

Reste-t-il une place à l'angioplastie des artères rénales?

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06 SAINT LAURENT DU VAR



- ✓ Kidney disease and renovascular disease promote Cardio Vascular Disease and hypertension.
- ✓ Increased risk of CVD in atherosclerotic RAS patients may result from activation of the RAAS and sympathetic nervous systems, decreased GFR, or concomitant atherosclerosis in other vascular beds.
- ✓ The prevalence of left ventricular hypertrophy with RAS is 79% vs. 46% in patients with essential hypertension, with a substantial impact on morbidity and mortality.
- ✓ However, in patients with atherosclerosis, RAS may induce an acute or subacute acceleration of a pre-existing essential hypertension including flash pulmonary oedema.
- ✓ After 2 years, 3, 18, and 55% of the kidneys had lost their function in the case of unilateral stenosis, bilateral stenosis, and contralateral occlusion, respectively.

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Revascularization versus Medical Therapy for Renal-Artery Stenosis

The ASTRAL Investigators*

ABSTRACT

BACKGROUND

Percutaneous revascularization of the renal arteries improves patency in atherosclerotic renovascular disease, yet evidence of a clinical benefit is limited.

METHODS

In a randomized, unblinded trial, we assigned 806 patients with atherosclerotic renovascular disease either to undergo revascularization in addition to receiving medical therapy or to receive medical therapy alone. The primary outcome was renal function, as measured by the reciprocal of the serum creatinine level (a measure that has a linear relationship with creatinine clearance). Secondary outcomes were blood pressure, the time to renal and major cardiovascular events, and mortality. The median follow-up was 34 months.

RESULTS

During a 5-year period, the rate of progression of renal impairment (as shown by the slope of the reciprocal of the serum creatinine level) was -0.07×10^{-3} liters per micromole per year in the revascularization group, as compared with -0.13×10^{-3} liters per micromole per year in the medical-therapy group, a difference favoring revascularization of 0.06×10^{-3} liters per micromole per year (95% confidence interval [CI], -0.002 to 0.13 ; $P=0.06$). Over the same time, the mean serum creatinine level was $1.6 \mu\text{mol}$ per liter (95% CI, -8.4 to 5.2 [0.02 mg per deciliter; 95% CI, -0.10 to 0.06]) lower in the revascularization group than in the medical-therapy group. There was no significant between-group difference in systolic blood pressure; the decrease in diastolic blood pressure was smaller in the revascularization group than in the medical-therapy group. The two study groups had similar rates of renal events (hazard ratio in the revascularization group, 0.97 ; 95% CI, 0.67 to 1.40 ; $P=0.88$), major cardiovascular events (hazard ratio, 0.94 ; 95% CI, 0.75 to 1.19 ; $P=0.61$), and death (hazard ratio, 0.90 ; 95% CI, 0.69 to 1.18 ; $P=0.46$). Serious complications associated with revascularization occurred in 23 patients, including 2 deaths and 3 amputations of toes or limbs.

CONCLUSIONS

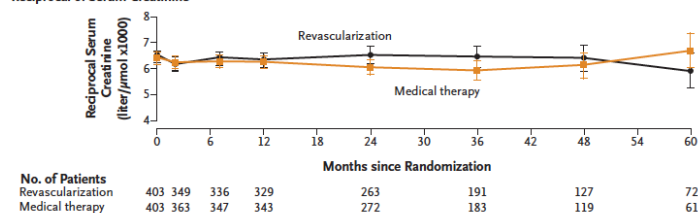
We found substantial risks but no evidence of a worthwhile clinical benefit from revascularization in patients with atherosclerotic renovascular disease.

N Engl J Med 2009;361:1953-62.

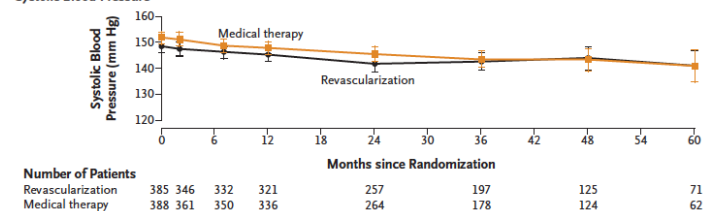
ASTRAL study 806 pts

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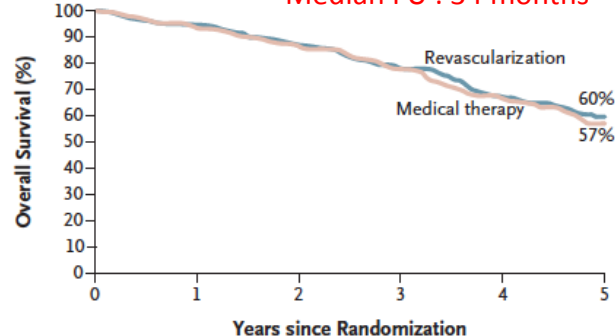
Reciprocal of Serum Creatinine



Systolic Blood Pressure



Median FU : 34 months



No. at Risk

Revascularization	403	337	257	178	109	46
Medical therapy	403	332	248	165	96	40

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Stenting and Medical Therapy* for Atherosclerotic Renal-Artery Stenosis

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BACKGROUND

Atherosclerotic renal-artery stenosis is a common problem in the elderly. Despite two randomized trials that did not show a benefit of renal-artery stenting with respect to kidney function, the usefulness of stenting for the prevention of major adverse renal and cardiovascular events is uncertain.

METHODS

We randomly assigned 947 participants who had atherosclerotic renal-artery stenosis and either systolic hypertension while taking two or more antihypertensive drugs or chronic kidney disease to medical therapy plus renal-artery stenting or medical therapy alone. Participants were followed for the occurrence of adverse cardiovascular and renal events (a composite end point of death from cardiovascular or renal causes, myocardial infarction, stroke, hospitalization for congestive heart failure, progressive renal insufficiency, or the need for renal-replacement therapy).

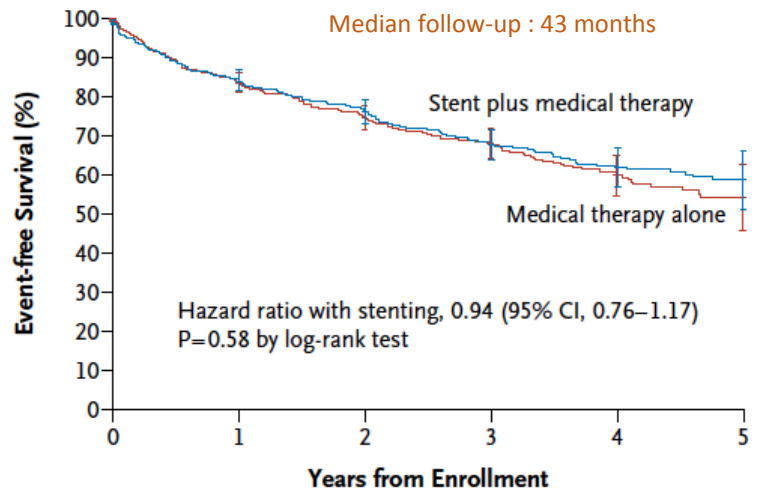
RESULTS

Over a median follow-up period of 43 months (interquartile range, 31 to 55), the rate of the primary composite end point did not differ significantly between participants who underwent stenting in addition to receiving medical therapy and those who received medical therapy alone (35.1% and 35.8%, respectively; hazard ratio with stenting, 0.94; 95% confidence interval [CI], 0.76 to 1.17; $P=0.58$). There were also no significant differences between the treatment groups in the rates of the individual components of the primary end point or in all-cause mortality. During follow-up, there was a consistent modest difference in systolic blood pressure favoring the stent group (-2.3 mm Hg; 95% CI, -4.4 to -0.2 ; $P=0.05$).

