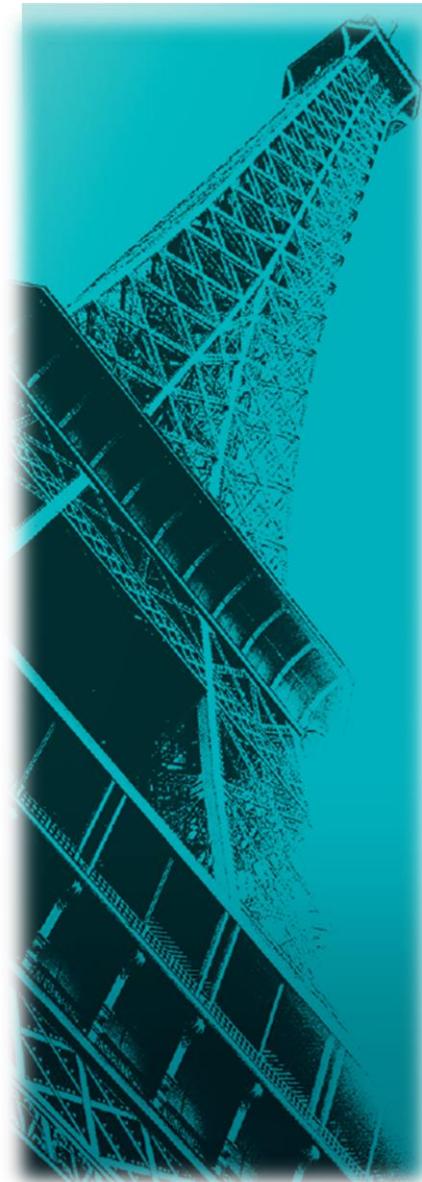


CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
**CONTROVERSIES & UPDATES
IN VASCULAR SURGERY**

JANUARY 19-21 2017
MARRIOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE



**Doppler Ultrasound:
is it a third generation AVF surveillance method?**

Jose Ibeas.

Servei de Nefrologia

Parc Taulí Sabadell, Hospital Universitari

Barcelona



Parc Taulí Sabadell
Hospital Universitari

Disclosures

I have the following potential conflicts of interest to report:

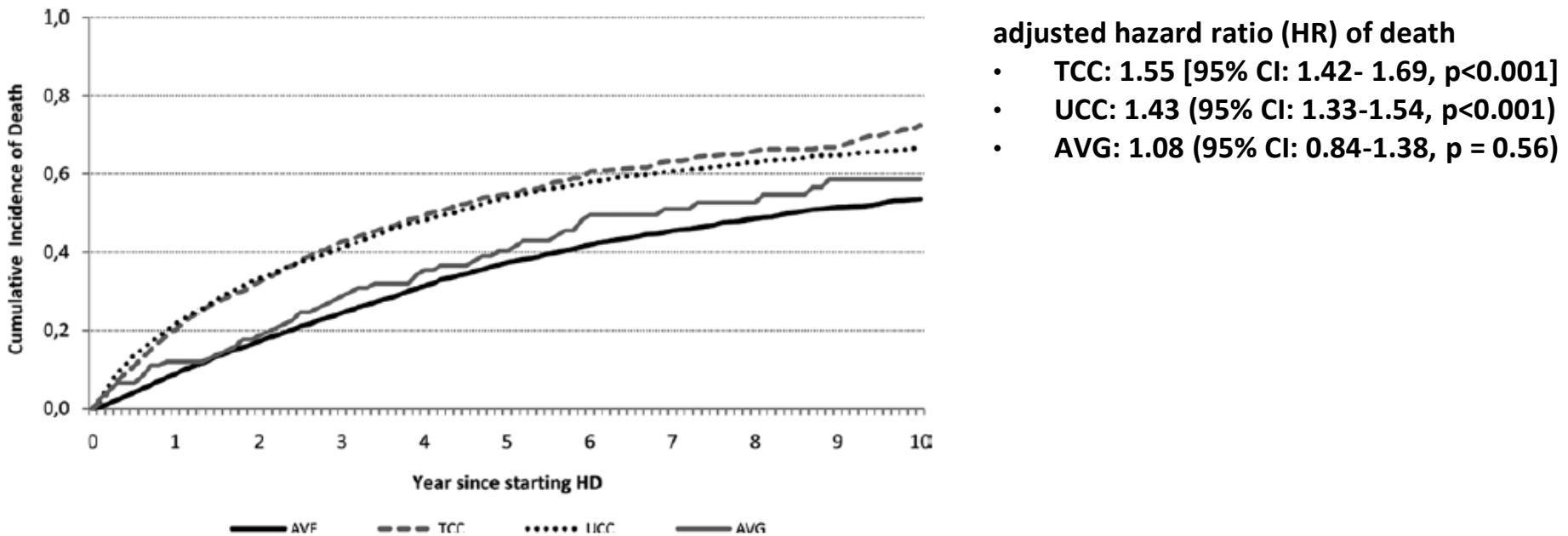
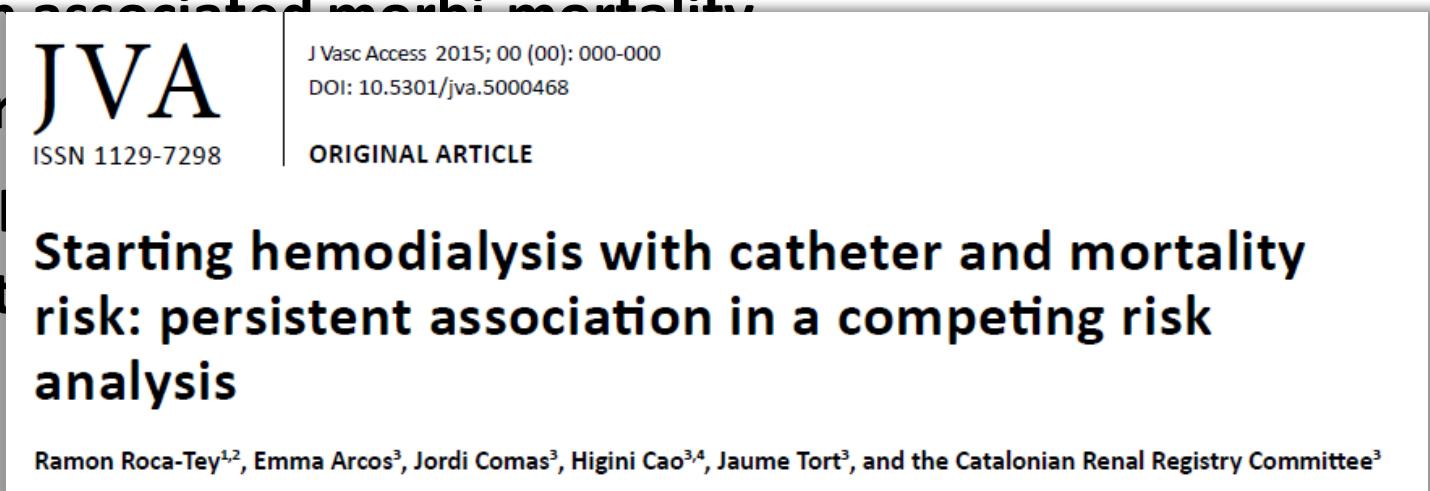
Consulting: **Covidien, Medtronic**

Owner of a healthcare company: **NephroCloud**

Financing for educational programs: **BARD, Covidien, Medtronic, Gore, Mindray, Rubio, Sonosite, General Electric, Toshiba, Cardiva-Angiodynamics**

- **Vascular Access Complications:**

- High associated morbidity
- Worse mortality
- Hospitalizations
- Costs



- **Problems of Vascular Access:**

- **Creation:**

- ***Resources:***
 - Radiological: Mapping
 - Surgical: Mapping, Creation or Reconstruction
 - ***Waiting lists***

- **Follow up:**

- ***Need surveillance protocols***
 - Flow?
 - Image?
 - ***Treatment (Preventive)***
 - Interventional
 - Surgical
 - ***Waiting lists***

- **Multidisciplinary requirement (Figure of Coordinator)**



NKF K/DOQI GUIDELINES

[Executive Summaries](#) | [Anemia](#) | [Hemodialysis](#) | [Peritoneal Dialysis](#) |
[Vascular Access](#) | [Nutrition](#) | [CKD 2002](#) | [Dyslipidemias](#) | [Bone Metabolism](#) |
[Hypertension and Antihypertensive Agents](#) | [Cardiovascular Disease in
Dialysis Patients](#) | [History of K/DOQI](#) | [Pediatric Bone](#) | [Anemia 2006](#) |
Updates 2006

**Clinical Practice Guidelines and Clinical Practice Recommendations
2006 Updates**

Hemodialysis Adequacy
Peritoneal Dialysis /
Vascular Access

Nephrol Dial Transplant (2007) 22 [Suppl 2]: ii88–ii117
doi:10.1093/ndt/gfm021



EBPG on Vascular Access

¹², Patrick Haage³, Klaus Konner⁴, Ali Basci⁵, Denis Fouque⁶,
Martin-Malo⁸, Luciano Pedrini⁹, Francesco Pizzarelli¹⁰,
Vennegoor¹², Christoph Wanner¹³, Piet ter Wee¹⁴ and



Sociedad
Espanola de
Nefrologia

**Guías de Acceso Vascular en
Hemodiálisis**

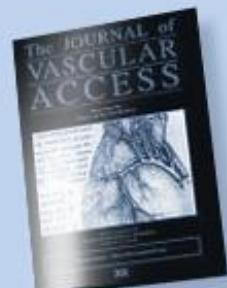
Surveillance Advised!



VASCULAR ACCESS SOCIETY

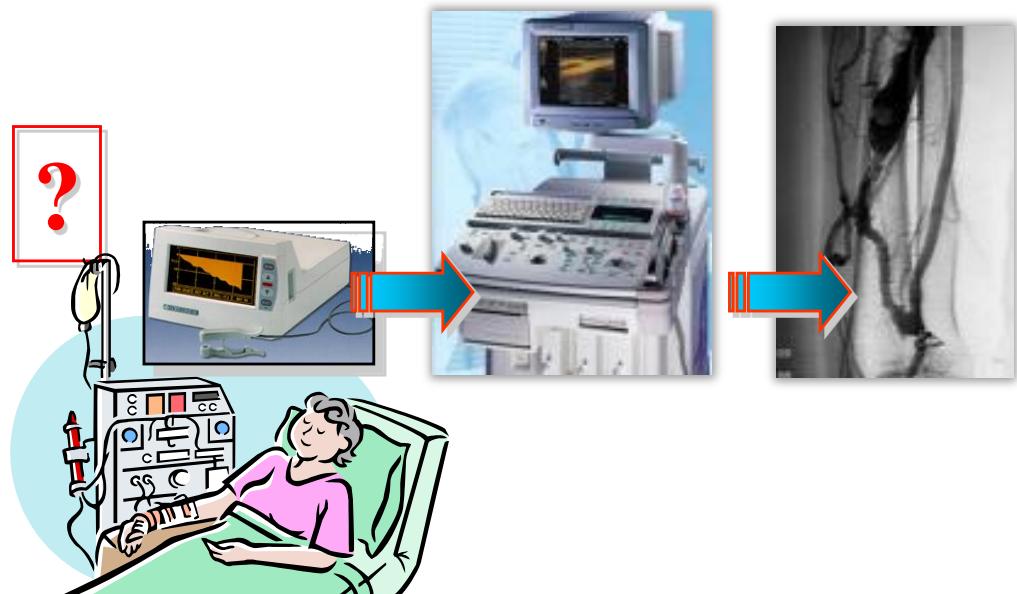
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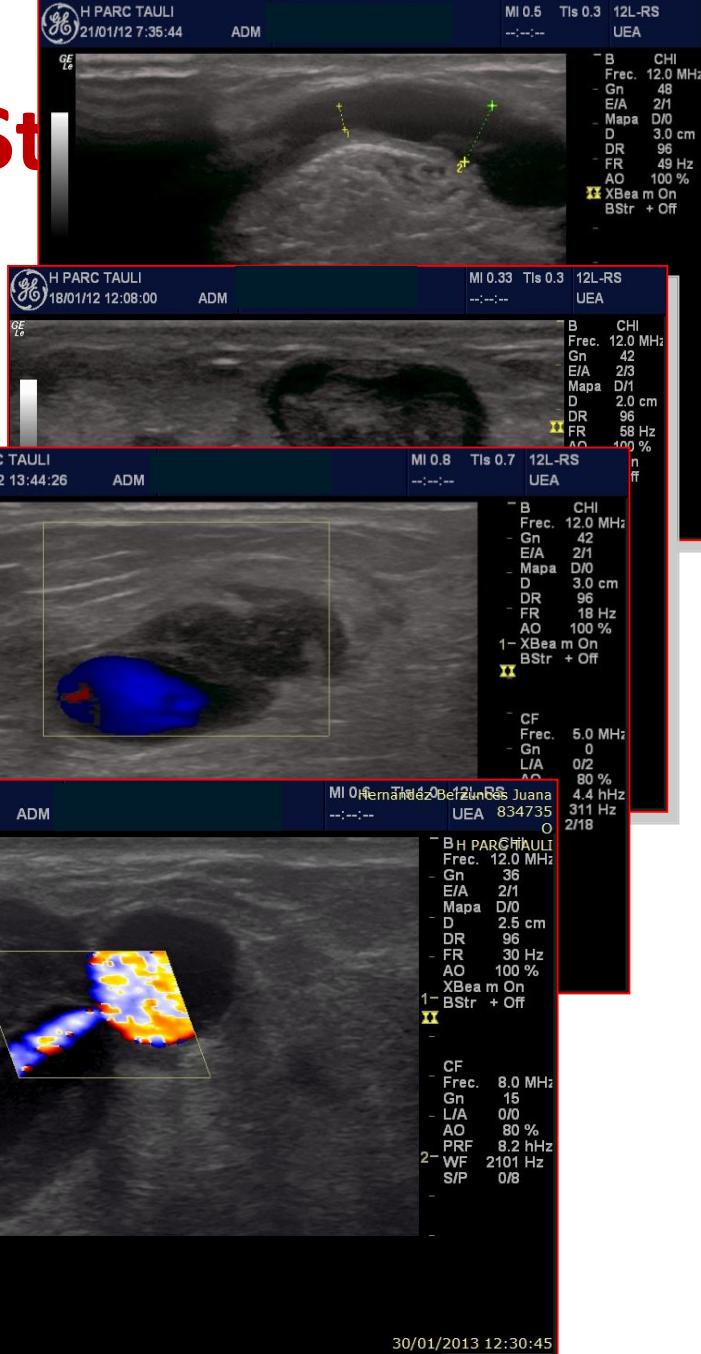
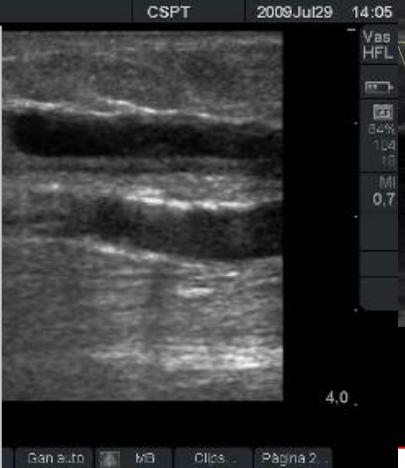
Screening AVF:

- **1st Generation Methods: Monitoring.** *Specific but not sensitive*
 - Physical exam
 - Pump Flow and pressures of hemodialysis device
 - Adequacy: eKt/V – recirculation
- **2nd Generation Systems: Surveillance.** *Devices dependence*
 - Flow
 - Dilution techniques
 - Doppler ultrasound
 - Flow + image
 - **Doppler ultrasound**
- **Acute problem**
 - It depends on radiology
 - Doppler US
 - Angiography
 - Selected patient



Morphological Study

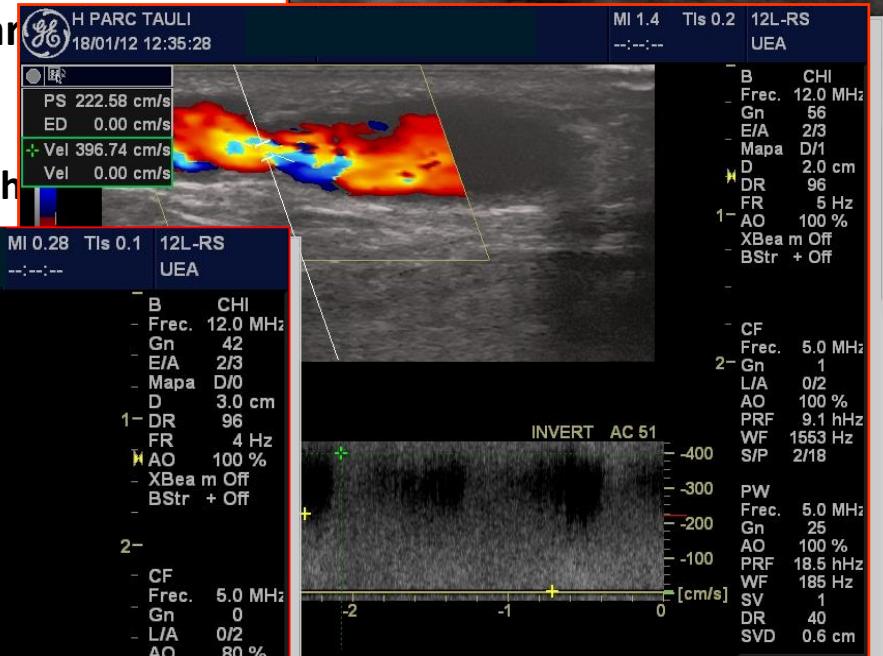
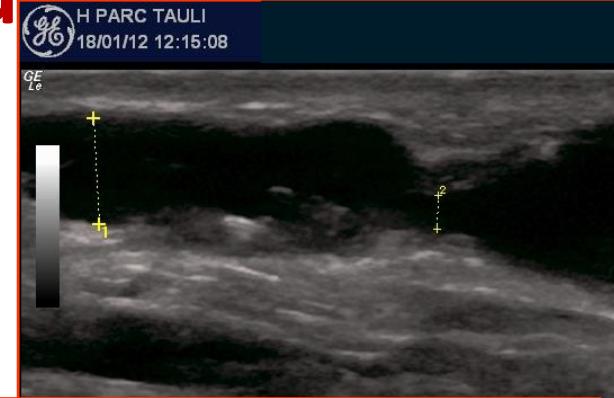
- Anatomical trajectory
 - Artery – Anastomosis – Vein – Subclavia
- Stenosis
 - % reduction of lumen
- Thrombosis
- Masses and collections
 - Hematomas
 - Abscesses



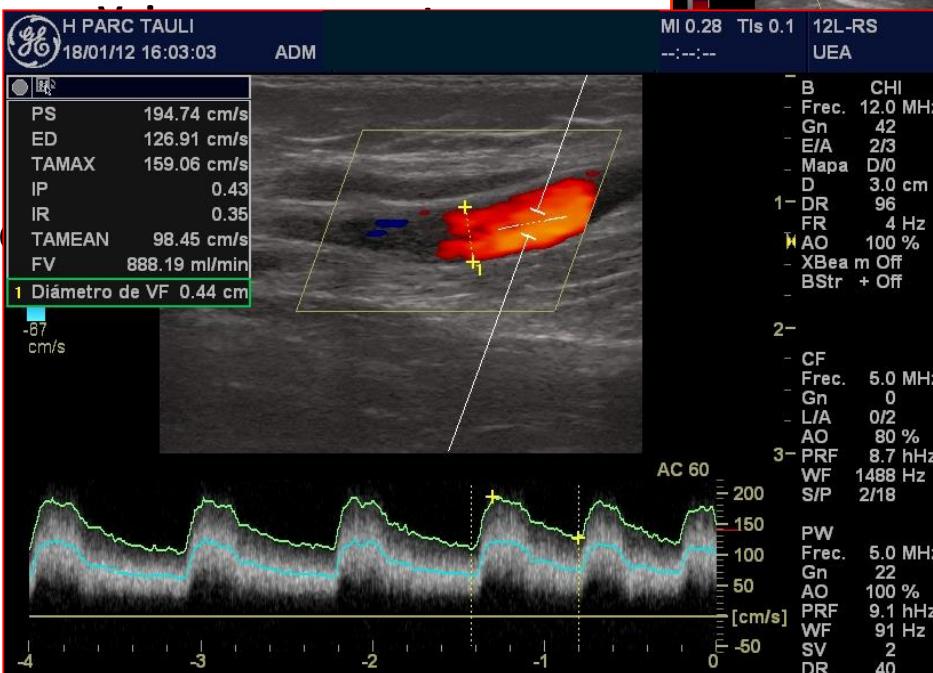
Functional study

- Flow

- Better dysfunction predictor
- Grafts: measurement of the whole access
- AVF: measurement in vein and artery
 - Better measurement in artery?
 - Artery measurement: how much?



