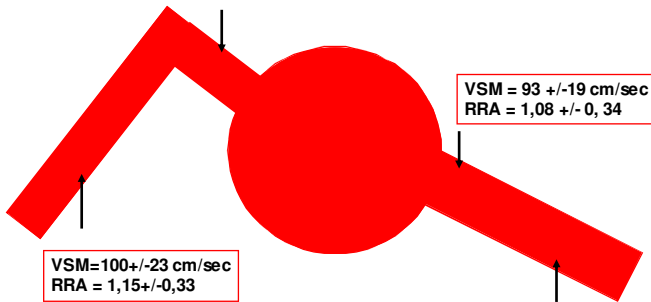


Echo Doppler des Artères Rénale
 Jean Pierre Laroche (Avignon, Montpellier)

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 UMI

Méthodologie, évaluation des paramètres hémodynamiques



VSM = 104 +/- 25 cm/sec
 RRA = 1,19 +/- 0,36

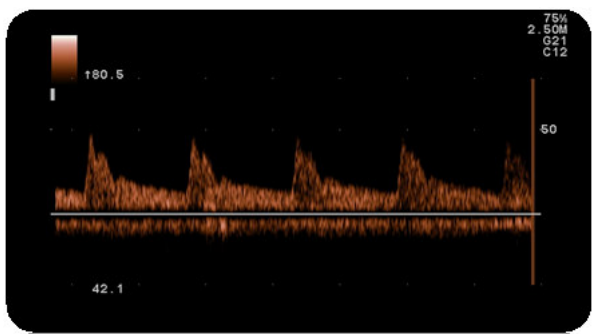
VSM = 93 +/- 19 cm/sec
 RRA = 1,08 +/- 0,34

VSM = 100 +/- 23 cm/sec
 RRA = 1,15 +/- 0,33

VSM = 88 +/- 19 cm/sec
 RRA = 1,02 +/- 0,32

Strandness D.E.Jr, Renal Arteries, 2001 (Lippincot Williams and Wilkins), Duplex Scanning in Vascular Disorders

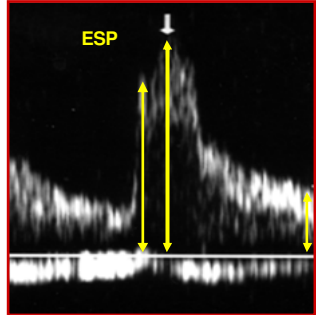
Artère Rénale : Profil d'écoulement



Proximité / Distalité = Profil conservé

Paramètres Quantifiables, Doppler Pulsé

- **Aorte :**
 - Diamètre AP,
 - VSM (Aorte Coeliaque)
- **Artères Rénales :**
 - VSM < 180 cm/sec
 - VD < 90 cm/sec
 - 0,50 < IR < 0,75
 - RRA < 3,3
- **Perfusion Rénale :**
 - 0,50 < IR < 0,75
 - TAS < 70 msec



Correction Angle, Volume de mesure
 Valeurs Normales : Sténose < 60%

Echo Doppler des Artères Rénales Critères AHA

- **Détection sténose > 60% en réduction de diamètre, correction d'angle < 60°**
- **Signes directs :**
 - VSM > 180 cm/sec
 - RRA > 3,5
- **Signes indirects :**
 - Temps d'Ascension Systolique (TAS) > 70 msec
 - Différence IR (/côté sain) > 0,15

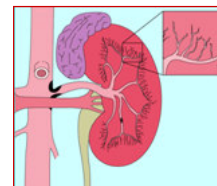
J Vasc Interv Radiol 2003;14 : S477-S492



Critères de sténose (> 60%, réduction de diamètre)

- **Signes directs (AR)**
 1. **Mode B** : calcifications, dysplasie fibro musculaire, atteinte inflammatoire.
 2. **Couleur** : aliasing, artéfact péri vasculaire
 3. **Pulsé** :
 - VSM > 180 cm/sec,
 - VD > 90 cm/sec
- **Signes indirects (Rein)**
 1. **Mode B** : petit rein
 2. **Couleur** : RAS
 3. **Pulsé** :
 - diminution IR / côté opposé sain,
 - augmentation TAS / côté opposé pour sténoses > 75%.
 - Disparition ESP

Sténoses entre 60 et 75%, pas de signes indirects le plus souvent



Vascular Medicine

<http://vmj.sagepub.com>

Guidelines for noninvasive vascular laboratory testing: a report from the American Society of Echocardiography and the Society for Vascular Medicine and Biology
Marie Gerhard-Herman, Julius M Gardin, Michael Jaff, Emile Mohler, Mary Roman and Tasneem Z Naqvi
Vasc Med 2006; 11: 183
DOI: 10.1177/1358863x06070516

Table 6 Diagnostic criteria for significant renal artery stenosis.

