

Trans-Radial Renal artery Angioplasty and Stenting

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Introduction

- Renal artery tended to have **downward** or **horizontal orientation** from DsAo
- Renal artery stenosis is an important factor which lead to uncontrolled hypertension and progressive renal function impairment
- Revascularization of renal artery stenosis is associated with preservation of renal function and better control of hypertension
- Percutaneous transluminal renal angioplasty was first introduced by Gruntzig et al in 1978

Methods and Patients

- From July 1999 to Apr. 2005, 49 patients in 54 renal artery stenosis.
- TR in 24 procedures and TF in 30 procedures
- Left renal artery in 28 and right renal artery in 26
- Stent implantation in 48 lesions and balloon only in 6 lesions

Patient characteristics

(N = 49)

Sex (M/F)	26/23
Age (y/o)	62.5 ±16.2
Serum creatinine	2.2 ± 1.6
≥ 1.5 mg/dl	63.2% (31/49)
Anti-HTN drugs	2.3 ± 1.0
Combined CAD	67.4%
3V	34.9%
2V	16.3%
1V	16.3%

Patient characteristics

Coexist risk factor	
Hypertension	100%
Dyslipidemia	37.2% (21/49)
Diabetes mellitus	38.8% (19/49)
Smoking	22.4% (11/49)
Angiography %DS	74.4 ± 12.8
MLD (mm)	1.7 ± 2.3
RVD (mm)	5.7 ± 1.3

Definition

- Significant renal artery stenosis: $>50\%$ diameter stenosis and peak to peak pressure gradient ≥ 20 mmHg
- Procedure success: peak to peak pressure gradient ≤ 5 mmHg
- Acute renal failure: creatinine elevation ≥ 0.5 mg/dl or double
- Major complication: blood transfusion, peri-renal hematoma, artery aneurysm

Transfemoral procedure (before 2002)

- Femoral artery approach
- 8F guiding catheter (JR, MP, renal guide)
- 0.035 guidewire
- Easy Wall stent

Transradial approach

(After 2002)

- Left radial artery approach
- Boston 6F Kimny mini radial or 7F JR, K-R guiding
- 0.018 (V18) guidewire, 0.014 guidewire, or 0.035 Amplatz extra-support guide wire (without guiding support)
- Express-II (diameter of 4-5 mm) or Express LD stent (diameter of 6-8 mm)

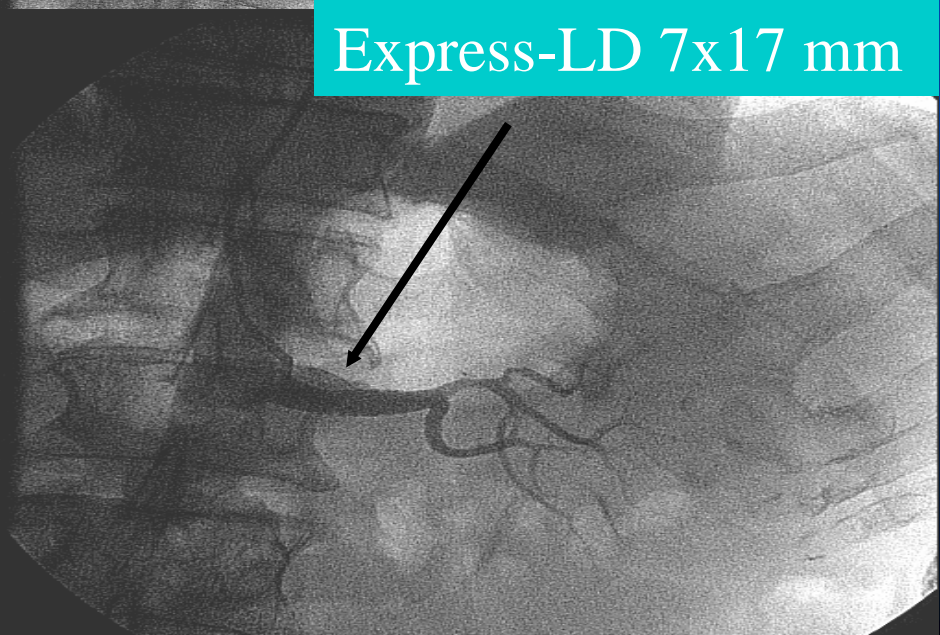
A 62 y/o Male, severe H/T with flush pulmonary edema



