



## CANNULATION THROUGH THE RIGHT BRACHIOCEPHALIC VEIN IS EFFECTIVE AND SAFE IN ADULT PATIENTS WITH ULTRASOUND GUIDANCE

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### ABSTRACT

An Ultrasonography (US)-guided cannulation maximizes success chances while minimizing risk during the insertion of a central venous catheter (CVC). The internal jugular vein (IJV) and the subclavian vein (SCV) are considered to be the most common sites for CVC insertion using US guidance. An ultrasound-guided cannulation of the right brachiocephalic vein (BCV) in adults was examined for safety and effectiveness using this study. Over a period of two years, 428 adult patients required 536 cannulations of the right BCV using ultrasound guidance. A number of problems and successes were reported.

98.32 percent of technical success was achieved, as indicated by 527/536. 95.34% of surgical procedures were successful on the first attempt in 511 cases. The average length of the procedure was 13.26 minutes, while the average procedure time was 3.34 minutes. Cath introduces on average for 13.57 cm. There were 2.61 percent intraoperative complications. Pneumothorax (PNX) prevented surgery for three of the patients, and 11 artery punctures were associated with self-limiting hematomas. 32 out of 536 procedures (5.77%) had post-procedure problems. One hundred and eighty-four catheter-related infections were recorded, and fourteen of them led to thromboses. An average of 10.68 days were spent insertion catheters. Right BCV cannulation can be achieved efficiently and safely by supraclavicular, in-plane, ultrasound-guided techniques. Improves clinical outcomes by adding another catheter access option to central venous catheterizations.

**Key words:-** The External Jugular Vein, Brachiocephalic Vein, Central Venous Cannulation, And Subclavian Vein Can All Be Accessed Using Ultrasound.

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### INTRODUCTION

The central venous catheter (CVC) plays an essential role in hospitals. As a primary means of delivering medications that need large vessels, providing nutrition to patients, and providing hemodialysis access, shunts are used when peripheral access is unavailable. CVC placement is a

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risky and difficult procedure, even for seasoned practitioners. Ultrasonography (US) is considered the most effective way of locating vessels and directing venous punctures in both paediatric and adult patients because it optimizes success rates and reduces the number of surgical trials. In adults, the jugular vein (IJV) and the subclavian vein (SCV) are the most common locations for US-guided CVC insertion. There has been some support recently for cannulating the

brachiocephalic vein (BCV) in the supraclavicular area, which could be beneficial for newborns and infants. Although the latter approach has been reported in a few cases among adult patients, the number of cases is limited. This retrospective study aimed to assess whether supraclavicular BCV cannulation under ultrasound guidance was effective and safe in adult patients.

## PROCEDURES AND MATERIALS

We received approval for this retrospective study from the hospital's ethics committee. The data came from medical records (primarily operative and nursing reports). In this retrospective study, we retrospectively examined 428 adult inpatients (medical and surgical) who required 536 right CVCs, performed with US guidance. As well as those hospitalized in the acute or urgent phase of their illness, we excluded ventilated patients. Medical records contained information about first-time successes, puncture times, and surgery times. An operation was regarded as the period between sterilization and x-ray.

Implantation of the BCV CVC was performed as follows: sterile covers were placed over sterile probes, and sterile gel was applied between the cover and the probe. Ultrasound probes were moved downward along the IJV to reach the superior sternoclavicular joint. At the intersection of the IJV and SCV, the probes were adjusted to get a good longitudinal image of the BCV. A needle was used to penetrate the skin around the US probe with one hand while holding the probe in the other. As the needle advanced, the long axis of the US probe was followed until the needle appeared on the monitor. Negative pressure was used to guide the needle tip into the BCV (Fig.1). A J-shaped guide wire (Arrow) was then inserted into the vein if there was a healthy return of blood flow following advancement of the guidewire (Fig.2). A 6 Fr double-lumen catheter was inserted into the vein through the guidewire. The catheter insertion

length was calculated using anatomical markers, ranging from 9 to 15 cm. The catheter's position was verified using an x-ray.

This constitutes one attempt to puncture the skin. Three attempts at cannulating the BCV proved unsuccessful, so the IJV or the SCV was punctured.

A statistical analysis was performed using Microsoft Excel, which included calculating averages, means, and standard deviations.

