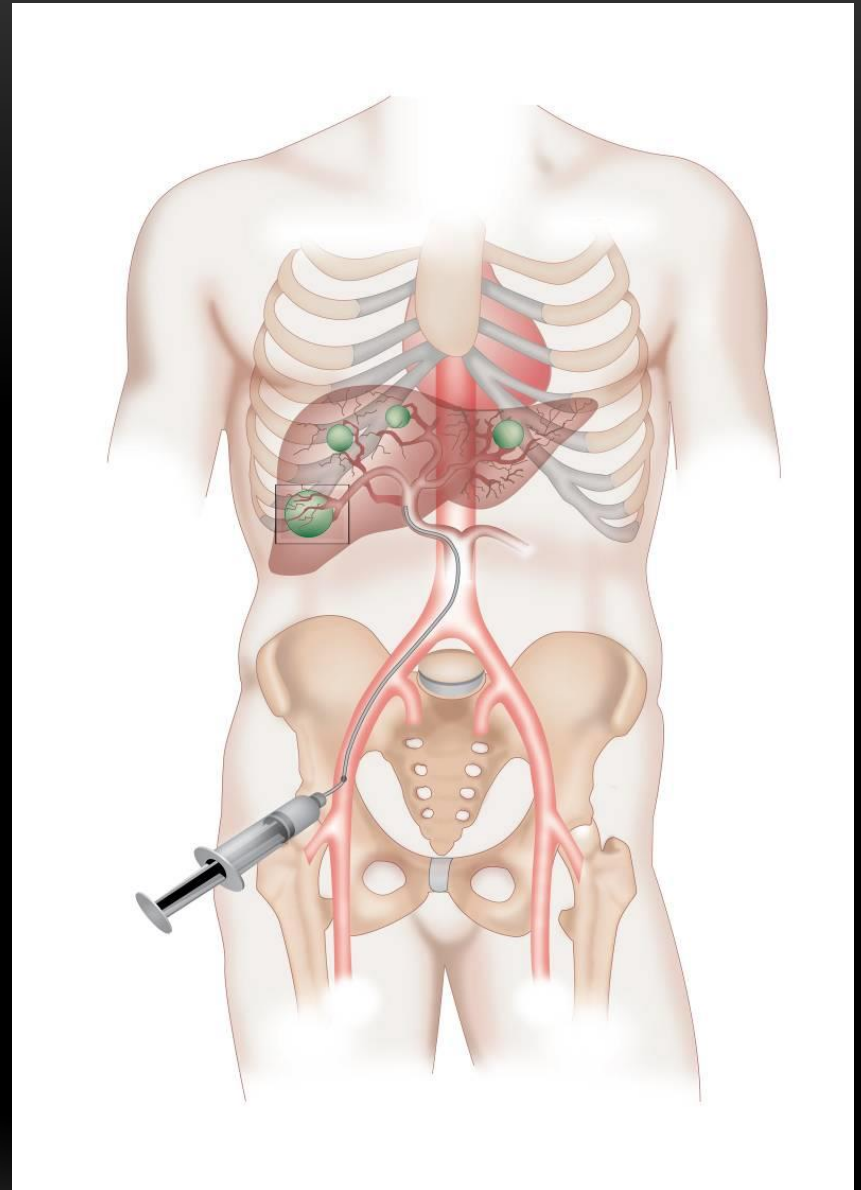
Parameter	Resin	Glass
Trade name	SIR-Spheres	Theraphere
Manufacturer and location	Sirtex Medical, Lane Cove, Australia	MDS Nordion, Kanata, Canada / BTG
Diameter	20-60 μm	20-30 μm
Specific gravity	1.6 g/dL	3.6 g/dL
Activity per particle	50 Bq	2500 Bq
Number of microspheres per 3 GBq vial	40-80 million	1.2 million
Material	resin with bound yttrium	glass with yttrium in matrix

+ 1 nouveau type de μ -spheres à l'holmium-166 : **QuiremSpheres**

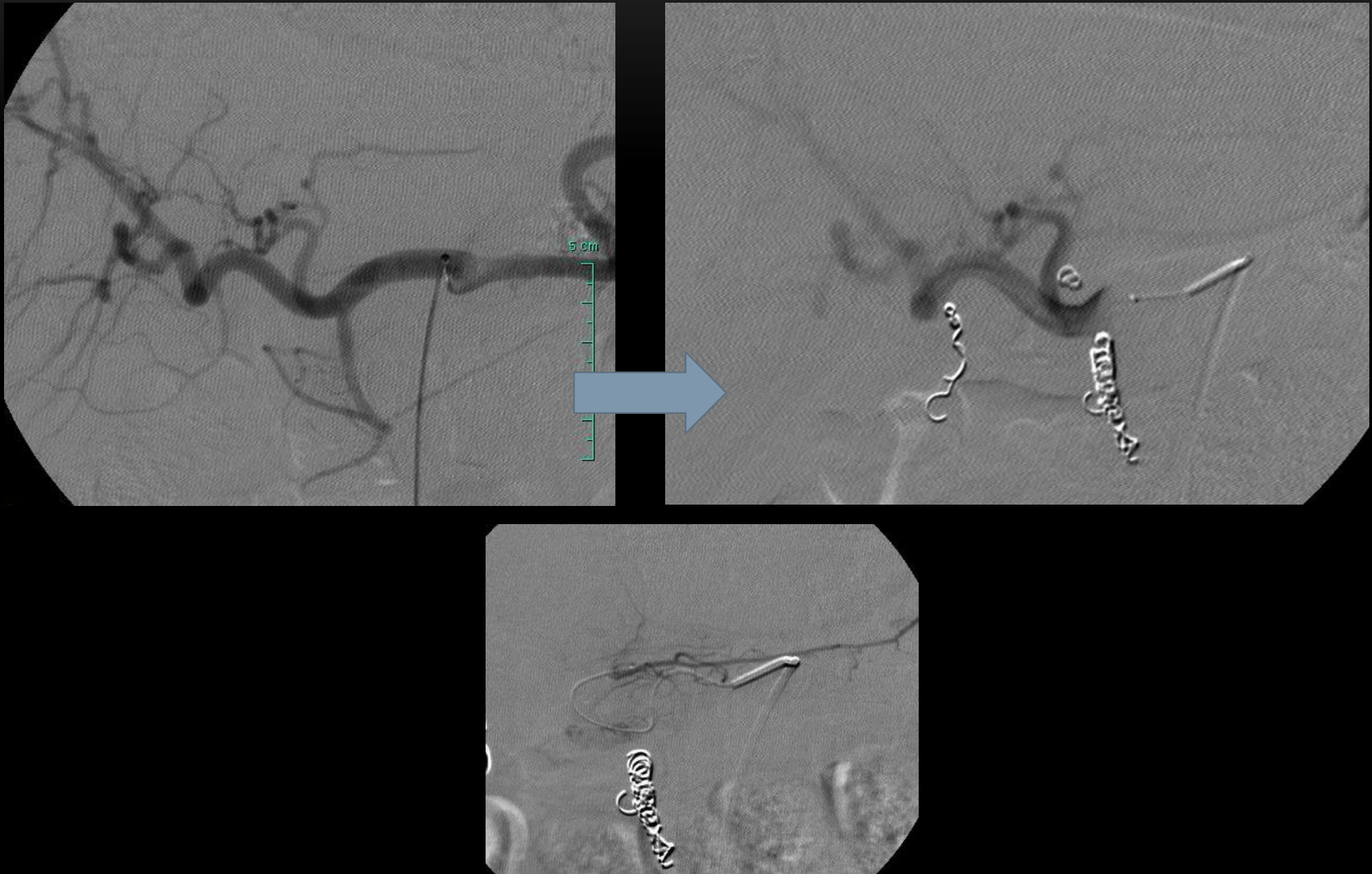
En général: processus en 2 étapes

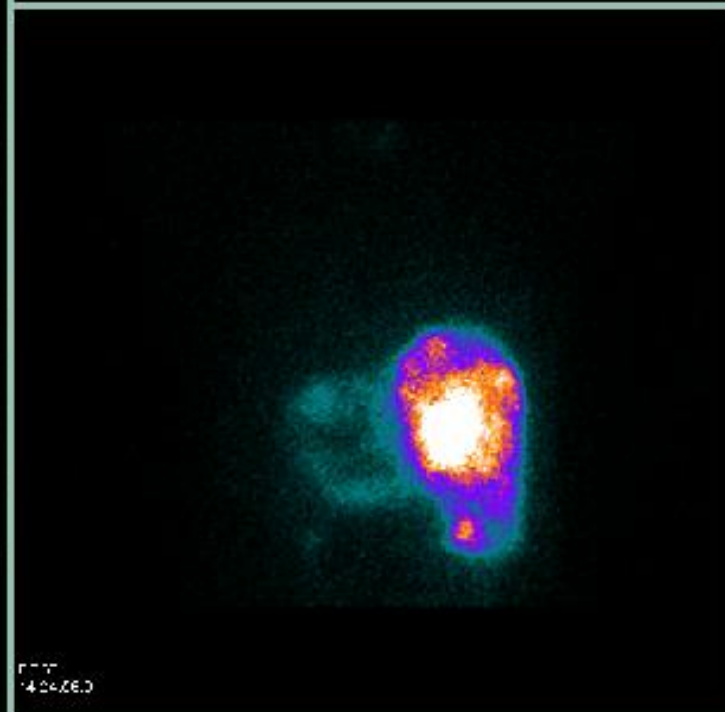
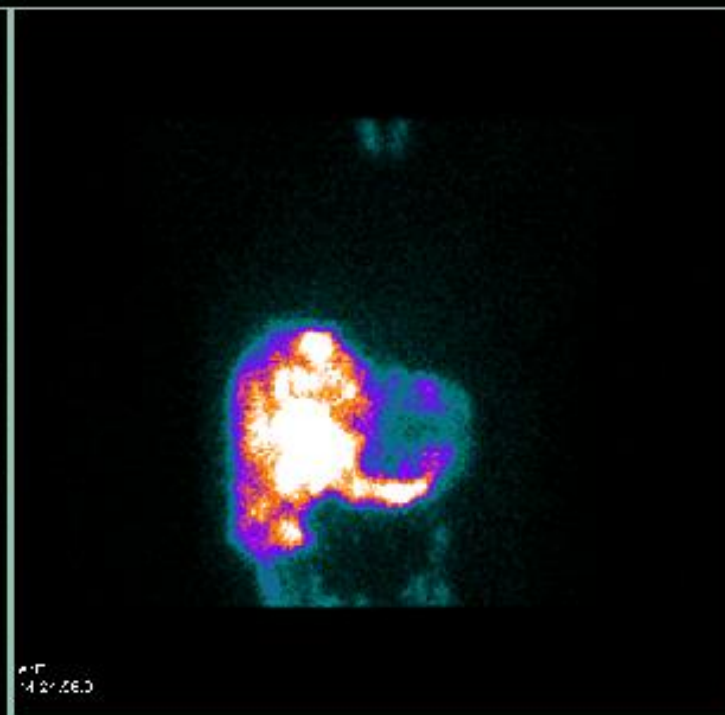
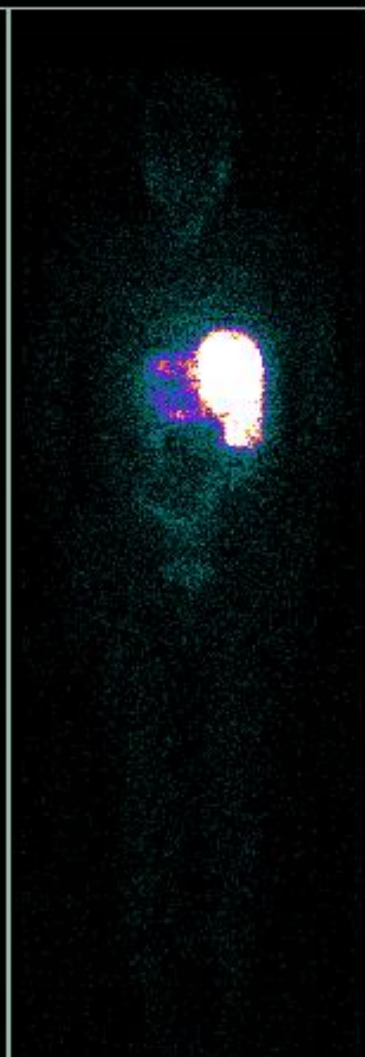
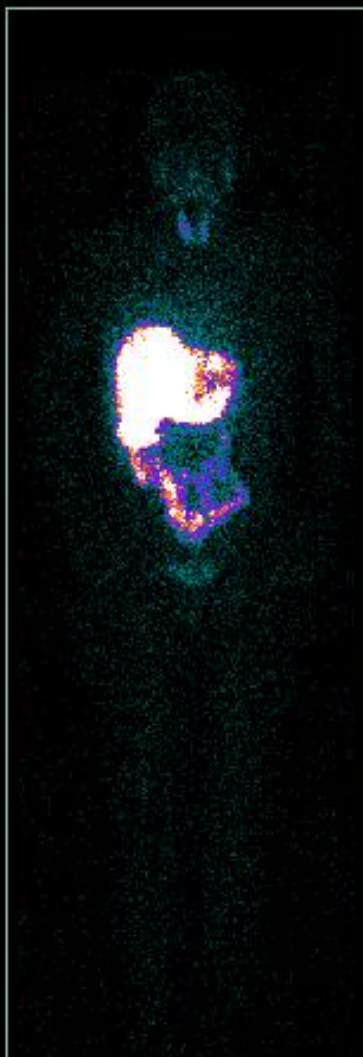
1. Procédure du "Work-up":

- Accès à l'artère hépatique par un cathéter trans-fémoral et identification des vaisseaux qui alimentent la (les) tumeur(s)
- **Occlusion prophylactique** des vaisseaux à destinées extra-hépatiques (gastroduodénale, gastrique droite , etc)
- Injection de ^{99m}Tc -MAA
- Analyse **SPECT** pour évaluer le shunt hépato-pulmonaire et une dispersion extra-hépatique éventuelle.

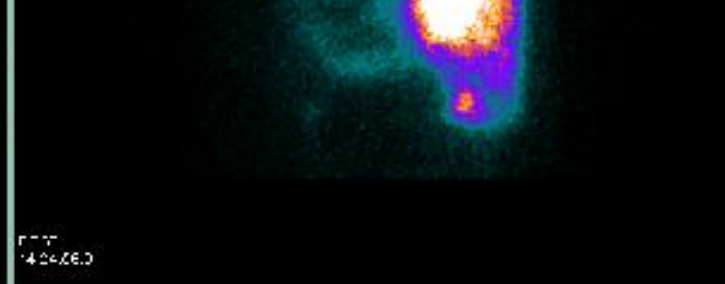


Coiling préalable avant injection test de ^{99m}Tc -MAA



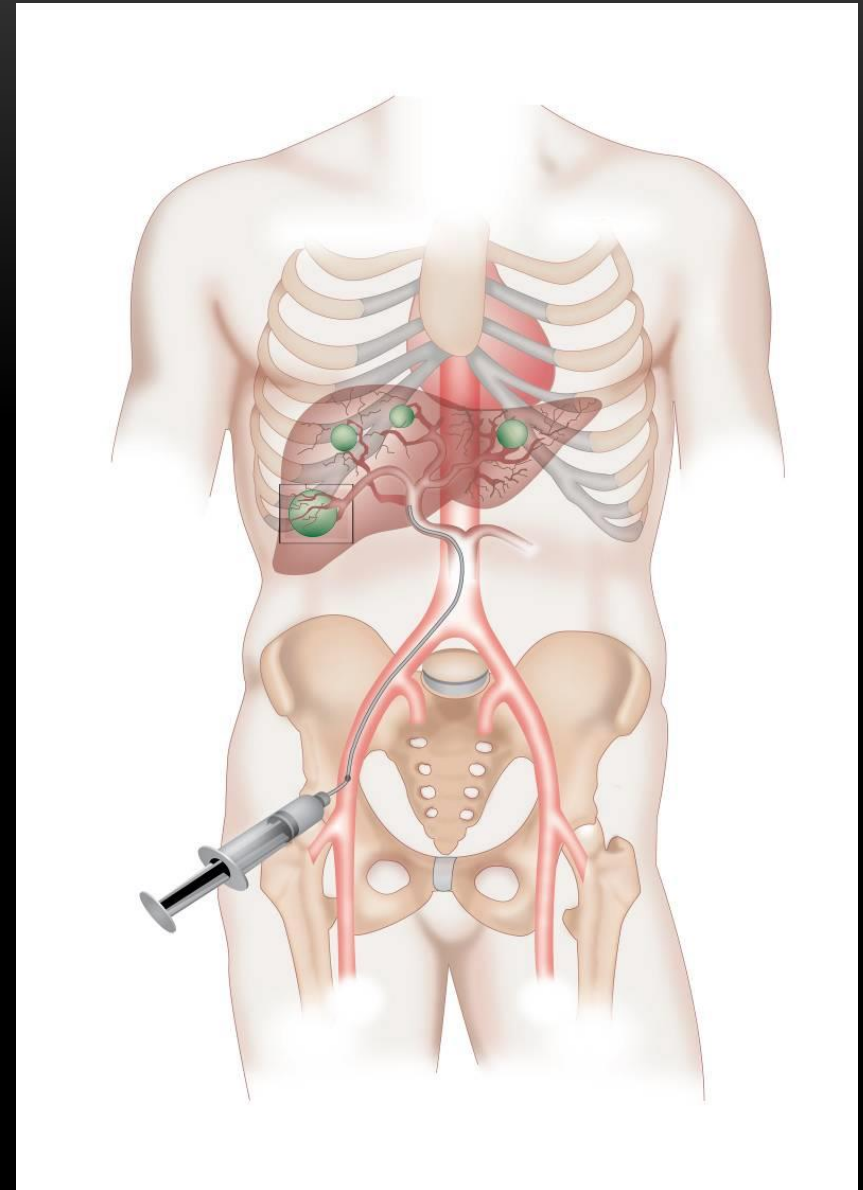


!! Uptake extra-hépatique : ECHEC



2. Phase de traitement:

- 1 à 3 semaines plus tard
- Réévaluation de l'occlusion
- Injection de la dose de SIR-sphères
- Examen SPECT ou PET optionnel pour confirmer l'implantation correcte des SIR-sphères
- Le plus souvent bilobaire d'emblée
- Approche de traitement séquentiel des lobes seulement si nécessaire pour la sécurité du patient
- 1 seul traitement nécessaire ($\neq$ TACE)

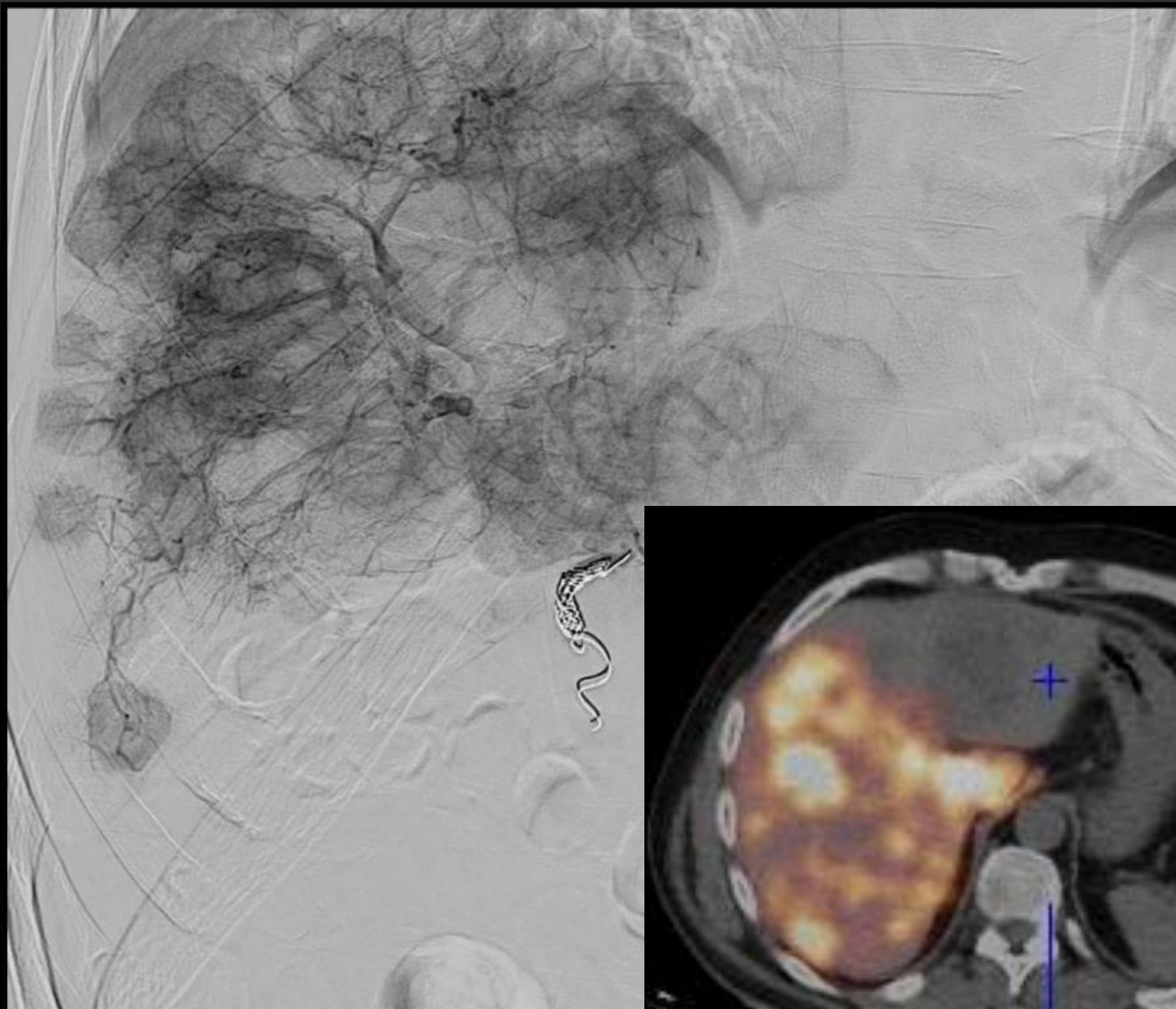


CASE REPORT

- ♂ - 62 ans
- Antécédent de carcinoma amygdalien, traité.
- Récidive hépatique uniquement: métastases hépatiques multiples, bilobaires
- Décision de traitement par
Radioembolisation (SIR-Spheres)

