

CLINICAL PROTOCOL

Ultrasound-guided Placement of Peripheral Intravenous Lines in the Internal Jugular Vein

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INTRODUCTION:

Intravenous (IV) access in the emergency department (ED) patient is essential for medication delivery, IV fluid resuscitation, rapid serum laboratory diagnostics, and administration of IV contrast for CT scans. Some patients, such as those with obesity, IV drug abuse, chronic illnesses, or vascular pathology may have difficult IV access. These patients are problematic for the busy ED nurse and physician as this can lead to a time consuming process, which slows efficiency and patient care.

Previously, patients with difficult IV access often ended up getting central venous catheterization, a procedure that can result in a number of serious complications (1). More recently, ultrasound guidance has been touted as an effective means to achieve peripheral IV access on these patients (2). In one study (2), there was a 73% first attempt cannulation rate, which seems respectable, but not excellent. Additionally, 8% of the successful IVs failed within one hour (2). Another study compared ultrasonographically guided peripheral IVs to non-ultrasonographically guided IVs, and it found that using ultrasound did not decrease the amount of time or the number of attempts it took to successfully place a peripheral IV (3).

It seems that we still have room to improve our ability to obtain difficult IV access, and a relatively new technique may be the answer. Ultrasound guided IVs are typically attempted in the upper extremities, targeting the brachial or basilic veins, but a recently described technique --- the “peripheral IJ” --- involves placement of a peripheral IV catheter in the internal jugular vein (4,5).

The peripheral IJ is gaining popularity in our ED as a solution to the difficult vascular access patient. In our clinical experience, it is a quick and easy procedure that is also safe, tolerated well by patients, and requires fewer resources. Several small studies have concluded that this is a fast and safe procedure and a feasible alternative to central access in the difficult vascular access patient (4-7). These studies mention the theoretical risks as being similar to central venous access such as carotid artery puncture, hematoma, pneumothorax, and line infection, however none of these have actually been reported (4-7).

We feel it is important to continue to contribute to the knowledge about the safety, speed, and feasibility of ultrasound-guided internal jugular vein peripheral cannulation. We

propose a prospective evaluation of peripheral IJ placement on a convenience sample of emergency department patients who require IV access and have difficult IV access. Therefore, we seek primarily to determine the average number of attempts to cannulation for ultrasound-guided peripheral IJ placement. Secondly, we wish to determine: 1) the prevalence of potential complications related to this procedure 2) the average time it takes the emergency physician to complete the procedure 3) the patient's satisfaction with the procedure. This data will be compared to the existing literature on ultrasound-guided peripheral IV placement using other techniques.

METHODS:

This will be a prospective study at a single, urban, academic emergency department evaluating the placement of peripheral IJs on a convenience sample of patients with difficult IV access ED patients who require IV access for medical management.

Inclusion criteria:

- * At least two unsuccessful attempts at peripheral IV access by ED nursing staff.
- * Age >18.

Exclusion criteria:

- * Critically ill patients with clinical indications for emergent central venous access.
- * Overlying skin infection.
- * External jugular vein easily visible for cannulation.
- * Patients in law enforcement custody.
- * Patients who are pregnant.
- * Patients who lack decision-making capacity

ED residents and attending physicians will perform ultrasound-guided cannulation of the IJ using aseptic technique. A biopatch and sterile dressing will be placed. This is similar to the technique used to place traditional central venous catheters. Standard catheter over needle method will be used, and the catheter will be secured in typical fashion as for a standard IV start.

A data collection form will be available for completion by a trained observer (who will observe the physician placing the IV). Data collection will include location, number of attempts, time to successful completion, post-procedure portable chest x-ray results, immediate complications, catheter type used, time to discontinuation of catheter, reason for catheter removal, delayed complications, and patient demographics.

For patients who end up getting admitted, data regarding discontinuation of the catheter, reason for removal, and delayed complications will be obtained from the inpatient nursing charts.

Although many of our ED physicians already use the peripheral IJ technique, all residents and attending physicians involved in this study will be required to attend a mandatory

training session about the placement of peripheral IJs to ensure adequate baseline knowledge of the technique.

The largest study to evaluate the placement of peripheral IJs had 33 patients (4). We hope to enroll 50 patients. Each patient will sign a written consent form.

In order to protect the privacy of the research subjects and to maintain the confidentiality of data, all data will be handled only by research assistants or investigators and will be stored only in secure cabinets in locked research offices.

REFERENCES:

- (1) Kornbau C, Lee KC, Hughes GD, Firstenberg MS. Central line complications. *International Journal of Critical Illness and Injury Science*. 2015;5(3):170-178. doi:10.4103/2229-5151.164940.
- (2) Keyes LE, Frazee BW, Snoey ER, Simon BC, Christy D. Ultrasound-guided brachial and basilic vein cannulation in emergency department patients with difficult intravenous access. *Ann Emerg Med* 1999;34:711–4.
- (3) Stein, J., George, B., River, G., Hebig, A., & Mcdermott, D. Ultrasonographically Guided Peripheral Intravenous Cannulation in Emergency Department Patients With Difficult Intravenous Access: A Randomized Trial. *Annals of Emergency Medicine*. 2009; 54(1), 33-40.
- (4) Teismann, N. A., Knight, R. S., Rehner, M., Shah, S., Nagdev, A., & Stone, M. (2013). The Ultrasound-guided “Peripheral IJ”: Internal Jugular Vein Catheterization using a Standard Intravenous Catheter. *The Journal of Emergency Medicine*, 44(1), 150-154.
- (5) Butterfield, M., Abdelghani, R., Mohamad, M., Limsuwat, C., & Kheir, F. (2015). Using Ultrasound-Guided Peripheral Catheterization of the Internal Jugular Vein in Patients With Difficult Peripheral Access. *American Journal of Therapeutics*, 1.
- (6) Kiefer, D., Keller, S. M., & Weekes, A. (2016). Prospective evaluation of ultrasound-guided short catheter placement in internal jugular veins of difficult venous access patients. *The American Journal of Emergency Medicine*, 34(3), 578-581.
- (7) Zwank, M. D. (2012). Ultrasound-guided catheter-over-needle internal jugular vein catheterization. [Letter to the Editor]. *The American Journal of Emergency Medicine*, 30(2), 372-373.
- (8) Ash, A., & Raio, C. (2016). Seldinger Technique for Placement of “Peripheral” Internal Jugular Line: Novel Approach for Emergent Vascular Access. *Western Journal of Emergency Medicine WestJEM*, 17(1), 81-83.