Original Research Article

A comparative study of advantages and disadvantages of anterior and posterior approach for internal jugular vein catheterization

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Abstract

Background: To obtain central venous access for hemodynamic monitoring (such as central venous pressure), long-term administration of fluids, antibiotics, total parenteral nutrition, chemotherapies, and hemodialysis Internal jugular vein (IJV) catheterization is commonly attempted. Different anatomical landmark (LM)-guided techniques for IJV puncture have been described. Complications, including death, are influenced by patient factors such as Body Mass Index (BMI), site of attempted access, and operator experience. Cannulation of the IJV is usually preferred because of its anatomical position and large diameter in the Trendelenburg position. Moreover, the minimal likelihood of obstructions along its route to the right atrium facilitates the introduction of various sizes of catheters using the external anatomical landmark method. **Objectives:** To compare the anterior and posterior approach in internal jugular vein catheterization and to document the advantages and disadvantages of each of the approach **Methods:** The present study was carried out in the ICARE Institute of Medical Science and Research and Dr. Bidhan Chandra Roy Hospital, Haldia and Gouri Devi Institute of Medical Sciences and Hospital, Durgapur. This study involves 60 patients (30 patients for each approach).Data was collected and analysis was done. **Results:** Out of 60 patients, it was found that the anterior approach was associated with a better success rate (96.6%) compared to posterior approach (93.3%). Carotid artery puncture was encountered in 2 patients. Internal jugular vein was successfully identified on the second attempt in posterior approach. **Conclusion:** The posterior approach is safe and easy to accomplish as that of more popular anterior approach

Key Word: Internal jugular vein; anterior approach; posterior approach; catheterization

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INTRODUCTION

To obtain central venous access for hemodynamic monitoring (such as central venous pressure), long-term administration of fluids, antibiotics, total parenteral nutrition, chemotherapies, and hemodialysis Internal jugular vein (IJV) catheterization is commonly attempted. Different anatomical landmark (LM)-guided techniques for IJV puncture have been described. Complications, including death, are influenced by patient factors such as Body Mass Index (BMI), site of attempted access, and operator experience. Cannulation of the IJV is usually preferred because of its anatomical position and large diameter in the Trendelenburg position. Moreover, the minimal likelihood of obstructions along its route to the right atrium facilitates the introduction of various sizes of catheters using the external anatomical landmark method. Objectives: To compare the anterior and posterior approach in internal jugular vein catheterization and to document the advantages and disadvantages of each of the approach Over the past 25 years, monitoring of intra

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cardiac pressures during anesthesia has become a widespread routine practice in patients with ventricular dysfunction. The filling pressure measurements afforded by monitoring central venous pressure allow differentiation between 1. hypovolemia and myocardial depression. Because differentiation between hypovolemia and ventricular failure is difficult under anesthesia, assessment of intracardiac pressure is necessary to make the accurate diagnosis. Central venous pressure monitoring is carried out during preoperative period on a patient who is undergoing a surgical or cardiac procedure, in intensive care monitoring for long term hyper alimentation and also for securing the central vein for rapid restoration of blood volume in case of unsuspected blood loss . Central venous catheterization can be accomplished, using a number of different venous accesses, including the internal jugular, external jugular, basilic, cephalic, subclavian or femoral vein . Internal jugular vein arises at the jugular foramen, at the base of the skull, passes downwards through neck and behind the medial end of clavicle and is joined by the subclavian vein to form brachiocephalic vein. The right jugular vein is the most common access used because of its accessibility, ease of insertion, relatively low incidence of complications. Hence the study was carried out to compare the anterior and posterior approach in internal jugular vein catheterization and to document the advantages and disadvantages of each of the approach. Objectives: 1. To compare the anterior and posterior approach in internal jugular vein catheterization and 2. To document the advantages and disadvantages of each of the approach

MATERIALS AND METHODS

After approval from ethical committee of ICARE Institute of Medical Science and Research and Dr. Bidhan Chandra Roy Hospital, Haldia and Gouri Devi Institute of Medical Sciences and Hospital, Durgapur 60 patients randomly selected (30 patients for each approach) requiring central venous pressure monitoring, medication, venous hemodialysis for a period of 6 month (Nov 2018 to May 2019). Data was entered in excel sheet and statistical analysis was carried out by using SPSS software. Proportions were compared using Chi-square test of significance. Mean values were compared using students 't' test. 'p' value of less than 0.05 was considered significant.

