ISCHEMIE TISSULAIRE
EXPLORATIONS
PRE-THERAPEUTIQUES

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Clinique ARAGO
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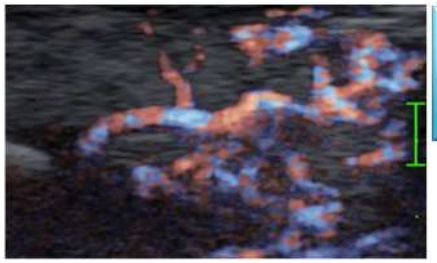
SYNDROME D'HYPOPERFUSION ISCHEMIQUE DISTALE

Insuffisance temporaire ou permanente de l'apport en oxygène aux cellules

- **Anamnèse**
- **Examen physique**
- **Examens complémentaires non invasifs**



DUPLEX –SCAN
+
PRESSION DIGITALES

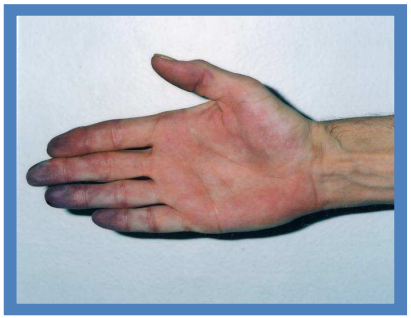
IMPUTABILITE
de la
SYMPTOMATOLOGIE

DIAGNOSTIC
POSITIF
EVALUATION SEVERITE

DIAGNOSTIC
DIFFERENTIEL

PATHOLOGIE INTRIQUÉE
NEUROPATHIE .CANAL CARPIEN. DTB (Double Crush) TENO SYNOVITES

?



RECOMMANDATIONS

6.4.3.2.1 Ultrasound
DUS is the main imaging modality for VA surveillance. DUS can enhance the understanding of the physiology and pathology of every VA. DUS has been described in Chapter 4.
6.4.3.2.2 Angiography
DSA is the gold standard for the evaluation of VA patency. DSA can be and is used in some centres as a primary surveillance method when clinical monitoring findings indicate VA dysfunction or after DUS examination.

EBPG on Vascular Access (2018)

KDOQI 2019

18.1 KDOQI considers it reasonable that strategies to both prevent and treat AV-access steal should be developed and implemented before AV-access creation, to reduce the risk of AV-access steal and related morbidity, respectively (Expert Opinion)

18.2 KDOQI considers it reasonable that postoperatively, patients should be monitored closely for signs and symptoms associated with AV-access steal and managed appropriately with consideration of individual circumstances as follows:

- **O *Mild to moderate* signs and symptoms require close monitoring for progression of ischemia and worsening of signs and symptoms**
- **O *Moderate to severe* signs and symptoms often require urgent treatment to correct the hemodynamic changes and prevent any longer-term disability**

18.3 KDOQI considers it reasonable that patients with signs and symptoms consistent with AV-access steal should be referred urgently to a surgeon/interventionist familiar with the diagnosis and options for the definitive treatment of AV-access complications, particularly AV-access steal (Expert Opinion)

18.4 KDOQI considers it reasonable that the optimal treatment of AV-access steal should be determined based upon the patient's_clinical presentation and resources. (Expert Opinion)

HYPOPERFUSION DISTALE

CHUTE DE PRESSION TEMPORAIRE OU PERMANENTE< SEUIL ISCHEMIQUE

ASSOCIATION DE PLUSIEURS FACTEURS à des DEGRES DIVERS

- **HEMODETOURNEMENT :peut être absent**
- **DEBIT : rôle du débit dans la chute de pression (haut débit isolé rare)**
- **LESIONS ATHEROMATEUSES D'AMONT (pas seulement proximale)**
- **ARTERIOPATHIE DISTALE ++**
- **OBSTACLE AU RETOUR VEINEUX(rare)**

« VOL » ISCHÉMIQUE SYMPTOMATIQUE

Dépend plus de la sévérité de l'AOMS que du DÉBIT

Konner K. Kidney Int 2002
Wixon CLJ Am Coll Surg (2000)
Sivanesan S.Nephrol Dial Transplant (1998)
Berman SS.J Vasc Surg 1997
Haimov M. Blood Purif (1996)
Schanzer HJ. Vasc Surg 1992

HEMODETOURNEMENT versus AOMS

EXPLORATION US + PRESSION
TEST COMPRESSION

VOL DOMINANT
LESIONS INFLOW PEU IMPORTANTES

VOL=AOMS

LESIONS INFLOW DOMINANTES
VOL PEU IMPORTANT

+++ **+** **---**

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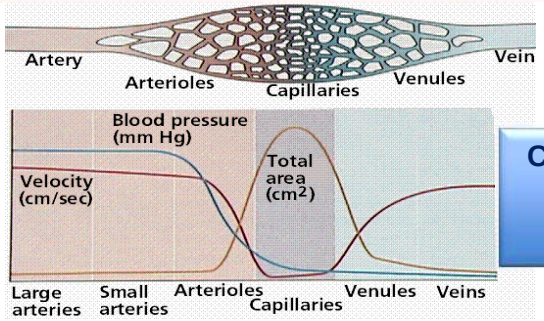
PRESSIONS DIGITALES
Element Diagnostic et Pronostic

SEUIL ISCHEMIQUE < 60 mm de Hg



CRITICAL CLOSING PRESSURE: VARIABLE avec le TONUS 40-15 mm Hg

- ✓ Fondamentales dans le diagnostic de l'ischémie
- ✓ Evaluation du risque ischémique évolutif
- ✓ Mesure au 3 ième doigt ipsilatéral à l'accès vasculaire

  Photopléthysmographie à IR

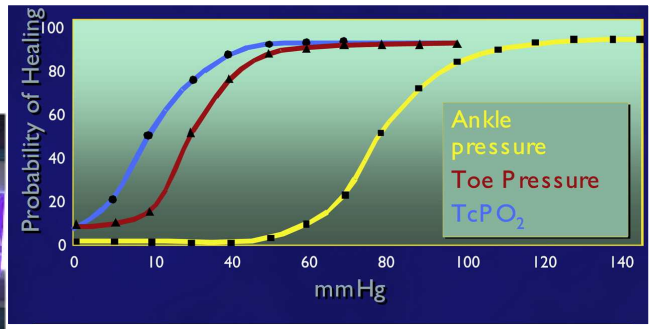
  Laser Doppler

  Moyenne de 3 mesures

30 mm Hg

ISCHEMIE CRITIQUE

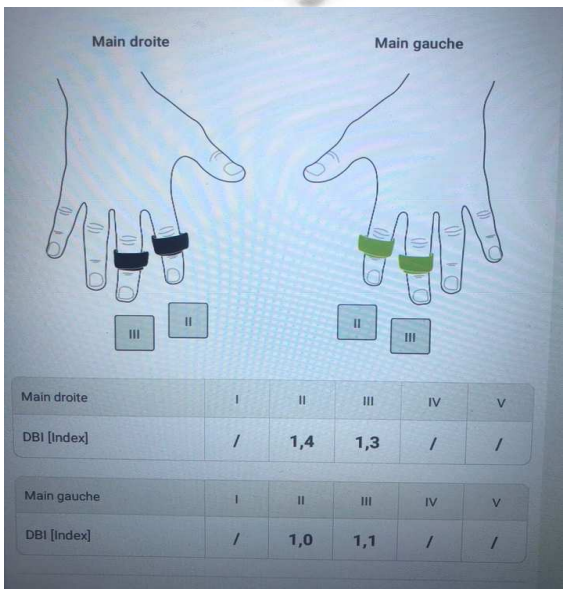
- ✓ Mesure aux autres doigts si ischémie: risque?



CONDITION de CICATRISATION

> 55 mm Hg

MESI

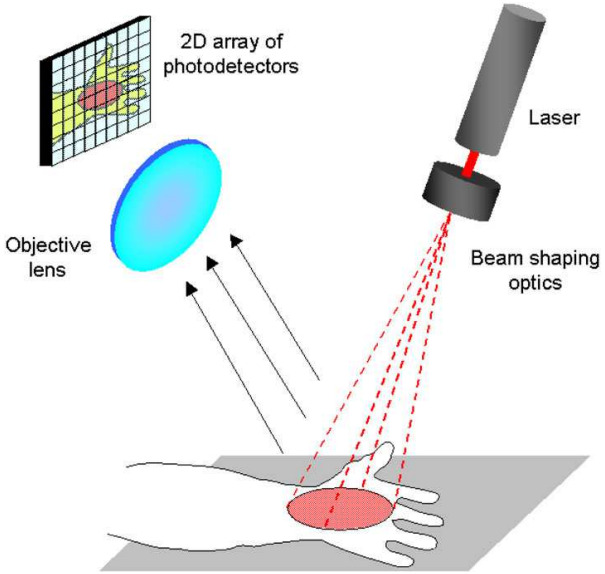


Main droite	I	II	III	IV	V
DBI [Index]	/	1,4	1,3	/	/

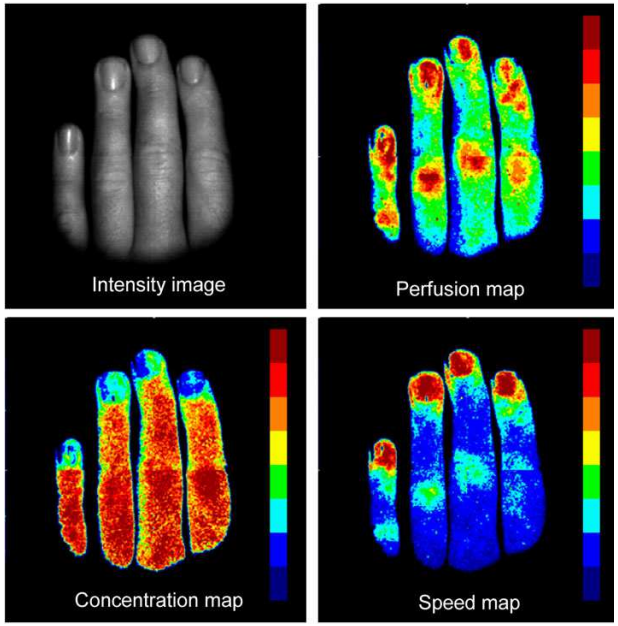
Main gauche	I	II	III	IV	V
DBI [Index]	/	1,0	1,1	/	/