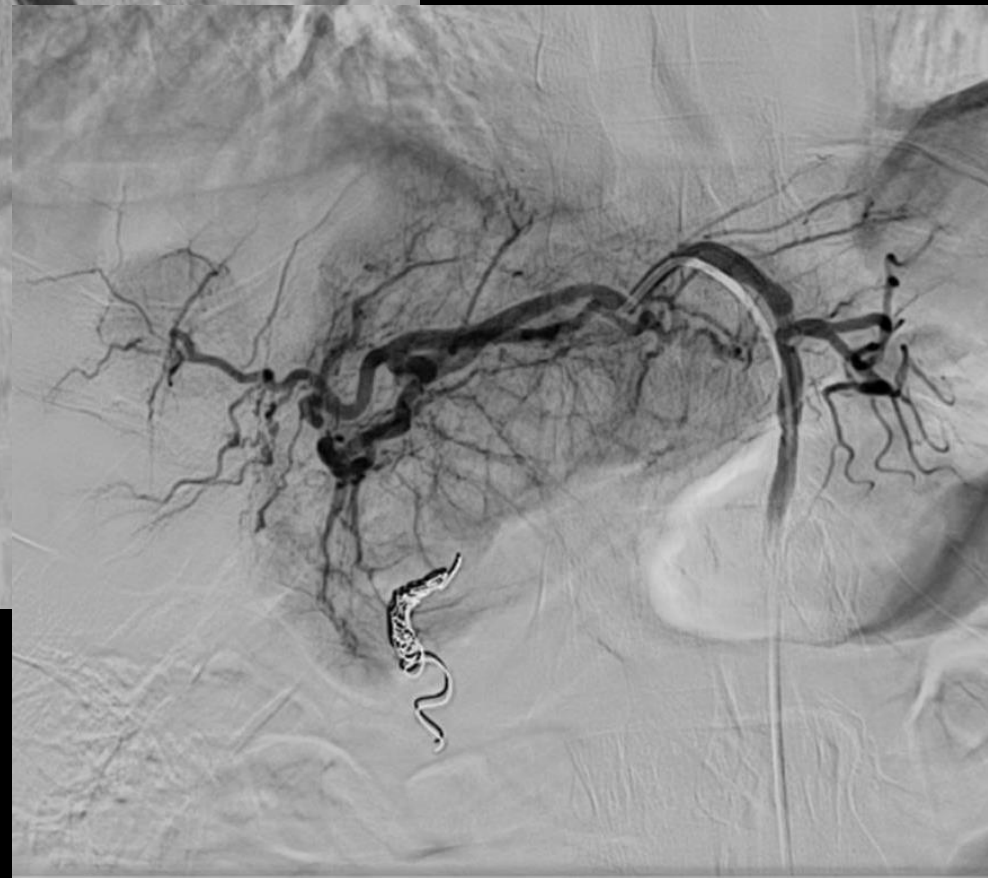
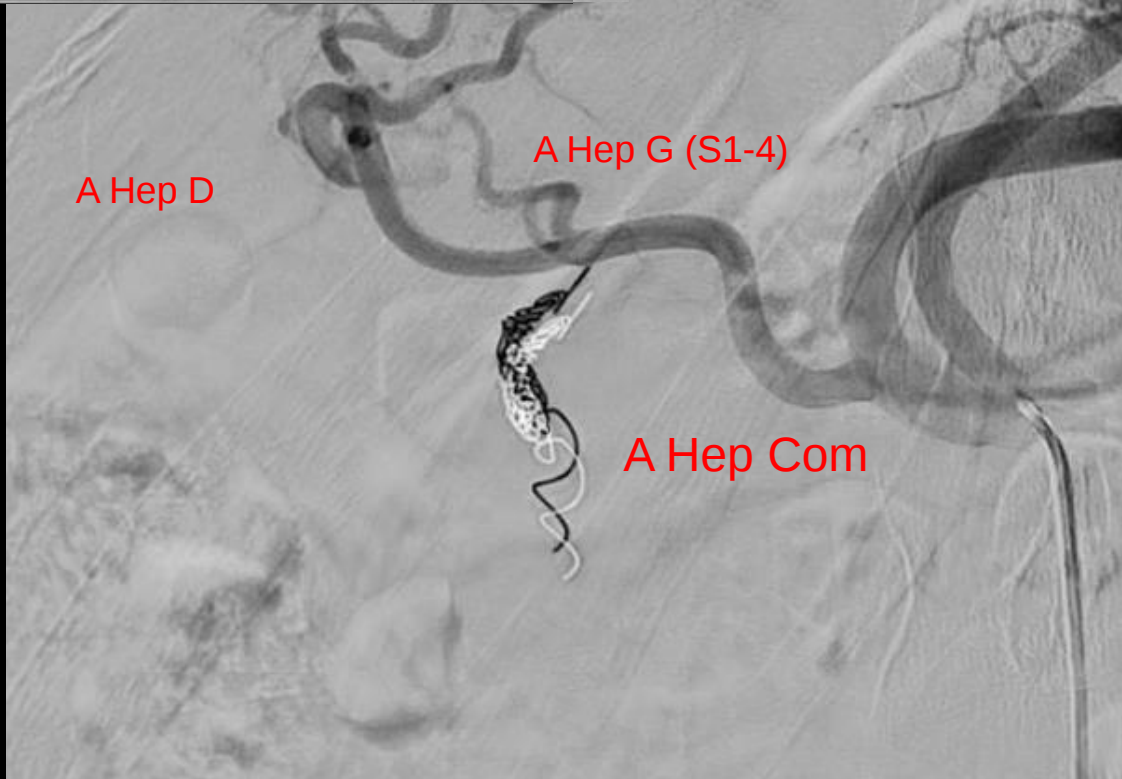
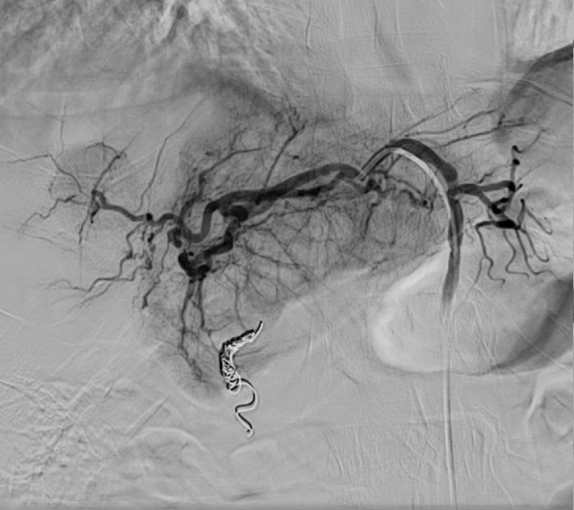


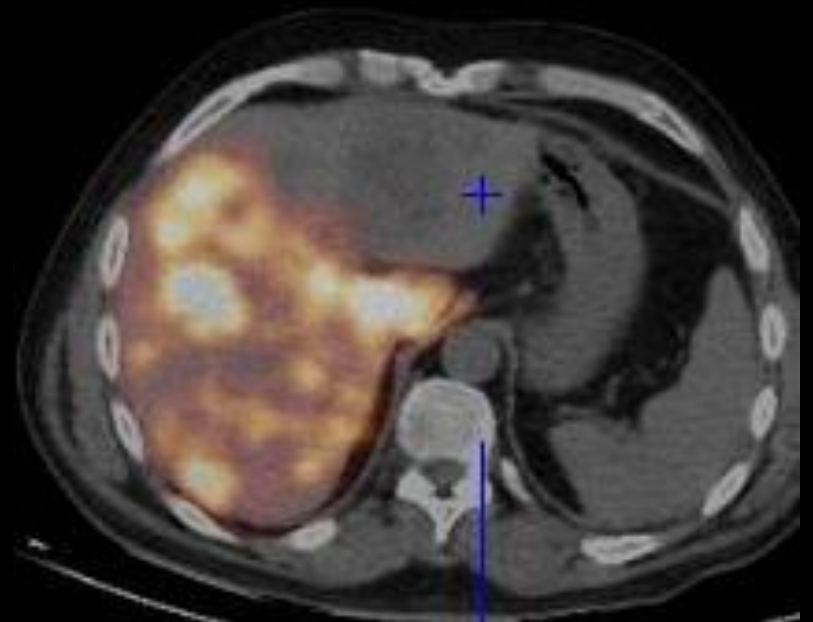
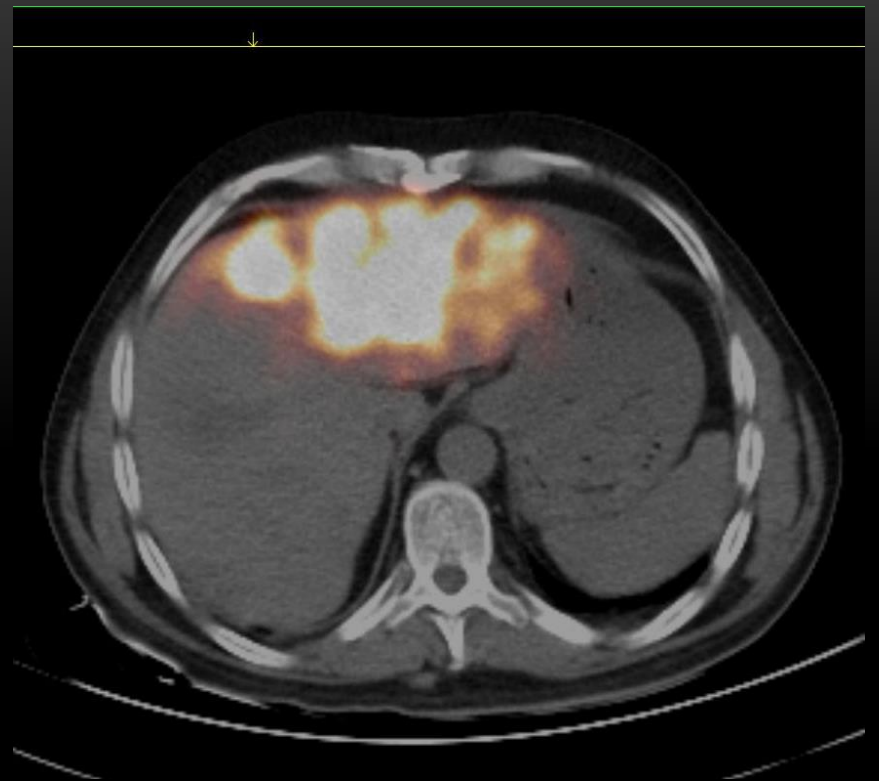
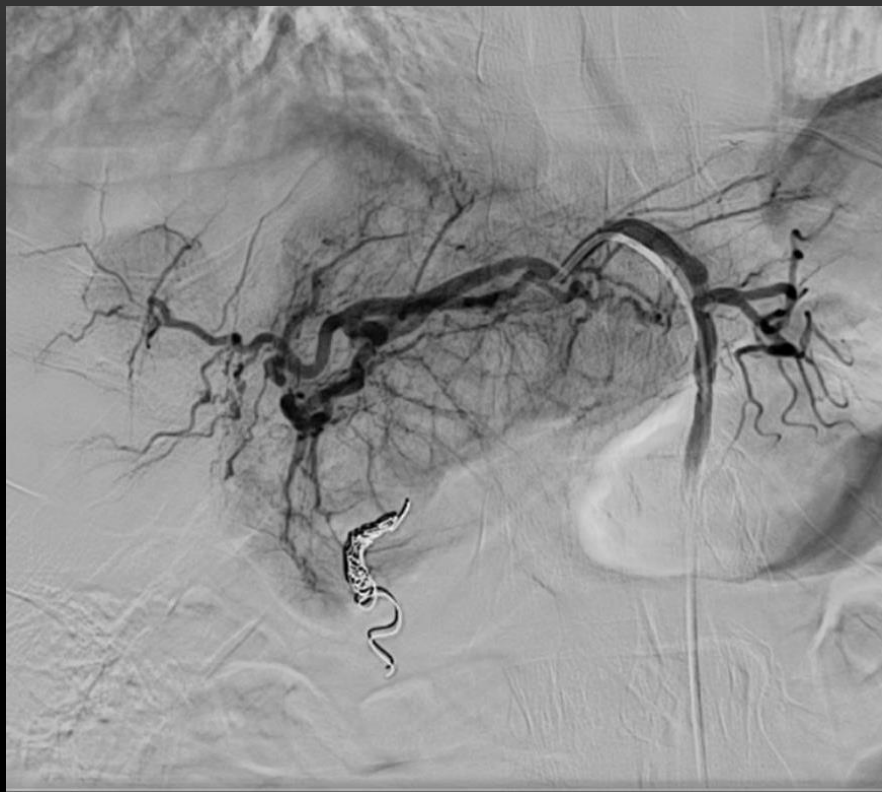






Classification de Michel





- **Complications:** (cancer colorectal métastasé)

Effet secondaires	Incidence selon grade		Présentation clinique	Prévention / traitement
	2	3		
Signes généraux	43 %	1 %		
Perte de poids	3 %	0 %	J 0-7 post Sirt	Anti-hémétiques, Dexaméthasone 20 mg à doses ↓ pdt 7j
Fatigue	37 %	1 %	J 0-14 post Sirt	Dexaméthasone 20 mg à doses ↓ pdt 7j
Fièvre	2 %	0 %	J 0-3 post Sirt	« Pan-Culture » pas nécessaire / Paracétamol pdt 3-7j

Effet secondaires	Incidence selon grade		Présentation clin.	Prévention / traitement
	2	3		
Gastro-intestinaux	25 %	5 %		
Nausées	9 %	1 %	J 0-7 post Sirt	Anti-hémétiques (5-HT3), Dexamethasone 20 mg à doses ↓ pdt 7j
Vomissements	6 %	1 %	J 0-3 post Sirt	Anti-hémétiques, Dexamethasone 20 mg à doses ↓ pdt 7j
Douleurs	11 %	2 %	J 0-14 post Sirt	Analgésiques per os
Ulcères	5 % (0 -20 %)		Nausée, douleur >J14	Embolisation prophylactique de la gastroduodénale et des artères gastriques / IPP en
Cholécystite radique	< 1 %		Douleur abdominale persistante	Evitement artère cystique
Abcès hépatique	< 1 %		Douleur abdominale, symptômes septiques	AB en prophylaxie (selon cas ?)

Effet secondaires	Incidence selon grade 2 3	Présentation clinique	Prévention / traitement
Biochimiques	16 % 2 %	Elévation constante 6 semaines post Sirt, retour normale 12 semaines post Sirt	Calcul de la dose Y90
Pancréatite radique	< 1 %	Douleur abdominale / ↑ amylases-lipases	Traitement supportif
Hépatite radique	<1 % (0-4%)	Ascite évolutive, hépatite biologique, ↑ bilirubine totale	Stéroïdes, traitement supportif
Pneumopathie radique	< 1 %	Asymptomatique, Rarement: épanchement pleural, «ARDS»	Stéroïdes, traitement supportif

Toxicité des thérapies loco-régionales: **SIRT vs TACE**

Variable	SIR-Spheres microsphères (n=27)		Chemoembolisation (n=44)	P value
Séjour hospitalier moyen (séances multiples cumulées)	1,7 ± 1,7	<<	6.0 ± 11.0	0,5
Complications	12 (44 %)	<<	31 (70 %)	0,5

- Indications et contre-indications des SIRT:

Critères d'inclusion

- Tumeur(s) totalement ou principalement limitées au foie d'une tumeur hépatique primitive ou d'une maladie métastatique
- Espérance de vie > 12 semaines
- ECOG $\leq$ 2

Critères d'exclusion absolus

- Ascite en cas d'insuffisance hépatique aigüe
- Grossesse
- Exposition potentielle excessive des poumons déterminée par la mise en évidence d'un shunt hépato-pulmonaire de plus de 20 %
- Impossibilité de corriger le shunt vers le tractus gastro-intestinal

Critères relatifs d'exclusion

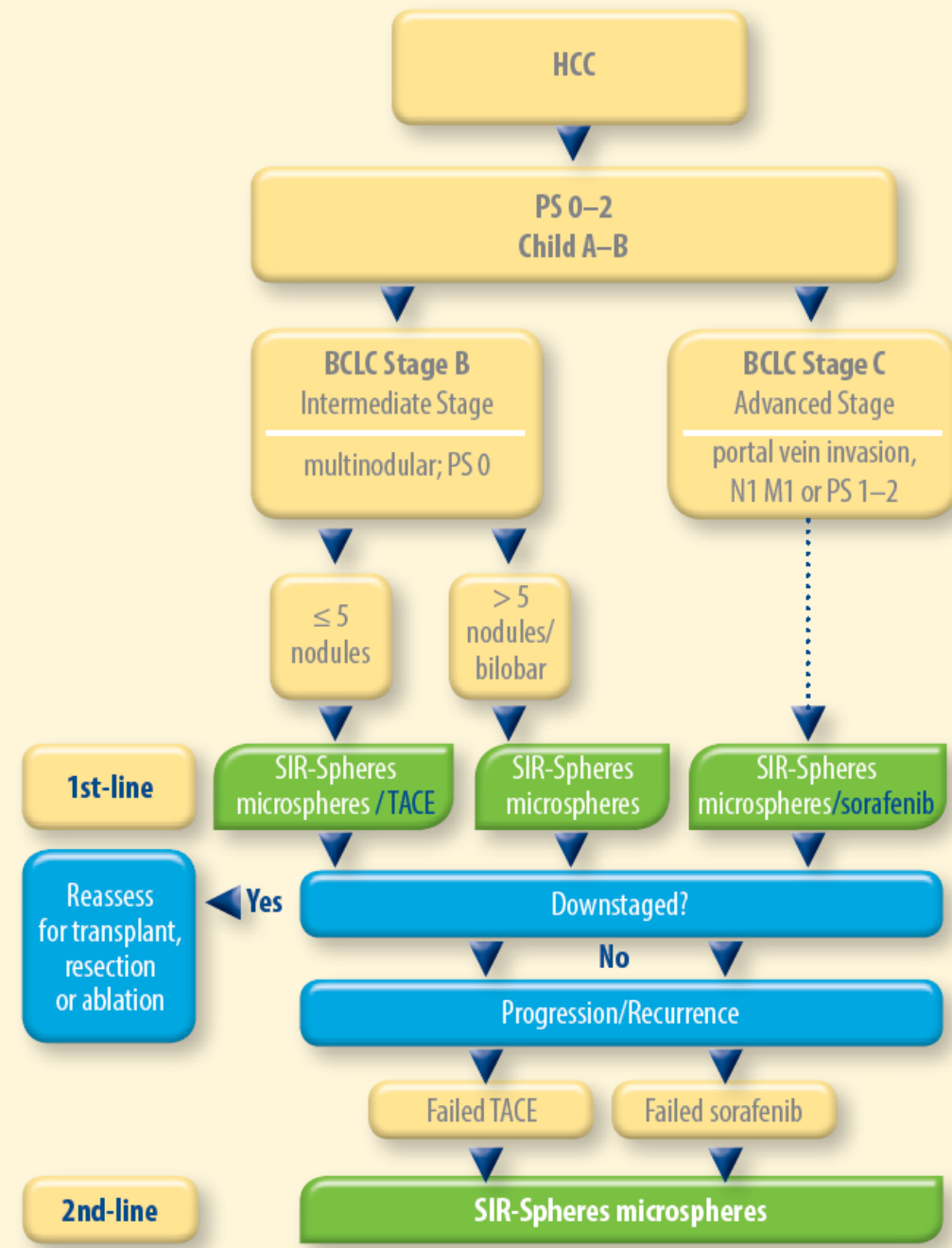
- Radiothérapie hépatique antérieure
- Charge tumorale excessive avec réserve hépatique limitée
- Fonctions hépatiques ou hématologiques significativement anormales déterminées par :
 - ✓ Leucocytes < 2,500/ μ l
 - ✓ NAN < 1,500/ μ l
 - ✓ Plaquettes < 60,000/ μ l
 - ✓ AST (SGOT/ALT(SGPT) > 5x ULN institutionnel
 - ✓ Taux de bilirubine totale > 2.0 mg/dL (>34 μ mol/L)
 - ✓ Albumine sérique < 3.0 g/dL
 - ✓ Créatinine > 2.5 mg/dL



Sélection des patients Tumeurs hépato- cellulaires

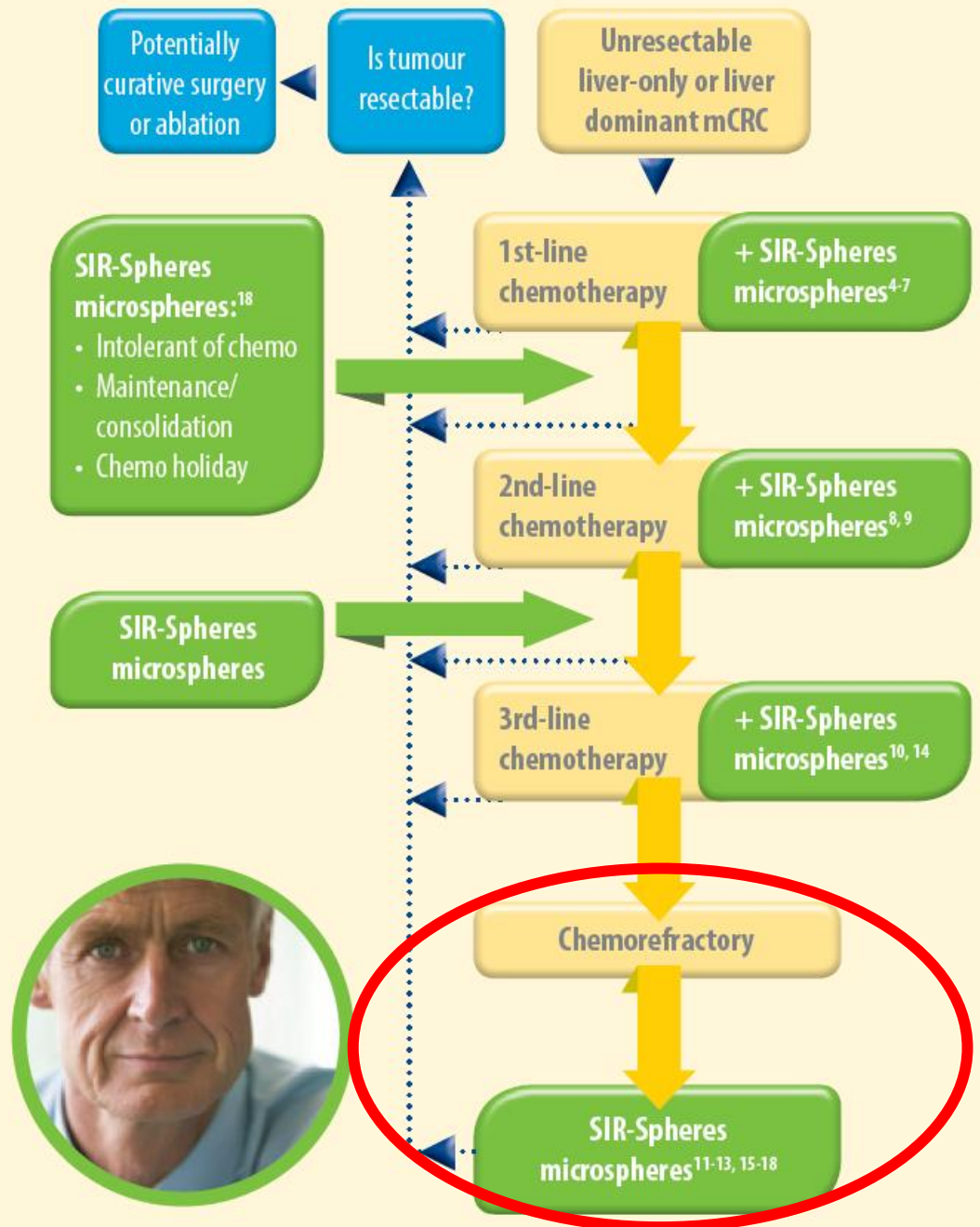
- Patients BCLC stade B avec maladie multi nodulaire et bi lobaire qui sont de mauvais candidats pour « TACE »
- Patients BCLC stade C avec tumeur isolée envahissant une branche lobaire ou segmentaire de la veine porte.
- Patients pour lesquels un « Downstaging » de la tumeur peut offrir une approche chirurgicale
- Patients après échec de TACE ou Sorafenib
- Alternative à TACE ou Sorafenib

Intégration de l'utilisation des SIR-SPHERES microsphères dans l'algorithme de traitement du cancer hépato-cellulaire



Sélection des patients dans le cancer colorectal métastasé

Intégration de l'utilisation des SIR-SPHERES microsphères dans l'algorithme de traitement du cancer colorectal métastasé



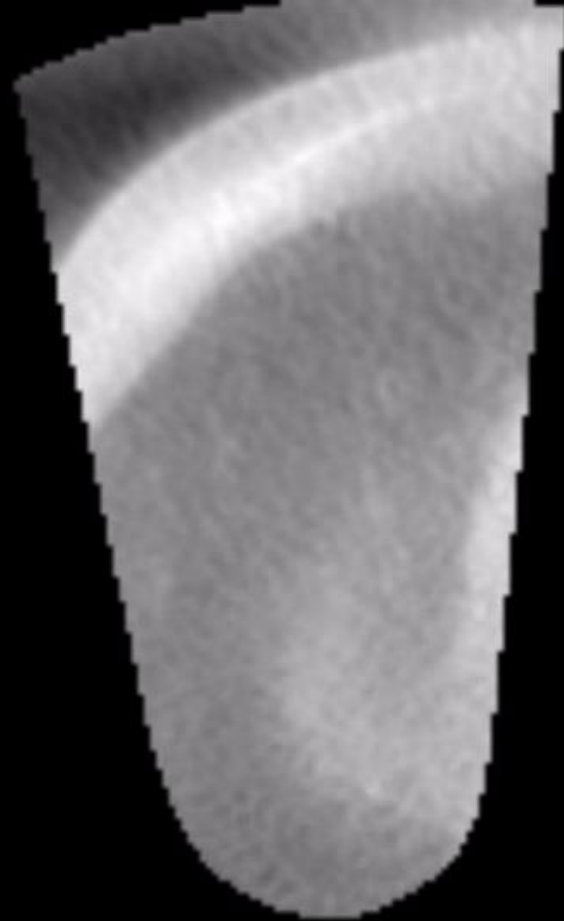
- Follow-up après SIRT:
 - Pet-CT directement après traitement
 - confirmation du placement des sphères dans les cibles
 - Les CT scanners ne donneront pas de bon résultat (fonte tumorale) dans les 2-3 premiers mois patience!
 - Les **Pet-CT** sont par contre de bons éléments pronostiques de la réponse
 - Marqueurs tumoraux