Inclusion criteria: Patients of either sex Patients aged between 18-80 years Patients requiring central venous pressure monitoring long-term administration of fluids and antibiotics, total parenteral nutrition, chemotherapies Venous hemodialysis No accessible peripheral superficial veins.

Exclusion criteria: Condition of severe bleeding Persistent shock Recently failed attempts Respiratory distress

RESULTS

A total of 60 patients (30 for each approach) were participated in the study. Anterior approach was conducted on 37 male and 13 female. Likewise posterior approach was 33 in male and 17 in female patients. The gender distribution between the two study groups has no statistical significance (p>0.05)

Table 1: Age and sex distribution of study participants

Age group in years	Sex		Total (%)
	Male(%)	Female(%)	
<20	1(3.5)	0	1(1.6)
20-29	3(10.7)	6(18.8)	9(15.0)
30-39	3(10.7)	9(28.1)	12(20.0)
40-49	6(21.4)	4(12.5)	10(16.6)
50-59	6(21.4)	4(12.5)	10(16.6)
60-69	5(17.8)	6(18.8)	11(18.3)
70-79	4(14.2)	3(9.4)	7(11.6)
Total	28(100)	32(100)	60(100.0)

X2 -3.29, df-6,p>0.05

Table 2: Gender distribution of study population according to approach

Approach	n	Gender			
		Male	%	Female	%
Anterior	30	15	50.0	15	50.0
Posterior	30	13	43.3	17	56.6

X2 -0.762, df-1, p>0.05

Table 3: Success rate according to first attempt for catheterization

First attempt	Total	Success	%
Anterior	30	29	96.6
Posterior	30	28	93.3

Success rate in the anterior approach is 96.6%, compared to 93.3 % in posterior approach The mean time taken in anterior approach in first attempt was 6.46±0.73, while in posterior approach it is 5.56±0.51 minutes. The complication observed in anterior approach was carotid artery puncture, while in the posterior approach failure and difficult to thread the guide wire was observed in 2 patients each.

Table 5: Type of complications observed during catheterization

Complications	Approach	
	Anterior	Posterior
Carotid puncture	02	00
Failure	00	02
Difficult to thread the guide wire	00	02

DISCUSSION

A total of 60 patients (30for each approach) were participated in the study. Distribution of age group identical with no statistical significant association observed (p>0.05). The gender distribution between the two study groups has no statistical significance (p>0.05). Success rate in the anterior approach is 96.6%, compared

to 93.3% in posterior approach. The mean time taken in anterior approach in first attempt was 6.46±0.73, while in posterior approach it is 5.56±0.51 minutes. The complication observed in anterior approach was carotid artery puncture, while in the posterior approach failure and difficult to thread the guide wire was observed in 2 patients each. Hind *et al* in their Meta analysis study observed reduced failure rate for cannulating the 5 internal jugular vein. Choudhary *et al* study compared the anterior and posterior approaches of internal jugular cannulation concluded that the posterior approach technique was associated with a higher success rate of cannulation in first attempt, they also observed incidence of complications are lower in posterior approaches and posterior 6 approach is the choice of technique in case of patients with short neck. Oda *et al* study observed that, in posterior approach the vein is entered laterally and the possibility of going anywhere near carotid artery is minimal

CONCLUSION

Posterior approach is safe and easy to accomplish that of the more popular anterior approach and posterior technique has every indication of becoming popular technique among anesthesiologists.

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