LASER DOPPLER PERFUSION IMAGING

- Mesure de la perfusion globale
- Non-invasif, sans contact
- Variation temporelle de la perfusion

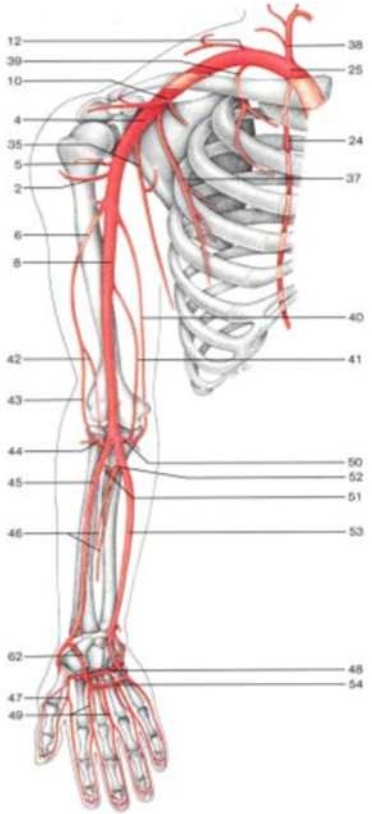


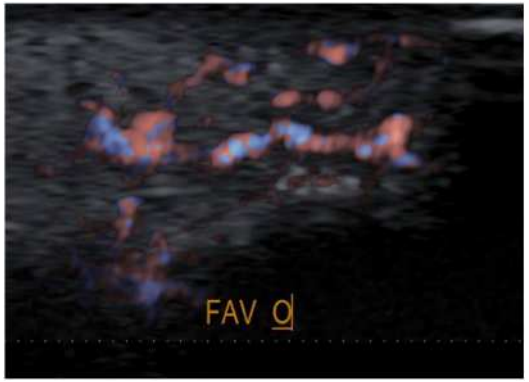
Imageur laser à balayage rapide



Perfusion /concentration/ speed signals

BILAN VASCULAIRE de BASE PRE- THERAPEUTIQUE





- **ECHO-DOPPLER (B-PW-CFM-DFI)**
  - **FAV - DEBIT**
  - **De La Crosse Jusqu'aux Arteres Digitales:**
  - **Global Limb Anatomic Staging System (GLASS)**
- **PRESSIONS DIGITALES (BDP et DBI)**

↓

- **TESTS DE COMPRESSIONS (DP- PW-DFI)**

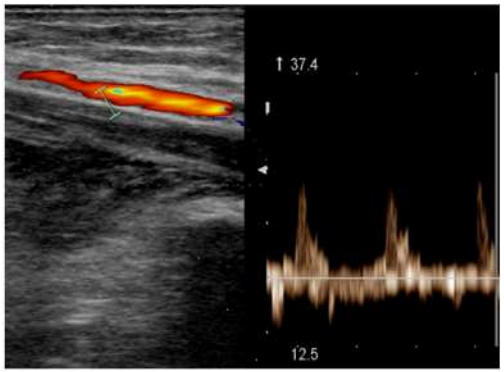
↓

COMMENT AMELIORER LA PERFUSION DISTALE SI ISCHEMIE MENANCANTE?

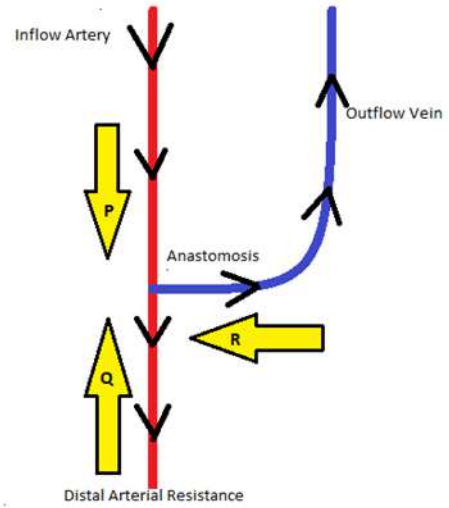
↓

REDUCTION DE DEBIT
TRAITEMENT DES STENOSES
REDUCTION DU « VOL »
FERMETURE

EVALUATION DE L'HEMODETOURNEMENT



- **EXISTENCE à des DEGRES DIVERS**
- **CONSÉQUENCE de la CHUTE DE PRESSION PERI-ANASTOMOTIQUE**
- **PHENOMENE DE RECRUTEMENT des COLLARERALES**
- **FONCTION DE L'ANATOMIE et de ses VARIATIONS et des LESIONS ARTERIELLES**



- **<u>ETUDIE PAR ED:</u>**
  SENS DE CIRCULATION
  RECRUTEMENT DES AUTRES AXES ARTERIELS
  PW AVEC COMPRESSION DE L'AAV

- **<u>PD ET TESTS de COMPRESSION :</u>**
  QUANTIFIE le VOL

PARAMÈTRES DE PRESSION ÉTUDIÉS

- ✓ (BDP) :basal digital pressure
- ✓ (DBI) :digital brachial index

BDP:Presssion digitale <60 mmHg (sens. 100%, spec. 87%)

DBI:Digital Brachial Index <0.4 (sens. 92%, spec. 94%)

Odland MD .Surgery 1991
Lazarides MK .J Am Coll Surg 1998
Schanzer A. Vasc Med 2006
Goff CD .*Ann Vasc Surg 2000*

TEST DE COMPRESSION UTILE
à
ORIENTATION THERAPEUTIQUE

- ➢ (CDPAC) :variation de la PD sous compression de l'AAV
- ➢(CDPDC) : :variation de la PD sous compression d'aval

PRESSION DIGITALE et TEST de COMPRESION

- **FAIT LA PART DU VOL ET DE L'ARTERIOPATHIE**
- **APPORTE DES PREUVES à L'UTILITE DE LA CORRECTION DU VOL**
- **⬆ PD SOUS COMPRESSION de la FAV > 20% et ou > seuil ischémique (facteur pronostic+)**

✓ **(CDPAC) : ⬆ de la PD sous compression de l'accès:**
Efficacité du DRIL et PAI si FAV au coude
Efficacité de fermeture quelque soit le niveau de la FAV
Proportionnelle à l'importance du VOL /AOMS

✓ **(CDPDC) : ⬆ de la PD sous compression d'aval de FAV distale:**
Efficacité de la ligature distale /PLUG
Valeur des artères ULNAIRE - IO et Arcades palmaires

EVALUER L'ISCHEMIE et la DIFFUSION DE LA MALADIE

EN DEHORS DE L'ETUDE ANATOMIQUE

Ischémie Silencieuse

ATTEINTE ET RETENTISSEMENT VARIABLE SELON LES DOIGTS

FACTEUR PRONOSTIC et AIDE à LA DECISION

BILAN ETIOLOGIQUE ET ANATOMIQUE

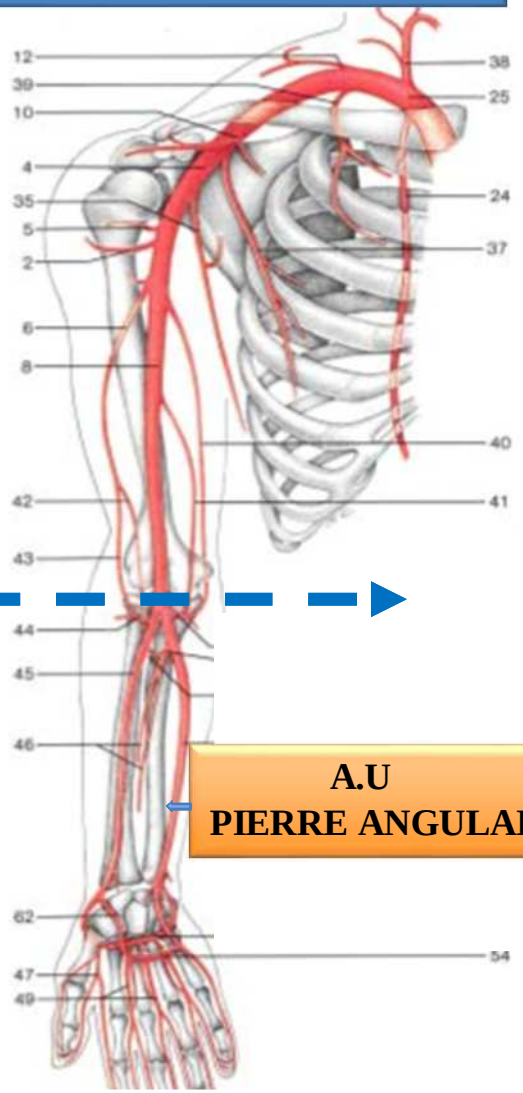
Global Limb Anatomic Staging System (GLASS)