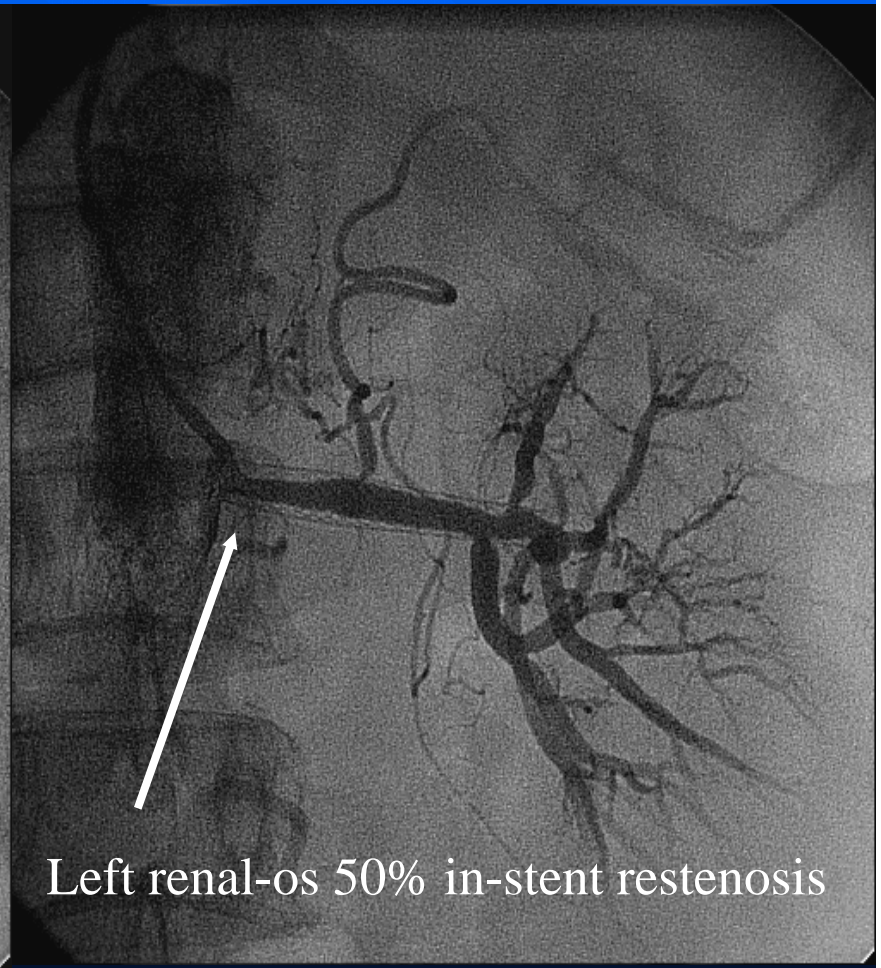
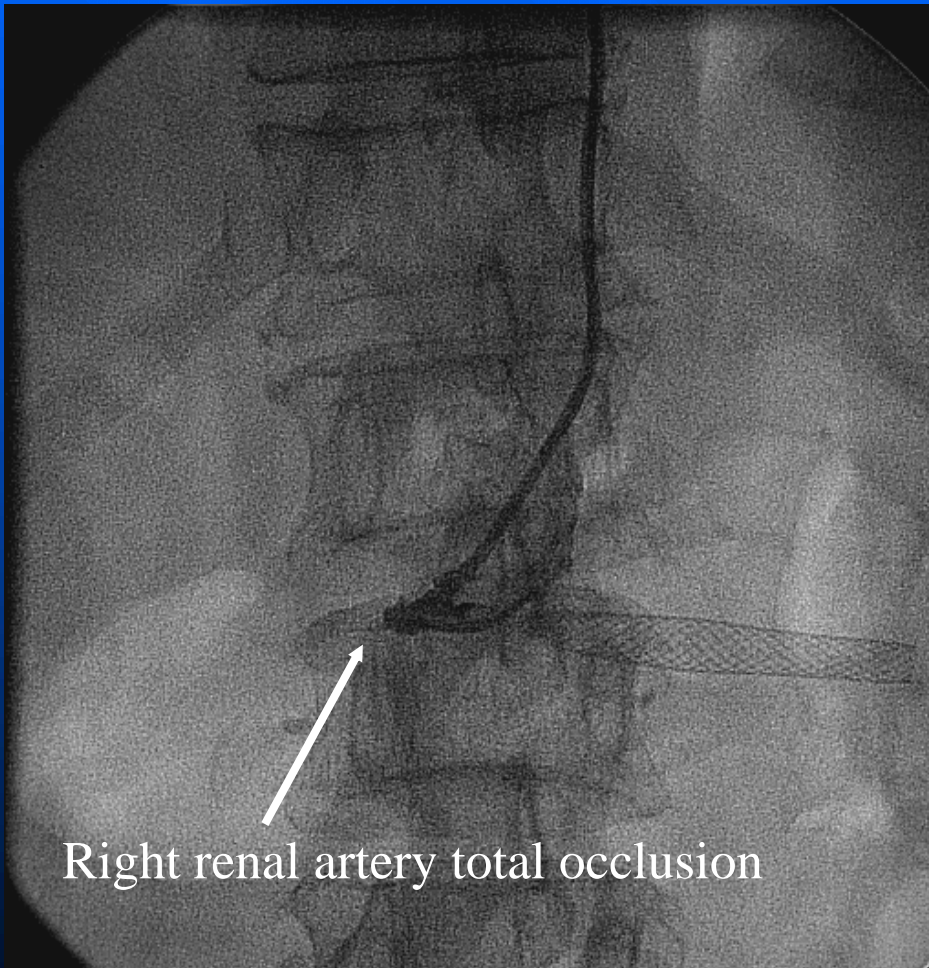
Express-II 5x20 mm stent