CAS TYPIQUE DE SIRT (MÉTASTASES CCR)





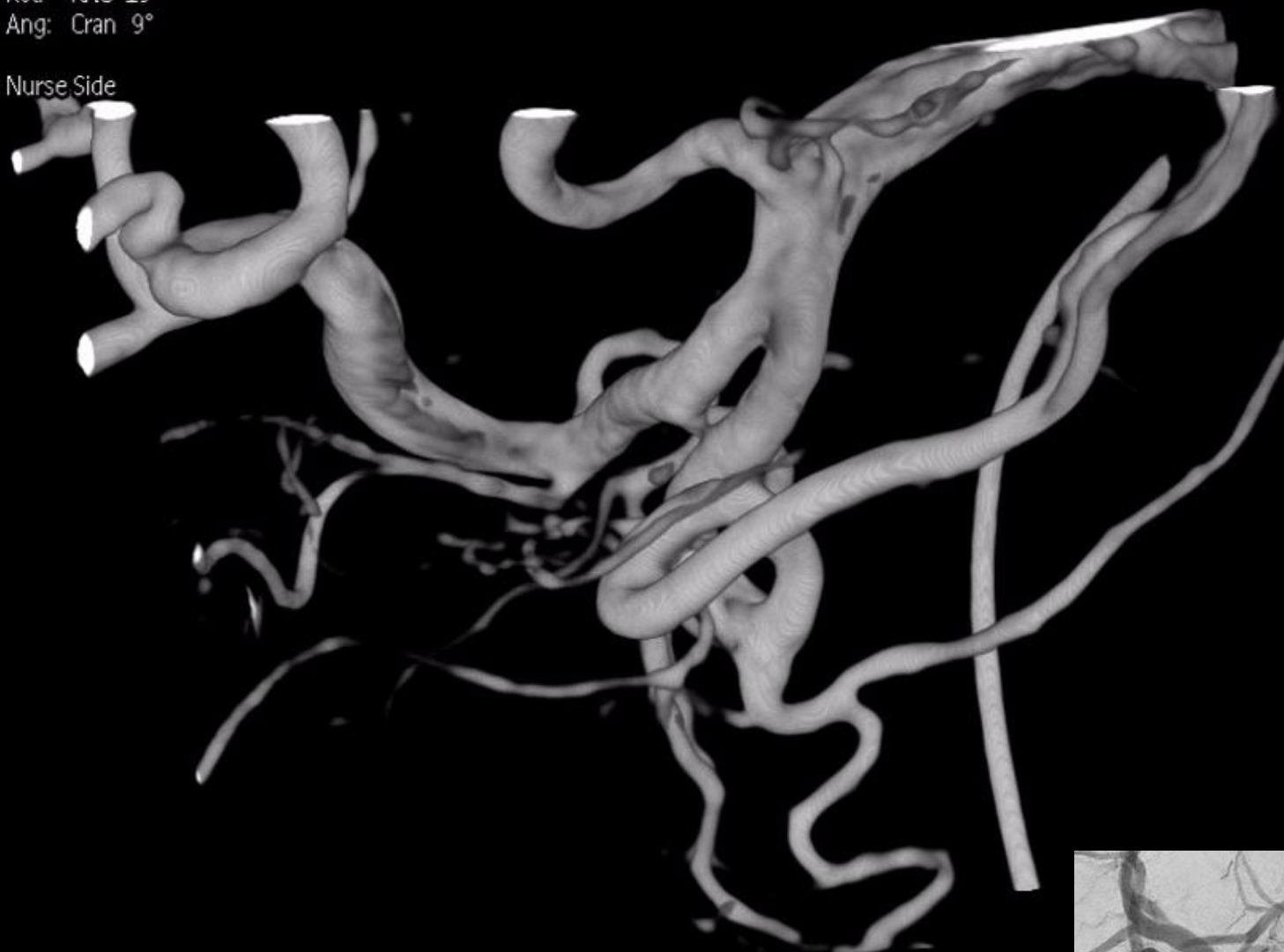




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Exam Date: 2017/09/14

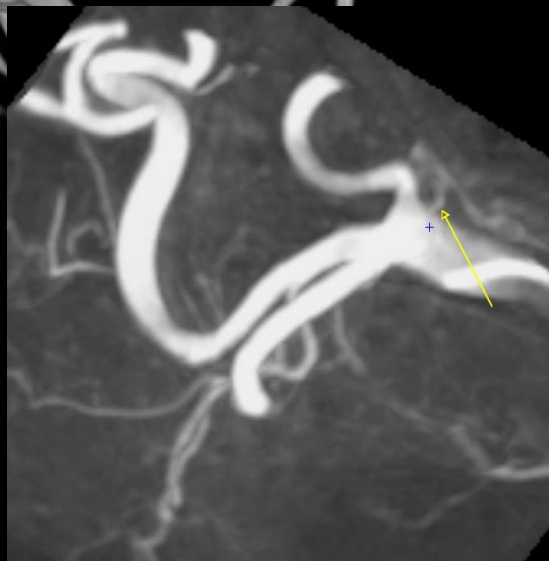
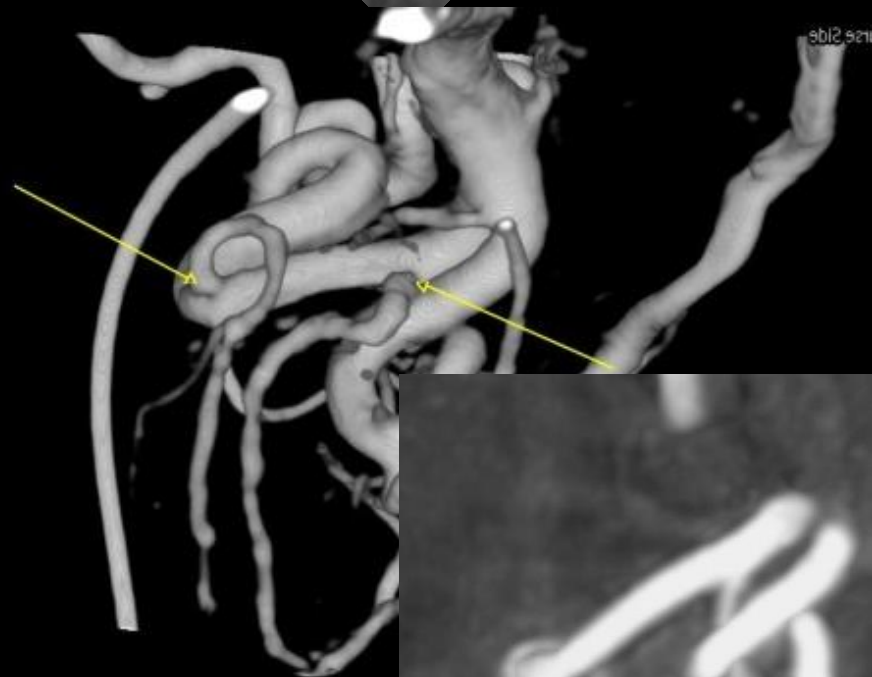
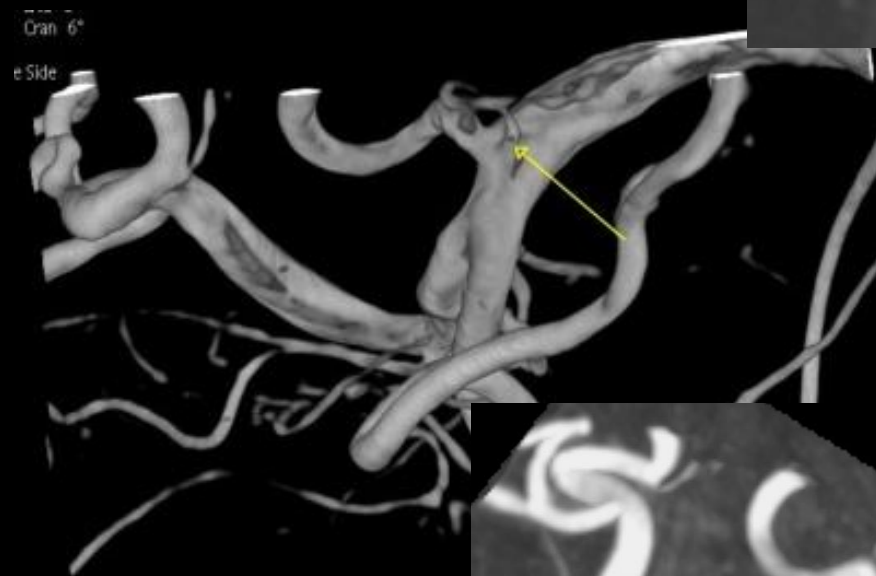
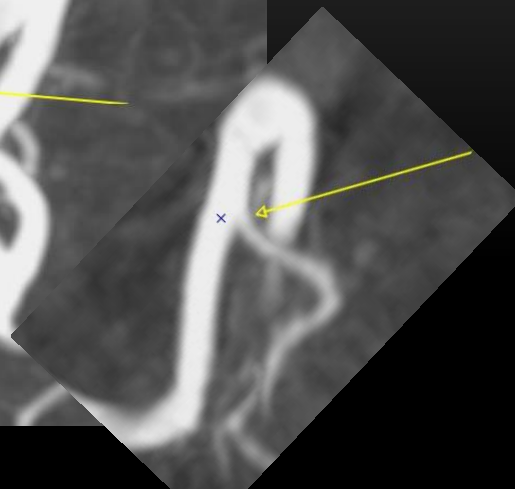
Rot: RAO 19°
Ang: Cran 9°

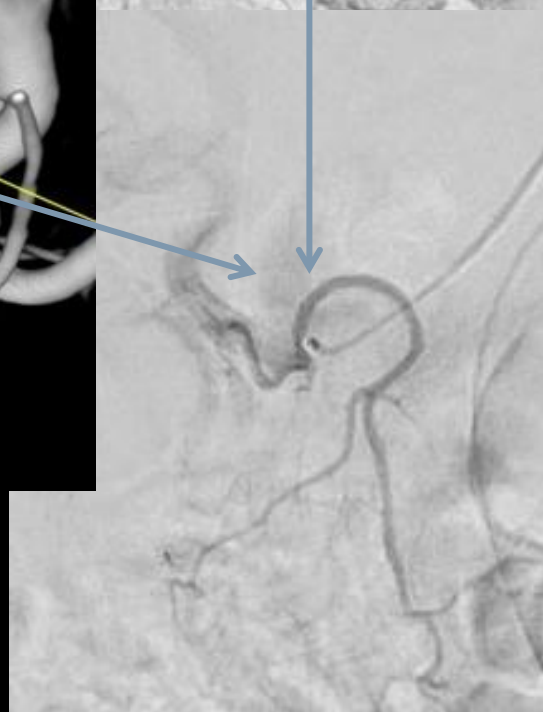
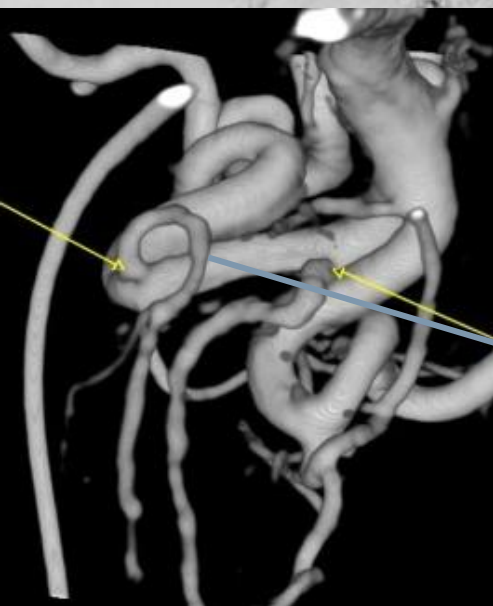
Nurse Side

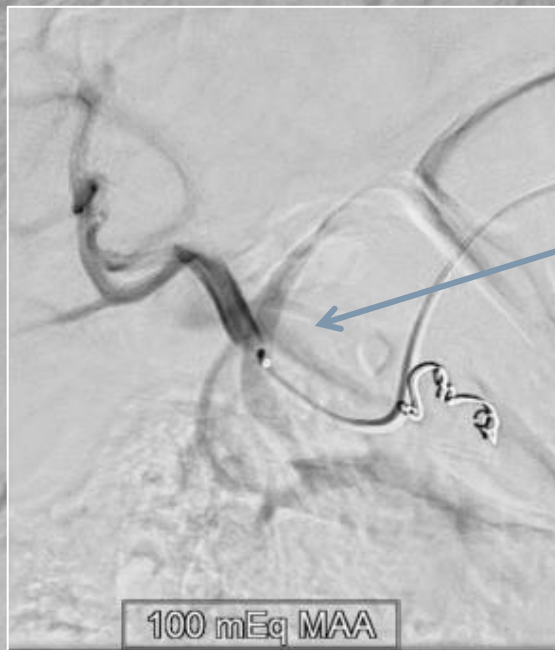
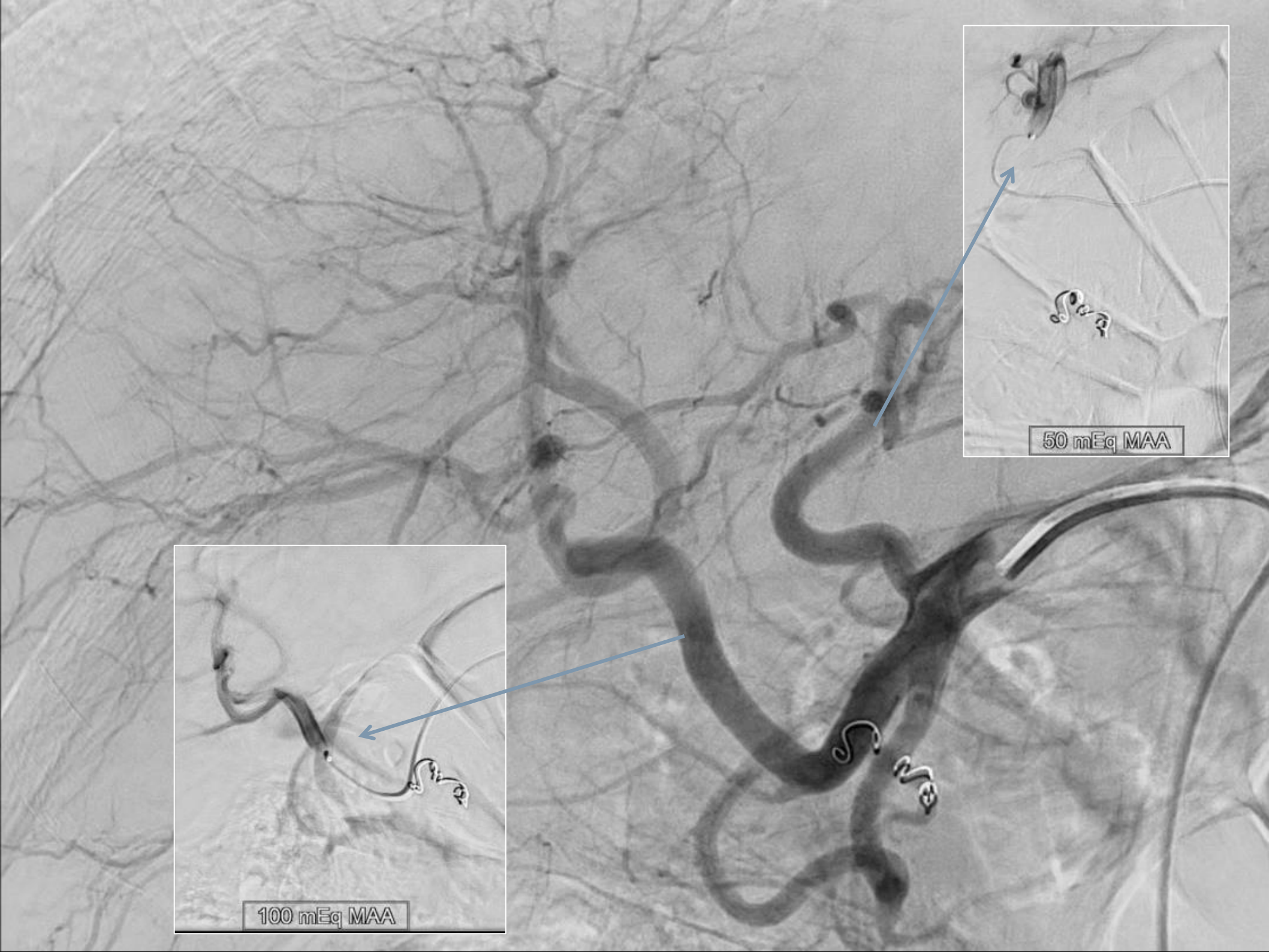


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Run Date: 2017/09/14
Run Time: 09:54:02
Cube Size: 81.78 x 63.18 x 81.78 mm³









EMBOLISATION PORTALE

Embolisation portale Dr



Portal Vein Embolization - Overview

- Curative treatment of primary and secondary liver malignancies = Complete resection
 - ✓ In up to 45% cases → extended liver resection is necessary
 - ✓ Unresectability if insufficient volume of the remnant liver: liver failure $\approx$ size of remnant functional liver volume
 - ✓ Preoperative embolization of the portal vein (PV) branches feeding the hepatic segments to be resected reduced the risk of postoperative liver failure after major liver resection and increased the number of resectable patients

➤ **FLR** (Future Liver Remnant) / **TELV** (Total Estimated Liver Volume) **ratio**

Min. 25% if normal liver
Min. 40% if hepatopathy

! If diabetes mellitus (slower rates of regeneration due to insulin)
↑ min FLR if concomitant surgery (e.g. pancreatectomy...)
↑ min FLR if associated left hepatic metastasectomy

- CI: coagulopathy, tumor invasion of the PV, tumor precluding safe transhepatic access, biliary dilatation (T/ drainage), portal hypertension, renal failure that requires dialysis.

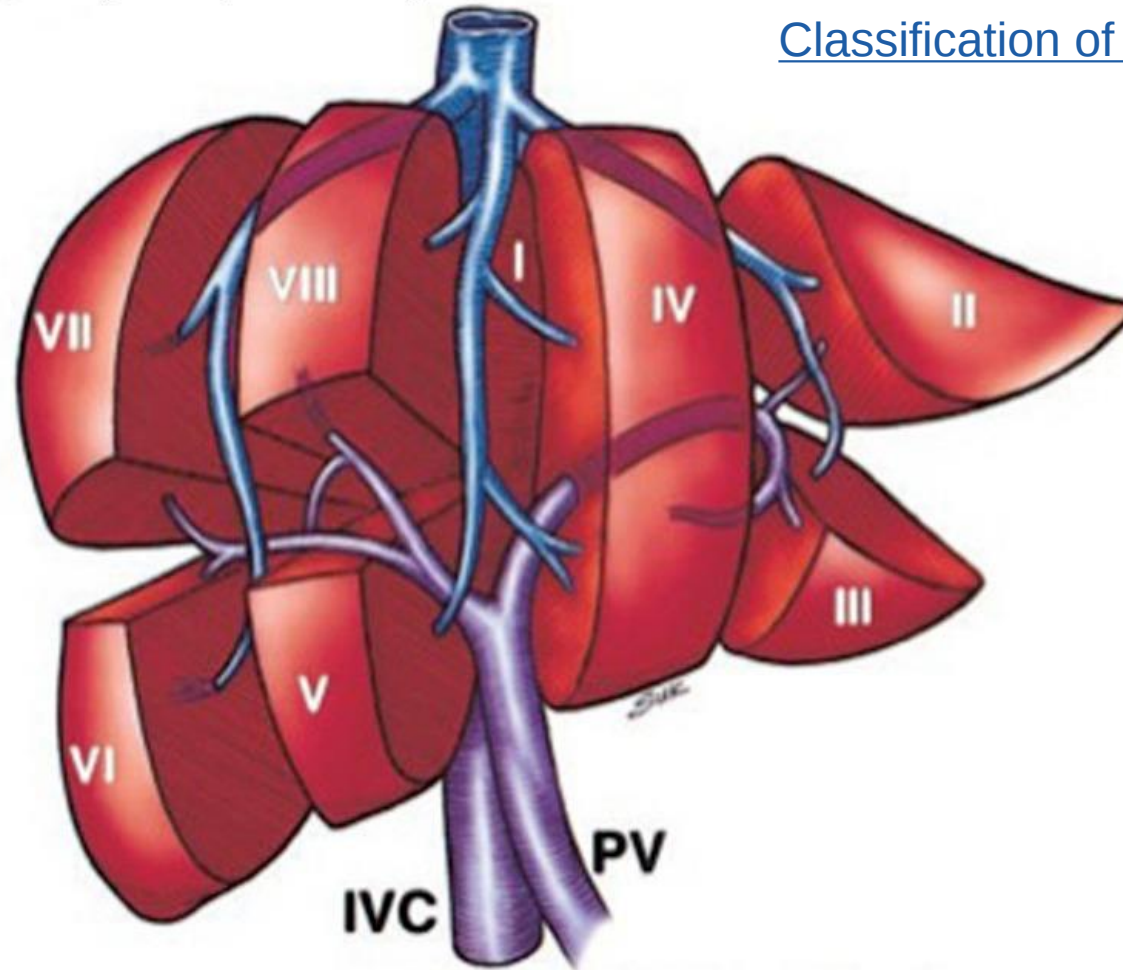
Preoperative portal vein embolization in liver cancer: indications, techniques and outcomes. Romaric Loffroy et al. *Quant Imaging Med Surg.* 2015 Oct; 5(5): 730–739

Extended right hepatectomy

Right trisegmentectomy

Right hepatectomy

[Classification of Couinaud \(1957\)](#)

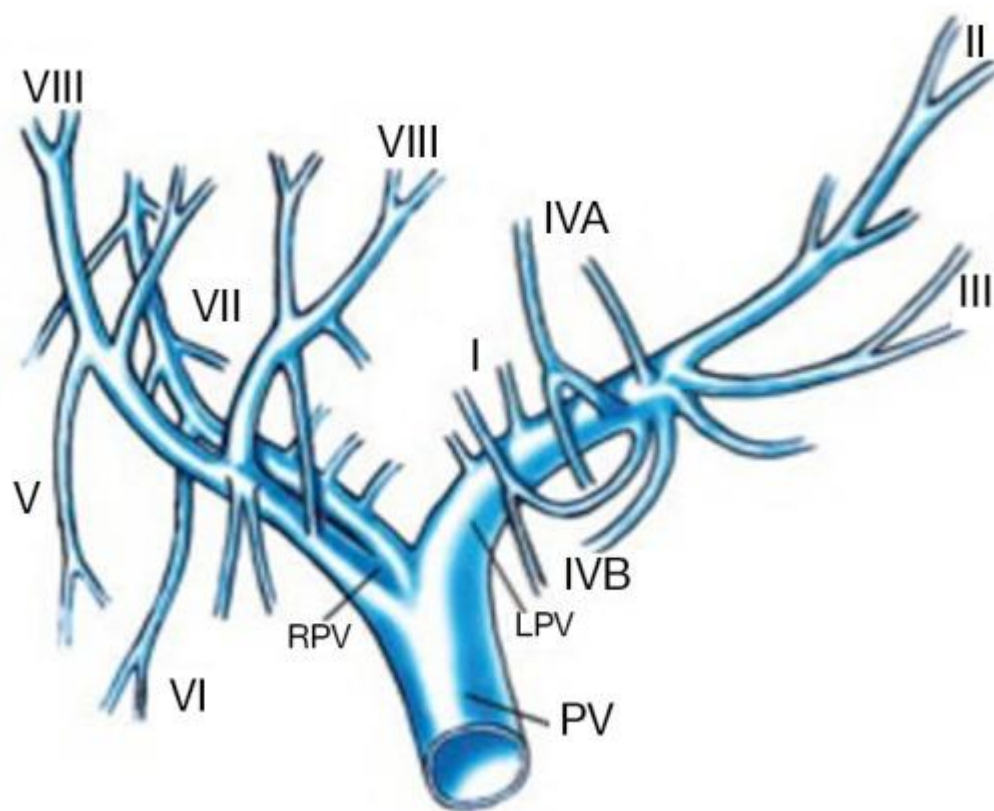


Left hepatectomy

Extended left hepatectomy

Left trisegmentectomy

A



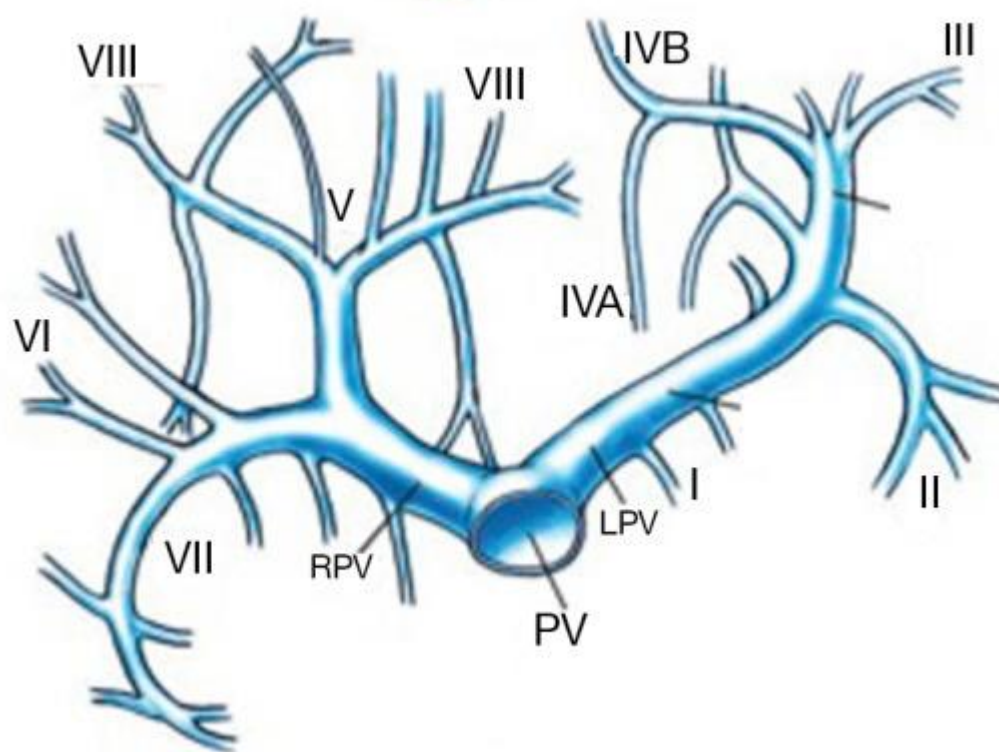
Normal PV anatomy

- **Portal bifurcation:** extrahepatic (48%), intrahepatic (26%), or right at the entrance of the liver (26%)
- **RVP:** usually two sectoral portal branches (anterior and posterior)
- **LVP:** two part: the extrahepatic portion (horizontal part) and the intrahepatic portion (the umbilical vertical part).

