Comparison of Exercise Blood Pressure Response in Patients with Coarctation of the Aorta: Surgical Repair vs. Endovascular Stent Placement

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ABSTRACT

Background: Percutaneous stent placement has been shown to be a safe and effective treatment option for patients with coarctation of the aorta. Immediate post-procedural and short term hemodynamic assessments comparing stent placement to surgical correction show equivalency. Little is known about the effects of either treatment modality on blood pressure response during exercise.

Methods: A prospective comparison of hemodynamic response to exercise by treadmill testing in patients at least one year after intervention. Patients included were greater than seven years of age without complex congenital heart disease or single ventricle physiology. Patients underwent standard Bruce Protocol treadmill testing with periodic arm leg blood pressure and metabolic measurements.

Results: 25 patients underwent treadmill testing: 18 with surgical correction. Median age was 13 years (IQR: 11-15.5yrs.). The median arm leg gradient prior to exercise was 12mmHg (IQR: 3-25mmHg) for surgical patients and 14mmHg (IQR: 7.5-40mmHg) for stented patients. The median peak exercise arm leg gradient was 28mmHg (IQR 16-44mmHg) for surgical patients and 40mmHg (IQR 3-25mmHg) for stented patients. The median increase in the arm leg gradient with exercise was 16mmHg (IQR: 16-44mmHg) for surgical patients and 28mmHg (IQR:16-44mmHg) for stented patients. The median peak exercise arm leg SBP gradient was 28mmHg (IQR 16-44mmHg) for surgical patients and 30mmHg (IQR 17-5-40mmHg) for stented patients. The median increase in the arm leg gradient with exercise was 16mmHg (IQR 14-25mmHg) for surgical patients and 16mmHg (IQR 16-44mmHg) for stented patients. The median peak exercise arm leg DBP gradient was 14mmHg (IQR 12-22mmHg) for surgical patients and 16mmHg (IQR 14-22mmHg) for stented patients.

Conclusions: Few studies have compared surgery and endovascular stenting for coarctation of the aorta, with only one prior study comparing both treatment modalities. Our study supports previous reports that surgical repair compared to stent placement both offer excellent hemodynamic responses to exercise testing with metabolic assessment. Little is known about the effects of either treatment modality on blood pressure response during exercise. A prospective comparison of hemodynamic responses to exercise testing with metabolic assessment is needed for both treatment modalities.

METHODS

Background: Coarctation of the aorta was first reported in 1902, with all cases postnatally diagnosed. Correction, whether surgical or endovascular, is timely, with early intervention reducing long-term complications. Surgical repair vs. endovascular stent placement both offer excellent hemodynamic equivalency. Little is known about the effects of either treatment modality on exercise blood pressure response.

OBJECTIVES

The purpose of this study was to compare the hemodynamic and metabolic response to exercise between patients treated with surgical repair vs. endovascular stent placement for coarctation of the aorta.

RESULTS

There was no significant difference between the two groups with regards to age, height, weight, or Body Mass Index.

A higher percentage of males underwent surgical repair compared to endovascular stent placement.

Resting systolic and diastolic blood pressure were not statistically different compared to endovascular stent placement.

Arm-leg blood pressure gradients at baseline and at peak exercise were not different between both groups.

The increase in arm-leg gradient was similar in both groups.

Baseline spirometry, VO2 Max, VCO2 Max, Heart Rate Response, Respiratory Rate, or Respiratory Exchange Ratio (RER) Max were not different between the two groups.

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