

Pulse oximetry home monitoring in infants with single ventricle physiology and a surgical shunt as the only source of pulmonary blood flow

Öhman A. (1), Nilsson B. (1), Strömvall-Larsson E.(1), Cavigelli-Brunner A. (2), Mellander M. (1)
Department of Paediatric Cardiology, The Queen Silvia Children's Hospital, Sahlgrenska University Hospital, Göteborg, Sweden (1); Division of Cardiology, University Children's Hospital Zurich, Switzerland (2)

INTRODUCTION

Thrombotic shunt occlusion is a major cause of death in children with single ventricle physiology and a surgical shunt as the only source of pulmonary flow. In a prospective non-randomized study we evaluated if home monitoring (HM) of oxygen saturation (SpO₂) would detect life-threatening shunt complications between discharge after stage I and re-admission for stage II.

METHODS

Twenty-four infants with single ventricle operated 2007-2010 with a BT(N=7), central(N=1) or Sano shunt(N=16) were included. All were on aspirin 5 mg/kg/day and 3 on warfarin. Parents were instructed to measure SpO₂ once daily when the baby was calm and if SpO₂<71% repeat the measurement after 15 minutes. Positive HM was defined as SpO₂ <71% on repeated measurement. By definition a shunt complication was present if there was arterial desaturation and narrowing of the shunt treated by intensified anticoagulation, surgical replacement, balloon dilatation, stenting, or with an earlier bidirectional cavopulmonary anastomosis (BDCPA).

Parents' attitude towards the method was investigated using a questionnaire.

RESULTS

A shunt complication occurred 11 times in 8 patients. HM was positive in 8 of 11 shunt complications (73%). In 2/8 shunt complications HM was probably life-saving; one patient had shunt endocarditis and the shunt was replaced the same day (age 59d), the other had an emergency balloon dilatation because of severe shunt narrowing (age 47d). In 3/11 shunt complications HM was negative; one of these 3 patients had an earlier BDCPA and survived but 2 died suddenly at home (age 42* and 221d) from thrombotic shunt occlusion (autopsy), one of them* only 3 hours after an SpO₂ reading of >90%. On 5 occasions HM was positive but there was no shunt complication, albeit other problems in most. HM with pulse oximetry was well accepted by the parents according to the results of the questionnaire. Twenty of 21 survivors had a BDCPA (median 187d, range 95-377) with no mortality. One had a heart transplant instead of BDCPA.

CONCLUSION

HM of SpO₂ is well tolerated by caregivers and has the potential to detect some of the life-threatening shunt complications between stage I and II in infants with single ventricle physiology.