Appendix A. Search Strategy

MEDLINE 1966-August Week 4 2005

#	Search History	Results
1	exp Hypertension, Renal/	15140
2	exp Renal Artery Obstruction/	7388
3	renal arter$ stenosis.tw.	3264
4	renal arter$ dis$.tw.	390
5	renovascular dis$.tw.	613
6	reno vascular dis$.tw.	6
7	renal vascular dis$.tw.	156
8	(arvd or "atherosclerotic renovascular dis$").tw.	302
9	renal steno$.tw.	49
10	steno$ kidney.tw.	137
11	renovascular steno$.tw.	27
12	or/1-11	20249
13	limit 12 to humans	15628
14	limit 13 to english language	10148
15	limit 14 to (addresses or bibliography or biography or case reports or congresses or consensus development conference or consensus development conference, nih or dictionary or directory or editorial or festschrift or government publications or interview or lectures or legal cases or legislation or letter or news or newspaper article or patient education handout or periodical index or "review of reported cases")	2736
16	14 not 15	7412
17	limit 16 to "all adult (19 plus years)"	4222
18	16 not 17	3190
19	limit 18 to "all child (0 to 18 years)"	488
20	16 not 19	6924
21	limit 20 to (guideline or practice guideline or "review" or review, academic or "review literature" or review, multicase or review, tutorial)	1316
22	limit 20 to meta analysis	8
23	20 not (21 or 22)	5601
24	follow-up studies/	303611
25	(follow-up or followup).tw.	332435
26	exp Case-Control Studies/	288665
27	(case adj20 control).tw.	43581
28	exp Longitudinal Studies/	498762
29	longitudinal.tw.	61304
30	exp Cohort Studies/	536922
31	cohort.tw.	70605
32	(random$ or rct).tw.	315873
33	exp Randomized Controlled Trials/	38577

Appendix A. Search Strategy (continued)

#	Search History	Results
34	exp random allocation/	53586
35	exp Double-Blind Method/	82631
36	exp Single-Blind Method/	9171
37	randomized controlled trial.pt.	204593
38	clinical trial.pt.	412355
39	controlled clinical trials/	2929
40	(clin$ adj trial$).tw.	88180
41	((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).tw.	79196
42	exp PLACEBOS/	23902
43	placebo$.tw.	90025
44	exp Research Design/	194218
45	exp Evaluation Studies/	529271
46	exp Prospective Studies/	190597
47	exp Comparative Study/	1211784
48	or/24-47	2748065
49	23 and 48	2167

Sample Data Extraction Form

Author (first)	Year	Identifier	Interventions	Modifier topics
		Medline UI: **Ref ID:**	Angioplasty vs Medical Angioplasty only Medical treatment only Natural history only	Pre-intervention predictors of outcome (Q2) Treatment variable predictors of outcome (Q3)

Study Design		**Intervention Dates:**	**Follow-up dates**
Randomized controlled trial Non-randomized comparative trial Prospective cohort (pre-post, single arm) Retrospective cohort			**Follow-up times**
Per patient analysis?	**Both ?**	**Setting / Country:**	**Mean Follow-up**
Per Kidney analysis?			**Funding:**

Inclusion criteria	**Exclusion criteria**
Definition of RAS:	
Other:	
Comments:	

Were eligibility criteria the same for all arms? (Describe differences)
Comments:

Description of ANGIOPLASTY Intervention	**Description of MEDICAL Intervention**		
Stent type:	**BP Goal:**		
Distal protection device:	**Drug**	**Dose**	**Frequency**
Other adjunct technique:			
Peri-procedural Rx:			
Other information:			
Comments:			

Outcomes	**Incl?**	**Definitions**
Survival / Mortality		
Acute / Flash pulmonary edema		
Diastolic dysfunction		
Other CVD outcomes:		
Kidney function/structure:		

Appendix B. Sample Data Extraction Form (continued)

Blood pressure control:			
Adverse events			
Comments:			

Cofactors / Predictors	**Incl?**	**Definitions**	**Threshold**
Imaging test:			
Laboratory test:			
Clinical exam test:			
Demographics:			
Concurrent diseases:			
Anatomic characteristic:			
% Stenosis:			
Bilateral stenoses / solitary kidney stenosis			
Peri-procedural Rx:			
Type of stent:			
Distal protection device:			
ARAS etiology:			
Predominant clinical presentation:			
Blood pressure:			
Other:			
Comments:			

Quality Assessment for RCTs	
Blinding:	**Allocation concealment?**
Intention-to-treat?	**Other:**
Comments:	

Quality Assessment for non-randomized and cohort studies:
Limitations:
Comments:

Characteristics of Enrolled Patients at Baseline			
Mean Age:	**Age range:**		**Race:**
% Male:			
Mean BP	**BP range:**		**Duration of HTN:**
% Stenosis:	**Location of stenoses:**		**Test used to measure stenosis:**
% Bilateral stenosis:			
Mean GFR/CrCl/SCr:	**units:**	**Range:**	**Other kidney:**
CVD:			

Medical management at baseline:
Other:
Comments:

Sub-Groups Enrolled & Analyzed		
N enrolled with RAS (total):	**with ARAS:**	**ARAS analyzed separately (if mixed population)?**
N analyzed with RAS (total):	**with ARAS:**	
N analyzed who had angioplasty (total):	**plasty+stent:**	**Stent analyzed separately (if mixed interventions)?**
Other mixtures of populations:		
Comments:		

Disposition of Patients (Arteries if nd on patients)			
ANGIOPLASTY			
N enrolled:	**N had Plasty:**		**N successful Plasty**
Other details re: patients:			
N complete follow-up:	**Dropout %:**	**Dropout reasons:**	
Mean duration follow-up:			**Duration range:**
MEDICAL TREATMENT			
N enrolled:	**N received Rx:**		
Other details re: patients:			
N complete follow-up:	**Dropout %:**	**Dropout reasons:**	
Mean duration follow-up:			**Duration range:**
Comments:			

(Copy a Separate table for each outcome-duration combination)

Outcome:				**Time of follow-up:**		
	ANGIOPLASTY			**MEDICAL TREATMENT**		
	N	**Value (or n)**	**SE/SD**	**N**	**Value (or n)**	**SE/SD**
Baseline value						
Final value						
Difference						
***P* Difference**						

Net Difference							
***P* Net difference**							
(RR/OR/HR)							
***P* (RR/OR/HR)**							
Comments:							

FOR ANALYSES OF PREDICTORS OF OUTCOMES:

IF GROUPS DIVIDED BY PREDICTORS (eg, Low GFR v High GFR) INCLUDE *DETAILED* RESULTS BELOW:	
Univariate:	
Multivariate:	

IF GROUPS DIVIDED BY OUTCOMES (eg, Dead v Alive) INCLUDE *LIST OF SIGNIFICANT* ASSOCIATIONS ONLY BELOW:	
Univariate:	
Multivariate:	

Adverse Events
Comments:

Quality: (A/B/C)	**Comments:**
Applicability: (Low/Medium/High)	**Comments:**

Other comments:

Excluded Studies

Acher CW, Belzer FO, Grist TM, Turnipseed WD, Hoch JR, Archibald JE. Late renal function in patients undergoing renal revascularization for control of hypertension and/or renal preservation. Cardiovasc Surg 4(5):602-6. 1996
Pre-1993 (Surgery study)

Adams MB, Harris SS, Kauffman HM, Towne JB. Effect of primary renal disease in patients with renovascular insufficiency. J Vasc Surg 1(3):482-6. 1984
N<100 (Surgery study)

Ahmadi R, Schillinger M, Sabeti S, et al. Renal artery PTA and stent implantation: immediate and late clinical and morphological outcome. Wien Klin Wochenschr 114(1-2):21-7. 2002
Retrospective (PTRA study)

Alhadad A, Mattiasson I, Ivancev K, Gottsater A, Lindblad B. Sustained beneficial effects on blood pressure during long time retrospective follow-up after endovascular treatment of renal artery occlusion. J Human Hypertens 18(10):739-44. 2004
Retrospective (PTRA study)

Allie DE, Lirtzman MD, Wyatt CH, et al. Bivalirudin as a foundation anticoagulant in peripheral vascular disease: a safe and feasible alternative for renal and iliac interventions. J Invasive Cardiol 15(6): 334- 42. 2003.
Prospective treatment vs retrospective control (Question 3)

Arlart IP, von Dewitz H, Bargon G. Transvenous digital subtraction angiography (DSA) for diagnostic control following percutaneous transluminal angioplasty (PTA) in patients with renovascular hypertension. Eur J Radiol 5(2):115-9. 1985
N<30 (PTRA study)

Arlart IP. Digital subtraction angiography (DSA) in renal and renovascular hypertension: diagnostic value and application in follow-up studies after PTA. Uremia Invest 9(2):217-29. 1985
Pre-1993 (Surgery study)

Askari A, Novick AC, Stewart BH, Straffon RA. Surgical treatment of renovascular disease in the solitary kidney: results in 43 cases. J Urol 127(1):20-2. 1982
N<100 (Surgery study)

Baert AL, Wilms G, Amery A, Vermylen J, Suy R. Percutaneous transluminal renal angioplasty: initial results and long-term follow-up in 202 patients. Cardiovasc Intervent Radiol 13(1):22-8. 1990
Pre-1993 (Surgery study)

Bakker J, Goffette PP, Henry M, et al. The Erasme study: a multicenter study on the safety and technical results of the Palmaz stent used for the treatment of atherosclerotic ostial renal artery stenosis. Cardiovasc Intervent Radiol 22(6):468-74. 1999
Post-failed PTRA

Barbalias GA, Liatsikos EN, Siablis D, et al. Virtual endoscopy in renal artery stenosis: an innovative approach for diagnosis and follow-up. J Endourol 18(6):540-3. 2004
N<30 (PTRA study)

Bardram L, Helgstrand U, Bentzen MH, Buchardt Hansen HJ, Engell HC. Late results after surgical treatment of renovascular hypertension. A follow-up study of 122 patients 2-18 years after surgery. Ann Surg 201(2):219-2. 1985
N<100 (Surgery study)