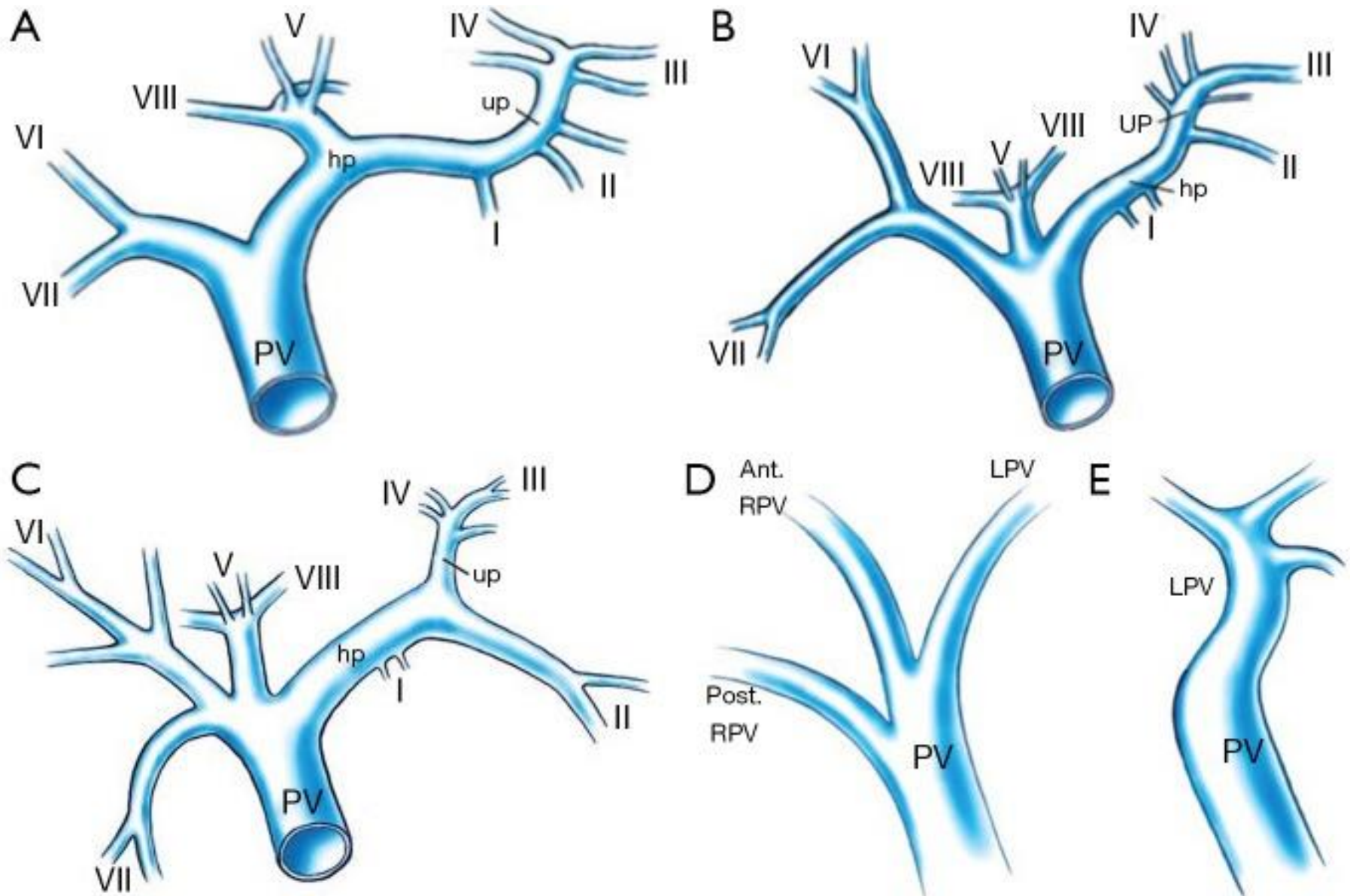
S II, VI, VII (& III): 1 segmental branch

S IV, V, & VIII: commonly >1 segmental branch

B



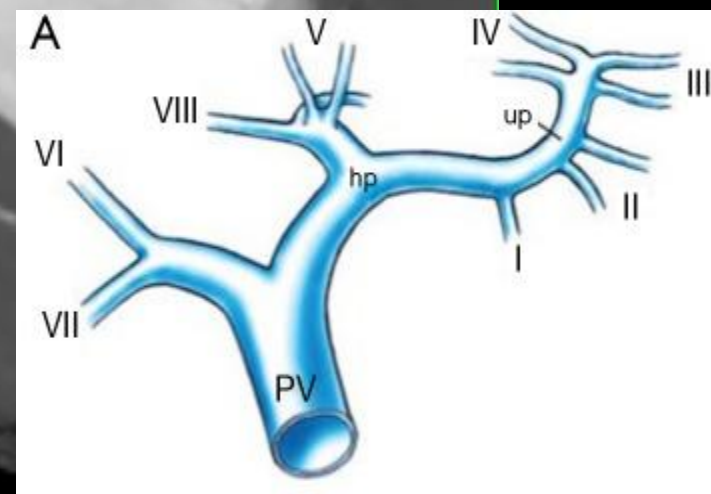
PV variants



AH

RHP

LFA



Portal Vein Embolization - Technique

- General anesthesia vs Local anesthesia + IV sedatives
- US guidance
- Ipsilateral (RVP) vs Controlateral (LVP) approach
 - Less complication
 - Harder access & catheterization
 - More complication
 - Easier access & catheterization
- Portography from the splenomesenteric confluence +/- PV pressure measurement
 - ! CI if portosystemic gradient >12 mmHg
 - ! Post PVE: ↑ PV pressure ≈ 3 mmHg
- **S IV** embolization ? If extended right hepatectomy ?
Usually not necessary for adequate FLR hypertrophy - ↑ risk of LVP embolization !

Preoperative portal vein embolization in liver cancer: indications, techniques and outcomes. Romaric Loffroy et al. *Quant Imaging Med Surg.* 2015 Oct; 5(5): 730–739



Portal Vein Embolization - Technique

Influence of embolic agent on the hypertrophy response

Embolic agent	Authors	No. of patients	Increase FRL (%)
Gelatin sponge	Fujii <i>et al.</i> (24)	30	17.8
	Kusaka <i>et al.</i> (25)	18	21.2
	Kakizawa <i>et al.</i> (26)	14	23.8
	Nanashima <i>et al.</i> (27)	30	29.4
PVA + coils/plugs	Covey <i>et al.</i> (28)	100	24.3
	van den Esschert JW <i>et al.</i> (29)	10	26.1
	Libicher <i>et al.</i> (30)	10	26.4
N-butyl cyanoacrylate	De Baere <i>et al.</i> (31)	107	57.8
	Giraud <i>et al.</i> (32)	146	41.7
	Elias <i>et al.</i> (33)	68	59.1
	Broering <i>et al.</i> (1)	17	69.4
Fibrin glue	Nagino <i>et al.</i> (34)	105	27.4
	Liem <i>et al.</i> (35)	15	31.4

! HR of PV recanalization

! Nonspherical < Spherical particules

Preoperative portal vein embolization in liver cancer: indications, techniques and outcomes. Romaric Loffroy *et al.* *Quant Imaging Med Surg.* 2015 Oct; 5(5): 730–739

Portal Vein Embolization - Technique

- FORGET proximal embolization alone (Coils, Amplazer Plug) !!
- FORGET direct intraportal alcohol injection → efficient, but hard to control and associated with significant morbidity (liver necrosis, PV thrombosis)
- **NBCA embolization**
 - ✓ Historically: mixture of **n-butyl 2-cyanoacrylate (NBCA) + Lipiodol** - 1:1 to 1:2
NBCA: Histoacryl® (Germany) or Glubran® 2 (Italy) - Lipiodol (Guerbet, France)
 - ✓ In the literature: **NBCA : Lipiodol** → from 1:1 to ... 1:8 ?
 - ✓ Flush with nonionic liquid, e.g. dextran or glucose 5%
 - ✓ Try to leave 1 cm unembolized segment of the RPV to facilitate surgical ligation
- Hypertrophy response
 - At (2-)4-6 weeks
 - Resection rate +/- 85%** (70% if cirrhosis): absence of hypertrophy **or** tumor progression
 - The smaller FRL before PVE will have the larger hypertrophy: no lower FRL limit !

Preoperative portal vein embolization in liver cancer: indications, techniques and outcomes. Romaric Loffroy et al. *Quant Imaging Med Surg.* 2015 Oct; 5(5): 730–739

Portal Vein Embolization - Technique

- Post-PVE: minor post-embolization syndrome (fever, abdominal discomfort, elevated transaminases)
- To avoid tumor progression ?
 - ✓ PVE + TAE ?
 - ✓ PVE + SIRT ?
 - ✓ +/- S IV (if tumor in S IV) ?
 - ✓ +/- systemic chemotherapy
- Surgical solutions ?

ALPPS : Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy

→ « New operation inducing an amount of hypertrophy that is unparalleled by other techniques. Schnitzbauer et al. report a 74% volume increase of the remnant liver in a mean of 9 days » ...

<http://www.alpps.net/?q=about>

http://www.alpps.net/?q=RCT_general_information_endpoints



Portal Vein Embolization – How I do it

- Under GA
- Ipsilateral (RPV) US-guided approach, with micropuncture kit (6Fr)
- RIM 4Fr catheter + 2,3Fr J-type Direxion (Boston) micro-catheter (+/- microguide)

- 2cc (2x1cc) Glubran² mixed with 20cc (2x10cc) Lipiodol →
- Flush with Glucose 5%

NBCA:Lipiodol = 1:10

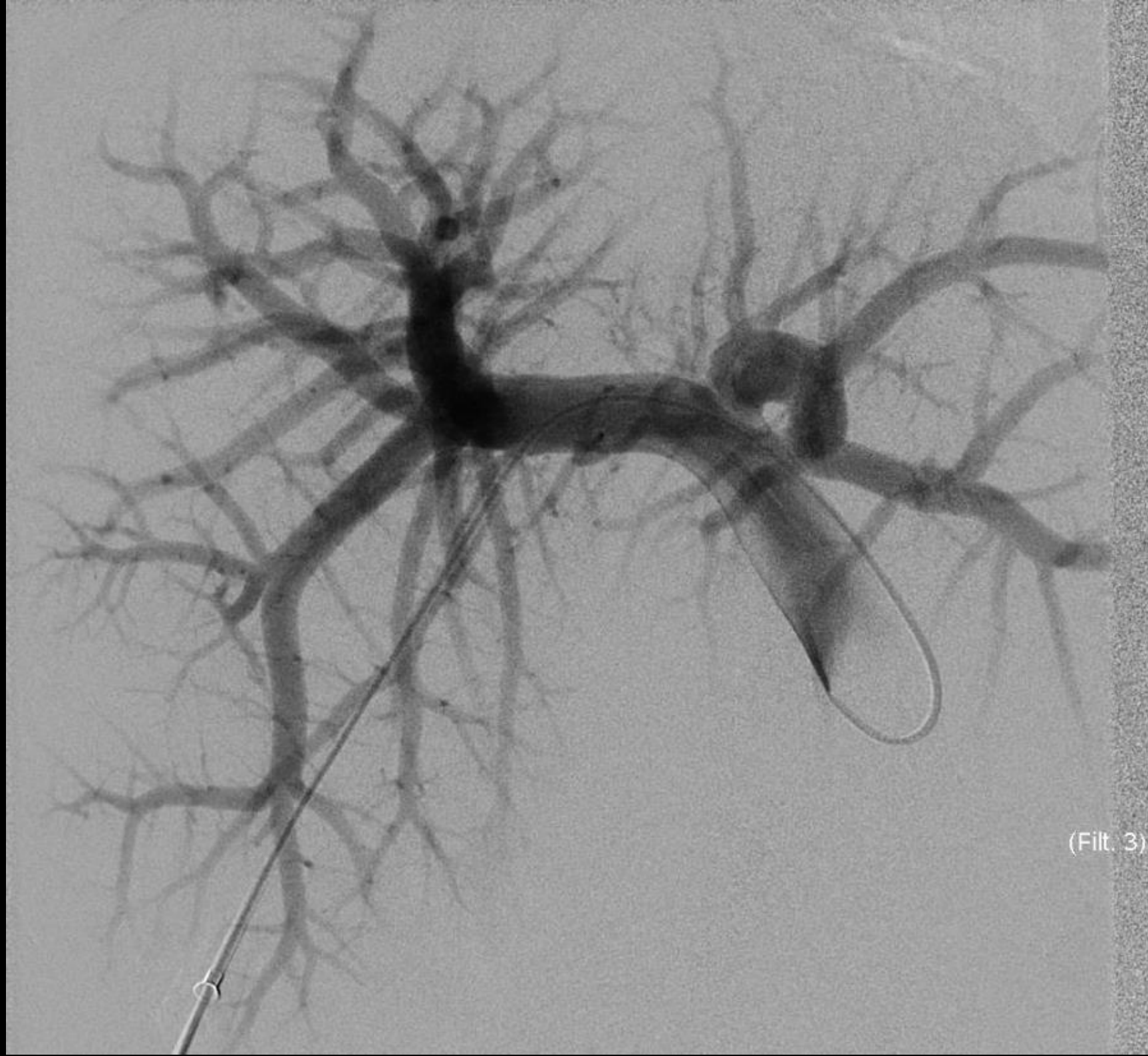
- Benefits of NBCA:Lipiodol 1:10
 - ✓ Very distale embolization, even from proximal injection
 - ✓ Less and later adherence to the microcatheter – Easier to use
 - ✓ Faster – Cheaper

- Cost / Gain (in Belgium)
 - ✓ Cost: Lipiodol = 166€ / 10cc vial (<2015: 27,42€!) → cat.D, payed by patient
Glubran = 98,5€ / 1cc
 - ✓ Gain: 589142 (I600) = 458€ + matériel 161501 = 671,55€

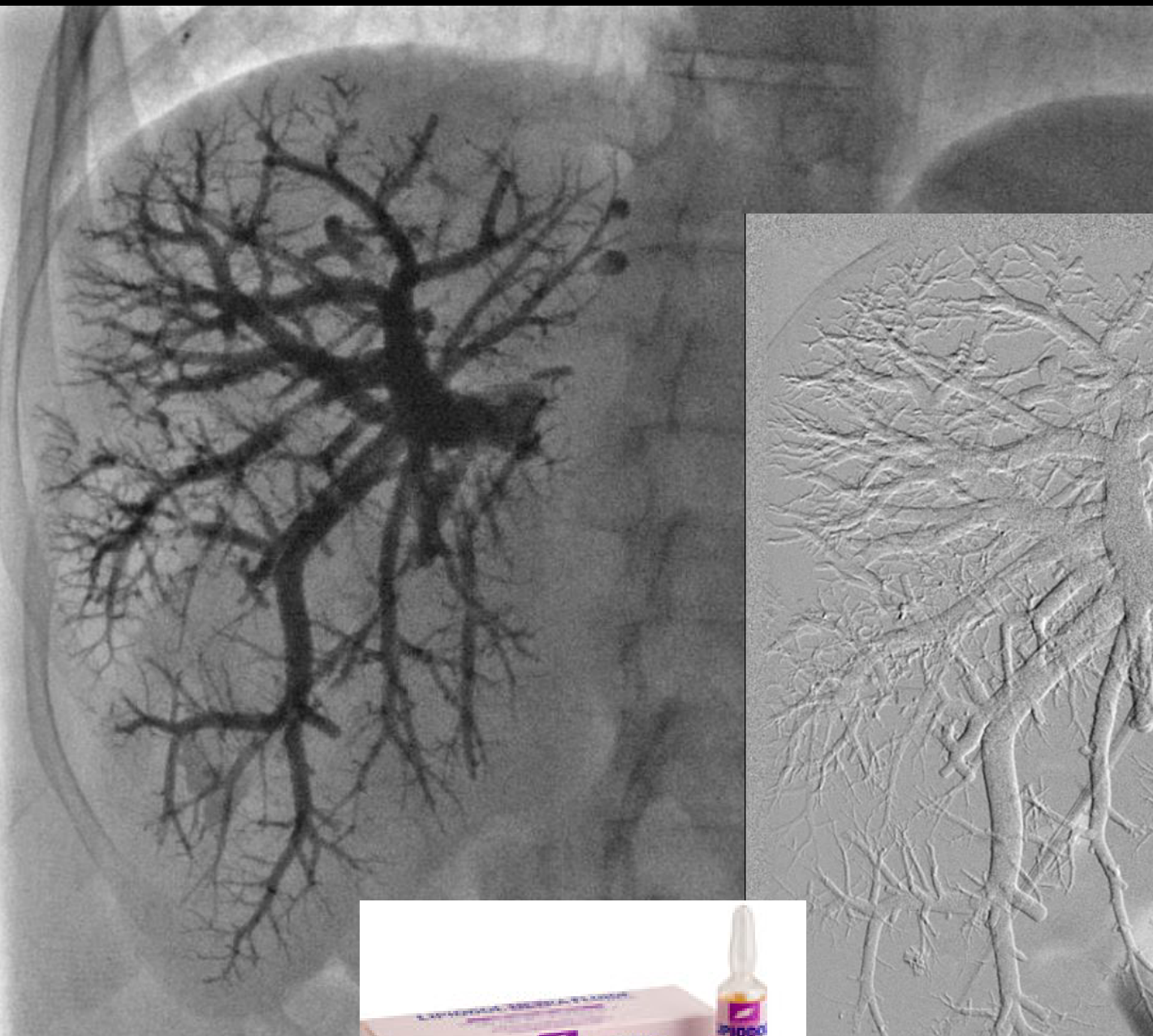
Occlusion percutanée sous contrôle d'imagerie médicale de la vascularisation artérielle ou veineuse de lésions pathologiques ou d'hémorragie artérielle dans la région faciale, thoracique, abdominale ou pelvienne, y compris les manipulations et contrôles pendant le traitement et les cathéters utilisés, à l'exclusion du ou des cathéter(s) d'embolisation utilisé, des produits pharmaceutiques et de contraste, du matériel d'embolisation



1st case



(Filt. 3)



PVE + Right Hepatic Vein Embolization ?