- Arteries



Colour Doppler ultrasound in dialysis access.

Hemodialysis

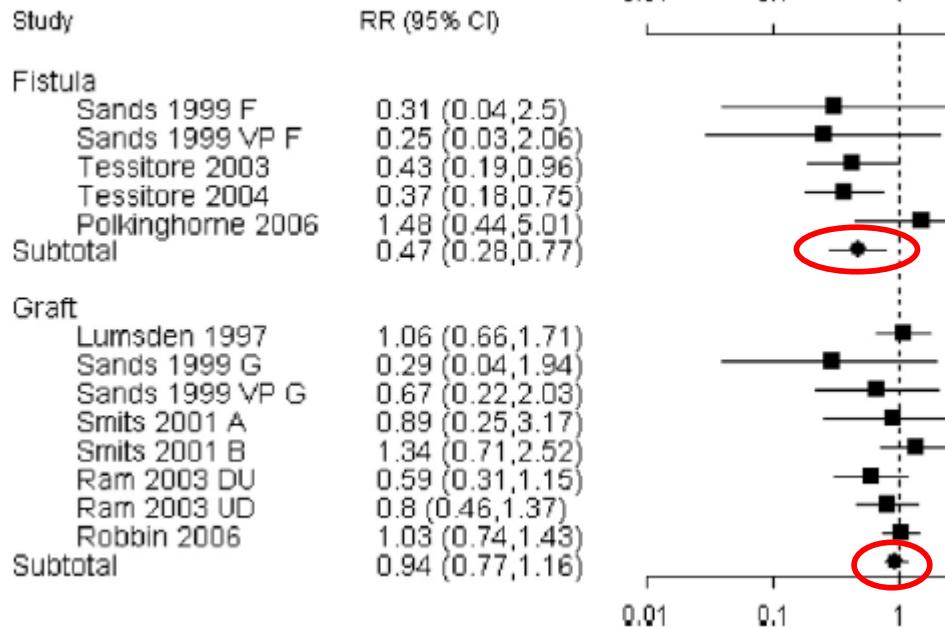


Figure 2. Thrombosis with access blood flow surveillance versus standard care. Standard care could consist of either venous pressure monitoring or no access surveillance. Abbreviations: RR, relative risk; CI, confidence interval; F, fistula; VP, venous pressure; G, graft; DU, Doppler ultrasound; UD, ultrasound dilution.

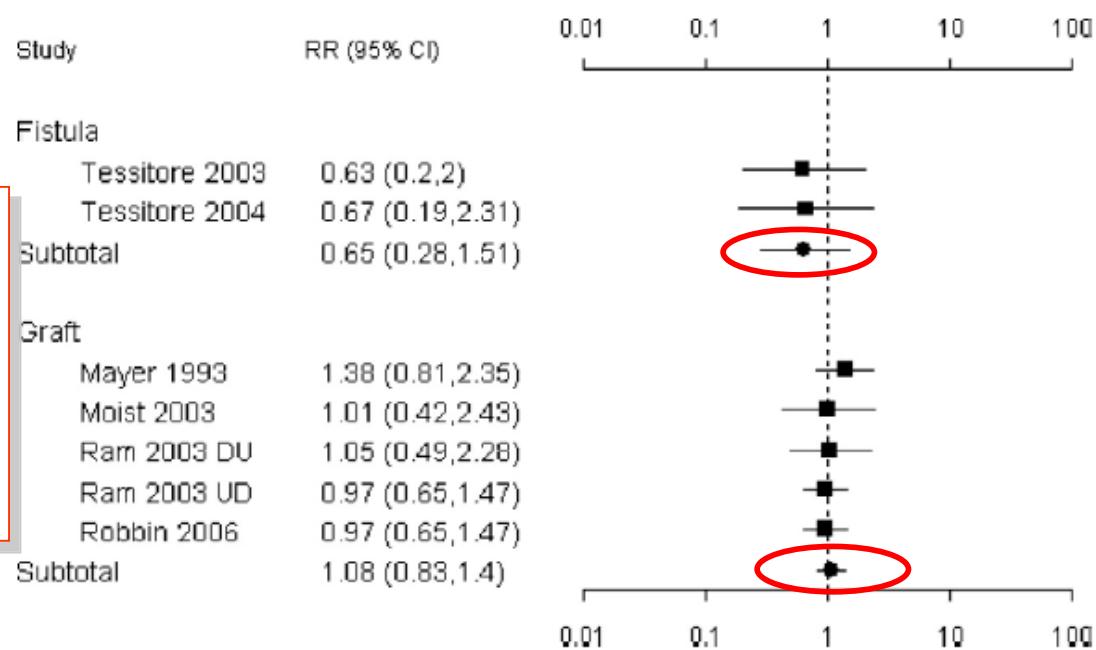
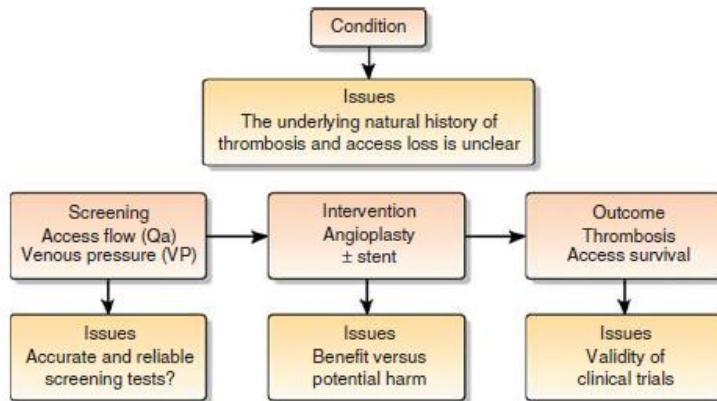


Figure 3. Access loss with access blood flow surveillance versus standard care. Standard care could consist of either venous pressure monitoring or no access surveillance. Abbreviations: RR, relative risk; CI, confidence interval; DU, Doppler ultrasound; UD, ultrasound dilution.

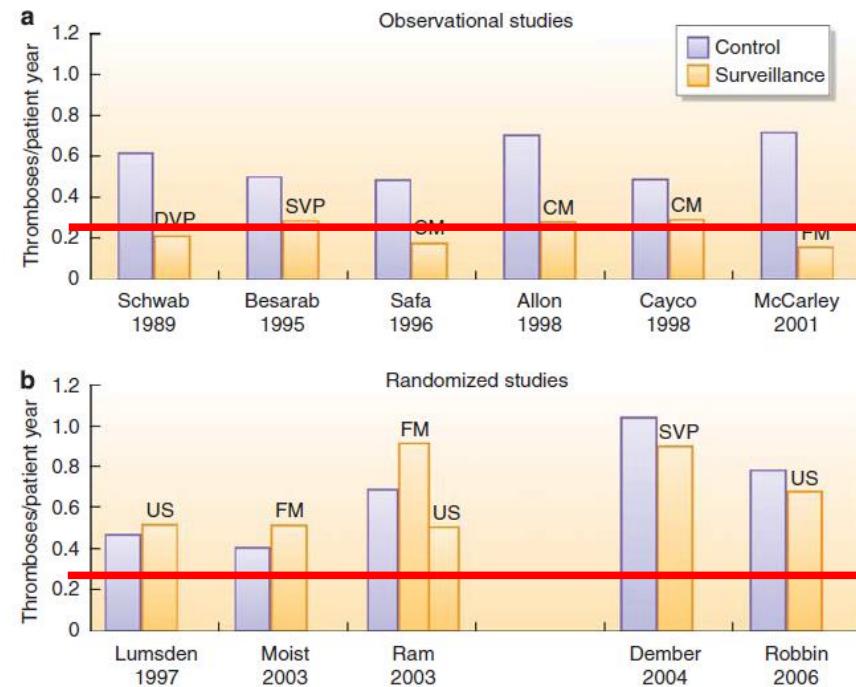
Vascular access surveillance: an ongoing controversy

William D. Paulson¹, Louise Moist² and Charmaine E. Lok³

¹Charlie Norwood VA Medical Center and Nephrology Section, Department of Medicine, Georgia Health Sciences University, Augusta, Georgia, USA; ²Division of Nephrology, University of Western Ontario, London, Ontario, Canada and ³Department of Medicine, Division of Nephrology, The Toronto General Hospital and The University of Toronto, Toronto, Ontario, Canada



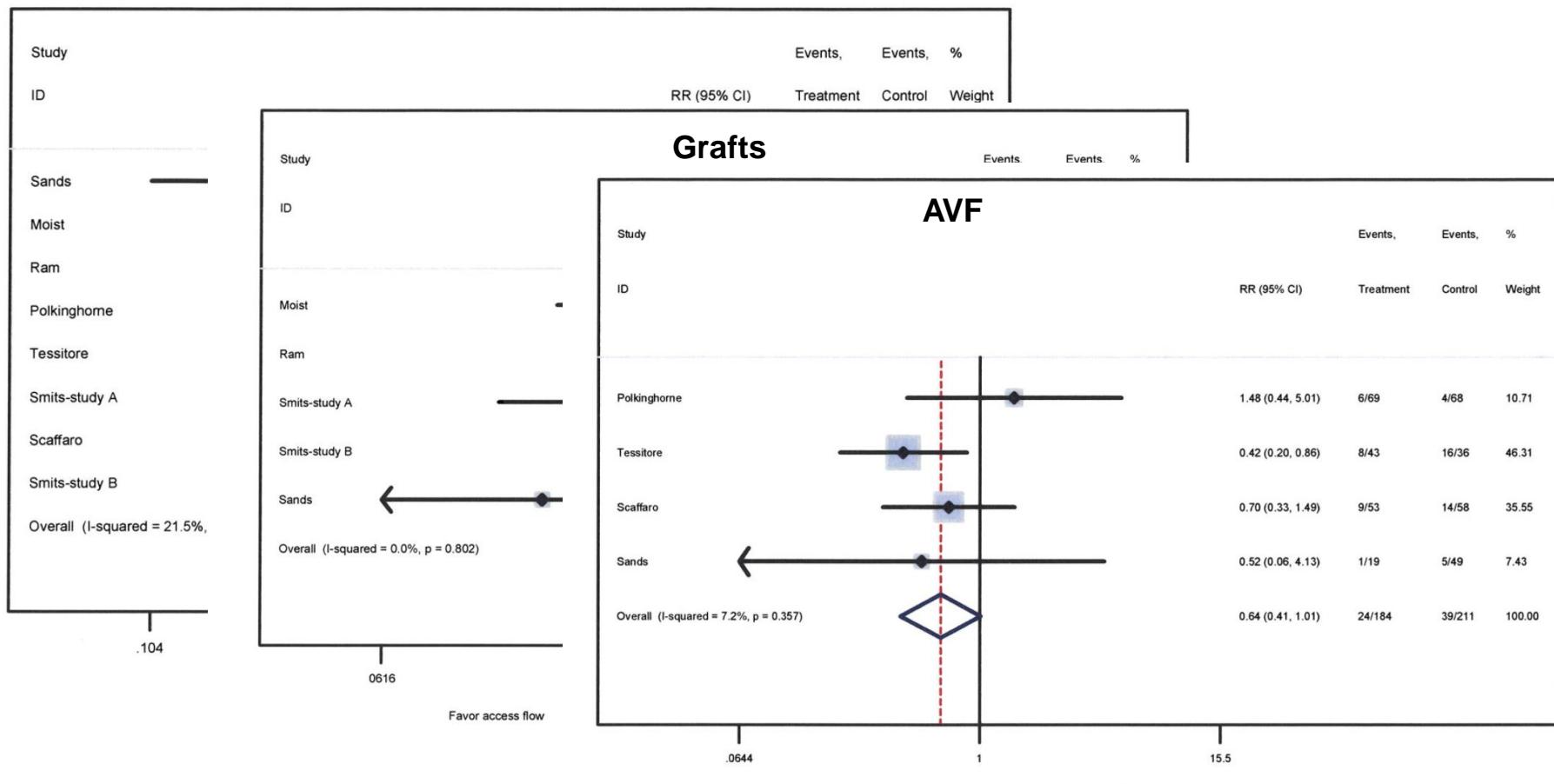
- **Graft:**
 - No patency modification
- **AVF:**
 - Qa decrease thrombosis
 - No patency modification
 - **No Doppler US Studies**



A Meta-analysis of Randomized Clinical Trials Assessing Hemodialysis Access Thrombosis Based on Access Flow Monitoring: Where Do We Stand?

Timothy Muchayi,* Loay Salman,† Leonardo J. Tamariz,‡ Arif Asif,§ Abid Rizvi,‡ Oliver Lenz,¶ Roberto I. Vazquez-Padron,‡ Marwan Tabbara,‡ and Gabriel Contreras**

RR of thrombosis was 0.87 (95% CI, 0.67–1.13) favoring access blood flow monitoring



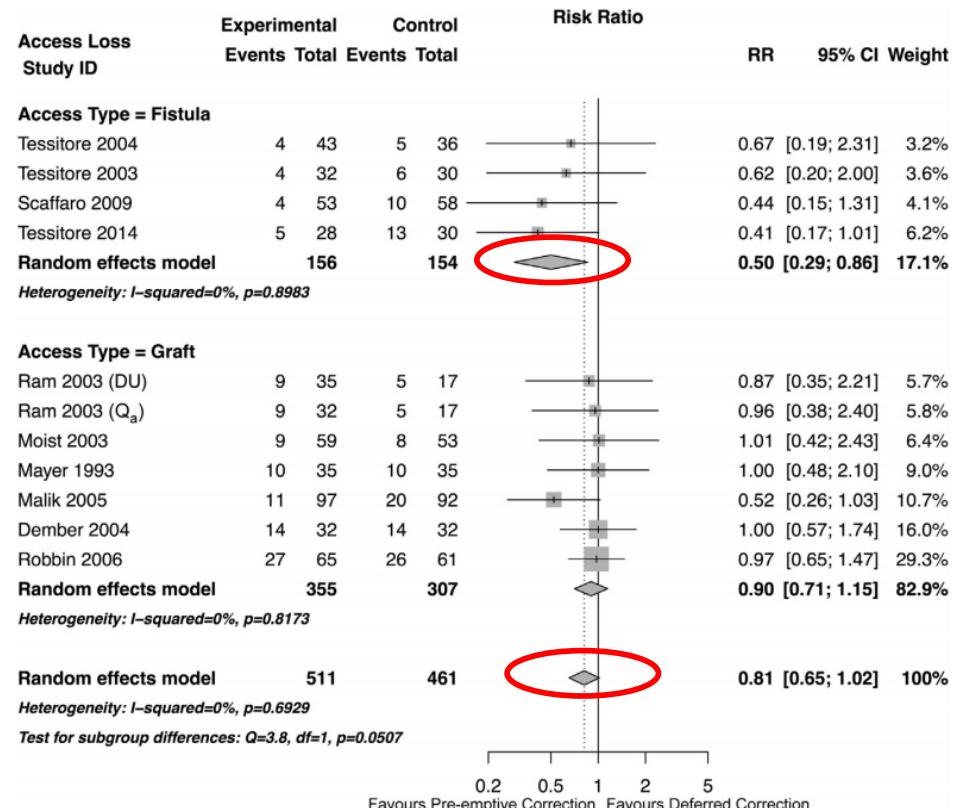
Preemptive Correction of Arteriovenous Access Stenosis: A Systematic Review and Meta-analysis of Randomized Controlled Trials

Pietro Ravani, MD, PhD,^{1,2} Robert R. Quinn, MD, PhD,^{1,2} Matthew J. Oliver, MD,³

Divya J. Karsanji, MSc,² Matthew T. James, MD, PhD,^{1,2}

Jennifer M. MacRae, MD, MSc,¹ Suetonia C. Palmer, MD, PhD,⁴ and

Giovanni F.M. Strippoli, MD, PhD^{5,6,7,8,9}



The Rise and Fall of Access Blood Flow Surveillance in Arteriovenous Fistulas

Nicola Tessitore,* Valeria Bedogna,* Giuseppe Verlato,† and Albino Polit

*Renal Unit,Department of Medicine,University Hospital,Verona, Italy, and †Department of Public Health and Community Medicine,University of Verona,Verona, Italy

- **Stenosis diagnosis capability (III):**
 - $\Delta Q_a > 25\%$: S: 80% and PPV:89%
 - $Q_a 500 \text{ mL/min} + \Delta Q_a > 25\%$: S and PPV SIMILAR to ONLY SURVEILLANCE
 - $Q_a < 500 \text{ mL/min} + \text{EF (+)}$: SIMILAR to ONLY SURVEILLANCE
 - $Q_a 600-750 \text{ mL/min} + \Delta Q_a > 25\%$: S: 92-95%, PPV 79-86%) **BETTER!!!**
- All Q_a cut-offs, separately, have similar PPV to physical examination and lower than DU.
- The increase in the cut-off remains controversial, once care increases without any clear benefit and even with potential harm (PTA of stable subclinical stenoses).