Baumgartner I, Triller J, Mahler F. Patency of percutaneous transluminal renal angioplasty: a prospective sonographic study. Kidney Int 51(3):798-803. 1997
Prior publication of accepted study

Baus S, Radermacher J, Galanski M, Chavan A. Kissing balloon technique for angioplasty of renal artery bifurcation stenoses. J Vasc Interv Radiol 14(11):1455-9. 2003
Retrospective (PTRA study)

Bax L, Mali WP, van de Ven PJ, Beek FJ, Vos JA, Beutler JJ. Repeated intervention for in-stent restenosis of the renal arteries. J Vasc Interv Radiol 13(12):1219-24. 2002
Retrospective (PTRA study)

Bedoya L, Ziegelbaum M, Vidt DG, Badhwar K, Novick AC, Gifford RW. Baseline renal function and surgical revascularization in atherosclerotic renal arterial disease in the elderly. Cleve Clin J Med 56(4):415-21. 1989
Pre-1993 (Surgery study)

Beebe HG, MacFarlane SD. Antegrade aortorenal bypass graft: a new alternative. Am J Surg 155(5):647-50. 1988
N<100 (Surgery study)

Bell GM, Reid J, Buist TA. Percutaneous transluminal angioplasty improves blood pressure and renal function in renovascular hypertension. Qjm 63(241):393-403. 1987
Retrospective (PTRA study)

Bergrem H, Jervell J, Solheim DM, Flatmark A. Prognostic value of renal vein renin determination in suspected renovascular hypertension. Acta Med Scand Suppl 211(5):387-91. 1982
N<100 (Surgery study)

Beutler JJ, Van Ampting JM, van de Ven PJ, et al. Long-term effects of arterial stenting on kidney function for patients with ostial atherosclerotic renal artery stenosis and renal insufficiency. J Am Soc Nephrol 12(7):1475-81. 2001
>20% had previous plasty

Bhandari S, Wilkinson A, Nicholson A, Farr MJ, Sellars L. Atherosclerotic renovascular disease in the elderly: angioplasty with stenting versus reconstructive surgery. Geriatr Nephrol Urol 7(2):87-94. 1997
Retrospective (PTRA) / N<100 (Surgery)

Binkert CA, Debatin JF, Schneider E, et al. Can MR measurement of renal artery flow and renal volume predict the outcome of percutaneous transluminal renal angioplasty?. Cardiovasc Intervent Radiol 24(4):233-9. 2001
N<30 (PTRA study)

Blaufox MD, Fine EJ, Heller S, et al. Prospective study of simultaneous orthoiodohippurate and diethylenetriaminepentaacetic acid captopril renography. The Einstein/Cornell Collaborative Hypertension Group. J Nucl Medicine 39(3):522-8. 1998
No intervention

Blaufox MD. Cost-effectiveness of nuclear medicine procedures in renovascular hypertension. Semin Nucl Med 19(2):116-21. 1989
Review

Bloch MJ, Trost DA, Whitmer J, Pickering TG, Sos TA, August P. Ostial renal artery stent placement in patients 75 years of age or older. Am J Hypertens 14(10):983-8. 2001
N<30 (PTRA study)

Bloch MJ, Trost DW, Pickering TG, Sos TA, August P. Prevention of recurrent pulmonary edema in patients with bilateral renovascular disease through renal artery stent placement. Am J Hypertens 12(1 Pt 1):1-7. 1999
Retrospective (PTRA study)

Boisclair C, Therasse E, Oliva VL, et al. Treatment of renal angioplasty failure by percutaneous renal artery stenting with Palmaz stents: midterm technical and clinical results. AJR Am J Roentgenol 168(1):245-51. 1997
Post-failed PTRA

Bonelli FS, McKusick MA, Textor SC, et al. Renal artery angioplasty: technical results and clinical outcome in 320 patients. Mayo Clin Proc 70(11):1041-52. 1995
Retrospective (PTRA study)

Bonner G, Lederle RM, Scholze J, Stumpe KO. Therapeutic safety of perindopril in the treatment of mild hypertension with concomitant nephropathy. Arzneimittel-Forschung 43(8):852-5. 1993
Exclusion population

Bush RL, Martin LG, Lin PH, et al. Endovascular revascularization of renal artery stenosis in the solitary functioning kidney. Ann Vasc Surg 15(1):60-6. 2001
N<30 (PTRA study)

Bush RL, Najibi S, MacDonald MJ, et al. Endovascular revascularization of renal artery stenosis: technical and clinical results. J Vasc Surg 33(5):1041-9. 2001
Retrospective (PTRA study)

Cambria RP, Brewster DC, L'Italien GJ, et al. The durability of different reconstructive techniques for atherosclerotic renal artery disease. J Vasc Surg 20(1):76-85. 1994
Pre-1993 (Surgery study)

Cambria RP, Brewster DC, L'Italien GJ, et al. Renal artery reconstruction for the preservation of renal function. J Vasc Surg 24(3):371-80. 1996
Pre-1993 (Surgery study)

Cambria RP, Kaufman JL, Brewster DC, et al. Surgical renal artery reconstruction without contrast arteriography: the role of clinical profiling and magnetic resonance angiography. J Vasc Surg 29(6):1012-21. 1999
N<100 (Surgery study)

Campo A, Boero R, Stratta P, Quarello F. Selective stenting and the course of atherosclerotic renovascular nephropathy. J Nephrol 15(5):525-9. 2002
Retrospective (PTRA study)

Canzanello VJ, Millan VG, Spiegel JE, Ponce PS, Kopelman RI, Madias NE. Percutaneous transluminal renal angioplasty in management of atherosclerotic renovascular hypertension: results in 100 patients. Hypertension 13(2):163-72. 1989
Pre-1993 (Surgery study)

Caps MT, Perissinotto C, Zierler RE, et al. Prospective study of atherosclerotic disease progression in the renal artery. Circulation 98(25):2866-72. 1998
No outcome of interest

Carmichael DJ, Mathias CJ, Snell ME, Peart S. Detection and investigation of renal artery stenosis. Lancet 1(8482):667-70. 1986
Retrospective (PTRA) / N<100 (Surgery)

Chabova V, Schirger A, Stanson AW, McKusick MA, Textor SC. Outcomes of atherosclerotic renal artery stenosis managed without revascularization. Mayo Clin Proc 75(5):437-44. 2000
Pre-1993 (Surgery study)

Chaikof EL, Smith RB, Salam AA, et al. Empirical reconstruction of the renal artery: long-term outcome. J Vasc Surg 24(3):406-14. 1996
N<100 (Surgery study)

Chatterjee SS, Pahari DK, Sharma RK, et al. Long term follow-up of percutaneous transluminal renal angioplasty with special reference to aorto-arteritis. Indian Heart J 47(2):120-4. 1995
Retrospective (PTRA study)

Chatziioannou A, Mourikis D, Agroyannis B, et al. Renal artery stenting for renal insufficiency in solitary kidney in 26 patients. Eur J Vasc Endovascular Surg 23(1):49-54. 2002
Retrospective (PTRA study)

Cianci R, Lavini R, Letizia C, et al. Low-contrast medium doses for ultrasound imaging during renal revascularization by PTA-stenting. J Nephrol 17(4):520-4. 2004
Retrospective (PTRA study)

Cicuto KP, McLean GK, Oleaga JA, Freiman DB, Grossman RA, Ring EJ. Renal artery stenosis: anatomic classification for percutaneous transluminal angioplasty. AJR Am J Roentgenol 137(3):599-601. 1981
Retrospective (PTRA study)

Cioni R, Vignali C, Petruzzi P, et al. Renal artery stenting in patients with a solitary functioning kidney. Cardiovasc Intervent Radiol 24(6):372-7. 2001
Retrospective (PTRA study)

Cognet F, Garcier JM, Dranssart M, et al. Percutaneous transluminal renal angioplasty in atheroma with renal failure: long-term outcomes in 99 patients. Eur Radiol 11(12):2524-30. 2001
Retrospective (PTRA study)

Colapinto RF, Stronell RD, Harries-Jones EP, et al. Percutaneous transluminal dilatation of the renal artery: follow-up studies on renovascular hypertension. AJR Am J Roentgenol 139(4):727-32. 1982
Pre-1993 (Surgery study)

Conlon PJ, Athirakul K, Kovalik E, et al. Survival in renal vascular disease. J Am Soc Nephrol 9(2):252-6. 1998
Pre-1993 (Surgery study)

Connolly JO, Higgins RM, Walters HL, et al. Presentation, clinical features and outcome in different patterns of atherosclerotic renovascular disease. Qjm 87(7):413-21. 1994
Retrospective (PTRA study)

Cormier JM, Fichelle JM, Laurian C, Gigou F, Artru B, Ricco JB. Renal artery revascularization with polytetrafluoroethylene bypass graft. Ann Vasc Surg 4(5):471-8. 1990
N<100 (Surgery study)

Crinnion JN, Gough MJ. Bilaterial renal artery atherosclerosis--the results of surgical treatment. Eur J Vasc Endovascular Surg 11(3):353-8. 1996
>50% had aortic reconstruction

Crowley JJ, Santos RM, Peter RH, et al. Progression of renal artery stenosis in patients undergoing cardiac catheterization. Am Heart J 136(5):913-8. 1998
No outcome of interest

Dal Canton A, Russo D, Iaccarino V, Caputo A, D'Anna F, Andreucci VE. Percutaneous angioplasty for treatment of renovascular hypertension. Proc Eur Dial Transplant Assoc 20:582-6. 1983
N<30 (PTRA study)

de Fraissinette B, Garcier JM, Dieu V, et al. Percutaneous transluminal angioplasty of dysplastic stenoses of the renal artery: results on 70 adults. Cardiovasc Intervent Radiol 26(1):46-51. 2003
Retrospective (PTRA study)

Dean RH, Kieffer RW, Smith BM, et al. Renovascular hypertension: anatomic and renal function changes during drug therapy. Archives Surg 116(11):1408-15. 1981
Pre-1993 (Surgery study)

Dean RH, Krueger TC, Whiteneck JM, et al. Operative management of renovascular hypertension. Results after a follow-up of fifteen to twenty-three years. J Vasc Surg 1(1):234-42. 1984
N<100 (Surgery study)