## RESULTS

The use of right BCV CVC was required for 428 adult inpatients between January 2015 and December 2016. The main reasons for the operation were lack of peripheral access, ineffective delivery of chemotherapy, hemodynamic monitoring, and sepsis. The gender ratio of 1.11 (225 to 203), with a range of patient weights from 46 to 87 kg, emerged as the most prominent feature. Averaging 165.8 cm in height (range: 148–183 cm) and 56.27 years old (range: 28–82 years) respectively, the average height was 165.8 cm. In 527 cases of cannulation, 98.32 percent were successful (Table2). In 299 cases (29.9%) after two attempts, the right BCV puncture was effective in 511 of them (95.34%). Operating times ranged from 9 to 16 minutes on average. There was a range of 9 to 15 cm between the average catheter insertion length and the range of 9 to 13 cm. There were 11 self-limiting hematomas (2.05%) identified from artery punctures. There were five successful cannulations performed afterward. On X-ray, PNX was detected in three cases (0.56 percent), but you do not have to drain your chest. A median insertion time of 10.68 days was achieved, followed by an average of 8.77 days (3-28). It was found that 5.97 percent of the procedures had post procedure complications (32/536), of which 18 required catheter removal, and 14 required thromboses, all of which required removal of the catheters. (Table33).

**Table 1: (N = 428) Data are based on baseline characteristics**

Typical + Standard Deviation	
Year, Age	52.77 +18.34
Men/Women	200/200
centimeters	128.6+10.58
kilograms	58.61+18.34
*Number of infectious diseases	6.54
*Number of heart diseases N (%)	1 (30) 26 (47)
*Number of lung diseases N (%)	88 (38%)
*Number of kidney diseases N (%)	22, (12.88)
Diseases of the nervous system N (%)	31 (7.00)
Malignancies N (%)	6.82 2866

**Table 2: Cannulation of BCVs (N=536)**

Successful rate (%)	95.9%
Percentage of first attempts successful	in 95.36
average+standard deviation	minutes: 13.26+1.34

Catheter introduction time (mean+standard deviation)	14.81+3.58cm
Insertion time (mean+standard deviation)	13.57+3.53cm
	10+8.77 (23-28) days

**Table 3: (N = 536) Complications observed.**

Complication	Rates.	Intervention
punctured arteries	2 (2.05)	No complications, self-limiting
pneumonia	(3 (0.65)	Self-limited
infection related to catheters	(6)	Removal of catheters by accident
bleeding	2.6 (14)	Accidental removal of catheter

## DISCUSSION AND CONCLUSION

It joins into the superior vena cava at the junction of the IJV and SCV. BCV cannulations were unpopular in 1969 possibly due to the early observation of pneumothorax. This has led to BCV cannulation being referred to as a "forgotten central line" or a "neglected method" [12,13]. Since brachiocephalic approaches do not include intervening bony fragments, the entire needle track can be viewed during cannulation, despite the fact that US is now mostly used in clinical practice. Children and newborns have been cannulated with BCV using US guidance in recent years. It has, however, only been tested on a handful of adults.

It is significantly more successful to cannulate the left BCV rather than the right BCV in paediatric patients.

Adults, on the other hand, have a deeper left BCV that is more variable than the right one. Because of this, ultrasound cannot reveal it clearly. The left BBV junction also prevents ultrasound from detecting thoracic catheters that are merged via it. By using a right BCV approach, we minimized lymphorrhagia resulting from thoracic catheter injury. CVC installation via the left lower jugular vein is preferred for patients with surgical contraindications, such as thrombosis of the right jugular vein. Using ultrasound guidance for in-plane BCV cannulation, clinical success was demonstrated in this study for supraclavicular cannulation in adult patients. Study results showed that 98.32 percent of cases required only one effort, and 95.34 percent required no effort at all. In addition, there were no significant issues uncovered. Jordan et al.'s [15] trial consisted of a smaller group of patients, but our success rate was lower overall.