Surveillance of arteriovenous accesses with the use of duplex Doppler ultrasonography

Jan Malik¹, Jaroslav Kudlicka¹, Ludmila Novakova², Josef Adamec², Hana Malikova³, Jan Kavan⁴

¹ Third Department of Internal Medicine, First Faculty of Medicine, Charles University in Prague, Prague - Czech Republic

² Department of Fluid Dynamics and Power Engineering, Faculty of Mechanical Engineering, Czech Technical University in Prague, Prague - Czech Republic

³ Department of Anatomy, 2nd Medical Faculty, Charles University in Prague, Prague - Czech Republic

⁴ Department of Radiology, First Faculty of Medicine, Charles University in Prague, Prague - Czech Republic

TABLE I - DEFINITION OF STENOSIS USED IN THE AUTHOR'S CENTER BY ULTRASONOGRAPHY

Main criteria	Additional criteria
>50% diameter reduction	>25% decrease of flow volume
>Twofold increase of peak systolic velocity	Flow volume <600 mL/min Residual diameter <2.0 mm
Only 2 main = borderline; 2main+ ≥ additional = significant stenosis.	

Monitorización del acceso vascular: ¿*Quo vadis?*

J. Ibeas López

Servicio de Nefrología. Corporació Sanitària i Universitària Parc Taulí. Hospital de Sabadell. Universitat Autònoma de Barcelona

NefroPlus 2011;4(2):11-20

doi:10.3265/NefroPlus.pre2011.Jul.11062

- **Further studies needed?**
- **Low risk stenosis overtreated, with secondary thrombosis**
- **Look for the risk the thrombosis instead of stenosis?**

Ecografía del acceso vascular para hemodiálisis: conceptos teóricos y prácticos. Criterios

José Ibeas-López¹, Joaquim Vallespín-Aguado²

¹ Servicio de Nefrología. Parc Taulí Sabadell, Hospital Universitari. Universitat Autònoma de Barcelona. Sabadell, Barcelona

² Servicio de Cirugía Vascular. Parc Taulí Sabadell, Hospital Universitari. Universitat Autònoma de Barcelona. Sabadell, Barcelona

Nefrologia Sup Ext 2012;3(6):21-35

doi:10.3265/NefrologiaSuplementoExtraordinario.pre2012.Dec.11877

- **Surveillance but with ethiologic diagnosis**
- **Patient bedside decision**

Doppler Ultrasound: A Powerful Tool for Vascular Access Surveillance

Maria Guedes Marques,* José Ibeas,† Carlos Botelho,* Pedro Maia,* and Pedro Ponce*

*Vascular Access Center, Nephrocare Coimbra, Coimbra, Portugal, and †Nephrology, Hospital de Sabadell, Sabadell, Spain

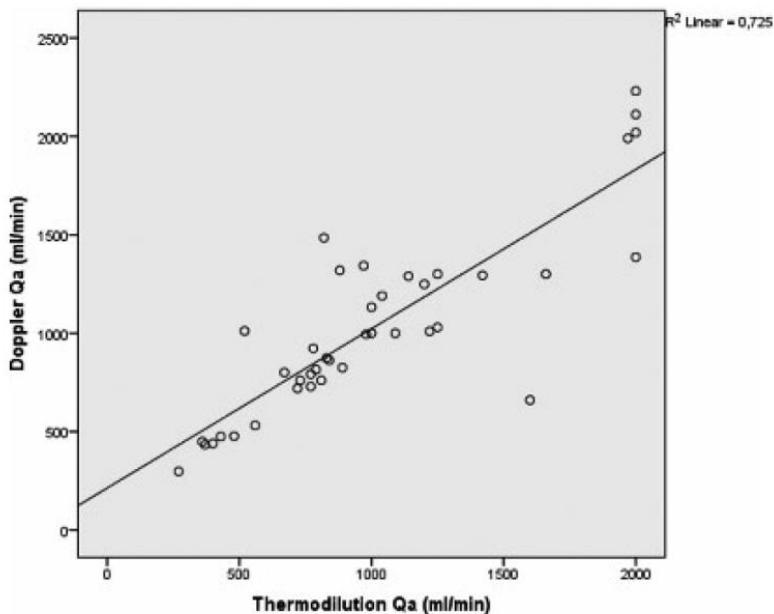


FIG. 1. Simple scatter plot DU-Qa vs. BTM-Qa.

- Cohort: 50 patients
- Qa determination using US vs BTM and its capability of diagnosing hemodynamically significant stenosis.
- NOTE: hemodynamically significant stenosis: reduction vessel lumen > 50% + increase in PSR of more than 2x (PSR in stenosis > 400 cm/s)

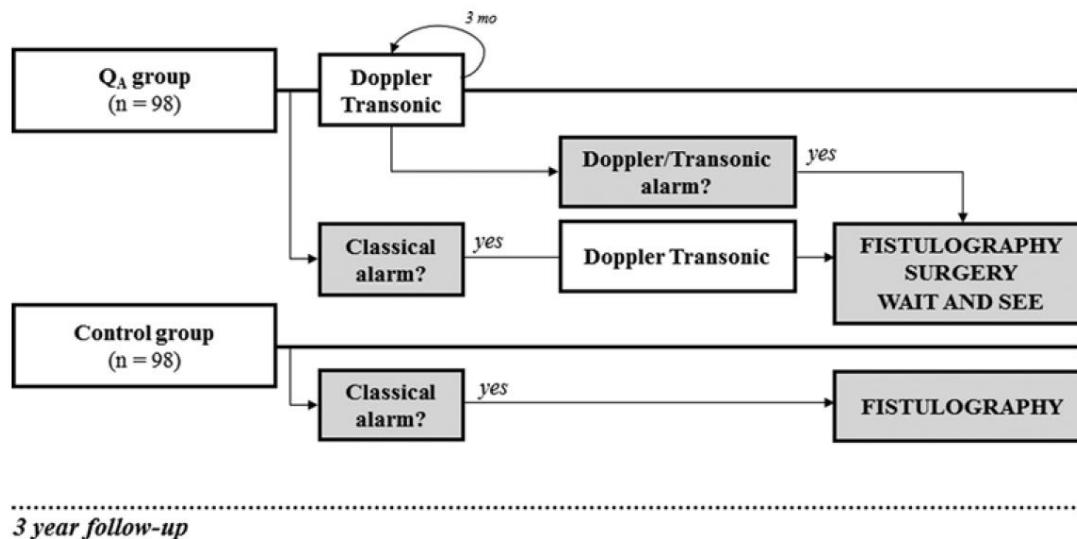
TABLE 3. Kruskal–Wallis and Mann–Whitney test

	<i>p</i> -value	
	TD Qa (ml/minute)	DU-Qa (ml/minute)
DU request motive	0.076	0.006
First VA	0.036	0.199
VA type	0.079	0.021
Time of VA (threshold 48 months)	0.112	0.061
Previous endovascular procedure	0.509	0.478
Venous pressure (threshold 200 mmHg)	0.203	0.155
Arterial pressure (threshold –185 mmHg)	0.028	0.015
Recirculation (threshold 10%)	0.145	0.266
Anastomosis characteristics	0.103	0.076
Artery characteristics	0.538	0.048
Vein characteristics	0.208	0.844
Presence of stenosis	0.039	0.038
Stenosis location	0.087	0.031
Stenosis hemodynamic meaning	0.290	0.935
Number of stenosis	0.012	0.034

- Besides Qa monitoring, the DU detects and characterises the stenosis with regard to its location, etiology, residual diameter, hemodynamic significance.

The impact of access blood flow surveillance on reduction of thrombosis in native arteriovenous fistula: a randomized clinical trial

Inés Aragón cillo^{1,2}, Yésika Amézquita², Silvia Caldés¹, Soraya Abad³, Almudena Vega³, Antonio Cirugeda¹, Cristina Moratilla², José Ibeas⁴, Ramón Roca-Tey⁵, Cristina Fernández⁶, Borja Quiroga³, Ana Blanco⁷, Maite Villaverde⁷, Caridad Ruiz⁷, Belén Martín⁸, Asunción M. Ruiz⁸, Jara Ampuero⁸, Juan M. López-Gómez³, Fernando de Alvaro¹

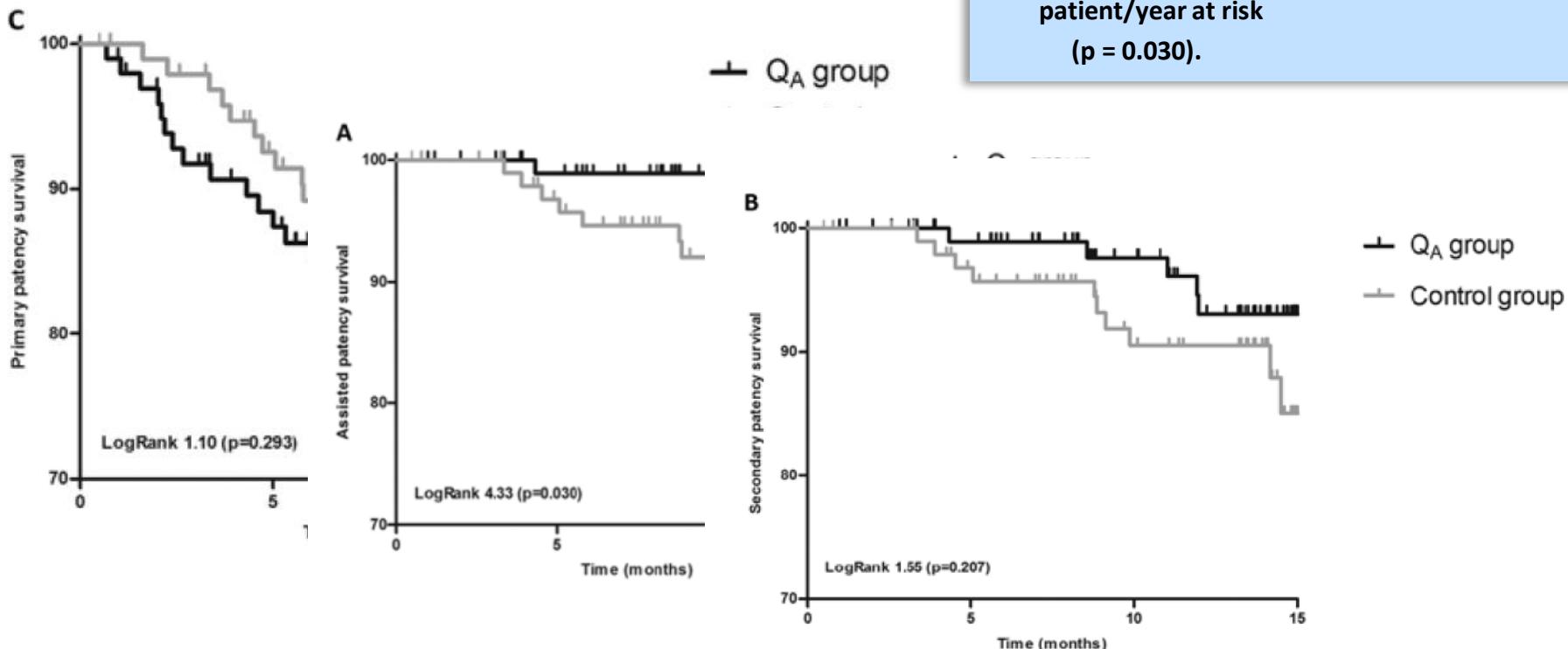


- As an intermediate analysis pre-specified in protocol show the results at one-year follow-up

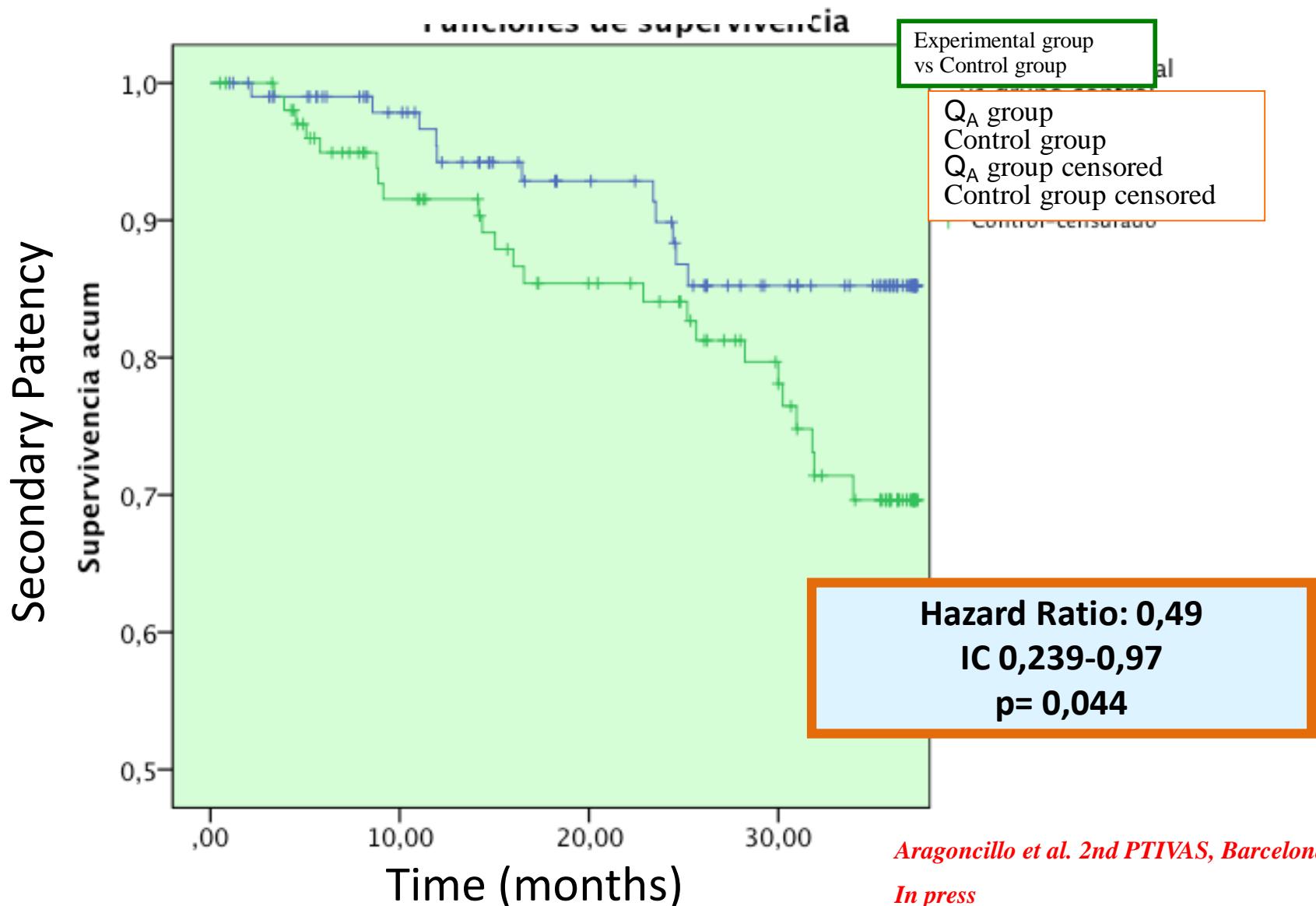
TABLE I - Alarm criteria for an intervention

Classical alarm criteria	DU and UDM alarm criteria
- 25% Increased dynamic venous pressure.	- 25% or higher decreased in Q_A compared with previous measurement.
- 25% Decreased pump blood flow.	- Q_A lower than 500 ml/min.
- 0.2 Kt/V decreased compared with previous measurement.	- Stenotic area with a higher than 50% reduction of blood vessel lumen would be considered as alarm criteria only if it comes with a hemodynamic repercussion criteria defined as peak systolic velocity (PSV) higher than 400 cm/s, or PSV ratio stenosis/pre-stenosis higher than 3.
- More than 10% recirculation using urea method.	
- Prolonged coagulation time in three consecutive dialysis sessions.	
- Cannulation problems in three consecutive dialysis sessions.	
- Pathologic physical examination with any of the previous criteria.	

DU = Doppler ultrasound; UDM = ultrasound dilution methods; Q_A = access blood flow.



SECONDARY PATENCY 3 years follow up



Vein dissection, a rare complication of a fistula puncture readily distinguished by ultrasound

Maria Guedes-Marques^{1,2}, Joaquim Vallespín¹,
Xavier Vinuesa¹, Dolores Barrera¹, José Ibeas¹

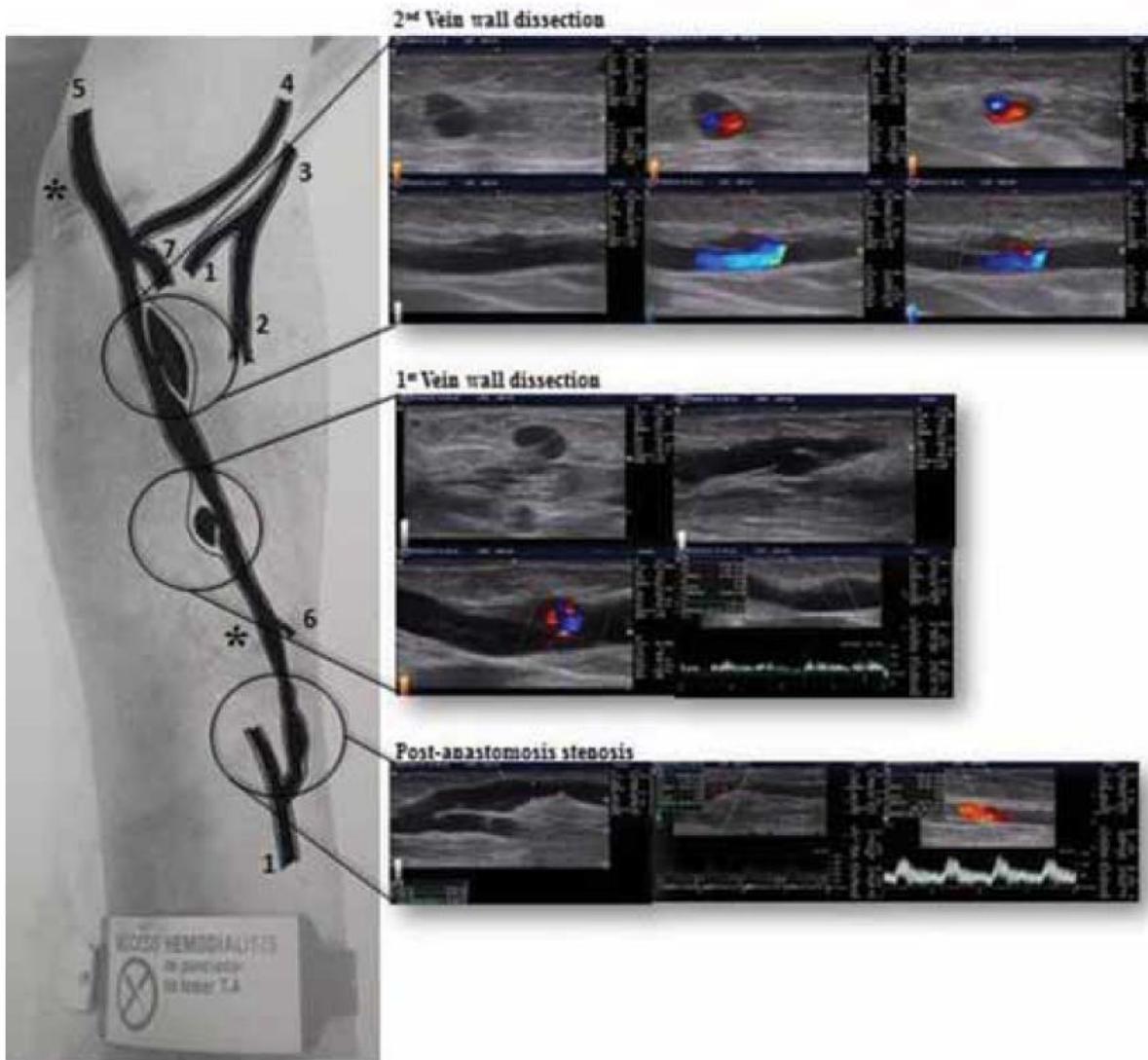
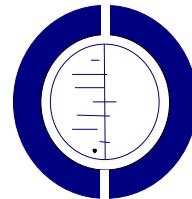


Fig. 1 - Schematic drawing of patient's fistula with the post-anastomotic stenosis and the two vein wall dissection. 1 - Radial artery; 2 - Ulnar artery; 3 - Brachial artery; 4 - Cephalic vein; 5 - Basilic vein; 6 - Colateral vein; 7 - Perforating vein. *New cannulation sites.