CORAL

From the University of Toledo, Toledo, OH (C.J.C.); Rhode Island Hospital (T.P.M., L.D.D.) and Alpert Medical School of Brown University (T.P.M., L.D.D.) — both in Providence; Harvard Clinical Research Institute (D.E.C., J.M.M., R.B.D.), Beth Israel Deaconess Medical Center (D.E.C.), Massachusetts General Hospital (M.R.J.), Brigham and Women's Hospital (E.F.L.), and Boston University School of Public Health (R.B.D.) — all in Boston; University of Michigan, Ann Arbor (K.J.); University of Texas Health Science Center, San Antonio (W.H.); National Heart, Lung and Blood Institute, Bethesda, MD (D.M.R.); Saint Luke's Mid America Heart Institute, University of Missouri-Kansas City School of Medicine, Kansas City (D.J.C.); University of Virginia, Charlottesville (A.H.M.); University of Minnesota, Minneapolis (M.S.); Weill Cornell Medical Center, New York (M.R.P.); Providence Sacred Heart Medical Center and University of Washington School of Medicine, Spokane (K.R.T.);

Kaplan–Meier Curves for the Primary Outcome.



No. at Risk

	0	1	2	3	4	5
Medical therapy alone	472	371	314	214	115	40
Stent plus medical therapy	459	362	318	224	131	59

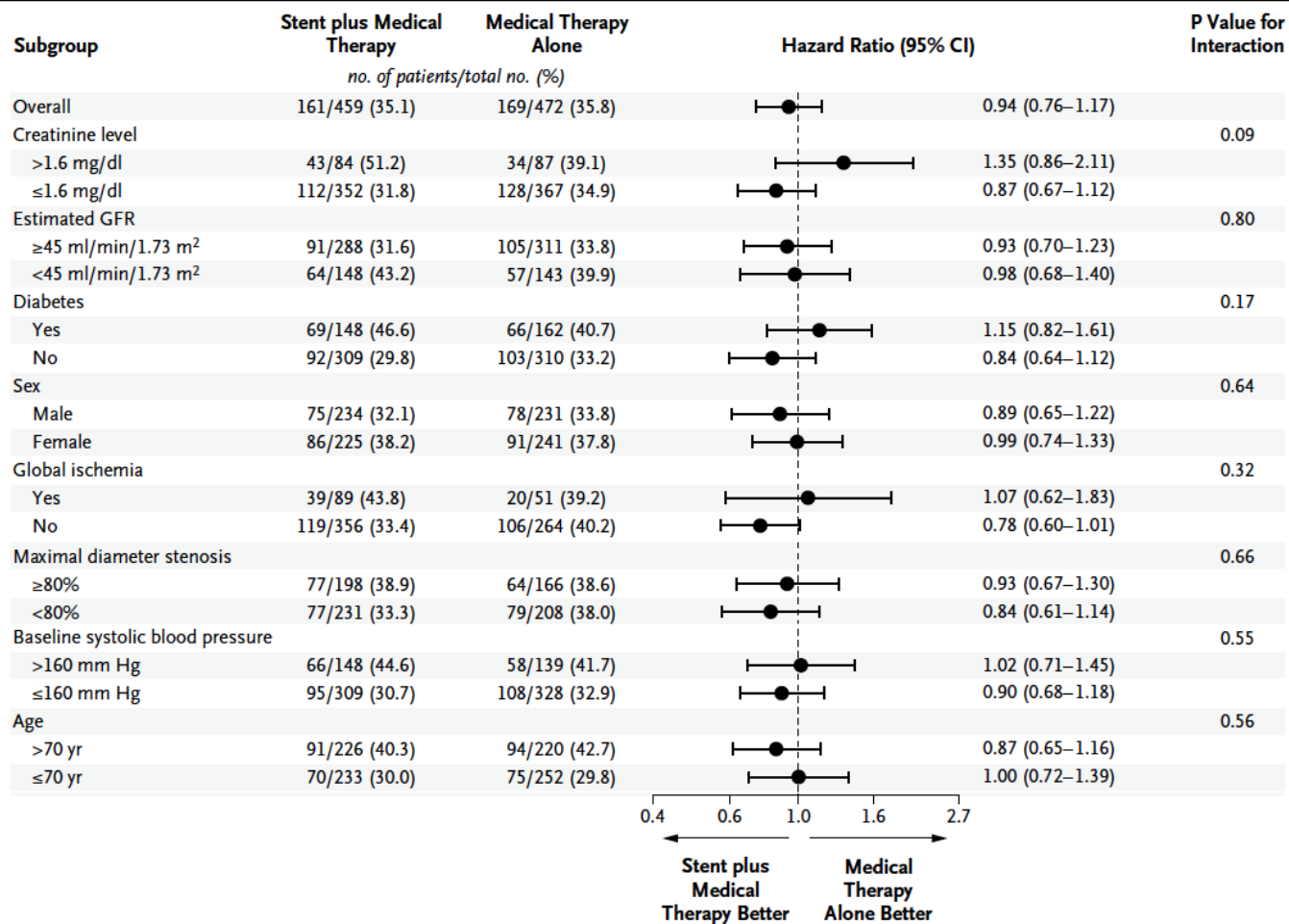
The CORAL study shows that, when added to a background of high-quality medical therapy, contemporary renal-artery stenting provides no incremental benefit.

*candesartan, hydrochlorothiazide and atorvastatin–amlodipine

CORAL study (*Cardiovascular Outcomes in Renal Atherosclerotic Lesions*) NEJM 2014

End Point	Stenting plus Medical Therapy (N = 459)	Medical Therapy Only (N = 472)	Hazard Ratio (95% CI)	P Value
	no. (%)			
Primary end point: death from cardiovascular or renal causes, stroke, myocardial infarction, hospitalization for congestive heart failure, progressive renal insufficiency, or permanent renal-replacement therapy	161 (35.1)	169 (35.8)	0.94 (0.76–1.17)	0.58
Components of primary end point				
Death from cardiovascular or renal causes	20 (4.4)	20 (4.2)		
Stroke	12 (2.6)	16 (3.4)		
Myocardial infarction	30 (6.5)	27 (5.7)		
Hospitalization for congestive heart failure	27 (5.9)	26 (5.5)		
Progressive renal insufficiency	68 (14.8)	77 (16.3)		
Permanent renal-replacement therapy	4 (0.9)	3 (0.6)		

The CORAL study shows that, when added to a background of high-quality medical therapy, contemporary renal-artery stenting provides no incremental benefit.



