



BUILDING  
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# Percutaneous recanalization of occluded renal arteries in patient with resistant hypertension and high rennin activity

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# DISCLOSURES

- I do not have any potential conflict of interest regarding this presentation

### EUROPE

**EUROPEAN UNION**

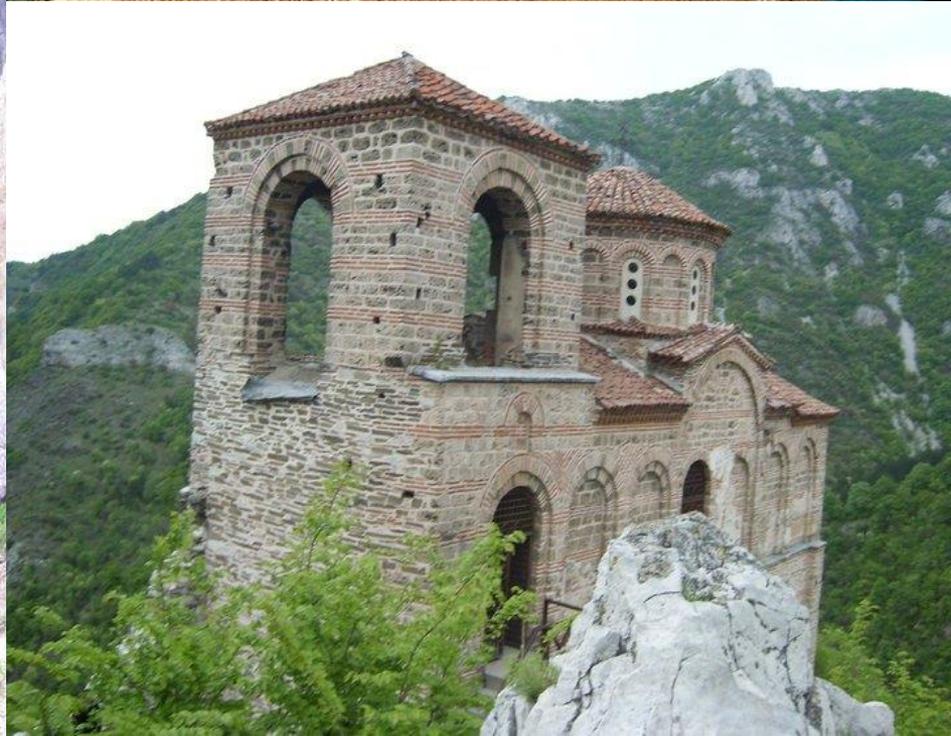
- EU Member - 2007
- EU Member States
- EU New Members 2004
- EU Candidates
- EFTA Member States

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# BACKGROUND (1-2)

- Hypertension affects more than 25% of the worldwide adult population. (1) Although the vast majority have essential hypertension, it is important to identify patients with secondary treatable causes of hypertension, especially atherosclerotic RAS, the most common cause of renovascular hypertension. (2) The DRASTIC , CORAL study showed that renal stenting resulted in improvement of blood pressure and reduce the number of antihypertensive medications. (3) The ASTRAL study showed that is no significant difference between the group with renal stenting and group medical therapy

1. (Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, HeJ. Global burden of hypertension: analysis of worldwide data. Lancet2005;365:217–23.).

2. ( Spitalewitz S, Reiser IW. Atherosclerotic renovascular disease. Am J Ther 1996;3:21– 8.).

3. ( van Jaarsveld BC, Krijnen P, Pieterman H, et al. The effect of balloon angioplasty on hypertension in atherosclerotic renal-artery stenosis.Dutch Renal Artery Stenosis Intervention Cooperative Study Group.; CORAL clinical trial. Available at: [www.coralclinicaltrial.org](http://www.coralclinicaltrial.org). Accessed May 10, 2005) .

