

Table 3. Direct Comparisons of Angioplasty or Surgery and Medical Treatment for Renal Artery Stenosis*

Author, Year (Reference)	Study Design	Intervention	Patients with Renal Artery Stenosis (Patients with Atheroscle rotic Renal Artery Stenosis), <i>n</i>	Mean Blood Pressure, <i>mm Hg</i>	Mean Glomerular Filtration Rate, <i>mL/s (mL/min)</i>	Mean Serum Creatinine Concentration <i>μmol/L (mg/dL)</i>	Mean Degree of Stenosis (Patients with Bilateral Stenosis), %	Location of Stenosis (Patients), %	Years in Which Patients Were Enrolled	Mean Study Duration (Range)	Results	Quality	Applicability	
											Blood Pressure	Kidney Function		
Angioplasty versus medical treatment														
Webster et al., 1998 (10)														
Patients with bilateral disease	Randomized trial	Angioplasty, no stent placement	12 (12)	190/99	NR	182 (2.1)	>50 (100)	Ostial (46)	NR	NR (3–54 months)	Decrease, 34/11 mm Hg	Creatinine increase, 10 μmol/L; 8% developed "renal failure"†	Fair	Moderate

		2 or 3 agents (atenolol, bedrofluazide, calcium- channel blockers)‡	16 (16)	190/101	NR	148 (1.7)					Decrease, 8/1 mm Hg ($P <$ 0.005 [net]); total Rx change not significant (net)	Creatinine increase, 4 μ mol/L; not significant (net); 7% developed "renal failure"†		
Patients with unilateral disease		Angioplasty, no stent placement	13 (13)	189/105	NR	138 (1.6)	>50 (0)	Ostial (52)			Decrease, 2/2 mm Hg	Creatinine increase, 8 μ mol/L		
		2 or 3 agents (atenolol, bedrofluazide, calcium- channel blockers)‡	14 (14)	182/99	NR	168 (1.9)					Decrease, 10/2 mm Hg (not significant [net]); total Rx change not significant (net)	Creatinine change, 0 μ mol/L; not significant (net)		
Plouin et al., 1998 (11)	Randomized trial	Angioplasty, with or without stent placement	23 (23)	165/98	1.2 (73)	NR	>60 (0)	Ostial (39)	1992–1999	6 months	Decrease, 14/8 mm Hg; total Rx at end, 1.0	No patient had worsened kidney function; increase in creatinine clearance, 0.06 mL/s	Fair	Low

Multiple drug regimens	25 (25)	165/96	1.2 (73)	NR						Decrease, 7/1 mm Hg (<i>P</i> = not significant/0.04 [net]); total Rx at end, 1.8 (<i>P</i> = 0.009 [net])	1 of 19 patients had worsened kidney function; increase in creatinine clearance, 0.01 mL/s(not significant [net])
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Angioplasty versus medical treatment or delayed angioplasty

Krijnen et al., 2004 (12); van Jaarsveld et al., 2000) (13, 14)	Angioplasty, no stent placement	56 (56)	179/104	1.1 (67)	NR	76 (23)	NR	1993–1998	1 year	Decrease, 19/12 mm Hg; total Rx decrease, 0.8	Worsened in 4%; increase in creatinine clearance, 0.05 mL/s	Moderate	High
	Multiple drug regimens (28 patients) or delayed angioplasty (22 patients)	50 (50)	180/103	1.0 (60)	NR	72 (22)				Decrease, 17/7 mm Hg (not significant [net]); total Rx decrease, 0.1 (<i>P</i> = 0.10 [net])	Worsened in 12%; increase in creatinine clearance, 0.03 mL/s (not significant [net])		

Angioplasty versus medical treatment

Webster et al., 1998 (10)	Nonrandomized, prospective	Angioplasty, no stent placement	28 (28)	196/109	NR	169 (1.9)	>50 (NR)	Ostial (63)	NR	3–54 months	Decrease, 13/11 mm Hg; total Rx decrease, 0.5 (not significant [net])	Creatinine increase, 13 μmol/L	Moderate	Low
		2 or 3 agents (bedrofluazid e, calcium-channel blocker)	51 (51)	197/103	NR	144 (1.6)					Decrease, 12/6 mm Hg; total Rx increase, 0.3 (<i>P</i> = 0.01 [from baseline])	Creatinine increase, 5 μmol/L (not significant [net])		
Taylor et al., 1989 (15)	Nonrandomized, prospective	Angioplasty, no stent placement	5 (NR)	160/96	NR	NR	>60 (NR)	NR	NR	6.5 months (1–21 months)	Decrease, 23/6 mm Hg; total Rx decrease, 1; no data on change in blood pressure status	Creatinine decrease, 44 μmol/L (including 7 patients who had surgery)	Poor	Low
		No revascularization, 0–3 drugs	15 (NR)	174/100	NR	NR					13 months (7–20 months)	Decrease, 24/20 mm Hg; total Rx change, 0; 20% had unchanged blood pressure	Creatinine increase, 88 μmol/L (<i>P</i> < 0.01 [net])	

