Double Trouble: Continuous non-invasive hemodynamic monitoring during twin Caesarean-section under spinal anesthesia in a gravida 2 para 1 patient with advancing severe combined aortic valve defect

Primary Author: Mathias Emmerich MD DEAA
Krankenhaus Bad Oeynhausen, Institute of Anaesthesiology and Intensive Care Medicine

Co-Authors: Max Emmerich, MA (Cantab.) BM BCh;

Background:
Patients with aortic stenosis presenting for non-cardiac surgery are at high risk of major perioperative cardiac complications. Rapid detection and prevention of hypotension and any hemodynamic change that will decrease cardiac output is essential. In 2015 we reported on the successful use of continuous non-invasive hemodynamic monitoring in a patient with severe combined aortic valve defect undergoing spinal anesthesia for C-Section. The same patient presented again in 2017 - this time with a twin pregnancy, posing an even greater risk of perioperative complications.

Case Scenario:
A 36-year-old patient (BMI 26.3) was admitted for Caesarean section at 39 weeks gestation due to a background of aortic stenosis and a bicuspid aortic valve defect (mean gradient 39 mmHg, AVA 1 cm2 ) with medium degree insufficiency. She had a history of severe scoliosis and C-section two years prior. At the time, her C-section was performed without complications under spinal anesthesia using continuous non-invasive hemodynamic monitoring as a safety measure. Despite progression of her valvular defect with a plan for surgical therapy, the patient made the decision to have another child before undergoing valve replacement and conceived twins. She desired the same anesthetic approach as for her previous section.

Given the high likelihood of significant hemodynamic changes upon induction of the spinal anesthetic, a noninvasive system for continuous hemodynamic monitoring (ClearSight Device, Edwards Lifescience) was again installed pre-operatively. This system incorporates the volume clamp technique developed by Penáz into a finger cuff for constant blood pressure, cardiac output/cardiac index and stroke volume measurement. The patient was preloaded with 750 mL of Ringerâ€™s lactate solution. Prior to induction of the spinal anesthetic, she had a cardiac index (CI) of 4.3 L/min/m², stroke volume (SV) of 111 mL/b and blood pressure (BP) of 160/87 mmHg. The spinal anesthetic was given at L2/L3 with the patient sat up, but was technically challenging due to the severe scoliosis. Following successful entry into the dural sac, 2 mL Carbostesin 0.5% were given via a 27 G pencil-point needle. The patient was then immediately placed in a left lateral position to avoid caval compression. Still, due to the sympathetic block up to T4, the BP dropped to 88/46 mmHg, whilst her CI declined to 3.2 L/min/m² and the SV to 74mL/b. A fluid challenge of 3 x 250mL of Ringerâ€™s lactate was rapidly given to maintain venous return and optimize left
ventricular filling. 20mg Cafedrin hydrochloride and 1mg Theodrenaline were given four times over 6 minutes to treat hypotension, which successfully stabilized the circulation. At the beginning of the procedure hemodynamic parameters were back within the normal range (BP 120/64 mmHg, CI 4.1 L/min/m2, SV 121 mL/b). The intra-operative course was uneventful and two healthy boys were delivered. The immediate post-operative parameters were BP 130/75 mmHg, CI 3.7 L/min/m2, SV 101 mL/b. The patient tolerated the finger cuff well at all times and hemodynamic monitoring was continued for 2 hours in recovery with all parameters remaining within normal limits.

Discussion:

Patients with aortic valve defects presenting for non-cardiac surgery are at high risk of cardiac complications. In patients with aortic stenosis, general anesthesia is often preferred because spinal and epidural anesthesia can lead to significant hypotension due to sympathetic blockade. On the other hand, regional anesthesia is the method of choice in patients presenting for C-Section. In patients with aortic valve defects, epidural anesthesia is recommended because the sympathetic blockade develops more slowly than in spinal anesthesia. We report the case of a patient with aortic stenosis presenting for her second caesarean section in a twin pregnancy. Spinal anesthesia was preferred once again in our patient, as her significant scoliosis would have likely made epidural anesthesia extremely challenging. Continuous non-invasive hemodynamic monitoring was used successfully to detect the inevitable hemodynamic changes immediately and aided their rapid and successful correction in this case.