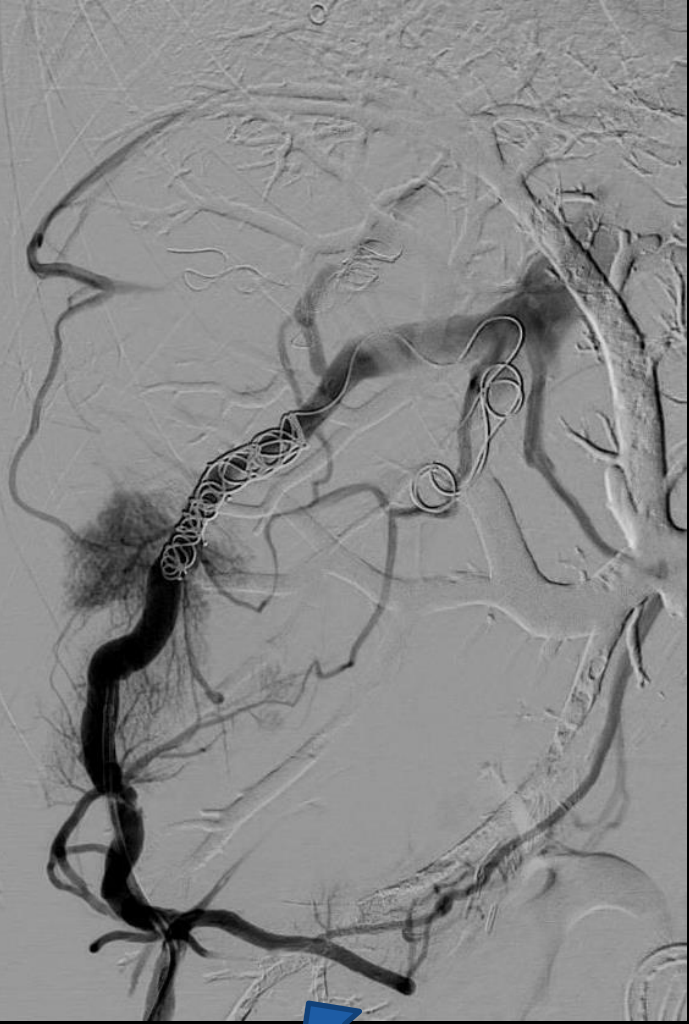
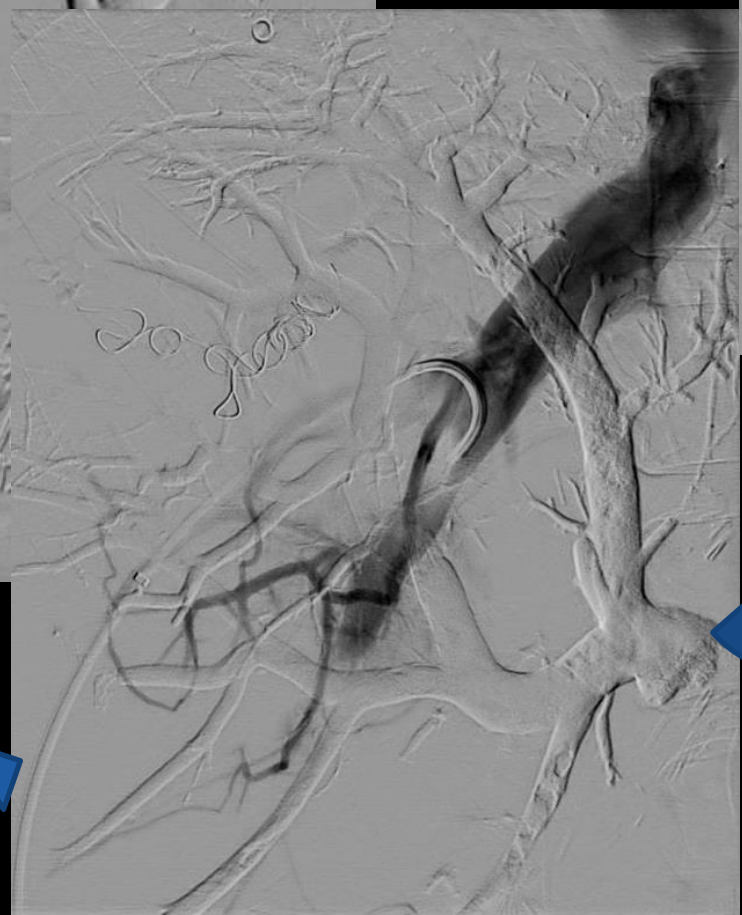
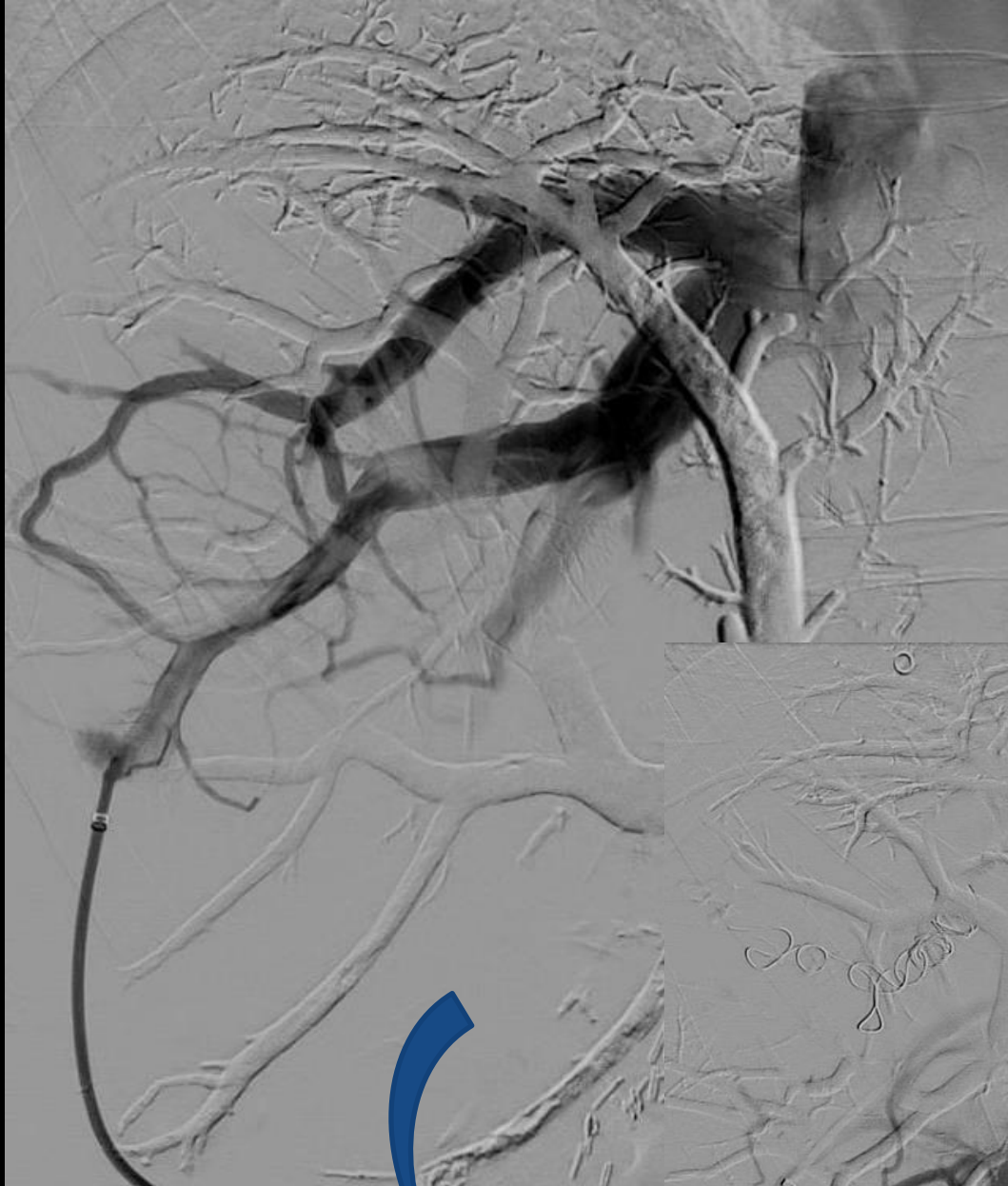
- Simultaneously
- Percutaneous PVE + RHVE by jugular access...
... or **percutaneous PVE + RHVE (ultrasound guidance)**
- **PVE:** NBCA + Lipiodol (1/10)
- **Percutaneous RHVE:** detachable coils + NBCA/Lipiodol (less diluted)
- **(RHVE by jugular access:** plugs or detachable coils)
- Probably **as efficient as ALPPS** (Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy) !!



2^d case



RPVE



RHVE



RPVE (20cc Glubran/Lipiodol 1/10)

+

RHVE (coils + 7cc Glubran/Lipiodol 1/5)

Results:

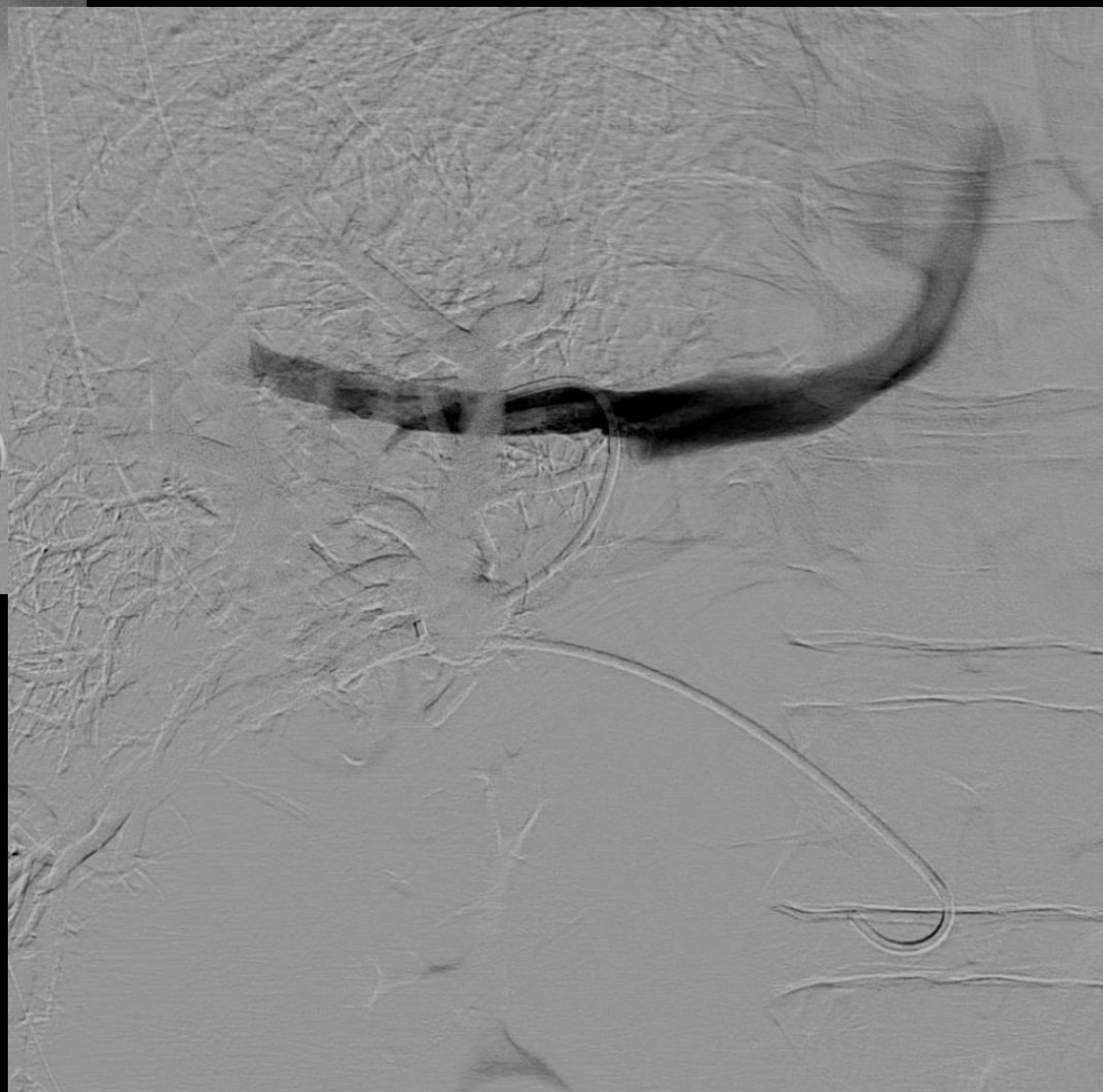
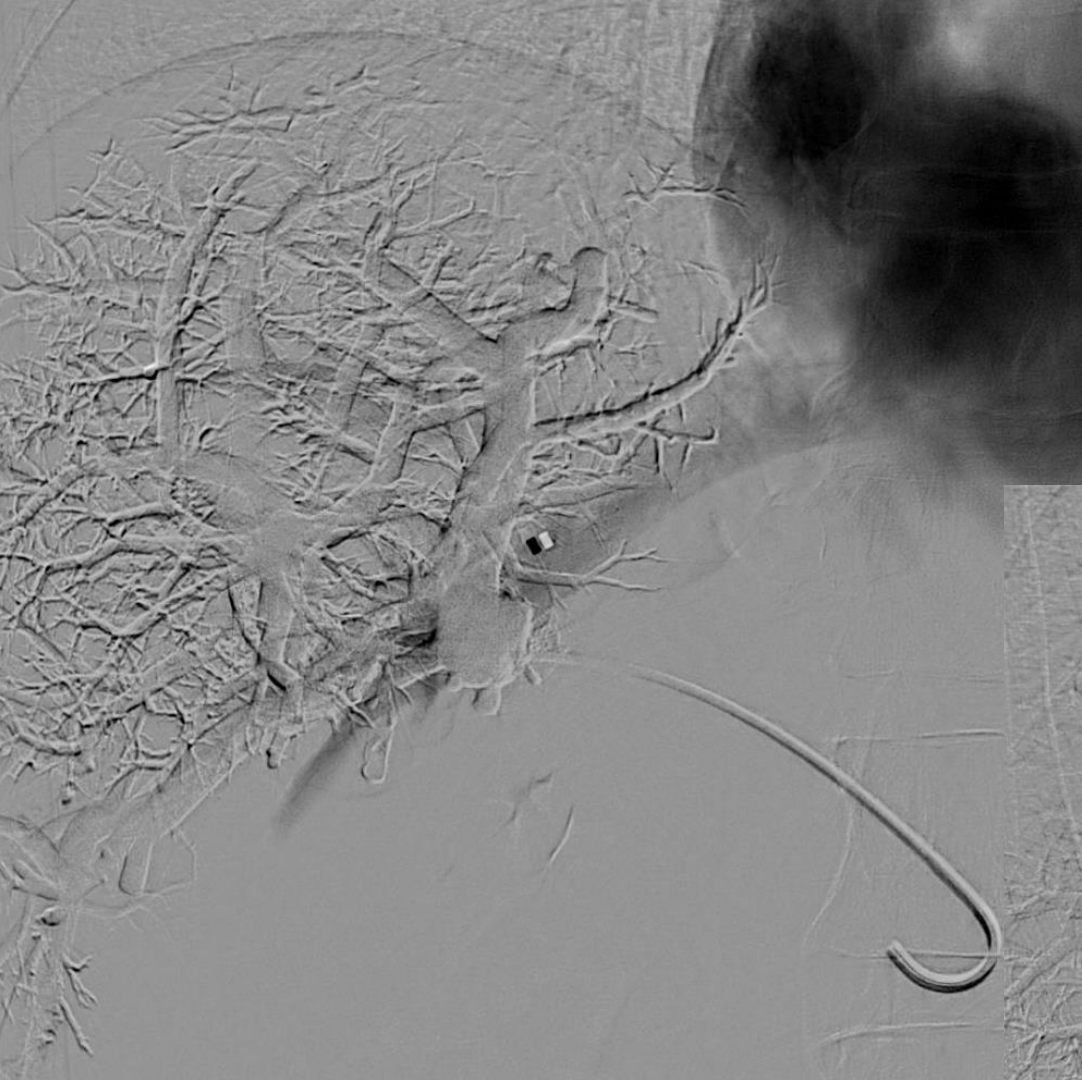
Left Liver hypertrophy (volume): +71%

**Left Liver function (HIDA): 65 % total
(vs 45% before embolization)**

→ Successfull right hepatectomy
performed

3^d case







RPVE + RHVE



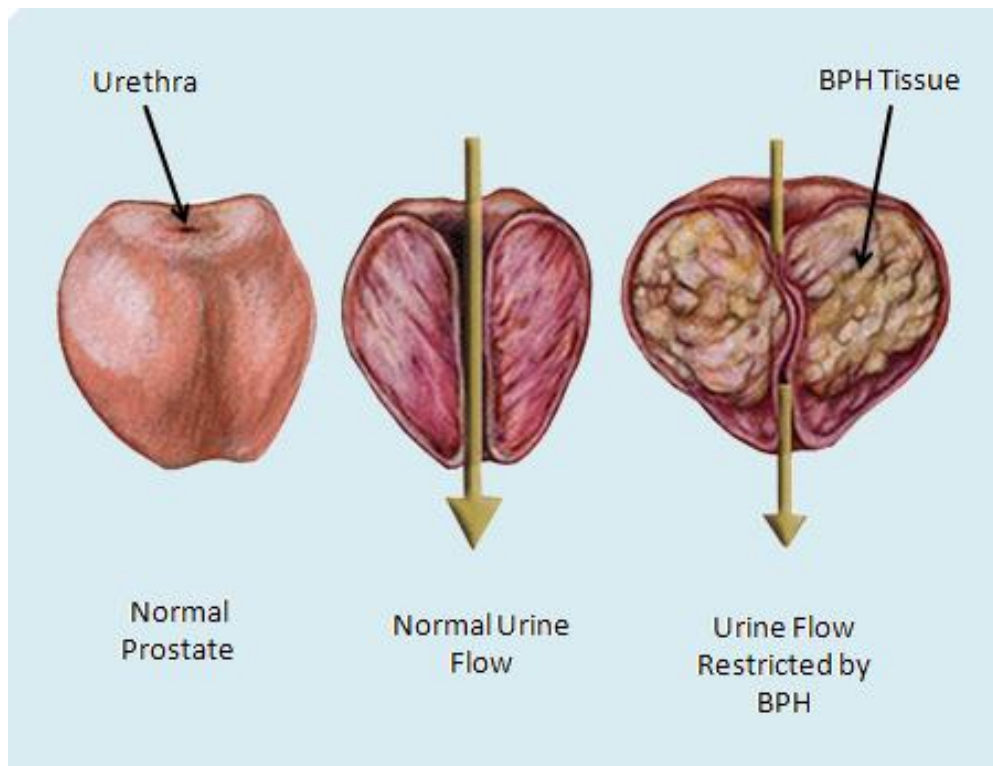
5- EMBOLISATION: AUTRES INDICATIONS ACTUELLES

(HORS HÉMORRAGIE)

- Embolisation prostatique
- Embolisation des fibromes utérins
- Embolisation des varicocèles et des varices pelviennes
- MAV/FAV
- (Embolisation splénique dans l'hypersplénisme)

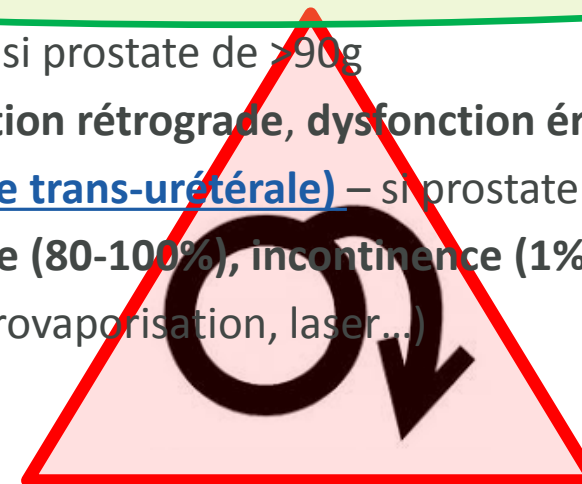
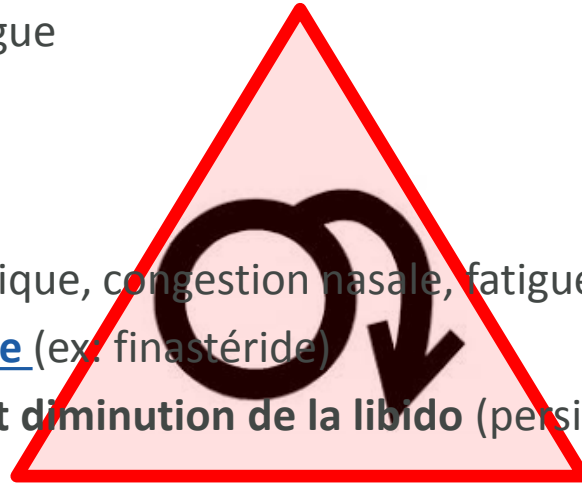
L'hypertrophie prostatique bénigne

- Hypertrophie **adénomateuse (supéro-médiane)** de la prostate
- Homme >50ans - prévalence: 50% si >80ans
- Symptômes: **troubles mictionnels** → pollakiurie, mictions de petit volume, bas débit, nycturie... plus rarement, rétention urinaire aigue



L'hypertrophie prostatique bénigne

- Hypertrophie **adénomateuse (supéro-médiane)** de la prostate
- Homme >50ans - prévalence: 50% si >80ans
- Symptômes: **troubles mictionnels** → pollakiurie, mictions de petit volume, bas débit, nycturie... plus rarement, rétention urinaire aigue
- Traitements:
 - ✓ **α-bloquants** (ex: tamsulosine)
E2^{aires}: hypotension orthostatique, congestion nasale, fatigue, **troubles de l'érection**
 - ✓ **Inhibiteurs de la 5-α-reductase** (ex: finastéride)
E2^{aires}: **dysfonction érectile et diminution de la libido** (persistante après R/), infertilité, dépression,
 - ✓ (Anti-cholinergiques)
- ✓ **Embolisation des artères prostatiques** – PAE (Prostatic Artery Embolization)
- ✓ **Prostatectomie chirurgicale** – si prostate de >90g
E2^{aires}: **incontinence, éjaculation rétrograde, dysfonction érectile (40%), hémorragie...**
 - ✓ **TURP (resection endoscopique trans-urétérale)** – si prostate de >30g <90g
E2^{aires}: **éjaculation rétrograde (80-100%), incontinence (1%), sténose urétrale (10%)...**
 - ✓ **Autres** (thermothérapie, électrovaporisation, laser...)



International Prostate Symptom Score (I-PSS)

Patient Name: _____ Date of birth: _____ Date completed _____

In the past month:	Not at All	Less than 1 in 5 Times	Less than Half the Time	About Half the Time	More than Half the Time	Almost Always	Your score
1. Incomplete Emptying How often have you had the sensation of not emptying your bladder?	0	1	2	3	4	5	
2. Frequency How often have you had to urinate less than every two hours?	0	1	2	3	4	5	
3. Intermittency How often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	
4. Urgency How often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. Weak Stream How often have you had a weak urinary stream?	0	1	2	3	4	5	
6. Straining How often have you had to strain to start urination?	0	1	2	3	4	5	
	None	1 Time	2 Times	3 Times	4 Times	5 Times	
7. Nocturia How many times did you typically get up at night to urinate?	0	1	2	3	4	5	
Total I-PSS Score							

Score: 1-7: Mild 8-19: Moderate 20-35: Severe

Quality of Life Due to Urinary Symptoms	Delighted	Pleased	Mostly Satisfied	Mixed	Mostly Dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?	0	1	2	3	4	5	6

IPSS

The questions refer to the following urinary symptoms:

Questions	Symptom
1	Incomplete emptying
2	Frequency
3	Intermittency
4	Urgency
5	Weak Stream
6	Straining
7	Nocturia

Question eight refers to the patient’s perceived quality of life.

The first seven questions of the I-PSS are identical to the questions appearing on the American Urological Association (AUA) Symptom Index which currently categorizes symptoms as follows:

Mild (symptom score less than or equal to 7)
Moderate (symptom score range 8-19)
Severe (symptom score range 20-35)

QoL

The IIEF-5 Questionnaire (SHIM)

Please encircle the response that best describes you for the following five questions:

Over the past 6 months:					
1. How do you rate your confidence that you could get and keep an erection?	Very low 1	Low 2	Moderate 3	High 4	Very high 5
2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5
3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated your partner?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5
4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?	Extremely difficult 1	Very difficult 2	Difficult 3	Slightly difficult 4	Not difficult 5
5. When you attempted sexual intercourse, how often was it satisfactory for you?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5

IIEF

(erectile function)

Total Score: _____

1-7: Severe ED 8-11: Moderate ED 12-16: Mild-moderate ED 17-21: Mild ED 22-25: No ED

Sélection des patients

➤ Equipe MULTIDISCIPLINAIRE !

- ✓ Toujours via un **urologue référent** (*CHU Godinne: Dr. Marcelo Di Gregorio*)
- ✓ Collaboration urologie – radiologie interventionnelle – radiologie diagnostique

➤ Evaluation du patient (par l'urologue):

- ✓ IPSS et QoL, IIEF
- ✓ TRUS et RMI + CTA
- ✓ PSA +/- biopsies écho-guidées
- ✓ Evaluation urodynamique

PAE (prostatic arterial embolization) SSI:

IPSS > 18 et/ou QoL > 3

Prostate > 30cm³

Pas de cancer

Pas de vessie «neuro» / décomp.

➤ Consultation en radiologie interventionnelle

- ✓ Discussion de l'ensemble des options thérapeutiques
- ✓ Technique, effets secondaires, consentement

➤ Critères d'exclusion: **très rares**

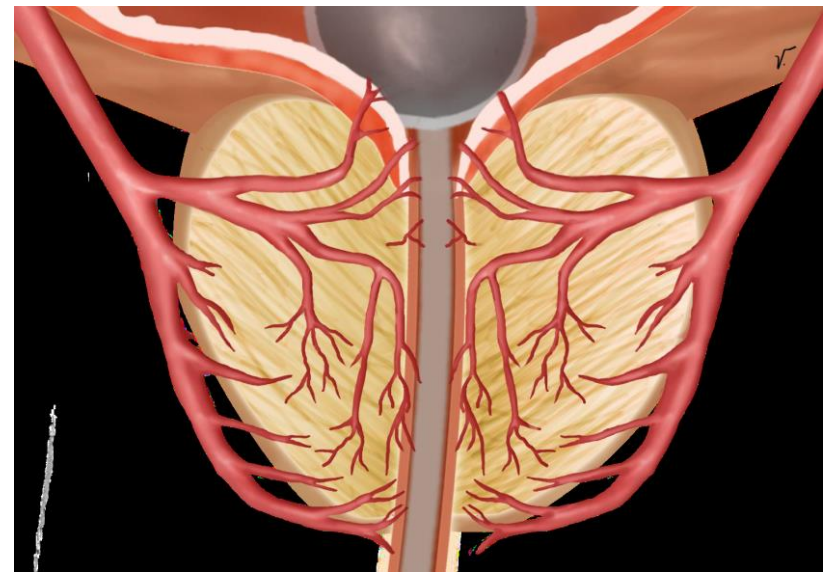
- ✓ IRC sévère (*option: CO2*), **artériosclérose sévère des artères iliaques (CTA)**
- ✓ Troubles de la coagulation marqués, infection urinaire...

