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Long-term Follow up of Patients with Acute Aortic Syndromes: Relevance of both Aortic and Non-aortic Events

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WHAT THIS PAPER ADDS

This study provides a detailed analysis of long-term follow up of patients discharged after type A and type B acute aortic syndromes. In particular, data about aorta related events (death, re-interventions) and non-aorta related events (cardiovascular and non-cardiovascular) were collected and analysed. Data collected over a long time interval (16 years) were analysed.

Background: The aim was to assess the long-term outcome of patients diagnosed with type A and type B acute aortic syndromes (AAS) and the mortality risk predictors.

Methods: A single centre retrospective observational study was performed on consecutive patients diagnosed with AAS and discharged between 2000 and 2016: 242 surgically treated type A, 87 uncomplicated, medically treated type B, and 80 complicated type B who received endovascular/surgical/hybrid treatment. The average follow up of discharged patients was 5 $\pm$ 3.9 years. The mean age was 65.3 $\pm$ 12.5 years, and 70.2% were men. Long-term all cause mortality was 5.4 per 100 patients per year in surgically treated type A AAS patients and 6.7 per 100 patients per year in type B AAS patients ($p = .236$). The rates of major aorta related events were 6.1 per 100 patients per year and 13.4 per 100 patients per year, respectively ($p < .001$). Non-aorta related events during long-term follow up occurred in 18.2 per 100 patients per year in type A and 13.8 per 100 patients per year in type B ($p = .055$).

Conclusions: Among patients with either type A or type B AAS surviving the acute phase, the risk of adverse aorta and non-aorta related events, including death, progressively increases during follow up, so that in the long-term about 70% of patients experience at least one event. Notably, mortality of type B AAS patients overtakes that of type A from the third follow up year onwards.

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INTRODUCTION

Acute aortic syndromes (AAS) include different conditions (intramural haematoma, penetrating aortic ulcer, and aortic dissection) that share aetiological substrates and clinical manifestations.

In type A AAS emergency surgery is the standard treatment and is associated with a 30 day mortality of around 30%.[1,2] Thoracic endovascular aortic repair (TEVAR) has become the treatment of choice for all type B AAS with clinical and/or anatomical complications.[3] Furthermore, recent data from multicentre randomised trials[4] and from the International Registry of Acute Aortic Dissection (IRAD) registry[5] suggest that TEVAR can offer long-term benefit in terms of aortic events even in uncomplicated type B patients, and this has been acknowledged in the most recent European guidelines.[1]

Although a number of studies have analysed long-term aortic complications in AAS[6,7] data regarding the incidence of non-aorta related events in the long term are limited.

The aim was to assess the long-term outcome of patients diagnosed with AAS, including all cause mortality, aorta and non-aorta related events, as well as risk predictors for mortality.

METHODS

Study design

The S. Orsola-Malpighi University Hospital is the referral centre for AAS treatment in a metropolitan hospital

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network that covers Bologna and its surrounding area (catchment area 1,000,000 inhabitants). The series includes all consecutive patients with a final diagnosis of spontaneous AAS (aortic dissection, intramural haematoma, penetrating aortic ulcer), with symptom onset <14 days, referred between January 1, 2000, and December 31, 2016.

Follow up after discharge was obtained through scheduled 1, 6, and 12 month computed tomography (CT) scans and visits, and yearly thereafter for both type A and type B patients. For those patients who were not followed in the centre, follow up information was obtained through telephone calls. The investigation conformed with the principles outlined in the Declaration of Helsinki and the study was approved by the local ethics committee.

Definitions

Major aorta related events included aorta specific mortality (defined as death from documented aortic rupture, heart failure secondary to cardiac tamponade or severe aortic regurgitation, malperfusion, proximal extension in type B patients, and peri-operative mortality), rehospitalisation for aortic complications (progression of aortic pathology causing malperfusion, increasing aortic diameter, progressive false lumen dilation, aortic rupture, redissection, moderate/severe aortic regurgitation) with or without re-intervention.