- ✓ **STENOSES et OCCLUSIONS +++++**
- ✓ **EMBOL (anévrisme /moignon de FAV/plug)**

5 à 10 %

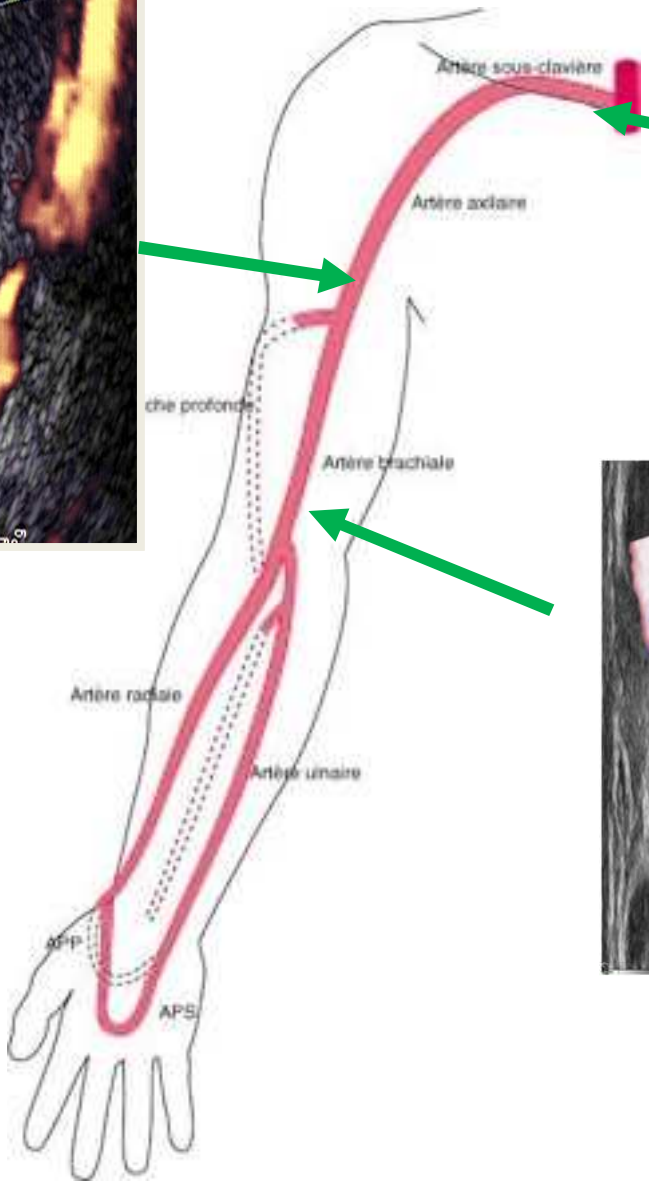
90 à 95 %

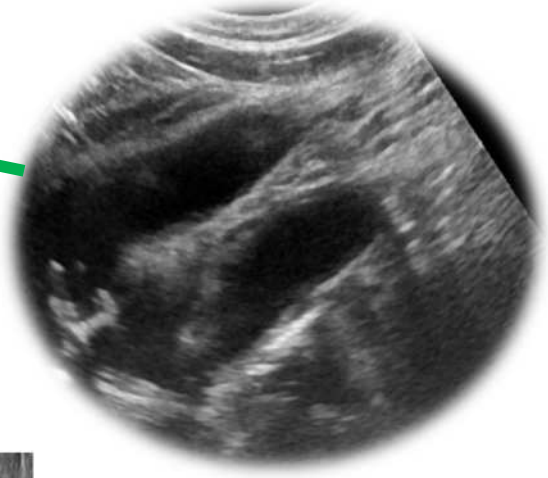
»BELOW THE ELBOW » BTE

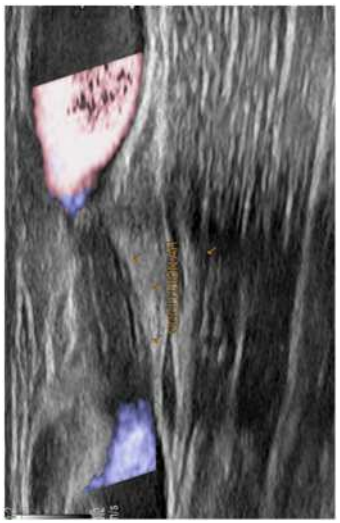


A.U
PIERRE ANGULAIRE

LESIONS ARTERIELLES PROXIMALES







MATURATION LIMITE et ISCHEMIE EN DIALYSE

ECHO DOPPLER PULSE ET COULEUR DES MBS SUPERIEURS:

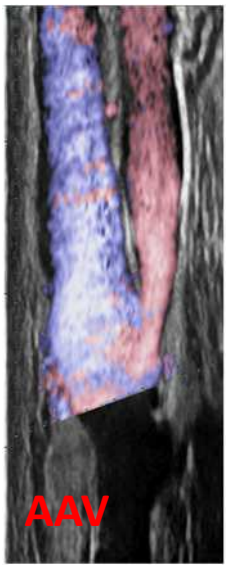
A GAUCHE :

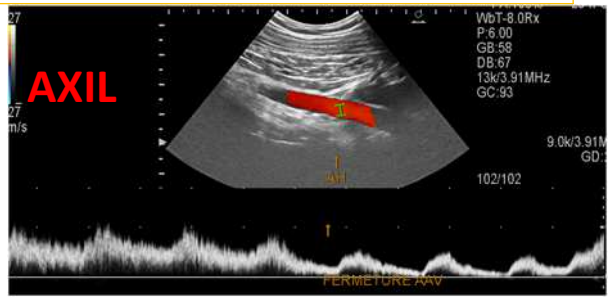
FAV radio-céphalique de 580 ml/mn de débit moyen.

Anastomose artérioveineuse normale.

Pas de sténose intermédiaire.

Pas de sténose significative de la veine céphalique, ni basilique au bras.





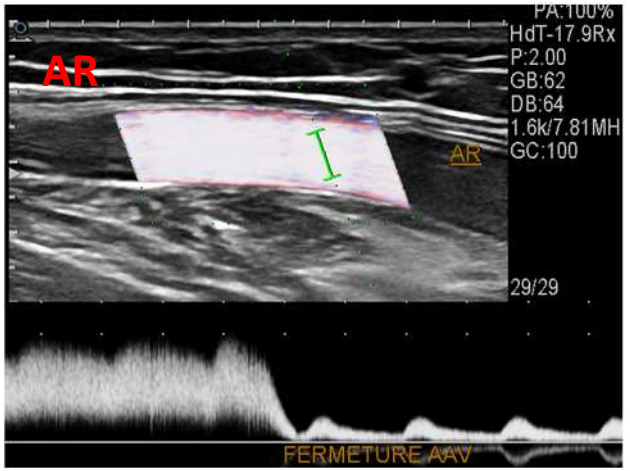
Occlusion de la sous clavière pré vertébrale avec hémodétournement vertébro-sous-clavier.

Pas de lésion significative humérale radiale et cubitale.

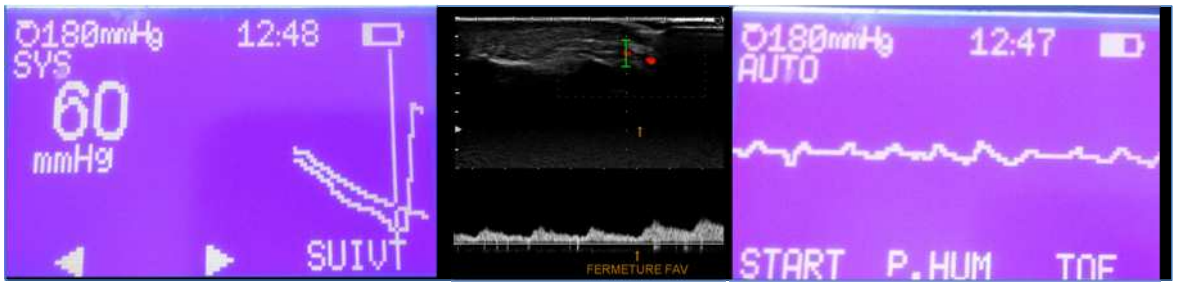
Artère digitale perméable avec des flux distaux modérément dégradés, mais non effondrés.