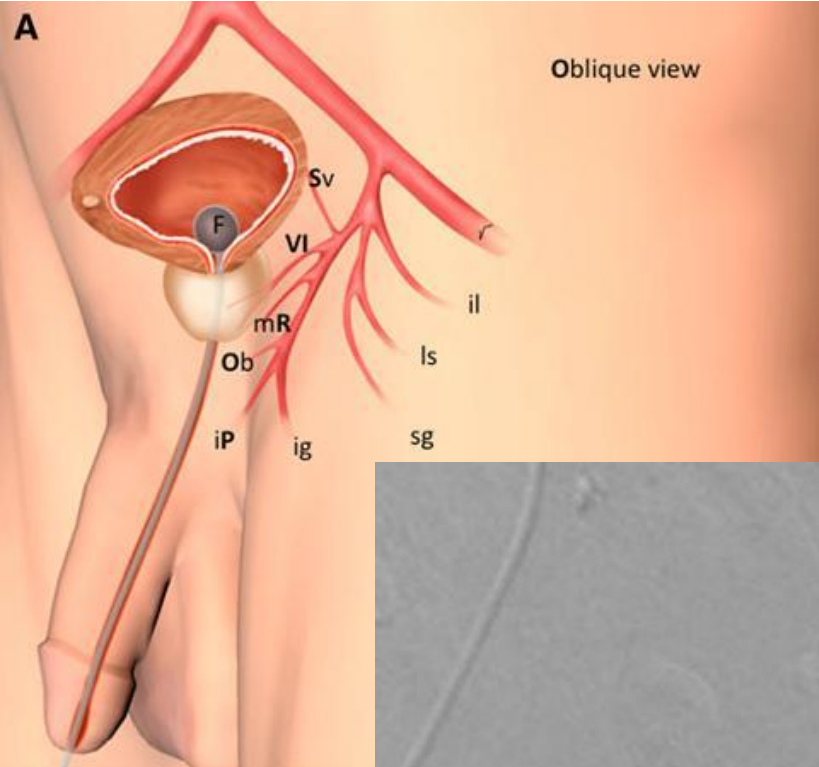
Technique

- Intervention « **one-day** » (hôpital de jour)
- Sonde urinaire (Foley) – retrait avant sortie
- Sous anesthésie locale
- Abord fémoral commun unilatéral (4F + système de fermeture)
- Micro-cathétérisme hyper-sélectif des artères prostatiques
- Embolisation par μ sphères de 300-500 μ m, bilatéralement

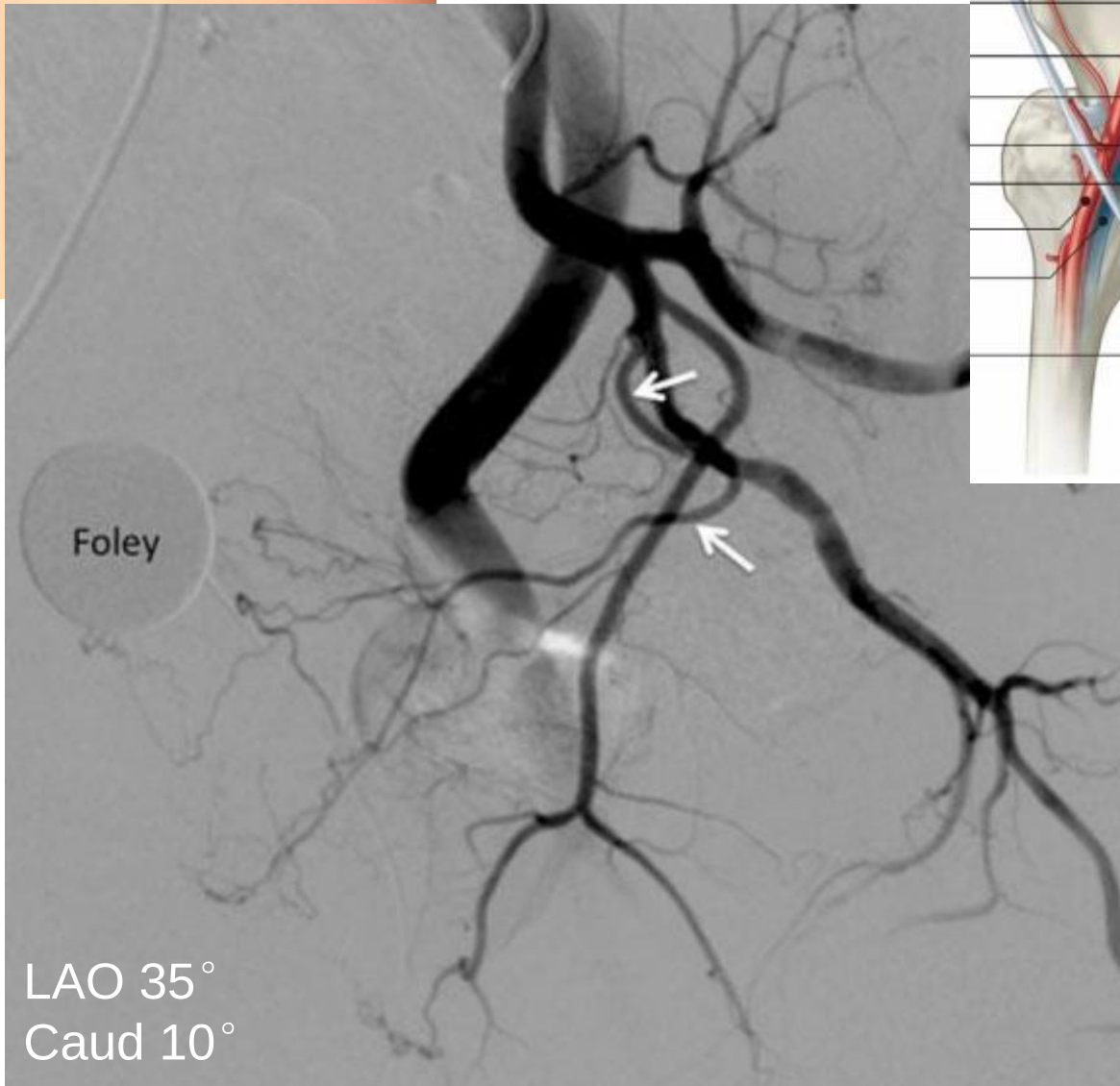
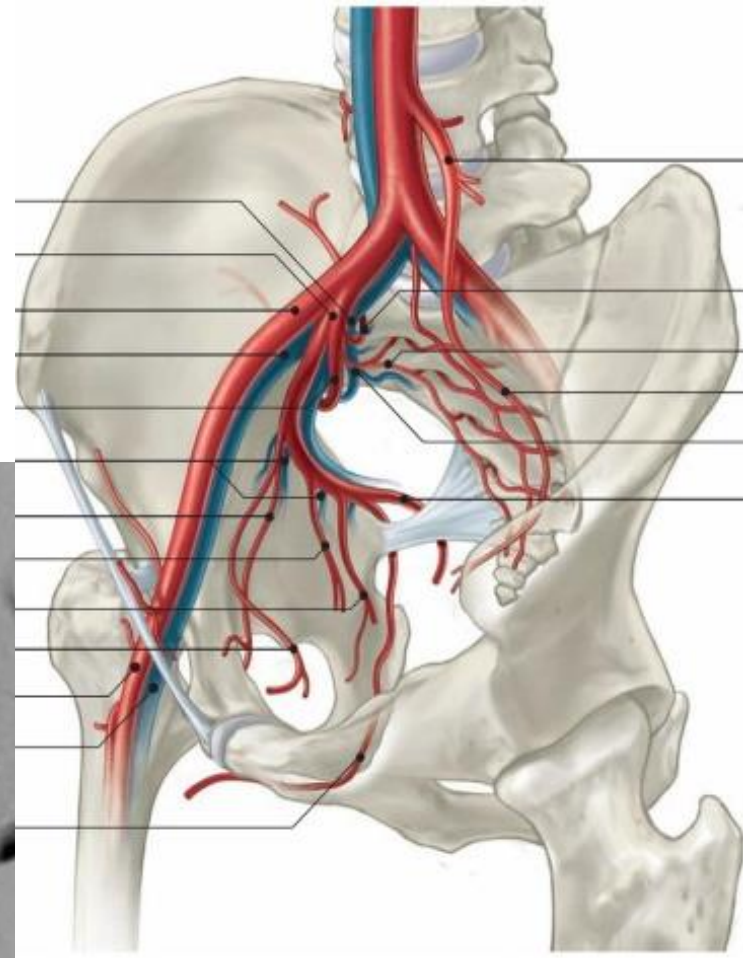
! Procédure longue: 2 à 3h en moyenne

- Traitement antidouleur post-op (2-3j): paracétamol +/- tramadol SN
+ prednisone 20mg/j pdt 3j



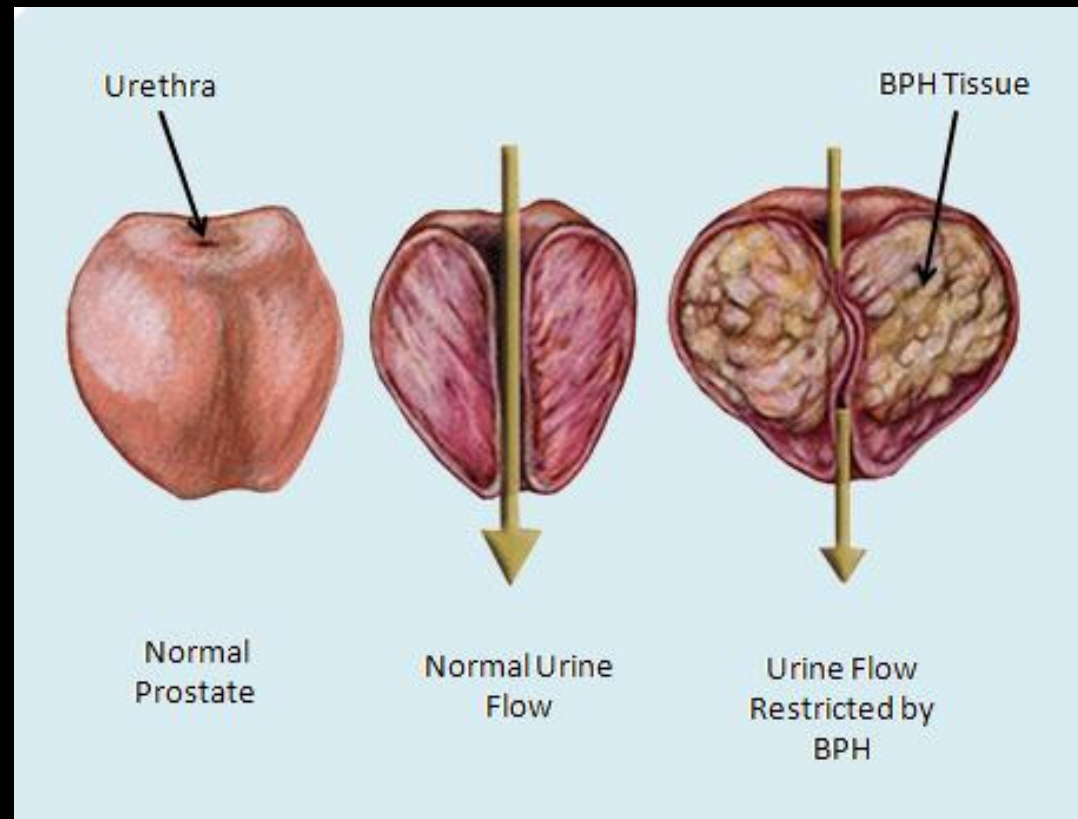


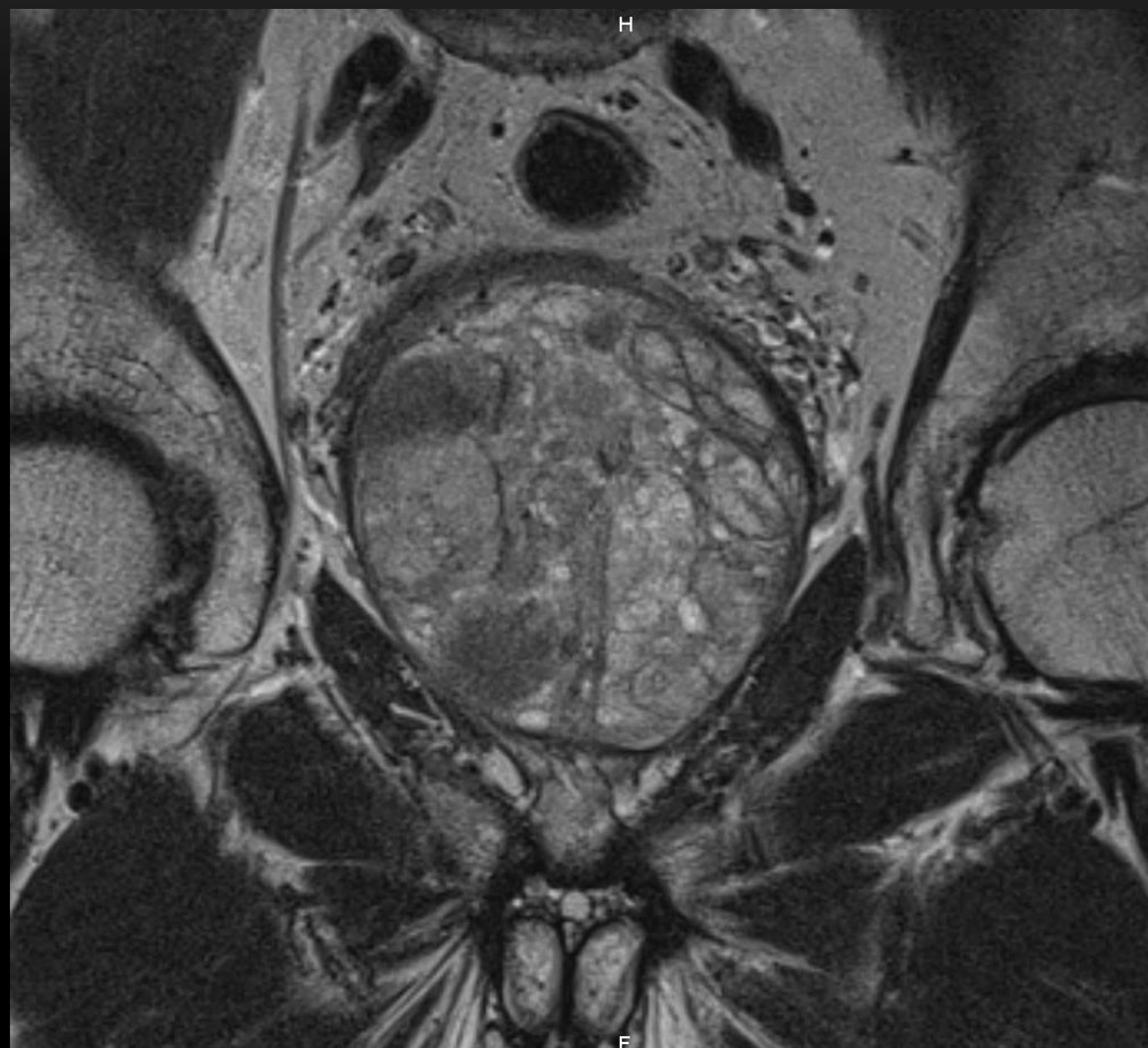
Anatomie



Case 2 – Prostate Embolization

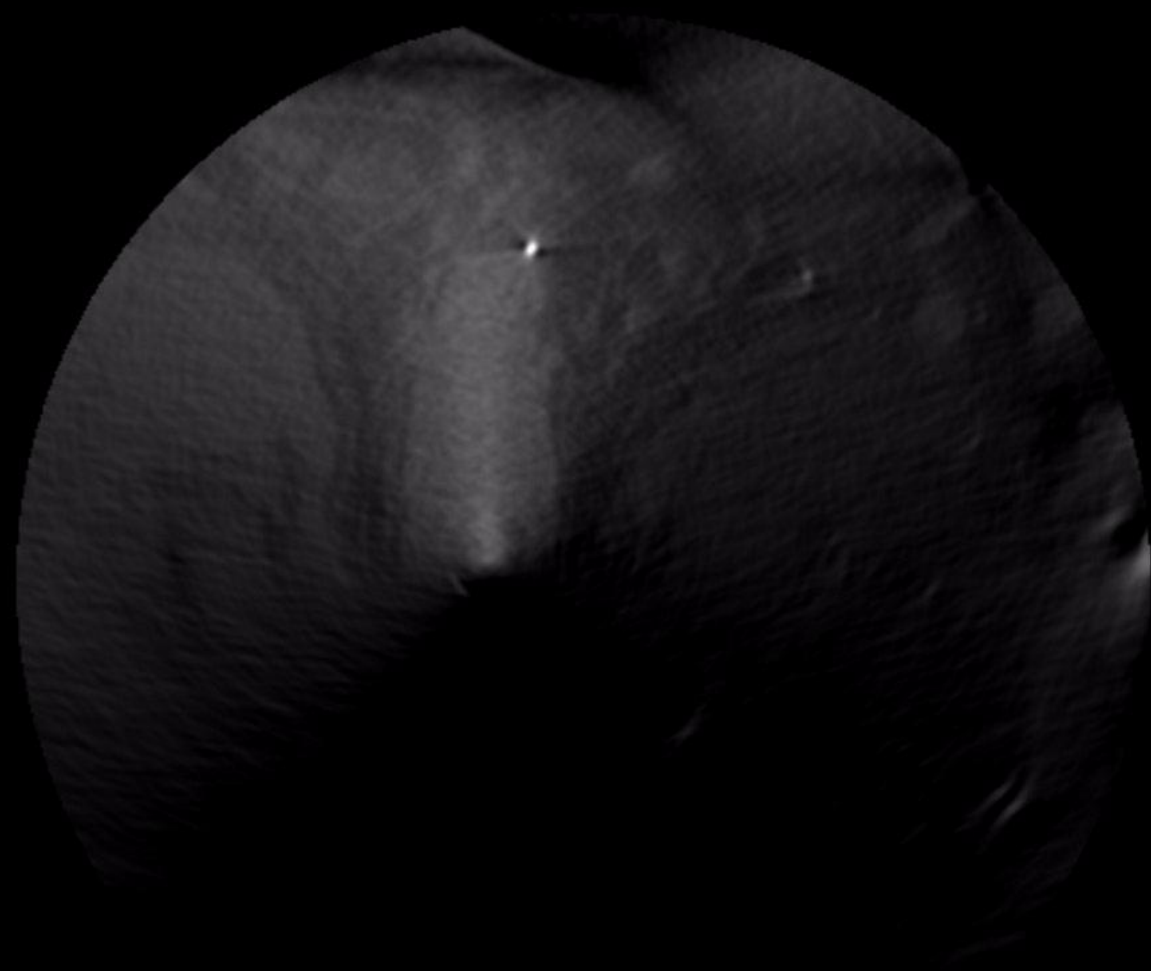
- ♂, 85y
- Very large BPH (140g)





