Ultrasound Guided "Easy IJ" vs Traditional Central Venous Access

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Background

- Difficult peripheral intravenous access causes significant delay in necessary evaluation and treatment of patients in the Emergency Department (ED).
- When traditional alternative approaches fail (external jugular vein or ultrasound guided peripheral vein catheterization), Central Venous Line Placement (CVLP) has been the standard procedure to obtain venous access. CVLP can be costly, time consuming, and uncomfortable for the patient given the extended measures taken to prevent infection.
- A few studies have shown that an "easy IJ" catheter (or Ultrasound Guided Internal Jugular (IJUG) catheter) can be safe, timely placed and accessed for a short duration of time without an increased risk of infection or line failure.
- The IJUG catheter seeks to provide an alternative method to gain intravenous access when a traditional peripheral IV is not an option. There is little evidence in the current literature on this technique as it is limited by small sample sizes and has only been evaluated when performed by experienced emergency medicine physicians.
- There is little evidence for placement guidance regarding safety/failure rates.
- We expect peripheral I.J.U.G. lines to be quicker, cost efficient, less painful and have equal to lower complication rates compared to central venous line placement (CVLP)
- We expect to see no difference in failure rates when comparing measures between physicians in training and faculty physicians.

Objective

- **Primary:** Determine if there is a difference in completion time between Central Venus Catheter Placement(CVLP) and Peripheral Internal Jugular (IJ) placement procedures.
- **Secondary:** Compares measures between residents of varying training levels (PGY II—PGY IV) and faculty physicians
- **Tertiary:** assessing difference in Number of attempts between CVLP and Peripheral IJ
- **Quaternary:** Compare incidence rates of pneumothorax in CVLP vs peripheral IJ placement.
- **Quinary:** Compare incidence of post placement infection (i.e. cellulitis, bacteremia, sepsis, etc.) with peripheral IJ as compared to CVLP.
- **Senary:** Assessing line viability of up to 72 hours.
- **Septenary:** Determine difference in perceived pain between CVLP and Peripheral IJ procedures.

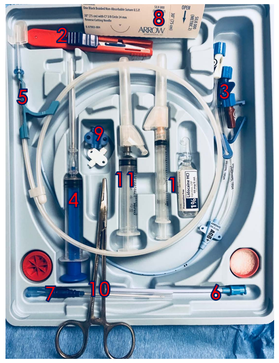
Setting

- **Single center, county hospital**
- **All departments where peripheral Internal jugular and Central Lines are monitored (ER, ICU, OR, Floor…)**

Methods

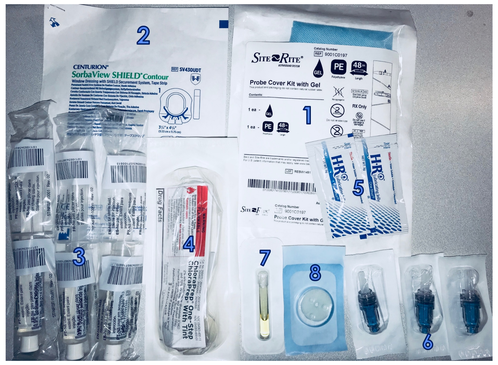
- Prospective, non-blinded, interventional cohort of adults
- Prospective arm
- February 2018 – August 2018
- N 25 (15 IJUG, 10 CVLP)

Central Line Kit



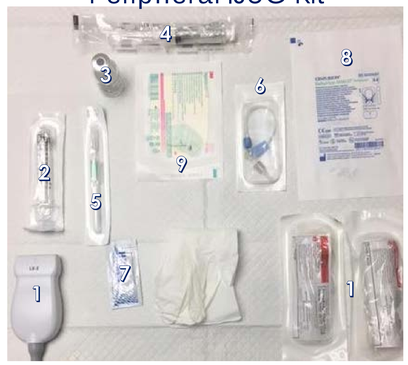
1. Syringe with local anesthetic
2. Scalpel in case venous cut down is needed
3. Triple lumen catheter
4. Introducer needle (18G) on syringe
5. Guide wire
6. Tissue dilator
7. Indwelling catheter/angiocath needle (16G)
8. Surgical thread
9. Additional fasteners
10. Needle driver
11. Guide syringe

CVLP Kit



1. General purpose probe cover (sterile)
2. I.V. Dressing
3. Saline flush x 3
4. Chloraprep
5. Sterile lubrication jelly for ultrasound x 2
6. Central line Caps (needleless) x 3
7. Liquid adhesive
8. Biopatch protective disc