Englund and Brown, 1991 (16)	Nonrandomized, retrospective	Angioplasty, no stent	21 (?19–21)	165/96	NR	341 (3.9)	NR	NR	1981–1988	NR	Decrease, 9/5 mm Hg; total Rx decrease, 1; no patient cured of hypertension	Creatinine increase, 93 μ mol/L	Poor	Low
		Unspecified drugs	17 (17)	185/101	NR	332 (3.8)	NR	NR		16 months (NR)	Decrease, 24/12 mm Hg (not significant [net]); total Rx change, 0 (not significant [net]); no patient cured of hypertension	Creatinine increase, 61 μ mol/L (not significant [net])		
Pizzolo et al., 2004 (17)¶	Retrospective	Angioplasty, with or without stent	63 (63)	168/95	NR	129 (1.5)	~88 (30)	NR	1996–2002	28 months (1–60 months)	0% cured of hypertension, 57% improved, 43% unchanged	82% improved, 18% worse	Poor	Low
		Multiple drug regimens**	37 (37)	159/91	NR	127 (1.4)	~79 (27)	NR			0% cured of hypertension, 29% improved, 71% unchanged	52% improved, 48% worse		

Angioplasty versus surgery or medical treatment

Pillay et al., 2002 (18)	Nonrandomized, prospective	Various procedures ††	12 (NR)	86 (diastolic)	NR	150 (1.7)	>50 (100)	NR	1994–1998	2.5 years (>2 years)	Decrease, 15 mm Hg; total Rx increase, 0.03 $\mu\text{mol/L}$ ($P = 0.01$ [from baseline]); 1 patient required dialysis	Creatinine increase, 53 $\mu\text{mol/L}$ ($P = 0.01$ [from baseline]); 1 patient required dialysis	Poor	Low
		Unspecified drugs	21 (NR)	90 (diastolic)	NR	110 (1.2)					Decrease, 6 mm Hg (not significant [net]); total Rx increase, 0.13 (not significant [net])	No creatinine change (not significant [from baseline]); no patient required dialysis		
Johansson et al., 1999 (19)	Nonrandomized, prospective	Various procedures †††	105 (~91)	179/91	1.0 (61)	–	50 (NR)	NR	1983–1984 and 1988–1994	7.1 years (NR)	53% cured of hypertension at 1 year	NR	Poor	Low
		Unspecified drugs	64 (~56)	NR	NR	NR					NR	NR		

Surgery versus medical treatment

Uzzo et al., 2002 (20)§§	Randomized trial	Surgery	25 (25)	NR	NR	NR	75 (NR)	NR	NR	6.2 years (up to 7 years)	No difference in "blood pressure control" (not significant)	No difference in dialysis-free survival or change in glomerular filtration rate (not significant)	Poor	Low
		Unspecified drugs	27 (27)	NR	NR	NR								

*NR = not reported; Rx = prescriptions.

†Among participants with both unilateral and bilateral renal artery stenosis, congestive heart failure occurred in 9% of those who received angioplasty and 13% of those who received medical treatment alone, and stroke occurred in 4% and 13%, respectively. Myocardial infarction occurred in 4% of patients who received angioplasty and in an unclear proportion of those who received medical treatment alone.

‡Alternatively, patients received furosemide, methyldopa, or prazosin. Angiotensin-converting enzyme inhibitors were not allowed.

§Target diastolic blood pressure < 95 mm Hg; if necessary, atenolol (50 mg), furosemide (40 mg), or enalapril (10 mg) was used.

||Twenty-two of 50 patients assigned to medical therapy received angioplasty at 3 months because of persistent hypertension or deterioration of kidney function.

These patients were originally assigned to receive amlodipine, 10 mg (plus atenolol, 50 mg if > 40 years of age) or enalapril, 20 mg (plus hydrochlorothiazide, 25 mg if > 40 years of age) or, if neither regimen was tolerated, atenolol, 100 mg (plus hydrochlorothiazide, 25 mg if > 40 years of age).

¶¶Entry criteria differed markedly for patients receiving angioplasty and those receiving medical therapy. Patients receiving angioplasty had primary evaluation for resistant hypertension or unexplained azotemia. Patients receiving conservative therapy had angiographic evaluation for other causes, primarily lower extremity arteriopathy. Endovascular therapy not considered for this latter group.

**Goal blood pressure \leq 140/90 mm Hg. The most frequently used classes of drugs were angiotensin-converting enzyme inhibitors (62% of patients), diuretics (62%), calcium antagonists (49%), and β -blockers (30%).

††Among 12 patients, “9 [had] angioplasties (1 failure) and 1 [had] bilateral stent. 4 kidneys had... surgery.”

‡‡Eighty-eight patients had angioplasty and 17 had reconstructive surgery or nephrectomy.

§§The stopping point (diastolic blood pressure $>$ 100 mm Hg during treatment or worsening kidney function (including need for dialysis) or occurrence of an atherosclerotic cardiovascular event or death) was reached in 68% of patients after surgery and 67% of those receiving medical treatment (not statistically significant).