

CASE REPORT

Medicine Science 2017;6(1):151-3

Stenosis of internal jugular vein detected by ultrasound imaging in renal recipient patient**Ahmet Selim Ozkan¹, Mehmet Ali Erdogan¹, Sedat Akbas¹, Mahmut Sahin², Nevzat Erdil³**¹Inonu University Medical Faculty, Department of Anesthesiology and Reanimation, Malatya, Turkey²Inonu University Medical Faculty, Department of Radiology, Malatya, Turkey³Inonu University Medical Faculty, Department of Cardiovascular Surgery, Malatya, Turkey

Received 13 April 2016; Accepted 10 October 2016

Available online 24.10.2016 with doi: 10.5455/medscience.2016.05.8535

Abstract

Central Venous Stenosis (CVS) has been reported as a later complication of recurrent and long-term Central Venous Cannulation (CVC). Using ultrasonography (USG) before or during CVC greatly increases first-pass success and decreases the complications such as arterial puncture or hemotoma. Anatomical abnormalities of Internal Jugular Vein (IJV) often leads to increase the complication rate and the failed attempt. In this presentation; we aimed to report that the use of USG during CVC in renal recipient patient with CVS.

Keywords: Jugular vein stenosis, ultrasound, renal recipient patient

Introduction

Central Venous Cannulation (CVC) is used widely procedure in anesthesia practice with many indications and usually internal jugular vein or subclavian vein is chosen. CVC is often applied for hemodialysis as large-bore catheters in renal failure. Central Venous Stenosis (CVS) has been reported as a later complication of recurrent and long-term CVC application [1]. The cause of CVS is not known clearly, but it has been thought that CVS is developed due to the trauma which induced by central venous catheters in venous endothelium and inflammatory response of vessel wall. In a prospective study, CVS was found in 52.4% of hemodialysis patients with a greater number of inserted catheters, longer time in place and more dialysis sessions [2].

CVC can be performed with blind landmark method or USG-guided. Using ultrasonography (USG) before (static) or during (realtime-dynamic) CVC greatly increases first-pass success and decreases the incidence of complications such as arterial puncture or hemotoma [3]. In this presentation; we aimed to report that the use of USG during CVC in renal recipient patient with CVS.

Case Report

A 30-year-old and 65 kg, 170 cm male applied to our hospital for living donor renal transplantation. The patient was diagnosed with the chronic renal failure. Hemodialysis was performed last 10 months and internal jugular vein (IJV) cannulation was applied 6 times. After obtaining informed consent, patient was monitored in operating room and general anesthesia was planned. Patient was intubated after the induction of anesthesia with propofol, remifentanyl and cisatracurium. The cannulation of double-lumen hemodialysis catheter was scheduled from the right IJV. Patient was received 15 trendelenburg position to improve venous distension and neck was returned to left slightly. It was tried venous puncture by the anatomic landmark technique, but without success and decided to perform CVC with guidance of USG after the second unsuccessful trial. The anaesthesiologist tried to imaging IJV on the right sight with linear, high-frequency ultrasound device transducer (Sonosite M-Turbo®, Sonosite Inc, Bothell, WA, USA, 6-13 MHz, Sonosite) which was wrapped with a sterile sheath. Right carotid artery were clearly displayed, but the right IJV was not visible by USG and could not be seen despite replacing the transducer and changing the position of neck (Figure 1). The right carotid artery was displayed with Color Dopler imaging without the right IJV (Figure 2). An experienced radiologist smoothly proved right IJV stenosis and lack of blood flow with extreme narrowing of vein. The left IJV cannulation was seamlessly applied by the same anaesthesiologist using USG. Left IJV cannulation was verified with guidance of USG simultaneously (Figure 3).

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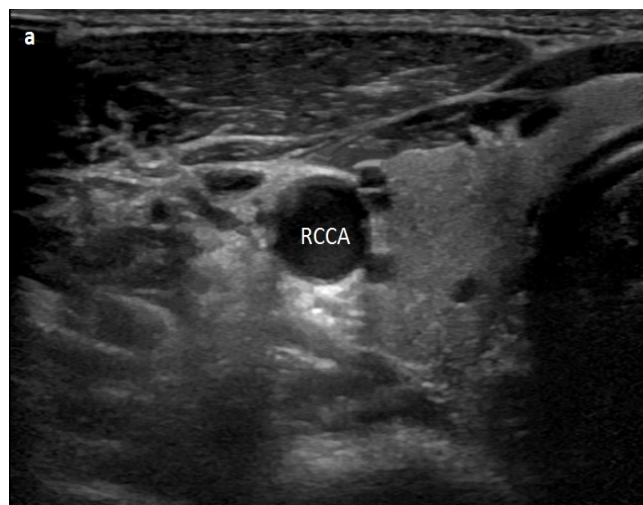


Figure 1. Ultrasonographic appearance of the right common carotid artery (RCCA) with the absence of the right internal jugular vein. The image was obtained during the Trendelenburg position. (RCCA)