Dean RH, Tribble RW, Hansen KJ, O'Neil E, Craven TE, Redding JF. Evolution of renal insufficiency in ischemic nephropathy. Ann Surg 213(5):446-55. 1991
N<100 (Surgery study)

Dean RH. Late results of aortorenal bypass. Urol Clin North Am 11(3):425-34. 1984
Pre-1993 (Surgery study)

Denolle T, Chatellier G, Julien J, Battaglia C, Luo P, Plouin PF. Left ventricular mass and geometry before and after etiologic treatment in renovascular hypertension, aldosterone-producing adenoma, and pheochromocytoma. Am J Hypertens 6(11 Pt 1):907-13. 1993
Retrospective (PTRA) / N<100 (Surgery)

Desai TR, Meyerson SL, McKinsey JF, Schwartz LB, Bassiouny HS, Gewertz BL. Angioplasty does not affect subsequent operative renal artery revascularization. Surgery 128(4):717-25. 2000
N<100 (Surgery study)

Dondi M, Fanti S, De Fabritiis A, et al. Prognostic value of captopril renal scintigraphy in renovascular hypertension. J Nucl Medicine 33(11):2040-4. 1992
Pre-1993 (Surgery study)

Donohoe P, de Takats D, Bishop N, et al. A four-year audit of interventional treatment for atheromatous renal artery stenosis. Contrib Nephrol 119:78-82. 1996
Retrospective (PTRA) / N<100 (Surgery)

Dorros G, Prince C, Mathiak L. Stenting of a renal artery stenosis achieves better relief of the obstructive lesion than balloon angioplasty. Catheter Cardiovasc Diagn 29(3):191-8. 1993
N<30 (PTRA study)

Eldrup-Jorgensen J, Harvey HR, Sampson LN, Amberson SM, Bredenberg CE. Should percutaneous transluminal renal artery angioplasty be applied to ostial renal artery atherosclerosis?. J Vasc Surg 21(6):909-14. 1995
Retrospective (PTRA study)

England WL, Roberts SD, Grim CE. Surgery or angioplasty for cost-effective renal revascularization?. Med Dec Making 7(2):84-91. 1987
Retrospective (PTRA) / N<100 (Surgery)

Erbsloh-Moller B, Dumas A, Roth D, Sfakianakis GN, Bourgoignie JJ. Furosemide-131I-hippuran renography after angiotensin-converting enzyme inhibition for the diagnosis of renovascular hypertension. Am J Med 90(1):23-9. 1991
N<30 (PTRA study)

Erdoes LS, Berman SS, Hunter GC, Mills JL. Comparative analysis of percutaneous transluminal angioplasty and operation for renal revascularization. Am J Kidney Dis 27(4):496-503. 1996
Retrospective (PTRA) / N<100 (Surgery)

Esper IE, Chajari M, Fonroget J, et al. Steady-state captopril renography: continuous monitoring of the captopril-induced increase in 99mTc-MAG3 mean parenchymal transit time in renovascular hypertension. Eur J Nucl Med 24(7):739-44. 1997
N<30 (PTRA study)

Fergany A, Kolettis P, Novick AC. The contemporary role of extra-anatomical surgical renal revascularization in patients with atherosclerotic renal artery disease. J Urol 153(6):1798-801. 1995
Pre-1993 (Surgery study)

Fiala LA, Jackson MR, Gillespie DL, O'Donnell SD, Lukens M, Gorman P. Primary stenting of atherosclerotic renal artery ostial stenosis. Ann Vasc Surg 12(2):128-33. 1998
Retrospective (PTRA study)

Fichelle JM, Colacchio G, Farkas JC, et al. Renal revascularization in high-risk patients: the role of iliac renal bypass. Ann Vasc Surg 6(5):403-7. 1992
N<100 (Surgery study)

Fiorani P, Faraglia V, Aissa N, et al. Late results of reconstructive surgery for renovascular hypertension. Int Angiol 8(2):81-91. 1989
Pre-1993 (Surgery study)

Flechner S, Novick AC, Vidt D, Buonocore E, Meaney T. The use of percutaneous transluminal angioplasty for renal artery stenosis in patients with generalized atherosclerosis. J Urol 127(6):1072-5. 1982
Retrospective (PTRA study)

Fletcher JP, Simmons K, Little JM. Percutaneous transluminal angioplasty: experience at Westmead Centre. Australas Radiol 29(2):158-62. 1985
Retrospective (PTRA study)

Fommei E, Mezzasalma L, Ghione S, et al. European Captopril Radionuclide Test Multicenter Study. Preliminary results. Inspective renographic analysis. The European Captopril Radionuclide Test Multicenter Study Group. Am J Hypertens 4(12 Pt 2):690S-697S. 1991
Pre-1993 (Surgery study)

Fouad FM, Gifford RW, Fighali S, et al. Predictive value of angiotensin II antagonists in renovascular hypertension. JAMA 249(3):368-73. 1983
N<100 (Surgery study)

Fowl RJ, Hollier LH, Bernatz PE, Pairolero PC, Vogt PA, Cherry KJ. Repeat revascularization versus nephrectomy in the treatment of recurrent renovascular hypertension. Surg Gynecol Obstet 162(1):37-42. 1986
N<100 (Surgery study)

Frauchiger B, Zierler R, Bergelin RO, Isaacson JA, Strandness DE. Prognostic significance of intrarenal resistance indices in patients with renal artery interventions: a preliminary duplex sonographic study. Cardiovasc Surg 4(3):324-30. 1996
N<30 (PTRA study)

Fry RE, Fry WJ. Supraceliac aortorenal bypass with saphenous vein for renovascular hypertension. Surg Gynecol Obstet 168(2):180-2. 1989
Pre-1993 (Surgery study)

Galli M, Tarantino F, Mameli S, et al. Transradial approach for renal percutaneous transluminal angioplasty and stenting: a feasibility pilot study. J Invasive Cardiol 14(7):386-90. 2002
N<30 (PTRA study)

Geroulakos G, Wright JG, Tober JC, Anderson L, Smead WL. Use of the splenic and hepatic artery for renal revascularization in patients with atherosclerotic renal artery disease. Ann Vasc Surg 11(1):85-9. 1997
N<100 (Surgery study)

Geyskes GG, de Bruyn AJ. Captopril renography and the effect of percutaneous transluminal angioplasty on blood pressure in 94 patients with renal artery stenosis. Am J Hypertens 4(12 Pt 2):685S-689S. 1991
Pre-1993 (Surgery study)

Geyskes GG, Puylaert CB, Oei HY, Mees EJ. Follow up study of 70 patients with renal artery stenosis treated by percutaneous transluminal dilatation. BMJ 287(6388):333-6. 1983
Retrospective (PTRA study)

Gill IS, Novick AC, Hodge EE. Extra-anatomic renal revascularization in patients with renal artery stenosis and abdominal aortic occlusion. Urology 42(6):630-4. 1993
N<100 (Surgery study)

Giroux MF, Soulez G, Therasse E, et al. Percutaneous revascularization of the renal arteries: predictors of outcome. J Vasc Interv Radiol 11(6):713-20. 2000
Retrospective (PTRA study)

Giulini SM, Bonardelli S, Cangiotti L, et al. Surgery for obstructive lesions of the main trunk of the renal artery. A review of the literature and personal experience of 41 operated patients. J Cardiovasc Surg 36(4):329-36. 1995
N<100 (Surgery study)

Greminger P, Luscher TF, Zuber J, et al. Surgery, transluminal dilatation and medical therapy in the management of renovascular hypertension. Nephron 44 Suppl 1:36-9. 1986
<50% with ARAS

Greminger P, Vetter H, Steurer J, Siegenthaler W, Vetter W. Captopril and kidney function in renovascular and essential hypertension. Nephron 44 Suppl 1:91-5. 1986
N<10 (Medical study)

Grim CE, Luft FC, Yune HY, Klatte EC, Weinberger MH. Percutaneous transluminal dilatation in the treatment of renal vascular hypertension. Ann Intern Med 95(4):439-42. 1981
N<30 (PTRA study)

Grim CE, Yune HY, Donohue JP, Weinberger MH, Dilley R, Klatte EC. Renal vascular hypertension. Surgery vs. dilation. Nephron 44 Suppl 1:96-100. 1986
Retrospective (PTRA) / N<100 (Surgery)

Grim CE, Yune HY, Weinberger MH, Donohue JP. Percutaneous transluminal dilatation or surgery in the management of renal vascular hypertension?. Clin Sci 61 Suppl 7:485s-486s. 1981
N<30 (PTRA study)

Gruenewald SM, Collins LT, Antico VF, Farlow DC, Fawdry RM. Can quantitative renography predict the outcome of treatment of atherosclerotic renal artery stenosis?. J Nucl Medicine 30(12):1946-54. 1989
Retrospective (PTRA) / N<100 (Surgery)

Grutzmacher P, Bussmann WD, Meyer TH, et al. Non-operative revascularisation of renal artery occlusion by transluminal angioplasty. Nephrol Dial Transplant 3(2):130-7. 1988
N<30 (PTRA study)

Guerrero M, Syed A, Khosla S. Survival following renal artery stent revascularization: four-year follow-up. J Invasive Cardiol 16(7):368-71. 2004
Retrospective (PTRA study)

Haddad M, Barral X, Boissier C, Bouilloc X, Beraud AM. Extracorporeal repair of renal artery branch lesions. Eur J Vasc Surg 3(5):435-41. 1989
N<100 (Surgery study)

Hagino RT, Valentine RJ, Clagett GP. Supraceliac aortorenal bypass. J Vasc Surg 26(3):482-9. 1997
N<100 (Surgery study)

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Retrospective (PTRA study)

Halimi JM, Ribstein J, Du CG, Ennouchi JM, Mimran A. Albuminuria predicts renal functional outcome after intervention in atheromatous renovascular disease. J Hypertens 13(11):1335-42. 1995
N<30 (PTRA study)

Hallett JW, Fowl R, O'Brien PC, et al. Renovascular operations in patients with chronic renal insufficiency: do the benefits justify the risks?. J Vasc Surg 5(4):622-7. 1987
N<100 (Surgery study)