New Spanish Guideline on Vascular Access

Chapters

- 1. Pre-surgical phase**
- 2. VA Creation**
- 3. VA Care**
- 4. Monitoring and surveillance**
- 5. Complications treatment**
- 6. Catheter**
- 7. Quality indicators**



Centro Cochrane Iberoamericano
Iberoamerican Cochrane Centre

4. Monitoring and Surveillance

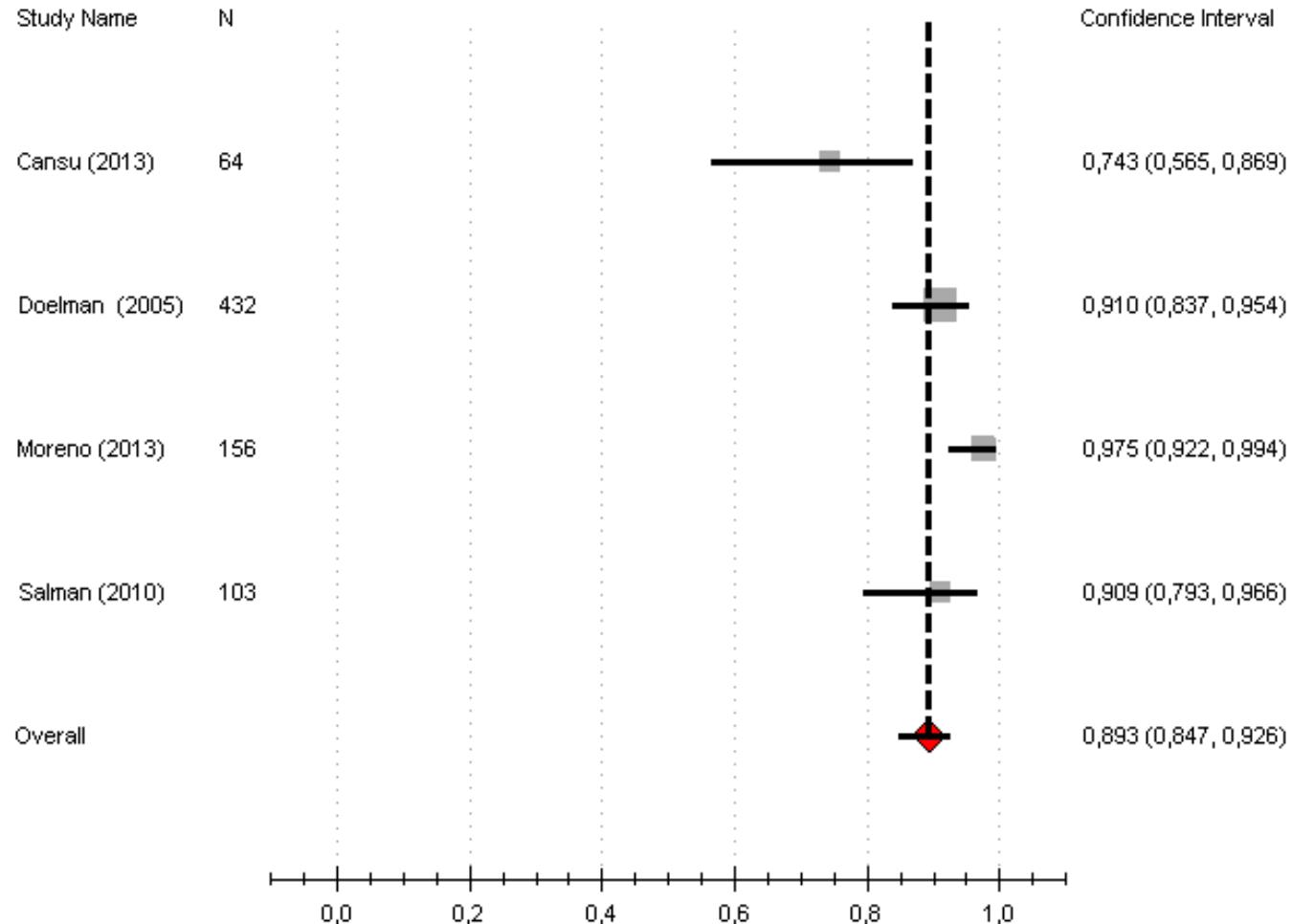


PICO Question

Can Doppler Ultrasound, performed by an experienced examiner, replace fistulography as the gold standard for confirming a diagnosis of significant stenosis in VA?



Forest Plot: Sensitivity



Sensitivity

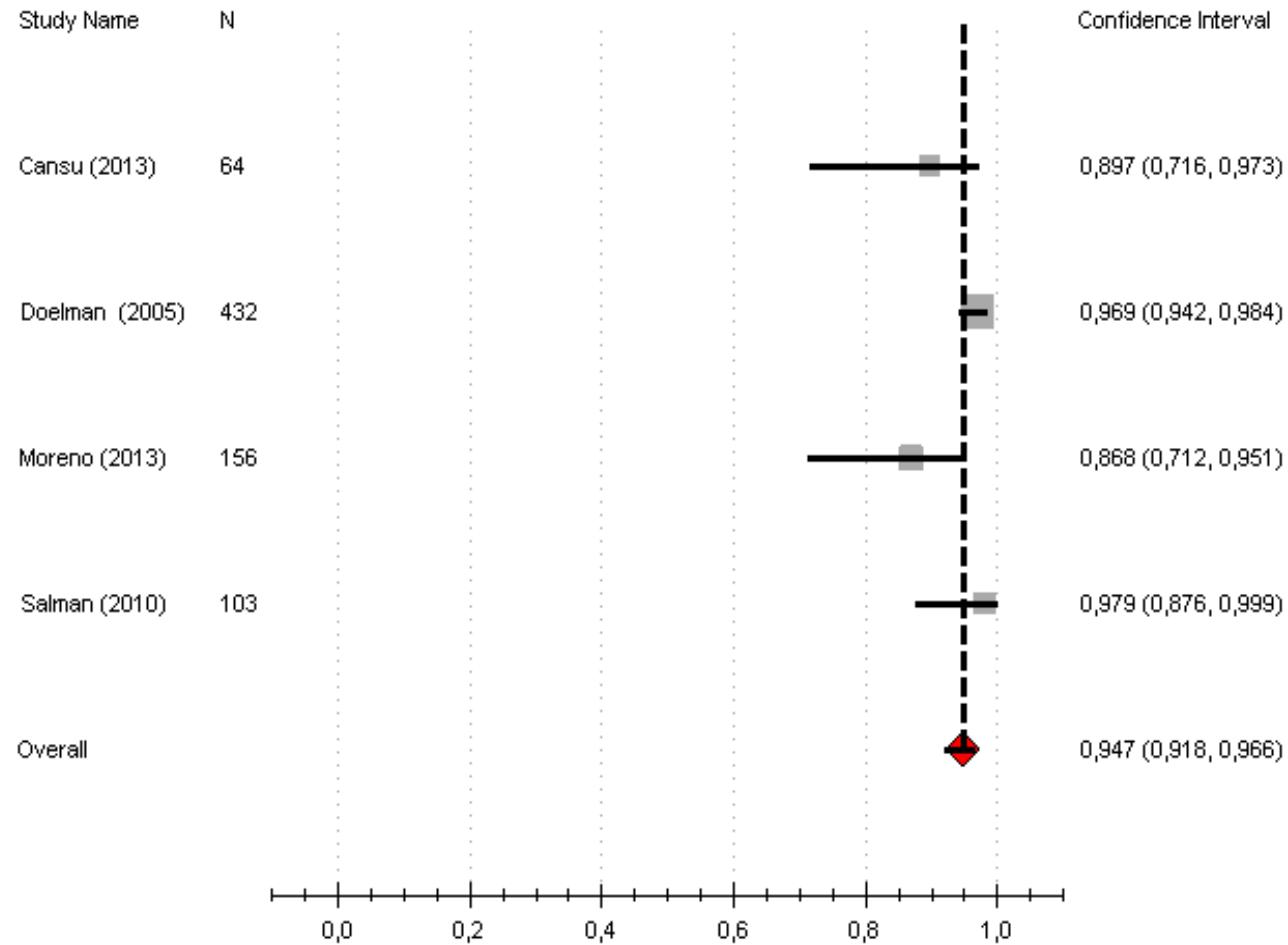
89.3 %

(IC 95%: 84.7-92.6 %)

Meta-analysis made by the Iberoamerican Cochrane group, which included 755 patients in 4 studies over the last 10 years, of which 319 were diagnosed with significant stenosis by fistulography (prevalence: 42.3%). **Sensitivity** of Doppler US ruled against fistulography for diagnosis confirmation of significant VA stenosis in patients with clinical suspicion of stenosis: 89,3 % (IC 95%: 84,7-92,6 %).
(MetaAnalyst Program, 11.11.2013).



Forest Plot: Specificity



Specificity

94.7 %

(IC 95 %: 91.8 -96.6 %)

Meta-analysis made by the Iberoamerican Cochrane group, which included 755 patients in 4 studies over the last 10 years, of which 319 were diagnosed with significant stenosis by fistulography (prevalence: 42.3%). **Specificity** of Doppler US ruled against fistulography for diagnosis confirmation of significant VA stenosis in patients with clinical suspicion of stenosis: 94.7% (95% CI: 91.8 to 96.6%).
(MetaAnalyst Program, 11.11.2013).



Positive and negative predictive values of the EDC according to the prevalence of significant stenosis.

PREVALENCE SIGNIFICANT STENOSIS (%)	0	10	20	30	40	50	60	70	80	90	100
Positive predictive value (%)	0.0	65.2	80.8	87.8	91.8	94.4	96.2	97.5	98.5	99.3	100.0
Negative predictive value (%)	100.0	98.8	97.3	95.4	93.0	89.8	85.5	79.1	68.9	49.6	0.0
Accuracy (%)	94.7	94.16	93.62	93.08	92.54	92	91.46	90.92	90.38	89.84	89.3

4. Monitoring and Surveillance



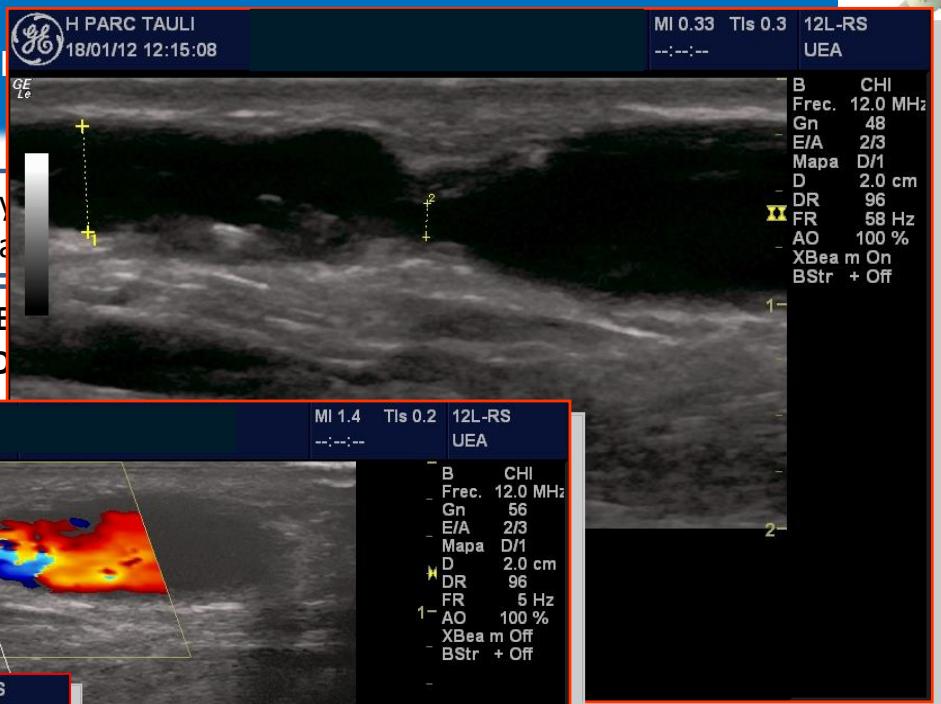
Can Doppler Ultrasound, performed by an experienced examiner, replace fistulography as the gold standard for confirming a diagnosis of significant stenosis in VA?

R 4.2) Doppler Ultrasound is the first approach recommended for image exploration in the hands of an experienced examiner, thereby eliminating the need for confirming via fistulography, to indicate elective treatment when significant stenosis is suspected.

It is recommended that fistulography be reserved for diagnostic image exploration only in cases where US results are non-conclusive and there is a persistent suspicion of significant stenosis.

R. 4.6) It is recommended using both first and second generation methods for monitoring and surveillance AVFn.

4. Monitoring and treatment



5. Complications treatment



R 5.1.1) In the absence of any contraindication, **it is recommended that all stenoses with a vascular lumen reduction equal to or higher than 50% and that fulfil stenosis criteria related to high-risk of thrombosis be treated.**

R 5.1.2) It is recommended that **fistulography be performed when central venous stenosis is suspected.**

CLINICAL STUDY

Doppler ultrasound and calcification score: improving vascular access surveillance

Maria Guedes Marques¹, Carlos Botelho¹, Pedro Maia¹, José Ibeas², and Pedro Ponce³

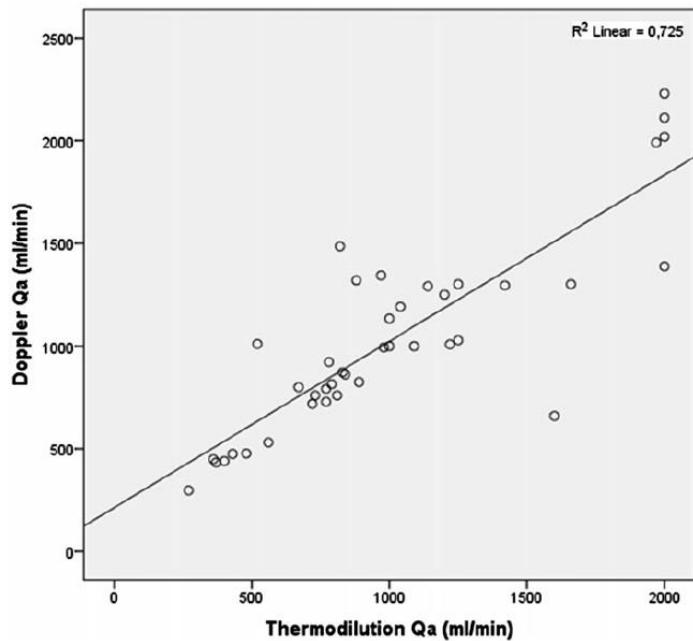


Table 3. Kruskal-Wallis and Mann-Whitney tests.

	p-Value	
	BTM Qa	DU Qa
Gender	0.262	0.575
Age (threshold 65 years)	0.017	0.012
Diabetes	0.027	0.100
Hypertension	0.989	0.924
First VA	0.036	0.199
Previous endovascular procedure	0.509	0.478
SCVS (0–8 score)	0.173	0.030
Venous pressure (threshold 200 mmHg)	0.203	0.155
Arterial pressure (threshold -185 mmHg)	0.028	0.015
OCM (threshold 1.4)	0.868	0.892
PTH (threshold 400 pg/mL)	0.257	0.239
Calcium (threshold 8 mg/dL)	0.777	0.918
Phosphate (threshold 4 mg/dL)	0.138	0.402
Bicarbonate (threshold 22 mEq/L)	0.615	0.859
Magnesium (threshold 2.3 mEq/L)	0.234	0.389
Recirculation (threshold 10%)	0.145	0.266
Time on dialysis (threshold 48 months)	0.001	0.002
Time of VA (threshold 48 months)	0.112	0.049
VA type	0.079	0.021

Note: Bold values indicate significant p value < 0.05 .

