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Central venous catheter in a morbidly obese patient — a sequence of mistakes and coincidences leading to the patient being exposed to the risk of severe complications

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Editor,

We would like to present a case of incorrect approach to central vein catheterisation in a morbidly obese patient. A sequence of mistakes and coincidences including the wrong approach, mistaken recognition of placement of central venous catheter in chest X-ray, and wrong interpretation of symptoms led to an unnecessary replacement of the catheter that exposed the patient to additional risk of severe complications.

A 30-year-old female patient, body mass 132 kg, height 176 cm (BMI 42.6 kg m^{-2}) was admitted to the university hospital for elective bariatric surgery: open Roux-En-Y-gastric bypass. Operation was performed under general anaesthesia using sevoflurane, fentanyl, midazolam and atracurium. A double-lumen central venous catheter through the right subclavian vein was inserted under general anaesthesia. The placement of the tip of the catheter was confirmed by ECG monitoring during catheter insertion. Depth of the catheter was 16 cm from the surface of the skin. Blood could be aspirated from both lumens.

After transfer to PACU, a persistent tachycardia was observed: 110–120 bpm. The patient complained of slight shortness of breath and pain in the abdomen. The pain score was estimated at 3–4 using VAS. The surgeon suggested that tachycardia may be connected with the central venous catheter - the tip of the catheter may be too deep and stimulating the right atrium, causing supraventricular arrhythmia. An X-ray of the chest was performed (Fig. 1). Because of the technical problems — the patient was very obese — the X-ray was not clear. However, the radiologist described the place of the tip of the central venous catheter in the right atrium. The surgeon decided to pull the catheter 4 cm up. Tachycardia was still present, and the patient started to complain of pain during injection through the proximal lumen. Blood could be aspirated only through the distal lumen. Because at this moment a peripheral vein access was easy to establish, the surgeon decided to remove the central vein catheter. The site of CVC insertion had no symptoms of infection.

Two days later, the patient`s general condition worsened. She suffered from fever, abdominal pain and tachycardia. An anastomosis dehiscence was suspected. The patient was operated upon and the diagnosis of peritonitis was confirmed. The patient was transferred to the ICU for treatment of sepsis. A central venous access was needed, so the anaesthesiologist decided to put a catheter through the jugular vein under USG control. The procedure was successful, and the patient was cured in the ICU. She was discharged home two months later.

There have been a number of reports about possible complications of central venous catheterisation in obese patients [1–3]. The main problem in obese patients, apart from technical problems with vein puncture, lies in estimating the appropriate length of the catheter and confirming tip placement [3]. It is recommended to use USG for catheterisation and the right jugular vein is recommended as the first choice [4]. In the described case, it was an anaesthesiologist's decision to perform catheterisation using a subclavian approach. A list of mistakes, coincidences and misunderstandings led to unnecessary removal of the catheter and exposed the patient to additional risk of severe complications.

First of all, catheterisation for elective surgery in morbidly obese (but not only) patients should be performed the day before in the X-ray room, and the proper placement of the tip of the catheter should be confirmed right away with chest X-rays. Secondly, the performing anaesthesiologists decided to place the catheter in such a difficult patient without using USG and chose the subclavian approach which is associated with the highest risk of severe complications such as pneumothorax. Thirdly, catheterisation

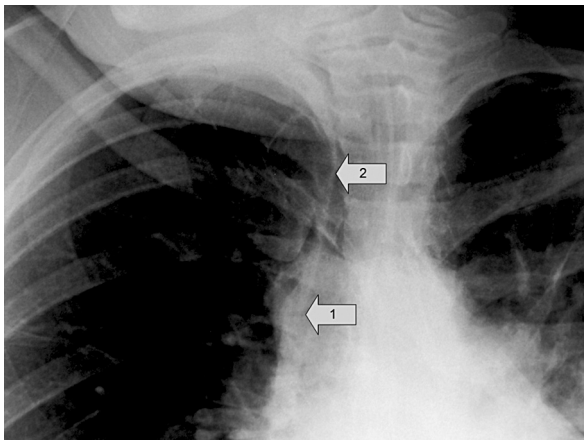

Figure 1. A chest radiograph obtained after placement of the 16 cm double-lumen subclavian catheter. Arrow 1 points to the distal tip of the catheter described by radiologists, while arrow 2 points to the real position

was performed under general anaesthesia which made it impossible to detect early the accidental puncture of the pleura. Additionally, during placement of the catheter, the appropriate depth was confirmed only by ECG monitoring and this was made with the assistance of pulling the skin and subcutaneous tissue fold down. This manoeuvre helps to puncture the vein, but after this is released the catheter may be pulled up by skin and subcutaneous tissue.

We describe a technique that eliminates this possibility by using a longer needle than the standard needle in the CVC set. This allows for not pulling the skin and subcutaneous tissue fold down [5]. The patient in the PACU was moving in the bed and this also can cause dislocation of the tip of the catheter. Johnson et al. [3] described a similar problem with an adequate length of catheter in morbidly obese patients [3]. They suggested that in this group of patients, catheters shorter than 20 cm should not be used. The next mistake was made by the radiologist. In this case, the tip of the catheter was in fact higher than the radiologist had described (Fig.1). The X-ray was not clear because of the obesity, so the radiologist was mistaken. The next mistake was that the surgeon concentrated on one possible reason for arrhythmia: tachycardia caused by deep insertion of the central venous catheter, not on other possible causes of tachycardia. In fact, overly deep insertion of a catheter should cause extrasystole rather than tachycardia. Arrhythmias, if they occur (0.4–1.5%), are usually observed during catheterisation, not after the procedure. In this patient, the tachycardia was connected to the developing peritonitis caused by anastomosis dehiscence. Pulling up the catheter by the surgeon resulted in almost removing it, which was observed when the patient complained of pain during injection through the proximal lumen. It was unnecessary to remove the catheter completely because blood could be aspirated through the distal lumen. The catheter could be inserted deeper using a guidewire. As became clear later, the CVC was necessary for further treatment.

In the case of a morbidly obese patient after major abdominal surgery, if persistent tachycardia occurs without other possible causes like ineffective postoperative analgesia, a diagnosis towards possible peritonitis should be implemented right away. In morbidly obese patients, typical symptoms including tenderness of the abdomen may not be expressed [6]. Tachycardia, worsening abdominal or back pain, and hiccups may be the only signs. This concern makes radiologic investigation with a water-soluble contrast agent mandatory.

In conclusion, we suggest that CVC in morbidly obese patients:

1. Should be placed under USG and X-ray control [4].
2. The preferred first choice site is the right jugular vein [3].
3. The tip of the catheter should be placed deep enough without adopting helpful manoeuvres such as pulling down the skin fold. This may require longer needles and longer catheters [3].
4. Catheterisation should be performed under local anaesthesia if possible, not under general anesthesia.
5. Proper positioning of the morbidly obese patient for CVC is essential to make the procedure effective and safe.

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