Hallett JW, Textor SC, Kos PB, et al. Advanced renovascular hypertension and renal insufficiency: trends in medical comorbidity and surgical approach from 1970 to 1993. J Vasc Surg 21(5):750-9. 1995
Pre-1993 (Surgery study)

Hansen KJ, Deitch JS, Oskin TC, Ligush J, Craven TE, Dean RH. Renal artery repair: consequence of operative failures. Ann Surg 227(5):678-89. 1998
Post-failed PTRA

Hansen KJ, Ditesheim JA, Metropol SH, et al. Management of renovascular hypertension in the elderly population. J Vasc Surg 10(3):266-73. 1989
N<100 (Surgery study)

Hansen KJ, Lundberg AH, Benjamin ME, et al. Is renal revascularization in diabetic patients worthwhile?. J Vasc Surg 24(3):383-92. 1996
N<100 (Surgery study)

Hansen KJ, O'Neil EA, Reavis SW, Craven TE, Plonk GW, Dean RH. Intraoperative duplex sonography during renal artery reconstruction. J Vasc Surg 14(3):364-74. 1991
N<100 (Surgery study)

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Pre-1993 (Surgery study)

Hansen KJ, Thomason RB, Craven TE, et al. Surgical management of dialysis-dependent ischemic nephropathy. J Vasc Surg 21(2):197-209. 1995
N<100 (Surgery study)

Hansson BG, Bergentz SE, Dymling JF, Hedeland H, Hokfelt B. Pre- and postoperative studies in 72 hypertensive patients with renal artery stenosis, with special reference to renin activity and aldosterone. Acta Med Scand Suppl 210(4):249-55. 1981
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N<30 (PTRA study; accepted for medical cohort)

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Retrospective (PTRA) / N<100 (Surgery)

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N<30 (PTRA study)

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N<30 (PTRA study)

Helin KH, Tikkanen I, von Knorring JE, et al. Screening for renovascular hypertension in a population with relatively low prevalence. J Hypertens 16(10):1523-9. 1998
N<30 (PTRA study)

Hennequin LM, Joffre FG, Rousseau HP, et al. Renal artery stent placement: long-term results with the Wallstent endoprosthesis. Radiology. 1994
N<30 (PTRA study)

Henry M, Amor M, Henry I, et al. Stent placement in the renal artery: three-year experience with the Palmaz stent. J Vasc Interv Radiol 7(3):343-50. 1996
Retrospective (PTRA study)

Henry M, Amor M, Henry I, et al. Stents in the treatment of renal artery stenosis: long-term follow-up. J Endovascular Surg 6(1):42-51. 1999
Post-failed PTRA

Henry M, Klonaris C, Henry I, et al. Protected renal stenting with the PercuSurge GuardWire device: a pilot study. J Endovascular Ther 8(3):227-37. 2001
N<30 (PTRA study)

Hodsman GP, Brown JJ, Cumming AM, et al. Enalapril (MK421) in the treatment of hypertension with renal artery stenosis. J Hypertens Suppl 1(1):109-17. 1983
<6 mo (nd AE)

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<6 mo (nd AE)

Hoffman O, Carreres T, Sapoval MR, et al. Ostial renal artery stenosis angioplasty: immediate and mid-term angiographic and clinical results. J Vasc Interv Radiol 9(1 Pt 1):65-73. 1998
Retrospective (PTRA study)

Holden A, Hill A. Renal angioplasty and stenting with distal protection of the main renal artery in ischemic nephropathy: early experience. J Vasc Surg 38(5):962-8. 2003
Retrospective (PTRA study)

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Pre-1993 (Surgery study)

Hupp T, Clorius JH, Allenberg JR. Renovascular hypertension: predicting surgical cure with exercise renography. J Vasc Surg 14(2):200-7. 1991
Pre-1993 (Surgery study)

Ilkay E, Gunal IA, Yavuzkir M, et al. Effect of renal artery stenting on renal function in patients with ischemic nephropathy. Jpn Heart J 45(4):637-45. 2004
N<30 (PTRA study)

Isles C, Main J, O'Connell J, et al. Survival associated with renovascular disease in Glasgow and Newcastle: a collaborative study. Scott Med J 35(3):70-3. 1990
Pre-1993 (Surgery study)

Ivanovic V, McKusick MA, Johnson CM, et al. Renal artery stent placement: complications at a single tertiary care center. J Vasc Interv Radiol 14(2 Pt 1):217-25. 2003
Retrospective (PTRA study)

Jenni R, Vieli A, Luscher TF, Schneider E, Vetter W, Anliker M. Combined two-dimensional ultrasound Doppler technique. New possibilities for the screening of renovascular and parenchymatous hypertension?. Nephron 44 Suppl 1:2-4. 1986
Retrospective (PTRA study)

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N<30 (PTRA study)

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Retrospective (PTRA study)

Joffre F, Rousseau H, Bernadet P, et al. Midterm results of renal artery stenting. Cardiovasc Intervent Radiol 15(5):313-8. 1992
N<30 (PTRA study)

Julien J, Jeunemaitre X, Raynaud A, et al. Influence of age on the outcome of percutaneous angioplasty in atheromatous renovascular disease. J Hypertens Suppl 7(6):S188-9. 1989
Retrospective (PTRA study)

Kadir S, Russell RP, Kaufman SL, et al. Renal artery angioplasty. Technical considerations and results. Rofo Fortschr Geb Rontgenstr Nuklearmed 141(4):378-83. 1984
N<30 (PTRA study)

Kaplan-Pavlovcic S, Nadja C. Captopril renography and duplex Doppler sonography in the diagnosis of renovascular hypertension. Nephrol Dial Transplant 13(2):313-7. 1998
N<30 (PTRA study)

Karagiannis A, Douma S, Voyiatzis K, et al. Percutaneous transluminal renal angioplasty in patients with renovascular hypertension: long-term results. Hypertens Res 18(1):27-31. 1995
Pre-1993 (Surgery study)

Kaylor WM, Novick AC, Ziegelbaum M, Vidt DG. Reversal of end stage renal failure with surgical revascularization in patients with atherosclerotic renal artery occlusion. J Urol 141(3):486-8. 1989
N<100 (Surgery study)

Keith TA. Renovascular hypertension in black patients. Hypertension 4(3):438-43. 1982
Pre-1993 (Surgery study)

Kent KC, Salvatierra O, Reilly LM, Ehrenfeld WK, Goldstone J, Stoney RJ. Evolving strategies for the repair of complex renovascular lesions. Ann Surg 206(3):272-8. 1987
N<100 (Surgery study)

Khilnani NM, Trost D, Jagust MB, Sos TA. Multiple-side-hole catheter technique for selective over-the-wire completion angiography following renal angioplasty. J Vasc Interv Radiol 5(2):387-9. 1994
Retrospective (PTRA study)

Khosla S, White CJ, Collins TJ, Jenkins JS, Shaw D, Ramee SR. Effects of renal artery stent implantation in patients with renovascular hypertension presenting with unstable angina or congestive heart failure. Am J Cardiol 80(3):363-6. 1997
N<30 (PTRA study)

Kim PK, Spriggs DW, Rutecki GW, Reaven RE, Blend D, Whittier FC. Transluminal angioplasty in patients with bilateral renal artery stenosis or renal artery stenosis in a solitary functioning kidney. AJR Am J Roentgenol 153(6):1305-8. 1989
Retrospective (PTRA study)

Kjellbo H, Lund N, Bergentz SE, Hood B. Renal artery stenosis and hypertension. II. Mortality in operated patients compared with the mortality in individually matched medically treated patients with cryptogenetic hypertension. Scand J Urol Nephrol 4(1):43-7. 1970
Pre-1993 (Surgery study)

Klinge J, Mali WP, Puijlaert CB, Geyskes GG, Becking WB, Feldberg MA. Percutaneous transluminal renal angioplasty: initial and long-term results. Radiology 171(2):501-6. 1989
Retrospective (PTRA study)

Klow NE, Paulsen D, Vatne K, Rokstad B, Lien B, Fauchald P. Percutaneous transluminal renal artery angioplasty using the coaxial technique. Ten years of experience from 591 procedures in 419 patients. Acta Radiol 39(6):594-603. 1998
Retrospective (PTRA study)

Korsakas S, Mohaupt MG, Dinkel HP, et al. Delay of dialysis in end-stage renal failure: prospective study on percutaneous renal artery interventions. Kidney Int 65(1):251-8. 2004
N<30 (PTRA study)

Koyanagi T, Nonomura K, Takeuchi I, Watarai Y, Seki T, Kakizaki H. Surgery for renovascular diseases: a single-center experience in revascularizing renal artery stenosis and aneurysm. Urol Int 68(1):24-31. 2002
N<100 (Surgery study)

Kremer Hovinga TK, de Jong PE, de Zeeuw D, Donker AJ, Schuur KH, van der Hem GK. Restenosis prevalence and long-term effects on renal function after percutaneous transluminal renal angioplasty. Nephron 44 Suppl 1:64-7. 1986
Retrospective (PTRA study)

Krishnamurthi V, Novick AC, Myles JL. Atheroembolic renal disease: effect on morbidity and survival after revascularization for atherosclerotic renal artery stenosis. J Urol 161(4):1093-6. 1999
N<100 (Surgery study)

Kuhlmann U, Greminger P, Gruntzig A, et al. Long-term experience in percutaneous transluminal dilatation of renal artery stenosis. Am J Med 79(6):692-8. 1985
Pre-1993 (Surgery study)

Kuhlmann U, Vetter W, Furrer J, Lutolf U, Siegenthaler W, Gruntzig A. Renovascular hypertension: treatment by percutaneous transluminal dilatation. Ann Intern Med 92(1):1-6. 1980
Retrospective (PTRA study)

Kuhn FP, Kutkuhn B, Torsello G, Modder U. Renal artery stenosis: preliminary results of treatment with the Strecker stent. Radiology 180(2):367-72. 1991
Retrospective (PTRA study)