Why

BS Dixon

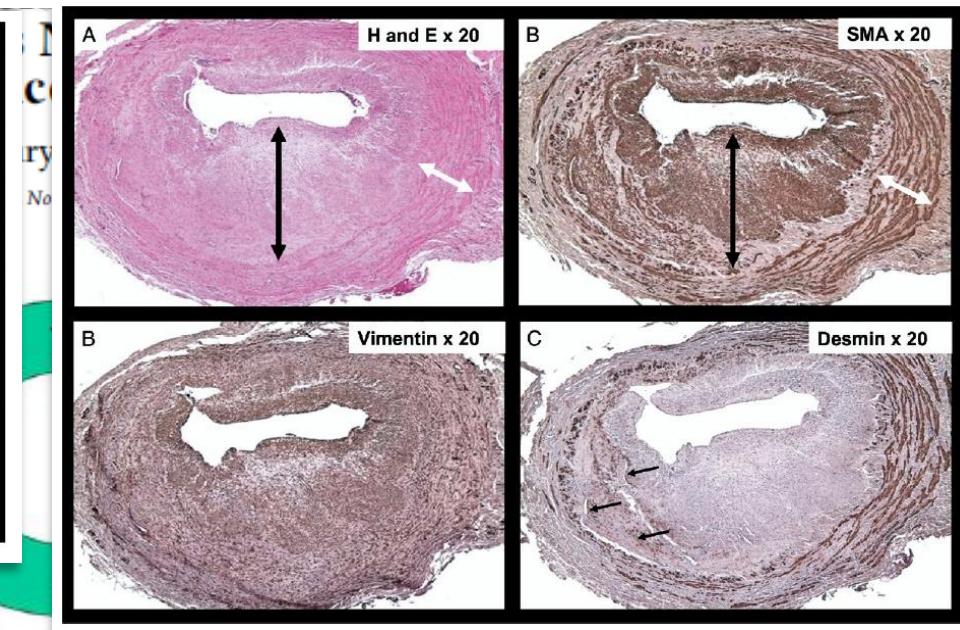
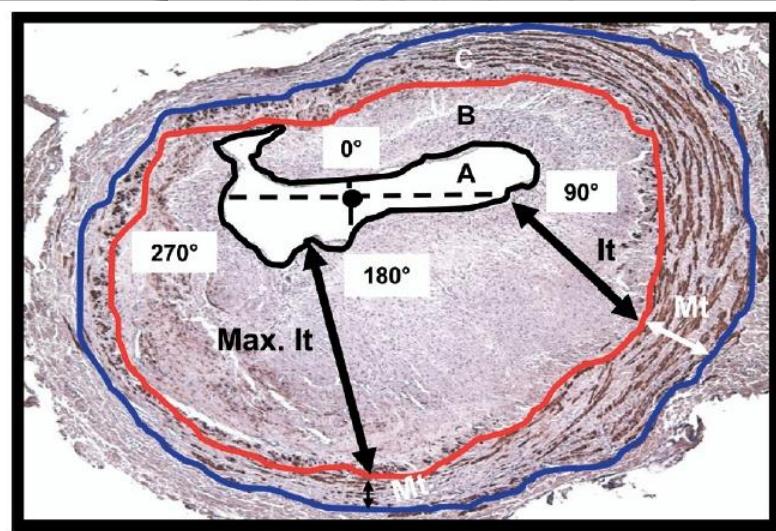
¹Veterans A...

Neointimal Hyperplasia in Early Arteriovenous Fistula Failure

Prabir Roy-Chaudhury, MD, PhD,¹ Lois Arend, MD,² Jianhua Zhang, MS,¹ Mahesh Krishnamoorthy, MS,³ Yang Wang, MD,¹ Rupak Banerjee, PhD,³ Antoine Samaha, MD,⁴ and Rino Munda, MD⁵

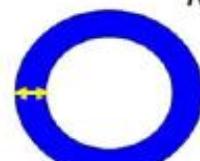
Am J Kidney Dis 50:782-790. © 2007 by the National Kidney Foundation, Inc.

Advances an

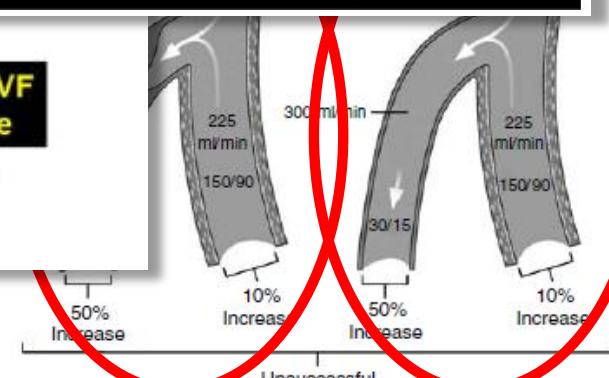
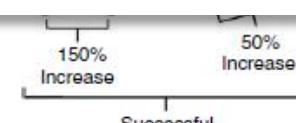


Minimal Wall Thickening + Negative Remodeling

100%



Early AVF Failure
25%



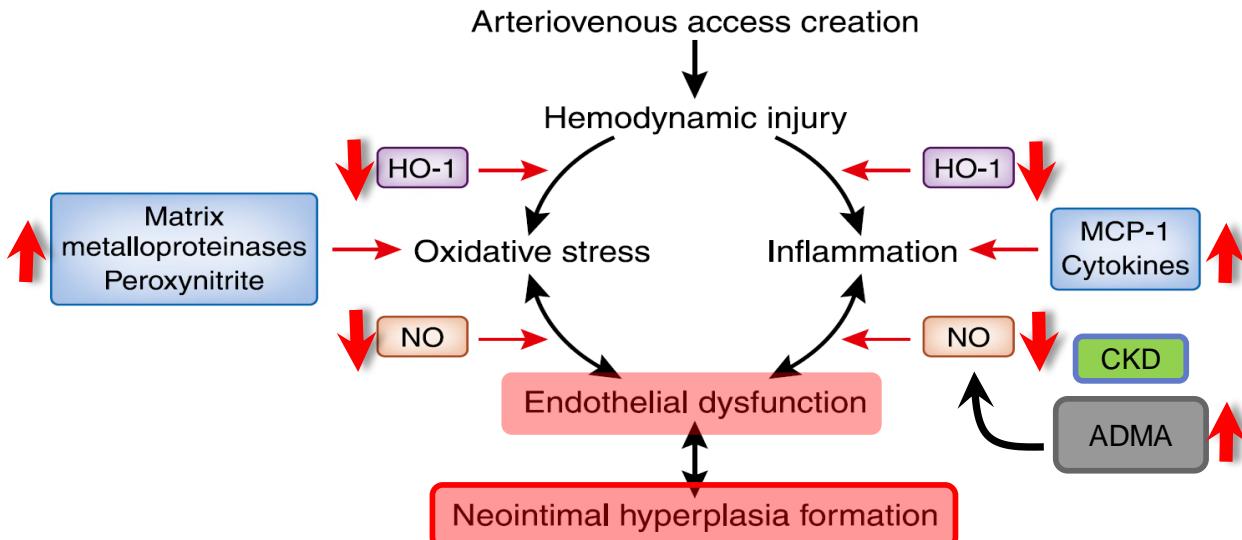
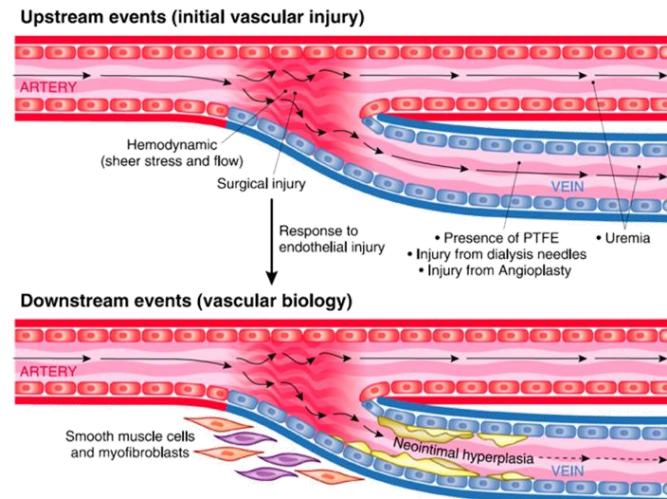
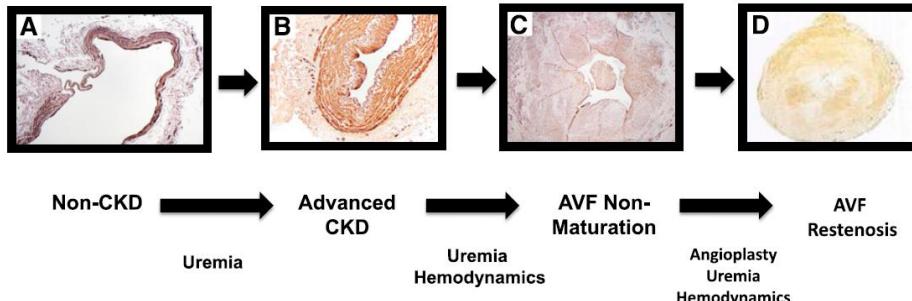
Moving Points in Nephrology

Clin J Am Soc Nephrol 8: 2194–2201, 2013.

Novel Paradigms for Dialysis Vascular Access: Downstream Vascular Biology—Is There a Final Common Pathway?

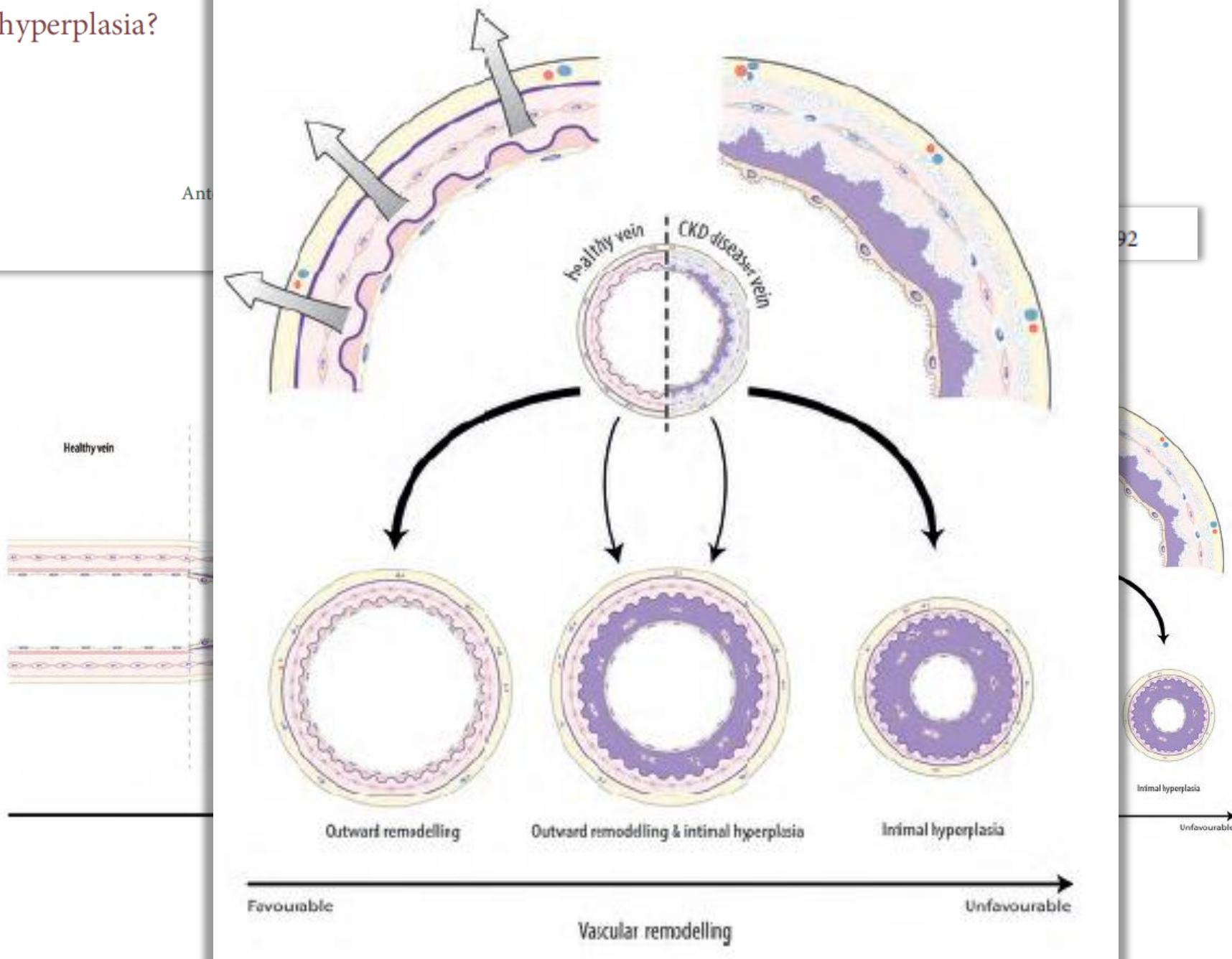
Timmy Lee^{*†‡§}

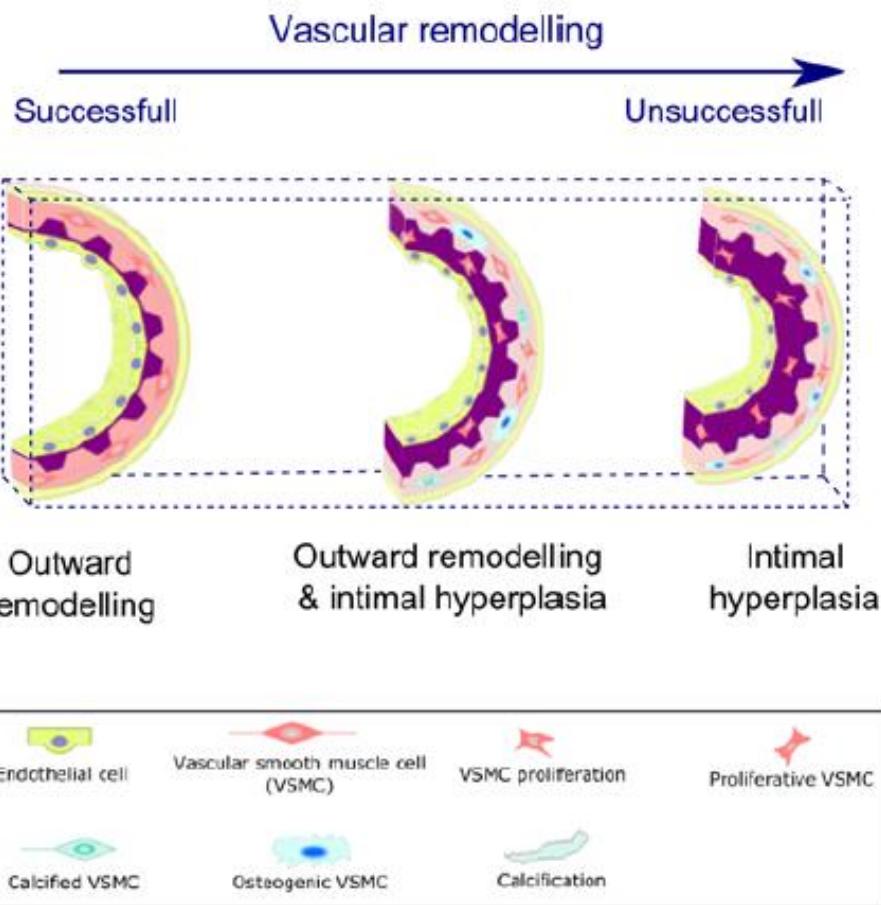
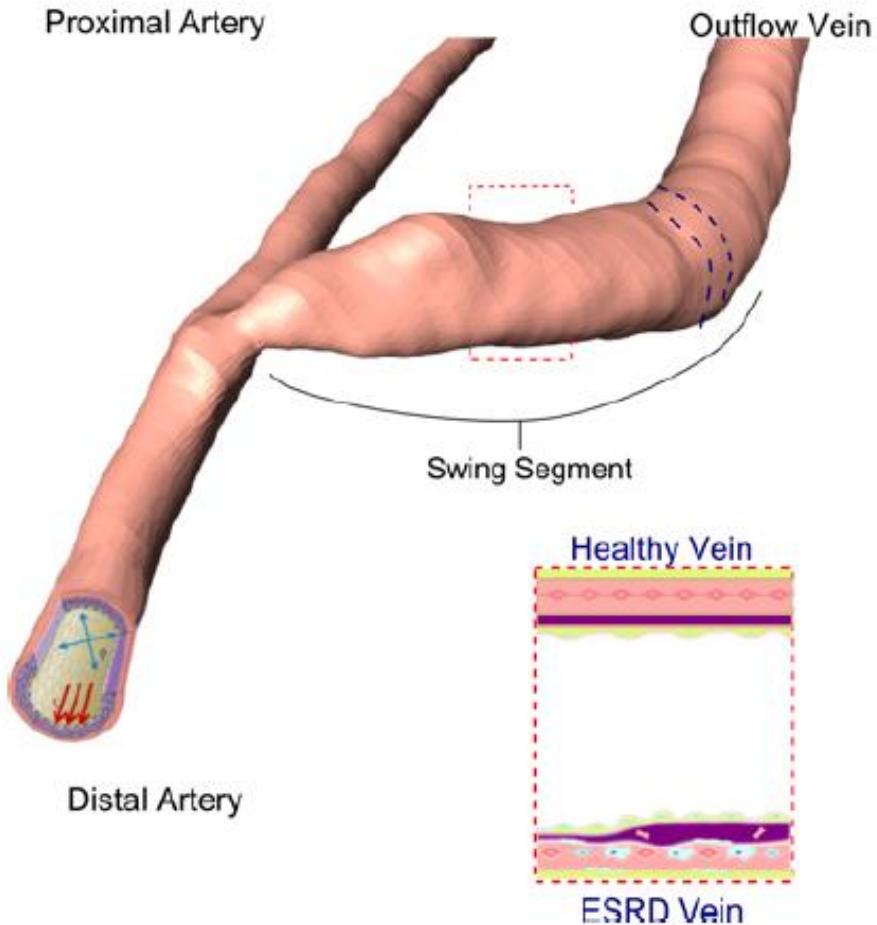
Natural history of vascular access dysfunction



Arteriovenous access hyperplasia?

92





walls closing in depends on...



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for vasodilation and thickening of the intima-media should be evaluated

Original Article

Ultrasonographic measurement of intima-media thickness of radial artery in pre-dialysis uremic patients: comparison with histological examination

Young Mi Ku², Young Ok Kim¹, Ji Il Kim³, Yeong Jin Choi⁴, Sun Ae Yoon¹, Young Soo Kim¹, Sun Wha Song², Chul Woo Yang¹, Yong Soo Kim¹, Yoon Sik Chang¹ and Byung Kee Bang¹

¹Department of Internal Medicine, ²Radiology, ³General Surgery, ⁴Clinical Pathology, College of Medicine, The Catholic University of Korea, Seoul, Korea

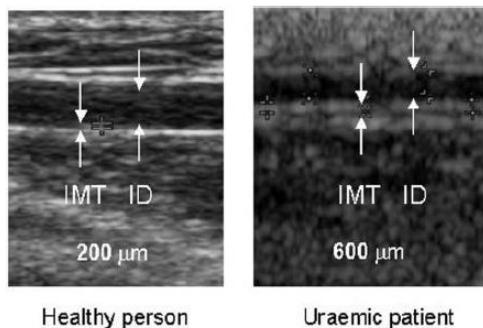


Fig. 1. B-mode ultrasonography shows intima-media thickness (IMT) and internal diameter of the radial artery in a uremic patient and a healthy person. IMT is the distance between blood-intima and media-adventitia interface at the far wall of the straight portion at the just above the wrist. See increased IMT of the uremic patient, compared to the control.