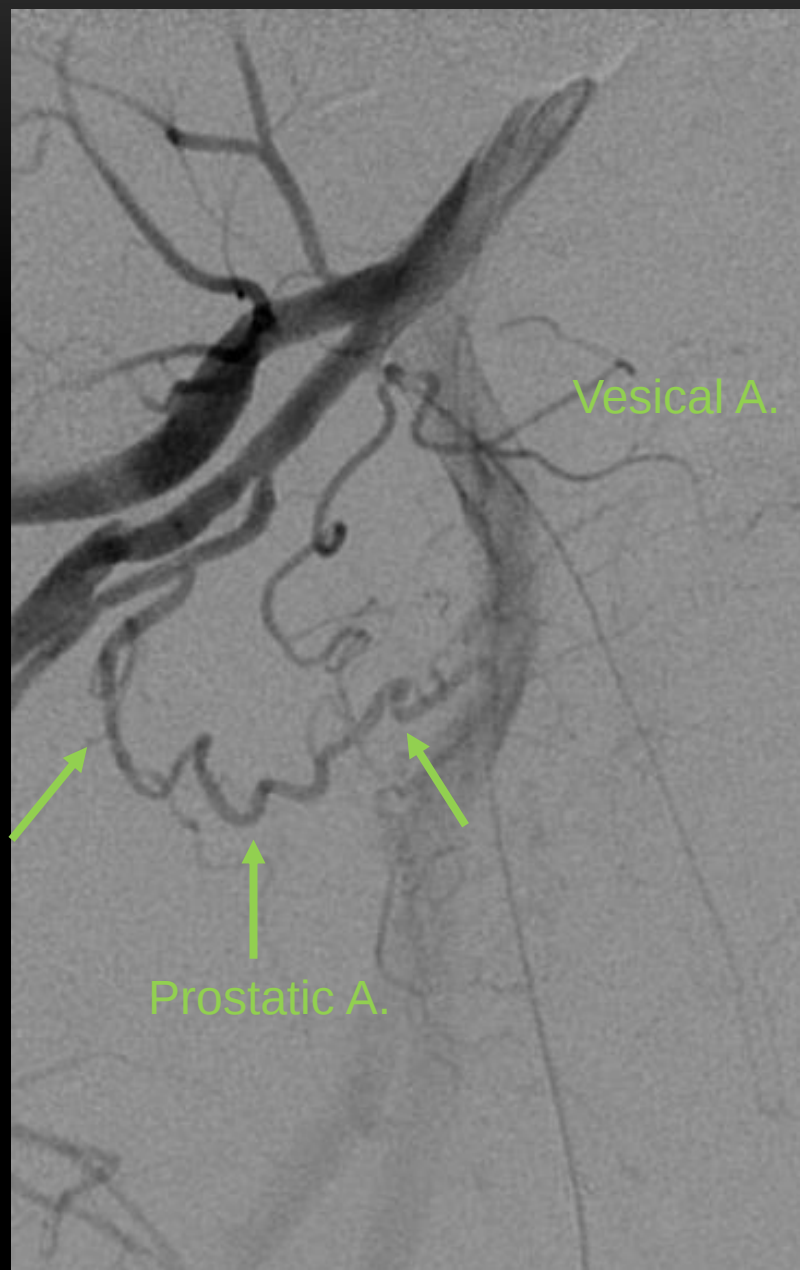


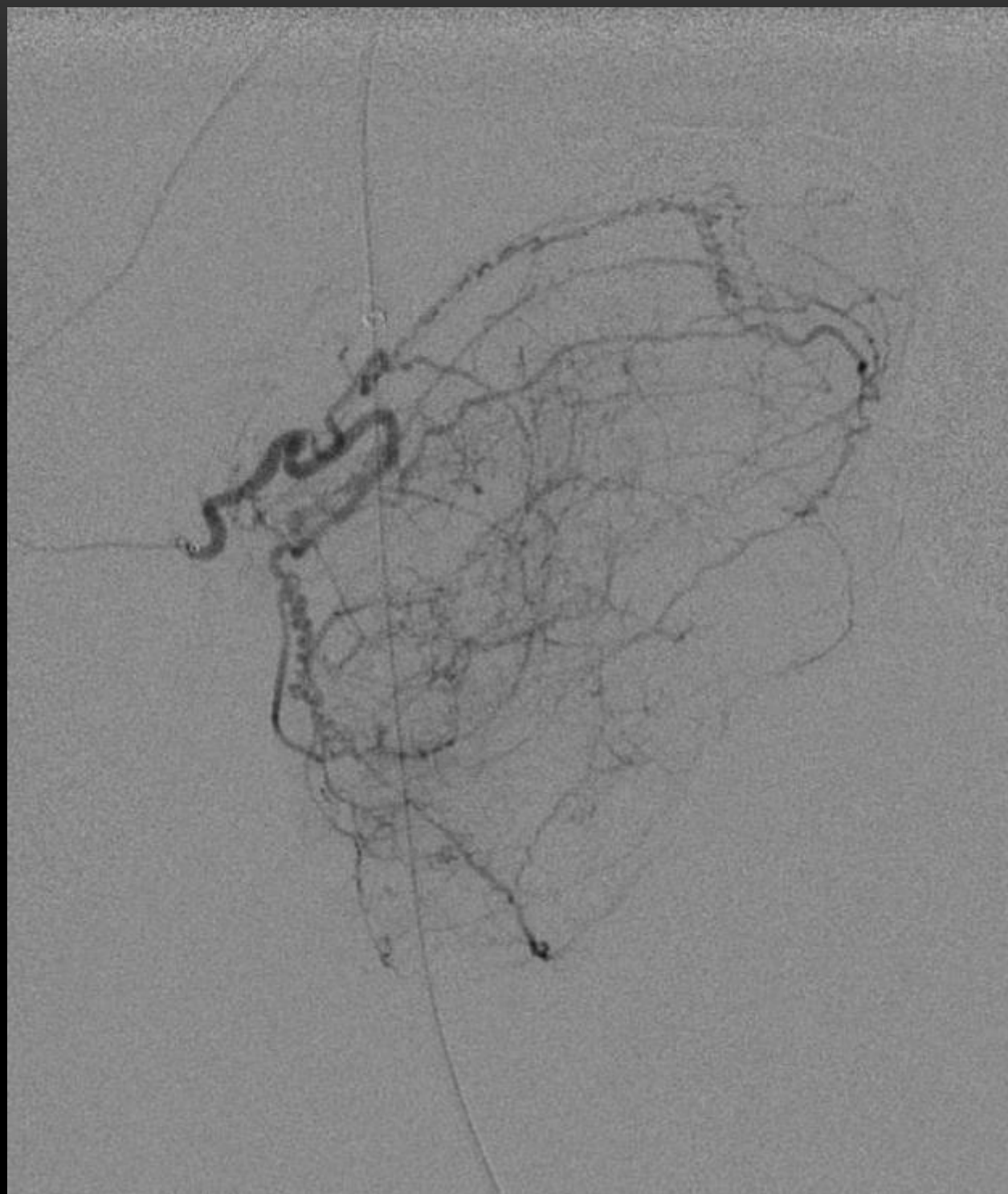
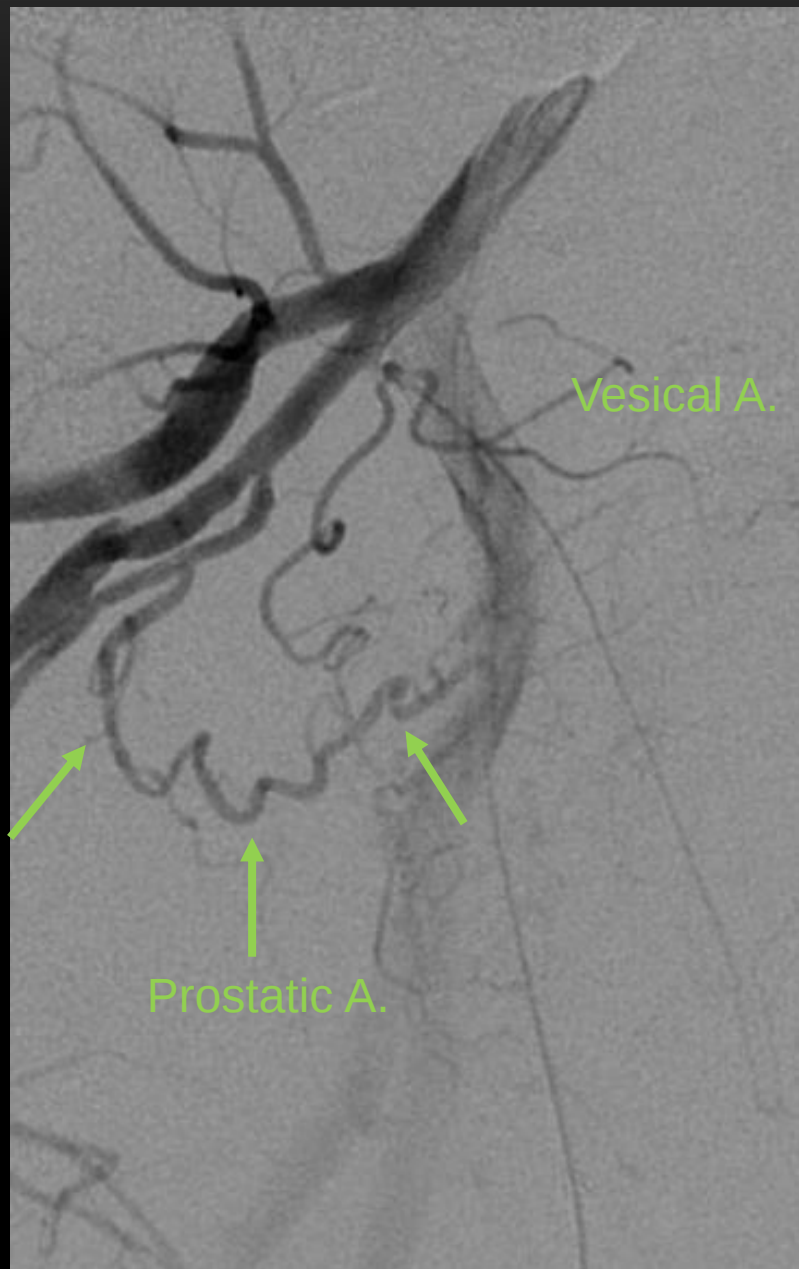
(Filt. 6)





RAO 35°
Caud 10°



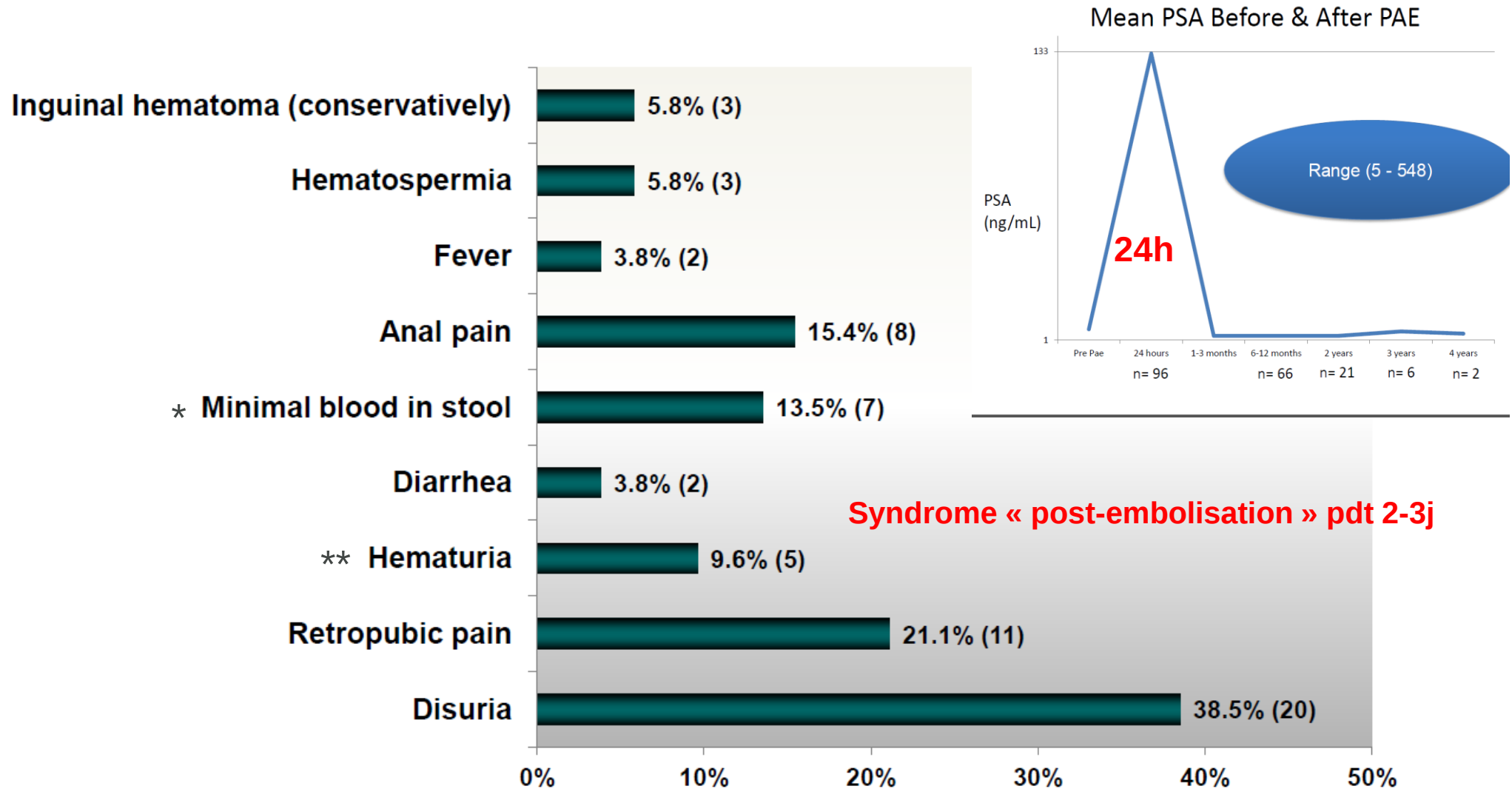


Clinical Results to Date (2008 →)

- Succès **technique**: **bilateral PAE**
 - ✓ 92% des cas
 - ✓ mais **amélioration des symptômes** même si échec technique partiel (**embolisation unilatérale**)!
- Succès **clinique**, 3-6 mois post-PAE:
 - ✓ **98%** des patients décrivent une **amélioration des symptômes**
 - **98%** des patients ont un score **IPSS<8** (*versus >18 avt PAE*)
 - **96%** des patients ont une **QoL≤3** (*versus >3 avt PAE*)
- Suivi des patients: par l'urologue !



Suivi, complications



* Très rares cas d'ischémie rectale → résolution spontanée

** Très rares cas d'ischémie vésicale nécessitant une résection (0,5%)

The role of prostatic arterial embolization in patients with benign prostatic hyperplasia: a systematic review.

Schreuder SM, Scholtens AE, Reekers JA, Bipat S.

Cardiovasc Intervent Radiol. **2014 Oct**;37(5):1198-219. PMID: 25005565

But: Méta-analyse de 9 séries (between June 2008 and March 2013)
706 patients – suivi jusqu'à 12 mois post PAE.

Résultats:

IPSS and QOL-related symptoms improved mainly during the first month, with a further improvement up to 30 months.

- Mean IPSS score: **t0 = 23.31** → t+1m = 11.92 → **t+30m = 8.1**
- Mean QOL: **t0 = 4,34** → t+1m = 2,4 → **t+30m = 1,67**

No deterioration of the IIEF was seen after PAE

No case of impotence or retrograde ejaculation reported.

The PAE procedure seems **safe**:

- 6 bladder ischemia → 2 transient, 4 R/minor surgery (resection of a small area of necrosis).
- 20 transient rectal bleeding
- No cases of intestinal wall ischemia or corpus cavernosum ischemia.
- Most patients experienced no or mild pain. 4 patients with severe pain (VAS 9 or 10 – dt 4 bladder ischemia).
- Minor complications: hematoma on puncture site (n = 26), hematuria (n = 59), hematospermia (n = 38), urinary tract infection (n = 67), prostatitis and balanitis (n = 10) → Transient and R/Ab.



Embolisation des fibromes utérins



INTRODUCTION

- L'embolisation utérine est proposée depuis 1979
 - Saignement traumatique ou tumoral
 - Hémorragie du post-partum
- L'embolisation des **fibromes utérins** est proposée depuis 1989/**1995** (Lancet)

- **Essor récent** (USA, France, Allemagne...)

- 1. Pression *économique* (assurances US)

- * USA: 350 000 hystérectomies/an pour fibrome

- * France: 60 000 env.

- 2. Influence des résultats d'*études favorables*

(France : Femic , Ecosse : Rest trial , Nederland : Emmy trial , Canada : arrêtée car préférence embolisation...)

... retard +++ de la Belgique !

(lobby gynécologique – UCL+++)

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POLITICS

Rice 'resting comfortably' after surgery

Expected to return to work on Monday

Friday, November 19, 2004 Posted: 4:07 PM EST (2107 GMT)

WASHINGTON (CNN) -- National security adviser Condoleezza Rice, President Bush's nominee to be the next secretary of state, is doing well after successful surgery, Jim Wilkinson, deputy national security advisor, told CNN Friday.



National security adviser Condoleezza Rice

Rice is "out of surgery and resting comfortably after undergoing a successful uterine fibroid embolization at Georgetown University Hospital this morning," he said. "The minimally invasive procedure took an hour and a half and was performed by interventional radiologist James Spies."

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Treating uterine fibroids without surgery

Alternative to hysterectomy often not discussed with patients

By Robert Bazell

Correspondent

NBC News

Updated: 12:59 p.m. ET Aug. 25, 2004

Laura Rogers, a 38-year-old allergist, suffered from uterine fibroids, a condition that strikes hundreds of thousands of women each year. Even though she is a physician, her own gynecologist did not tell her about a non-surgical treatment option.



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To fix a brain aneurysm, doctors had to saw open the skull. Now they can use a tiny catheter instead. The promise of IR.



Choice: An aneurysm under IR repair

The New York Times nytimes.com

PRINTER-FRIENDLY FORMAT SPONSORED BY SIDWAYS NOW PLAYING IN THEATERS

November 23, 2004

Treating Troubling Fibroids Without Surgery

By LAWRENCE K. ALTMAN

Condoleezza Rice, the national security adviser, shares at least one thing with millions of other American women: she had fibroids, benign tumors in the uterus that required treatment.

Ms. Rice, the nominee for secretary of state, entered the hospital for an overnight stay last week to undergo a procedure - uterine artery embolization - that is rapidly becoming an alternative to major surgery for troublesome fibroids.

For most women, fibroids, consisting of muscle and fibrous tissue, are no bother. But for millions of others, fibroids can be so large (in some cases, the size of a melon) or so numerous that they cause discomfort, severe bleeding, anemia, urinary frequency and other symptoms.

Silent Treatment

Hysterectomy Alternative Goes Unmentioned to Many Women

Gynecologists Often Don't Cite Less-Invasive Procedure To Treat Fibroid Tumors

Bailiwick of Other Specialists

By KEVIN HOLLERER And LAUREN ETTER

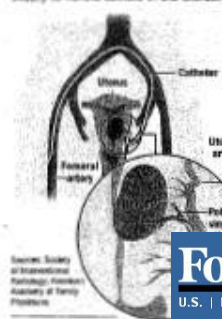
Hundreds of thousands of women go to gynecologists each year with a common condition known as uterine fibroid tumors. When it's severe, a majority of them get the same recommendation: a hysterectomy, or removal of the uterus. In recent years, a less-invasive procedure, known as uterine artery embolization or UAE, has been growing in popularity. Yet some patients, and even some gynecologists, say many gynecologists aren't telling their patients about the alternative.

A study presented at a medical conference in 2003 found that of 100 UAE patients at Chicago's Northwestern Memorial Hospital, 79 had learned about the procedure from a source other than a gynecologist. A survey by Yale University School of Medicine in 2003 found that 13 of 21 UAE patients had learned about the procedure from the Internet.

"It's sad," says Joergen Eisermann, a gynecologist who is medical director of the South Florida Institute for Reproductive Medicine. "We do a disservice not to mention all the options." In the large majority of cases, UAE brings relief from uterine fibroid tumors, and it has a much shorter recovery time than hysterectomies. These tumors aren't cancerous, but their growth can be debilitating. UAE involves cutting off the blood supply to the tumors, causing them to shrink. Some gynecologists blame the failure

Delicate Remedy

Uterine artery embolization uses small painful particles to cut off the blood supply to fibroid tumors in the uterus.



Source: Society of Interventional Radiology. Fibroids: Anatomy of Uterus

that they provide, they are refer you" to another specialist. Bush Shaber, a gynecologist women's health at Kaiser Northern California, a large insurance organization.

Gynecologists in the U.S. about 200,000 hysterectomy fibroids, meaning that \$400 million is at stake. Women have uterine problems alone to, or are referred to, gynecological profession's expertise.

UAE isn't a perfect solution recommended for women with children. Studies have success rate of 73 percent, according to a new study involving 102 women who experienced further symptoms after three years, and the procedure is too new for doctors to know whether that percentage will rise with

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Nonsurgical Technique Effective Against Fibroids

By Robert Preidt

FRIDAY, April 1 (HealthDay News) - A nonsurgical treatment for uterine fibroids, known as uterine fibroid embolization (UFE), has a five-year success rate of 73 percent, according to a new study involving 102

abc NEWS



Elyse Fine found an alternative to hysterectomy for treatment of her uterine fibroids. ABC News

Conflicting Opinions

Is a Turf War Compromising Women's Medical Care? ABCNEWS.com

Aug. 27, 2004 — Elyse Fine's gynecologist told her she needed a hysterectomy to treat a uterine fibroid that was causing heavy bleeding. But Fine, a 44-year-old mother of two, did not agree.

Every minute of every day in this country a woman has her uterus removed in a hysterectomy. Most of the surgeries are done on women under age 50, and the vast majority are performed to treat fibroids, benign tumors that develop in the uterus. Fibroids occur in as many as 80 percent of women. While the growths can cause pain and heavy bleeding, most do not need treatment.

Non-Surgical Option

Good Housekeeping August 2004

Dr. Phil's Simple Plan to Make You Thin

GET OUT OF DEBT Fast solutions, p.63

NEW CURES FOR FIBROIDS

BAD SERVICE How to Complain And Get Results

15 Quick Dinners For the Grill

Too Tough On Yourself? Learn to go easy

MOM-TESTED!

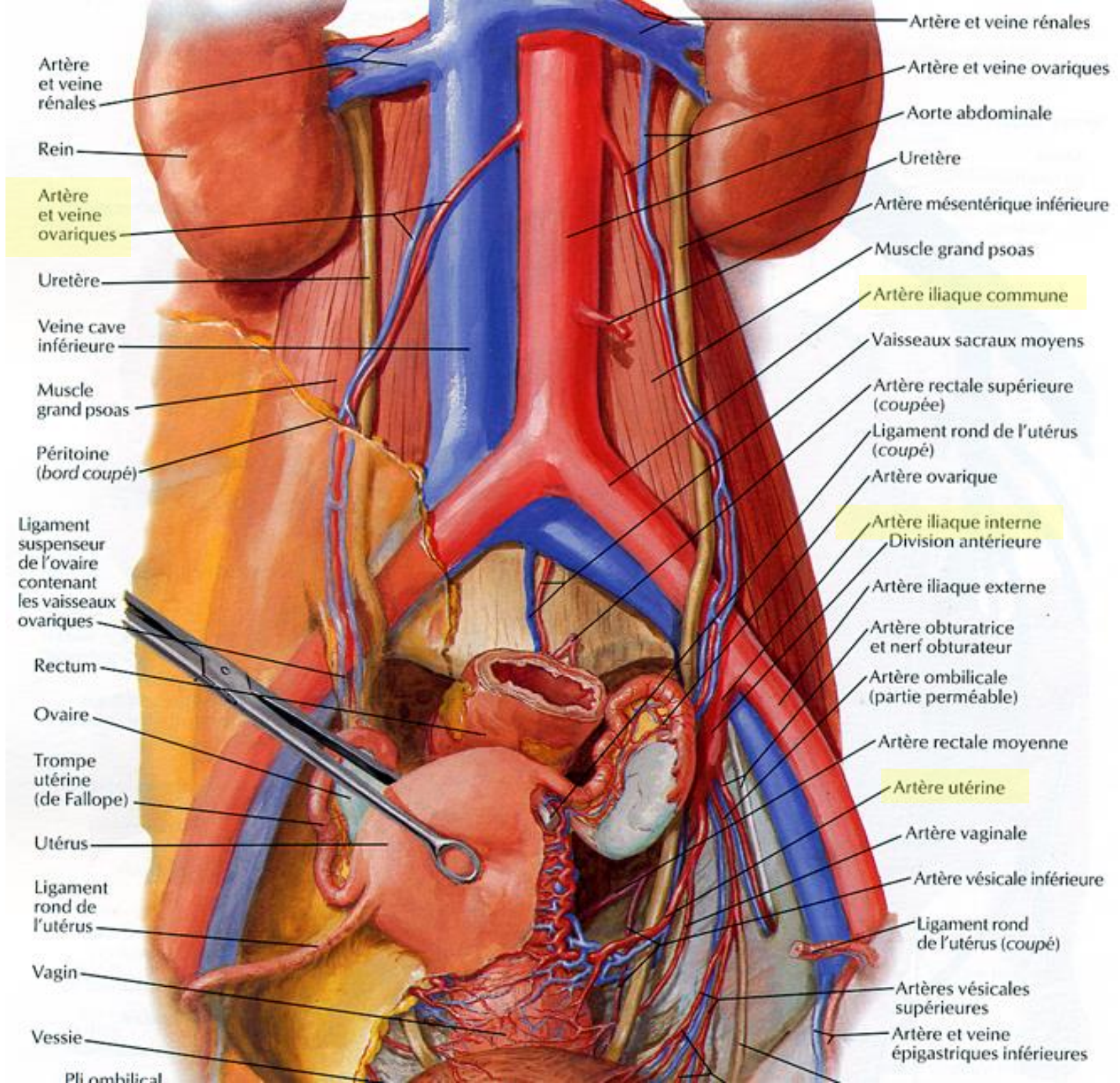
LOSE BIG! Diet Secrets From Real Women

No surgery, no fads

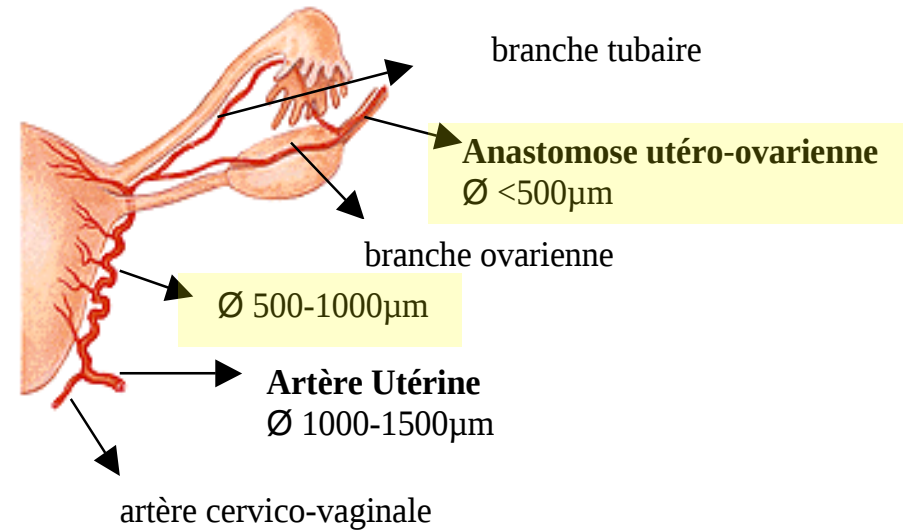
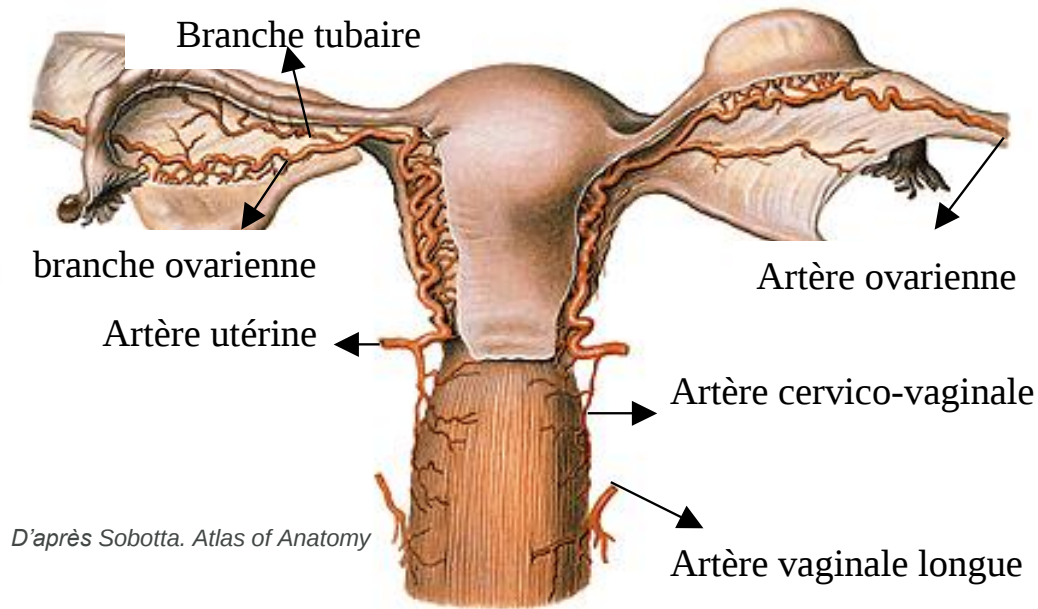
Tricks to keep weight off

ADVERTISEMENT

FINALLY, A FATHER'S DAY GIFT... HE WON'T HAVE TO PRETEND HE LIKES.