Kumagai H, Suzuki H, Matsukawa S, Ryuzaki M, Saruta T. Captopril therapy following percutaneous transluminal angioplasty for bilateral renal artery stenosis. Arch Intern Med 149(9):1973-6. 1989
N<30 (PTRA study)

Kvist S, Mulvany MJ. Reduced medication and normalization of vascular structure, but continued hypertension in renovascular patients after revascularization. Cardiovas Res 52(1):136-42. 2001
Retrospective (PTRA) / N<100 (Surgery)

La Batide-Alanore A, Azizi M, Froissart M, Raynaud A, Plouin PF. Split renal function outcome after renal angioplasty in patients with unilateral renal artery stenosis. J Am Soc Nephrol 12(6):1235-41. 2001
N<30 (PTRA study)

Laasonen L, Edgren J, Forslund T, Eklund B. Renal transplant artery stenosis and percutaneous transluminal angioplasty. Acta Radiol 26(5):609-13. 1985
Exclusion population

Lagneau P, Michel JB. Surgical management and results of renal artery revascularization. Int Angiol 4(3):329-33. 1985
Pre-1993 (Surgery study)

Lamawansa MD, Bell R, House AK. Short-term and long-term outcome following renovascular reconstruction. Cardiovasc Surg 3(1):50-5. 1995
N<100 (Surgery study)

Lawrie GM, Morris GC, DeBakey ME. Long-term results of treatment of the totally occluded renal artery in forty patients with renovascular hypertension. Surgery 88(6):753-9. 1980
Pre-1993 (Surgery study)

Lawrie GM, Morris GC, Glaeser DH, DeBakey ME. Renovascular reconstruction: factors affecting long-term prognosis in 919 patients followed up to 31 years. Am J Cardiol 63(15):1085-92. 1989
Pre-1993 (Surgery study)

Lawrie GM, Morris GC, Soussou ID, et al. Late results of reconstructive surgery for renovascular disease. Ann Surg 191(5):528-33. 1980
Pre-1993 (Surgery study)

Leertouwer TC, Derkx FH, Pattynama PM, Deinum J, van Dijk LC, Schalekamp MA. Functional effects of renal artery stent placement on treated and contralateral kidneys. Kidney Int 62(2):574-9. 2002
Retrospective (PTRA study)

Lewis BE, Leya FS, Johnson SA, et al. Improved hemodynamic, angiographic and functional results after renal artery stenting. J Invasive Cardiol 6(4):136-40. 1994
N<30 (PTRA study)

Li JJ, Fang CH, Jiang H, et al. Increased C-reactive protein level after renal stent implantation in patients with atherosclerotic renal stenosis. Angiology 55(5):479-84. 2004
No outcome of interest

Losinno F, Zuccala A, Busato F, Zucchelli P. Renal artery angioplasty for renovascular hypertension and preservation of renal function: long-term angiographic and clinical follow-up. AJR Am J Roentgenol 162(4):853-7. 1994
Retrospective (PTRA study)

Lovaria A, Nicolini A, Meregaglia D, et al. Interventional radiology in the treatment of renal artery stenosis. Ann Urol (Paris) 33(3):146-55. 1999
Retrospective (PTRA study)

Lyons D, Fowler G, Petrie JC, Webster J. The haemodynamic effects of GR 32191, a thromboxane A2 receptor antagonist, in patients with renal artery stenosis and hypertension. Br J Clin Pharmacol 36(3):271-3. 1993
Single dose

Mackrell PJ, Langan EM, Sullivan TM, et al. Management of renal artery stenosis: effects of a shift from surgical to percutaneous therapy on indications and outcomes. Ann Vasc Surg 17(1):54-9. 2003
Retrospective (PTRA) / N<100 (Surgery)

MacLeod M, Taylor AD, Baxter G, et al. Renal artery stenosis managed by Palmaz stent insertion: technical and clinical outcome. J Hypertens 13(12 Pt 2):1791-5. 1995
N<30 (PTRA study)

Madias NE, Kwon OJ, Millan VG. Percutaneous transluminal renal angioplasty. A potentially effective treatment for preservation of renal function. Arch Intern Med 142(4):693-7. 1982
N<30 (PTRA study)

Mahler F, Probst P, Weidmann P, Krneta A. Transluminal dilatation of renal artery stenoses due to atherosclerosis and fibromuscular dysplasia : early results and follow-up of twelve consecutive cases. Ann Radiol (Paris) 24(5):355-6. 1981
Retrospective (PTRA study)

Marekovic Z, Mokos I, Krhen I, Goreta NR, Roncevic T. Long-term outcome after surgical kidney revascularization for fibromuscular dysplasia and atherosclerotic renal artery stenosis. J Urol 171(3):1043-5. 2004
N<100 (Surgery study)

Marshall FI, Hagen S, Mahaffy RG, et al. Percutaneous transluminal angioplasty for atheromatous renal artery stenosis--blood pressure response and discriminant analysis of outcome predictors. Qjm 75(277):483-9. 1990
Retrospective (PTRA study)

Martin LG, Casarella WJ, Alspaugh JP, Chuang VP. Renal artery angioplasty: increased technical success and decreased complications in the second 100 patients. Radiology 159(3):631-4. 1986
Retrospective (PTRA study)

Martin LG, Casarella WJ, Gaylord GM. Azotemia caused by renal artery stenosis: treatment by percutaneous angioplasty. AJR Am J Roentgenol 150(4):839-44. 1988
Retrospective (PTRA study)

Martin LG, Cork RD, Kaufman SL. Long-term results of angioplasty in 110 patients with renal artery stenosis. J Vasc Interv Radiol 3(4):619-26. 1992
Pre-1993 (Surgery study)

Martinez-Amenos A, Rama H, Sarrias X, Galceran J, Alsina J, Montanya X. Percutaneous transluminal angioplasty in the treatment of renovascular hypertension. J Human Hypertens 5(2):97-100. 1991
Retrospective (PTRA study)

Matalon TA, Thompson MJ, Patel SK, Brunner MC, Merkel FK, Jensik SC. Percutaneous transluminal angioplasty for transplant renal artery stenosis. J Vasc Interv Radiol 3(1):55-8. 1992
Exclusion population

Mathias CJ, Wilkinson AH, Pike FA, Sever PS, Peart WS. Clonidine in unilateral renal artery stenosis and unilateral renal parenchymal disease--similar antihypertensive but different renin suppressive effects. J Hypertens Suppl 1(2):123-5. 1983
Single dose

May J, Sheil R, Harris J, Horvath J. Failure of patent aorto-renal grafts to cure hypertension in renin positive patients. J Cardiovasc Surg 28(5):535-7. 1987
N<100 (Surgery study)

McCready RA, Daugherty ME, Nighbert EJ, Hyde GL, Freedman AM, Ernst CB. Renal revascularization in patients with a single functioning ischemic kidney. J Vasc Surg 6(2):185-90. 1987
N<100 (Surgery study)

McDonald DN, Smith DC, Maloney MD. Percutaneous transluminal renal angioplasty in the patient with a solitary functioning kidney. AJR Am J Roentgenol 151(5):1041-3. 1988
Retrospective (PTRA study)

Mestres CA, Campistol JM, Ninot S, et al. Improvement of renal function in azotaemic hypertensive patients after surgical revascularization. Br J Surg 75(6):578-80. 1988
N<100 (Surgery study)

Milot A, Lambert R, Lebel M, Cusson JR, Larochelle P. Prostaglandins and renal function in hypertensive patients with unilateral renal artery stenosis and patients with essential hypertension. J Hypertens 14(6):765-71. 1996
No intervention

Miranda JF, Perez MC, Plavnik F, Francisco JJ, Burihan E. Percutaneous transluminal angioplasty in the treatment of renovascular hypertension: sequential prospective study. Sao Paulo Med J 116(1):1613-7. 1998
Retrospective (PTRA study)

Miyamori I, Yasuhara S, Matsubara T, Takasaki H, Takeda R. Comparative effects of captopril and nifedipine on split renal function in renovascular hypertension. Am J Hypertens 1(4 Pt 1):359-63. 1988
Case Report

Moncure AC, Brewster DC, Darling RC, Atnip RG, Newton WD, Abbott WM. Use of the splenic and hepatic arteries for renal revascularization. J Vasc Surg 3(2):196-203. 1986
N<100 (Surgery study)

Morellato C, Bergelin RO, Cantwell-Gab K, et al. Clinical and duplex ultrasound follow-up after balloon angioplasty for atherosclerotic renal artery stenosis. Vasc Surg 35(2):85-93. 2001
Retrospective (PTRA study)

Morganti A, Quorso P, Ferraris P, et al. Time-course of the changes in blood pressure and in plasma renin activity during the first week after dilation of renal artery stenosis. J Hypertens Suppl 7(6):S186-7. 1989
N<30 (PTRA study)

Morganti A, Quorso P, Ferraris P, et al. Initial versus long-term results of percutaneous transluminal renal angioplasty in patients with renovascular hypertension. J Hypertens Suppl 9(6):S238-9. 1991
N<30 (PTRA study)

Morin JE, Hutchinson TA, Lisbona R. Long-term prognosis of surgical treatment of renovascular hypertension: a fifteen-year experience. J Vasc Surg 3(3):545-9. 1986
N<100 (Surgery study)

Mounier-Vehier C, Haulon S, Lions C, et al. Renal atrophy in atherosclerotic renovascular disease: gradual changes 6 months after successful angioplasty. J Endovascular Ther 9(6):863-72. 2002
N<30 (PTRA study)

Muray S, Martin M, Amoedo ML, et al. Rapid decline in renal function reflects reversibility and predicts the outcome after angioplasty in renal artery stenosis. Am J Kidney Dis 39(1):60-6. 2002
Retrospective (PTRA study)

Nahman NS, Maniam P, Hernandez RA, et al. Renal artery pressure gradients in patients with angiographic evidence of atherosclerotic renal artery stenosis. Am J Kidney Dis 24(4):695-9. 1994
No outcome of interest

Neymark E, LaBerge JM, Hirose R, et al. Arteriographic detection of renovascular disease in potential renal donors: incidence and effect on donor surgery. Radiology 214(3):755-60. 2000
No intervention

