



Comparison of Ultrasonogram (USG)- Guided Supraclavicular Approach vs Infraclavicular Approach for Subclavian Vein (SCV) Cannulation

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Abstract

Background: Central venous cannulation is essential for open heart surgery and critically ill patients. SCV was customarily cannulated by infraclavicular landmark technique. With USG, waves are obscured by bony structures in infraclavicular but clear with supraclavicular approach. Therefore we compared these approaches.

Materials and Methods: 40 patients undergoing open heart surgery were randomly allocated into Group S and Group I. Group S (n=20) underwent SCV cannulation by supraclavicular approach, Group I (n=20) by infraclavicular approach. Outcome measures are duration of the procedure, number of attempts, success of cannulation and the complications. Under USG guidance, in supraclavicular approach the vein was cannulated by 'in plane technique' and longitudinal axis, in infraclavicular approach by 'out of plane' technique and short axis of the vein.

Results: The duration of the procedure (secs) for supraclavicular and infraclavicular approaches were 68.53 + 28.39 and 116.58 + 38.95 respectively with P value of <0.05, hence statistically significant. The number of successful attempts for supraclavicular and infraclavicular approaches were 1.26 + 0.375 and 1.21 + 0.42 respectively and the success rate was 95.0% for both approaches.

Conclusion: USG guided SCV cannulation is easy and rapid to perform with supraclavicular approach.

Keywords: SCV cannulation, Supra clavicular, Infraclavicular, Ultrasound guidance.

Introduction

Central venous cannulation is essential for open heart surgery and critically ill patients. USG is used for SCV and IJV cannulation. SCV can be cannulated by supraclavicular and infraclavicular approaches. SCV was customarily cannulated by infraclavicular landmark technique. With USG guidance sound waves are obscured by bony structures in infraclavicular but clear with

supraclavicular approach. Therefore we compared these two approaches.

Materials and Methods

40 patients undergoing open heart surgery were randomly allocated into Group S and Group I. Group S (n=20) underwent SCV cannulation by supraclavicular approach, Group I (n=20) by infraclavicular approach. Outcome measures

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Fig 1. Duration of the procedure

Approach	Average Duration of the Procedure (secs)
Supraclavicular	68.53
Infraclavicular	116.58

Fig 2. Attempts for the procedure

Approach	Arterial Puncture		Total
	Yes	No	
Supraclavicular	2(10%)	18(90%)	20
Infraclavicular	1(5%)	19(95%)	20
Total	3	37	40

Fig 3. Success Rates after both approaches

Approach	Success	Failed	Total
Infraclavicular	19(95%)	1(5%)	20
Supraclavicular	19(95%)	1(5%)	20
Total	38	2	40

Fig 4. Rate of arterial puncture

Approach	No. of Attempts			Total
	1	2	>2	
Infraclavicular	15	4	1	20
Supraclavicular	16	3	1	20
Total	31	7	2	40

Results

Statistical analysis was done by applying Chi-square test and Student’s Independent Samples T-test.

The number of successful attempts for supraclavicular and infraclavicular approaches were 1.26 + 0.375 and 1.21 + 0.42 respectively (P>0.05).

The duration of the procedure (secs) for supraclavicular and infraclavicular approaches were 68.53+ 28.39 and 116.58 + 38.95 respectively with p value <0.05, difference was statistically significant.

The overall success rate was 95.0% for supraclavicular and 95.0% for infraclavicular approach (p>0.05).

Discussion

The results reported that the duration of procedure was relatively higher in infraclavicular approach. Our observation of longer duration in infraclavicular approach may be due to difficult sonoanatomy caused by bony shadows. However with this approach arterial puncture is minimized due to the simultaneous visualization of artery and vein.

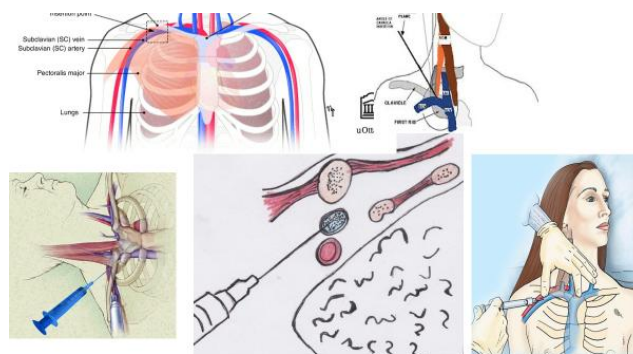


Fig 5. Inplane and out of plane Subclavian vein cannulation.

Both the approaches has merits and demerits in them. The advantages in supraclavicular approach is that the vein is at a short distance from the skin and the needle in inplane orientation to the probe, visualizing the whereabouts of needle tip whereas in infraclavicular approach artery and vein both are visualized simultaneously. The disadvantages in supraclavicular approach is that the artery is not visualized simultaneously and its relationship with lung while in infraclavicular approach the needle is in out of plane orientation leading to difficulty in needle tip visualization and the depth of the vein from skin.

Vascular delineation can be enhanced by colour Doppler imaging. Needle movements can be well followed with newer needle navigation systems.

Conclusion

The duration of subclavian vein cannulation by supraclavicular approach is significantly shorter

than the infraclavicular approach. However this statement need to be confirmed by meta analytic studies.

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