

Complete Heart block during right IJV cannulation –An unusual complication: 2 Different Cases

K Singh, D Kane, S Rao, T Sahoo, T Kharche, Nirav, L Dewoolkar

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Abstract

Heart block and arrhythmia are complications of pulmonary artery and cardiac catheterization. Injury to the conducting system of the heart more often involves the right bundle causing right bundle branch block (RBBB)⁷ but complete heart block (CHB) can also result. After trauma, impairment of the right bundle is usually transient with recovery in hours, but complete heart block can lead to symptoms requiring invasive treatment. Similar complications with insertion of central venous catheters, like IJV cannulation, are rare as they do not enter the heart. Injury to the conduction system during central venous catheter insertion can be by trauma from the guide wire or from the catheter itself⁷. We report a patient with TAPVC who developed CHB during IJV cannulation by high approach.

CASE REPORT 1

A 1 month old male patient with history of cyanotic spells, diagnosed to have supra cardiac type of TAPVC on a 2-D echo was posted for intra cardiac repair (ICR). On examination, she had a heart rate of 139 beats min⁻¹, chest x-ray showed pulmonary congestion and the electrocardiogram (ECG) showed sinus rhythm. After inducing general anaesthesia right IJV was cannulated by the high approach. Using the seldinger technique, a paediatric guide wire was inserted through the 22 G cannula. Soon after the guide wire was passed, ventricular rate dropped instantly from 136 bpm to 53 beats per min and the cardiac monitor showed complete heart block. Inj. Atropine was administered immediately. Repeat dose was administered on failure of effect of 1st dose. However, having no response, quick decision was made to implant temporary pacemaker, which was able to restore heart rate to the desired rate of 134 bpm. Surgery and post operative observation were uneventful. Pace maker wire was removed after 3 days of uneventful course with rhythm reverting back to sinus rhythm.

CASE REPORT 2

A 3 month old female child was admitted for failure to thrive and history of cyanotic spells. 2-D echo showed TAPVC of supracardiac type with severe pulmonary hypertension. Patient was posted for intra cardiac repair (ICR) for TAPVC. After inducing general anesthesia, right IJV was cannulated by the high approach. Using the seldinger technique, a

paediatric guide wire was inserted through the 22 G cannula. Soon after the guide wire was passed, ventricular rate dropped instantly from 138 bpm to 46 beats per min and the cardiac monitor showed complete heart block. Inj. Atropine was administered immediately. Heart rate responded and steadily increased to 132 bpm. Later heart rate remained stable. IJV cannulation with 5.5 Fr triple lumen catheter went uneventful. Surgery and postoperative observation were uneventful.

DISCUSSION

Conduction block during cannulation of IJV is a rare complication compared with pulmonary artery or cardiac catheterization as placement does not involve entry into the heart.^{1,2,3,4,5} The guide wires, provided to facilitate the insertion of triple lumen catheters have been implicated more commonly in causing the conduction disturbances.¹ The tips of these guide wires are less flexible and rigid, making them more arrhythmogenic, by causing direct trauma to the conduction system of the heart⁷.

In our patients, we cannulated the IJV using high approach. High approach has been reported⁶ to be reliable and useful technique than other approaches for IJV cannulation in paediatric patients. In 1st case, we had to implant a temporary pacemaker to set the heart rate to desired value. However, we were able to get sinus rhythm back to around 132 bpm in 2nd case with the help of atropine only. We presume that complete heart block in both the patients was due to injury to

conduction system of the heart caused by the guide wire. However we can not rule out any other probable cause. To confirm any defect in the conduction system of the heart, cardiac conduction studies involving measurement of A-H interval and H-V interval need to be done⁷. The A-H interval is the conduction time through the atrium to the Bundle of His (normal: 55–130 ms) and the H–V interval is the conduction time from the Bundle of His to the earliest depolarization of ventricular myocardium (normal: 30–55 ms). If no structural disease is present, and these intervals are prolonged, transient heart block can be considered to be caused by trauma during guide wire insertion⁷. We however didn't do any such test.

Cardiac arrest as a complication of internal jugular vein cannulation has been reported in literature⁸.

Complete heart block due to guide wire insertion has been reported in a patient already having RBBB, implicated to direct trauma to the conduction system caused by the guide wire⁷.

Other cardiac complications from guide wire insertion include premature ventricular contractions, ventricular fibrillation or perforation resulting in cardiac tamponade^{9,10,11,12}.

External landmarks, especially in paediatric patients, are not reliable predictors of insertion lengths and assessments from radiographs correlate poorly with direct measurements. Ultra sound has been implicated in higher success rates of central venous cannulation with lesser complication rates¹³.

Currently ECG-guided central venous catheter (CVC) placement is considered to be a useful and safe method to ensure extra-atrial catheter tip position^{14,15,16}. ECG guidance for CVC placement has replaced a post-insertion chest X-ray (CXR) to confirm its position. Increase in p wave height to same as that of qrs complex as an end point of further guide wire insertion can limit unnecessary advancement of guide wire and lower down the arrhythmogenic complications associated with this procedure.

We conclude that extreme vigilance is required by the anaesthesiologist while cannulating IJV in paediatric patients and cardiac drugs / pacemaker must be kept standby to deal with any cardiac complication.

CORRESPONDENCE TO

Dr. Kanwar Vishal Singh¹ Dept. of anaesthesia, Seth G.S. medical college and K.E.M. Hospital, Parel, Mumbai-12
Email: kanvis1981@gmail.com Ph.- 91-9819908226

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Author Information

Kanwar Vishal Singh, M.B.B.S.

Junior Resident, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

Deepa Kane, M.D.

Associate Professor, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

Sangeeta Rao, M.D.

Associate Professor, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

Tapas Kumar Sahoo, M.B.B.S.

Junior Resident, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

Tushar Kharche, M.D.

Lecturer, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

Nirav, M.D.

Lecturer, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College

L. V. Dewoolkar

Professor and Head of Department, Department of Anaesthesiology, K.E.M.Hospital & Seth G.S.Medical College