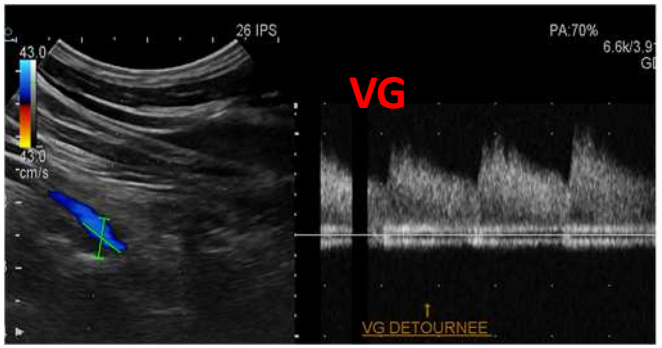
Vol peu ischémique dans les conditions basales.

Pressions digitales 60 mmHg FAV ouverte.

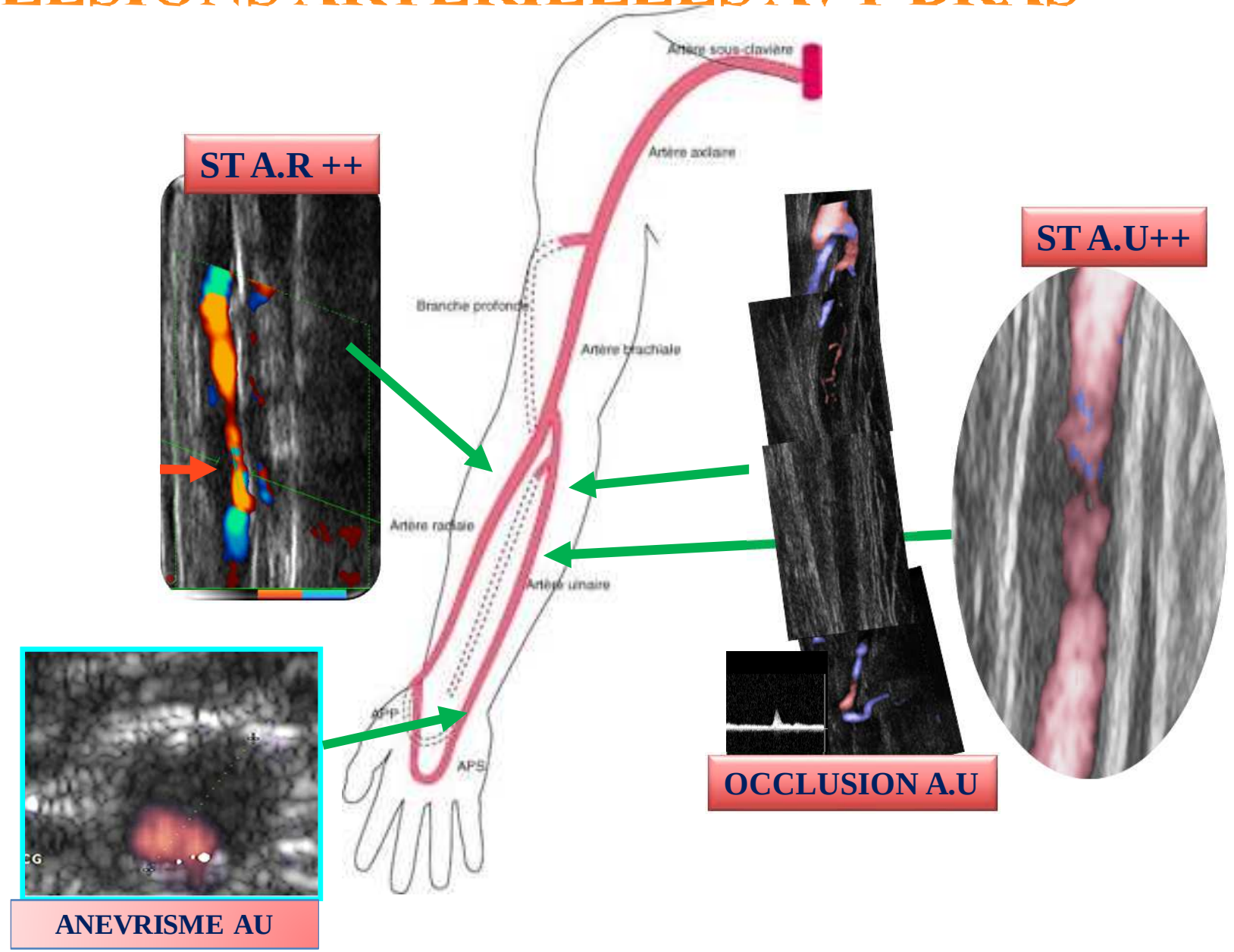


Il est possible que les conditions hémodynamiques s'aggravent pendant la dialyse.

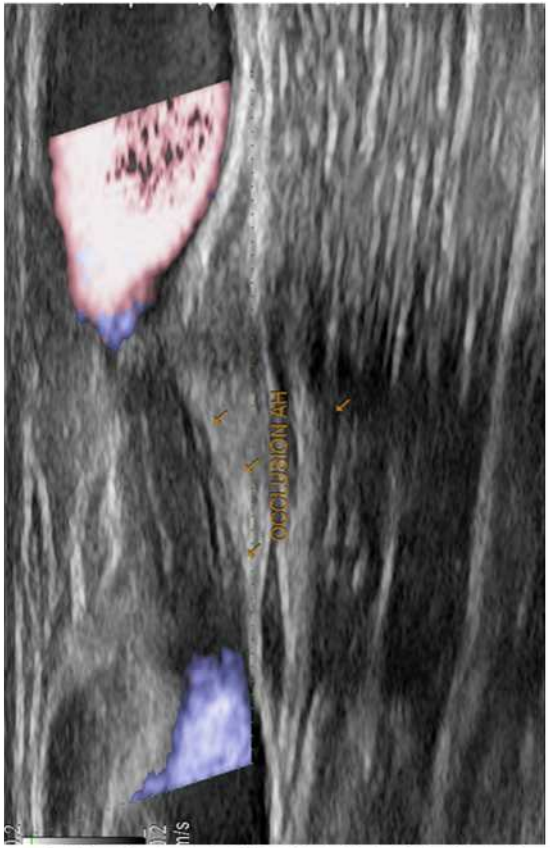




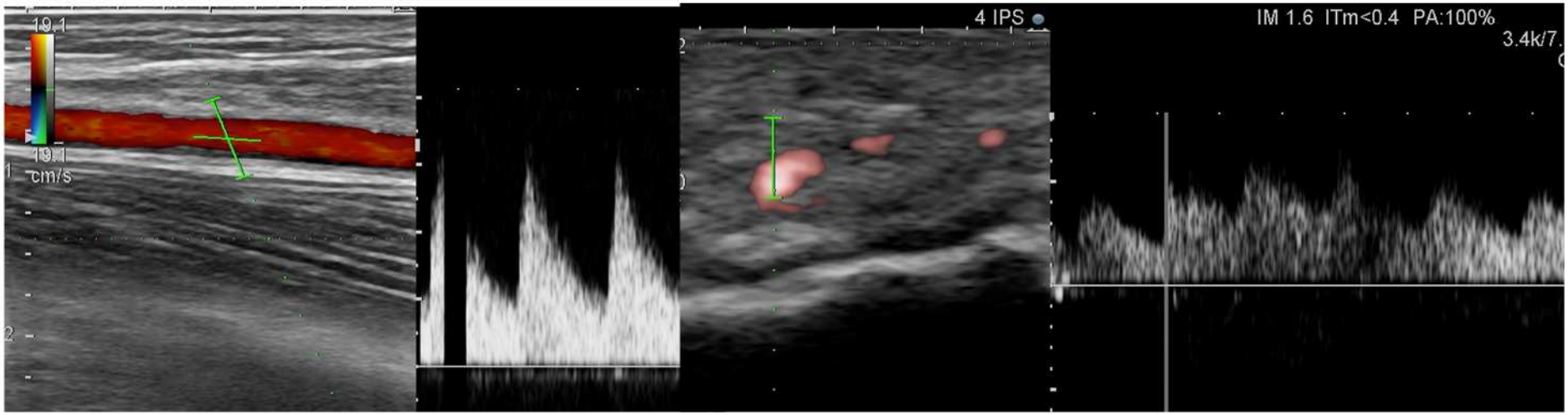
LESIONS ARTERIELLES AVT BRAS



ISCHEMIE MODEREE



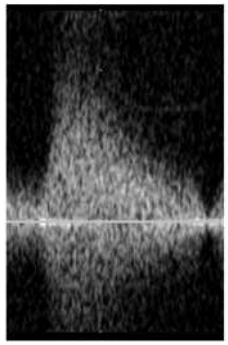
FAV PROXIMALE NORMALE
FROIDEUR- PARESTHESIES
OCLUSION AH SOUS AAV
REVASULARISATION D'AVAL CORRECTE
Paroi sub normale
DP> 60 mm de Hg
WIFI 1
REVASCULARISATION ou SURVEILLANCE?