Peripheral IJUG Kit



1. Chloraprep x 2
2. Syringe 10ml
3. Syringe with local anesthetic
4. Saline flush
5. Angiocath 18GA 1.3 x48mm
6. J-loop (Non- DEHP Catheter extension set)
7. Lubrication jelly for ultrasound
8. I.V. dressing
9. Ultrasound probe cover (non-sterile)

Results

- Significant difference in mean procedure time between the IJUG and CVLP: 10.55 minutes and 26.25 minutes (P < 0.05; **Figure 1** & **Table 1**)
- No significant difference in mean pain scores: 3.3 and 4.4, respectively (P > 0.05; **Figure 2** & **Table 2**)
- Incidence of post placement infection: Results pending larger sample size
- Incidence of pneumothoraces post-placement when comparing IJUG vs. CVLP: Results pending larger sample size

Analysis of Variance (ANOVA)

Table 1. ANOVA table displaying degrees of freedom (df), sums of squares (SS), means squares (MS), the F-value (F), and P-value (P) for time of procedure between (factor) and within (error) IJUG and CVLP.

Source	SS	df	MS	F	P
Factor	1142.299	1	1142.299	32.139	.000
Error	604.227	17	35.543		
Total	1746.526	18			

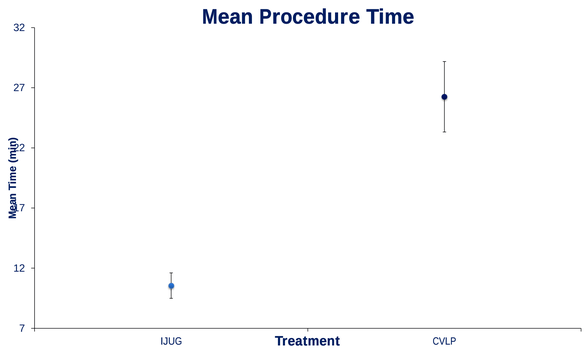


Figure 1. The mean time of procedure, in minutes, between IJUG and CVLP. The means are represented by the markers and the error bars represent the 95% confidence intervals of the mean (n=18).

Table 2. ANOVA table displaying degrees of freedom (df), sums of squares (SS), means squares (MS), the F-value (F), and P-value (P) for pain scores between (factor) and within (error) IJUG and CVLP.

Source	SS	df	MS	F	P
Factor	3.025	1	3.025	.218	.653
Error	111.000	8	13.875		
Total	114.025	9			

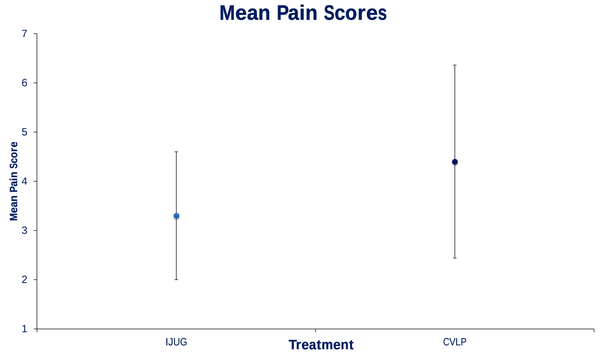


Figure 2. The mean pain score in IJUG and CVLP. The means are represented by the markers and the error bars represent the 95% confidence intervals of the mean (n=10). The pain score of each patient was obtained using the Wong-Baker FACES Pain Rating Scale, ranging from a happy face at 0 represents "no hurt" to a crying face at 10 representing "hurts worst".

Discussion

- Evaluated the success and complication rates associated with IJUG catheterization in a cohort of patients with failed attempts to obtain peripheral IV access.
- This poses to be the largest study to date evaluating this procedure and, to our knowledge, the only one which accounts for training level and compares outcome measures to a control group (CVLP).
- Significant difference in mean procedure time between IJUG and CVLP (< 59%).
- No significant difference in mean pain scores, but expect to see a difference in the future.
- Initial success rates of IJUG line placement were non-inferior when compared to central lines with no difference between residents in various levels of training.
- We have not yet encountered any difference in complication rates involving cases of arterial puncture, pneumothorax, line failure or insertion site infection in either group.

Conclusions

- Our study will support and build on what has been evident in the literature thus far.
- The IJUG technique is an efficient and rapid alternative for establishing effective IV access in patients who lack suitable peripheral venous access.
- This procedure can be safely and effectively performed by both experienced and resident Emergency Medicine physicians.

References

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