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Patient age influences neoaortic root dimensions and aortic regurgitation following the Ross operation in children

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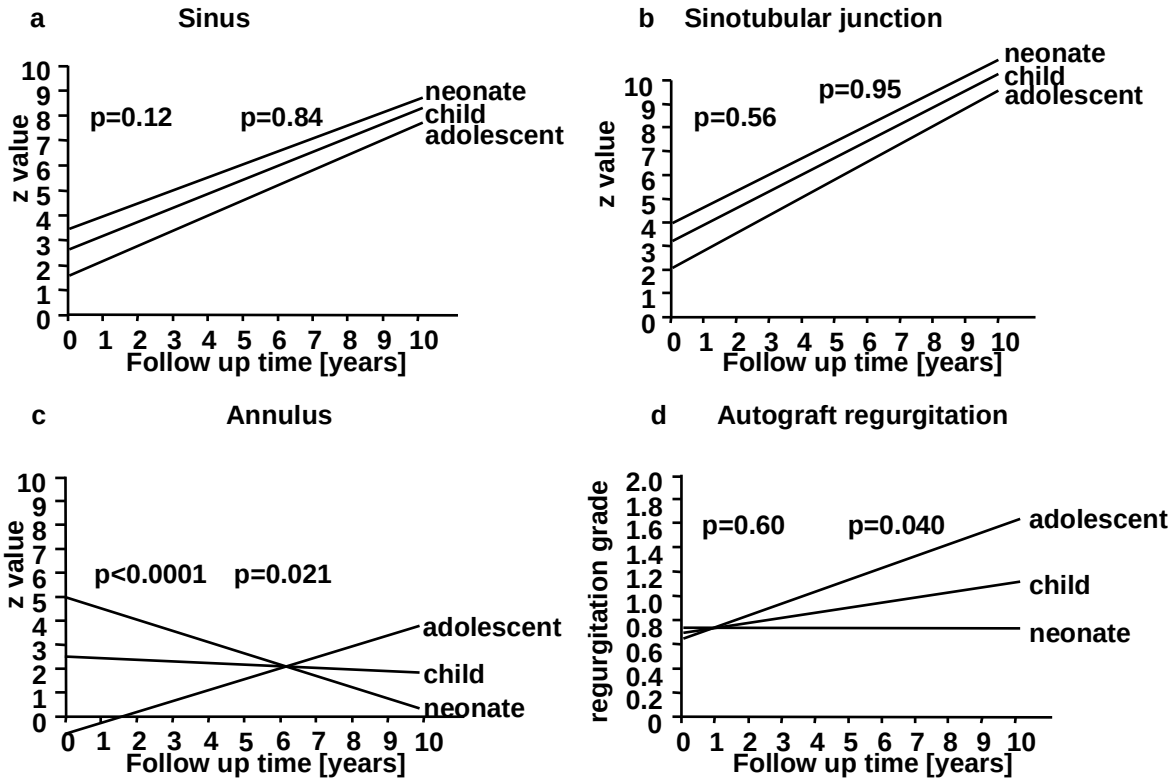
Introduction: For children who require aortic valve replacement, the Ross operation provides the advantage of growth potential of the pulmonary autograft in the aortic position. However, development of autograft dilatation and regurgitation may occur in some patients. We sought to assess the progression of autograft diameters and regurgitation with regard to patient age.
Methods: Autograft echo dimensions from 48 children <16 years of age at the time of the Ross operation, who had follow-up echocardiograms at <20 years of age, were analyzed using hierarchical multilevel modeling. Z-values of autograft dimensions were calculated according to the normal aortic dimensions. Mean follow-up was 5.1±3.3 years.
Results: The mean age at the time of the Ross operation was 10.0±4.3 years. The mean z-values showed a significant increase with follow-up time at the sinus (0.5±0.1/year, p<0.001), and the sinotubular junction (0.7±0.2/year, p<0.001), but not at the annulus (0.1±0.1/year, p=0.59). There was no significant difference of the sinus, and the sinotubular junction z-value between younger and older children (figure a and b). The annulus z-value was significantly larger in younger children (p<0.0001), whereas the annual increase was significantly higher in older children (p=0.021, figure c). Autograft regurgitation develops significantly faster in older children (p=0.040, figure d).

figure



Conclusions: Sinus and STJ dilate with time regardless of patient age. Young children show larger initial annulus sizes than older children. However, annulus diameters tend to normalize in young children, whereas they increase in older children. Autograft regurgitation develops in older children, but not in young children. Stabilizing measures to prevent autograft root dilatation are warranted in adolescents, but they are not required in young children.