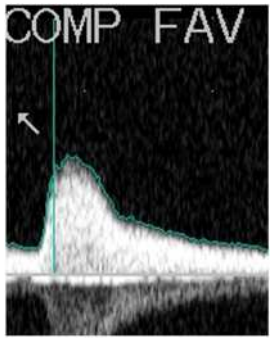
LESIONS DES ARTERES DE L'AVANT BRAS

ISCHEMIE/FAV COUDE: Q°. Normal

Artère ulnaire occluse
AIO perméable
AR perfuse la main
Artère radiale proximale de flux sub normal

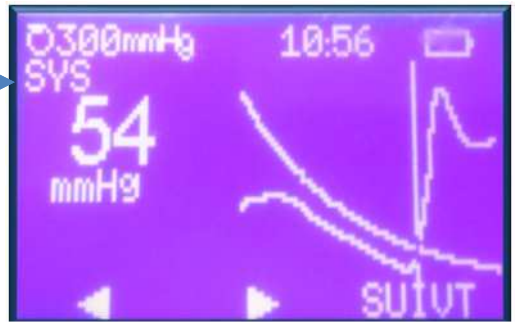


Sténose serrée distale →

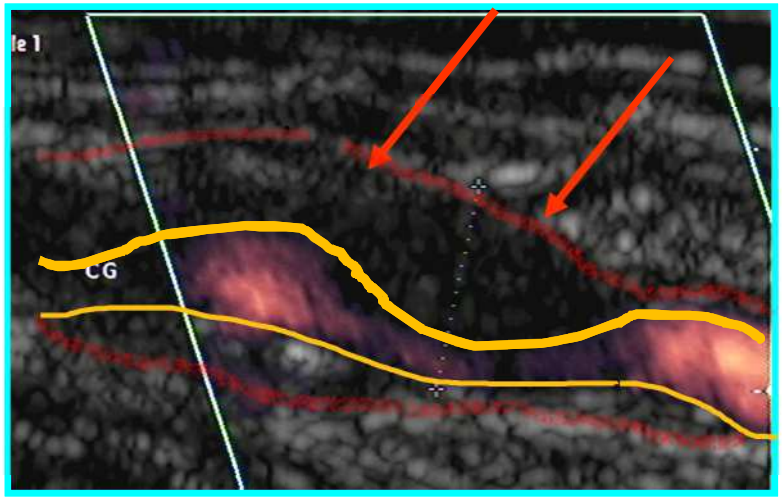


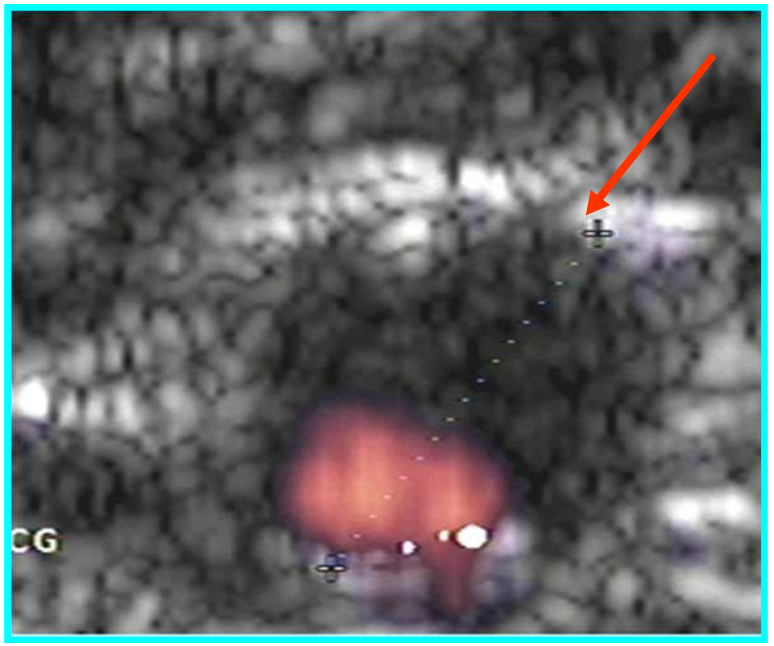
COMPRESSSION DE L'AAV:

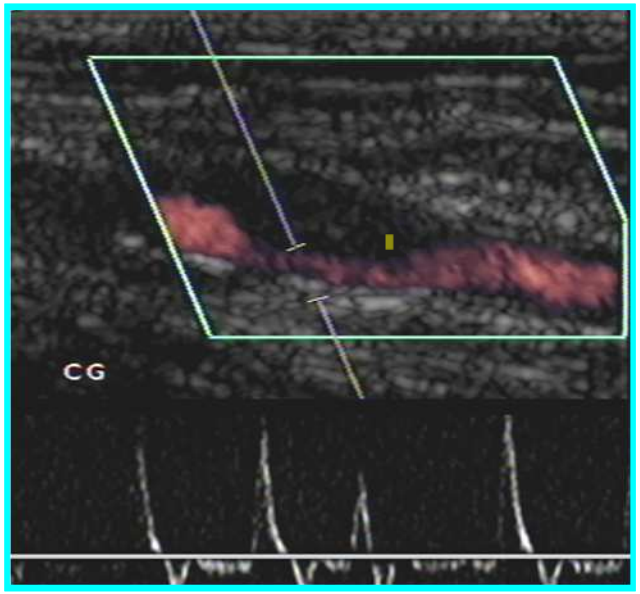
- Dégradation persistante d'aval
- Pressions dégradées
- PAS D'ISCHEMIE CRITIQUE



