

MALPOSITION OF CENTRAL VENOUS DIALYSIS CATHETER IN THE RIGHT INTERNAL MAMMARY VEIN IN UREMIC PATIENT: CASE REPORT

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SUMMARY – A 68-year-old Caucasian woman was admitted to the Department for construction of vascular access for dialysis after thrombosis of arteriovenous fistula. Temporary dialysis catheter was inserted in the left internal jugular vein while she had permanent pacemaker implanted on the right thoracic side. The patient signaled pain in the left breast. Postprocedural chest x-ray revealed that the catheter was malpositioned in the right internal mammary vein. The catheter was immediately pulled out and temporary catheter was inserted in the left femoral vein. Malposition of central venous catheter into small tributaries of central vein is a rare complication which can be hazardous and needs to be quickly recognized.

Key words: *Catheterization – central venous; Hemodialysis, vascular access*

Introduction

Malposition of central venous catheter (CVC) should be expected as a complication, especially into large tributaries of central veins such as internal jugular vein when using subclavian approach, or subclavian and axillary vein when using jugular approach. In some patients, CVC can be misdirected into smaller tributaries of central veins, particularly when inserting catheter through left central veins¹. One reason is that left brachiocephalic vein is anatomically longer and has more smaller tributaries than the right one^{2,3}. Another reason is that left smaller tributaries anatomically anastomose with the brachiocephalic vein opposite to the orifice of the left jugular vein⁴. Small thoracic tributaries where CVC can be misdirected are left and right internal mammary, left superior intercostal, pericardiophrenic, thyroid inferior, azygos

and hemiazygos vein. Clinical signs and symptoms are not specific. They usually present as upper trunk pain syndromes associated with catheter flushing or flow of hypertonic solutions through CVC^{2,5,6}.

Case Report

A 68-year-old Caucasian woman suffering for 6 years from end-stage renal disease caused by chronic glomerulonephritis was admitted to Department of Nephrology, Arterial Hypertension and Dialysis after thrombosis of the arteriovenous fistula on the left arm. Diagnostic tests confirmed afunctional arteriovenous fistula and stenosis of the left brachial vein. Her history included arterial hypertension, ischemic cardiomyopathy, rhythm disturbances including left bundle branch block and first degree atrioventricular block, with occasional total atrioventricular block. Firstly, she had temporary pacemaker on the left thoracic side, and later she got permanent pacemaker on the right thoracic side. She also suffered from chronic hepatitis B, coxarthrosis and had bilateral artificial knees due to gonarthrosis. Her drug therapy included

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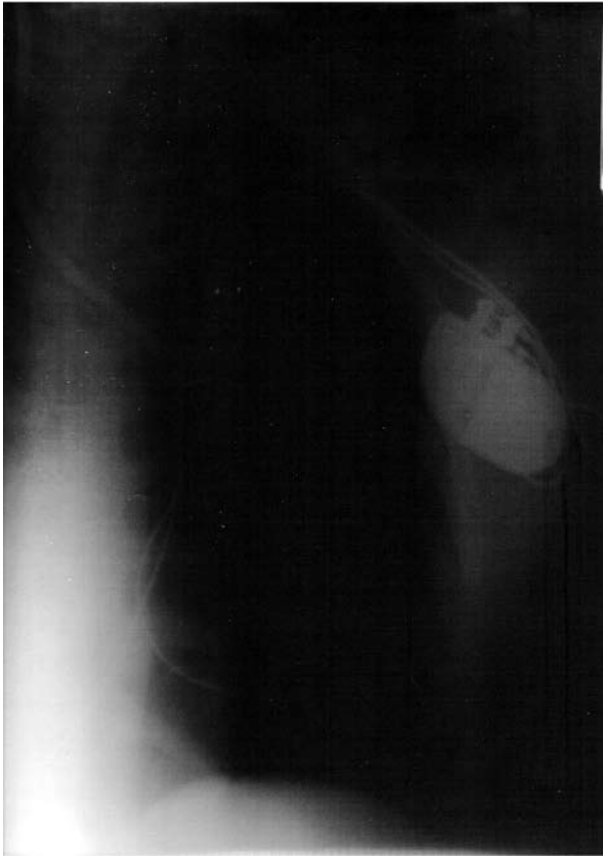


Fig. 1. Anteroposterior chest radiograph showing the central venous catheter (thick white shadow) lying in the right paramedian location, laterally to the vena cava superior indicating internal mammary placement. Pacemaker electrodes are positioned in the right atrium and ventricle (thin white shadows).

