

### **Acquired von Willebrand syndrome in infants with aortopulmonary shunt**

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**Introduction:** The acquired von Willebrand syndrome (aVWS) was first described in 1968 by Simone and colleagues in patients with autoimmune diseases. The aVWS is very rare in children, most frequently being described in connection with congenital heart defects including aortic stenosis, persistent ductus arteriosus, ventricular septal defect and pulmonary hypertension. The aVWS often results in increased bleeding tendency such as mucosal-, gastrointestinal- or surgical bleeding. Until now, there are no reports describing aVWS in infants with aortopulmonary shunts.

**Methods and Results:** Between 07/15-07/16 we evaluated 11 infants younger than 3 months with univentricular hearts and aortopulmonary shunt (9x Blalock-Taussig-Shunt, 1x central aortopulmonary shunt, 1x Sano-Shunt (from the systemic right ventricle to the pulmonary artery)) and tested for avWD. The shunt operation was performed between day 5.-180. (median 8d), the blood samples were collected between days 18-260 after surgery (median 32d). In all these 11 patients we identified avWD with a reduction/loss of the largest VWF multimers. In 10 patients the collagen binding capacity was reduced, in 3 patients the VWF:Ag was slightly elevated, while in 8 infants it was in the normal range.

**Conclusions:** Despite the limited number of patients, we can presume that nearly 100% of the patients with aortopulmonary shunt present aVWS. Its pathogenesis is explained by the increased activation of the VWF under the influence of the turbulent flow within the shunt. The activated VWF is bound to its specific receptors located on the platelets and on the activated endothelial cells, and undergoes an ADAMTS 13 mediated proteolysis, which leads to the loss of large multimeres. First results show that the VWF swiftly normalizes shortly after suppression of the shunt dependent lung perfusion and switching to a cavopulmonary (Glenn) connection.

So far none of our patients demonstrated an increased bleeding tendency in everyday life. However, we must consider this anomaly as a potential cause of increased blood loss during cardiac catheterizations and operations. Knowledge of the existence of an avWD is therefore necessary for introduction of the replacement therapy with FVIII/VWF products.