

# 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

## Citation

K Singh, D Kane, S Rao, T Sahoo, T Kharche, Nirav, L Dewoolkar. *Complete Heart block during right IJV cannulation –An unusual complication: 2 Different Cases*. The Internet Journal of Anesthesiology. 2006 Volume 13 Number 1.

## 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)<sup>7</sup> 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 itself<sup>7</sup>. 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<sup>-1</sup>, 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 1<sup>st</sup> 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 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 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.<sup>1,2,3,4,5</sup> The guide wires, provided to facilitate the insertion of triple lumen catheters have been implicated more commonly in causing the conduction disturbances.<sup>1</sup> 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 heart<sup>7</sup>.

In our patients, we cannulated the IJV using high approach. High approach has been reported<sup>6</sup> to be reliable and useful technique than other approaches for IJV cannulation in paediatric patients. In 1<sup>st</sup> 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 2<sup>nd</sup> 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 done<sup>7</sup>. 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 insertion<sup>7</sup>. We however didn't do any such test.

Cardiac arrest as a complication of internal jugular vein cannulation has been reported in literature<sup>8</sup>.

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 wire<sup>7</sup>.

Other cardiac complications from guide wire insertion include premature ventricular contractions, ventricular fibrillation or perforation resulting in cardiac tamponade<sup>9,10,11,12</sup>.

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 rates<sup>13</sup>.

Currently ECG-guided central venous catheter (CVC) placement is considered to be a useful and safe method to ensure extra-atrial catheter tip position<sup>14,15,16</sup>. 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 Singh Dept. of anaesthesia, Seth G.S. medical college and K.E.M. Hospital, Parel, Mumbai-12  
Email: kanvis1981@gmail.com Ph.- 91-9819908226

## References

1. Eissa NT, Kvetan V. Guide wire as a cause of complete heart block in patients with preexisting left bundle branch block. *Anesthesiology* 1990; 73: 772-4
2. Morris D, Mulvihill D, Lew WY. Risk of developing complete heart block during bedside pulmonary artery catheterization in patients with left bundle-branch block. *Arch Intern Med* 1987; 147: 2005-10
3. Sprung CL, Elser B, Schein RM, Marcial EH, Schragger BR. Risk of right bundle-branch block and complete heart block during pulmonary artery catheterisation. *Crit Care Med* 1989; 17: 1-3
4. Stein PD, Mahur VS, Herman MV, Levine HD. Complete heart block induced during cardiac catheterization of patients with pre-existent bundle-branch block. The hazard of bilateral bundle-branch block. *Circulation* 1966; 34: 783-91
5. Coulter TD, Wiedemann HP. Complications of hemodynamic monitoring. *Clin Chest Med* 1999; 20: 249-67
6. Hayashi Y, Uchida O, Takaki O, Ohnishi Y, Nakajima T, Kataoka H, Kuro M. Internal jugular vein catheterization in infants undergoing cardiovascular surgery: an analysis of the factors influencing successful catheterization. *Anesth Analg*. 1992 Oct;75(4):643.
7. D. Unnikrishnan, N. Idris and N. Varshneya. Complete heart block during central venous catheter placement in a patient with pre-existing left bundle branch block. *British Journal of Anaesthesia*, 2003, Vol. 91, No. 5 747-749
8. M. Ohlgisser, T. Kaufman, U. Taitelman, S. Bursztein and J.H. Birkhan. Cardiac arrest following a complication of internal jugular vein cannulation. *Anaesthesia* Volume 34 Issue 10 Page 1035 - November 1979
9. Dronen SC, Younger JG. Central venous catheterization and central venous pressure monitoring. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 3rd Edn. Philadelphia: WB Saunders & Co., 1997; 359-79
10. McGee WT, Ackerman BL, Rouben LR, Prasad VM, Bandi V, Mallory DL. Accurate placement of central venous catheters: a prospective, randomized, multicenter trial. *Crit Care Med* 1993; 21: 1118-23
11. Scott WL. Complications associated with central venous catheters. A survey. *Chest* 1988; 94: 1221-4
12. Adar R, Mozes M. Fatal complications of central venous catheters. *Br Med J* 1971; 3: 746
13. Sauer W, Luft D, Risler T, Renn W, Eggstein M. Significance of ultrasonics in the placement of a central venous catheter. *Dtsch Med Wochenschr*. 1988 Sep 16;113(37):1423-7.
14. Koscielniak-Nielsen ZJ, Otkjaer S, Hansen OB, Hemmingsen C. CVP catheter electrocardiography: an alternative to radiographic control after cannulation of central veins? *Acta Anaesthesiol Scand* 1991; 35: 762-6
15. Scott WL. Complications associated with central venous catheters. A survey. *Chest* 1988; 94: 1221-4
16. Weissauer W. The cava-catheter from the medico-legal viewpoint. *Anesthesiol Intensivmed Notfallmed Schmerzther* 1998; 33: 117-8

**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