Endovascular Repair of Juxta and Suprarenal Aortic Aneurysm

Essay

Submitted for the partial fulfillment of

Master degree in general surgery

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2015

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صدق الله العظيم

Acknowledgement

*All praise be to **Allah** and all thanks. He has guided and enabled me by His mercy to fulfill this Essay, which I hope to be beneficial for people.*

*I would like to express my deepest gratitude to **Prof. Dr. Tarek Adel Abd El Azeem** Professor of General and Vascular Surgery Faculty of Medicine, Ain Shams University, for his continuous encouragement, his kind support and appreciated suggestions that guided me to accomplish this work.*

*Words are not enough to express my greatest thanks and deepest appreciations to **Prof. Dr. Essam Abd El Fattah El Kady** Professor of Vascular surgery, Military Medicine Academy, for his comments, ideas and constrictive criticism.*

*Special thanks are extended to **Dr. Mohamed Abd El Monem Abd El Salam Rizk** Lecturer of Vascular Surgery, Faculty of Medicine, Ain Shams University, for his constant encouragement and advice whenever needed.*

Finally I would like to express my gratitude to my family for their unending encouragement, care, love and their warm serenity that gave me the prospect to complete this work.

Mahmoud Mohamed Mohamed Mahmoud

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Abbreviations

AAA	Abdominal Aortic Aneurysm
ASA	American Society Of Anesthesia Classification
CAD	Coronary Artery Disease
CEUS	Contrast Enhanced Ultra Sound
CFA	Common Femoral Artery
CI	Confidence Interval
CLF	Center Line Of Flow
CM	Contrast Media
COPD	Chronic Obstructive Pulmonary Disease
CT	Compued Tomography
DSA	Digital Subtraction Angiography
ECM	Extra Celluar Matrix
EL	Endoleak
ER	Endovascular Repair
EVAR	Endovascular Aortic Aneurysm Repair
FEVAR	Fenestrated Endovascular Aortic Aneurysm Repair
GFR	Glomerular Filtration Rate
GI	Gastrointestinal
IBD	Iliac Branch Device
IMA	Inferior Mesenteric Artery
IRAD	The International Registry of Acute Aortic Dissections

IVC	Inferior Vena Cava
JAA,JRA	Juxtarenal Aortic Aneurysm
MMPS	Matrix Metalloproteinases
MRA	Magnetic Resonance Angiogram
NADH	Nicotinamide Adenine Dinucleotide
NADPH	Nicotinamide Adenine Dinucleotide Phosphate
NR	Not Reported
OR	Odds Ratio
OSR	Open Surgical Repair
PTFE	Polytetrafluoroethylene
SCI	Spinal Cord Ischemia
SMA	Superior Mesenteric Artery
SR	Surgical Repair
SVS	Society For Vascular Surgery
TAAA,TAA	Thoracoaabdomina Aortic Aneurysm
TIMPS	Tissue Inhibitor Of Metalloprotinase
US	Ultra Sonography
VSMCS	Vascular Smooth Muscle Cells

Introduction

Thoracoabdominal aortic aneurysms are defined by contiguous involvement of the descending thoracic aorta and abdominal aorta and account for 5% to 10% of all aortic aneurysms. ***(Isselbacher, 2005)***

The prevalence of isolated TAA is poorly defined but estimated at 6 persons per 100,000 per year. In autopsy records reported from 63% of 70,368 deaths between 1958 and 1985 in the city of Malmo, Sweden, TAAs were diagnosed in 205 of the deceased, 53% of whom were men. ***(Ince H et al., 2007)***

Over 30 years, of approximately 45,000 residents, 72 (0.16%) were diagnosed with a TAA; 61% were women, and 67 patients had thoracic aortic involvement only. Most studies, however, suggest that men are twice as likely to develop a TAA as women, Thoracoabdominal aortic aneurysms occur even more infrequently. ***(Svensjo S et al., 1996)***

Evaluation of a patient with a TAAA, as well as the technical performance of either open or endovascular repair, is closely aligned with the Crawford classification. The classification of TAAAs also has important therapeutic implications for the operation to be performed, as well as the risk for specific complications. ***(Crawford ES et al., 1986)*** ***(Safi HJ et al., 2003)***

The decision when to operate on a patient with a TAAA involves assessment of the likelihood of aortic rupture versus the operative risk of the individual patient. It is unclear at present what the impact of endovascular therapy will be, with its attendant lower short-term mortality and morbidity, on decision making regarding what aortic

diameter should serve as a threshold for TAAA repair. ***(Greenberg RK et al., 2003)***

Size criteria for TAAA repair are not as clearly defined as for infrarenal AAAs because there are no level A or B scientific data regarding the timing of operative intervention. ***(Lederle FA et al., 2002)***

This issue is further complicated by the observation that degenerative TAAAs are often not uniform in size and involve aortic segments of varying diameters and morphology. In addition, it is important to recognize the impact of body size on aortic size. Adjustment for body surface area or height needs to be incorporated into decision making about the threshold for repair and risk for rupture. ***(Davies RR et al., 2006)***

The authors have suggested that repair of TAAAs should be considered in patients with aortas twice the size of a normal continuous segment or approximately 6 cm in diameter. ***(Fann JI, 2002)***

Based on natural history studies that have documented an extremely high risk for rupture and death if left untreated, all patients with TAAAs should be considered for repair. The natural history of ruptured TAAAs was first study extensively by Crawford and colleagues. ***(Coselli JS et al., 2000)***

Contraindications to open repair of TAAA are mainly determined by operative risk factors such as age, impaired cardiac and pulmonary function, poor functional status, and renal insufficiency. Anatomic considerations such as previous thoracotomy and an abdominal stoma can present prohibitive operative risk; in contemporary practice such features will also influence the choice between open and endovascular surgery.

Anatomic complexity in the form of previous aortic grafting procedures is commonly encountered in patients with thoracic and thoracoabdominal aneurysms. ***(Cambria RP et al., 1997) (Coselli JS et al., 2007)***

Complete endovascular repair of TAAA with avoidance of aortic cross-clamping and spinal cord ischemic time and with minimal renal and visceral ischemic time is an attractive concept for high-risk patients who cannot tolerate any open cavitary incision. This can be achieved with the use of branched/fenestrated endografts, which remain investigational at this stage but may provide the least invasive option for treating TAAAs. ***(Chuter TA et al., 2008)***

Even though the application of these branched grafts is currently restricted to individuals who cannot tolerate the open procedure, the indications are expected to broaden as the technology matures and long-term results become more widely available. Patients with an expected mortality rate of greater than 20% with open surgical treatment and whose life expectancy is longer than 2 years may soon be regarded as suitable candidates. ***(Greenberg RK et al., 2008)***

Unsuitable anatomic conditions, characterized by lack of proximal or distal landing zones and significant angulation or stenosis of the visceral arteries precluding access and stent-grafting of the branches, are contraindications to total endovascular treatment of TAAA. Symptomatic or ruptured aneurysms are not currently suitable for this technique because of the lengthy planning process, construction of the devices, and performance of the procedure. Other contraindications to exposure to radiation and intravenous contrast material would also apply. ***(Roselli EE et al., 2007)***