Recommendations for treatment strategies for renal artery disease

ESC 2017

Recommendations	Class	Level
Medical therapy		
ACEIs/ARBs are recommended for treatment of hypertension associated with unilateral RAS.	I	B
Calcium channel blockers, beta-blockers and diuretics are recommended for treatment of hypertension associated with renal artery disease.	I	C
ACEIs/ARBs may be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney, if well-tolerated and under close monitoring.	IIb	B

Routine revascularization is not recommended in RAS secondary to atherosclerosis.	III	A
In cases of hypertension and/or signs of renal impairment related to renal arterial fibromuscular dysplasia, balloon angioplasty with bailout stenting should be considered.	IIa	B
Balloon angioplasty, with or without stenting, may be considered in selected patients with RAS and unexplained recurrent congestive heart failure or sudden pulmonary oedema.	IIb	C

Ces recommandations réactionnaires sont-elles contestables ?

Chez les patients ayant une HTA affectés d'une lésion athéromateuse rénale jugée critique à l'œil, le stenting systématique n'apporte aucun bénéfice à moyen terme par rapport à un traitement médical optimal couplant ARA II, thiazidique et Amlodipine (en sus des AAP, d'une statine et des mesures hygiéno-diététiques), mais...

- *Beaucoup de patients screenés n'ont pas été retenus par l'équipe soignante, convaincue qu'ils ne devaient pas être privés d'une angioplastie...et notamment ceux ayant une HTA sévère réfractaire au traitement, ceux qui font des poussées d'insuffisance cardiaque ou qui détériorent rapidement leur fonction rénale...*
- *Le taux de complications de l'angioplastie est inacceptable dans ces études (5%!)*
- *Le bénéfice escompté n'est pas à moyen terme, mais à l'échelle de la vie du patient.*
- *Quid de la surveillance et que faire des lésions rénales qui s'aggravent ?*
- *Ces études ne concernent pas les HTA sur dysplasie du sujet jeune, susceptible de guérir après angioplastie...*
- *Les lésions générant une hypoperfusion réelle du parenchyme rénal démontrée par l'hémodynamique (FFR) pourraient tirer un bénéfice réel et rapide de l'angioplastie.*

Clinical situations raising suspicion for renal artery disease ESC 2017

Onset of hypertension before the age of 30 years

Onset of severe hypertension after the age of 55 years, when associated with CKD or heart failure

Hypertension and abdominal bruit

Rapid and persistent worsening of previously controlled hypertension

Resistant hypertension (i.e. other secondary form unlikely and target not achieved despite four drug classes including a diuretic and a mineralocorticoid-receptor antagonist in appropriate doses)

Hypertensive crisis (i.e. acute renal failure, acute heart failure, hypertensive encephalopathy, or grade 3–4 retinopathy)

New azotaemia or worsening of renal function after treatment with RAAS blockers

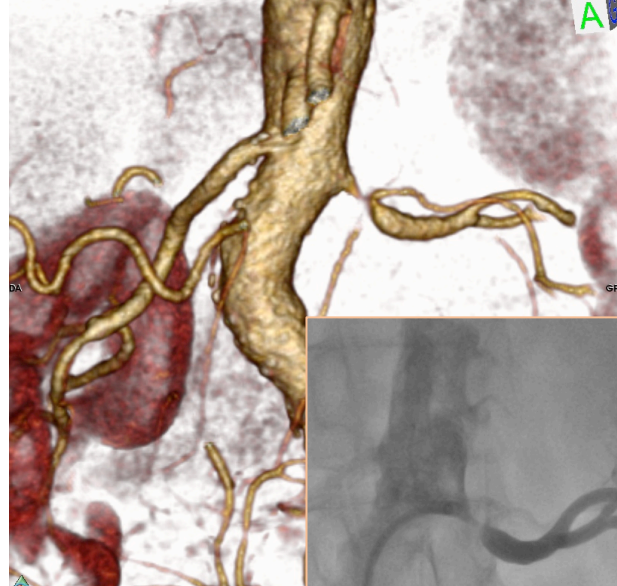
Unexplained atrophic kidney or discrepancy in kidney size, or unexplained renal failure

Flash pulmonary oedema



Recommendations for diagnostic strategies for renal artery disease

Recommendations	Class	Level
DUS (as first-line), CTA and MRA are recommended imaging modalities to establish a diagnosis of RAD.	I	B
DSA may be considered to confirm a diagnosis of RAD when clinical suspicion is high and the results of non-invasive examinations are inconclusive.	IIb	C
Renal scintigraphy, plasma renin measurements before and after ACEI provocation and vein renin measurements are not recommended for screening of atherosclerotic RAD.	III	C



AHA Scientific Statement

(*Circulation*. 2014;129:1048-1078.)

Fibromuscular Dysplasia: State of the Science and Critical Unanswered Questions

A Scientific Statement From the American Heart Association

Jeffrey W. Olin, DO, FAHA, Co-Chair; Heather L. Gornik, MD, MHS, FAHA, Co-Chair;

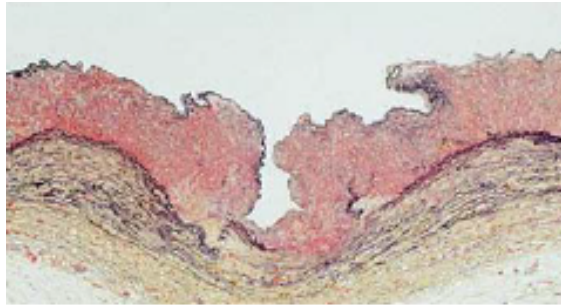
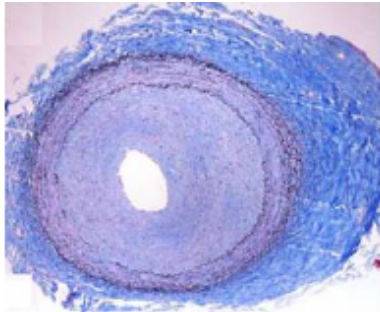
J. Michael Bacharach, MD, MPH; Jose Biller, MD, FAHA;

Lawrence J. Fine, MD, PhD, FAHA; Bruce H. Gray, DO; William A. Gray, MD;

Rishi Gupta, MD; Naomi M. Hamburg, MD, FAHA; Barry T. Katzen, MD, FAHA;

Robert A. Lookstein, MD; Alan B. Lumsden, MD; Jane W. Newburger, MD, MPH, FAHA;

Tatjana Rundek, MD, PhD; C. John Sperati, MD, MHS; James C. Stanley, MD; on behalf of the American Heart Association Council on Peripheral Vascular Disease, Council on Clinical Cardiology, Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation, Council on Cardiovascular Disease in the Young, Council on Cardiovascular Radiology and Intervention, Council on Epidemiology and Prevention, Council on Functional Genomics and Translational Biology, Council for High Blood Pressure Research, Council on the Kidney in Cardiovascular Disease, and Stroke Council



