Outcomes in Patients Undergoing Percutaneous Interventions for Transplant Renal Artery Stenosis

UC DAVIS SCHOOL OF MEDICINE

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INTRODUCTION

Transplant renal artery stenosis is a serious complication of renal transplantation that can result in graft failure and patient mortality and has an incidence of 8.3 cases per 1000 patient-years[1]. Endovascular interventions including percutaneous transluminal angioplasty (PTA) without or with stenting (PTAS) have been shown to be effective in treating this complication in small studies, but there is a lack of large studies, especially those comparing PTA to PTAS[2-4]. We present one of the largest retrospective studies to date analyzing outcomes of endovascular intervention in TRAS.

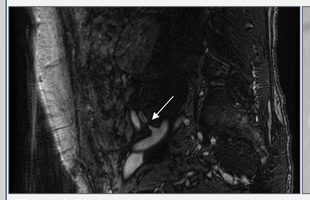


Figure 1. Magnetic resonance angiogram (MRA) with Ferraheme demonstrates focal narrowing (white arrow) of the transplant renal artery near the anastomosis with the external iliac artery.

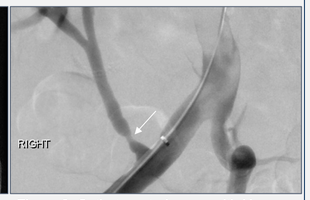


Figure 2. Catheter arteriogram with IA contrast demonstrates focal high-grade stenosis (white arrow) of the transplant renal artery near the anastomosis with the external iliac artery.

METHODS

A retrospective analysis was performed of approximately 2918 renal transplants done at UC Davis between August 2010 and July 2021. Montage analytics software was used to scan all radiology reports for any study involving transplant renal angiography. SPSS was used for data analysis.

- 163 patients received at least one intervention or arteriogram after undergoing MR angiography.
- Total of 203 catheter arteriograms performed (some arteriograms were diagnostic only).
- Primary outcome: Primary TRAS patency rates after intervention, Overall Survival, Graft Survival
- Secondary outcome: Graft function (i.e. serum creatinine, blood pressure)

Inclusion Criteria:

- Patients who received a renal transplant and were found to have transplant renal artery stenosis on follow-up imaging (catheter arteriogram or MRA) between August 2010 and July 2021

Exclusion Criteria:

- Patients without catheter arteriogram to confirm TRAS
- Patients with less than 1 year of follow-up

RESULTS

Table 1. Patient Demographics (n=163)

Mean Age (Years)	55.2
Ethnicity	
Hispanic	32.1%
Gender	
Female	27.4%
Male	72.6%
Race	
White	59.4%
Asian	17.3%
African American or Black	9.5%
American Indian or Alaska Native	0.6%
Native Hawaiian or PI	1.8%
Other or Not Specified	11.3%
Medical Co-morbidities	
Type II Diabetes Mellitus	50.6%
Hypertension	88.1%
Coronary Artery Disease	17.9%
Peripheral Arterial Disease	5.4%
Cerebrovascular Accident	4.2%

Figure 3. Catheter arteriogram of left transplant renal artery demonstrates short segment stenosis (red arrow) with decreased flow and poor visualization of transplanted kidney parenchyma.

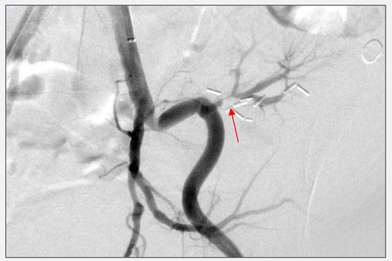


Figure 4. Catheter arteriogram of left renal transplant artery post-angioplasty and stenting demonstrates improved caliber of renal artery and visualization of transplanted kidney parenchyma.

RESULTS (Cont'd)

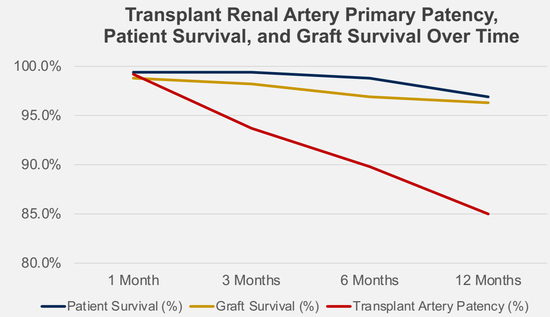
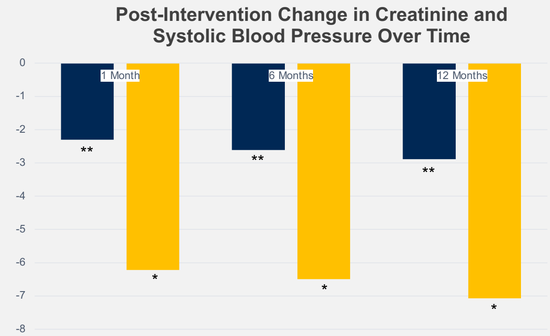


Figure 5. Overall patency of transplanted renal artery, patient survival, and graft survival over time as proportion of total (N=163).



* p < 0.01
** p < 0.05

Figure 6. Differences in creatinine and systolic blood pressures compared to pre-intervention values using paired samples t-test in patients undergoing angioplasty, stenting, or both.

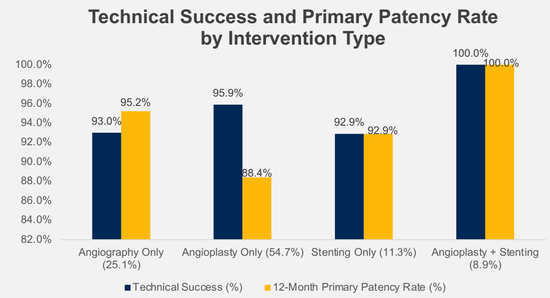


Figure 7. Type of interventions performed and proportion of total interventions (including arteriogram) are reported in x-axis (n=203). Technical success and primary patency rate are reported for the initial intervention or arteriogram for each patient (n=163).

RESULTS (Cont'd)

Out of 203 arteriograms for transplant renal artery stenosis, there were 152 interventions performed; 73% angioplasty only, 15% stenting only, and 12% which involved both angioplasty and stenting. Of stented patients, 37% of stents were placed primarily and the remaining 63% were placed as a secondary intervention for refractory stenosis or as a for bail-out strategy.

Overall graft survival was 87% after a mean follow-up of 6.04 years. Of patients who received an intervention, there was 88% graft-survival. Graft failure occurred at a mean of 3.44 years post-intervention. Of the 15 patients who had graft failure, only 1 graft failed due to refractory transplant renal artery stenosis.

Primary patency rate was 86.2% after a mean follow-up of 2.6 years. 3-, 6-, and 12-month rates were 93.9%, 91.6%, and 89.3%, respectively. When further stratified, primary patency rates for primary stents were 87% compared to 84% for angioplasty alone (p=0.9) .

CONCLUSIONS

At a single-center, the analysis of a decade of endovascular interventions for TRAS shows that angioplasty and/or stenting have reasonable mid-term patency. Angioplasty only strategy has no significant difference in patency rates compared to a stent only strategy. However, for stenting used in combination with angioplasty or as repeat interventions for refractory stenosis and bail-out strategy, the data demonstrates improved patency rates and improved graft survival.

Further research is needed to determine whether there are differences in angioplasty vs. stenting and to measure the difference in outcomes between those undergoing endovascular intervention and those without intervention or undergoing conservative management.

REFERENCES

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