Renal artery to aorta peak systolic velocity ratio is >3.5
PSV > 200 cm/s with evidence of poststenotic turbulence
EDV > 150 cm/s (>80% renal artery stenosis)
RI > 0.8 (used to predict response of blood pressure, renal function, to renal revascularization)
An occluded renal artery demonstrates no flow in the affected vessel

EDV, End-diastolic velocity; PSV, peak systolic velocity; RI, resistive index (1 - [EDV/maximum systolic velocity] × 100).


Vascular Med 2006



Valeur de l'IR

- **AR : 0,50 < IR < 0,75**
- **Intra Rénal : 0,50 < IR < 0,75**
- **IR augmente en cas d'artériolosclérose (néphroangioclérose) :**
 - Diabète
 - Insuffisance Rénale
 -
- **IR diminue (unilatérale) , en cas de sténose de l'AR > 75%**
- **IR diminue (bilatérale) : effets médicaments**
- **IR paramètre décisionnel dans la prise en charge des sténoses de l'AR.....**





European Heart Journal (2008) 29, 517–524
 doi:10.1093/eurheartj/ehm631

CLINICAL RESEARCH
Vascular medicine

Assessment of renal artery stenosis: side-by-side comparison of angiography and duplex ultrasound with pressure gradient measurements

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Table 4 Receiver-operating characteristic curves of different parameters compared with P_d/P_a ratio

	Optimal cut-off value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)	AUC
DS _{angio}	>65%	63 (49–75)	90 (78–96)	77	86	83	0.82 ± 0.072 (0.67–0.91)
MLD	<1.74 mm	63 (49–75)	94 (83–98)	91	83	85	0.81 ± 0.062 (0.67–0.91)
PSV	>318 cm/s	88 (76–95)	77 (63–87)	57	88	74	0.88 ± 0.040 (0.75–0.96)
EDV	>70 cm/s	88 (76–95)	77 (63–87)	62	92	79	0.85 ± 0.046 (0.71–0.94)
RAR	>3.74	75 (61–85)	97 (88–99)	92	89	89	0.94 ± 0.043 (0.83–0.99)

PPV, positive predictive value; NPV, negative predictive value; AUC, area under the curve; DS_{angio}, percentage stenosis derived from quantitative renal angiography; MLD, minimal luminal diameter; PSV, peak systolic velocity; EDV, end-diastolic velocity; RAR, renal-to-aortic ratio; values in brackets represent 95% confidence intervals.





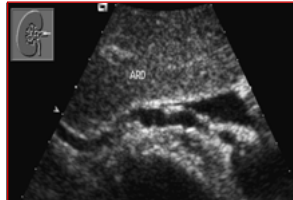
Table 5 Optimal cut-off values and confidence intervals (CI, fifth and 95th percentiles) for different parameters obtained by bootstrap procedure

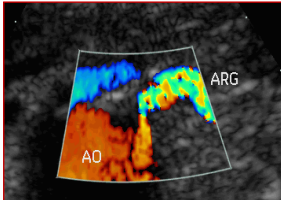
	Optimal cut-off value	CI
DS _{angio}	>61%	58–69
MLD	<1.74 mm	1.58–2.52
PSV	>320 cm/s	238–373
EDV	75.1 cm/s	54.4–113.0
RAR	3.80	2.98–4.10


DS_{angio}, percentage diameter stenosis derived from quantitative renal angiography; MLD, minimal luminal diameter; PSV, peak systolic velocity; EDV, end-diastolic velocity; RAR, renal-to-aortic ratio; CI, confidence interval.