ISCHEMIE POST EMBOLIQUE



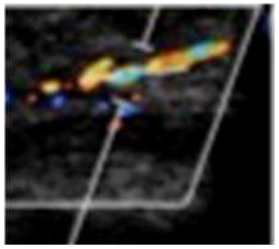


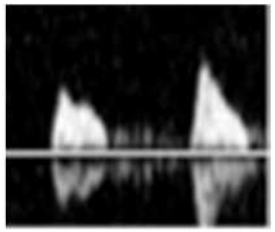


ANEVRISME
PARTIELLEMENT THROMBOSE DE LA CUB G

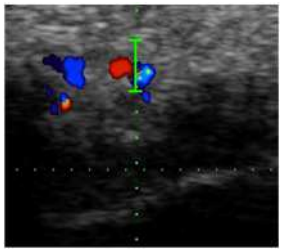
IMAGE DE STENOSE à L'ANGIOGRAPHIE

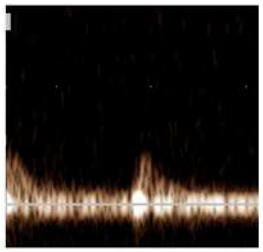
STATUT DE LA PERFUSION PULPAIRE



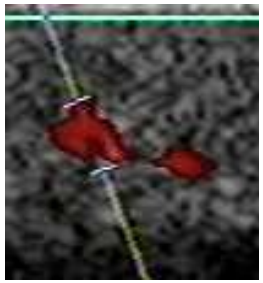


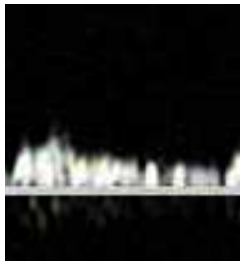
ST I FLUX SUB N



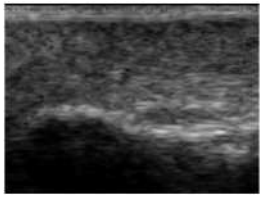


ST II FLUX PEU DEGRADE





ST III FLUX DEGRADE

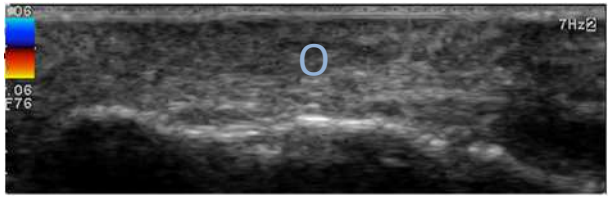


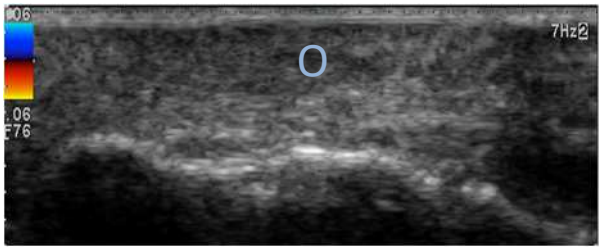
ST IV FLUX NON PERCU

STATUT DE LA PERFUSION PULPAIRE

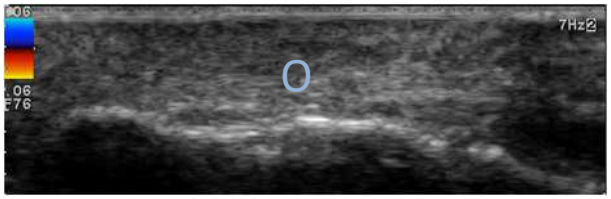
Tests de compresssions

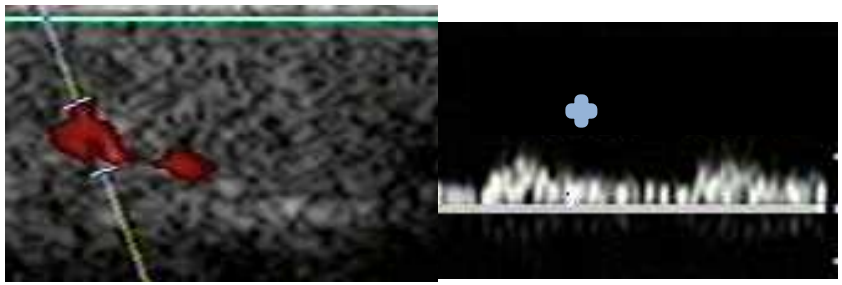
FAV OUVERTE



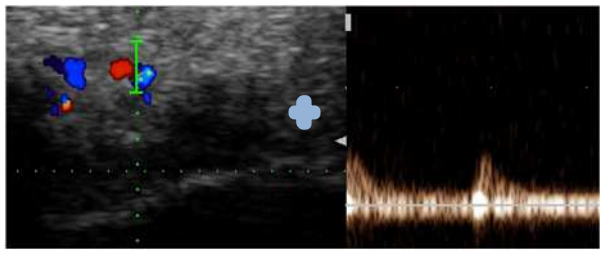


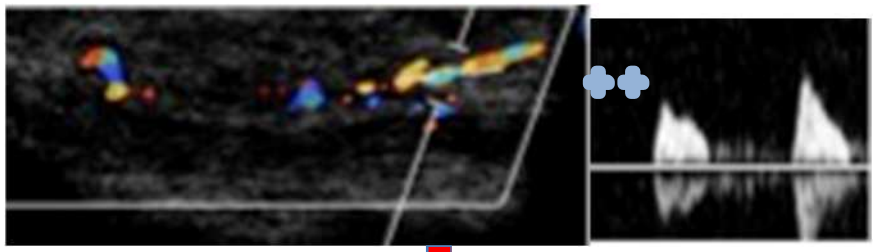
FAV FERMEE





ST III et IV Flux distaux éffondrés BDP :++

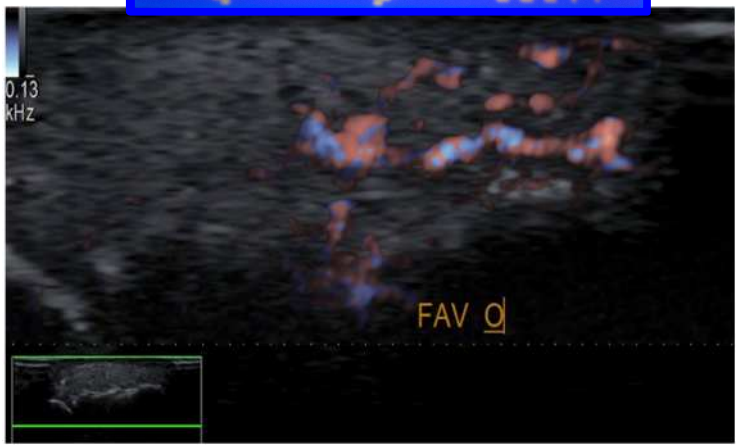


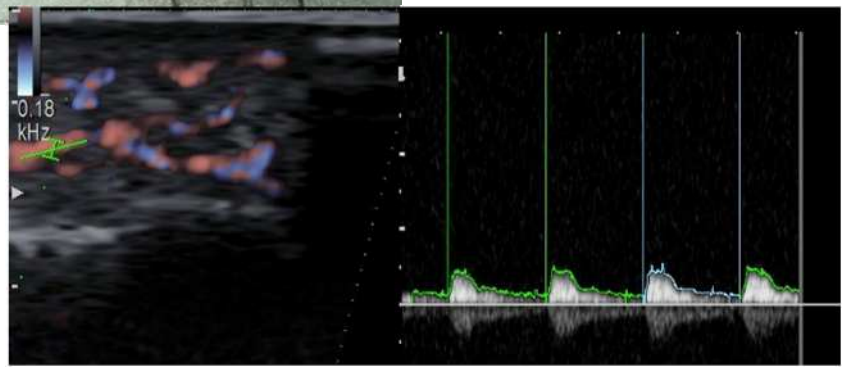


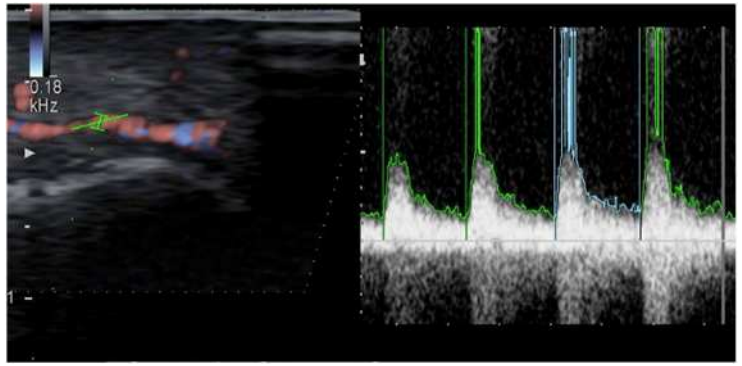
ST I et II Flux distaux sub normaux BDP +/-

FAV PROXIMALE -TR TROPHIQUE

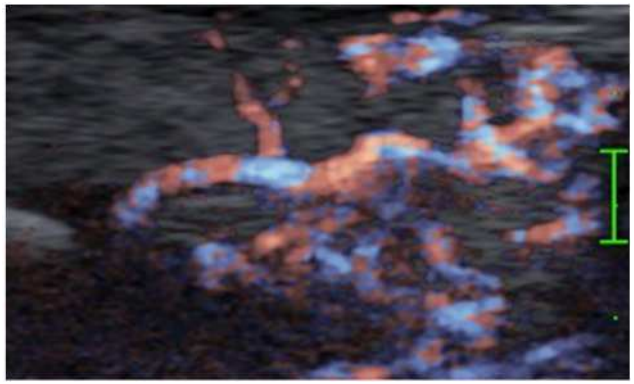
WIFI 2

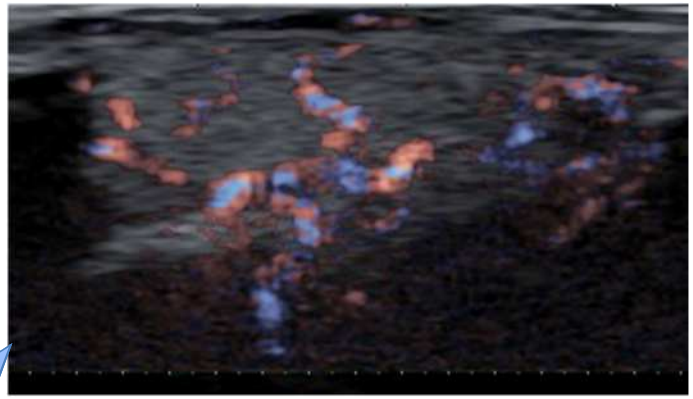


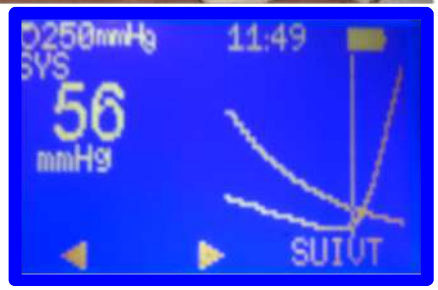




DFI et VIABILITE







FAV HUMERO-BASILIQUE
STENOSE +AH
AMPUTTION DU III et IV
PAI

CLASSIFICATIONS de L'ISCHEMIE

CALQUEES sur LERICHE et RUTHERFORD

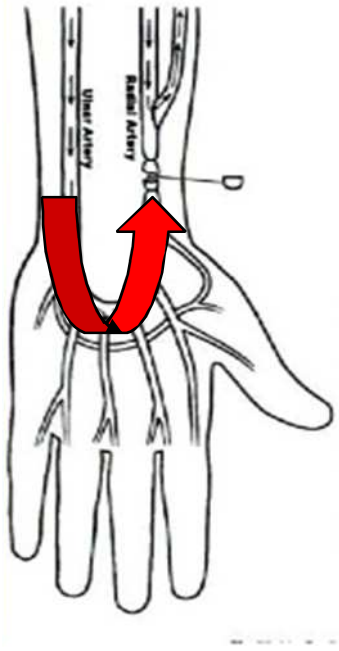
- **DEUX LIMITES MAJEURES**
  - **Manque de validité de l'histoire naturelle**
  - **Incapacité à évaluer et à classer les facteurs influençant la cicatrisation et le risque d'amputation.**

La cicatrisation des plaies dépend donc non seulement du degré d'ischémie, mais aussi de l'étendue et de la profondeur de la plaie et de la présence et de la gravité de l'infection

