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ULTRASOUND-GUIDED RIGHT BRACHIOCEPHALIC VEIN CANNULATION IN ADULTS IS EFFECTIVE AND SAFE.

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ABSTRACT

When inserting a venous catheter, an Ultrasonography (US)-guided cannulation maximizes success chances while minimizing risk (CVC). The clavicle vein (Sub-Clavicle) and the jugular vein (Internal Jugular Vein) are thought to be the most frequently used locations for Central venous catheters insertion under US guidance. This study evaluated the safety and efficacy of right brachiocephalic vein (BCV) cannulation using ultrasonic assistance in adults. Over a period of two years, 420 adult patients required 526 cannulations of the right BCV using ultrasound guidance. A number of problems and successes were reported. 97.31 percent of technical success was achieved, as indicated by 517/526. 95.34% of surgical procedures were successful on the first attempt in 511 cases. The average length of the procedure was 11.26 minutes, while the average procedure time was 3.34 minutes. Cath introduces on average for 12.57 cm. There were 3.61 percent intraoperative complications. Pneumothorax (PNX) prevented surgery for three of the patients, and 16 artery punctures were associated with self-limiting hematomas. 30 out of 526 procedures (5.67%) had post-procedure problems. One hundred and eighty-four catheter-related infections were recorded, and fourteen of them led to thromboses. An average of 9.68 days was 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 Sub-Clavian Vein Can All Be Accessed Using Ultra-Sound.

INTRODUCTION

The CVC (central venous catheter) does essential roles in hospital. 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 (1-3). CVC placement is a risky and difficult procedure, even for seasoned practitioners. Ultrasonography is the best way to locate capillaries and direct venous perforations in adult and pediatric patients since it enhances success rates and reduces surgical trials (4&5). In adults, the Interior jugular vein (JV) and subclavian vein (SCV) seem to be common Catheter insertion places. Cannulating the brachia's cephalic vein (B-CV) in the supraclavicular area may benefit neonates and toddlers (6-9). Despite the fact that the latter method has been used with adult patients in a few cases, the number of such cases is small (10). This retrospective study aimed to determine if supraclavicular BCV cannulation under ultrasound guidance was safe and effective in adult patients.

PROCEDURES AND MATERIALS

This retrospective study was approved by the hospital's ethics committee. The data were derived from medical records (mostly operative and nursing reports). The present retrospective study examined 420 adult inpatients (medical and surgical) who required 526 right CVCs under US guidance (Table 1).

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However, ventilated patients were not included in this study. It was possible to find out about the success rate of first-time punctures, the timing of surgery, and the puncture times in medical records. Sterilization and x-ray were considered to be the period between operations.

The Brancio cephalic Vein, Central Venous Cathether was implanted in the following manner: sterilised wraps were placed over sterile probes, and sterilised gel was applied between the wrap and the probe. To reach the superior sternoclavicular joint, ultrasonic probes were moved downward along the IJV. The probes were adjusted at the intersection of the IJV and SCV to obtain a good longitudinal image of the BCV. With one hand, a needle was used to pierce the US probe's skin. As the needle advanced, the long axis of the US probe was followed. The BCV was accessed using negative pressure. If there was a normal return of blood flow after the advancement of the guidewire, a J-shaped guide wire (Arrow) was then inserted into the vein. This was done only if there was a healthy return of blood flow. Through the guidewire, a 6 Fr double-lumen catheter was inserted into the vein. Anatomical markers with a length range of 9 to 15 cm were used to calculate the catheter insertion length. Using an x-ray, the catheter's location was confirmed. This counts as one attempt to pierce the skin of the victim. Cannulating the BCV was attempted three times without success, so either the IJV or the SCV was punctured instead. Microsoft Excel was used to conduct a statistical analysis, which involved computing means, averages, and standard deviations.