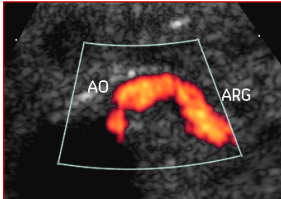



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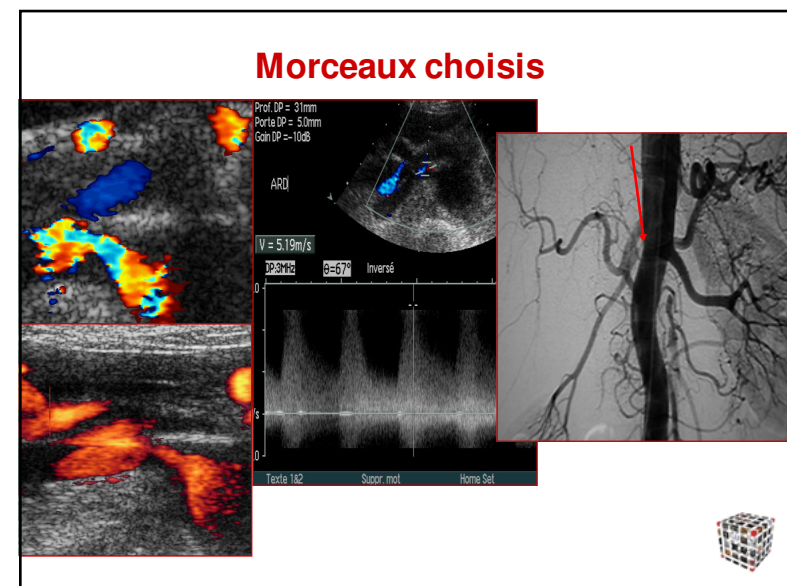
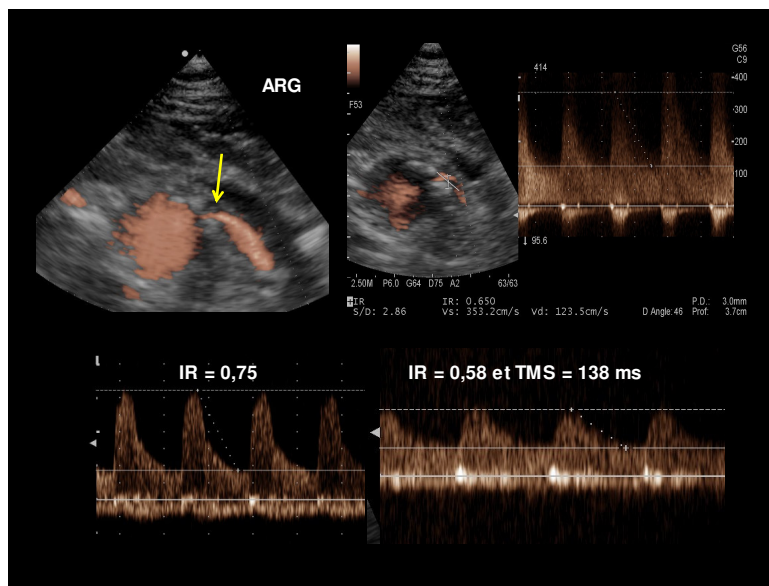
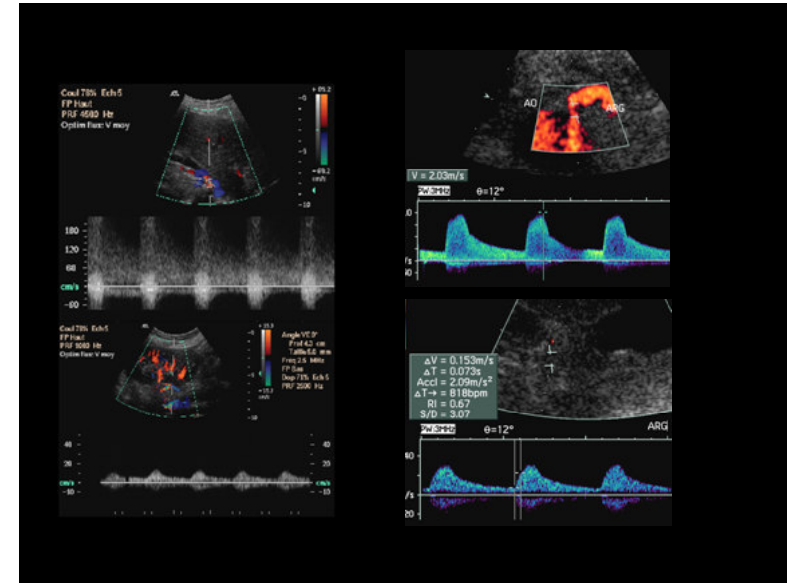
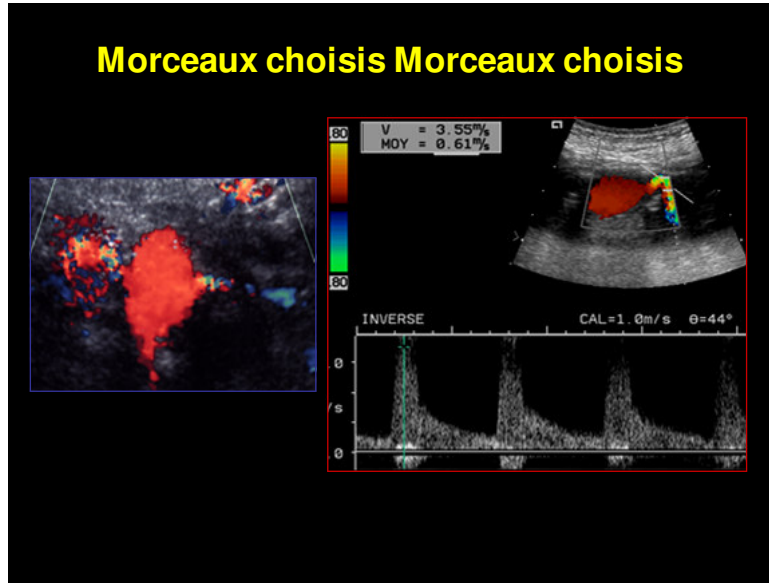