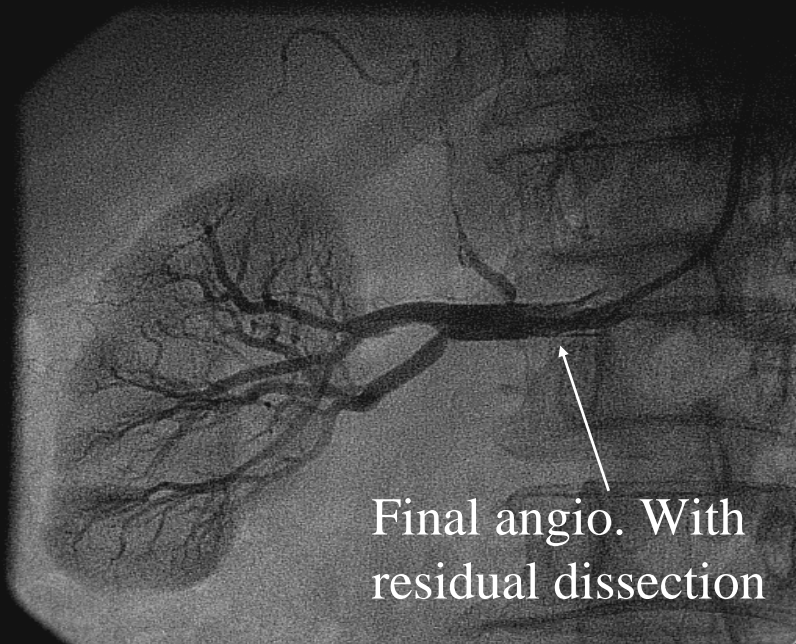
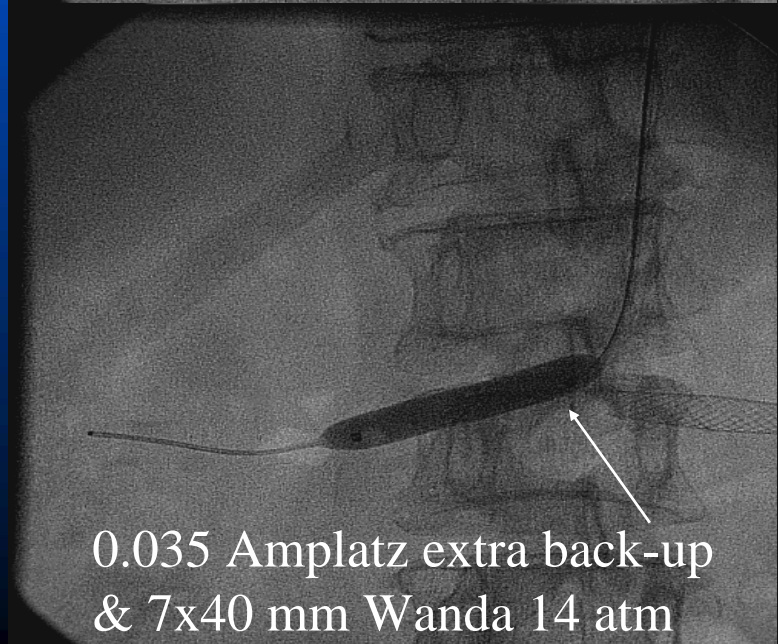