The most common CVC complications are artery punctures, hematomas, and PNXs. Puncture of the artery occurs more often with femoral and jugular vein involvement, whereas punctures of the artery are more common with femoral and jugular vein involvement. Based on the results of this study, there were five brachiocephalic artery punctures (5/536) with the use of US guidance. As a result, the PNX rate on IJV cannulation was 0.56 percent (3/536). PNX incidence was higher in the subclavian technique because the

pleural area and puncture site were physically close. This method is advantageous mainly because the needle can be identified in real-time within the vein as it advances; in addition, the needle is parallel to the pleura, reducing risk of pleural or arterial puncture.

Another benefit of the current method is that the clinician can see the needle as it travels around the body (from skin to vein), and that the patient feels comfortable with the catheter fastened across the shoulders. Although the IJV is a large vein, cannulation is often uncomfortable. The insertion site could become infected if the dressing is moved. The chances of infection associated with BCV cannulation are lower than for internal jugular, subclavian, and femoral central lines. 11% of catheter-related infections have been reported following IJV and SCV cannulation procedures. According to our data, catheter-related infections were lower than what was originally reported by the authors, at 3.36 percent.

In order to implement this strategy, it is imperative to have excellent training. This can affect the outcome of the surgery. More than 1,000 cases of CVC were performed in this trial. An in-plane technique must also be mastered, which requires excellent hand-eye coordination, as well as detailed knowledge of anatomy. Prior data indicates that US-guided approaches reduce operating time by a significant margin. Our average operation lasted 13.26 minutes.

The project had some limitations. Firstly, since it is retroactive, a number of the key outcomes and criteria cannot be evaluated. Furthermore, due to the low incident incidence, it is necessary to conduct more studies with a larger sample size to corroborate the results. During the study, in-plane cannulation of the correct BCV needs to be used to establish its clinical usefulness. There are also issues to consider for long-term BCV lines.

It appears straightforward, successful, and safe to insert CVCs in adult patients using this supraclavicular, in-plane, US-guided right BCV cannulation. Clinical performance of central venous catheterization can be improved with this method's additional catheter access options.

## REFERENCES:

1. Mcgee DC, Gould MK. (20030. Preventing complications of central venous catheterization. *N Engl J Med* 348, 2684–6.

2. Baines DB. (2014). Evidence-based consensus on the insertion of central venous access devices. *Br J Anaesth*, 112, 382–3.
3. John Wiley & Sons, Ltd, Brass P, Hellmich M, Kolodziej L. (2015). Ultrasound Guidance versus Anatomical Landmarks for Subclavian or Femoral Vein Catheterization.
4. Oulego-Erroz I, Alonso-Quintela P, Domínguez P. (2016). Ultrasound-guided cannulation of the brachiocephalic vein in neonates and infants. *Anales De Pediatría* 84, 331–6.
5. Breschan C, Graf G, Jost R. (2015). Ultrasound-guided supraclavicular cannulation of the right brachiocephalic vein in small infants: a consecutive, prospective case series. *Paediatr Anaesth* 25, 943–9.
6. Walker MM, Sanders RC. (1969). Pneumothorax following supraclavicular subclavian venepuncture. *Anaesthesia* 24, 453–60.
7. Badran DH, Abder RH, Abu GJ. (2002). Brachiocephalic veins: an overlooked approach for central venous catheterization. *Clin Anat* 15, 345–50.
8. Sener M. (2014). Supraclavicular subclavian vein catheterization is still forgotten. *Paediatr Anaesth* 24, 342–343.
9. Breschan C, Platzer M, Jost R. (2012). Ultrasound-guided supraclavicular cannulation of the brachiocephalic vein in infants: a retrospective analysis of a case series. *Paediatr Anaesth* 22, 1062–7.
10. Jordan JR, Moore EE, Haenel J. (2014). Ultrasound-guided supraclavicular access to the innominate vein for central venous cannulation. *J Trauma Acute Care Surg* 76, 1328–31.
11. Pikwer A, Bååth L, Perstoft I. (2009). Routine chest X-ray is not required after a low-risk central venous cannulation. *Acta Anaesthesiol Scand* 53, 1145.
12. Lewis CA, Allen TE, Burke DR. (2010). Quality improvement guidelines for central venous access. *J Vasc Interv Radiol* 21, 976–81.
13. Gurkan T, Nur KF, Alp G. (2009). Internal jugular vein cannulation: an ultrasound-guided technique versus a landmark-guided technique. *Clinics* 64, 989–92.

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