Vascularisation de l'utérus



Les fibromes utérins sont vascularisés par un réseau artériel périphérique (pseudo-capsule), de $500-900\mu\text{m}$ Ø, d'où partent des branches centripètes grêles.

→ BUT: Obtenir la **nécrose ischémique** des fibromes



Bilan Pré-Embolisation

- Sélection des patientes: **fibromes symptomatiques**
- Confirmation du diagnostic de fibrome
 - Nombre et taille
 - Localisation
 - Vascularisation
- Eliminer un **cancer associé** !
- Eliminer une **infection gynécologique** ou annexielle évolutive
- Prévention du spasme artériel:
 - ✓ Arrêt des analogues de la Gn-RH 3 à 4 mois avant la procédure
 - ✓ Arrêt des progestatifs 4 à 6 semaines avant la procédure
- **Contre indications:**
 - ✓ **Fibrome sous-séreux pédiculé**
 - ✓ Pathologies associées (cancer, infection)
 - ✓ **Désir de grossesse AVEC alternative chirurgicale simple** (myomectomie) ?

Pelage JP, et al. Radiology 1999;210:573-5

EN PRATIQUE

➤ Consultation gynécologique

Pose l'indication

Discussion des alternatives
thérapeutiques !

Elimine les autres
pathologies

➤ Consultation radiologue
interventionnel

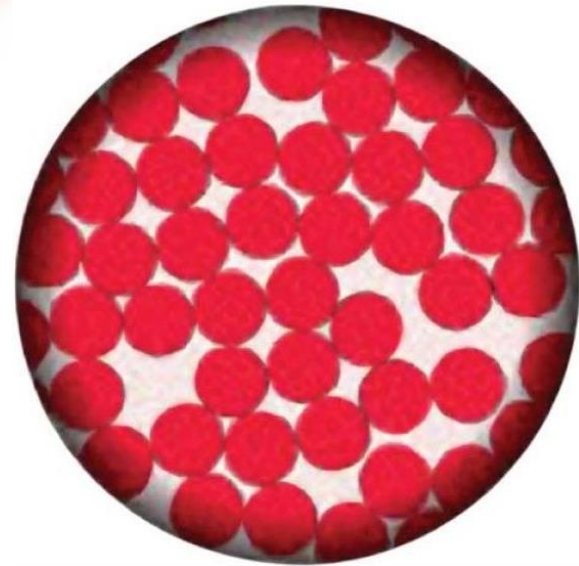
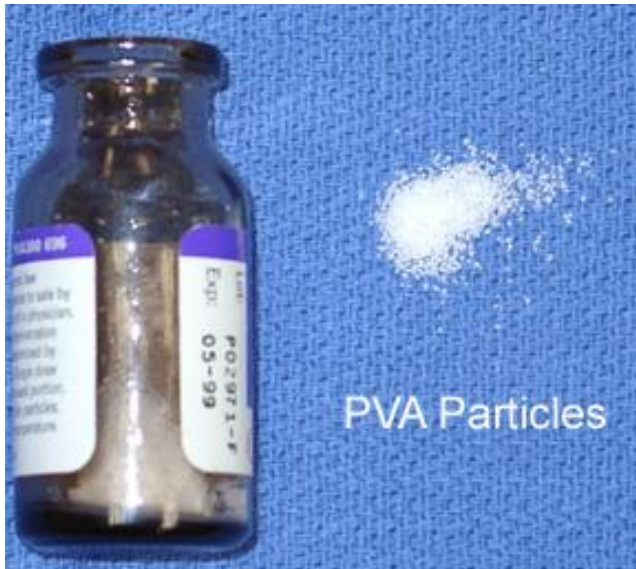
Faisabilité

Information,
consentement

➤ +/- Consultation anesthésie

TECHNIQUE

- Abord artériel fémoral commun unilatéral (rarement bilatéral) – intro 4F (1,5mm)
- Cathétérisme A.iliaques internes puis micro-cathétérisme A.utérines.
- Matériel d'embolisation:
 - ✓ Particule de PVA ($>500\text{ }\mu\text{m }\varnothing$)
 - ✓ **Micro-sphères (500-700 $\mu\text{m }\varnothing$)**
- Système de fermeture du point de ponction artériel



ANALGESIE

- Antidouleurs IV avant et pendant la procédure +/- anxiolytique
- Pendant la procédure: selon souhait patiente
 - ✓ **Pompe PCA**
 - ✓ Péridurale
 - ✓ Anesthésie générale
- **Après la procédure:**
 - ✓ **AINS**
 - ✓ Paracétamol +/- morphiniques

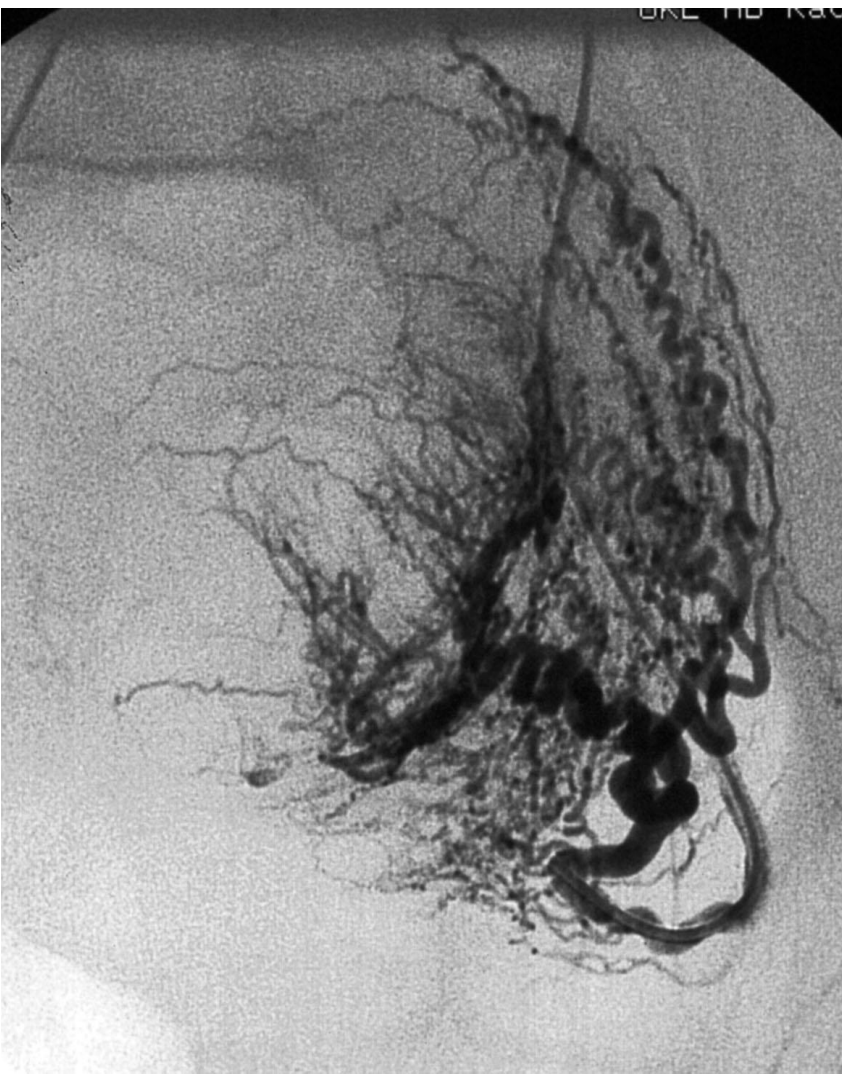
Déroulement d'une Embolisation



1: KT en cross over, dans l'artère iliaque primitive G



2: KT dans l'artère iliaque interne G



3. μ KT sélectif de l'artère utérine G



4. Aspect après embolisation

- ✓ Disparition des branches distales
- ✓ Réduction du flux dans l'artère utérine
- ✓ Branches cervico-vaginales perméables
- ✓ Flux ovarien préservé (←)





RESULTATS

- **Disparition dans 85 à >90% des cas des symptômes, à 6 mois :**
 - ✓ Saignements
 - ✓ Douleur pelvienne
 - ✓ **Amélioration de la qualité de vie**
- **Diminution de la taille des fibromes (IRM de contrôle à 6 mois)**
 - ✓ volume utérin - 50%
 - ✓ volume des fibromes - 60-70%
- **Absence d'amélioration clinique après embolisation: 10%**
 - ✓ **Echecs techniques: 1 à 4%**
 - ✓ **Gros fibromes > 10cm**
 - ✓ Adénomyose associée
 - ✓ **Leiomyosarcome**
 - ✓ **Vascularisation extra-utérine (artères ovariennes,...)**

Symptômes (2007 Femmes)

Etude	Nombre	Mois	Ménorragies
Goodwin	60	16.3	81%
Ravina	88	?	89%
Hutchins	305	12	92%
Siskin	49	6	89%
Pelage	80	24	94%
Brunereau	58	3	90%
Andersen	62	6	96%
Mc Lucas	167	6	88%
Spies	200	21	85%
Walker	400	16.7	84%
Pron	538	8.2	83%

Volume (1125 femmes)

Etude	Nombre	mois	Utérus*	Fibrome*
Goodwin	59	10.2	- 42%	- 49%
Ravina	88	?	NA	- 69%
Hutchins	92	>3	- 48%	NA
Siskin	16	6	NA	- 47%
Walker	88	3	- 48%	- 48%
Pelage	80	6	NA	- 52%
Brunereau	46	6	- 23%	- 43%
Andersen	30	6	NA	- 68%
Mc Lucas	46	12	- 52%	- 37%
Spies	116	12	- 38%	- 58%
Pron	464	3	- 35%	- 33%

LIMITES et COMPLICATIONS

➤ Limites du traitement par embolisation:

- ✓ Si désir de grossesse ? → voir si myomectomie possible
- ✓ Myome sous séreux pédiculé → chirurgie facile
- ✓ Myome sous muqueux → prévenir du risque d'expulsion
- ✓ Myome interstitiel > 90 mm (douleurs) → protocole d'analgésie renforcé

➤ Complications post-embolisation et solutions:

- ✓ **Douleurs: 100%** → bien contrôlées, protocole d'analgésie adéquat
- ✓ **Pyométries (4%)** → suivi post-embolisation
- ✓ **Aménorrhée transitoire ou définitive - Ménopause précoce**
→ privilégier μ sphère de $\varnothing$ suffisant (>500 μ m)
- ✓ Récidive ?
- ✓ Expulsion des fibromes (sous-muqueux) → prévenir patiente

Complications Graves de l'Embolisation

- Infection sévère <1-2%
- Aménorrhée secondaire 2-5%
dont **Aménorrhée définitive** **2%**

→ Plus fréquent chez les femmes de plus de 45 ans

→ Amélioration technique: particules plus grosses (>500 µm) et mieux calibrées

- Expulsion de fibrome 1-5%
- Hystérectomie en Urgence 5,5/1000
 - Pour infection (et/ou nécrose)
 - Dans le premier mois après l'embolisation
 - Risque majoré avec les fibromes pédiculés
- Mortalité : 5 cas publiés (infection, EP)

Douleurs Post-Embolisation

- **Quasi-constantes**
 - ✓ Douleurs dorsales, crampes abdominales
 - ✓ Nausées et vomissements
 - ✓ Fièvre
 - ✓ Saignements
- Sévères dans 50% des cas
- Précoces, maximum d'intensité **12-24 heures après l'embolisation**
- Persistent **pendant 3-7 jours**
- Traitement intra-veineux durant l'hospitalisation
- Relais per os à la sortie (**antalgiques, AINS**)

UFE BENEFITS COMPARED TO SURGERY

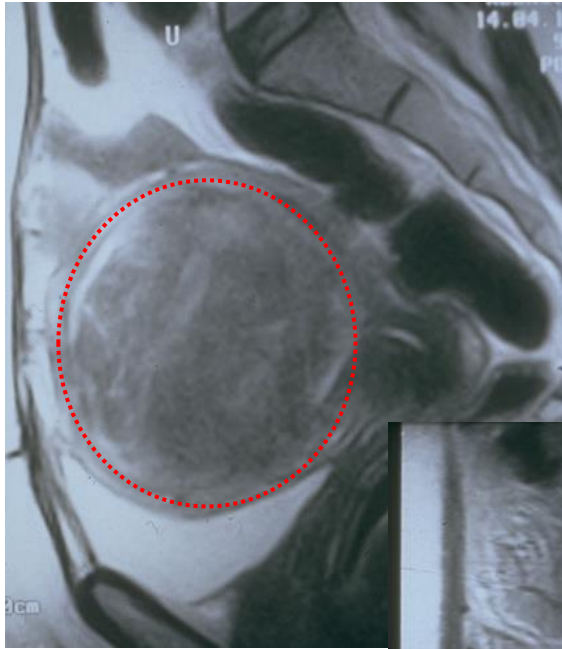
	UFE ^(a)	Hysterectomy ^(a)	Myomectomy ^(b)
Minor complications ^(c)	28.4% <<	52%	71.7%
Major complications ^(c)	3.9% ^(a) 4.0% ^(b)	12%	1.7%

	Embolisation	Hystérectomie	Δ
Hospitalisation (jours)	1.71 $\pm$ 1.59 <<	5.85 $\pm$ 2.52	4.14 $P < .001$
Retour à une activité normale (jours)	9.50 $\pm$ 7.21 <<	36.18 $\pm$ 20.47	26.68 $P < .001$

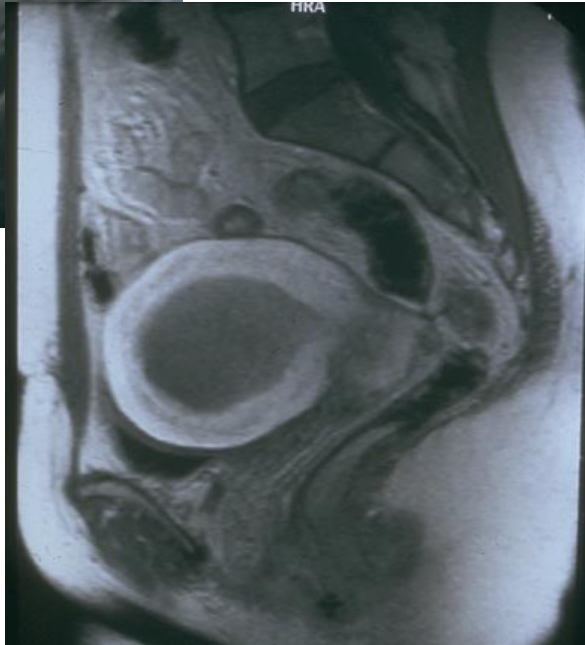
Pinto-Pabon. Radiology 2003;226: 425-431

- a) Spies, J.B., et al. (March 2004). Outcome of uterine embolization and hysterectomy for leiomyomas: Results of a multicenter study. *American Journal of Obstetrics and Gynecology*, 191, 22-31.
- b) Goodwin, S.C., et al. (January 2006). Uterine artery embolization versus myomectomy: a multicenter comparative study. *Fertility and Sterility*, 85, 14-21.
- c) Spies, J.B., et al. (November 2002). Complication After Uterine Artery Embolization for Leiomyomas. *Obstetrics and Gynecology*, 100, 873-880.
 - Minor complications include Society of Interventional Radiology complication classification levels A & B
 - Major complications include Society of Interventional Radiology complication classification levels C or higher

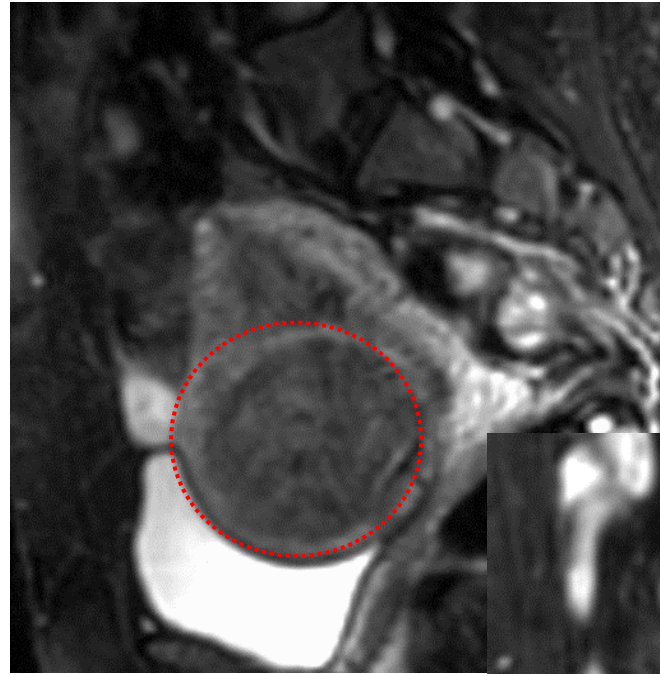
IRM Avant et Après Embolisation



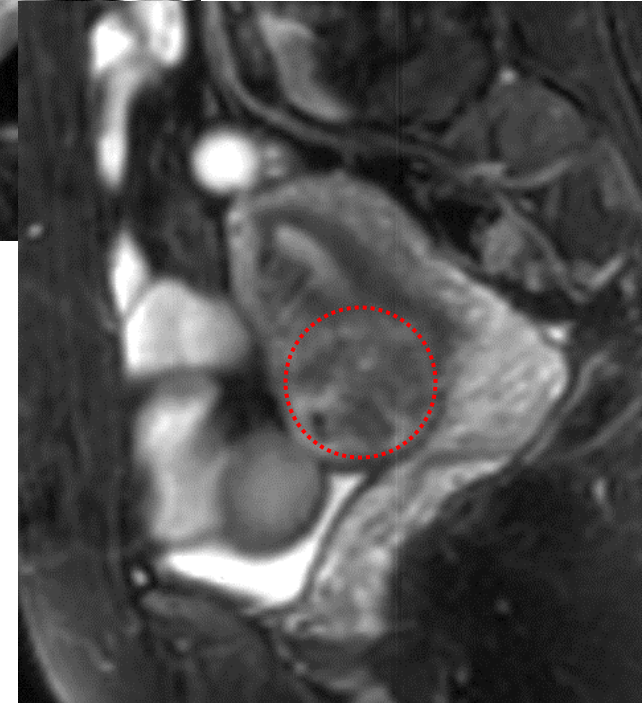
IRM initiale



IRM à 6 mois



IRM initiale



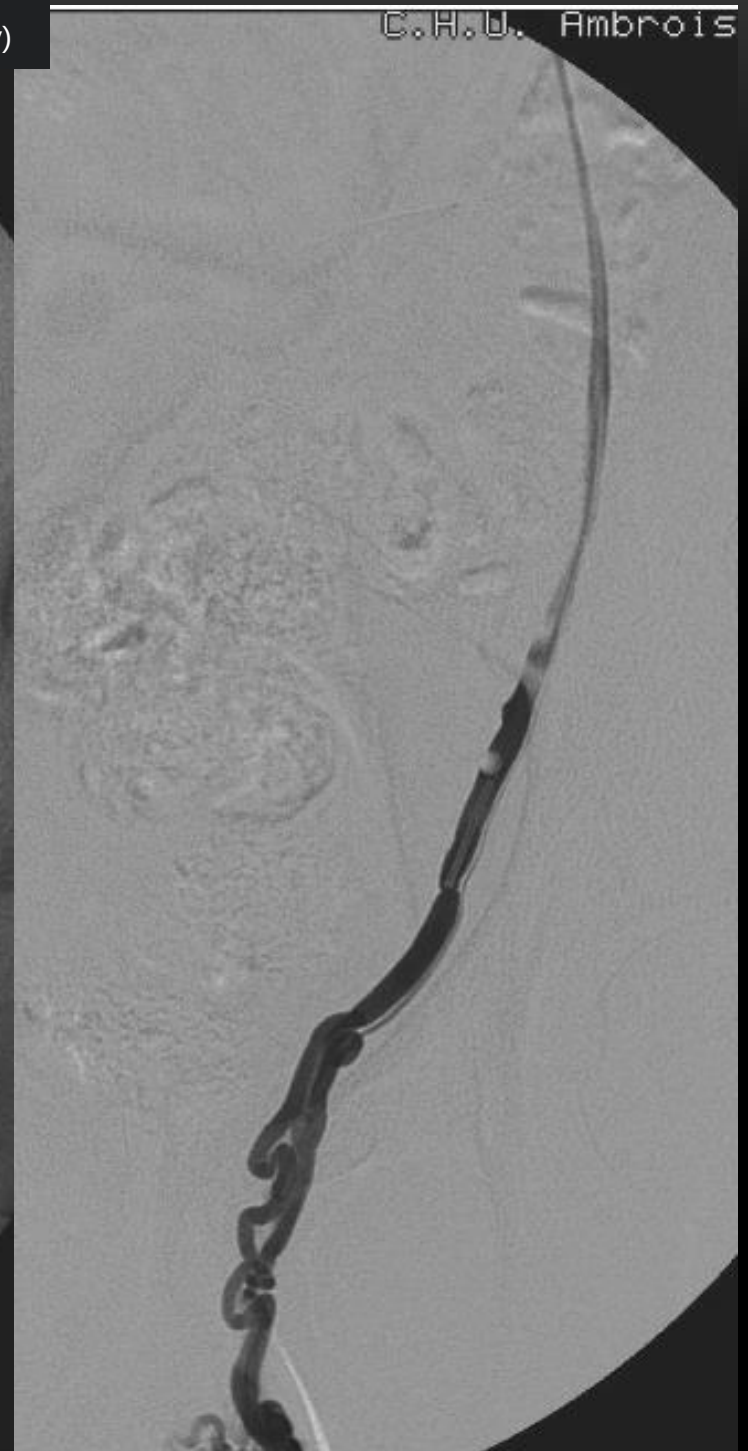
IRM à 4 mois



Embolisation (sclérose) de varices pelviennes

Embolisation de varicocèles (Courtesy of Dr D.Wery)

C.H.U. Ambrois





Embolisation de varicocèles – Coils +/- sclérosant

(Courtesy of Dr D.Wery)



6- EMBOLISATION: FUTUR ?

- Embolisation des hémorroïdes (artères rectales supérieures + moyennes)
- Embolisation « bariatrique » (artère gastrique gauche) → effet sur les cellules à gréline
- Embolisation des arthrites inflammatoires
- ONCO:
 - SIRT: autres organes ?
 - TACE: autres chimiothérapies ?
 - Autres agents transmis (thérapies ciblées) ?

Thanks for your attention !



KEEP
CALM
AND LOVE

Interventional
Radiology

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Interventional Radiology
It's like surgery, only