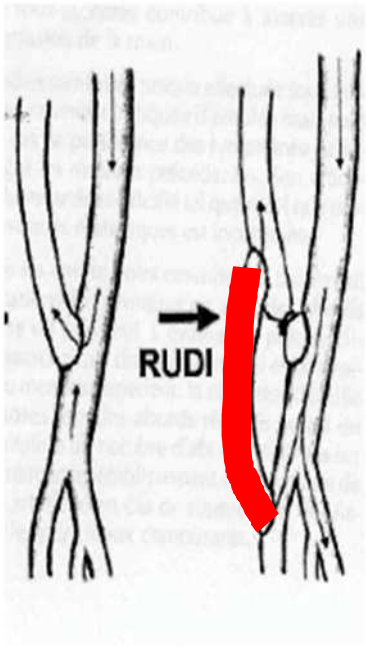
TRAITEMENT CHIRURGICAL

En DH de la Fermeture

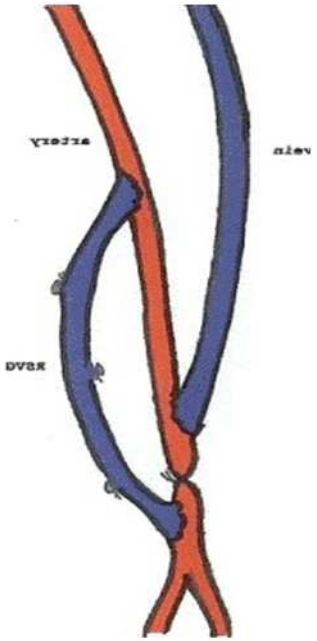
LARD /PLUG



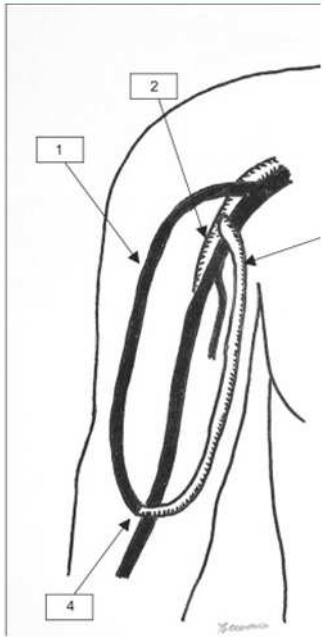
RUDI



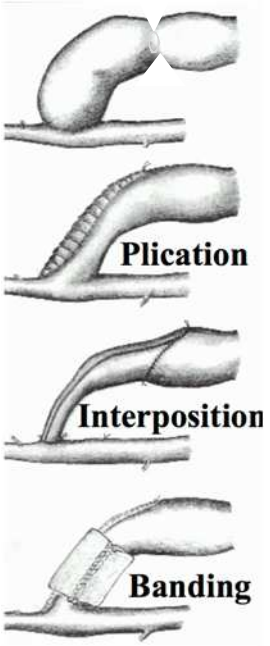
DRIL



PAVA/PAI



BANDING



FAV DISTALE

FAV PROXIMALE

TOUTES FAV

FREQUENCE de L'ISCHEMIE

10%

STADE III et IV

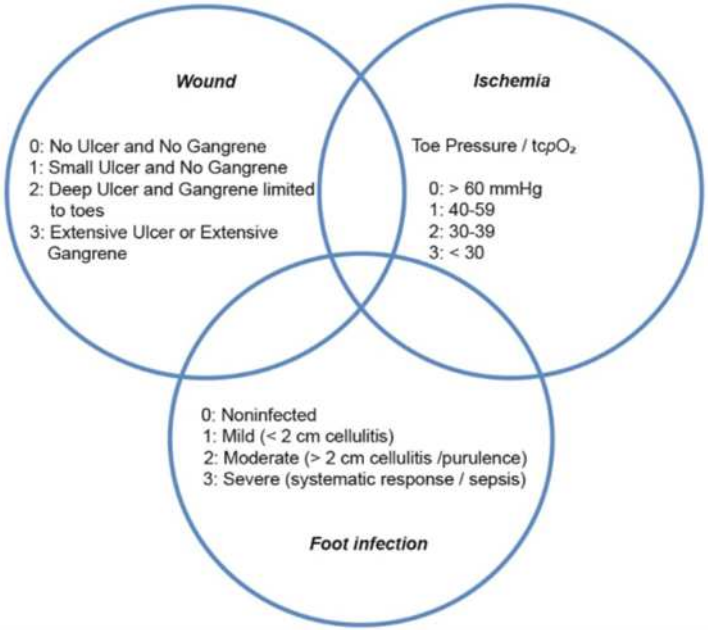
- **1–2% AVF au poignet**
- **5–15% AVF au coude**
- **36% AVF à la cuisse**

Odland MD.Surgery 1991
Schanzer HJ. Vasc Surg 1992
Berman SS.J Vasc Surg 1997
Konner K. Kidney Int 2002
Keuter .EJVES 2008
Gradman WS.JVascSurg 2005

4% de REINTERVENTION

Hubert TS ,Access-related hand ischemia and the Hemodialysis Fistula Maturation Study
J.Vasc Surg 2016

BESOIN D'ADAPTER WIFI aux FAV



a, Estimate risk of amputation at 1 year for each combination

	Ischemia – 0				Ischemia – 1				Ischemia – 2				Ischemia – 3			
W-0	VL	VL	L	M	VL	L	M	H	L	L	M	H	L	M	M	H
W-1	VL	VL	L	M	VL	L	M	H	L	M	H	H	M	M	H	H
W-2	L	L	M	H	M	M	H	H	M	H	H	H	H	H	H	H
W-3	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3

b, Estimate likelihood of benefit of/requirement for revascularization (assuming infection can be controlled first)

	Ischemia – 0				Ischemia – 1				Ischemia – 2				Ischemia – 3			
W-0	VL	VL	VL	VL	VL	L	L	M	L	L	M	M	M	H	H	H
W-1	VL	VL	VL	VL	L	M	M	M	M	H	H	H	H	H	H	H
W-2	VL	VL	VL	VL	M	M	H	H	H	H	H	H	H	H	H	H
W-3	VL	VL	VL	VL	M	M	M	H	H	H	H	H	H	H	H	H
	f-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3

Very low = VL = clinical stage 1
Low = L = clinical stage 2
Moderate = M = clinical stage 3
High = H = clinical stage 4
Clinical stage 5 would signify an unsalvageable foot

Mills JL. *J Vasc Surg*

SUSPICION D'ISCHEMIE DISTALE

DOULEURS -PARESTHESIE -TROUBLE TROPHIQUE

↓

EX CLINIQUE

↓

SUGGESTIF D' AOMS

↓

MESURE DP/DBI
DUPLEX SCAN
DOPPLER WAVEFORMS
TEST DE COMPRESSION

↓

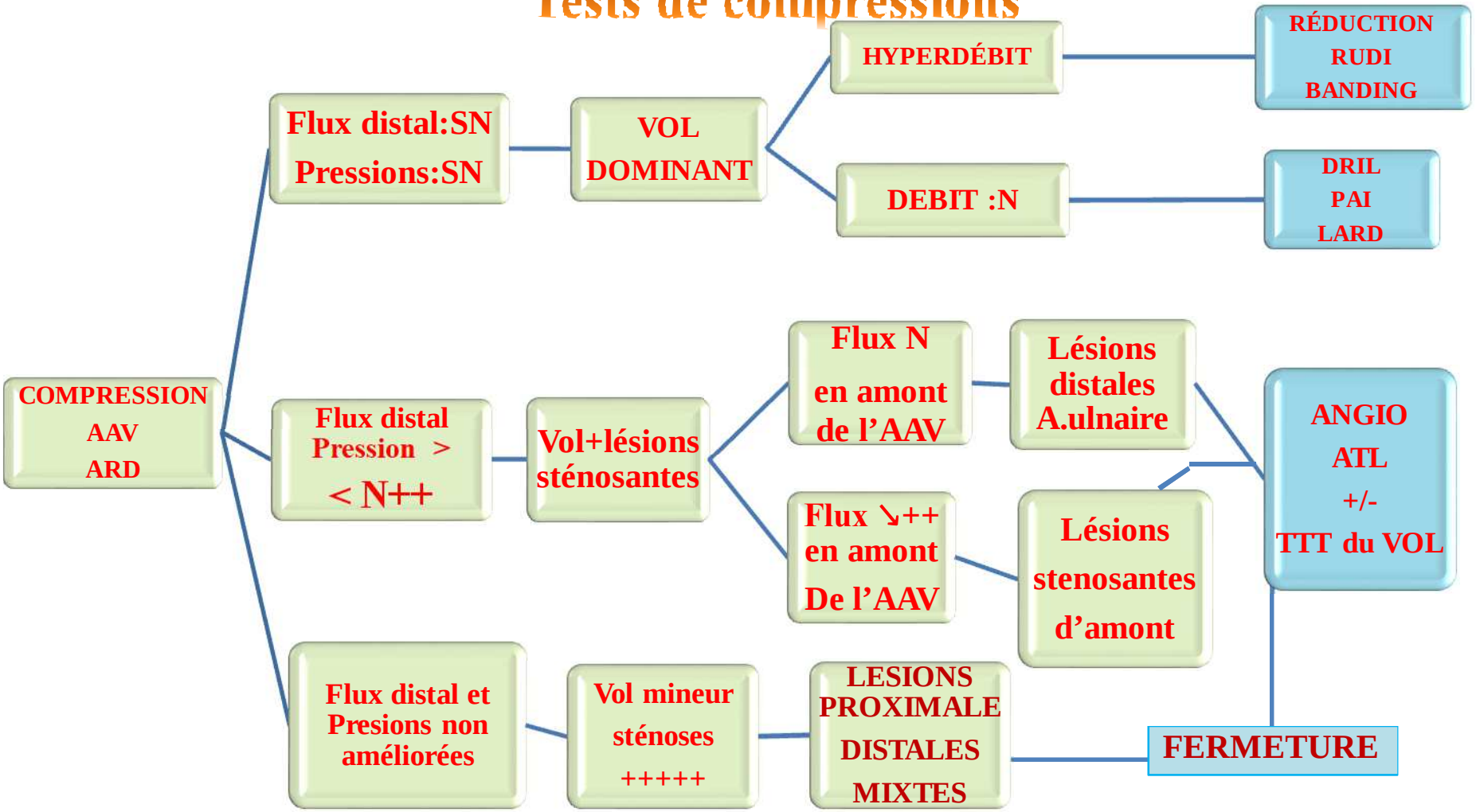
STAGING DE LA MENACE
WIFI

GLASS

↓

REVASCULARISATION
OU
CORECTION DU VOL
OU
SURVEILLANCE

LOCALISATION DES LESIONS
DUPLEX +Presssions
Tests de compressions



FACTEURS DE RISQUES DE L'ISCHEMIE

70% de HAIDI:antécédents CLI & AMPUTATION

Clinical Characteristics of Patients with Hand Ischemia after Hemodialysis Access Procedures