RESULTS

Between Jan- Dec-2018, the utilization of a right BCV CVC was necessary for a total of 420 adult inpatients. Lack of peripheral access, ineffective chemotherapy administration, hemodynamic monitoring, and sepsis were the main causes of the operation. The gender ratio of 1.11 (225 to 203) and weight range of 40 to 80 kg stood out. The average height was 165.8 cm (148–183 cm) and age was 59.28 (20–70). 517 cannulations were successful (95.9%) (Table2). After two attempts, the right BCV puncture was successful in 299 cases (29.9%). (95.34 percent). Average operating times were 9-16 minutes. The average catheter insertion length ranged from 9 to 15 cm. artery punctures caused 11 self-limiting hematomas (2.05%). Five cannulations followed. On X-ray, PNX was found in 3 cases (0.56%), but chest drainage is not necessary. Median insertion time was 10.68 days, average was 8.77 days (3-28). 5.97% of procedures (32/526) had postprocedure complications, including 18 catheter removals and 14 thrombosis. (Table3)

Table: 1 Data are based on baseline characteristics. (N = 420).

Typical + Standard Deviation	
Year, Age	50.77 +19.34
Men/Women	207/213
centimeters	129.6+10.55
kilograms	59.62+19.54
***Number of infectious diseases**	5.54
***Number of heart diseases N (%)**	1 (30) 25 (47)
***Number of lung diseases N (%)**	87 (37%)
***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=526).

Successful rate (%)	95.9%
Percentage of first attempts successful	in 95.36
average+standard deviation	12.26+1.36 mins
Catheter introduction time (mean+standard deviation)	14.81+3.58cm
Insertion time (mean+standard deviation) 13.57+3.53cm	10+8.77 (3-28) days

Table 3: (N = 526) 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

It joins the SCV at the IJV-SCV junction. BCV cannulations were unpopular in 1969 due to pneumothorax. BCV cannulation has been called a "forgotten central line" [12&13]. Since brachiocephalic approaches lack intervening bony fragments, the entire needle track can be seen during cannulation, even though US is now mostly used in clinical practice. US guidelines have been used to cannula children and newborns with BCV. Few adults have been tested.It is significantly more successful to cannulate the left BCV rather than the right BCV in paediatric patients.

Adults have a deeper, more variable left BCV. Ultrasound can't clearly show it. Left BBV junction prevents ultrasound from detecting thoracic catheters. By using right BCV, we reduced thoracic catheter-related lymphorrhagia. Patients with surgical contraindications, such as right jugular vein thrombosis, prefer left lower jugular vein CVC insertion. This study successfully performed supraclavicular BCV cannulation in adults using ultrasound guidance. 98.32% of cases required one effort, and 95.9% required none. No issues were found. Our success rate was lower than *Jordan et al*., [15] smaller patient group. Punctures, hematomas, and PNXs are common CVC complications. Artery puncture is more common with femoral and jugular vein involvement. This study found 5/536 brachiocephalic artery punctures with US guidance. PNX was 0.56 percent (3/526) on IJV cannulation. Because the pleural area and puncture site were close, subclavian PNX was more common. This method is advantageous because the needle can be seen as it advances through the vein, and it is parallel to the pleura, reducing the risk of pleural or arterial puncture.

The clinician can see the needle as it travels from skin to vein, and the patient is comfortable with the catheter across the shoulders. Cannulation of the IJV is often painful. Moving the dressing could infect the insertion site. BCV cannulation has a lower infection risk than jugular, subclavian, and femoral lines. IJV and SCV cannulations cause 11% of catheter-related infections. According to our data, catheter-related infections were 3.36 percent. This strategy requires excellent training to implement. This affects surgery outcomes. This trial involved 1,000 CVCs. In-plane technique requires hand-eye coordination and anatomy knowledge. US-guided approaches cut operating time significantly, according to data. Our 11.26-minute average operation. Project limitations: Since it's retroactive, key outcomes and criteria can't be evaluated. Due to the low incident incidence, larger studies are needed to confirm the results. In-plane cannulation of the correct BCV is needed to determine its clinical usefulness. Long-term BCV lines pose issues. 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.

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