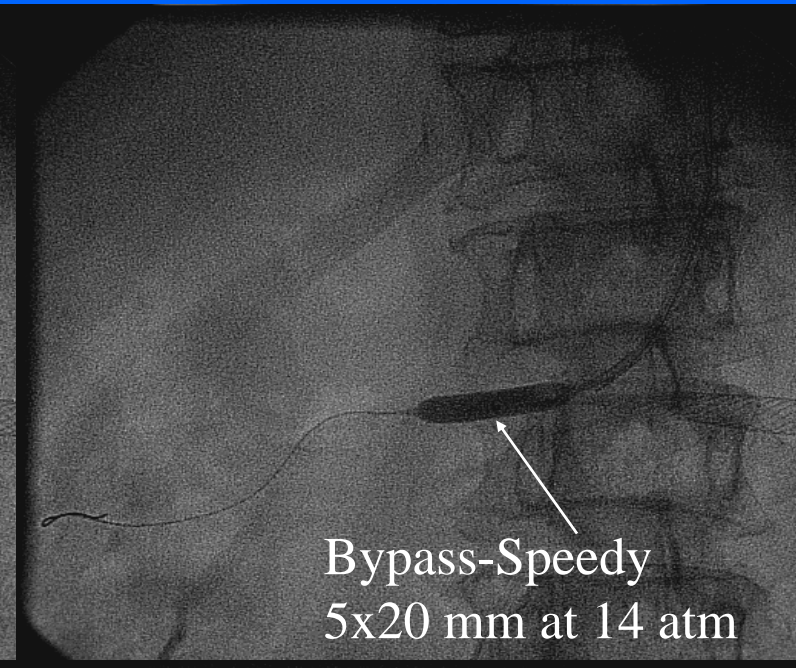
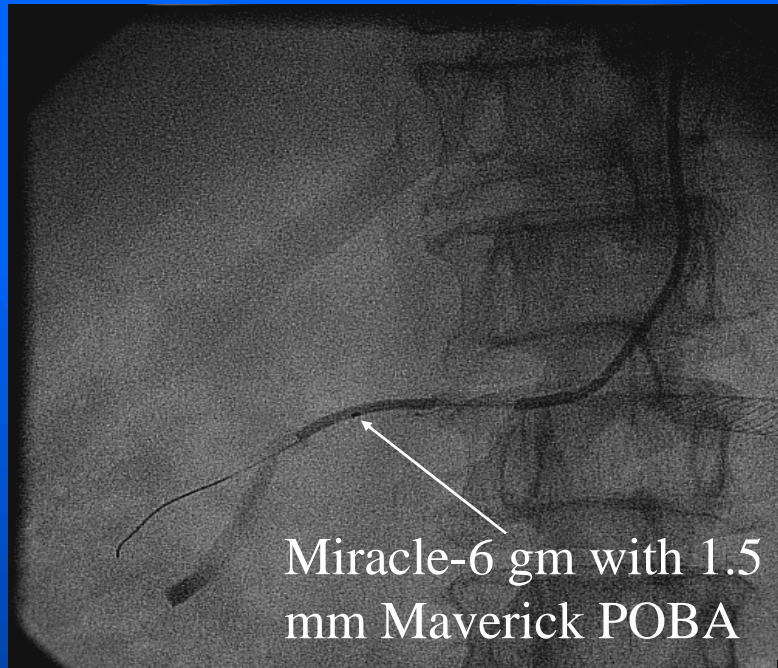
Express-LD 7x17 mm