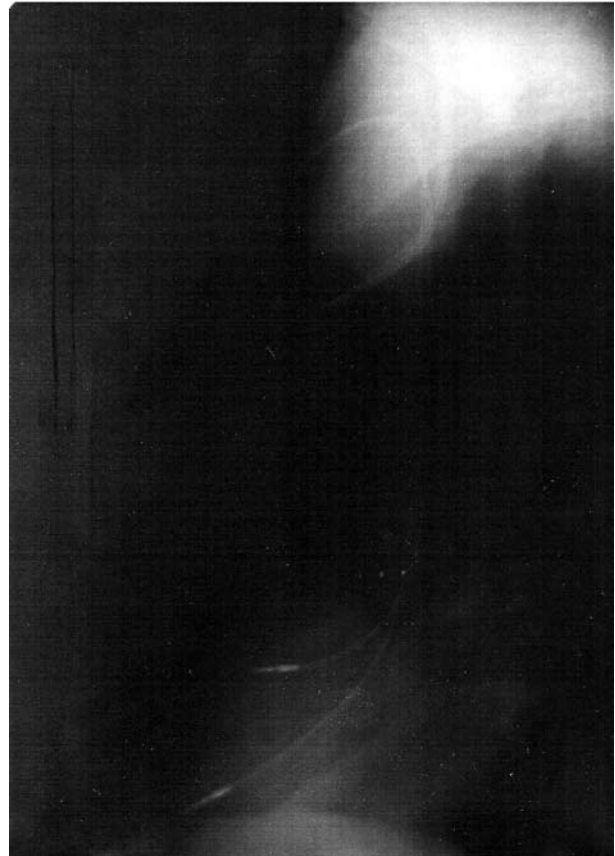


Fig. 2. Lateral chest radiograph showing the central venous catheter placement (thick white shadow) just behind the sternum indicating internal mammary placement. Pacemaker electrodes are positioned in the right atrium and ventricle (thin white shadows).

calcium carbonate, alprazolam, diazepam, ranitidine and isosorbide-dinitrate. She was treated with hemodialysis three times a week. As her arteriovenous fistula was afunctional, the patient needed temporary dialysis catheter to continue with scheduled dialysis.

She was conscious, in verbal contact, hemodynamically stable, eupneic at rest, with pale skin and mucous membrane, and numerous hematomas on the skin. On auscultation, her heart rate was arrhythmic, and systolic murmur was heard over precordium. She had auscultatorily weak breathing sound on the left side and expressed thoracic subcutaneous venous circulation. Her left breast and arm were swollen. Her laboratory tests revealed thrombocytopenia

(Trc $89 \times 10^9/L$), elevated blood urea nitrogen (urea 21.9 mmol/L, creatinine 557 $\mu\text{mol/L}$) and liver enzymes (AP 277 U/L, AST 34U/L, ALT 30U/L, GGT 277 U/L). Potassium was 5.2 mmol/L. Since she had permanent pacemaker on the right thoracic side, CVC was inserted into the left jugular vein using percutaneous aseptic Seldinger technique with anatomic landmarks. Dialysis catheter insertion went uneventful. Infusion flow and venous reflux *via* CVC were confirmed. The patient complained of pain in the breast. Postprocedural anteroposterior chest x-ray could not confirm the position of CVC in vena cava superior (Fig. 1). Lateral chest x-ray was done, which confirmed that CVC was in the right internal mam-

mary vein (Fig. 2). Immediately, dialysis catheter was pulled out uneventfully. Next, temporary catheter was inserted in the left femoral vein and hemodialysis was performed.

