

COMPARISON BETWEEN ULTRASOUND-GUIDED SUBCLAVIAN VEIN VERSUS LANDMARK CANNULATION TECHNIQUES IN THE ADULT INTENSIVE CARE UNIT

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INTRODUCTION

A central venous catheter (CVC) is an indwelling device that is peripherally inserted into a large, central vein and advanced until the terminal lumen resides within the inferior vena cava, superior vena cava, or right atrium.

Central venous catheters have many different indications including fluid resuscitation, drug infusions or medication administration that could otherwise cause phlebitis or sclerosis such as vasopressors and hyperosmolar solutions. Furthermore for emergency venous access due to difficult peripheral intravenous access

The subclavian vein site has many advantages as easier nursing care, easier to keep dry, reducing infection risk. It is associated with lower risk of catheter-associated deep vein thrombosis, compared to the internal jugular or femoral sites.

AIM OF THE WORK

The aim of the work was comparing between the outcomes of insertion of subclavian central venous catheter by ultrasound-guided technique and the landmark technique.

PATIENTS AND METHODS

PATIENTS:

A total sample size of 140 eligible patients with an indication for central venous catheter insertion, divided further into a group of 70 patients for the landmark technique versus a group of 70 patients using the ultrasound-guided technique that will be further divided randomly into 35 patents with long axis view and 35 patients with short axis view.

OUTCOMES

The results of the study will be used to compare the following outcomes:

First Placement Success Rate

Access Time

Number of Attempts

Failure Rate

Complications that may aggravate the morbidity of the patient

RESULTS

Results of the Main Groups

This table shows a summary of the results of the comparison between the landmark (LM) group and the ultrasound (US) group:

Author	Sample size (n=140)	First placement success (%)	Mean Number of Attempts	Success Rate (%)	Mean Access Time (min.)	Total Complications (%)	Types of Complications Encountered	
							Arterial Puncture	Local Hematoma
Current study	LM (n=70)	20 %	2.36	70%	7.90 min	40%	17.1%	22.9%
	US (n=70)	64.3%	1.54	85.7%	4.97 min	12.9%	10%	2.9%
	Significance Difference	P< 0.001 YES	P< 0.001 YES	P= 0.025 YES	P<0.001 YES	P< 0.001 YES	P= 0.217 NO	P< 0.001 YES

Results of the Subgroups of the Ultrasound Group

This table shows a summary of the results of the comparison between the subgroups of the ultrasound group according to the long axis (LA) and short axis (SA) view:

Author	Sample Size of Subgroup (n=70)	First Placement Success (%)	Mean Number of Attempts	Success Rate (%)	Mean Access Time (min.)	Total Complications (%)	Types of Complications Encountered	
							Arterial Puncture	Local Hematoma
Current study	Long axis (n=35)	57.1%	1.66	82.9 %	5.1 min.	22.9%	20%	2.9%
	Short axis (n=35)	71.4%	1.43	88.6 %	4.8 min.	2.9%	0%	2.9%
	Significance Difference	P= 0.212 NO	P= 0.214 NO	P= 0.495 NO	P= 0.297 NO	P= 0.028 YES	P= 0.01 YES	P=1 NO

Comparison between the two studied groups according to first placement success and number of attempts

	US (n = 70)		Landmark (n = 70)		Test of Sig.	p
	No.	%	No.	%		
First Placement Success	45	64.3	14	20.0	$\chi^2=28.152^*$	<0.001*
Number of Attempts						
Min. – Max.	1.0 – 3.0		1.0 – 3.0		U=1241.5*	<0.001*
Mean ± SD.	1.54 ± 0.79		2.36 ± 0.80			
Median (IQR)	1.0 (1.0 – 2.0)		3.0 (2.0 – 3.0)			

Comparison between long axis view and short axis view of the infraclavicular US technique according to access time (minutes)

	Long axis (n = 29)	Short axis (n = 31)	t	P
Access time (min.)				
Min. – Max.	3.0 – 7.0	3.0 – 7.0	1.053	0.297
Mean $\pm$ SD.	5.10 $\pm$ 1.01	4.84 $\pm$ 0.93		
Median (IQR)	5.0 (5.0 – 6.0)	5.0 (4.0 – 5.0)		

IQR: Inter quartile range SD: Standard deviation t: Student t-test
p: p value for comparing between long axis and short axis of Infraclavicular US

Comparison between long axis view and short axis view of the infraclavicular US technique according to the absence or presence of complications and between the types of complications that occurred while insertion.

	Long axis (n = 35)		Short axis (n = 35)		χ^2	FEp
	No.	%	No.	%		
Complication						
Present	8	22.9	1	2.9	6.248*	0.028*
Arterial puncture	7	20.0	0	0.0	7.778*	0.011*
Local hematoma	1	2.9	1	2.9	0.000	1.000

χ^2 : Chi square test FE: Fisher Exact
p: p value for comparing between Long axis and Short axis of Infraclavicular US
*: Statistically significant at $p \leq 0.05$

CONCLUSION

This study with the presented results encourages the usage of ultrasound to guide the insertion of central venous catheter in the subclavian vein as the standard method of choice. Furthermore, the short axis of the ultrasound guided technique is preferred over the long axis causing less complications, recommending to start with this axis first.