A 59 y/o female, severe H/T, hyper-cholesterolemia,
with non-critical CAD (RCA), h/o left renal
stenting with right renal artery total occlusion

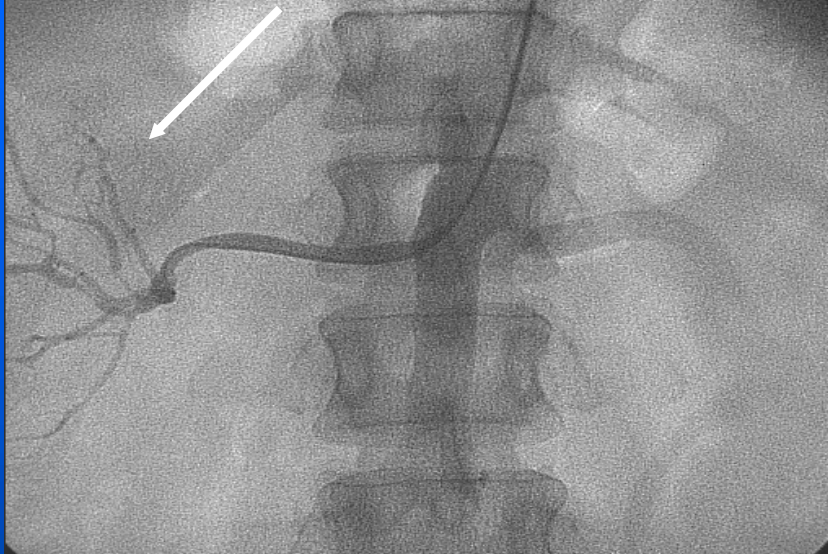


Right renal artery total occlusion s/p successful PTA

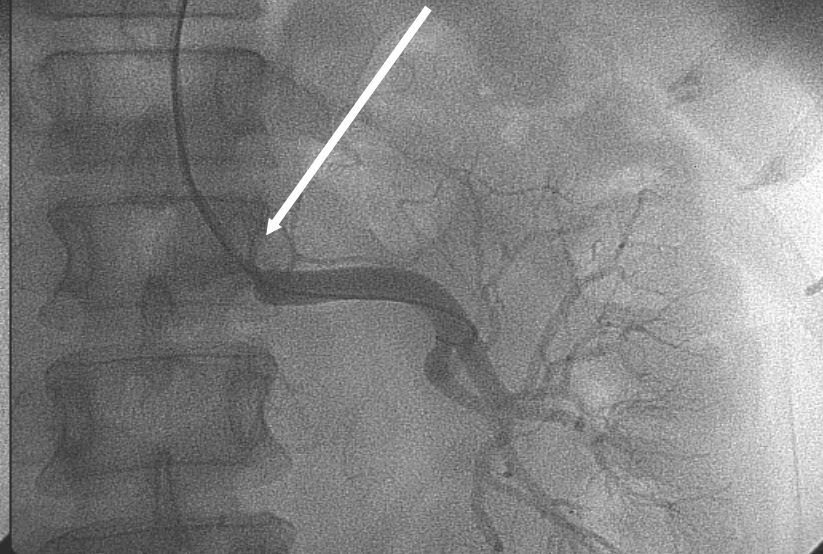


A 52 y/o female, NIDDM, poor BP control with Cr = 2.8 mg/dl

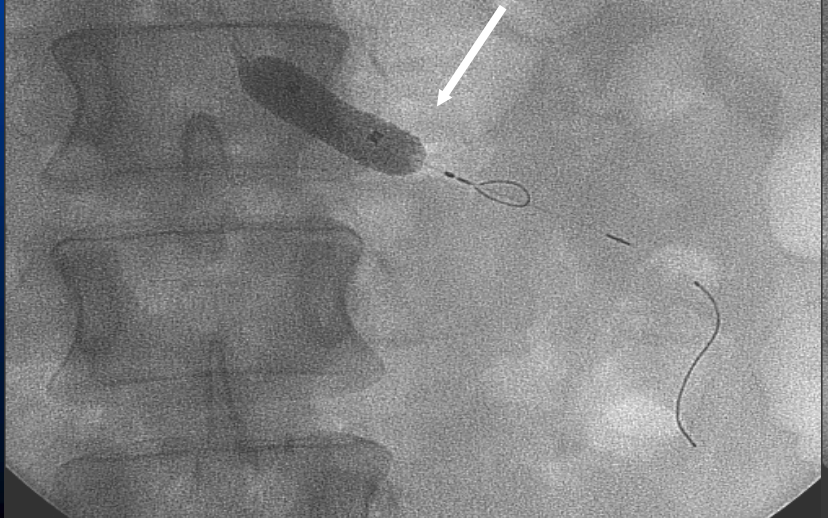
Atrophy of Rt kidney



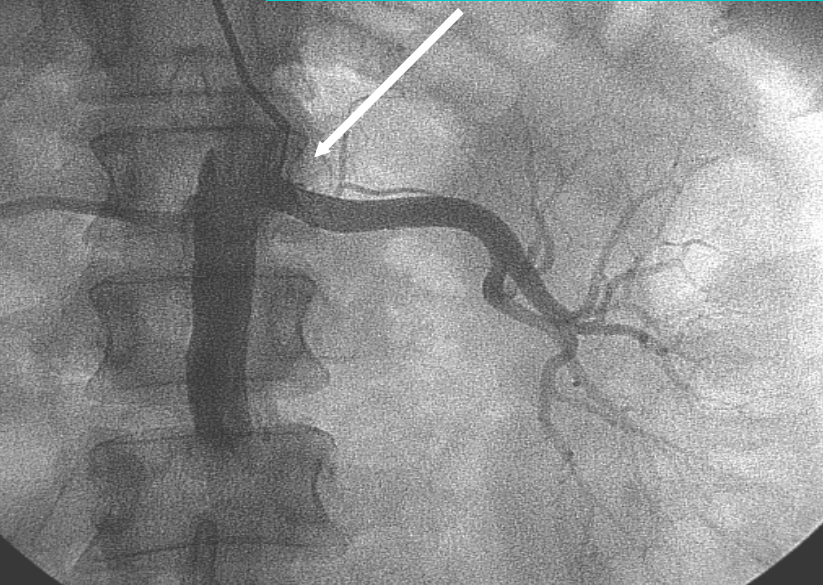
Lt renal-os 70% stenosis



Express-LD 6x17 mm stenting
with EPI-Filter protection



Final DS 10% residual



Result -I

- Procedure success: 98.1% (53/54), failed guiding engagement via RFA approach due to AAA
- Angiography result:
 - %DS 12.0 ± 12.1
 - MLD 5.4 ± 1.5 (mm)
 - RVD 6.1 ± 1.3 (mm)
- Post procedure (48 hrs):
 - Creatinine = 2.4 ± 1.7 mg/dl
 - Acute renal failure occurred in 16% (8/49)
 - renal function improve in 6.0% (4/49)
 - anti-hypertension medication: 2.1 ± 1.1

Results-II

- **In-hospital death occurred in 1 (PTA failure pt with triple vessel CAD after CABG)**
- **Major complication: 6 (11%)**
 - wound hematoma: 2 (groin)**
 - retro-peritoneal hematoma: 2 (TR 1, TF 1)**
 - blood transfusion: 2**
 - renal artery dissection: 2**
 - femoral artery occlusion: 1**

Result -III

- **Clinical follow-up: 24.2 ± 19.6 (1- 64) Mo.**
- **Death: 8/49 (16.3%)**
 - cardiac death: 5**
 - Non-CV death: 3 (sepsis, traffic accident)**
