CARDIAC ARREST FOLLOWING CENTRAL VENOUS CATHETERIZATION

(A Case Report)

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Introduction

Bleichroder described central venous catheterization for the first time in 1912. However, the spectrum of its clinical application has broadened only recently [1]. Thereafter in 1929, Werner Forssman performed the first human cardiac catheterization on himself through the right basilic vein [2]. This landmark achievement has been the basis on monitoring cardiac performance, especially diastolic function, during anaesthesia and in intensive care units. In addition central cannula provides excellent intravenous access for drugs, fluids and parenteral nutrition. Right internal jugular vein (IJV) is the most popular site amongst anaesthesiologists because of its easy access, short and straight course to superior vena cava and high success rate [3].

Despite the simplicity of the procedure, the technique is associated with low but definite risk of morbidity and mortality. Cardiac arrhythmias during the procedure have been the subject of intensive studies [4-6]. We report a patient who suffered a cardiac arrest, a rare complication of IJV cannulation which is perhaps the second documented case in literature.

Case report

A 75-year-old patient with carcinoma bladder was posted for partial cystectomy. Pre-operative evaluation revealed a patient weighing 50 kg in ASA grade II. He was not on any medication and systemic examination did not reveal any abnormality. Relevant investigations including electrocardiogram (ECG) and chest radiogram were normal. On the day of surgery, he was pre-medicated with 50 mg pethidine and 0.2 mg glycopyrrolate intramuscularly. General anaesthesia was in-

duced with thiopentone and maintained with oxygen, nitrous oxide, pancuronium and divided doses of pethidine. In addition to continuous ECG, oxygen saturation and end-tidal carbon dioxide monitoring, central venous pressure (CVP) monitoring was also contemplated. Right IJV was chosen and a 15 cm long cannula was introduced over 18 gauge needle using direct puncture technique. As the cannula was introduced to its full length, irregular pulse followed by bradycardia was noticed. It recovered spontaneously and as a precautionary measure cannula was withdrawn slightly. Surgery was in progress and abdomen had been opened by this time. Subsequently, as the cannula was being sutured to skin, bradycardia recurred which rapidly progressed to asystole. Immediately external cardiac compression was started and 1000 µg of adrenaline was administered in CVP line. The rhythm reverted to normal sinus rhythm within a minute. Blood pressure, however dropped to 70 mmHg systolic which improved with dopamine infusion. The catheter was withdrawn further and fixed. The surgery was continued and subsequent course of anaesthesia was uneventful. At the end of surgery residual muscle paralysis was reversed with atropine and neostigmine. Spontaneous respiration returned promptly and the patient recovered completely without any evidence of neurological deficit or recall of intraoperative event. Twelve-lead ECG was recorded in ICU and was normal. Patient had a smooth post-operative period and was discharged on the tenth day.

Discussion

The commonest complication following CV cannulation is trauma to adjacent structures [3]. However, cardiac complications have evoked more interest as serious morbidity and mortality can occur. Cardiac arrhythmias are usually associated with insertion of pulmonary artery catheter (PAC) and incidence is low with CV catheter. An incidence of 45 to 69 per cent has been reported for premature ventricular complexes (PVC) during insertion of catheter [4]. Sprung et al reported PVC in 15 of 28 patients undergoing PAC [5].

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Atrial arrhythmias are uncommon and premature atrial contractions were noted in only 1.3 per cent of cases [7].

In our patient bradyarrhythmia and cardiac arrest occurred during advancement of catheter and during fixation. Catheter presence in intracardiac chamber is arrhythmogenic which is supported by the observation that prophylactic lignocaine reduces incidence of arrhythmia [6]. It is possible that manipulation of catheter could have caused irritation to myocardium resulting in arrhythmia and arrest but it appears unlikely as discussed in next paragraph. Ohlgisser et al described a case of AV block and cardiac arrest following IJV cannulation. However they attributed it to pressure exerted on carotid artery in order to prevent development of haematoma secondary to venepuncture [8].

The catheter tip, if correctly placed, should lie superior to the reflection of pericardium on superior vena cava (SVC). In adult patients with normal stature, optimal length of catheter is 10 to 15 cm. The length of SVC varies from 3 to 10 cm with an average of 6 cm. However, it is worth noting that approximate distance between point of insertion in IJV and atrium is 12 to 14 cm (IJV - 5 cm, right brachiocephalic vein - 2.5 cm, SVC - 6 cm). Thus it is unlikely that the catheter could have traversed down to irritate right ventricular wall and cause fibrillatory arrest. This is further borne by the fact that there were no premature ventricular contractions seen preceding the arrest as is normally the case with direct catheter irritation of myocardium. It appears that manipulation during advancement and fixation of catheter activated carotid sinus reflex which is all too common in old patients [9]. It is therefore tempting to believe that cardiac arrest was of asystolic type and probably of sinus origin.

We conclude by emphasizing that cardiac arrest during central venous cannulation is a potential threat especially in view of various types of arrhythmias. ECG monitoring during the procedure is mandatory. In addition, approximate length of cannula to be inserted may be adjusted beforehand by calculating the distance between point of insertion and angle of Louis. This would help to prevent an inadvertent entry of catheter in cardiac chambers.

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