# BACKGROUND (2-2)

- In SCAI Expert Consensus Statement for Renal Artery Stenting Appropriate Use - PTA in unilateral, solitary, or bilateral renal artery chronic total occlusion is considered to be rarely appropriate (1).
- We want to prove that in patients with totally occluded renal arteries, but preserved microcirculation by collateral filling and high rennin activity recanalization of the renal occlusion leads to significant reduction of blood pressure and reduced need for antihypertensive medications.

1. Parikh S, Shishehbor MH, Gray BH, White CJ, Jaff MR. SCAI expert consensus statement for renal artery stenting appropriate use. *Catheterization and Cardiovascular Interventions*, 2014; DOI: [10.1002/ccd.25559](https://doi.org/10.1002/ccd.25559).

# MATERIALS AND METHODS (1-2)

- Between 2009 - 2015 we have done 57 renal artery PTA and stenting. Among them 6 patients (10%) with total renal artery occlusions.  
Percutaneous recanalization was attempted in 7 cases, success was achieved in 6 (85%).
- All patients were hypertensive, before the procedure with mean values of BP 161/90 mmHg under systematic antihypertensive treatment with at least 3 antihypertensive agents. In all patients plasma renin activity (PRA) was more than 2.76 ng/ml/h) before the procedure. The patients had duplex signs of occluded renal artery and partially preserved subsegmental blood flow by collaterals.

# MATERIALS AND METHODS (2-2)

- Two of the patients were with normal serum creatinine level; one was with end stage kidney disease (EKD) and was receiving chroniodialysis. The other three patients had slightly increased creatinine levels and in two of them those levels normalized and in one there was no significant change after the procedure.
- For recanalization of the occlusions of the renal arteries we used coronary CTO techniques (hydrophilic wires, low profile OTW balloons) and 6Fr GC with preferred radial approach (in 5 out of 7 (71%).

# Renal CTO recanalization

n	Initials	gender	age	renal	etiology	IR*	PRA**	Average BP (mmHg)		Guide wire 0.014"	Balloon (mm)	Stent (mm)	succes
								S	D				
1	TKT	female	39	left	FMD	0.65	3.50	163	10 2	Asahi Grand Slam	Ryujin 2,5x15	Dynamic Renal 5x19	yes
2	RIN	female	31	left	FMD	0.55	2.98	181	11 2	Miracle 6.0	Ryujin 1.25x15	Xience V 4.0x28	yes
3	IIM	male	61	left	Athero	0.63	3.02	167	97	Miracle 6.0	NA	NA	no
4	STN	male	72	right	Athero	0.70	3.11	158	84	Miracle 6.0	NA	NA	yes
5	VNP	male	36	right	FMD	0.62	2.86	170	98	Miracle 3.0	Ryujin 1.25x15	Infinium 3.25 x29	yes
6	TKP	female	51	left	Takayasu	0.67	2.57	159	94	Miracle 6.0	Sprinter	Hypocamp	yes
7	FMF	male	15	left	Dissection	0.63	3.45	172	79	Whisper	Sprinter	Racer	yes

