The Thoracic and Cardiovascular Surgeon

Sex differences in the histopathology of acute type A aortic dissections

Nimrat Grewal, Onur B Dolmaci, Robert J Klautz, Robert E Poelmann.

Affiliations below.

DOI: 10.1055/a-2239-1741

Please cite this article as: Grewal N, Dolmaci O B, Klautz R J et al. Sex differences in the histopathology of acute type A aortic dissections. The Thoracic and Cardiovascular Surgeon 2024. doi: 10.1055/a-2239-1741

Conflict of Interest: The authors declare that they have no conflict of interest.

Abstract:

Background: While sex-related differences in cardiovascular surgery outcomes have increasingly garnered attention in the past decades, knowledge about sex disparities in the pathophysiology of acute type A aortic dissections (ATAADs) remains sparse. In this study, we evaluate the histopathologic and atherosclerotic lesions in female and male ATAAD patients.

Methods: A total of 68 patients were studied: 51 ATAAD patients (mean age 62.5 ± 10.8 years, 49% women) and 17 control patients (mean age 63 ± 5.5 years, 53% women). Cardiovascular risk factors were assessed clinically. Intimal and medial histopathological features were systematically evaluated in all.

Results: Compared to the control group, all ATAAD patients showed significantly more elastic fibre pathology, mucoid extracellular matrix accumulation, smooth muscle cell nuclei loss, and overall medial degeneration (p<0.0001). The intimal layer was significantly thinner in the ATAAD vs the control group (p<0.023), with the control group exhibiting significantly more progressive atherosclerotic lesions compared to the ATAAD patients. No difference in medial vessel wall pathology was seen between the sexes. As compared to male ATAAD patients, atherosclerotic lesions were more severe in female ATAAD patients, independent of age and the cardiovascular risk factor hypertension.

Conclusions: All ATAAD patients had a significantly thinner intimal layer and significantly diseased middle media compared to the control patients. Our results suggest that the severity of medial aortic pathology is not sex-specific in ATAAD patients. Intimal differences between sexes could however be considered as a potential risk factor for the development of an aortic dissection.

Corresponding Author:
Dr. Nimrat Grewal, Amsterdam UMC Locatie AMC, Cardiothoracic surgery, Meibergdreef 9, 1105 AZ Amsterdam, Netherlands, n.grewal@amsterdamumc.nl

Contributors’ Statement: Data collection: N. Grewal; design of the study: N. Grewal, R.E. Poelmann; statistical analysis: N. Grewal, O.B. Dolmaci; analysis and interpretation of the data: N. Grewal, O.B. Dolmaci, R.E. Poelmann, R.J.M. Klautz; drafting the manuscript: N.Grewal, R.E. Poelmann, O.B. Dolmaci, R.J.M. Klautz; critical revision of the manuscript: N.Grewal, R.E. Poelmann, R.J.M. Klautz

Affiliations:
Nimrat Grewal, Amsterdam UMC Locatie AMC, Cardiothoracic surgery, Amsterdam, Netherlands
Onur B Dolmaci, Amsterdam UMC Locatie AMC, Cardiothoracic surgery, Amsterdam, Netherlands
Onur B Dolmaci, Leiden Universitair Medisch Centrum, Cardiothoracic surgery, Leiden, Netherlands
Robert J Klautz, Amsterdam UMC Locatie AMC, Cardiothoracic surgery, Amsterdam, Netherlands
Robert E Poelmann, Leiden University, Animal sciences and health, Leiden, Netherlands
A type A aortic dissection is a life-threatening condition which may be fatal if not detected and treated promptly. Current guidelines suggest prophylactic surgical aortic replacement based on a size cut-off, for both female and male individuals. However, the guidelines do not advice sex-specific strategies in the risk stratification or treatment, even though the clinical consequences are worse in women [12], with a poorer surgical outcome and a higher mortality [6, 13, 14]. Despite evident clinical differences, little is known about histopathological sex-differences in ATAADs. Therefore, this study investigated the role of sex on the histopathology of a dissected ascending aorta in female and male patients.

Eighty four percent of the ATAAD group had a normal intima or exhibited non-progressive atherosclerotic lesions. Notably, a large majority of the individuals who did develop progressive atherosclerotic lesions, were female (86%, N=6). To the best of our knowledge, this is the first study to demonstrate significant histopathological differences between male and female ATAADs, independent of age and cardiovascular risk factors such as hypertension.


Figure 4
Figure 5