Nenamerna kateterizacija skupne karotidne arterije pri poskusu vstavitve centralnega venskega katetra v notranjo jugularno veno

Unintentional common carotid artery cannulation during attempted internal jugular venous catheter insertion

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Izvleček

Namen: *Vstavljanje centralnih venskih katetrov je praktično vsakodnevno delo anesteziologov in drugih zdravnikov v enotah intenzivne nege in terapije. Običajno se za centralni venski pristop uporabita desna notranja jugularna vena ali desna vena subklavija.*
Poročilo o primeru: *V prispevku predstavljamo primer moškega srednjih let, ki mu je bilo zaradi končne ledvične odpovedi potrebno presaditi ledvico. Med pripravo na operacijo je pri poskusu uvajanja centralnega venskega katetra v desno notranjo jugularno veno prišlo do nenamerne vstavitve katetra v skupno karotidno arterijo. Zaplet je bil takoj prepoznan in ustrezno oskrbljen s strani žilnega kirurga. Bolnik je po operaciji okreval brez dodatnih zapletov.*
Zaključek: *Velikokrat se centralni venski kateter vstavlja brez pomoči ul-*

Abstract

Purpose: *Insertion of a central venous catheter is a common procedure, performed by anesthesiologists and other medical professionals. The preferred site for central venous cannulation is the right internal jugular vein.*

Case report: *We present the case of a male patient who underwent renal transplantation for end-stage renal disease. During preparation for surgery, the right common carotid artery was cannulated instead of the right internal jugular vein. The situation was immediately recognized and managed by a vascular surgeon. The patient recovered completely without neurological deficit.*
Conclusions: *Central venous cannulation is usually performed using the landmark technique. Incidental cannu-*

trazvoka, in sicer s slepo metodo po Seldingerju. Nenamerna vstavitev katetra v skupno karotidno arterijo je redek zaplet, vendar ima lahko za bolnika hude posledice, če ga ne prepoznamo pravočasno in ne ukrepamo ustrezno.

lation of the common carotid artery is a rare complication that can have serious consequences if not immediately recognized and properly managed.

INTRODUCTION

Insertion of a central venous catheter is a common procedure performed by anesthesiologists and other medical professionals almost on a daily basis. It is usually a safe procedure but certain complications can occur. Accidental penetration into the pleural space with pneumothorax can occur, or unintentional cannulation of the artery instead of the central vein. Carotid artery catheterization is a rare complication associated with jugular venous catheter insertion that can have serious consequences if not immediately recognized and properly managed (1).

Two sites are usually used for central venous cannulation: the right subclavian vein or the right internal jugular vein. The preferred site for central venous access is the right internal jugular vein (2). Arterial puncture during internal jugular vein cannulation is reported to be between 6.3% and 9.4%. Fortunately, the incidence of arterial cannulation is less than 1%. With the increasing use of ultrasound guidance during central venous catheter placement, higher rates of success on the first attempt and a decrease in complication rates have been reported (3). In this paper, we present a case of a male patient who was referred to our medical centre for renal transplantation due to end-stage renal failure. During preparation for surgery, the right common carotid artery was cannulated instead of the right internal jugular vein.

CASE REPORT

A 68-year-old male was referred to our medical centre for renal transplantation. The kidney was harvested from a brain dead donor. The patient had end-stage renal failure due to IgA glomerulonephritis and was on temporary hemodialysis three times per week. He also had arterial hypertension and type 2 diabetes mellitus, both treated with oral medications. He had no prior operations. Preparation for surgery by the anesthesiology team was performed according to our standard protocol for renal transplantation. During cannulation of the right internal jugular vein with the central venous catheter, pulsatile flow of blood was obtained and it was suspected that the carotid artery had been punctured. A blood sample was obtained for gas analysis and arterial blood was confirmed. Central vein cannulation was attemped using the landmark technique without ultrasound guidance. Brain oxygenation monitoring by near infrared spectroscopy (NIRS) was immediately performed. The central venous catheter was left in place on the right side, and using ultrasound guidance, the left internal jugular vein was successfully cannulated. The patient underwent successful kidney transplantation and the vascular surgeon was consulted at the end of the procedure. The vascular surgeon and anesthesiologist decided that surgical exploration of the right carotid artery would be the best option. During surgical exploration, it was found that the internal jugular vein was not punctured or damaged and the common carotid artery was cannulated. The vascular surgeon removed the central venous catheter from the carotid artery and sutured the defect in the arterial wall. During the entire surgical procedure neurological monitoring was performed and no neurological deficit was noted. The patient recovered fully with an uneventful postoperative course. The patient had no perioperative neurological symptoms.

DISCUSSION

Complications after accidental arterial trauma during attempted cannulation of the central vein can be serious. Iatrogenic trauma to the carotid arteries may provoke severe bleeding, arterial dissection, emboli, thrombosis, or stroke. In anesthetized patients, inadvertent arterial cannulation that is not promptly recognized and managed can lead to debilitating, irreversible complications (4). Thrombembolism can occur up to 48 hours after trauma to the carotid artery; neurological symptoms may not necessarily be evident immediately after arterial catheterization. Close neurological monitoring for up to 48 hours is suggested in these cases (5).

In our case, we attempted to cannulate the right internal jugular vein using the landmark technique, without ultrasound guidance. After puncturing the vein, we obtained dark, non-pulsatile blood; therefore, it was thought that the right vein was punctured. Then, we dilated the vein and inserted a central venous catheter. However, immediately after insertion of the catheter, pulsatile blood flow into the catheter was noted. We suspected that the carotid artery had been punctured. Blood gas analysis confirmed that the artery was cannulated.

Physical findings of arterial puncture include the following: enlarging hematoma or ecchymosis in the region which can obstruct the airway, diminished distal pulses, tracheal deviation, vocal cord palsy, or a palpable thrill or bruit. In some cases, especially in patients such as ours with end-stage kidney failure, the classic signs of arterial puncture may be absent and therefore dilatation and cannulation of the artery may occur.

Confirmation of venous blood prior to dilatation and cannulation is also critical in patients with chronic pulmonary obstructive disease, who normally have lower arterial oxygenation, or in patients with hypotension (6). To avoid incidental puncture of the carotid artery instead of the internal jugular vein, many published guidelines and recommendations support the clinical utility of ultrasound-guided internal jugular vein puncture. The use of appropriate cannulation techniques involving real-time ultrasound guidance to avoid puncturing of the common carotid artey has been widely reported in the literature (7). The classic teaching of looking for dark, non-pulsatile blood can be inaccurate in hypotensive, hypoxic patients and patients with kidney failure. Also, when a collapsible vein overlies the carotid artery, puncture through the vein can occur (8). In our case, the vascular surgeon confirmed that the internal jugular vein was anterior to the common carotid artery; but interestingly, the vein was not punctured or damaged.

It is recommended, that a vascular surgeon is consulted in cases of inadvertent carotid artery cannulation. Surgical or endovascular repair of the artery is the best management and has minimum complications (4). Some authors report a complication rate of 47% in cases where the catheter was removed and manual compression applied. No complications have been reported in patients treated with surgical exploration and surgical repair of the damaged artery wall (4).

CONCLUSIONS

Complications after catheter-related carotid arterial trauma can be devastating if not immediately recognized and managed. Ultrasound guidance should be utilized when performing central venous catheter insertion into the internal jugular vein. If inadvertent carotid artery cannulation occurs, the central venous catheter should be left in place and a vascular surgeon consulted.

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