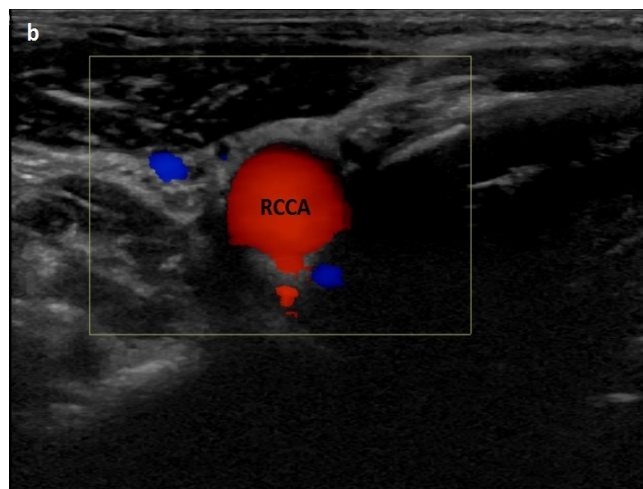


Figure 2. Ultrasonographic appearance of the right common carotid artery (RCCA) with the absence of the right internal jugular vein. The image was obtained during the Trendelenburg position. (RCCA with color Doppler imaging)

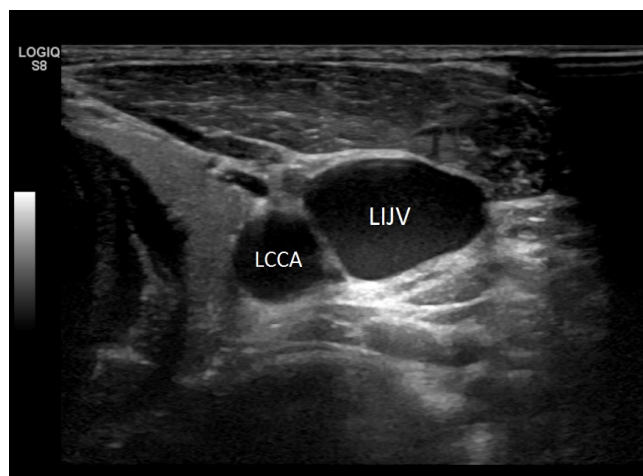


Figure 3. Ultrasonographic appearance of the left common carotid artery (LCCA) and the left internal jugular vein (LIJV)

Discussion

Hemodialysis patients are commonly exposed to the recurrent catheter [1]. CVC which purpose of hemodialysis is a reliable and temporary attempt. Studies have been reported that recurrent CVC cause to CVS as a delayed complication of central venous catheters [1]. Common pathology of CVS is combination of lesions that formed in the central vein's wall after CVC. It is believed that central venous catheters induce venous endothelium with trauma and inflammatory response in vascular wall, but the mechanism of CVS is exactly unknown. Many factors such as having a foreign object in the vein, shifts of catheter during breathing, head and postural movement during CVC can cause some changes in the vein wall. Intimal hyperplasia of vein wall and increase of fibrous tissue due to occlusion or symptomatic stenosis are seen in the histological analysis of the central veins. Intimal focal damaged areas in veins and endothelial abrasion was detected in 3 patients that were applied short-term catheter less than 14 days [4]. CVC was applied to the right IJV 6 times for dialysis last 10 months in our patient.

Right IJV is commonly preferred for central venous cannulation for hemodialysis. Anatomical abnormalities of IJV may be encountered in placement of the catheter [1]. This anatomical abnormalities of IJV often leads to increased complication rate and the failed attempt. The complication rate of CVC is reported as 0.3-12% [5]. Carotid artery puncture and hematoma are a common complications in cannulation of the IJV due to the proximity to the carotid artery and it can be resulted as vascular injury, neurological damage and airway obstruction. The incidence of mechanical complications increases when more attempts are made. Thrombosis can cause decreased blood flow in the IJV. It was reported that long term and recurrent catheter procedure also increase the risk of thrombosis [6]. The possibility of thrombosis was excluded in our patient with USG.

Ultrasonography has been put into use in different clinical indications that parallel to the developments of ultrasound since the 1970s. USG shows the vein diameter and location, anomalies and potent vessel so avoiding unsuccessful attempts in patients with absent or thrombosed veins and congenital anomalies. Anatomical landmarks and palpation are generally used for CVC before the attempt and landmark techniques for vascular cannulation are associated with high success rate. Unsuccessful CVC is due partly to the deficiency of landmarks and location of the vessels. USG-guided vascular access is most effective when used in real time. It has been shown that real time USG increases the success rate of CVC in the first attempt and decreases time to cannulation, rate of arterial puncture and the mechanical complications [3]. In Nejad et al. [7]'s study, long-term catheter was concluded to be associated with CVS in hemodialysis patients. It was suggested that CVC must be

applied with USG-guide in patients with coagulation disorders and anatomical variations [8]. Rad et al [9] suggested that Color doppler USG is a best alternative to venography in order to demonstrate the CVS in hemodialysis patients with CVC history and it was stated that the sensitivity is 80.9%, and the specificity is 79.3% for doppler USG. Patel et al. [10] have proposed that CVC for dialysis must be done routinely with Color Doppler USG-guide for minimize the complications due to iatrogenic trauma wherefore anatomical proximity of jugular vein to the other major vascular structures. Butal et al. [11] have recommended the using of preoperative doppler USG for the patients with history of multiple attempts and long-term catheter. In our clinic, CVC is performed routinely with ultrasound guidance in patients with coagulation disorder and pediatric patients. The using of ultrasound will be helpful to reduce complications and morbidity in all central venous cannulations, but require more experience. Our patient had a history of recurrent long term dialysis catheter, and stenosis of IJV was seen easily with the using of USG. But, there is no consensus between anesthesiologist in terms of using real-time USG during jugular CVC.

Consequently, we believe that the routine using of USG should be preferred in all CVC for imagining the IJV. If this is not possible, USG can be applied routinely in hemodialysis patients with a greater number of inserted catheters, longer time in place and more dialysis sessions. There is a need to further studies to determine the effect of the routine use of ultrasound.

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