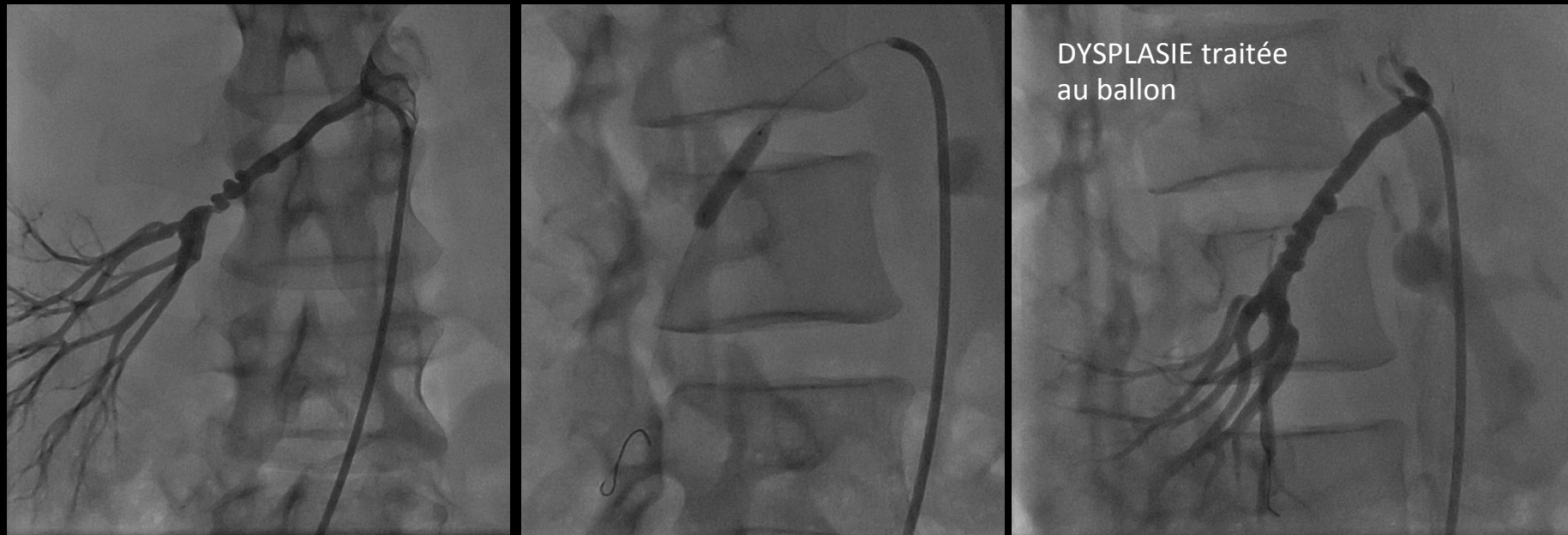
Indications for Renal Artery Revascularization

Revascularization by percutaneous transluminal angioplasty (PTA) or surgery should be considered in patients with renal artery FMD and the appropriate clinical presentation.

Indications for renal artery revascularization are as follows:

1. Resistant hypertension (failure to reach goal blood pressures in patients on an appropriate 3-drug regimen including a diuretic).¹⁸¹
2. Hypertension of short duration with the goal of a cure of hypertension.
3. Renal artery dissection; rarely is intervention needed, but if so, stenting is generally the procedure of choice.
4. Renal artery aneurysm(s); surgical resection, endovascular coiling, or placement of a covered stent is usually used.
5. Branch renal artery disease and hypertension; some lesions can be treated with PTA, but if this is not possible, surgical revascularization may be required, often with bench repair.
6. Preservation of renal function in the patient with severe stenosis, especially in the pediatric population with perimedial fibroplasia or intimal fibroplasia.^{190–193}

Mme Ben... MYRIAM 42 ans ; hypertension réfractaire sévère avec rétinopathie hypertensive et hypertrophie concentrique du myocarde à l'écho. Tension demeurant élevée (170/110 mm Hg) malgré une quadrithérapie (Ipersten/Coaprovel/Témérit). Dysplasie dépistée à l'écho Doppler, confirmée par scanner.



A 6 mois, TA : 125/80 sous bithérapie. Doppler normalisé.

A 1 an, normotendue sans traitement. Régression de l'HVG et de la rétinopathie.

Mme Bre... 29 ans.

HTA à 180/105 de découverte récente,
mal équilibrée sous IEC + calcibloqueur.
Souffle ombilical. Doppler (Vs : 6 m/s)
et scanner dépistant une dysplasie
rénale droite



stent Biotronik Dynamic
6 x 19 mm

A un an : TA 110/80 mm Hg
sans aucun traitement...

Translesional Pressure Gradients to Predict Blood Pressure Response After Renal Artery Stenting in Patients With Renovascular Hypertension

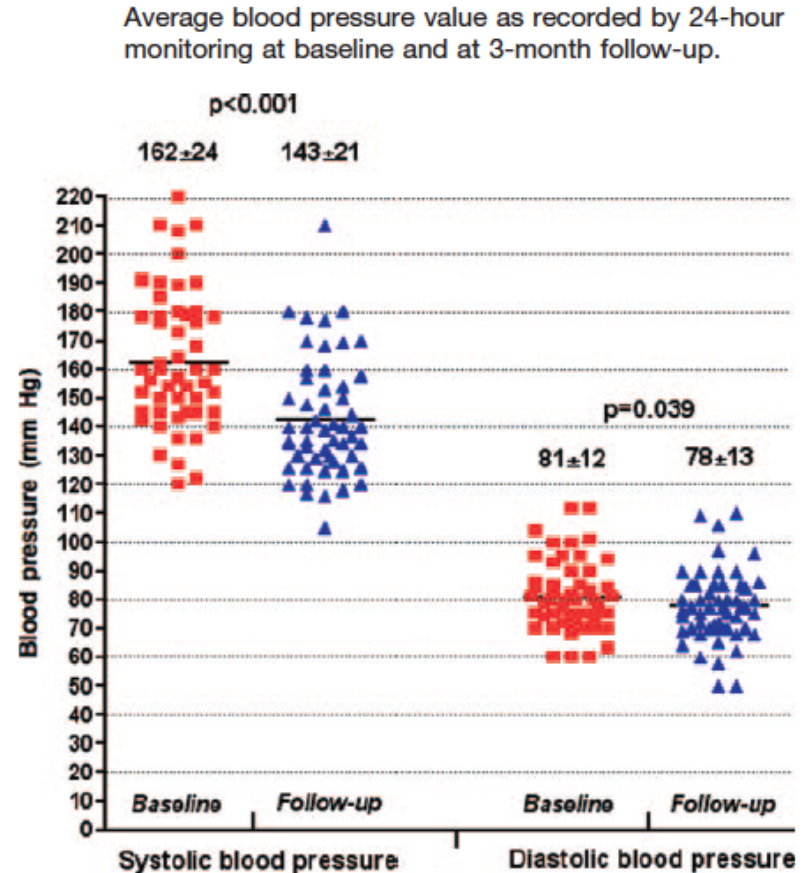
Fabio Mangiacapra, MD; Catalina Trana, MD; Giovanna Sarno, MD, PhD;
Giedrius Davidavicius, MD, PhD; Marcin Protasiewicz, MD; Olivier Muller, MD, PhD;
Argyrios Ntalianis, MD, PhD; Nerijus Misonis, MD; Bruno Van Vlem, MD, PhD;
Guy R. Heyndrickx, MD, PhD; Bernard De Bruyne, MD, PhD

Background—In previous studies on the effect of renal stenting on arterial hypertension, patients were selected mainly on the basis of angiographic parameters of the renal artery stenosis. The aim of the present study was to evaluate whether translesional pressure gradients could identify the patients with renal artery stenosis who might benefit from stenting.