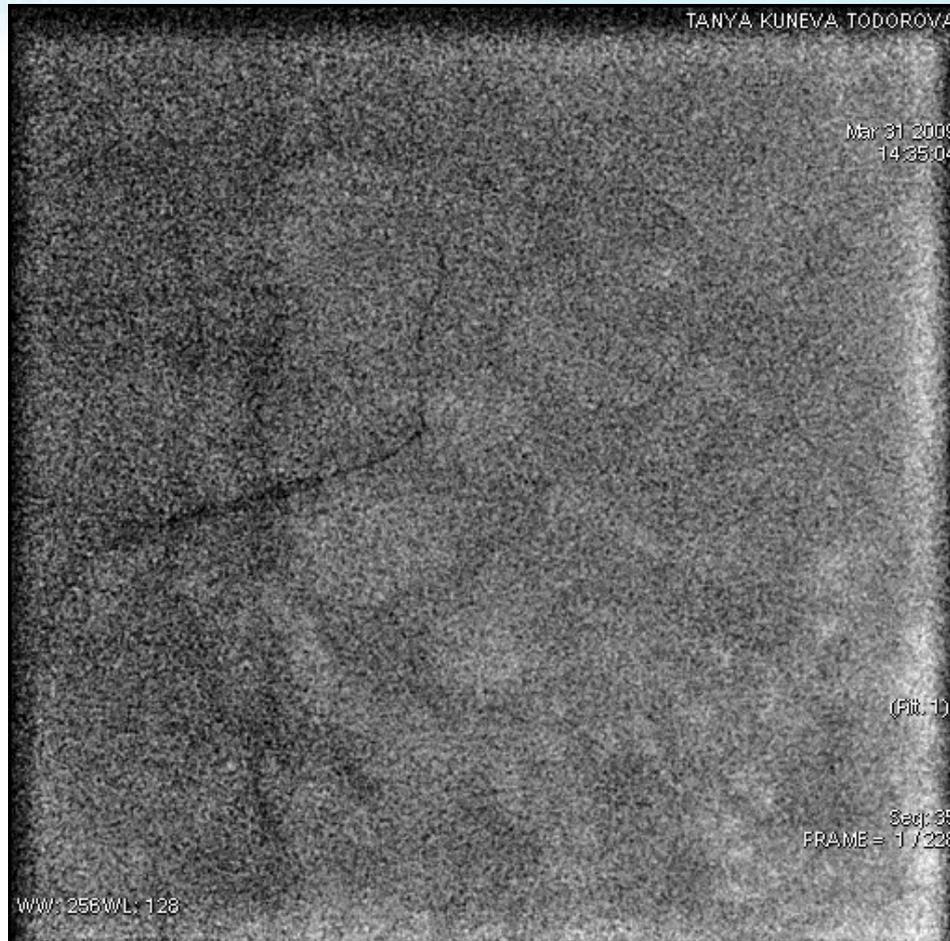
# Follow-up

		PRA (30d.)	BP(30d.)	Restenosis 6m	Reintervention	Secondary patency	Survival 1 y
		1.5	137/85	2	2	6 (100%)	6(100%)
1	TKT	0.37	98/59	yes	yes	yes	yes
2	RIN	1.1	157/97	no	yes	yes	yes
3	IIM	4.7	189/113	-	-	-	yes
4	STN	0.9	135/87	no	yes	yes	yes
5	VNP	1.4	143/99	no	yes	yes	yes
6	TKP	1.9	110/68	yes	yes	yes	yes
7	FMF	0.76	115/70	no	yes	yes	yes

Example- recanalization of left renal CTO in a 42 y old patient with extremely resistant AH with BP values reaching 240/1200mmHg on 5 medications treatment



# Dynamic Renal (Biotronik) 5.0/18mm implantation after recanalization



# Final result after recanalization and stenting



# 53 y old female before and after recanalization and stenting of left renal



# Discussion

Recanalization of renal CTO is rarely done and not indicated as a standard procedure

Published several case reports- it is probably feasible using coronary CTO techniques

In case of chronic renal artery occlusion renine production is preserved in case there is collateral flow sufficient to maintain juxtaglomerular apparatus even in kidney with no excretion

These patients with preserved vascular microcirculation are the most probable candidates for recanalization and stenting as part of the BP control treatment

In some cases of young patients with high PRA levels, recanalization of renal CTO is curative

1. Sezer et al. Nephrol Dial Transplant (2003) 18: 2663–2664
2. Yokoy, Kawarada Endovascular today (2007)

# CONCLUSION

- Renal artery CTO with preserved parenchymal flow is a rare but potentially unfavorable anatomical situation related to renovasal hypertension
- Recanalization and stenting of renal artery CTO is feasible and safe using protocols close to coronary CTO techniques
- In case of renal occlusion and resistant AH, the most probable mechanism of AH is the preserved vascular microcirculation allowing juxtaglomerular survival and renin production.
- On the same time the preserved microcircular perfusion is predictor for PRA lowering and blood pressure control success after opening a renal CTO.
- There is evidence of direct relationship between preserved parenchymal flow and the expected post interventional result regarding the BP control, confirmed in our cases.

Thank You

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