# [Progression of aortic root dilatation and aortic valve regurgitation after the arterial switch operation.](https://www.ncbi.nlm.nih.gov/pubmed/31292191)

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**Take-Home Points:**

* This very large, single institution study with late follow-up of patients after arterial switch operation in the Netherlands continues to expand our understanding of the natural history of this patient population now entering adulthood.
* Neo-aortic root dimensions increased linearly into adulthood though with minimally changing z-scores.
* Male gender and complex TGA subtypes were associated with neo-aortic root dilatation whereas previous PA banding and concomitant aortic arch anomalies were not.
* The incidence of greater-than-moderate aortic regurgitation increased from 5% at 10 years post-ASO to 31% at 25 years and was associated with TGA subtype, ASO after 6 months of age, and increasing aortic diameter.
* Only 2.9% required surgical reintervention during the study period.
* Continued serial follow-up is critical for patients following ASO to monitor for neo-aortic root dilatation.
* Further prospective studies and/or registries are needed to delineate the various factors that are associated with neo-aortic root dilatation particularly when different studies from different centers provide different risk factor profiles.



***Commentary from Dr. Jeremy Herrmann (Indianapolis), section editor of Congenital Heart Surgery Journal Watch:*** In one of the largest retrospective studies with late follow-up after the arterial switch operation (ASO), the Center for Congenital Heart Disease Amsterdam-Leiden in the Netherlands provides long-term follow-up including serial echocardiographic evaluations. The authors included 345 patients who underwent ASO from 1977 until 2015 with at least two subsequent echocardiographic evaluations that included assessment of the neo-aortic root. The longest follow-up period was 39 years with a study mean of 12.2 years. Preoperative balloon atrial septostomy was performed in 52.8% of patients and 5.2% of patients underwent initial PA banding.

In terms of growth of the neo-aortic root (annulus, sinus segment, and sinotubular junction), the authors observed a sharp increase in diameter dimensions during the first year with continued linear enlargement into adulthood (Figure 2A-C). When they converted these dimensions to z-scores, the curves were relatively flat, however (Figure 2D-F). The average diameter progression for the annulus, sinus segment, and sinotubular junction were 0.39 mm/year, 0.63 mm/year, and 0.54 mm/year, respectively. The authors analyzed neo-aortic growth by anatomic subtypes and found that TGA-IVS was associated with the smallest diameter increase whereas patients with DORV-SP-VSD exhibited the highest rate of growth. Male gender was also a risk factor for neo-aortic dilatation. Factors that were associated with the development of aortic regurgitation included TGA subtype, ASO after 6 months of age, and increasing aortic diameter. Despite these trends, only 2.9% of patients required surgical intervention for root dilatation with or without significant aortic regurgitation at a median age of 17.4 years. Interestingly, previous PA banding and the presence of aortic arch anomalies were not risk factors for neo-aortic root dilatation. A bicuspid native pulmonary valve was also not associated with aortic regurgitation.

It remains to be seen whether these trends (including rate of surgical reintervention) will continue as more ASO patients enter adulthood and even late adulthood. If the z-score curves remain flat, can we hope to see a plateau phase in absolute diameter dimension growth? Clearly, ASO patients need life-long surveillance to monitor neo-aortic dimensions and aortic regurgitation. Also needed are multi-center, prospective studies and/or registries that can delineate other management factors (e.g., anti-hypertension management) that contribute to the mixed picture of risk factors associated with neo-aortic root dilatation and the development of aortic regurgitation.