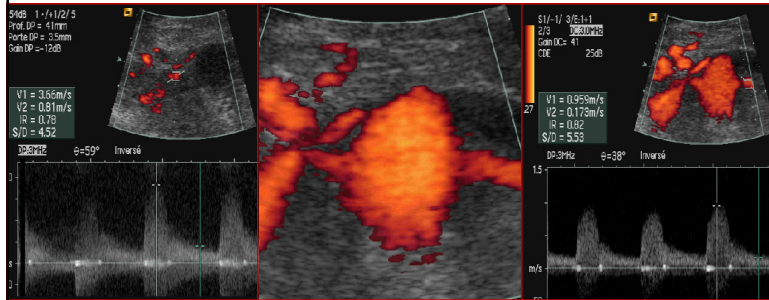




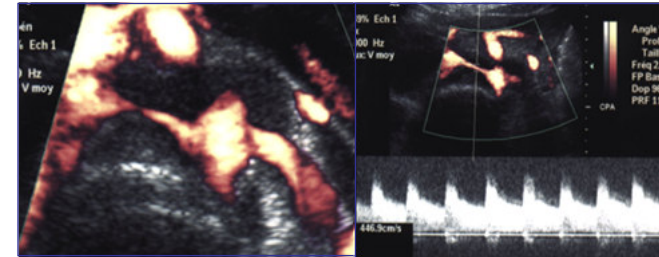




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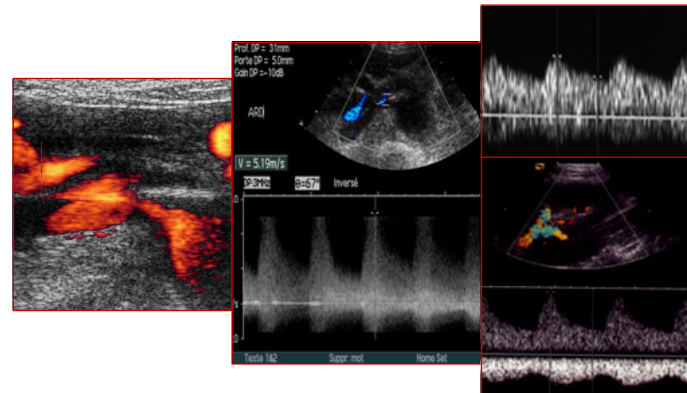
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Takayasu