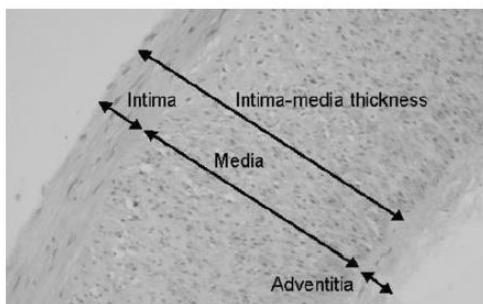


Fig. 2. Histologic examination of radial arterial wall. IMT means the sum of intima and media thickness.

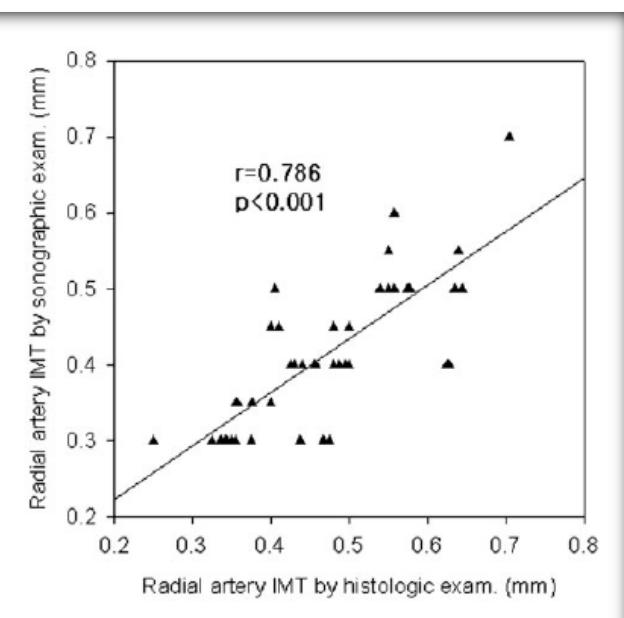
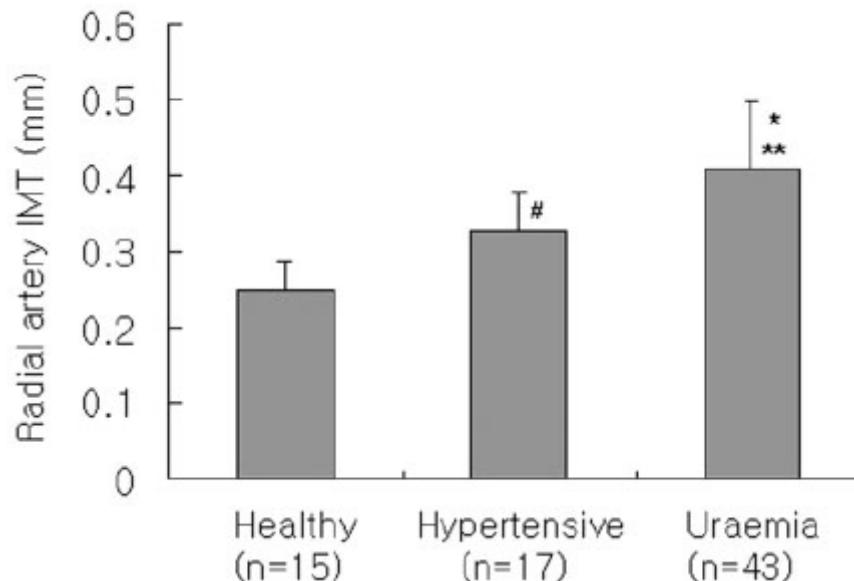
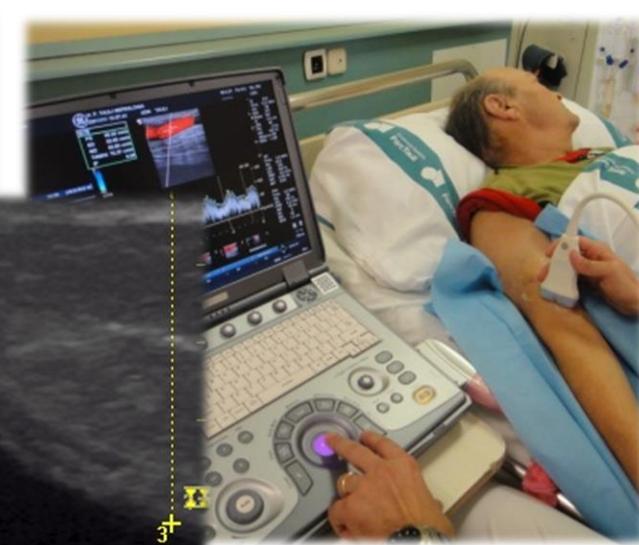
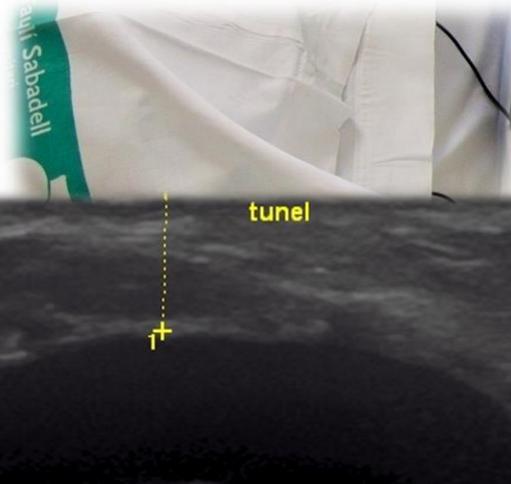
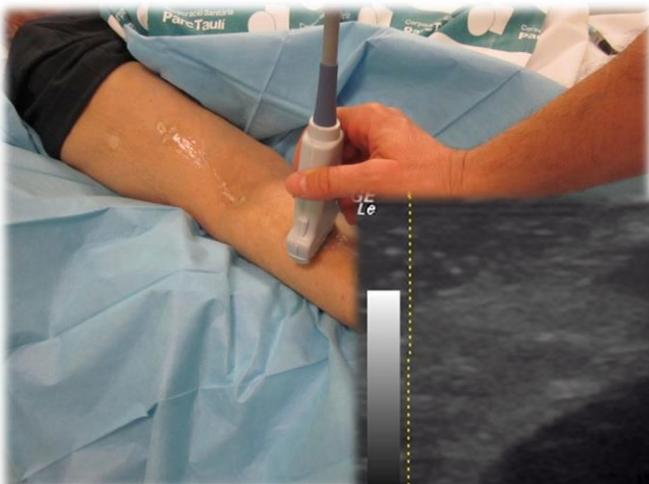


Fig. 6. Correlation of radial artery IMT by sonographic and histologic examinations in 43 uremic patients.

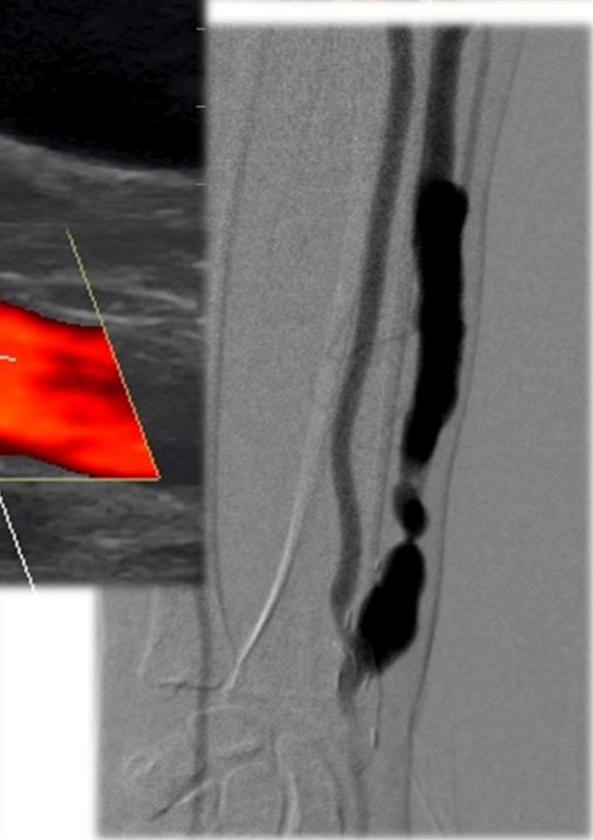
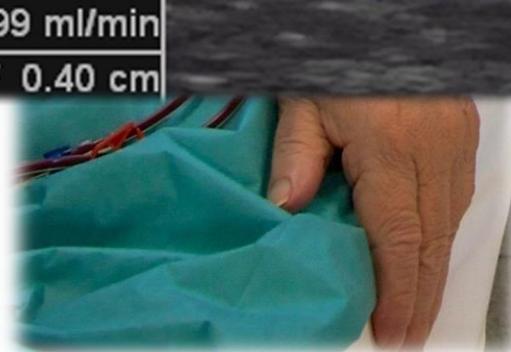
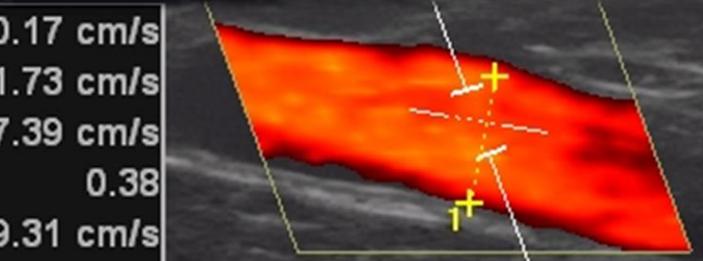


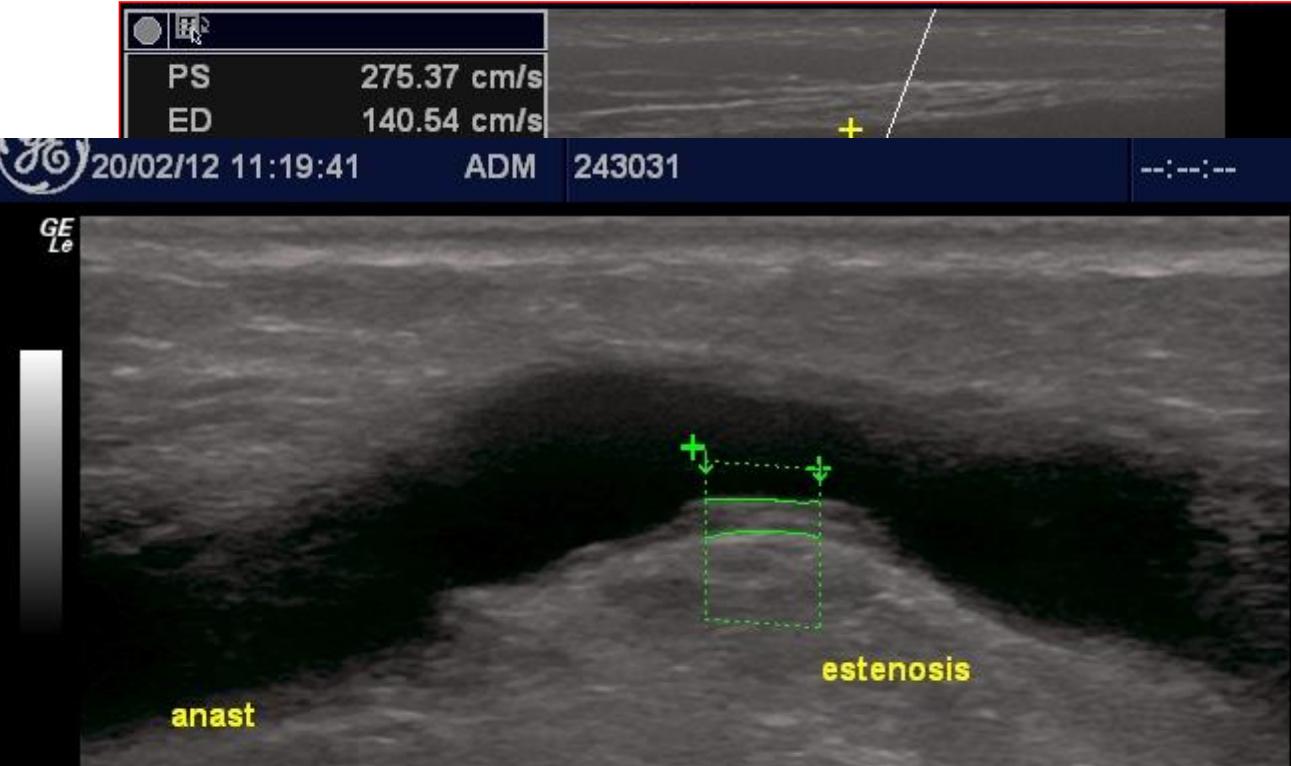


PS	180.17 cm/s
ED	111.73 cm/s
TAMAX	137.39 cm/s
IR	0.38
TAMEAN	69.31 cm/s
FV	523.99 ml/min

1 Diámetro de VF 0.40 cm

injerto antiguo





GE
Le

1	IMT Post Avg	1.03 mm
	IMT Post Max	1.24 mm
	IMT Post Min	0.96 mm
	IMT Post SD	0.07 mm
	IMT Post nPoints	90
+ d	0.80 cm	
	IMT Post Avg	0.00 mm
	IMT Post Max	0.00 mm
	IMT Post Min	0.00 mm
	IMT Post SD	0.00 mm
	IMT Post nPoints	0
+ d	1.16 cm	
L	0.00 cm	

Con MRI

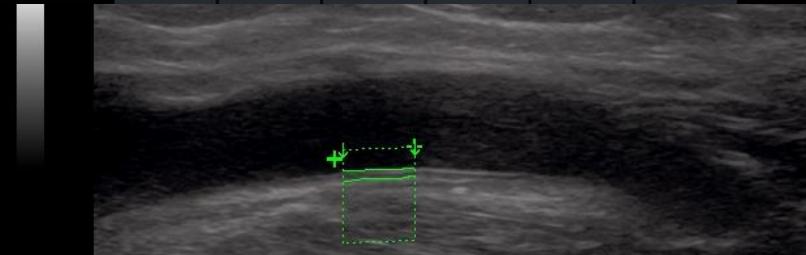
IMT der.
Anter P
Anter D
Later P
Later D
PosterP
PosterD
IMT 1
IMT 2

FPlaca
Placa 1
Placa 2
Sig...
Izq...

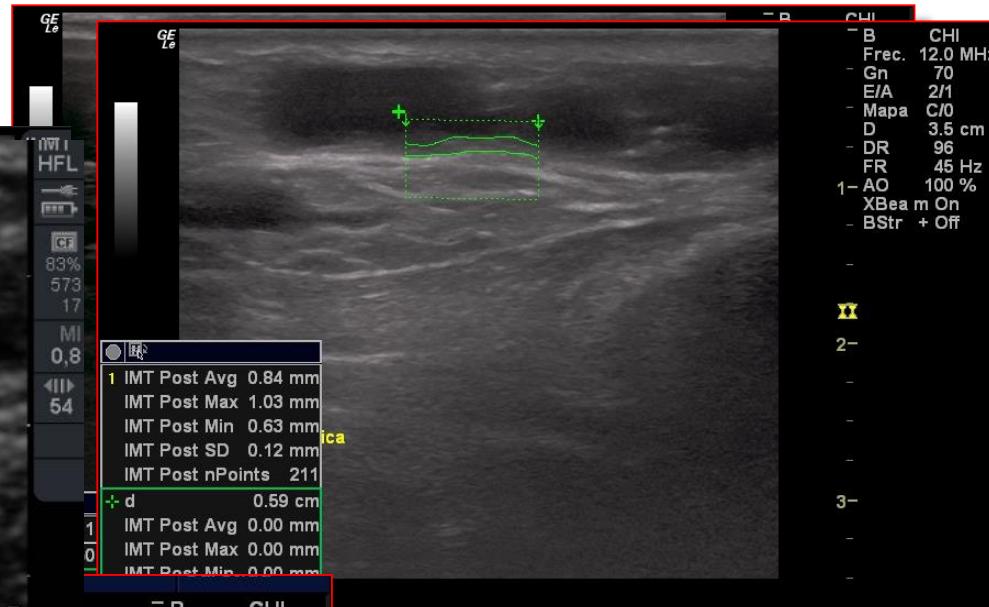
art humeral

IMT 1 Media 0,472mm Máx. 0,555mm Anch 5,0mm

Ocular Mover Anch Editar... Eliminar Guard.