Non-aorta related events included non-aorta specific mortality (cardiovascular [CV] and non-CV related), rehospitalisation for other CV causes (including acute coronary syndrome [ACS], congestive heart failure, arrhythmia, cerebrovascular accident, bleeding, and other CV causes), and rehospitalisation for non-CV causes. Sudden death was considered aorta related when preceded by signs or symptoms suggestive of cardiac tamponade or aortic rupture. Sudden death was considered cardiac non-aorta related in the remaining cases.

Complications leading to invasive treatment in type B patients included persistent or recurrent pain, uncontrolled hypertension despite optimal medical treatment, malperfusion, early aortic expansion or signs of rupture such as haemothorax, increasing periaortic effusion or mediastinal haematoma.

ECG was considered to be ACS-like in the presence of ≥1 of the following characteristics: (a) ST segment elevation in two contiguous leads with the cut off point ≥0.1 mV in all leads other than V2V3, where the cut off point was ≥0.2 mV; (b) horizontal or down sloping ST segment depression ≥0.1 mV in two contiguous leads; and (c) T wave inversion ≥0.1 mV in two contiguous leads.[8] Shock was defined as a systolic blood pressure persistently lower than 90 mmHg. GFR (glomerular filtration rate) was estimated using the modified Modification of Diet in Renal Disease equation.[9]

Statistical analysis

Categorical variables are expressed as percentages and proportions, and continuous variables are reported as mean ± SD. The chi-square test or the Fisher exact test (for fewer than 5 observations) was used to compare groups for categorical variables, and the two-tailed Student *t* test was used for normally distributed continuous variables. The Benjamini–Hochberg procedure was used to control the familywise error rate in multiple comparisons.

Cox regression was performed to identify predictors of long-term outcome for patients discharged; non-correlated variables with $p < .2$ at univariable analysis were included in the multivariable analysis. Survival analyses were performed using the Kaplan–Meier method. For all statistical comparisons $p < .05$ was considered significant. All analyses were performed with the STATA/SE 12.1 software for Windows (StataCorp LP, College Station, TX, USA).

RESULTS

The study population consisted of 553 consecutive patients with a final diagnosis of spontaneous AAS (347 type A, 206 type B). Patents that died soon after admission and/or those with surgical/endovascular indications who did not undergo surgery because of excessive peri-operative risk were excluded from follow up analyses.

Optimal treatment during the index hospitalisation included surgery for type A AAS (295 patients, 85% of type A patients), medical treatment for uncomplicated type B AAS (91 patients, 44% of type B patients), and endovascular, surgical or hybrid endovascular/surgical treatment for complicated type B AAS (101 patients, 49% of type B patients). Among surgically treated type A patients 63% (186/295) were DeBakey type I.

All follow up analyses were performed on patients who received optimal treatment during the index hospitalisation and were discharged after the acute phase: 409 overall, 242 type A, 87 uncomplicated type B, 80 complicated type B (Supplementary Fig. 1). Average follow up of discharged patients was 5 ± 3.9 years (6 ± 3.8 years for type A and 5 ± 4.1 years for type B). The median follow up index was 1 (IQR 0.9–1) for the overall discharged patients, and for both type A and type B subgroups.[10]

Thirty day outcome

Details of surgical and endovascular treatments performed during the index hospitalisation are reported in Supplementary Table 1.

Of the 347 patients admitted with type A AAS, 85 died (30 day mortality 24.5%) including 50 out of 295 who underwent surgery (peri-operative mortality 16.9%). Of the patients who did not undergo surgery because of excessive surgical risk, 35/52 (67%) died at 30 days.

A total of 242 patients with type A AAS were discharged and included in long-term follow up analyses.

Of the 206 type B AAS patients, 29 died (30 day mortality 14.1%); specifically, 19 of 101 (18.8%) complicated patients who underwent endovascular/surgical/hybrid treatment and three of 91 (3.3%) uncomplicated patients who received medical treatment ($p = .001$).

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