The next day, arteriovenous fistula was surgically extirpated. However, her swollen left arm and breast were much bigger. Emergency MSCT angiography of the neck base, thorax and abdomen was done to show segmental stenosis of the left brachiocephalic vein, 2 centimeters long and less than 5 millimeters in diameter. Rich venous collateral circulation was seen in the subcutaneous and muscle tissue, and edema of subcutaneous fat tissue in the upper thorax and arms, especially on the left. Her right internal mammary vein was engorged and superficial neck vein was thrombosed. She also had multicystic thyroid gland and cirrhotic liver parenchyma.

Antibiotic therapy with ciprofloxacin and anticoagulation therapy with warfarin was started. Her hospital stay was complicated with H1N1 virus infection and she received Tamiflu. After one month, she was discharged from the hospital. Her permanent vascular access is currently Tesio catheter inserted in the left femoral vein.

Discussion

Complications of CVC can be infectious, mechanical and thrombotic. In uremic patients, complications are due to individual anatomic variations and uremically changed tissues, coagulation disorders, thrombotic and stenotic obstruction of the large veins. Misdirection of CVC into small tributaries of central veins is a rare complication². In our case, CVC was inserted *via* left internal jugular vein because the patient had permanent pacemaker on the right thoracic side. There were many reasons for misdirection of the catheter in our patient. One of them were electrodes of the pacemaker, which directed the guidewire to the engorged right internal mammary vein. According to the literature, patients with liver disease are at a higher risk of this type of CVC malposition due to engorgement of collateral venous circulation^{7,8}. Our patient suffered from chronic hepatitis B and MSCT angiography revealed cirrhotic liver parenchyma and engorgement of the right internal mammary vein. Moreover, uremic patients before creating permanent vascular access are

dialysed *via* temporary catheters, which also contributes to stenotic occlusion of the vasculature, especially when using left subclavian approach⁹. This case was no exception from these stenotic changes, as confirmed by MSCT angiography of the neck base and thorax. Stenosis of the left brachiocephalic vein also contributed to engorgement and development of the collateral venous circulation, and consequently to the left arm and breast edema. Implantation of the pacemaker could also induce stenotic changes of the large veins. However, postprocedural anteroposterior chest x-ray could not confirm the exact position of the CVC tip. Lateral chest x-ray revealed its position in the right internal mammary vein. Clinical symptoms of this complication are nonspecific. Patients are usually without symptoms until the catheter is flushed or continuous infusion of hypertonic solution is applied^{2,5,6}. Then they can feel midthoracic, retrosternal, back, shoulder and precordial pain, depending on the smaller tributary vein in which CVC is malpositioned^{2,5}. The pain usually deteriorates with higher flow rate of infusion². Our patient complained of breast pain.

Conclusion

To conclude, routine clinical procedures of the infusion flow and venous reflux *via* CVC cannot confirm that the tip of the catheter is in the large central vein². To prevent complications, ultrasound guided insertion of the CVC should be used whenever possible and obligatory postprocedural anteroposterior chest x-ray taken^{1,10,11}. Because of the anatomic proximity of the mediastinal structures, lateral chest x-ray is sometimes also necessary to confirm the exact position of the CVC tip⁴.

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Sažetak

KRIVO POLOŽENI CENTRALNI VENSKI KATETER ZA DIJALIZU U DESNU UNUTARNJU PRSNU VENU U BOLESNICE SA ZAVRŠNIM STADIJEM ZATAJENJA BUBREGA: PRIKAZ BOLESNIKA

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Žena u dobi od 68 godina primljena je putem hitne službe na odjel radi osiguranja krvožilnog pristupa za hemodijalizu nakon tromboze arteriovenske fistule. Privremeni dijalizni kateter je postavljen u lijevu unutarnju jugularnu venu zbog elektrostimulatora implantiranog na desnoj strani prsnoga koša. Bolesnica se nakon postavljanja katetera žalila na bol u lijevoj dojci. Kontrolna rentgenska snimka pluća pokazala je da se kateter nalazi u proširenoj desnoj unutarnjoj mamarnoj veni. Kateter je odmah izvučen iz venske cirkulacije i postavljen privremeni kateter u lijevu femoralnu venu. Malpozicija centralnog venskog katetera u male ogranke centralne vene je rijetka komplikacija, ali potencijalno opasna i zahtijeva pravodobno prepoznavanje.

Ključne riječi: *Kateterizacija – centralna venska; Hemodijaliza, vaskularni pristup*