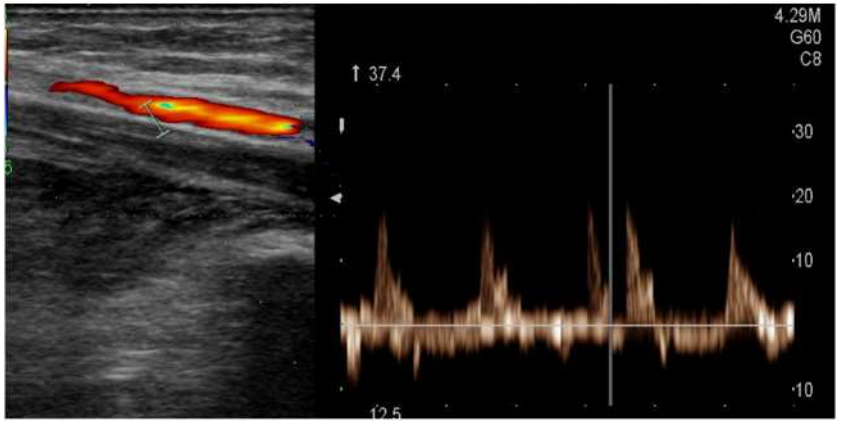
Clinical characteristic	No. of patients (%)
IDDM	10 (66.4)
Chronic hypertension	12 (80)
PAD	14 (93.3)
CAD	8 (53.3)
SLE	1 (6.7)

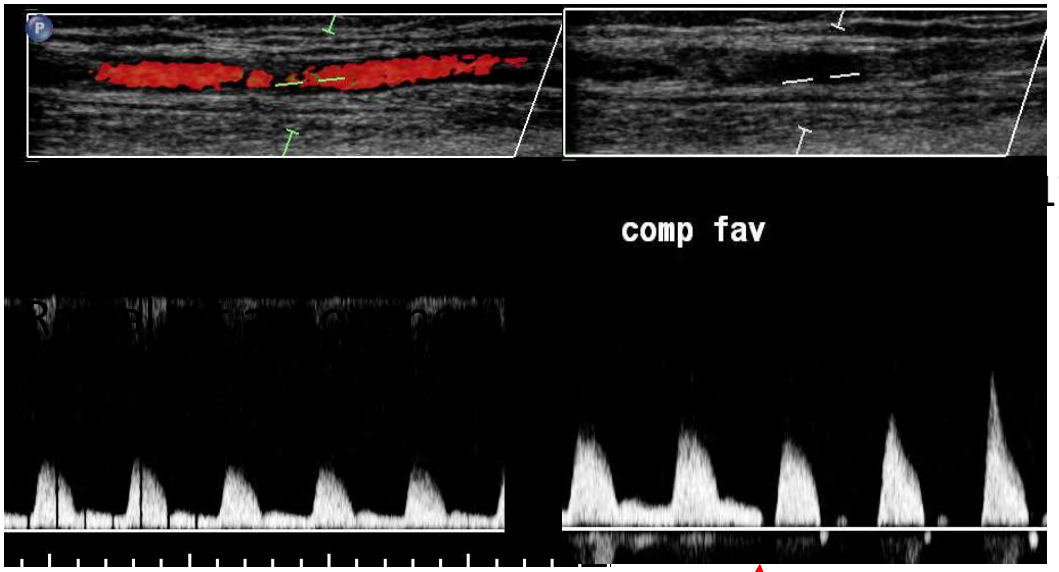
Note. IDDM, insulin-dependent diabetes mellitus; PAD, peripheral arterial disease; CAD, coronary artery disease; and SLE, systemic lupus erythematosis.

Morsy AH. *J Surg Res.* 1998

HD INTERMITTENT
SANS ISCHEMIE PERMANENTE

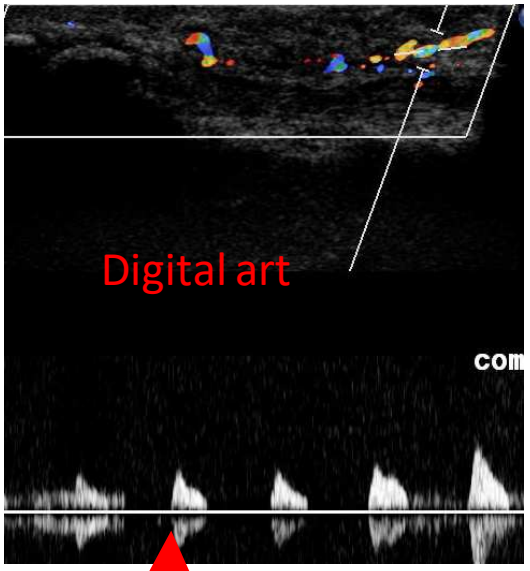
Vaisseaux normaux
COMPOSANTE DIASTOLIQUE RETROGRADE :
AMORTISSEMENT PROGRESSIF DES VITESSES





Flux permanent=vd

7.AVI



Comp avf

Comp avf

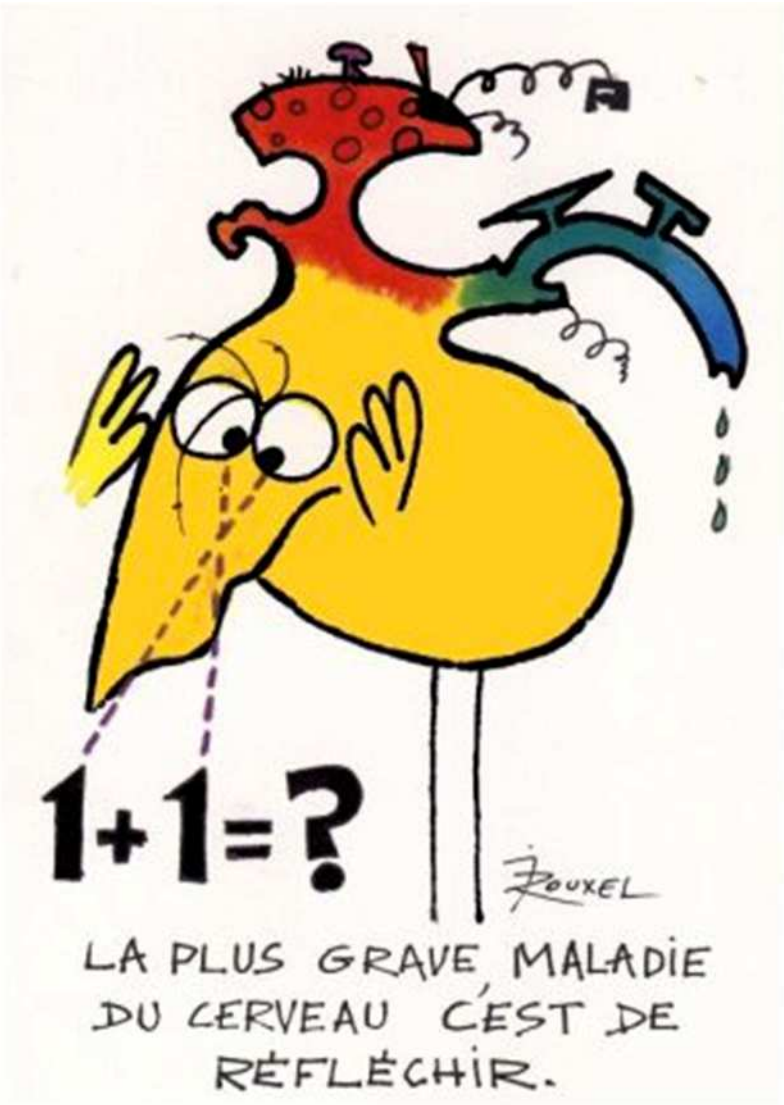
PRESSION DIGITALE SUB NORMALE à L'ETAT BASAL

DIAGNOSTIC US de L'AOMS

US + Pression digitale

DBI <0,7
90/100% SENSIBILITE

Roberts J.JVU 2018


1+1=?
ROUXEL
LA PLUS GRAVE MALADIE
DU CERVEAU C'EST DE
RÉFLÉCHIR.


THANKS FOR
YOUR ATTENTION
ANY QUESTIONS?
memegenerator.es