Case Report

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Website: www.afrjpaedsurg.org
DOI: 10.4103/0189-6725.132844
Quick Response Code:

Ultrasound- guided placement of double catheter in the right internal jugular vein: Two case reports

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ABSTRACT

Central vascular access in critically ill paediatric patients is, many times, a challenge for physicians due to the number of lines needed for multiple infusions. We present ultrasound-guided placement of a double catheter in the right internal jugular vein in two patients that required multiple central lines for management.

Key words: Double catheter, jugular vein, ultrasound-guided

INTRODUCTION

Central vascular access in critically ill paediatric patients many times is a challenge for physicians because of the number of lines needed for multiple infusions.

It has been reported that 41% of children admitted to a paediatric intensive care unit (PICU) require one or more catheters during their hospitalisation.[1,2]

The right internal jugular vein (RIJV) is often chosen as a central access because it is a large superficial vein, which is reasonably consistent in its reference points and easily visible with ultrasound. These advantages make cannulation predictable. Likewise, its straight course means that there are no barriers to easily reach the superior vena cava.

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The objective of this report is to present the experience of ultrasound-guided placing of two double-lumen catheters in the RIJV.

CASE REPORTS

Case 1

A 12-month-old male patient weighing 10 kg, with a diagnosis of acute leukaemia, was admitted to the PICU for septic shock. Attempts were made to obtain central vascular access through the femoral and subclavian vein without success. By ultrasound, the diameter of the RIJV was defined as 6.3 mm and the depth 4 mm, being lateral in relation to the carotid. Cannulation of the RIJV was achieved with the first puncture in both sites and placement time was 20 min. One of the catheters was removed at 8 days and the patient died with a functional catheter at 17 days.

Case 2

A 23-month-old female patient weighing 9.3 kg, with a diagnosis of acute myelogenous leukaemia, was admitted to the PICU because of acute liver failure. Attempts were made to obtain central vascular access through the RIJV and the femoral veins without success. By ultrasound, the diameter of the RIJV was 8.9 mm and the depth 4.1 mm, being anterolateral in relation to the carotid. Cannulation of the RIJV was achieved with the first puncture in both sites and placement time was 25 min. One of the catheters was removed at 15 days and the patient died with a functional catheter at 35 days.

In both cases, arrhythmias were not observed during the procedure, air leak complications did not occur and the carotid was not punctured. Both catheters were functional at one week with no clinical or ultrasonic evidence of thrombosis.

Catheter placement technique

The head was fixed at a 40° angle. Before the procedure, RIJV vascular assessment was performed with a

SonoSite MicroMaxx ultrasound with a 4-8 MHz transducer (SonoSite, Inc., Bothell, WA). The evaluation was performed at the level of the cricoid with the transducer placed in the short-axis view, so that a cross section of the RIJV could be seen.

Using an aseptic technique and sterile clothing, a puncture was made with ultrasound guidance synchronously with a short 22 Ga venous catheter. A 0.018 in guidewire was then passed. A second puncture was performed 1 cm proximal to the initial puncture with a short 22 Ga venous catheter introducing another 0.018 in guidewire [Figure 1]. A double lumen 13 cm long 4 Fr Arrow® catheter was then inserted using the Seldinger technique in both puncture sites [Figure 2]. A post-procedure X-ray was obtained and finally, both catheters were individually fixed and covered.

DISCUSSION

Central vein catheterisation in critically ill paediatric patients is used for multiple purposes, such as haemodynamic monitoring, the administration of solutions, parenteral nutrition and drawing blood samples.[2]

In 1988 the insertion of a double central vascular access was reported in the adult patient populations and at least two techniques for the introduction of two central venous catheters (CVC) have been described: in the first one vein puncture is made and in the other, two punctures are made. The venous accesses reported are the jugular and the subclavian vein.[3]

Reeves *et al.*[4] in a comparative study of 100 adult patients of catheterisation by anatomical reference points reported introducing a single CVC versus a double CVC in the RIJV. Researchers reported a 57% success rate of RIJV catheterisation in both groups; in some cases catheter placement took more than five punctures. Their incidence of carotid artery puncture was 4-6%.

Using real-time ultrasound, RIJV vascular assessment is performed, which includes measuring the diameter and depth of the vein and determining the location of the carotid. Vascular assessment increased the success rate in our two patients, the 4 catheters were placed after the first puncture and the carotid was not punctured.

The time that both catheters remain in the vein depends on the patient's clinical status and needs. Once the patient is stable, these can be removed and management can continue with only one catheter.