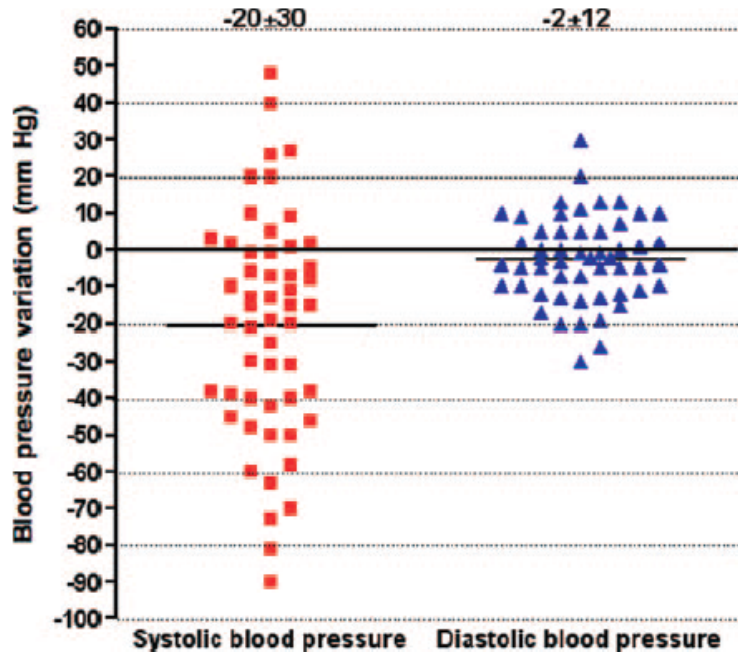
Methods and Results—A total of 53 consecutive hypertensive patients with unilateral RAS scheduled for renal artery intervention were recruited. Transstenotic pressure gradients were measured at baseline and during maximal hyperemia, before renal artery stenting. Twenty-four-hour ambulatory blood pressure measurements were performed in all patients before and 3 months after the intervention. Average reductions in systolic blood pressure and diastolic blood pressure at follow-up were -20 ± 30 mm Hg and -2 ± 12 mm Hg, respectively. At multivariate analysis, dopamine-induced mean gradient was the only independent predictor of the variations of both systolic blood pressure (regression coefficient = -4.03 , standard error = 1.11 ; $P < 0.001$) and diastolic blood pressure (regression coefficient = -3.11 , standard error = 1.20 ; $P = 0.009$). Patients who showed a decline in systolic blood pressure from the baseline value > 20 mm Hg were considered as “responders.” The optimal cutoff for identification of “responders” was a dopamine-induced mean gradient ≥ 20 mm Hg (area under the curve, 0.77 ; 95% confidence interval, 0.64 to 0.90 ; $P = 0.001$).

Conclusions—A dopamine-induced mean pressure gradient of ≥ 20 mm Hg is highly predictive of arterial hypertension improvement after renal stenting, and therefore this measurement is useful for appropriate selection of patients with arterial hypertension. (*Circ Cardiovasc Interv.* 2010;3:537-542.)

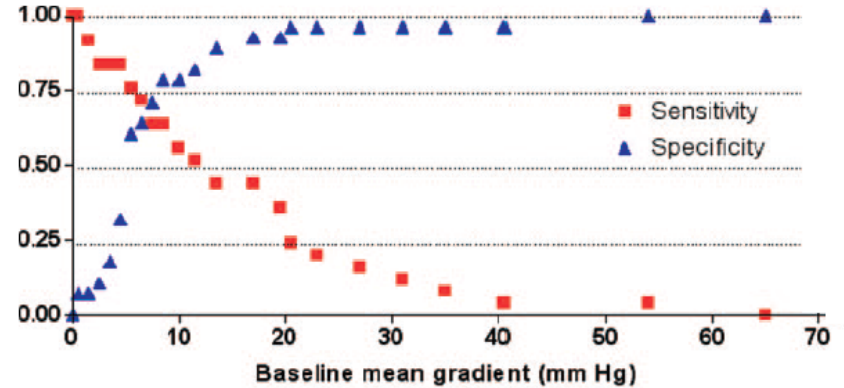
- ✓ Hypertension was diagnosed in the presence of SBP > 140 mm Hg and/or DBP > 90 mm Hg on at least 2 antihypertensive medications.
- ✓ 24 hour ambulatory blood pressure measurements were performed in all patients before and 3 months after the intervention.



Responders versus Nonresponders



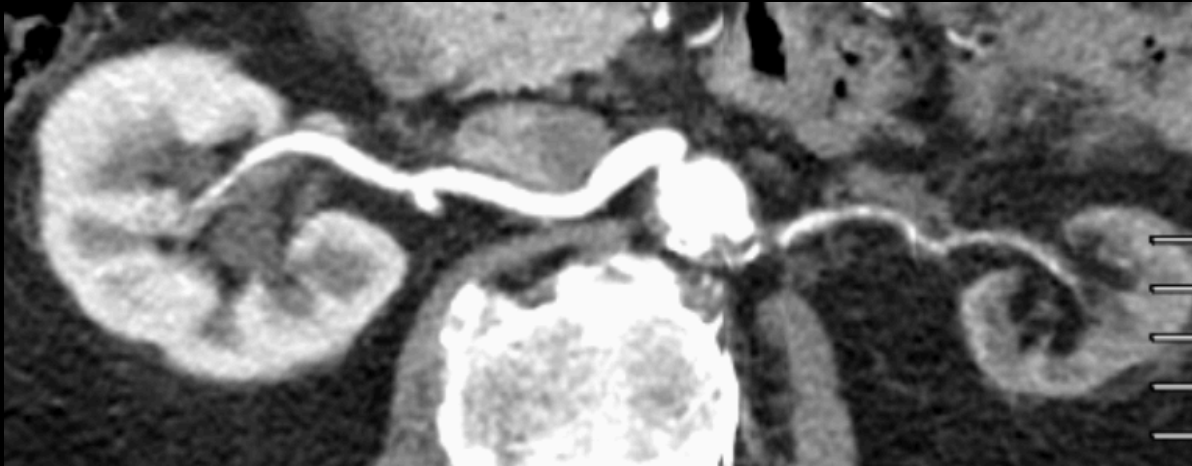
Systolic and diastolic blood pressure changes as recorded by a 24-hour arterial blood pressure monitoring during the follow-up