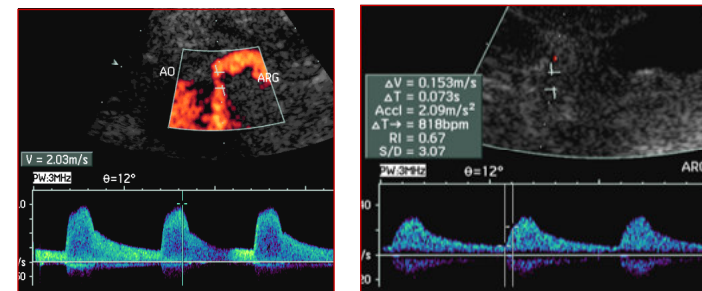
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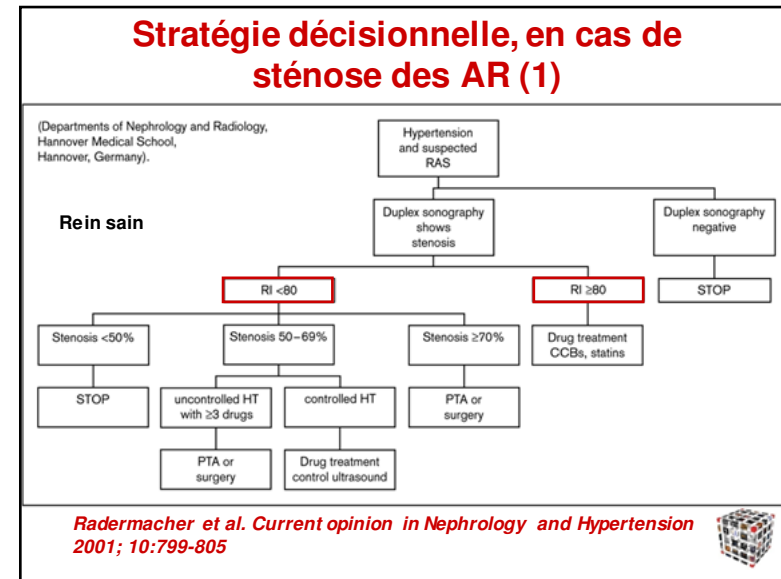
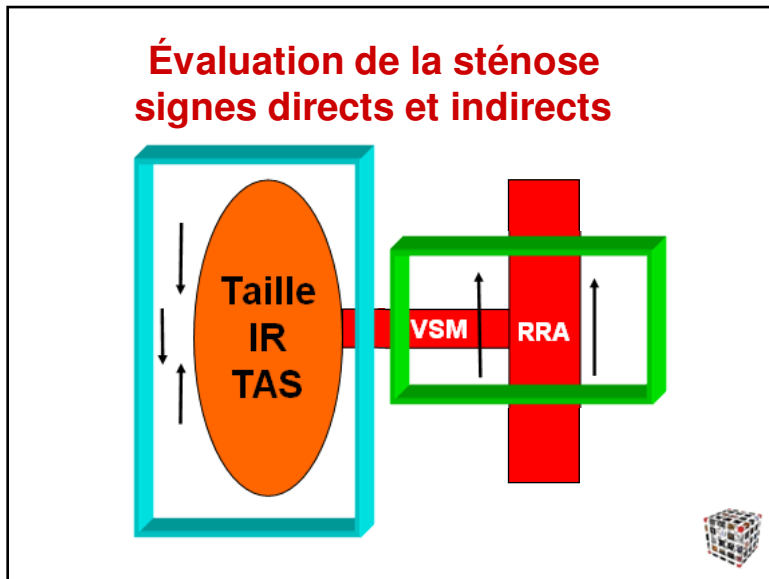
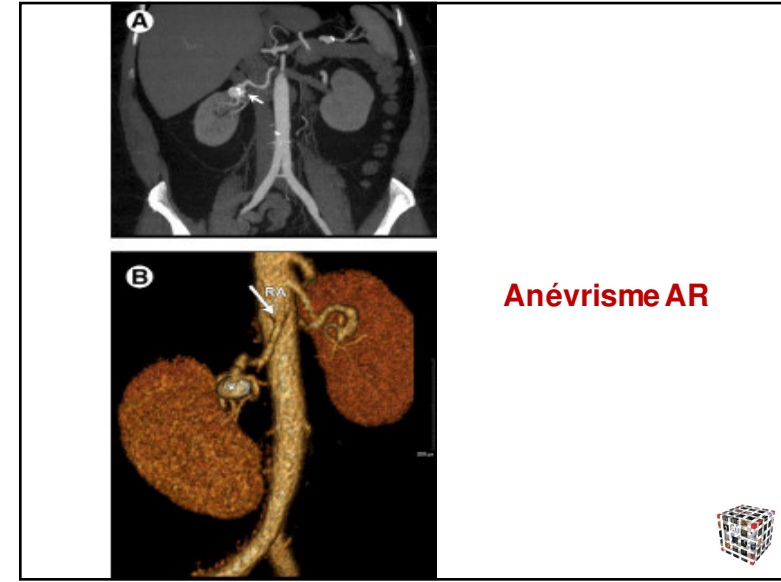
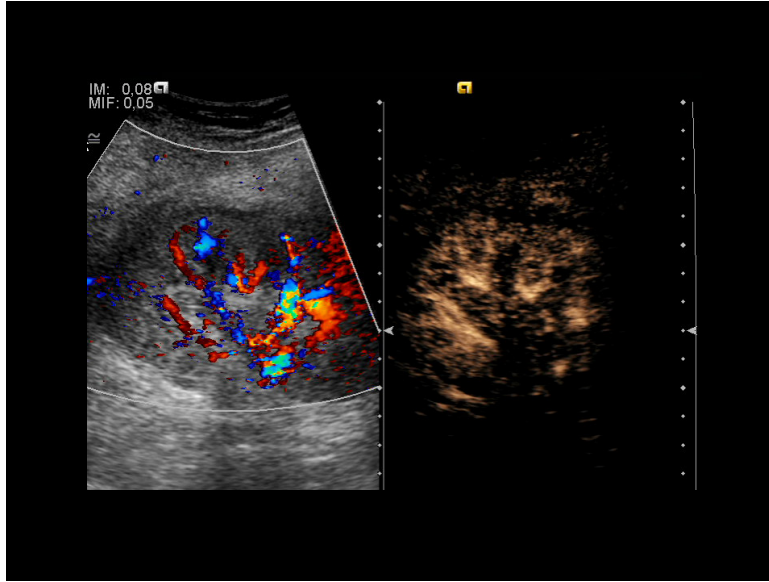


