Title: Anesthetic Management of Conjoined Twins with a Single Heart for Cardiac Catheterization

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Introduction

Anesthetic management of conjoined twins joined face-to-face at the thorax and abdomen (thoraco-omphalopagus type) presents a number of unique challenges, including airway control, ventilation, dosing of anesthetic agents and other drugs, patient positioning and monitoring. We present a case of thoraco-omphalopagus conjoined twins with a single shared cardiac mass with multiple anomalies that required cardiac catheterization under general anesthesia to delineate these and indicate whether separation was feasible.

Case Report

A pair of female conjoined twins were delivered at 36 weeks gestation by emergency Cesarean section following profuse maternal bleeding secondary to placenta previa. Their combined birth weight was 4.6 kg. Due to low oxygen saturations twin B was intubated and twin A (the smaller) placed on nasal CPAP as direct laryngoscopic intubation was unsuccessful. Due to the lack of suitable windows for transthoracic echocardiography, initial assessment was by CT scan of the thorax which showed a single cardiac mass. Twin A’s great vessels and lungs appeared hypoplastic, while twin B appeared to have D-looped transposition of the great arteries and more normally developed lungs. The number of cardiac chambers and their connections could not be fully resolved. The GI tracts were separate with a shared liver. Both patients were hemodynamically stable, hypoxemic with saturations ranging from 60-90%, and appeared to have intact neurological function. Despite the poor prognosis, the parents wished to know whether a separation could be attempted, and therefore cardiac catheterization was planned to elucidate further the cardiac anatomy, particularly the systemic and pulmonary venous drainage.

Given that both twins shared a common cardiovascular system, it was decided that one team of anesthesiologists with two complete sets of monitoring and two ventilators would result in optimum care in the confined catheterization laboratory (Figure 1). All lines, monitoring equipment and ventilator tubing were color coded to prevent confusion. Although the smaller twin A had hypoplastic lungs with an unclear amount of pulmonary blood flow, it was decided to intubate this twin to protect her airway and allow precise control of inhaled gas composition for calculation of pulmonary blood flow. This was achieved by direct laryngoscopy despite the patient’s lateral position and confirmed by fibreoptic bronchoscopy; subsequently ventilation of twin A demonstrated low lung compliance and minimal expired carbon dioxide, suggesting that pulmonary blood flow in twin A was minimal. Dosing of intravenous drugs was based on the combined weight of the infants. BIS monitoring was applied to both twins. Following completion of the procedure, the patients were transported back to the intensive care unit, both intubated. The cardiac anatomy was demonstrated to be too complex for a separation procedure, and would have involved the sacrifice of one of the twins (Figure 2); this was against the parents’ wishes. Twin A was almost entirely dependent on twin B for gas exchange and when the latter’s respiratory function subsequently deteriorated, both twins died without further intervention.

Discussion

Management of conjoined twins for any procedure involving anesthesia requires complex planning, particularly in the more challenging environment of the cardiac catheter laboratory or the MRI scanner. The use of separate anesthesia teams for each twin has been advocated, although has the obvious drawback of overcrowding the limited available space. In addition, in cases such as this one where there is only one fully functional shared cardiorespiratory system, a single team may provide better care than two. A utilitarian approach has been recommended in which best management is that which provides optimum care for both twins. Given the considerable variety in anatomy, physiology and prognosis of conjoined twins, anesthetic planning should be based on the specific requirements of each individual case for the procedure and environment for which anesthesia is needed.

References