GE
Le
IMT HFL
GE
83%
573
17
MI
0,8
III
54
1
0
1 IMT Post Avg 0.84 mm
IMT Post Max 1.03 mm
IMT Post Min 0.63 mm
IMT Post SD 0.12 mm
IMT Post nPoints 211
+d 0.59 cm
IMT Post Avg 0.00 mm
IMT Post Max 0.00 mm
IMT Post Min 0.00 mm



B CHI
Freq. 12.0 MHz
Gn 50
E/A 2/1
Mapa C/0
Res MB

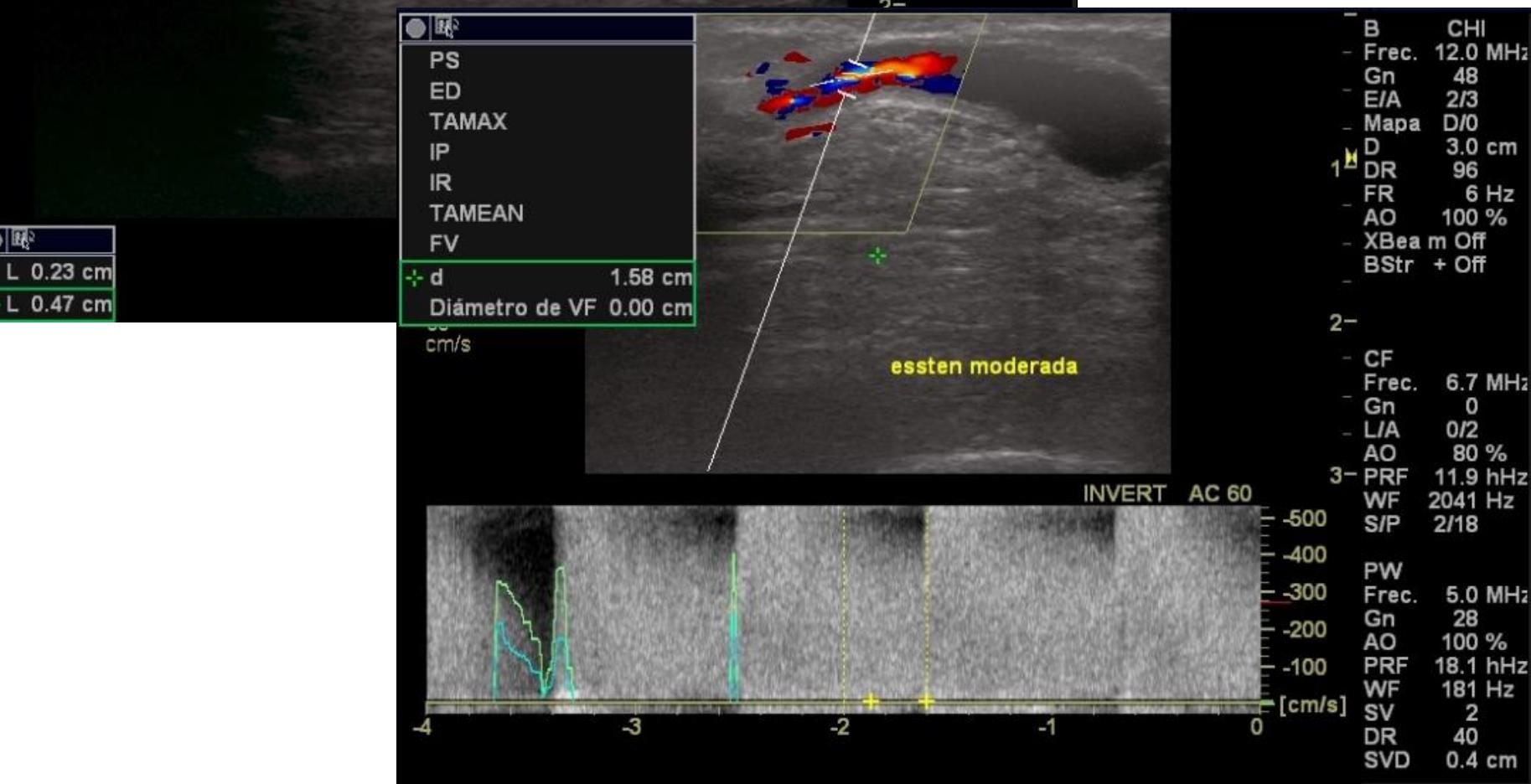
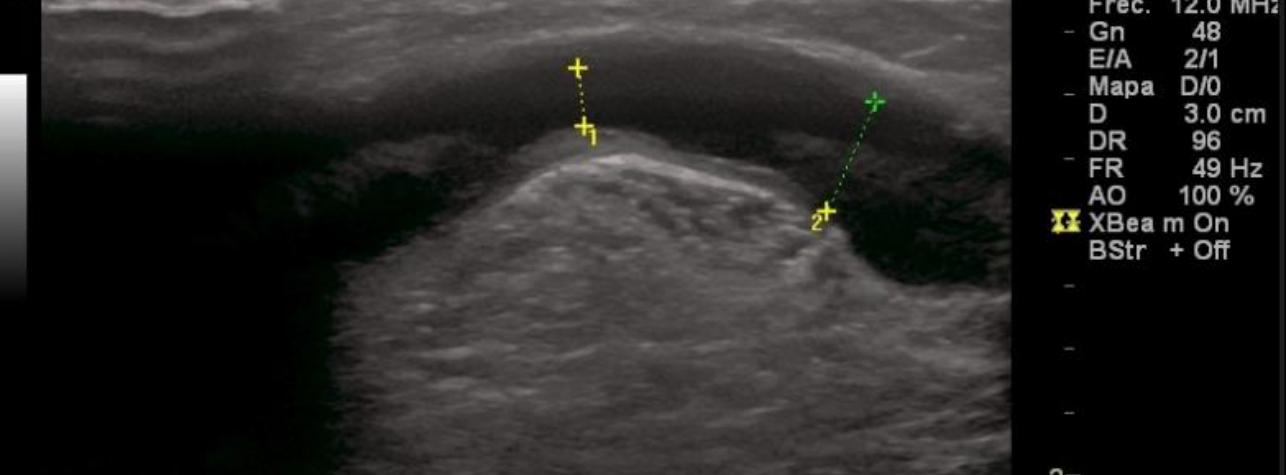
-L
-F
-A
-E

IMT der.
Anter P
Anter D
Later P
Later D
PosterP
PosterD
IMT 1
IMT 2
Placa
Placa 1
Placa 2
Sig...
Izq...

Media 0,498 mm
Máx. 0,745 mm
Anch 14,7 mm



IMT 1 Media 0,498mm Máx. 0,745mm Anch 14,7mm
X Eliminar



Predictive model?

Ibeas J, Vidal M, Vallespin J, Amengual MJ et al.

VASCULAR ACCESS STENOSIS: FROM BIOMARKERS TO HISTOLOGY.

COULD BE THE INTIMA MEDIA THICKNESS SURVEILLANCE WITH ULTRASOUND A NEW PREDICTOR?

8th Meeting of the American Society of Diagnostic and Interventional Nephrology. New Orleans, Feb 2012

Ibeas J, Vidal M, Vallespin J, Amengual MJ et al.

VASCULAR ACCESS STENOSIS: INTIMA MEDIA THICKNESS ULTRASOUND SURVEILLANCE.

FROM BASICS TO A RISK PREDICTOR?

ERA-EDTA 50th Congress – Istanbul, May 18-21, 2013

Dialysis
Inflammation
Atherosclerosis

Intima hyperplasia
vein - pre surgical

Intima
ultrasound

Inflammation

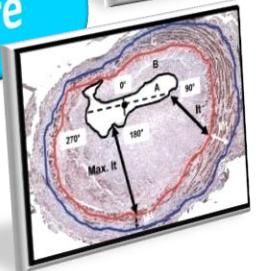
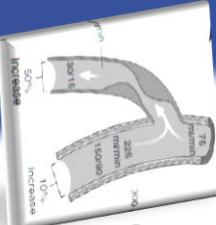
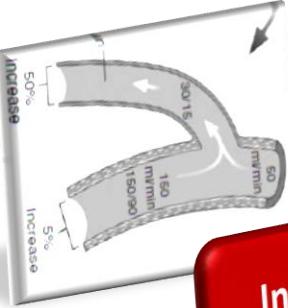
Intima hyperplasia
arteria - pre surgical

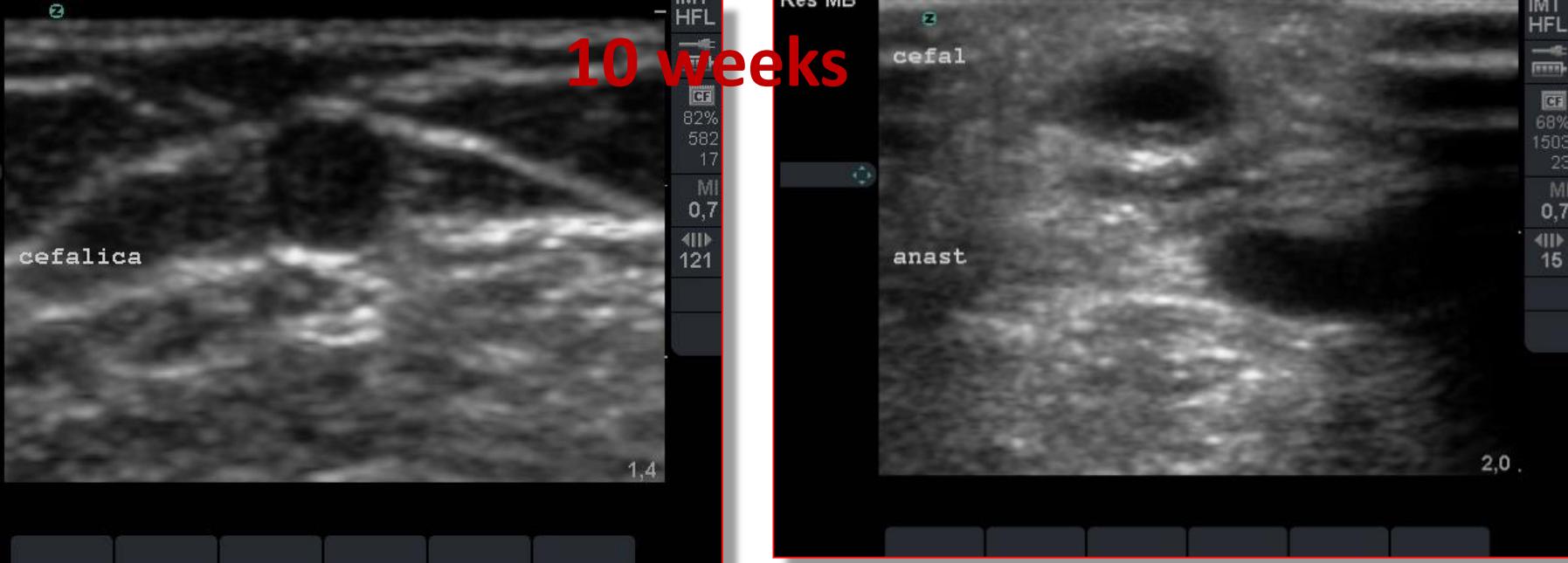
hyperplasia
measurement

Intima hyperplasia
Ultrasound measurement

Stenosis AVF

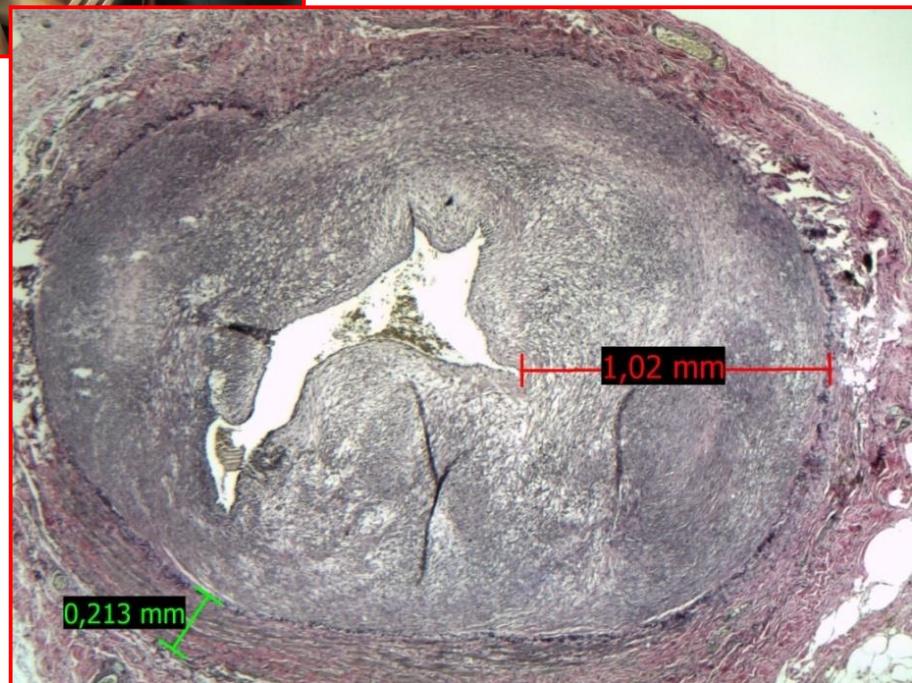
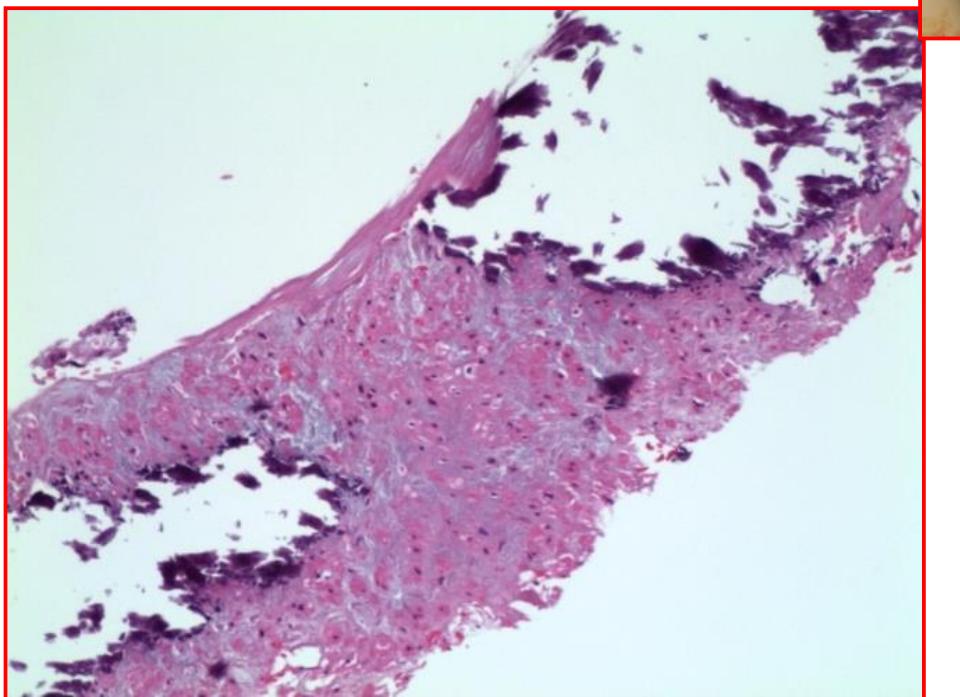
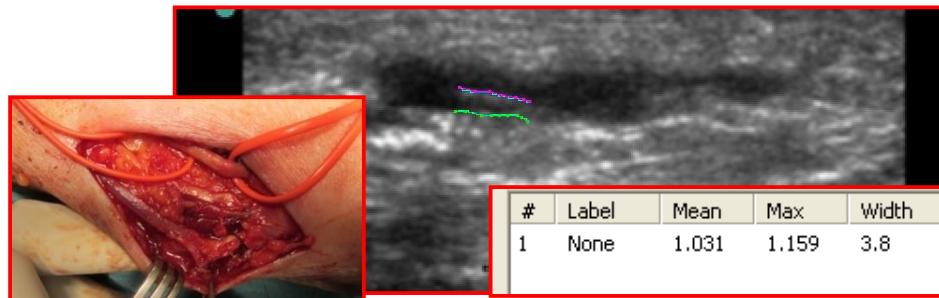
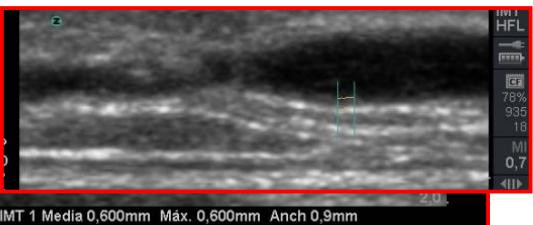
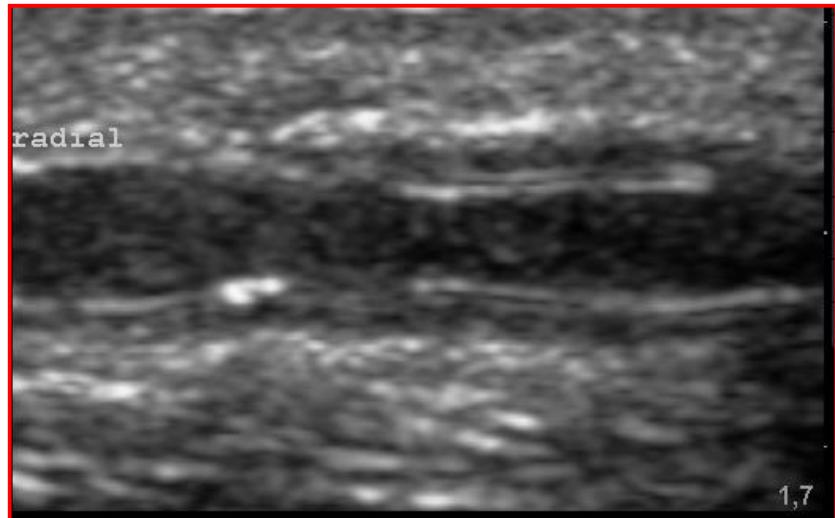
Early
Fistula
Failure





10 weeks

Artery



Vein

New concept of US in VA

Not only flow screening like a 2nd Generation Method

- **Image control**
 - Stenosis
 - Masses and collections
 - ‘Confusing’ or ‘alternative’ collaterals
- **Hemodynamics**
 - Velocities
 - Flow
- **Treatment prioritization**
 - Flow criteria
 - Seriousness of stenosis: risk of thrombosis
 - Dangerous masses: pseudoaneurysms
- **Treatment orientation**
 - Interventional
 - Surgical
 - Conservative
- **US-guided puncture**
 - Deep AVF or difficult to puncture
 - Pathological AVF waiting for treatment
- **Further possibilities**
 - Intima-media hyperplasia control?

Protocolization



Mapping



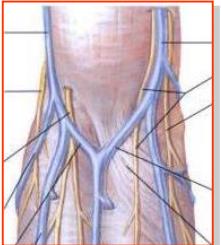
Surgery



Follow up



Screening



Alarms

Pre - HD

HD

Morphological

Functional

Prioritization

Treatment

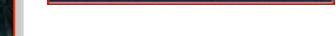
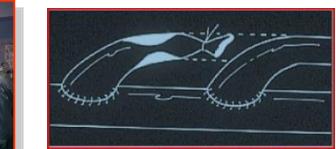
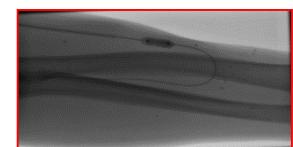
Confirmation



Diagnosis

Decision

TEXAS HOLD'EM									
TIPOS		LIMIT	NO LIMIT	POT LIMIT	202 PFLP	MANDATO	NOTE MEDIO	ESTADOS DE UNIDOS MEXICO	
MEGA	Table TH 07	Límite	0.00/0.20 EUR	5/S	0	60%	56	0.93	
	Table TH 08	Límite	0.00/0.20 EUR	5/S	0	60%	56	0.93	
	Table TH 09	Límite	0.00/0.20 EUR	5/S	0	63%	76	0.76	
	Table TH 10	Límite	0.00/0.20 EUR	5/S	0	63%	76	0.76	
	Table TH 11	Límite	0.00/0.20 EUR	5/S	0	63%	76	0.76	
	Table TH 12	Límite	0.00/0.20 EUR	5/S	0	63%	76	0.76	
	Table TH 13	Límite	0.00/0.20 EUR	5/S	0	63%	76	0.76	
	Table TH 14	Límite	0.00/0.20 EUR	10/10	2	26%	52	1.61	
	Table TH 15	Límite	0.00/0.20 EUR	10/10	2	26%	52	1.61	
	Table TH 16	Límite	0.00/0.20 EUR	10/10	2	26%	52	1.61	
	Table TH 17	Límite	0.00/0.20 EUR	10/10	2	30%	52	1.61	
	Table TH 18	Límite	0.00/0.20 EUR	10/10	2	30%	52	1.61	
	Table TH 19	Límite	0.00/0.20 EUR	10/10	2	33%	48	1.56	
	Table TH 20	Límite	0.00/0.20 EUR	10/10	1	36%	56	2.95	
	Table TH 21	Límite	0.00/0.20 EUR	5/S	0	72%	88	2.45	
	Table TH 22	Límite	0.00/0.20 EUR	5/S	0	54%	72	1.27	
	Table TH 23	Límite	0.00/0.20 EUR	5/S	0	64%	104	2.44	
	Table TH 24	Límite	0.00/0.20 EUR	5/S	0	54%	94	1.53	
	Table TH 25	Límite	0.00/0.20 EUR	5/S	0	72%	98	1.23	
	Table TH 26	Límite	0.00/0.20 EUR	5/S	0	60%	92	3.54	

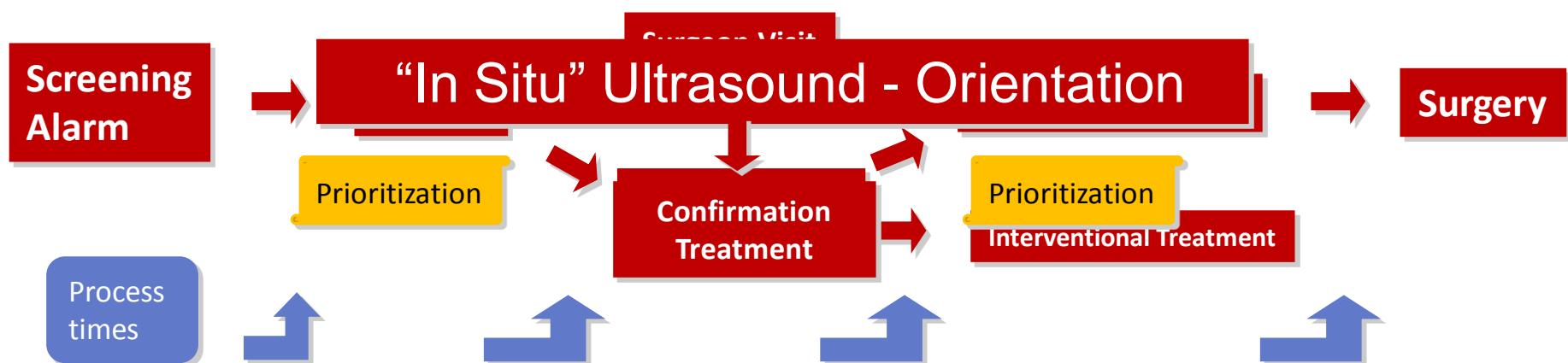


The Process Management: Optimization?