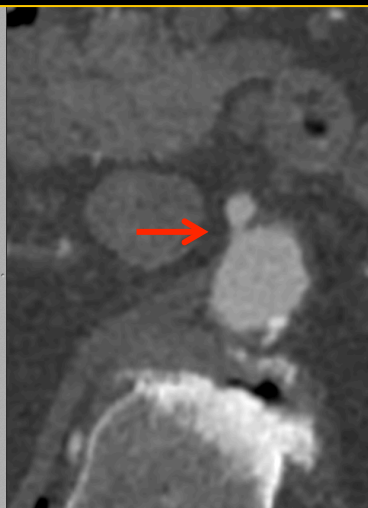
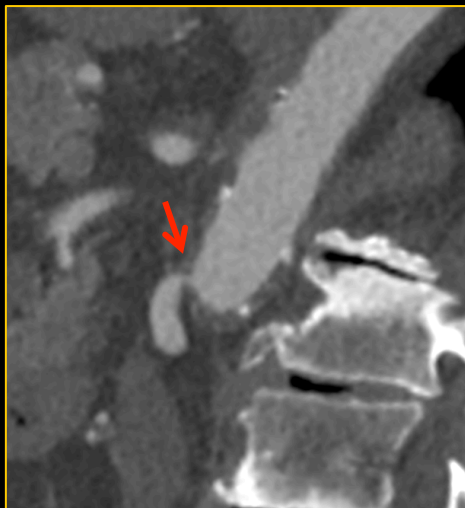
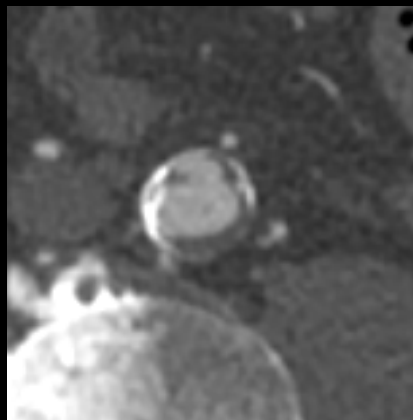
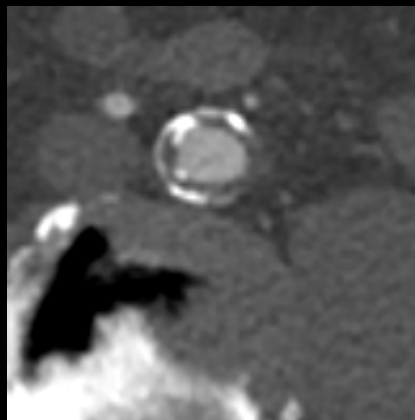
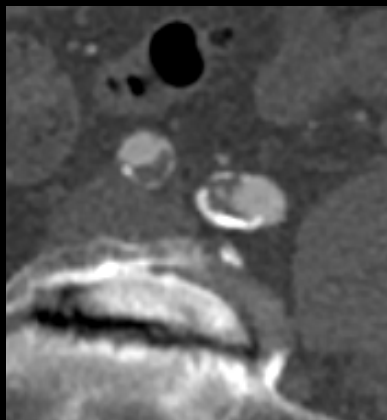


In conclusion, these data suggest that renal stenting is an effective means of treating hypertension in patients with unilateral RAS selected on the basis of renal artery hemodynamics. a dopamine-induced mean pressure gradient of 20 mm Hg is highly predictive of a marked improvement of the arterial hypertension after renal stenting

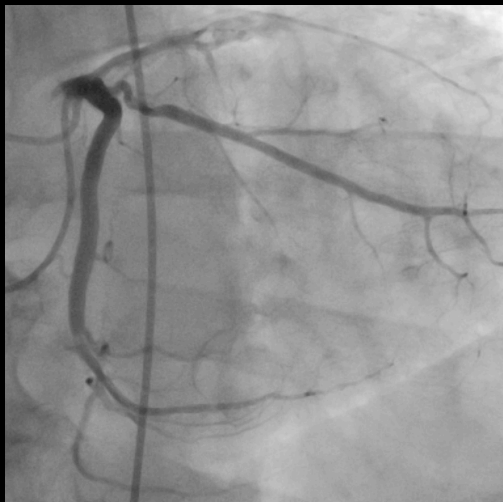
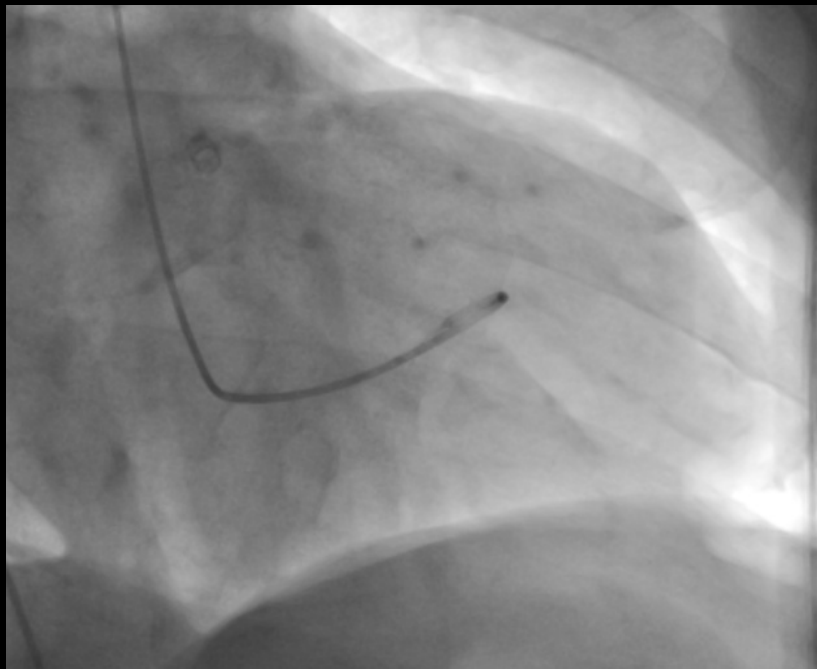
Mr Fa...81 ans *ex tabagique, dyslipidémique, hypertendu depuis une dizaine d'années*

