C.V.P. Catheter Embolism During Cardiopulmonary Bypass

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ABSTRACT

A Central Venous Pressure catheter in the jugular vein became disconnected and disappeared into the vein during bypass surgery. The catheter was finally found by taking an x-ray of the oxygenator.

It is generally accepted that Central Venous Pressure (CVP) monitoring is most useful in post-operative open heart surgery, and certainly necessary to evaluate the changes in blood volume of the patient during and after cardiac bypass.

We have used a catheter in the jugular vein of the self-threading type that although being more accurate during surgery, after the operation it is somewhat more uncomfortable requiring sometimes positioning of the patient's head to avoid kinking and to do an accurate reading.

On February 8, 1973, a thirty-five year old, white female was admitted to Butterworth Hospital because of progressive incapacitating exertional dyspnea of one year's duration. Echocardiography showed a very severe degree of mitral stenosis with fairly pliable mitral valve leaflets. Cardiac catheterization confirmed a very tight mitral stenosis with no calcium in the valves and mild aortic stenosis and insufficiency, with pulmonary hypertension of 70 millimeters Hg. systolic.

On February 12, 1973, an open mitral commissurotomy was performed. A Medi-Cath., 14 gauge, 2″ needle, 9″ radiopaque catheter was placed without difficulty in the right external jugular vein immediately prior to positioning the patient in a 45° oblique position with the right arm tied over the ether screen. The chest was entered through a right antero-lateral thoracotomy in the fourth interspace and transection of the sternum. The aorta was cannulated with an 8 millimeter Morris cannulae, two vena cava catheters, #32, were placed through separate right atrium purse strings and a sump catheter inserted in the apex of the left ventricle.

The mitral valve had a severely fused lateral commisure with subvalvular fusion of the papillary muscle and chordae tendinae such as not to allow the passage of the tip of the index finger. An adequate commissurotomy was performed. After closure of the left atrium, the surgeon was notified by the anesthesiologist that due to sudden change in the CVP, he had observed that the catheter had broken loose from its connection in the neck and was not further in sight at the neck puncture. The superior vena cava cannulae was removed and the surgeon's right index finger introduced through the purse string in the superior vena cava, exploring the right ventricle and the main pulmonary artery but not finding the catheter. One of the surgeons dissected the neck area and visualized the external jugular vein finding the opening in the vein but no catheter.

Meantime, x-rays of the chest and neck were taken with negative results. At the suggestion of a perfusionist (L.T., c.p.), an x-ray of the Bentley oxygenator was taken (Fig. 1-2). The catheter was seen inside the blood reservoir. The operation was terminated without complications and the patient recovered complete and uneventfully.

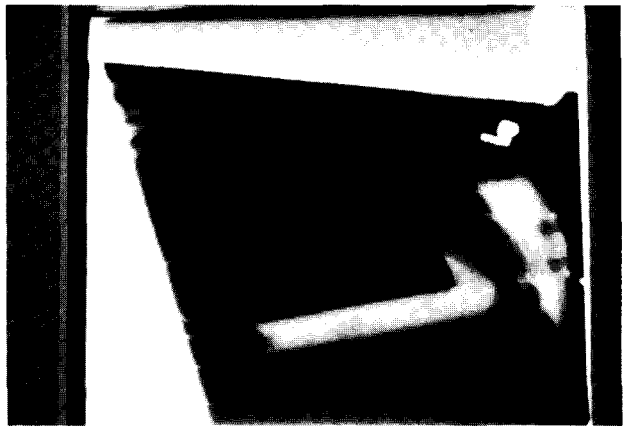

Fig. 1. X-ray of Bentley Oxygenator with opaque catheter in the blood column.

DISCUSSION

Under our present set-up, we use the Adult Bentley oxygenator with two #32 cannulaes connected through a half inch line to the oxygenator, 50 centimeters below the level of the patient. By gravity this set-up will allow a maximum flow of 7,600 milliliters per minute.

As a result of our present case, we now know that it is possible for any indwelling venous catheter to break loose during the pump run and be sucked into the venous line going into the oxygenator.

At present this catheter has been modified with a clamp fixation. This fixation avoids the very precarious connection to a plastic needle that despite what was thought to be an adequate fixation of the catheter to the skin, broke loose. The connection with a plastic needle was done because the nose adaptor was unsafe and the catheter easily will pull through. This accident is more likely to happen with these very soft catheters that will follow the lines of the current and negotiate all the curves of the tubes and connectors. The knowledge of this possibility of CVP catheter suction into the oxygenator can avoid painful, unsuccessful search for a lost catheter during bypass and the potential problems to be faced if the catheter is not found.

For this reason we now cannulate one of the branches of the saphenous veins in the groin with a Swann-Ganz catheter passing it into the right atrium where it can be palpated by the surgeon. This catheter is then withdrawn to the inferior vena cavae after note is made of the mark in the catheter when at the level of the atrium. This position is used during the pump run. After the venous cannulae have been removed, the catheter is advanced once again to the previous marking in the right atrium. If any difficulty is encountered in coming out of the pump, the ballon is inflated and allowed to advance into the pulmonary wedge position to measure wedge and right pulmonary pressures.

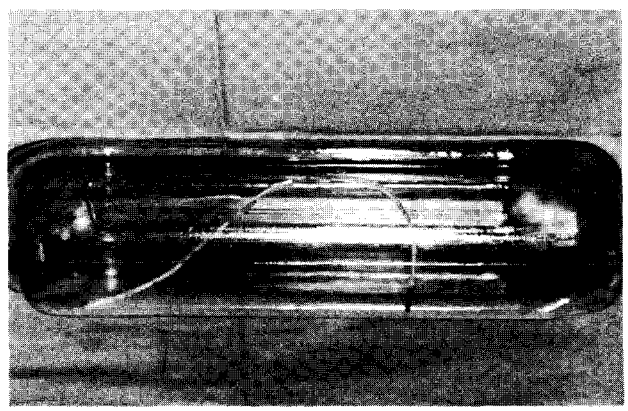

Fig. 2. Picture of Bentley Oxygenator empty with catheter inside.

SUMMARY

The case of a soft CVP catheter in the external jugular vein suctioned by the negative pressure of the vena cava pump catheter is discussed. The finding of this catheter in the oxygenator is demonstrated.