

# Supra-renal versus Infra-renal Graft Fixation Does Not Affect Outcomes After Endovascular Aortic Aneurysm Repair in Patients with Favorable Neck Anatomy

Molly Ratner MD<sup>1</sup>, Caron Rockman MD<sup>1</sup>, William Johnson MD<sup>1</sup>, Todd Berland MD<sup>1</sup>, Thomas Maldonado MD<sup>1</sup>, Neal Cayne MD<sup>1</sup>, Virendra Patel MD<sup>2</sup>, Jeffrey J, Siracuse MD MBD<sup>3</sup>, Glenn Jacobowitz MD<sup>1</sup>, Bhama Ramkhelawon MD<sup>1</sup>, Heepeel Chang MD<sup>4</sup>, Karan Garg MD<sup>1</sup>

1. NYU Langone Health, New York, NY
2. New York Presbyterian/Columbia University Medical Center, New York, NY
3. Boston Medical Center, Boston, MA
4. Westchester Medical Center, Valhalla, NY

## BACKGROUND

The decision to choose an endograft with or without supra-renal fixation for the treatment of aortic aneurysm remains debatable. Supra-renal fixation is thought to enhance stable proximal sealing but comes at the cost of placing metal struts across the renal artery ostia. As such, literature to date has focused on quantifying the risk of supra-renal graft fixation on postoperative renal function. This study aims to assess the effect of graft fixation on renal function as well as other intra- and post-operative outcomes.

## METHODS

The Vascular Quality Initiative was queried from 2012-2022 to identify patients undergoing EVAR for infra-renal AAA. Patients with hostile neck anatomy were excluded (defined as aortic neck diameter >28mm, aortic neck length < 15 and angulation > 60 degrees). Patients were stratified based on supra-renal versus infra-renal graft fixation. Primary outcomes were post-operative complications, including endoleak, as well as aortic related reintervention.

In this large study of patients in the VQI with favorable neck anatomy undergoing EVAR, supra-renal graft fixation, compared to infra-renal graft fixation, was associated with increased incidence of endoleak overall, although there was no difference in the rate of type 1a endoleak. Furthermore, supra-renal graft fixation was associated with increased risk of renal artery encroachment and/or coverage although this was not clinically significant.

## RESULTS

Of the 11,194 patients who underwent EVAR for infra-renal aortic aneurysm with favorable neck anatomy, 2,357 (21.1%) and 8,837 (78.9%) underwent supra-renal versus infra-renal graft fixation, respectively. Patients who underwent supra-renal graft fixation were more likely to be on an aspirin (68.1% vs 63.5%,  $p < .001$ ) or a beta-blocker preoperatively (52.1% vs 49.5%,  $p = 0.026$ ) compared to patients who underwent infra-renal graft fixation. Otherwise, the frequency of standard pre-operative comorbidities (i.e. smoking status, hypertension, diabetes, coronary artery disease, congestive heart failure and renal failure) and medication utilization (i.e. statins, anticoagulants, P2Y12 inhibitors and angiotensin converting enzyme-inhibitors) was similar across the two cohorts (see Table 1). Supra-renal grafts were more likely to be performed in an elective setting (90.5% vs 88.2%,  $p = .002$ ). On completion angiogram, patients who underwent supra-renal, as compared to infra-renal, graft fixation were more likely to have an endoleak (27.8% vs 21.8%,  $p < .001$ ) but there was no statistical difference in the frequency of type 1a endoleak (2.0% vs 2.1%,  $p = 0.760$ ). At one year follow-up, there was a significantly higher re-intervention rate among the supra-renal graft fixation cohort (5.2% vs 3.5%,  $p = .003$ ), however, there was no meaningful difference in the frequency of interventions performed for type 1a endoleak. Although there was a higher rate of renal artery coverage in the supra-renal cohort (2.8% vs 1.8%,  $p = .001$ ), there was no difference in rate of re-intervention for renal artery stenosis/occlusion (0.4% vs 0.2%,  $p = 0.170$ ) or significant difference in creatinine elevation at 12-month follow-up from baseline (0.08 +/- 0.67 vs 0.06 +/- 0.51,  $p = 0.43$ ).

TABLE I

| Variable                 | Infra-renal Graft | Supra-renal Graft | P value |
|--------------------------|-------------------|-------------------|---------|
| Male                     | 7320 (82.8%)      | 1941 (82.4%)      | .581    |
| Age (years)              | 72.9 +/- 8.8      | 73.8 +/- 8.8      | .859    |
| Current Smoker           | 2725 (30.8%)      | 683 (29%)         | .082    |
| Hypertension             | 7226 (81.8%)      | 1912 (81.1%)      | .469    |
| Diabetes                 | 1769 (20%)        | 465 (19.7%)       | .753    |
| Coronary Artery Disease  | 2569 (29.1%)      | 689 (29.3%)       | .870    |
| Congestive Heart Failure | 1053 (11.9%)      | 262 (11.1%)       | .286    |
| Hemodialysis             | 76 (0.9%)         | 15 (0.6%)         | .283    |
| Pre-op Aspirin           | 5605 (63.5%)      | 1604 (68.1%)      | <.001   |
| Pre-op P2Y inhibitor     | 1145 (13%)        | 288 (12.2%)       | .344    |
| Pre-op Statin            | 6214 (70.3%)      | 1704 (72.4%)      | .052    |
| Pre-op beta blocker      | 4373 (49.5%)      | 1223 (52.1%)      | .026    |
| Pre-op ACE inhibitor     | 4047 (45.8%)      | 1070 (45.5%)      | .744    |
| Pre-op Anticoagulant     | 1250 (14.1%)      | 312 (13.2%)       | .262    |

## CONCLUSION

Patients who underwent EVAR with supra-renal graft fixation were more likely to have an endoleak on completion angiogram, however, there was no difference in type 1a endoleak between the two cohorts. As such, higher rates of re-intervention seen in the supra-renal graft fixation group was not driven by proximal leaks. Although renal artery encroachment and/or coverage was more commonly observed after suprarenal graft fixation, there was no significant difference in absolute creatinine elevation at follow-up or dialysis dependence at one year follow-up. Given the equivalent outcomes, surgeon preference and experience should dictate decision to use supra-renal vs infra-renal fixation in patients with favorable neck anatomy.

The authors have no conflicts of interest to report.