Sténose ARD, VSM = 519 cm / sec
Rein droit IR = 0,40, Rein gauche IR = 0,70

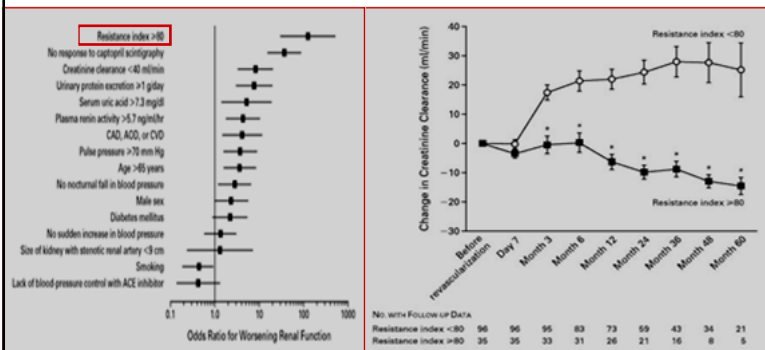


Morceaux choisis





Stratégie décisionnelle, en cas de sténose des AR (2)



N Engl J Med 2001;344:410-417. Use of Doppler Ultrasonography to Predict the Outcome of Therapy for Renal-Artery Stenosis, Jorg Radermacher et Coll



Stratégie décisionnelle, en cas de sténose des AR (3)

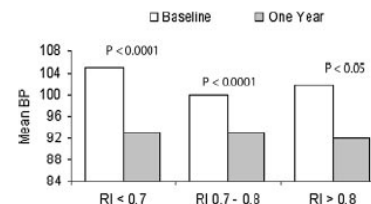


Figure 6. Bar graph of mean blood pressure in patients without nephrosclerosis (RI < 0.7), with mild nephrosclerosis (RI, 0.7 to 0.8), and with severe nephrosclerosis (RI > 0.8) comparing baseline and 1-year follow-up. There was significant improvement in the all groups despite elevation of the RI. Adapted from Zeller et al,⁴⁸ with permission.

White JC, *Circulation* 2006
 Zeller T, *Circulation* 2003



Stratégie décisionnelle, en cas de sténose des AR (3)

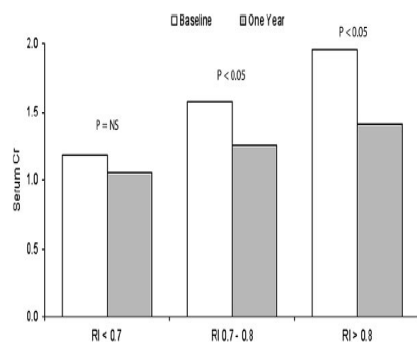


Figure 7. Bar graph of serum creatinine in patients without nephrosclerosis (RI < 0.7), mild nephrosclerosis (RI, 0.7 to 0.8), and severe nephrosclerosis (RI > 0.8) comparing baseline and 1-year follow-up. There was significant improvement in renal function in the moderate and severe elevation of RI groups. Data from Zeller et al,⁴⁸ with permission.