Nolan BW, Schermerhorn ML, Powell RJ, et al. Restenosis in gold-coated renal artery stents. J Vasc Surg 42(1):40-6. 2005
Retrospective (PTRA study)

Nolan BW, Schermerhorn ML, Rowell E, et al. Outcomes of renal artery angioplasty and stenting using low-profile systems. J Vasc Surg 41(1):46-52. 2005
Retrospective (PTRA study)

Novick AC, Ziegelbaum M, Vidt DG, Gifford RW, Pohl MA, Goormastic M. Trends in surgical revascularization for renal artery disease. Ten years' experience. JAMA 257(4):498-501. 1987
Pre-1993 (Surgery study)

O'Donovan RM, Gutierrez OH, Izzo JL. Preservation of renal function by percutaneous renal angioplasty in high-risk elderly patients: short-term outcome. Nephron 60(2):187-92. 1992
Retrospective (PTRA study)

Oertle M, Do DD, Baumgartner I, Triller J, Mahler F. Discrepancy of clinical and angiographic results in the follow-up of percutaneous transluminal renal angioplasty (PTRA). Vasa 27(3):154-7. 1998
Retrospective (PTRA study)

Oskin TC, Hansen KJ, Deitch JS, Craven TE, Dean RH. Chronic renal artery occlusion: nephrectomy versus revascularization. J Vasc Surg 29(1):140-9. 1999
Complete occlusion

Parildar M, Parildar Z, Oran I, Kabaroglu C, Memis A, Bayindir O. Nitric oxide and oxidative stress in atherosclerotic renovascular hypertension: effect of endovascular treatment. J Vasc Interv Radiol 14(7):887-92. 2003
N<30 (PTRA study)

Parildar Z, Gulter C, Parildar M, Oran I, Erdener D, Memis A. Effect of endovascular treatment on nitric oxide and renal function in Takayasu's arteritis with renovascular hypertension. Kidney Blood Press Res 25(2):91-6. 2002
Exclusion population

Park JS, Park JH, Kang JY, et al. Hyperfibrinogenemia is an independent risk factor for atherosclerotic renal artery stenosis. Am J Nephrol 19(6):649-54. 1999
No intervention

Park S, Jung JH, Seo HS, et al. The prevalence and clinical predictors of atherosclerotic renal artery stenosis in patients undergoing coronary angiography. Heart Vessels 19(6):275-9. 2004
No intervention

Pattynama PM, Becker GJ, Brown J, Zemel G, Benenati JF, Katzen BT. Percutaneous angioplasty for atherosclerotic renal artery disease: effect on renal function in azotemic patients. Cardiovasc Intervent Radiol 17(3):143-6. 1994

Retrospective (PTRA study)

Paty PS, Darling RC, Lee D, et al. Is prosthetic renal artery reconstruction a durable procedure? An analysis of 489 bypass grafts. J Vasc Surg 34(1):127-32. 2001
N<100 (Surgery study)

Paulsen D, Klow NE, Rogstad B, et al. Preservation of renal function by percutaneous transluminal angioplasty in ischaemic renal disease. Nephrol Dial Transplant 14(6):1454-61. 1999
Retrospective (PTRA study)

Pedersen EB, Jensen FT, Madsen B, Eiskjaer H, Nielsen JT, Rehling M. Angiotensin-converting enzyme inhibitor renography in the diagnosis of renovascular hypertension. Studies before and after angioplasty. Nephrol Dial Transplant 7(12):1178-84. 1992
Retrospective (PTRA study)

Pedersen EB, Madsen B, Danielsen H, Jespersen B. Experience with percutaneous transluminal renal angioplasty in renovascular hypertension. Acta Med Scand Suppl 714:23-7. 1986
N<30 (PTRA study)

Perkovic V, Thomson KR, Becker GJ. Factors affecting outcome after percutaneous renal artery stent insertion. J Nephrol 15(6):649-54. 2002
Retrospective (PTRA study)

Perkovic V, Thomson KR, Mitchell PJ, et al. Treatment of renovascular disease with percutaneous stent insertion: long-term outcomes. Australas Radiol 45(4):438-43. 2001
Retrospective (PTRA study)

Peterson RA, Baldauf CG, Millward SF, Aquino J, Delbrouck N. Outpatient percutaneous transluminal renal artery angioplasty: a Canadian experience. J Vasc Interv Radiol 11(3):327-32. 2000
Retrospective (PTRA study)

Pfeiffer T, Reiher L, Grabitz K, et al. Reconstruction for renal artery aneurysm: operative techniques and long-term results. J Vasc Surg 37(2):293-300. 2003
N<100 (Surgery study)

Pickering TG, Herman L, Devereux RB, et al. Recurrent pulmonary oedema in hypertension due to bilateral renal artery stenosis: treatment by angioplasty or surgical revascularisation. Lancet 2(8610):551-2. 1988
N<30 (PTRA study)

Plouin PF, Darne B, Chatellier G, et al. Restenosis after a first percutaneous transluminal renal angioplasty. Hypertension 21(1):89-96. 1993
Retrospective (PTRA study)

Postma CT, Dennesen PJ, de Boo T, Thien T. First dose hypotension after captopril; can it be predicted? A study of 240 patients. J Human Hypertens 6(3):205-9. 1992
Single dose

Postma CT, Hoefnagels WH, Barentsz JO, de Boo T, Thien T. Occlusion of unilateral stenosed renal arteries--relation to medical treatment. J Human Hypertens 3(3):185-90. 1989
Retrospective (PTRA study)

Poulias GE, Skoutas B, Doundoulakis N, et al. Surgical treatment of renovascular hypertension and respective late results. A twenty years experience. J Cardiovasc Surg 32(1):69-75. 1991
N<100 (Surgery study)

Ramsay LE, Waller PC. Blood pressure response to percutaneous transluminal angioplasty for renovascular hypertension: an overview of published series. BMJ 300(6724):569-72. 1990
Review

Rappelli A, Glorioso N, Madeddu P, et al. Renal vein renin in renovascular hypertension: the experience of two Italian centers. Nephron 44 Suppl 1:12-6. 1986
Retrospective (PTRA) / N<100 (Surgery)

Raynaud AC, Beyssen BM, Turmel-Rodrigues LE, et al. Renal artery stent placement: immediate and midterm technical and clinical results. J Vasc Interv Radiol 5(6):849-58. 1994
Retrospective (PTRA study)

Reams GP, Bauer JH. Enalapril versus triple-drug therapy in the treatment of renovascular hypertension. Drugs 30 Suppl 1:59-69. 1985
N<10 (Medical study)

Reams GP, Singh A, Logan KW, Holmes RA, Bauer JH. Total and split renal function in patients with renovascular hypertension: effects of angiotensin-converting enzyme inhibition. J Clin Hypertens 3(2):153-63. 1987
Retrospective (PTRA study)

Rees CR, Palmaz JC, Becker GJ, et al. Palmaz stent in atherosclerotic stenoses involving the ostia of the renal arteries: preliminary report of a multicenter study. Radiology 181(2):507-14. 1991
N<30 (PTRA study)

Reilly JM, Rubin BG, Thompson RW, Allen BT, Anderson CB, Sicard GA. Long-term effectiveness of extraanatomic renal artery revascularization. Surgery 116(4):784-90. 1994
N<100 (Surgery study)

Reilly JM, Rubin BG, Thompson RW, et al. Revascularization of the solitary kidney: a challenging problem in a high risk population. Surgery 120(4):732-6. 1996
N<100 (Surgery study)

Reisfeld D, Matas AJ, Tellis VA, et al. Late follow-up of percutaneous transluminal angioplasty for treatment of transplant renal artery stenosis. Transplant Proc 21(1 Pt 2):1955-6. 1989
Exclusion population

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Single dose

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RCT of PTRA v surgery, not v medical.
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Retrospective (Medical) / N<100 (Surgery)

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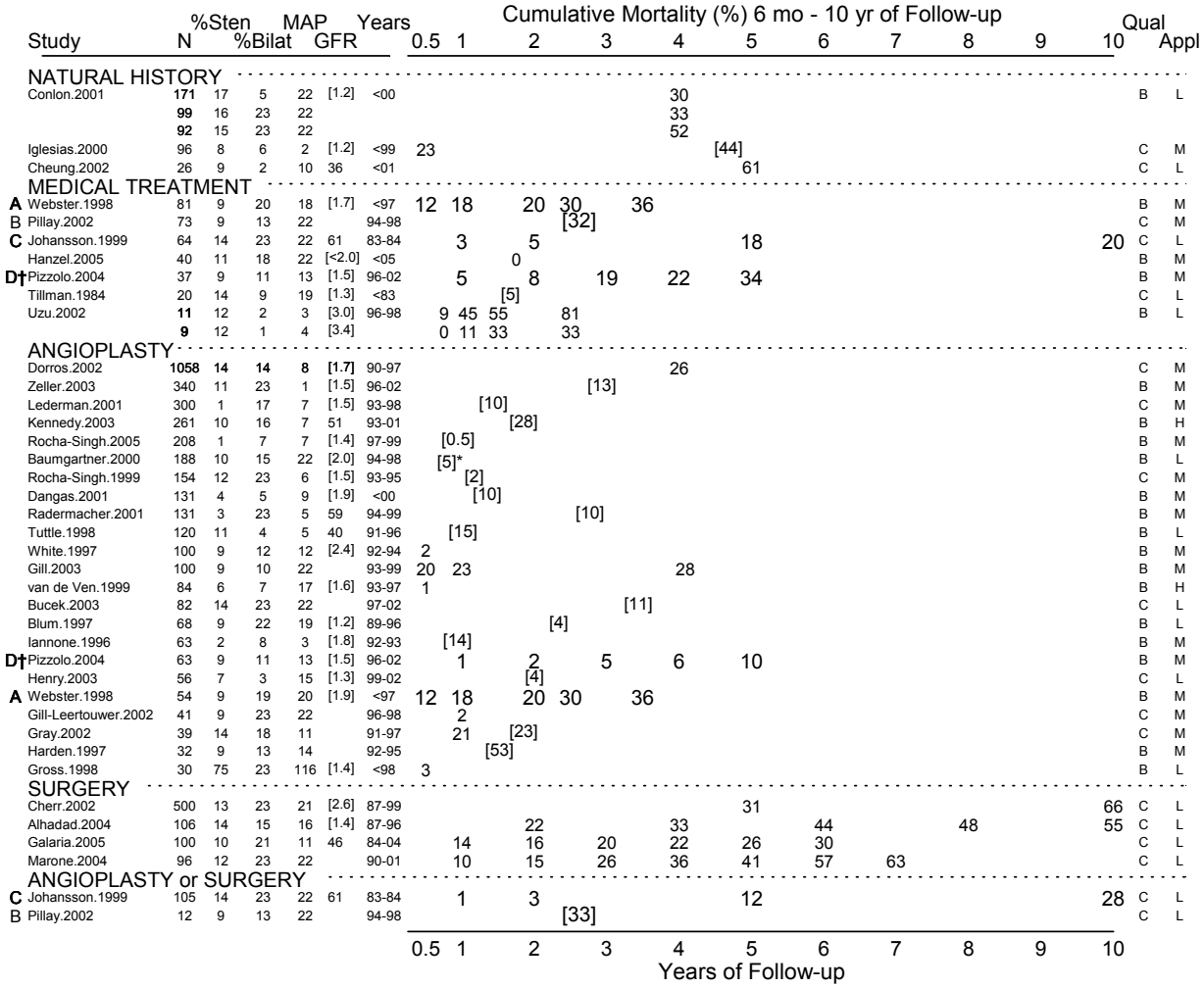
Drs. Cambria, Gilbert, Rundback, Textor and Tuttle were also members of the EPC's Technical Expert Panel
Dr. Cambria served as the EPC technical expert consultant. As such his comments were provided on an ongoing basis.

