

Surveillance After Proximal Aortic Surgery: What Are The Data?

Olaniran Omodara, Sana Khan, Massimo Capoccia, Syed Sadeque,
Govind Chetty, Stefano Forlani, Graham Cooper, Renata Greco

Sheffield Teaching Hospitals Foundation NHS Trust, Sheffield, United
Kingdom

Background

- **Radiological surveillance after major aortic surgery is recommended by current aortic guidelines. Length and frequency of follow-up are not specified, particularly for patients with no history of aortic dissection**
- **A strict radiological surveillance programme following aortic surgery is challenging to organise and only large aortic centres can offer and afford it**
- **The objective of this study is to review our 20 years radiological surveillance data to identify the patients at risk for complications or progression of the thoracic aortic disease**

Method

- **Surgical data and clinical outcomes were prospectively recorded in our electronic database**
- **We included all patients who underwent proximal aortic surgery (root and ascending aorta)**
 - We excluded acute/chronic dissection
- **All aortic patients were offered post-operative surveillance with the aortic team**
- **A CT/MRA was performed within 6 months and yearly after surgery (all the scans were reported by vascular radiologists)**
- **The findings of the first post-operative scan were compared to the last follow-up scan to identify any surgical complications or significant progression (diameter increased $\geq 5\text{mm}$) in the aortic disease**

Pre-Operative Data

- 565 patients underwent proximal aortic surgery between 2003 and 2022

	Ascending Aorta	Aortic Root	Total
Number of patients	274 (48.5%)	291 (51.5%)	565
Age (years)	61.85 ± 6.36	54.54 ± 13.98	58.08 ± 13.64
Sex (F)	88 (32.12%)	51 (17.53%)	139 (24.6%)
Elective	235 (85.77%)	249 (85.57%)	484 (85.66%)
Redo-surgery	19 (6.93%)	18 (6.19%)	37 (6.55%)
Marfan's/Loeys-Dietz's Syndrome	0	34 (11.68%)	34 (6.02%)
Bicuspid aortic valve	148 (54.01%)	108 (37.11%)	256 (45.31%)
Endocarditis/infection	6 (2.19%)	17 (5.84%)	23 (4.04%)
EuroScore I	14.52 ± 4	11.78 ± 12.55	13.11 ± 12.55

Operative Data and Outcomes

	Ascending Aorta (274)	Aortic Root (291)	Total (565)
Open distal anastomosis	47 (17.14%)	27 (9.28%)	74 (13.1%)
Mechanical aortic valve	125 (45.62%)		125 (22.12%)
Bioprosthetic aortic valve	104 (37.967%)		104 (18.41%)
Aortic valve repair	5 (1.82%)		5 (0.88%)
VSRR		39 (13.4%)	39 (6.9%)
Bio-Valsalva		22 (7.56%)	22 (3.89%)
Homograft		2 (0.69%)	2 (0.35%)
In-hospital death	6 (2.19%)	18 (6.19%)	24 (4.25%)
Length of stay (days)	13.3 ± 2.12	12.96 ± 13.92	13.13 ± 13.43
Re-intervention at follow-up	3 (1.09%)	3 (1.03%)	6 (1.06%)

Early Follow-up

	Ascending Aorta (274)	Aortic Root (291)	Total (565)
CT/MRA FU	210 (77%)	246 (84.54%)	456 (80.71%)
FU length (months)	5.79 ± 5.56	7.66 ± 9.53	6.79 ± 7.96
Pseudo-aneurysm	0	0	0
Peri-graft collection	17 (8.10%)	9 (3.66%)	26 (5.70%)
Residual disease	44 (20.85%)	17 (6.91%)	61 (13.38%)
- Root ≥45mm	14 (6.67%)	n/a	14 (3.07%)
- Distal ascending ≥45mm	17 (8.10%)	11 (4.47%)	28 (6.14%)
- Descending ≥45mm	22 (10.48%)	9 (3.66%)	31 (6.80%)

Late Follow-up

	Ascending Aorta (274)	Aortic Root (291)	Total (565)
CT/MRA FU	204 (74.45%)	238 (81.79%)	442 (78.23%)
FU length (years)	6.50 ± 9.35	7.43 ± 4.27	7.00 ± 7.08
Pseudo-aneurysm	2 (0.98%)	2 (0.84%)	4 (0.90%)
Peri-graft collection	4 (1.96%)	3(1.26%)	7 (1.58%)
Significant progression ≥5mm	19 (9.31%)	9 (3.78%)	28 (6.23%)
- Root	2 (0.98%)	n/a	2 (0.45%)
- Distal ascending	4 (1.96%)	7 (2.94%)	11 (3.49%)
- Descending	14 (6.86%)	3 (1.26%)	17 (3.85%)

Clinical Follow-up

- **6 patients (1.06%) required a re-operation: 2 pseudo-aneurysm repair; 1 root replacement for aneurysm; 3 re-do AVR**
- **2 pseudo-aneurysms originated from the coronary re-implantation site occurred at an early stage of the follow-up (2.3 and 11.1 months)**
- **2 delayed pseudo-aneurysm formations were observed at 2.5 and 6 years, both patients had residual descending thoracic disease**
- **2 patients required an endovascular procedure: 1 thoracic endovascular aortic repair (TEVAR) and 1 fenestrated endovascular repair (FEVAR)**

Adverse Outcomes

- **32 patients had an adverse outcome: 4 pseudo-aneurysm + 28 significant progression of the aortic disease**
- **Residual aortic disease after surgery and peri-graft collection ($p < 0.001$) were the 2 radiological signs associated with adverse clinical outcome**

Conclusions

- **Early post-operative scan alone is not sufficient to exclude surgical complications**
- **The two radiological factors associated with adverse clinical outcome were the presence of peri-graft collection and residual aortic disease at early post-operative scan**
- **Aggressive surgical treatment of aortic diseases should be considered at the time of surgery**
- **Strict follow-up should be recommended for the first 5 years after surgery**
- **Longer follow-up should be mandatory for patients with residual aortic disease**