Balloon Embolization During Atrial Septostomy

By John H. K. Vogel, M.D.

SUMMARY
The case of an infant with complete transposition is presented. Embolization occurred from a balloon catheter used in performing a Rashkind septostomy.

Additional Indexing Words:
Oxygenation Renal infarction

The use of atrial septostomy as a temporary means of improving systemic oxygenation in infants with transposition of the great vessels was introduced by Rashkind and Miller in 1966. Results of this technic have generally been satisfactory, at least on a short-term basis, with few complications other than occasional rupture of the balloon during septostomy. The purpose of this paper is to report a case of embolization of a portion of the balloon during atrial septostomy.

Report of Case
M. R., a 3-week-old male infant, was admitted to Colorado General Hospital with clinical findings suggestive of transposition of the great vessels. Arterial blood pH was 7.29, $P_aCO_2$ 40 mm Hg, and $P_aO_2$ 20 mm Hg, with a base excess of minus 7. Hematocrit was 44%, and the urine was normal. With oxygen, diuretics, and digitalization, some improvement was noted with an arterial pH of 7.34, $P_aO_2$ of 39 mm Hg and a $P_aCO_2$ of 48 mm Hg with a base excess of 0. Cardiac catheterization demonstrated complete transposition of the great vessels with a ventricular septal defect and no evidence of pulmonary valve obstruction.

Using a 5.5 catheter* (gas sterilized), a Rashkind septostomy was performed, the initial volume being 0.75 cc. The balloon was repositioned in the left atrium, inflated to 1.4 cc (1 cm in diameter), and a second withdrawal was made. However, the balloon burst on this pass. Systemic arterial oxygen saturation was 87.5%, and $P_aO_2$ was 54 mm Hg following the catheterization. On the following morning hematuria was noted. Increasing respiratory distress was apparent with $P_aCO_2$ increasing to 60 mm Hg and $P_aO_2$ falling to 15 mm Hg. Because of continuing deterioration a Blalock-Hanlon procedure was performed. The child tolerated the procedure well. However, that evening respiratory problems developed, and the following morning the infant expired.

Postmortem examination revealed complete transposition of the great vessels with a 4 by 6


From the Cardiovascular Laboratory, Division of Cardiology, Department of Medicine, University of Colorado Medical Center, Denver, Colorado.
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Figure 1
Catheter with small piece of balloon removed from renal artery.
mm ventricular septal defect. A probe-patent foramen ovale was present with a 2-mm rent at the site of the balloon passage. The surgically created atrial defect was of good size measuring 5 by 4 mm. The ductus arteriosus was patent. Severe atelectasis was present in both the right and left lungs. A piece of rubber from the balloon, measuring 4 by 3 mm, was stuck in the ostium of the right renal artery completely occluding it. Grossly, the right kidney was infarcted, and this was substantiated by histologic examination. In figure 1 is shown the catheter with the small piece of balloon removed from the renal artery.

Discussion

The catheter used in this patient had been used on three previous occasions. At the time of the last usage it had been inflated progressively from a volume of 0.5 cc to a volume of 2.7 cc (1.5 cm in diameter) during a number of withdrawals across the septum. Although the capacity is rated at 2 cc (1.1 cm diameter), it has been stated that a diameter of 1.5 cm is necessary to achieve an adequate opening in the atrial septum.1 Perhaps overdistention of the balloon during previous usage resulted in sufficient weakening, thus permitting bursting of the balloon to occur in this patient. The mechanism by which such a symmetrical piece of balloon was eclipsed from the balloon is not clear. The possibility of balloon embolization should be considered in any patient when bursting of the balloon occurs. Clearly, all balloons which have burst should be inspected for missing fragments.

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JOHN H. K. VOGEL

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