- **Deterioration of renal function & required maintenance hemodialysis in 4/49 (8.2%)**
- **Free of anti-H/T medications in 2 (age 22 & 24 y/o)**

Result-IV

- **Angiographic follow-up in 16 artery
mean 10.2 ± 6.9 Mo.**
- **Restenosis occurred in 3 (18.7%), post balloon
PTA restenosis in one (1/2, 50%) and stenting
restenosis in two (2/14, 14.3%)**

TR vs TF

	TR (24)	TF (30)
Procedure success	100%	96.7%
Wound hematoma	0 %	3.2% (2/30)
Blood transfusion	4.2% (1/24)	1.6% (1/30)
Arterial occlusion	0%	1.6% (1/30)

Conclusion-I

- Renal artery PCIs is feasible and safe via either trans-femoral or trans-radial approach
- Trans-radial had significant lower rate of vascular complications
- Contrast nephropathy easily to occurred in pts with preexisting renal function impairment

Conclusion-II

- Renal artery PCI had no improvement of renal function after procedure, but had a better blood pressure control
- Renal artery stenting is better than balloon angioplasty

Limitation, Tips & Tricks

- Relative small group in Single Center experience without randomization
- TR approach for BH > 170 cm or tortuous DsAo required longer guiding (110-125 cm long guide), but currently available coronary guide only 100 cm in length
- For reference vessel ≤ 5.5 mm renal artery, Coronary Express-II with 6F guide is OK, if renal artery > 5.5 mm, Express-LD peripheral stent required 7F guide or without guiding also feasible