Appendix E. Detailed Mortality Figure

Detailed Mortality Figure

Figure. Cumulative percent mortality from 6 months to 10 years of followup.



	Study	N	%Sten	%Bilat	MAP	GFR	Years	Qual	Appl
	NATURAL HISTORY								
	Conlon.2001	171	17	5	22	[1.2]	<00	B	L
		99	16	23	22				
		92	15	23	22				
	Iglesias.2000	96	8	6	2	[1.2]	<99	C	M
	Cheung.2002	26	9	2	10	36	<01	C	L
	MEDICAL TREATMENT								
A	Webster.1998	81	9	20	18	[1.7]	<97	B	M
B	Pillay.2002	73	9	13	22		94-98	C	M
C	Johansson.1999	64	14	23	22	61	83-84	C	L
	Hanzel.2005	40	11	18	22	[<2.0]	<05	B	M
D†	Pizzolo.2004	37	9	11	13	[1.5]	96-02	B	M
	Tillman.1984	20	14	9	19	[1.3]	<83	C	L
	Uzu.2002	11	12	2	3	[3.0]	96-98	B	L
		9	12	1	4	[3.4]			
	ANGIOPLASTY								
	Dorros.2002	1058	14	14	8	[1.7]	90-97	C	M
	Zeller.2003	340	11	23	1	[1.5]	96-02	B	M
	Lederman.2001	300	1	17	7	[1.5]	93-98	C	M
	Kennedy.2003	261	10	16	7	51	93-01	B	H
	Rocha-Singh.2005	208	1	7	7	[1.4]	97-99	B	M
	Baumgartner.2000	188	10	15	22	[2.0]	94-98	B	L
	Rocha-Singh.1999	154	12	23	6	[1.5]	93-95	C	M
	Dangas.2001	131	4	5	9	[1.9]	<00	B	M
	Radermacher.2001	131	3	23	5	59	94-99	B	M
	Tuttle.1998	120	11	4	5	40	91-96	B	L
	White.1997	100	9	12	12	[2.4]	92-94	B	M
	Gill.2003	100	9	10	22		93-99	B	M
	van de Ven.1999	84	6	7	17	[1.6]	93-97	B	H
	Bucek.2003	82	14	23	22		97-02	C	L
	Blum.1997	68	9	22	19	[1.2]	89-96	B	L
	Iannone.1996	63	2	8	3	[1.8]	92-93	B	M
D†	Pizzolo.2004	63	9	11	13	[1.5]	96-02	B	M
	Henry.2003	56	7	3	15	[1.3]	99-02	C	L
A	Webster.1998	54	9	19	20	[1.9]	<97	B	M
	Gill-Leertouwer.2002	41	9	23	22		96-98	C	M
	Gray.2002	39	14	18	11		91-97	C	M
	Harden.1997	32	9	13	14		92-95	B	M
	Gross.1998	30	75	23	116	[1.4]	<98	B	L
	SURGERY								
	Cherr.2002	500	13	23	21	[2.6]	87-99	C	L
	Alhadad.2004	106	14	15	16	[1.4]	87-96	C	L
	Galaria.2005	100	10	21	11	46	84-04	C	L
	Marone.2004	96	12	23	22		90-01	C	L
	ANGIOPLASTY or SURGERY								
C	Johansson.1999	105	14	23	22	61	83-84	C	L
B	Pillay.2002	12	9	13	22		94-98	C	L

* Excluded patients who died within first 6 months

† Markedly different eligibility criteria for angioplasty and medicine treatment cohorts. See summary table.

N, number of subjects; %Sten, mean percent renal artery stenosis or minimum threshold (indicated by ">"); %Bilat, percent subjects with bilateral renal artery stenosis; MAP, mean arterial pressure; GFR, mean glomerular filtration rate or creatinine clearance in mL/min (or serum creatinine in mg/dL if in brackets); Years, years of intervention (years indicated by "<" mean indicate that year not reported; intervention assumed to have occurred at some time at least one year prior to publication date); Qual, study quality (A, good; B, fair; C, poor); Appl, study applicability (L, low; M, moderate; H, high).

Percentages in brackets indicate that exact time of followup not reported; mean or median time of followup used.

Letters A-D indicate that these studies reported mortality rates for both medical treatment and an invasive intervention. The values of these studies are in larger type to increase ease of comparison.

Detailed Summary Table

Table. Summary of medical, angioplasty and surgical treatments

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Data Source	• 4 RCTs (1 a mix of medical treatment and delayed angioplasty)	• 4 RCTs (1 a mix of medical treatment and delayed angioplasty) • 6 nonrandomized comparative studies of medical treatment, 4 prospective, 2 retrospective • 3 prospective cohort studies with medical treatments for blood pressure control • 8 cohort studies (6 prospective, 1 retrospective, and 1 mixed) of natural history or nonspecified medical treatments	• 3 RCTs • 6 nonrandomized comparative studies, 4 prospective, 2 retrospective; 2 included surgical revascularization • 20 prospective cohort studies with stent placement • 4 prospective cohort studies that used various approaches	• 1 RCT (versus medical treatment) • 2 retrospective comparisons with percutaneous angioplasty • 2 retrospective cohorts
Population studied	• See other columns	• Medical treatment studies included patients with hypertension, mean blood pressure 172-180/103-106. • One study included patients with >50% stenosis, half of whom had bilateral disease. One included a population where 25% had bilateral disease, though the definition of RAS was unclear. The third study did not describe degree of stenosis or bilateral disease. • In two studies the mean serum creatinine was 1.3 mg/dL. • Patients had mean ages approximately in the mid-50s; however, all studies included patients in their 20s or younger. • In all three studies either some patients did not have ARAS or this was not reported. • All 3 studies were from the 1980s or earlier.	• Patients with ARAS with HTN as the most frequent indication. Also included patients with CKD, CHF • About 1/3 of studies included patients populations with >50% stenosis, about 1/4 included only >70% stenosis. Other thresholds were also used. • Mostly populations with both uni- and bilateral disease, range of bilateral disease generally 25-50% of patients; some populations of unilateral or bilateral disease only. • Comparative studies mostly had about 50% with ostial disease, when reported; cohort studies mostly with about 75% or more with ostial disease. • Mean age generally about 65. • Mean blood pressure generally in the range of 160-180/90-100. • Mean serum creatinine generally in the range of 1.5-2.4 mg/dL, or mean GFR about 55 mL/min.	• Patients with ARAS with HTN, CKD, or both HTN and CKD • Populations had ≥60% to ≥80% stenosis • Populations had unilateral and bilateral diseases; the range of bilateral disease was 40-60% • Mean age was in the 60s • Mean blood pressure was in the approximate range of 175-200/85-105 • Mean serum creatinine was in the approximate range of 1.5-2.5 mg/dL • The interventions occurred from 1980-1999

Appendix F. Detailed Summary Table (continued)

Table. Summary of medical, angioplasty and surgical treatments

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Population studied, continued		• In the 8 natural history studies, populations studied were patients with RAS who received no revascularization interventions and presumably were under standard care by their physician. • The mean serum creatinine levels ranged from 1.2 to 3.2 mg/dL at baseline, implying at least stage 2 chronic kidney disease. • The mean stenosis ranged from greater than 20% to greater than 75%. • The percentage of bilateral stenosis ranged from 17% to 100%. • Mean blood pressure ranged from 143-179/77-102, although several studies did not report blood pressure. • The mean age was around 70 years in most studies, though 1 study followed younger patients, between 34-55 years. • Patients were followed from the 1970s through the late 1990s; although several studies did not report time periods.	• Comparative studies almost all did not use stents and included populations from the 1980s and 1990s. 80% of cohort studies used stents and all included populations from the mid 1990s and later.	
Limitations	• Only 2 RCTs compared angioplasty to medical treatment. Neither used stents. Both were of short duration (1 6-month, 1 with main analyses at 12 months, but patients followed from 3-54 months). • Other comparative studies were nonrandomized, retrospective, and/or evaluated interventions of secondary interest	• Data on medical treatments or natural history were from cohort studies without controls. • Populations studied were highly heterogeneous, limiting comparability across studies. • 3 studies on medical treatments reported only outcomes of blood pressure control and limited data on mortality and kidney function. • Treatments were not specified in 8 natural history studies. • Limited data on cardiovascular outcomes.	• Majority of data on angioplasty from before-after intervention studies (cohorts) without controls • Generally short duration of followup, often only single average time estimates of outcomes, despite range of followup time within studies. • Very limited data on cardiovascular outcomes. • Analyses of baseline variables as predictors of outcomes frequently inadequate.	• Retrospective cohort studies