White JC, *Circulation* 2006
 Zeller T, *Circulation* 2003



Stratégie décisionnelle, en cas de sténose des AR (4)

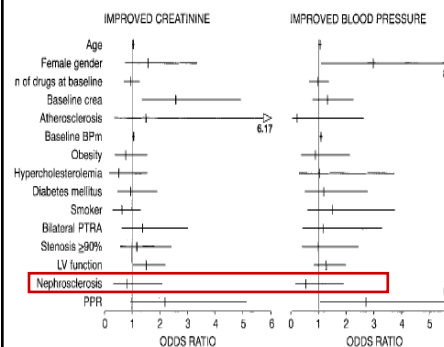


Figure 4. Predictors of improved serum creatinine concentration (left) or improved mean arterial blood pressure (right) by multivariate logistic regression analysis. Graphs show odds ratios and their 95% CIs. BPm indicates mean arterial blood pressure; crea, creatinine; PTRa, percutaneous transluminal renal angioplasty; LV, left ventricle function; and PPR, parenchymal/pelvic ratio.

Zeller T, *Circulation* 2003

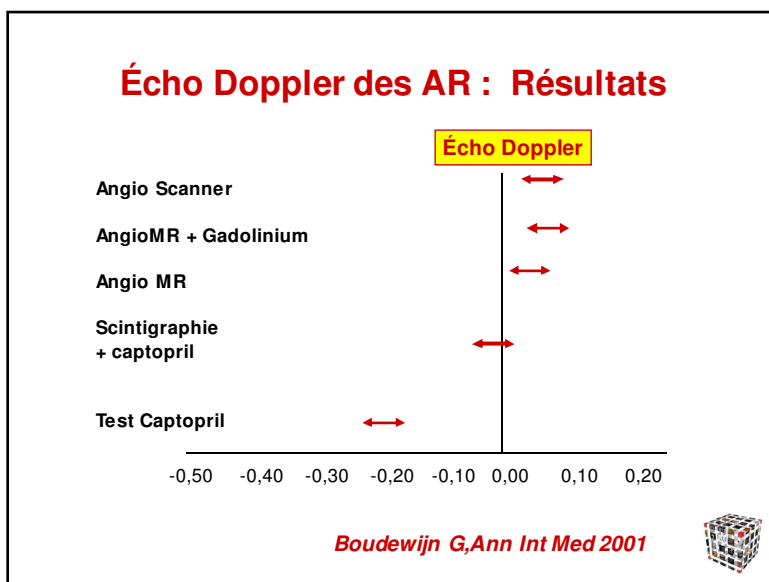
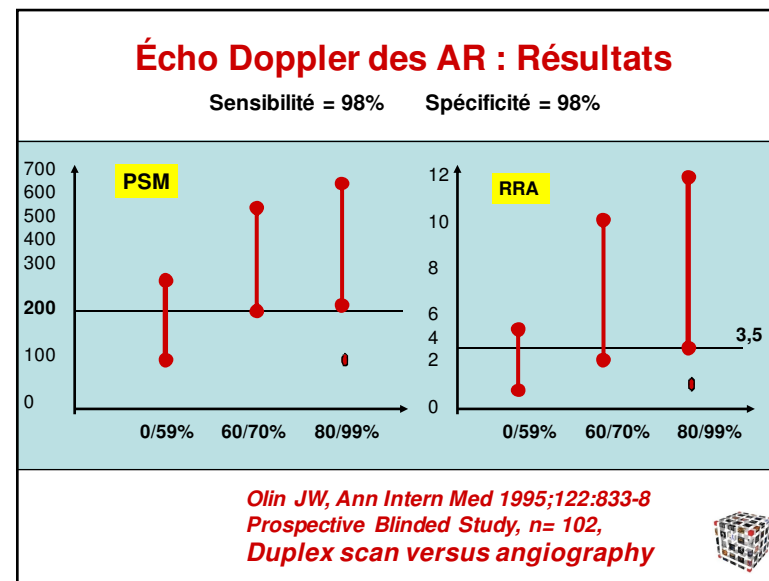


Echo Doppler des AR : Résultats

Tableau I. Performances du doppler comparées à l'angiographie pour le diagnostic de sténose artérielle rénale.

