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Comparison of Aortic Elastic Properties in Stent Implanted and Operated Patients with Aortic Coarctation

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Introduction

The aim of this study was to compare effects of stenting and operation on the aortic stiffness.

Method

Echocardiographic study was used on patients treated with intravascular stenting (n=10) and operated for the coarctation of aorta (n=10). All operations performed by end-to-end anastomosis method without prosthetic material. Patients in both groups had no recoarctation. We analyzed left ventricular wall thickness, systolic functions and stiffness index, distansibility index, strain of descending aorta and ascending aorta.

Results

Age range was 10-35 (mean18.4) years in operated group and 10-39 (mean 18.8) years in stenting group. Age at time of stent implantation was 6-36 (mean15.2) years and age at time of operation was 1-25 (mean 9) years. Evaluation time since stent implantation was 3-7 (mean4.6) years and since operation was 3-16 (mean 10.5) years. There was no significant difference in heart rate, systolic blood pressure, systolic functions of left ventricle and aortic valve gradient between the groups. There was no significant difference at diastole and systole left ventricle diameter, interventricular septum diameter, posterior wall thicknes in between groups. Compared with operated group; patients with stent implanted aort coarctation had smaller post stent descending aorta systolic diameters (stenting group: 1.3 ± 0.2 cm; operated group: 1.5 ± 0.4 cm; $p < 0.05$) but similar ascending aorta systolic and diastolic diameters. Aortic distensibility of stenting group was found decreased in the proximal ascending aorta (stenting group: $4.6 \pm 1.5 \cdot 10^{-6} \text{cm}^2/\text{dyne}$; operated group: $8.2 \pm 3.9 \cdot 10^{-6} \text{cm}^2/\text{dyne}$; $p < 0.05$) and post stent descending aorta (stenting group: $4.9 \pm 3.4 \cdot 10^{-6} \text{cm}^2/\text{dyne}$; operated group: $9.2 \pm 3.6 \cdot 10^{-6} \text{cm}^2/\text{dyne}$; $p < 0.05$). Aortic strain of stent implanted patients was found decreased in the proximal ascending aorta (stenting group: 16.1 ± 7.8 ; operated group: 22.8 ± 7.1 ; $p < 0.05$) and poststent descending aorta (stenting group: 14.8 ± 7.4 ; operated group: 22.8 ± 7.1 ; $p < 0.05$). Compared with operated group stiffness index of post stent descending aorta (stenting group: 6.5 ± 3.2 ; operated group: 2.7 ± 0.9 ; $p < 0.05$) was found increased.

Conclusion

Children who undervent stent implantation have decreased aortic elasticity compared with operated aort coarctation group. This situation may lead to more permanent hypertension or more diastolic dysfunction in stent implanted patients compared with operated aortic coarctation which may develop in the future.