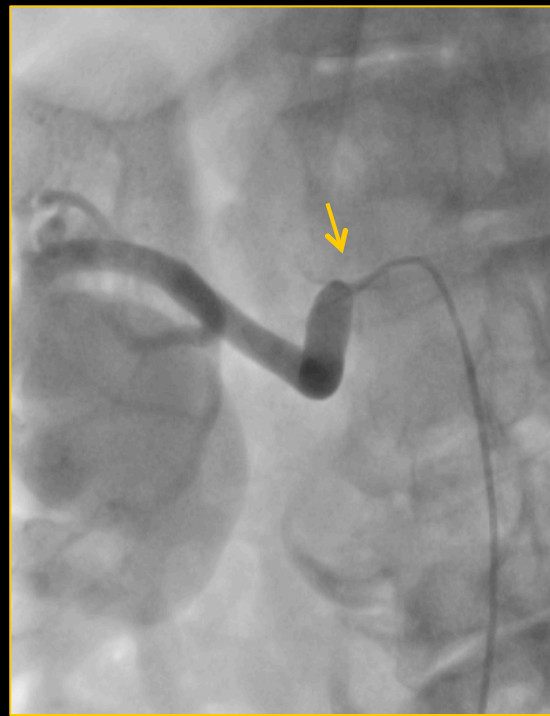
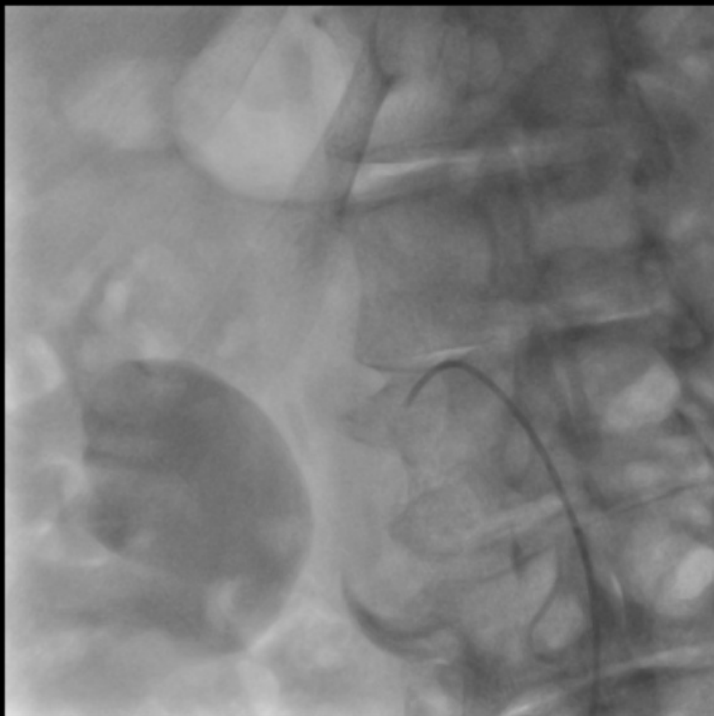
- Angioplastie rotablator + ballon IVA proximale et moyenne en 1994. Change d'hygiène de vie... OMT
- 2012 infarctus postéro-latéral traité par angioplastie primaire CX proximale et désobstruction au ballon MBG1
- HTA apparue depuis quelques années, échappant au traitement médical optimal depuis un an : 170 à 200 en automesure sous ARA2, diurétique, calcibloqueur et bêtabloquant...
- Insuffisance rénale avec une clearance MDRD à 42 ml.
- Scanner abdominal dépistant une atrophie rénale gauche avec thrombose rénale G et suspicion de lésion droite