Appendix F. Detailed Summary Table (continued)

Table. Summary of medical, angioplasty and surgical treatments

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Mortality	• In the 3 comparative studies with similar patients receiving each intervention, mortality was similar with angioplasty or angioplasty / surgery and with medical treatment.	• 3 natural history studies found that between 1/3 and 2/3 of patients died within 4-5 years. • Among 6 studies with medical treatment (4 comparative), wide range of mortality estimates across studies, from 0-12% at 6-9 months, and 3-38% at 1 year, and 19-69% at 2-3 years.	• Wide range of mortality estimates across studies, from 1-20% at 6 months, and 0.5-23% at 1 year, and 2-53% at about 2 years. Most studies, though reported only a single mortality rate at an unspecified time point. • Cardiovascular related death was the most frequent reported cause	• 5 -year mortality ranged from 12-41% in studies that used surgical revascularization or both surgery and angioplasty.
Kidney outcomes	• No difference in kidney function (change in serum creatinine or GFR, worsening kidney function, need for dialysis) after revascularization compared to medical treatment in all but one study. One prospective nonrandomized study found a significant difference between a small decrease in serum creatinine (-0.5 mg/dL) after revascularization and a modest increase (+1.0) on medical treatment.	• Kidney function outcomes were reported in seven studies (1 medical treatment and 6 natural history studies). In general patients' kidney function deteriorated over time, although to different degrees in the different studies.	• Among cohort studies the improved kidney function ranged from 8-51% with the majority of studies reporting statistically non significant improvements in serum creatinine • Kidney function improvement varied among those with lower baseline kidney function	• 17 % of patients became dialysis-dependent during the follow up (2 studies)

Appendix F. Detailed Summary Table (continued)

Table. Summary of medical, angioplasty and surgical treatments

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Blood pressure outcomes	• Comparative studies heterogeneous regarding relative effect of interventions on blood pressure. • One RCT of angioplasty vs. medicine found a significant net improvement with angioplasty among patients with bilateral, but not unilateral, disease. The second RCT found a net decrease in both systolic and diastolic blood pressure with angioplasty, but only the change in diastolic pressure was statistically significant. This study also found that after angioplasty, patients required fewer anti-HTN drugs; which was not found in the first RCT. • Most other comparative studies found no difference in blood pressure outcomes, regardless of intervention; however 2 found that blood pressure decreased more in patients on medical treatment than after angioplasty, although this effect was not significant.	• All three studies of medical treatments for blood pressure control showed that, on average, the various treatment regimens examined were effective for lowering blood pressures in RAS patients to normal ranges. • Outcomes of blood pressure control were reported in two natural history studies. The results were not comparable due to substantial differences in the RAS populations examined.	• The cure rates for BP outcome ranged from 4-18%, and the improved rates ranged from 35-79%. The studies also noted decreased use of anti-HTN medications compared to baseline.	• 60 - 70% of patients reported improvements in HTN (2 studies)
CVD outcomes	• 1 RCT of angioplasty vs. medical treatment and 1 RCT of surgery vs. medical treatment both found no differences in CVD outcomes, regardless of treatment.	• CHF events 13% and strokes 13% over 3-54 months (1 study) • CVD stop point (including hypertension, death, and also dialysis) 67% at about 6 years (1 study) • One natural history study reported eight fatal cardiovascular events in 20 patients with severe stenosis (≥ 75%) during 3 to 36 months followup.	• CHF events 9%, strokes 4%, and MI 4% over 3-54 months (1 study) • CVD stop point (including hypertension, death, and also dialysis) 68% at about 6 years (1 study) • CHF 20%, MI 11%, and stroke 7% at a mean of 21 months (1 study) • MI 5% at 15 months (1 study) NYHA class changed by –1.4 at 21 months, which was a significant improvement from baseline (1 study)	• Cardiovascular events accounted for most of the late deaths (1 study) • Nonfatal cardiovascular events occurred in 28% of patients at an average of almost 5 years (1 study)

Appendix F. Detailed Summary Table (continued)

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Adverse Events	• Comparative studies did not address the relative adverse events or complications between interventions (except that 30-day mortality was similar in one study, 3% vs. 5%).	• No study reported the 30-day mortality. • A wide variety of adverse effects were reported for the use of enalapril, timolol, hydralazine, and captopril • None of the 8 natural history studies reported adverse events	• The 30-day mortality ranged from 0-3%. • A transient deterioration in kidney function following procedure was reported ranged from 1-24% that included contrast-induced nephropathy. Severe decline in kidney function was also noted. • Renal artery or parenchymal injury during procedure ranged from 1-10%. • Periprocedural acute myocardial infarction ranged from 1-7%. • Other complications included: major hemorrhage; renal artery occlusion or spasm; false aneurysms; severe bleeding; and localized hematoma	• 30 -day mortality ranged from 4-9% • Procedural complication rate was significantly higher in combined renal artery and aortic reconstruction compared with renal artery reconstruction alone (2 studies)
Factors that influence outcomes	• The study comparing immediate to delayed or no angioplasty found that of two diagnostic tests, recent hypertension, bilateral stenosis, and severe stenosis (>70%), only bilateral disease was found to be associated with better creatinine clearance at 12 months in those patients who had immediate angioplasty, in contrast to those with unilateral disease, where creatinine clearance was statistically similar in the two groups.	• Among cohort studies of medical treatment, no analyses evaluated baseline variables as predictors. • 4 natural history studies analyzed various predictors of mortality and/or outcomes of kidney function. Percent stenosis and baseline kidney function were f predictors of death (or dialysis) in separate studies. Another study found that nonspiral blood flow in the renal arteries predicted kidney function deterioration. Other variables related to cardiovascular disease were also found to predict death. 1 study found that bilateral versus unilateral disease did not predict progressive kidney disease. • 1 natural history study found that patients with bilateral disease had higher CVD mortality.	• Worse baseline kidney function was associated with increased mortality, poor clinical outcomes, and relatively worse blood pressure after revascularization. • History of, or markers of, cardiovascular disease was associated with increased mortality, poor clinical outcomes, and relatively worse kidney function after revascularization.	• Preprocedure hemodialysis led to poorer functional kidney recovery but initiation of dialysis prior to surgery was predictive of long-term kidney function improvement in another (2 studies) • Preoperative CKD, DM, prior stroke, and severe aortic occlusive disease showed significant and independent associations with death or dialysis during the follow up (1 study)

Appendix F. Detailed Summary Table (continued)

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Factors with no effect	• The study comparing immediate to delayed or no angioplasty found that no variable predicted relative effectiveness of intervention strategy when diastolic blood pressure was the outcome. • The randomized trial of surgical versus medical treatment, found that demographic factors did not help to predict which patients would fare better with either intervention.		• Age and beta blocker or diuretic use at baseline were not significant predictors of mortality or other clinical outcomes. • Baseline captopril test, renogram, arterial norepinephrine, and ACE genotype were generally not associated with outcomes. • The association between baseline predictors and outcomes was uncertain for several factors including baseline kidney function as a predictor of followup kidney function, baseline cardiovascular disease as a predictor or blood pressure effect, percent stenosis before angioplasty, bilateral vs. unilateral RAS, and sex.	
Periprocedural factors	• N/A	• N/A	• Among the studies that used angioplasty with and without stent, there were no differences in blood pressure and kidney outcomes between the procedures. • No study reported analyses of whether other periprocedural interventions, such as different drugs or different approaches, affected either complications or long-term outcomes.	• N/A
Overall Summary	• The 2 applicable RCTs found no difference in kidney cardiovascular, or mortality outcomes between angioplasty without stent placement and medical treatment. The studies suggest a better reduction in blood pressure control after angioplasty, particularly in patients with bilateral disease.	• Data on medical treatments or natural history were from cohort studies without controls. • Populations studied were highly heterogeneous • 3 natural history studies found that between 1/3 and 2/3 of patients died within 4-5 years. • Among 6 studies with medical treatments, wide range of mortality estimates across studies.	• Data mostly from prospective cohorts without a control group that indicate BP outcomes as the significantly improved outcome especially among those with higher baseline kidney function • Mortality was mostly CVD-related; was predicted by lower baseline kidney function, CHF, and influenced by bilateral disease with or without baseline CKD	• Data from retrospective cohort analyses. Some data were poorly reported. • Major outcomes like long-term mortality, improvements in HTN, and proportion of patients who became dialysis-dependent were similar across studies.

Appendix F. Detailed Summary Table (continued)

	Angioplasty (or Surgery) vs. Medical Treatment	Medical / Natural history	Angioplasty	Surgical
Overall Summary, continued	• The other comparative studies mostly agree with these conclusions, although the studies are heterogeneous in regards to blood pressure outcomes. • The comparative studies do not adequately address comparative adverse events or the predictive value of baseline variables to determine whether any of these factors would favor one intervention over the other. • Indirect comparisons between cohort studies of revascularization and of medical treatment confirm the lack of difference in mortality rates between treatments, in resultant kidney function, with the caveat that improvement was reported only in cohort studies of revascularization, • Across cohort studies, the difference in blood pressure outcomes with either revascularization or medical treatment was uncertain, except that improvement was reported only in cohort studies of revascularization. • No conclusions could be reached about differences in cardiovascular outcomes or adverse events based on the cohort studies.	• In general patients' kidney function deteriorated over time, although to different degrees in the different studies. • All 3 studies of medical treatments for blood pressure control showed that, on average, the various treatment regimens examined were effective for lowering blood pressures in RAS patients to normal ranges.	• There was no difference in blood pressure and kidney outcomes between procedures with and without stent. Studies did not analyze the predictive value of periprocedural interventions	

ARAS, atherosclerotic renal artery stenosis; CHF, congestive heart failure; CKD, chronic kidney disease (renal insufficiency); CVD, cardiovascular disease; DM, diabetes mellitus; GFR, glomerular filtration rate; HTN, hypertension; MI, myocardial infarction; N/A, not applicable; NYHA class, New York Heart Association functional class.