EVAR in the Aortic Arch

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New insights into an old problem CHU Liège, FAD, APF

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Aortic Arch Zones



Ishimaru-classification

Aortic Arch Zones



Ishimaru-classification

Specifics of the Aortic Arch

- Branch vessels
 Patency / endoleak
- * Pulsatility Oversizing / migration
- * Curvature Conformity / infolding
- * Access Distance / profile



Descending Thoracic Aorta

Comparative studies

n = <mark>5888</mark>

TAA and Dissection

TEVAR better

- * 30d mortality
- * Paraplegia
- * Transfusion
- * Cardiac compl.
- * Renal function
- * Pneumonia
- * Reoperation
- * Length of stay

Endovascular Aortic Repair Versus Open Surgical Repair for Descending Thoracic Aortic Disease

A Systematic Review and Meta-Analysis of Comparative Studies

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London, Ontario, Canada; Phoenix, Arizona; Middlesbrough and Newcastle upon Tyne, United Kingdom; Brescia, Italy; Lausanne and Zurich, Switzerland; and Leuven, Belgium

Objectives	The purpose of this study was to determine whether thoracic endovascular aortic repair (TEVAR) reduces death and morbidity compared with open surgical repair for descending thoracic aortic disease.			
Background	The role of TEVAR versus open surgery remains unclear. Metaregression can be used to maximally inform a tion of new technologies by utilizing evidence from existing trials.			
Methods	Data from comparative studies of TEVAR versus open repair of the descending aorta were combined through meta- analysis. Metaregression was performed to account for baseline risk factor imbalances, study design, and thoracic pathology. Due to significant heterogeneity, registry data were analyzed separately from comparative studies.			
Results	Forty-two nonrandomized studies involving 5,888 patients were included (38 comparative studies, 4 registries). Patient characteristics were balanced except for age, as TEVAR patients were usually older than open surgery patients ($p = 0.001$). Registry data suggested overall perioperative complications were reduced. In comparative studies, all-cause mortality at 30 days (odds ratio [OR]: 0.44, 95% confidence interval [CI]: 0.33 to 0.59) and paraplegia (OR: 0.42, 95% CI: 0.28 to 0.63) were reduced for TEVAR versus open surgery. In addition, cardiac complications, transfusions, reoperation for bleeding, renal dysfunction, pneumonia, and length of stay were reduced. There was no significant difference in stroke, myocardial infarction, aortic reintervention, and mortality beyond 1 year. Metaregression to adjust for age imbalance, study design, and pathology did not materially change the results.			
Conclusions	Current data from nonrandomized studies suggest that TEVAR may reduce early death, paraplegia, renal insuffi- clency, transfusions, reoperation for bleeding, cardiac complications, pneumonia, and length of stay compared with open surgery. Sustained benefits on survival have not been proven. (J Am Coll Cardiol 2010;55:986-1001) © 2010 by the American College of Cardiology Foundation			
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Descending Thoracic Aorta

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30 day mortality TEVAR vs. OR