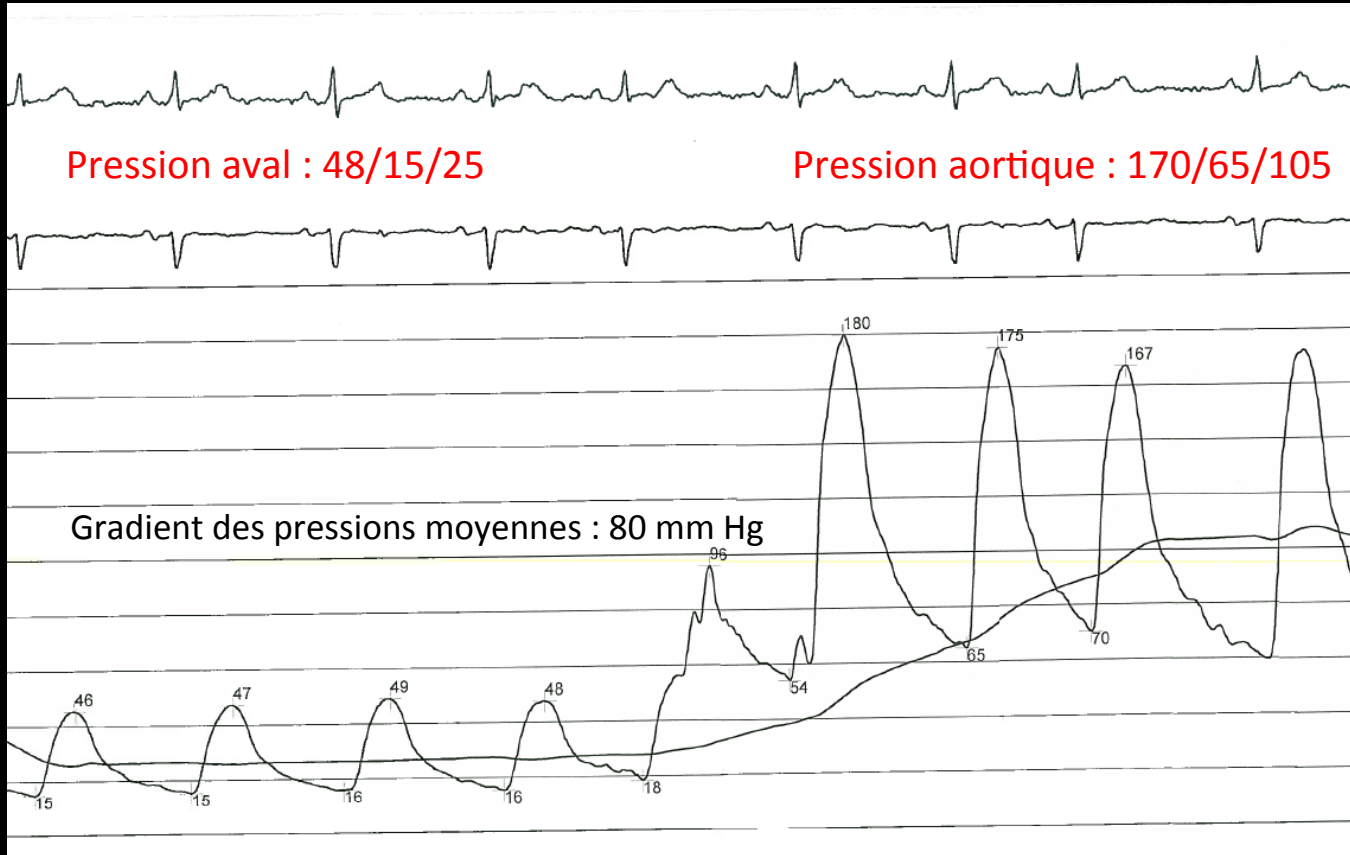


Contrôle angio : Intro 5F Cook IM
Guide Terumo J 035.
Sondes 4F AL3, PT, IM

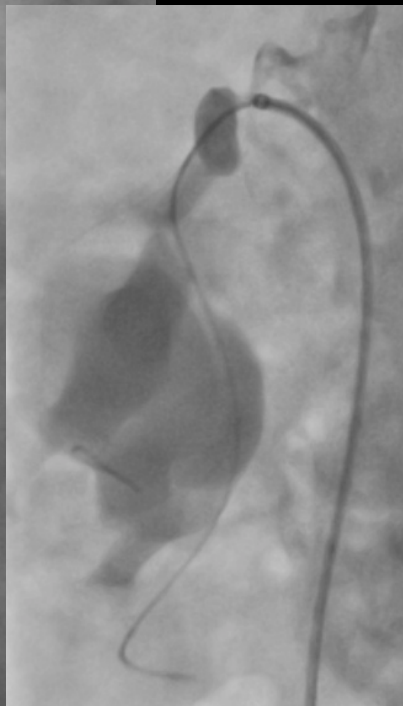
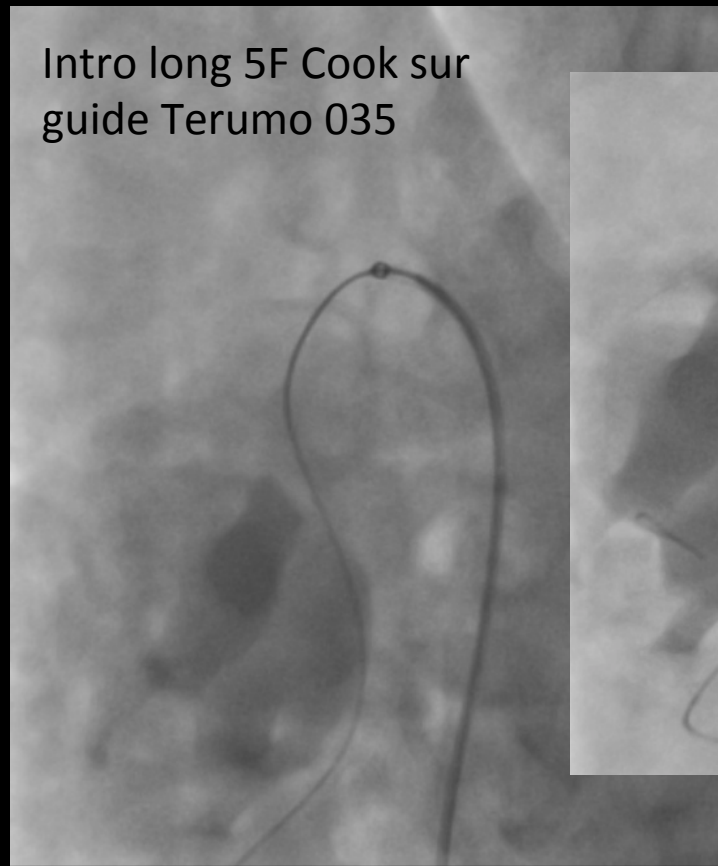




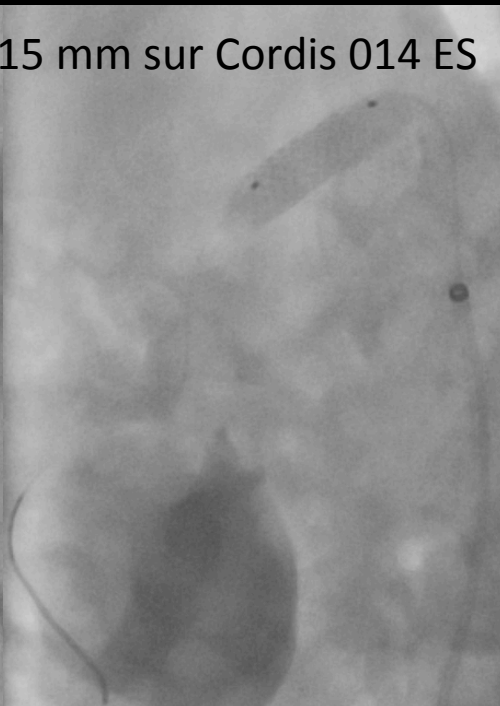
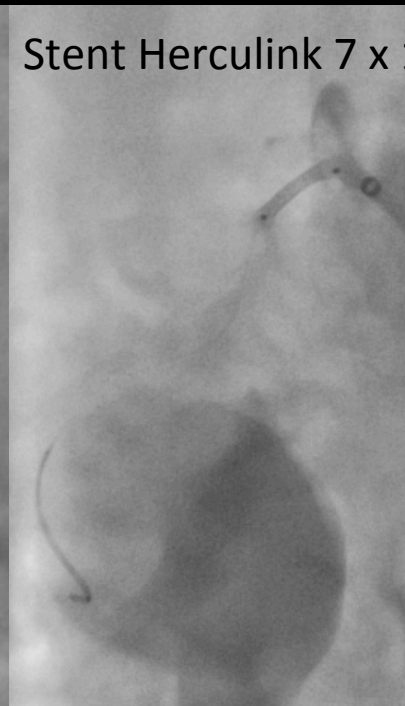
Confirmation de l'existence d'une lésion critique rénale droite

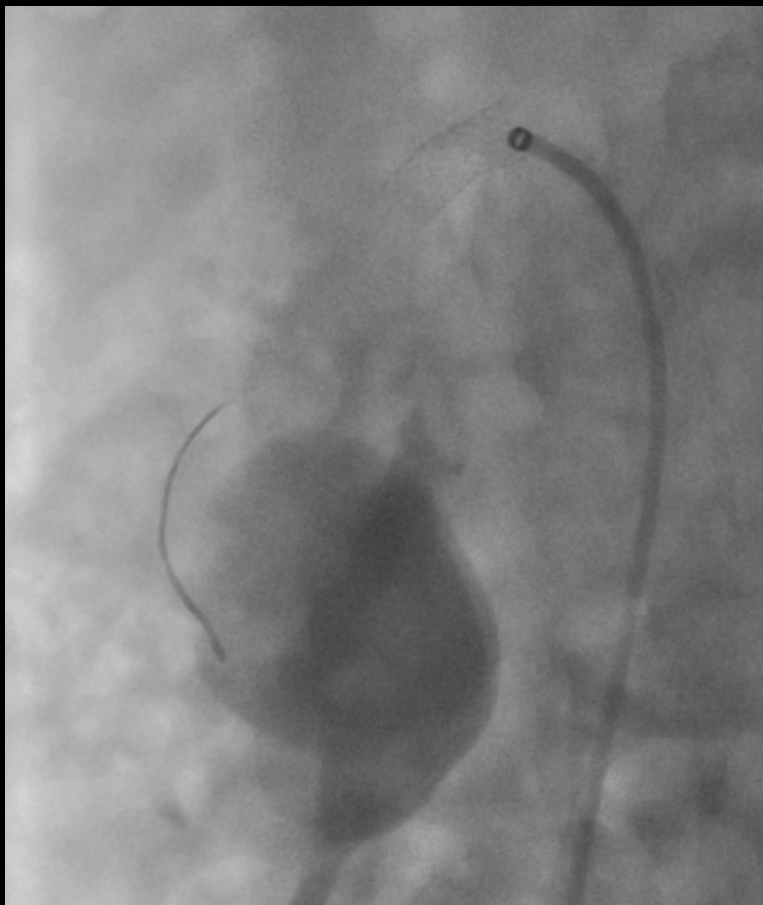


Intro long 5F Cook sur
guide Terumo 035



Stent Herculink 7 x 15 mm sur Cordis 014 ES





Suites simples ; sorti le lendemain.
pas d'augmentation de créatininémie,
TA à 135 dès J2 ...

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

A Report of the American College of Cardiology/American Heart Association Task Force on
Clinical Practice Guidelines

WRITING COMMITTEE MEMBERS

Paul K. Whelton, MB, MD, MSc, FAHA, *Chair*

Robert M. Carey, MD, FAHA, *Vice Chair*

Recommendations for Renal Artery Stenosis		
COR	LOE	Recommendations
I	A	1. Medical therapy is recommended for adults with atherosclerotic renal artery stenosis (1, 2).
IIb	C-EO	2. In adults with renal artery stenosis for whom medical management has failed (refractory hypertension, worsening renal function, and/or intractable HF) and those with nonatherosclerotic disease, including fibromuscular dysplasia, it may be reasonable to refer the patient for consideration of revascularization (percutaneous renal artery angioplasty and/or stent placement).