	Patients (nbre)	Échecs (%)	Degré de sténose (%)	Critères doppler (cm/s)	Sensibilité (%)	Spécificité (%)
<i>Critères proximaux</i>						
Kohler [10]	158	10	60	RAR	91	95
Hoffmann [13]	41	-	60	180	95	90
Karasch [15]	44	-	50	180	92	92
Olin [16]	102	-	60	200	98	98
Berland [17]	26	42	50	100	0	37
Desberg [18]	30	31	50	100	0	-
<i>Critères distaux intrarénaux</i>						
Stavros [19]	56	-	60	Perte PSP	95	97
				TA	78	94
				A	89	83
Halpern [22]	21	-	50	A	76	95
Schwerk [23]	72	-	50	ΔIR	82	92
				ΔIR	100	94
				TA	82	20
				TA	100	23
				A	71	48
				A	87	48
				50	57	67
				Perte PSP	66	67

N Grenier, Rev Méd Interne 2001, 22:540-59



Imagerie des sténoses des artères rénales

	Sensibilité	Spécificité	VPP	VPN
Angio Scanner	65%	92%	80%	90%
Angio MR	64%	85%	55%	90%

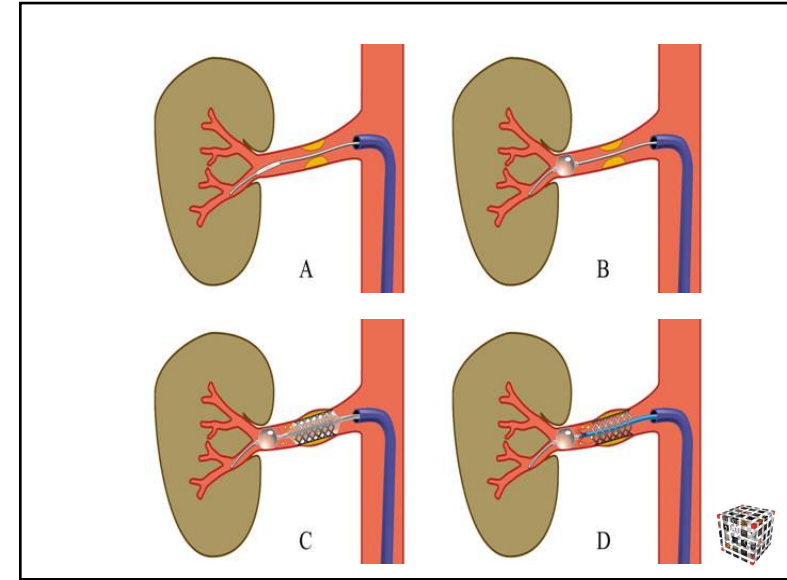
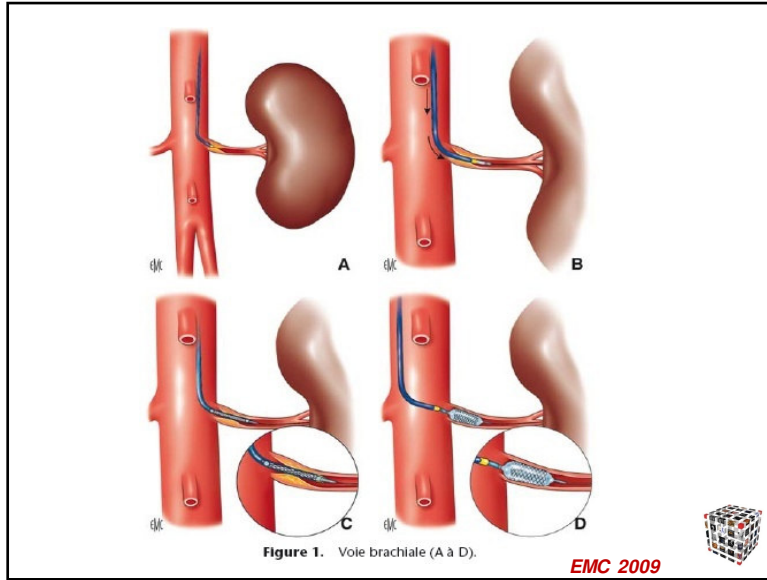
Référence : angiographie conventionnelle

Conclusion : l'Angio scanner et l'Angio MR ne sont pas assez reproductibles et sensibles pour éliminer une sténose de l'AR chez un hypertendu

Boudewijn C, Ann Intern Med 2004;141:674-682

Angio MR versus Angiographie :
 Sensibilité : 87%, Spécificité : 69%, VPN : 95%, VPP : 51%

Patel ST, J Vasc Surg 2005;41:462-468



Echo Doppler des Artères Rénales
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