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	Odds ratio	Lower limit	Upper limit	p-Value
Demetriades 08	0.25	0.10	0.61	0.00
Fairman 08	0.24	0.08	0.75	0.01
Matsumura 08	0.32	0.07	1.45	0.14
TAG 99-01/03-03	0.16	0.03	0.78	0.02
Multicenter	0.24	0.13	0.44	0.00
Aasland 05	0.25	0.03	2.29	0.22
Akowuah 07	0.33	0.01	9.57	0.52
Amabile 04	0.37	0.01	10.18	0.56
Andrassy 06	0.58	0.09	3.82	0.57
Brandt 04	0.13	0.01	1.16	0.07
Broux 06	0.59	0.09	3.86	0.58
Buz 08	0.33	0.08	1.41	0.13
Chung 08	0.67	0.11	3.95	0.65
Cook 06	0.80	0.19	3.37	0.76
Dick 2008	0.89	0.24	3.33	0.86
Doss 05	0.15	0.02	1.36	0.09
Ehrlich 98	0.25	0.03	2.10	0.20
Geisbusch 09	0.30	0.05	1.91	0.20
Glade 05	0.39	0.07	2.05	0.27
Kasirajan 03	0.25	0.02	3.10	0.28
Keiffer 08	3.48	1.14	10.62	0.03
Kokotsakis 07	0.43	0.02	7.63	0.56
Kuhne 05	0.43	0.02	8.71	0.58
Lebl 06	0.67	0.05	9.19	0.76
McPhee 07	1.33	0.09	20.11	0.84
Midgely 07	0.08	0.00	1.69	0.11
Moainie 08	1.00	0.22	4.51	1.00
Mohan 2008	0.38	0.03	4.87	0.46
Morishita 04	2.00	0.18	22.06	0.57
Najibi 02	0.16	0.01	4.37	0.28
Nienaber 99	0.31	0.01	8.31	0.48
Ott 04	0.32	0.01	7.85	0.49
Pacini 05	0.34	0.02	6.69	0.48
Patel 08	0.30	0.07	1.23	0.09
Reed 06	3.00	0.26	33.97	0.37
Riesenman 07	0.25	0.05	1.27	0.09
Rousseau 05	0.08	0.00	1.43	0.09
Stone 06	0.47	0.19	1.17	0.10
Single center	0.53	0.38	0.74	0.00
Overall	0.44	0.33	0.59	0.00

Statistics for each study





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 $l^2 = 0\%$

Study name

Descending Thoracic Aorta

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Paraplegia or -paresis TEVAR vs OR

Study name	Statistics for each study			
	Odds ratio	Lower limit	Upper limit	p-Valu
TAG 99-01	0.183	0.058	0.581	0.004
Demetriades 08	0.266	0.024	2.990	0.283
Matsumura 08	0.983	0.292	3.307	0.978
Fairman 08	0.494	0.261	0.934	0.030
Multicenter Aasland 05	0.436 0.323	0.225 0.034	0.844 3.080	0.014 0.326
Akowuah 07	0.333	0.012	9.566	0.521
Andrassy 06	0.114	0.006	2.335	0.159
Brandt 04	0.476	0.040	5.671	0.557
Broux 06	0.407	0.015	10.832	0.592
Chung 08	0.063	0.003	1.151	0.062
Cook 06	0.385	0.015	9.995	0.565
Dick 08	1.360	0.185	9.986	0.762
Doss 05	0.871	0.052	14.604	0.923
Ehrlich 98	0.327	0.017	6.177	0.456
Glade 05	0.299	0.032	2.779	0.288
Keiffer 08	0.113	0.006	1.975	0.135
Kokotsakis 07	0.429	0.024	7.632	0.564
Midgely 07	0.413	0.015	11.053	0.598
Mohan 08	0.264	0.010	7.117	0.428
Morishita 04	0.189	0.007	5.073	0.321
Nienaber 99	0.168	0.007	3.902	0.266
Ott 04	0.323	0.013	7.847	0.488
Pacini 05	0.341	0.017	6.687	0.478
Patel 08	0.382	0.033	4.371	0.439
Rousseau 05	0.157	0.008	3.176	0.228
Stone 06	0.759	0.264	2.180	0.608
Single center Overall	0.402 0.415	0.237 0.275	0.683 0.628	0.001



Odds ratio and 95% CI



Favors TEVAR

Any Evidence for the Arch?

- Smaller numbers of patients
- Heterogenity of techniques
- Different specialties involved
- Rapid technical development



Access for Arch TEVAR





Zone 0 – Debranching



Zone 0 – Debranching



Zone 0 – Debranching



Zone 0 – Branched SG



Courtesy of Krassi Ivancev, UCLH London, UK







Courtesy of Krassi Ivancev, UCLH London, UK

Zone 0 – Chimney Graft



Zone 0 – Chimney Graft



Zone 0 – Chimney Graft



Zone 0 – In-Situ Fenestration





Zone 0 – In-Situ Fenestration



Conclusions

*Technique under rapid development and we cannot expect evidence on its role in the near future

*Technique depends on local organisation and team-structure

 Feasible and lifesaving option in patients unfit for surgery