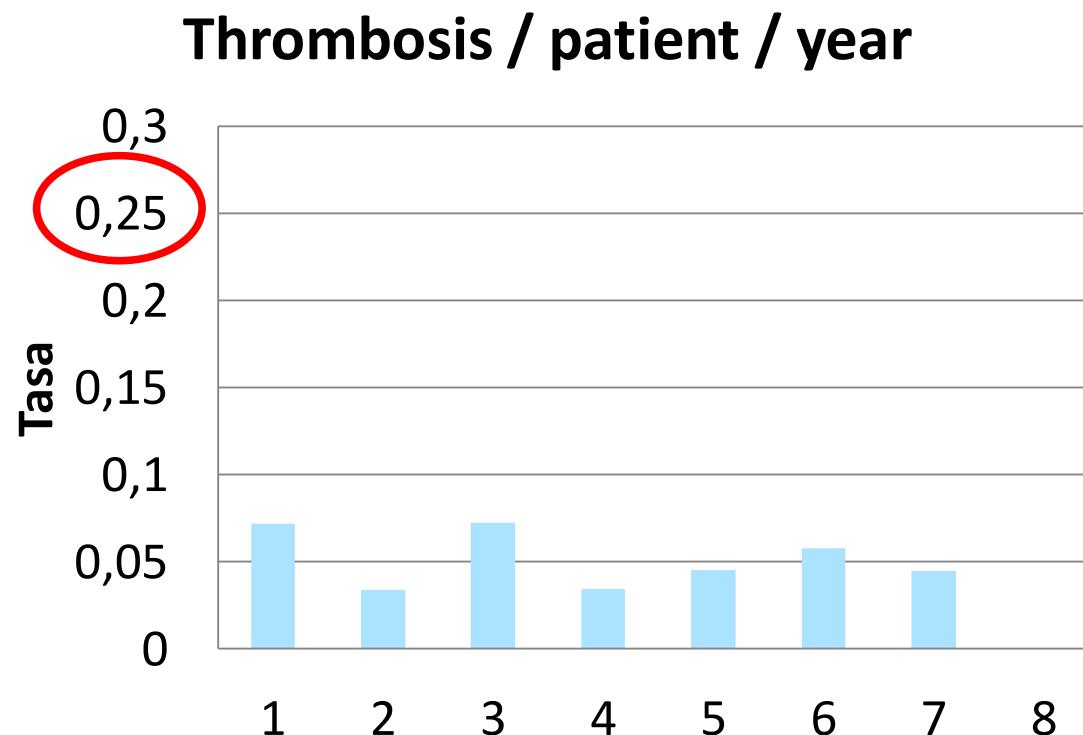
Vascular Access Creation



Vascular Access Follow Up

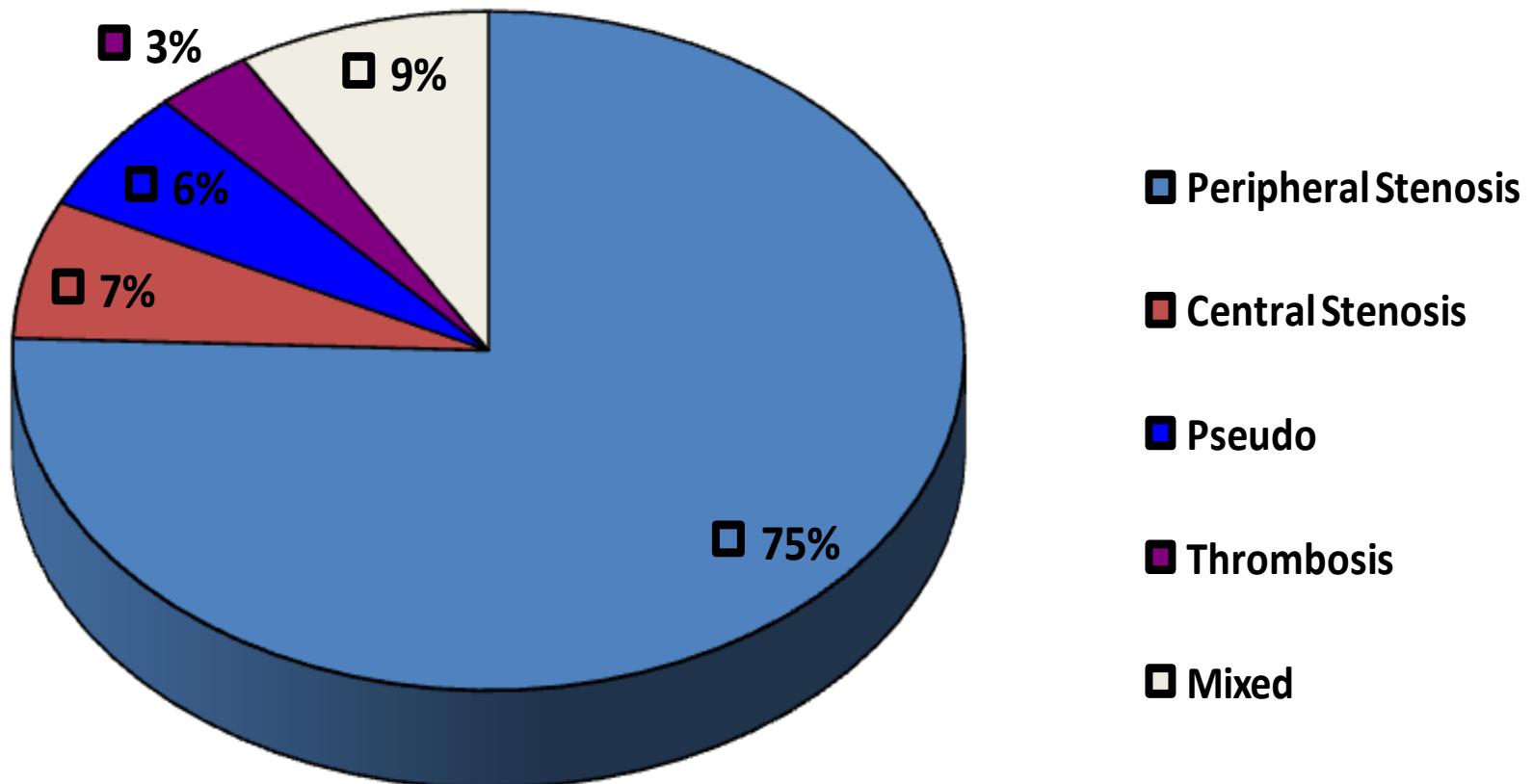


- Primary Assisted Patency: 1, 2 and 3 years: 74, 70 and 67 %
- Maturation failure: 20%
 - Immediate failure: 12%



Low level alarm

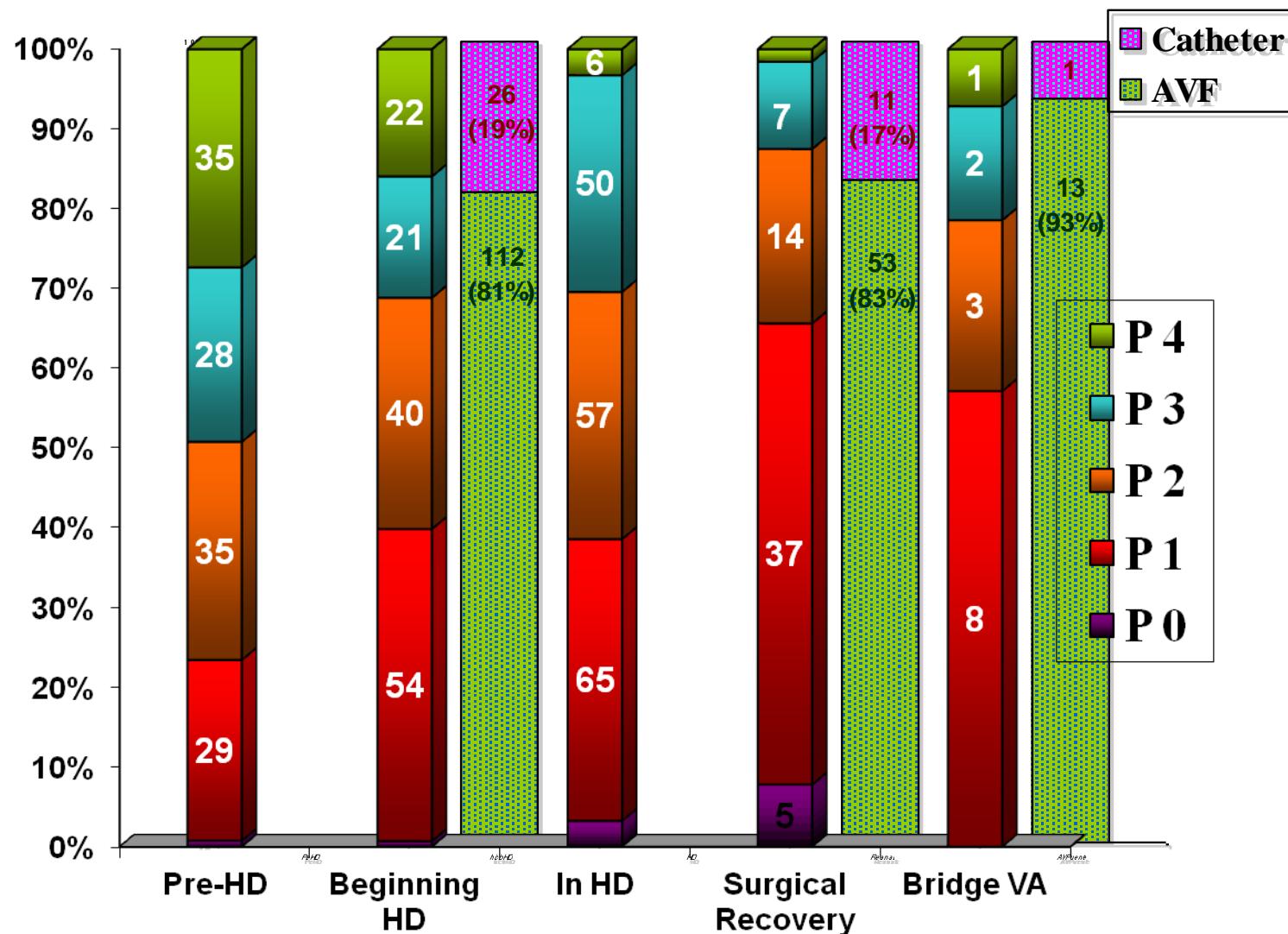
HIDDEN PATHOLOGY IN 76%

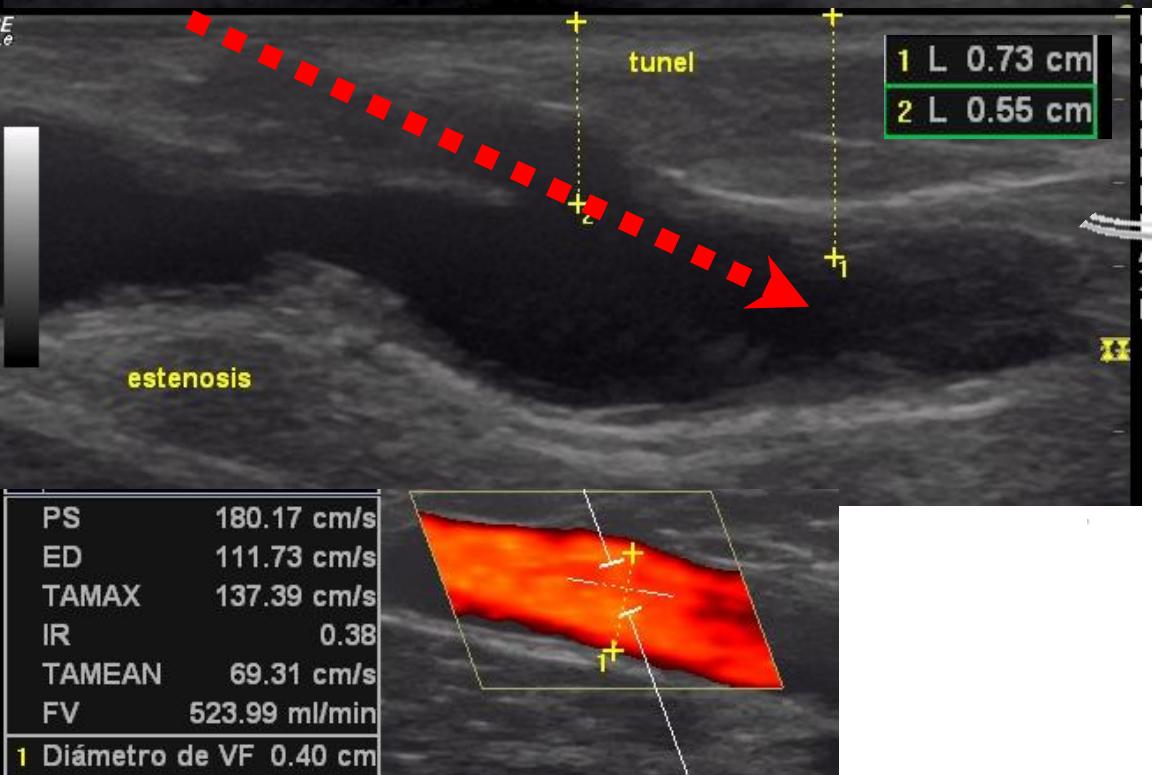
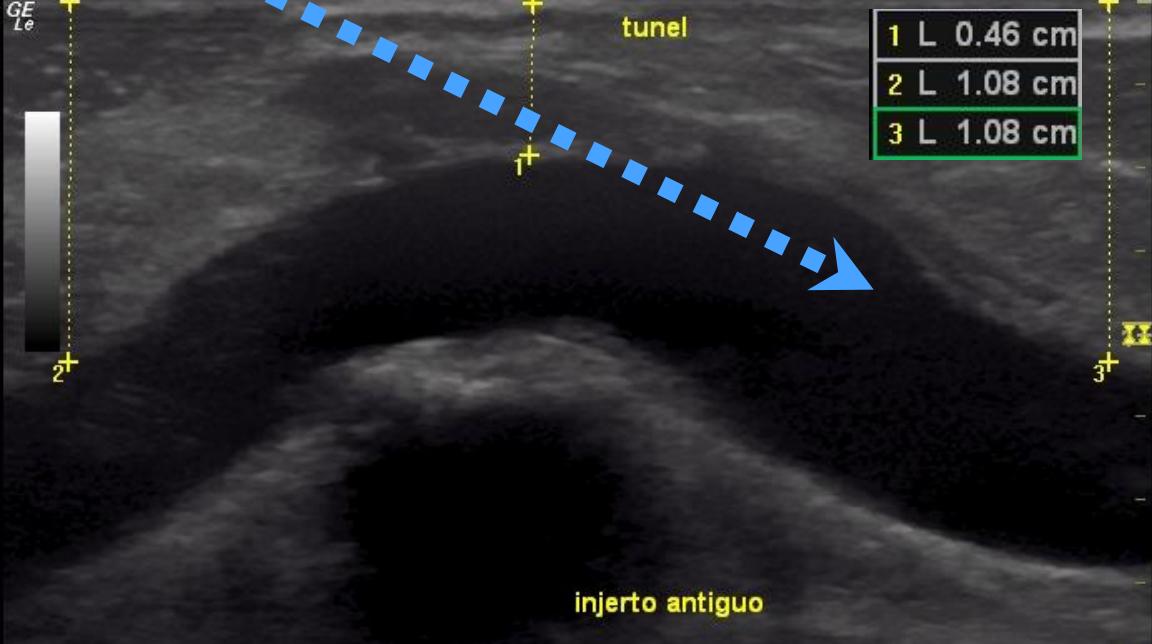


Reduction in waiting time for vascular access surgery following an computerized algorithm of clinical priorities gets 80% of starting hemodialysis by native fistula and 80% of fistula reparations on patients in hemodialysis without requirement of catheter.

XLVIII ERA-EDTA Congress. Praga, June 2011

Priorities Distribution





Conclusions

- Doppler Ultrasound not only became a 2nd generation method because of the flow measurement, but in combination with the image it also gives decision-making ability in:
 - Mapping
 - Early diagnosis
 - Treatment
 - Prioritization
 - US-guided puncture
- It can reduce morbility in patients with high morbidity
- It should be part of the arsenal of Vascular Access Programs and learning how to use it should be included in training plans of the related specialties
- As the behavior of stenoses can vary depending on multiple factors, including vascular remodeling and inflammation, then the balance between vascular dilation and the degree of thickening of the medial intima may determine the stenosis progression of vascular access and could be monitored with ultrasound
- More studies are needed to be able to transfer these new fields of interest into clinical practice

SAVE
THE DATE!



10th Congress of the Vascular Access Society

April 5–8, 2017 | Ljubljana, Slovenia

www.vas2017.org

