I. Introduction

Percutaneous central venous catheter cannulation is a common procedure for critically ill patients in the emergency room. These catheters are useful for rapid volume resuscitation, hemodynamic monitoring, intravenous drug therapy, parenteral nutrition, and hemodialysis. However, mechanical complications may occur during this procedure, such as pneumothorax, hemothorax, and arterial wall rupture.\(^{(1)}\)

The most serious vascular complication is arterial wall rupture, which can result in critical hemorrhage and even death.\(^{(2)}\) Surgical repair has been the preferred method of treatment.\(^{(3,4)}\) In recent years, endovascular stent graft placement has emerged as a valuable alternative to surgery.\(^{(5-7)}\)

However, the number of patients with subclavian...
artery injuries who undergo urgent endovascular stent graft placement is limited. Herein, we report on a patient with a ruptured subclavian artery during central venous catheterization who was successfully treated by endovascular stent graft with no complications.

II. Case

A 31-year-old female visited our hospital emergency room with hypovolemic shock due to cervical os laceration during vaginal delivery at a local obstetrical clinic. She was very pale in appearance and her mental status was drowsy. Systolic blood pressure was 60 mmHg. Hemoglobin level was 5.1 g/dL and hematocrit was 15.5%. Twelve lead electrocardiogram showed sinus tachycardia. The emergency physician attempted right subclavian vein catheterization for infusion of saline and blood transfusion, but failed. She was moved to the surgical intensive care unit and received blood transfusion but she did not recover from hypovolemic shock and hemothorax had occurred (Fig. 1). Obstetric & Gynecology doctors consulted to the cardiologist after 8 hours. Impression was iatrogenic subclavian artery rupture due to misplacement of the central venous catheter. Angiography was performed and demonstrated contrast extravasation in the site of the right subclavian artery (Fig. 2). Percutaneous balloon expandable stent graft (8.0×50 mm, Gore® VIABAHN®) placement was performed, through an 8F–12 cm introducer sheath placed into the right femoral artery. Active bleeding subsided after placement of a stent graft (Fig. 3) and her vital signs stabilized rapidly. The patient was discharged from the hospital without complication.
III. Discussion

Central venous catheterization is one of the most common procedures performed for the purpose of rapid volume resuscitation. However, accidental puncture of the surrounding major artery can occur during the procedure, which may lead to a more serious situation.

Several methods have been developed for safe central venous catheterization. Use of ultrasonography for placement of central venous catheters has been advocated to reduce iatrogenic complications.(8) Real time ultrasonography during central venous catheterization significantly reduced the number of complications during the procedure, according to the meta-analysis of the literature, Randolph and colleagues(9) however, they have also expressed concern about the cost of the technology.

Inadvertent arterial puncture with a small needle is usually benign,(10) however, arterial misplacement of a central venous catheter can cause a serious mechanical complication and requires urgent treatment.(11) Early detection of the complication is critical for physicians. Pulling a large-bore catheter from an artery and applying pressure is generally acceptable management when the provided artery is accessible to manual compression. However, an arterial puncture in the proximal common carotid artery, subclavian artery is unmanageable by external compression because of the overlying bony structure. Surgical repair has been the preferred method of treatment.(3,4) However, surgical approaches are technically complex in an already debilitated patient and consequently entail considerable morbidity and mortality rates.(3,4,12)

In this case, the patient visited our hospital with hypovolemic shock due to cervical os laceration during vaginal delivery. Rapid volume resuscitation was critical. The emergency physician attempted right subclavian vein catheter insertion several times but finally failed. The patient’s blood pressure remained low even after administration of massive blood transfusion. Under the impression of iatrogenic subclavian arterial wall rupture due to misplacement of a central venous catheter, we concluded that endovascular stent insertion is a better option than a surgical intervention for this patient in hypovolemic shock.

Angiography was performed and demonstrated contrast extravasation in the site of the right subclavian artery. Active bleeding subsided after placement of a stent graft (Fig. 3) and her vital sign stabilized rapidly. After a successful angioplasty, the patient was discharged from the hospital without complication. She visits our hospital regularly, and she actively uses her right arm without numbness or claudication. Both radial arterial pulses are equally palpable.

Based on the long-term results of stent graft treatment of subclavian artery injuries by du Toit DF,(13) stent restenosis is problematic. However, most cases were managed well with conservative treatment. The technology of endovascular stent graft intervention has shown continuous improvement, so far. We conclude that endovascular stent graft is a very attractive alternate to open surgery, when inadvertent arterial wall rupture occurs. Regular follow up of the stented artery by Doppler sono is recommended after successful angioplasty.

REFERENCES

7) duToit DF, Strauss DC, Blaszczyk M, deVilliers R, Warren