Is Aortic Enlargement a Risk Factor for Type A Acute Aortic Dissection?

Mitsumasa Hata, Kenji Akiyama, Shinji Wakui, Yusuke Ishii, Munehito Arimoto, Saki Suzuki and Masashi Tanaka

Department of Cardiovascular Surgery, Nihon University School of Medicine

Type A acute aortic dissection occurs suddenly, without any clinical sign and often takes the patient’s life before appropriate treatment can be provided. Herein, we report 12 patients who underwent computed tomography scan for assessment of other diseases less than 1 year before the onset of aortic dissection. We evaluated aortic diameter before the onset of aortic dissection. All patients had some risk of aortic dissection. The average maximum ascending aortic diameter was 44.3 ± 2.7 mm; range: 40 to 48 mm. Eleven patients underwent successful emergency surgery. However, 1 patient died before arrival at our hospital. Careful management is necessary for patients with aortic enlargement and risk of type A acute aortic dissection.

Key words: Type A acute aortic dissection, aortic enlargement, CT finding before onset of aortic dissection

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Introduction

A major concern about type A acute aortic dissection (AAD) is the lack of warning signs. A history of hypertension alone cannot be the only risk factor for sudden AAD. Several investigators reported that aortic dilatation was a risk factor for sports-related AAD. However, it is still unclear whether aortic enlargement presents a risk for AAD in non-hereditary, sporadic AAD. We reviewed 12 patients who undergone computed tomography (CT) scan within 1 year before the onset of AAD.

Presentation

During the last 5 years, 126 AAD patients were transferred to our institution. Among these, 12 had CT assessment for other diseases within 1 year before onset of AAD. Institutional review board approval and informed consent from all patients were provided before publication of this manuscript and reporting of the information. Three patients (25.0%) were female, and the average age was 64.3 ± 15.8 years, ranging from 34 to 83 years. All patients had been treated for hypertension. Five had been followed up for malignancy, 2 for type B dissection, 3 for sleep apnea syndrome, 3 for mild bicuspid aortic valve stenosis, and 1 for post-catheter ablation. One patient was assessed in the postpartum period. We assessed the maximum ascending aortic diameter using CT findings prior to onset of AAD. The average duration between CT assessment and AAD onset was 7.8 ± 2.3 months, ranging from 2 to 11 months. The average maximum ascending aortic diameter was 44.3 ± 2.7 mm, ranging from 40 to 48 mm (Table 1).

Discussion

Should aortic enlargement be considered a risk factor for AAD?

It is well known that mechanical deterioration of the structural properties of the aortic media, so-called “lamellar unit” is associated with aortic dissection. Koullias, et al. reported that an ascending aorta with a diameter of at least 5 cm had significantly higher wall stress values than compared with normal aortas and these phenomena were associated with marked mechanical deterioration of the structural properties of the aortic wall in a large ascending aorta. Hatzaras et al. reported that increased blood pressure due to weight lifting raises aortic wall stress to a level that produces aortic dissection in pre-
existing mild to moderate aortic enlargement. In the present study, no patients had sports-related dissection. However, all patients had some additional risks for aortic dissection, such as hypertension, type B dissection, bicuspid aortic valve, a sleep disorder, or pregnancy.

Aortic dissection occurs when the wall stress reaches a dangerous level and surpasses wall strength. Therefore, preventive surgical extirpation of the ascending aorta when the diameter reaches approximately 5 cm is recommended. The fact that aortic diameter in our patients had reached a dangerous level and that all had additional risks of dissection might provide evidence in favor of preventive surgical extirpation of the ascending aorta. If so, the patient with left main coronary mal-perfusion in this study might have survived.

Conclusion

When the patient’s aortic diameter, who was complicated by the risks of AAD, reached approximately 5 cm, it is necessary to consider whether preventive surgical extirpation is required or not.

Table 1 Profiles

| Case | Age | Sex | Disease   | Diameter | Until the onset | Histology  | Prognosis |
|------|-----|-----|-----------|----------|----------------|------------|-----------|
| 1    | 62  | M   | Bicuspid  | 40 mm    | 4 months       | atherosclerosis | Survive   |
| 2    | 70  | M   | BAD, SAS  | 45 mm    | 11 months      | atherosclerosis | Survive   |
| 3    | 34  | F   | Pregnancy | 47 mm    | 8 months       | CMN         | Survive   |
| 4    | 85  | F   | Br. Cancer| 41 mm    | 10 months      | atherosclerosis | Survive   |
| 5    | 63  | M   | G. Cancer | 44 mm    | 8 months       | CMN         | Survive   |
| 6    | 61  | M   | BAD       | 42 mm    | 6 months       | CMN         | Survive   |
| 7    | 45  | M   | Bicuspid  | 41 mm    | 7 months       | atherosclerosis | Survive   |
| 8    | 83  | M   | G. Cancer | 46 mm    | 6 months       | atherosclerosis | Survive   |
| 9    | 80  | F   | Br. Cancer| 45 mm    | 11 months      | CMN         | Died      |
| 10   | 65  | M   | Lu. Cancer| 47 mm    | 6 months       | CMN         | Survive   |
| 11   | 75  | M   | Bicuspid, SAS | 45 mm  | 9 months       | atherosclerosis | Survive   |
| 12   | 48  | M   | Ablation, SAS | 48 mm  | 2 months       | CMN         | Survive   |

BAD: Type B dissection, SAS: Sleep apnea syndrome, Br.: Breast, G.: Gastric, Lu.: Lung, CMN: Cystic medial necrosis

Fig. 1 CT finding before onset of AAD
Maximum ascending aortic diameter was 45 mm.

Fig. 2 CT finding at onset of AAD
CT showed AAD and further dilatation of the ascending aorta to 55 mm.

Disclosure Statement

There is no conflict of interest.

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