Knowledge of the vessel diameter contributes to the decision of choosing the diameter of the CVC that can accommodate to the vein without causing flow obstruction, which carries a risk of vessel thrombosis. In this report, every 4 Fr catheter had a diameter of 1.3 mm. The two catheters together had a diameter of 2.6 mm, which occupied 41% and 29%, respectively, of the anteroposterior diameter of the RIJV in each patient.

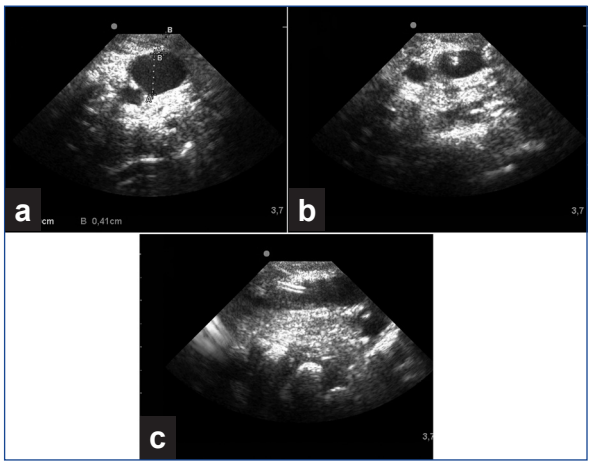


Figure 1: Ultrasound view (a) Short-axis view of jugular vein (transverse view). (b) Short-axis view of catheters in the right internal jugular vein. (c) Long-axis view (longitudinal view) of catheters in the right internal jugular vein

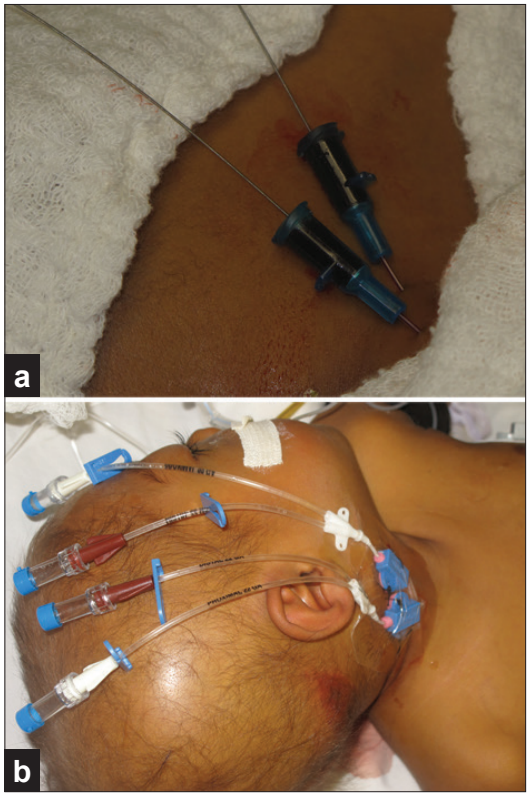


Figure 2: Patient view (a) two 0.018 in guidewires introduced in two short 22 Ga venous catheter in the right internal jugular vein. (b) Two double lumen 13 cm long 4 Fr Arrow® catheters individually fixed

The reported incidence of thrombosis is 1.4%, but associated with a single puncture technique.[5]

Since thrombosis is a frequently reported complication associated with placement of a CVC,[6] we believe that the technique described in this report presents certain advantages not only for paediatric patients:

- The diameter of the RIJV is determined before puncture, making it possible to select the best catheter diameter that does not obstruct more than 50% of vessel flow;
- The possibility of multiple punctures is reduced since the puncture is guided by ultrasound in real time and
- When the patient is stable, one catheter can be removed making the site a single vein access.

CONCLUSION

Ultrasound-guided double catheterisation of the internal jugular vein in the paediatric patient's is a safe method that increases the success rate of vein cannulation and allows assessment of the possibility of placing two central vein catheters. Thus, a single vein can hold four infusion lines, saving veins used for the multiple purposes that these severely ill patients need.

ACKNOWLEDGEMENT

We thank Sergio Lozano-Rodriguez, M.D. for his help in translating and editing the manuscript.

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Cite this article as: Montes-Tapia F, Rodríguez-Taméz A, Luévanos-Gurrola K, Garza-Alatorre A, de la O-Cavazos M. Ultrasound- guided placement of double catheter in the right internal jugular vein: Two case reports. Afr J Paediatr Surg 2014;11:196-8.

Source of Support: Nil. **Conflict of Interest:** None declared.