Treatment of inadvertent subclavian artery cannulation with a percutaneous vascular closure device

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A B S T R A C T

Inadvertent puncture of the subclavian artery is an uncommon but potentially fatal complication of the commonly performed internal jugular vein catheterization. We report a case of accidental subclavian artery catheterization close to the vertebral artery during internal jugular venous cannulation, which was successfully managed in the interventional suite with catheter removal and use of a vascular closure device.

Introduction

Internal jugular vein catheterization is a common clinical operation, and the inadvertent puncture of an artery is a life-threatening complication.1 This case shows the successful treatment of the inadvertent subclavian artery catheterization with a vascular closure device.

Case report

An 80-year-old man with acute myocardial infarction underwent emergency percutaneous coronary intervention with intra-aortic balloon pump (IABP) protection. After the procedure, when an internal jugular vein catheter was inserted for fluid administration, it began to pulsate with blood, suggesting erroneous insertion into the artery. Because of the severity of the patient’s status and the stability of his vital signs, the patient was closely monitored. After three days, the IABP was removed, and deep vein catheterization was performed.

The right femoral artery was punctured under local anesthesia, and a 6 F vascular sheath was inserted using a pigtail catheter angiography to identify the aortic arch shape. A 5 F MPA catheter was advanced to the brachiocephalic artery. Angiography showed that the deep vein catheter had penetrated the upper segment of the right subclavian artery near the vertebral artery (Fig. 1A). After conversion to general anesthesia, a 6 F 90 cm importer (COOK) was advanced to the proximal right subclavian artery along with a 10–60 mm balloon (Powerflex®, Cordis) as backup. A guidewire was advanced into the deep vein catheter, and the catheter was withdrawn and replaced with a 5 F vascular sheath (Fig. 1B). Another guidewire was then advanced from the vessel sheath into the right subclavian artery, and the sheath was withdrawn. The sheath from one of the guidewires was used to provide another wire outside the sheath. After sealing the artery with a closure device (EXOSEAL®, Cordis), the sheath and closure device were withdrawn together and manual pressure was applied. Angiography showed a small amount of contrast spillover (Fig. 1C), which resolved after 2 min (Fig. 1D). The other wire was removed, and continuous pressure was applied for 10 min without evidence of bleeding (Fig. 1E). The balloon and importer were removed. Fig. 1F shows the removed catheter. Vital signs were stable during the procedure, and the patient was discharged 48 h later.

Discussion

The internal carotid artery can be easily punctured during internal jugular vein puncture; bleeding usually can be managed by needle removal and compression. However, as in this case, insertion of a sheath into the internal carotid artery poses a greater management challenge2 with several options, such as (1) surgical incision and puncture site suturing, which is highly traumatic and may raise the risk for recurrent acute myocardial infarction in this patient; (2) use of a stent graft, which in this patient was undermined by the location of the puncture site between the vertebral artery and right internal carotid artery, with insufficient anchoring area in the vertebral artery opening; and (3) use of a closure device. Perclose Proglide™ and Angio-Seal closure devices were not chosen for this patient because they may injure or lead to suture of the vertebral artery1; hence, EXOSEAL® was used because it only blocks...
the outside of the vessel without affecting the vertebral artery. The probability of success was increased in the present case by using a preset balloon to prevent and treat severe bleeding after the percutaneous procedure, having a surgeon on stand-by, and using a smaller diameter (5 F) deep vein catheter. Patients with inadvertent cannulation of the subclavian artery should undergo comprehensive evaluation to inform them of the treatment choice.

Conclusion

Accidental subclavian artery catheterization during internal jugular venous cannulation can be successfully managed with a vascular closure device, with no influence on vertebral artery flow.

References

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Fig. 1. Angiography views and removed catheter. A. Angiography showed that the deep vein catheter was stuck into the right subclavian artery near the vertebral artery. B. The catheter was withdrawn and replaced with a 5 F vascular sheath. C. Immediately after closed, angiography showed a small amount of contrast spillover. D. After 2 min, the contrast overflow was disappeared. E. Final angiography. F. The catheter pulled out in vitro.