Original Article

Is finder needle necessary for internal jugular vein catheterization?

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ABSTRACT

Objective: We studied finder needle use in Internal Jugular Vein (IJV) catheterization and complications rate in adult cardiac surgery.

Methods: A prospective study was carried out for 3 month period from august to November 2007 and all patients older than 18 years who underwent elective cardiac surgery were studied. Data were collected about using finder needle, patient position, success rate, intra and postoperative complications of IJV catheterization.

Results: Out of 399 patients, 42 patients were excluded from study. Of remaining 357 patients, in 93% right internal jugular vein was the preferred vein. Finder needle was used in 148 (45.8%) of IJV catheterization (group one) versus 175 (54.2%) patients that IJV catheterization were done without finder needle (group two). Anesthesiology residents significantly used finder needle more than attendings (p=0.001). Using finder needle significantly increased catheterization time from 5.8±2.2 to 8.6±3.4 minutes (p=0.002). There were no significant differences in complications and success rate between two groups.

Conclusions: To reduce complications or increase success rate, there is not any need for finder needle use in internal jugular vein catheterization. (Rawal Med J 2008;33:74-77).

Key Words: Internal jugular vein, complications, Central venous catheterization, finder needle, Seldinger technique.

INTRODUCTION

Central vein cannulation is the standard clinical method for monitoring central venous pressure (CVP) in operating room and ICU. Internal jugular vein (IJV) is the most common vein used by anesthesiologists. Serious complications may be associated with IJV catheterization. As with most medical procedures, the level of experience of the physician reduces the risk of complications.[1] Seldinger technique (catheter over guide-wire) has been an extremely useful and safe method of inserting all types of central venous access lines since 1956. However, central venous catheterization continues to be associated with significant complications approximately 10% of the time.[1-3] Use of ultrasound during central venous catheterization can reduce rate of complications, but it is not used routinely.[4] Finder needle is usually used for reducing its arterial complications, but its roll was questioned.[2] We studied finder needle use and complications rate in IJV catheterization in elective adult cardiac surgery.

METHODS

In a 3 month period from august to November 2007 all adult patients undergoing cardiac surgery in two university hospitals, were studied prospectively. Patient's anesthesia and surgical teams were blind about what data were being collected. Patients of emergency or redo operations, same day reoperation because of tamponade or hemorrhage, apparent preoperative coagulupathy and renal failure were excluded

from study. Demographic, intraoperative and 48 hour ICU stay period data were collected. From a total of 399 eligible patients, 42 patients were excluded from study because of reoperation or mechanical ventilation dependency more than 24 hours. Remaining 357 patients were enrolled in the study. Premedication, anesthesia induction and arterial catheterization performed as routine for all patients.

Table 1. Sites used for central venous catheterization (n=357).

Catheterization site	Number (%)
RIJV	321 (89.9%)
RSCV	23 (6.4%)
LSCV	5 (1.4%)
LIJV	2 (0.6%)
PA catheter	10 (2.8%)

Central venous catheterization was performed after anesthesia induction/tracheal intubation by an attending or resident of anesthesiology who were blind about study and nature of what data were being colleted. Site of central venous cannulation, patient position, using finder needle, failure rate, numbers of tries, arterial puncture, changing to other site, bleeding and hematoma formation, anesthesia and operation times were recorded. In ICU, sedation, intubation and ICU stay times, objective and subjective complications were recorded. Data were analyzed with SPSS software version 14.0 using chi-square, Fisher's exact test, independent samples t-test.

RESULTS

Out of 357 patients, in 4 patients, simultaneous subclavian and right internal jugular veins were used because of poor peripheral veins access and in 10 (2.8%) patients, pulmonary artery catheter was used simultaneously and all these were excluded from data analysis. Right internal jugular vein was used in 93% of all patients (table 1). ASA class of physical status of all patients was as table 2. Mean age of patients was 55±12.5 years, mean height was 163±7.8 cm and mean weight was 68.8±10.4 kg. Risk factors, diagnosis and anesthesia, surgery, sedation, intubation ICU times are

shown in tables 3. In all patients head rotation about 30 degree was used but Trendelenburg (head down) position was used in 74 patients (22.9 %) during catheterization. There was no difference between anesthesiology attendings and residents about using this position. Central landmark approach was used in 99.3% of patients.

Table 2. ASA status classification of patients.

ASA class	N (%)
I	5 (1.4%)
II	157(44%)
III	155(43.4%)
IV	40(11.2%)
Total	357

ASA class; American society of anesthesiologist classification of clinical status

Finder needle was used in 148 (45.8 %) for IJV catheterization. Total IJV catheterization performed by attendings and resident anesthesiologists were 244 (75.5%) and 79 (24.5%) respectively (table4). Resident anesthesiologists significantly preferred finder needle use ($p=0.001$).

Table 3. Risk factors, diagnosis, anesthesia, surgery and ICU data of patients.

Condition	Number (%)
DM	72 (22.3%)
C/S	134 (41.5%)
HLP	135 (41.8%)
HTN	191 (59.1%)
Asthma	16 (5.0%)
COPD	22 (6.8%)
CAD	210 (65.0 %)
VHD	69 (21.4%)
CAD+VHD	21 (6.5%)
CHD	23 (7.1%)
Anesthesia time (minute)	336 ± 59
Operation time (minute)	284 ± 54
Sedation time (hour)	5.6 ± 5.0
MV time (hour)	9.4 ± 5.9
ICU stay time (hour)	58.0 ± 21.7

DM; diabetes mellitus, **C/S;** cigarette smoking, **HLP;** hyperlipidemia, **HTN;** hypertension**, COPD;** chronic obstructive pulmonary disease, **CAD;** coronary artery disease, **VHD;** valvular heart disease, **CAD+VHD;** coronary artery disease and valvular heart diseas,e **CHD;** congenital heart disease (ASD, VSD, TOF,PAPVC), **MV time**; mechanical ventilation time

Attendings performed procedure significantly faster than residents **(**p=0.004**).** There were no significant differences in success rate or changing to subclavian vein between two groups (table 4) or male to female patients (table 5) (p= 0.42). There were no differences related to risk factors or diagnosis, except asthmatic patients where usually finder needle was used (p=0.023). Neck pain and Sore throat/ dysphasia were

seen in 19.2% and 7.7% respectively (table 6). There was no difference about complications rate between attendings and residents.

DISCUSSION

Central venous cannulation has become an integral component of modern medical care and has become an important skill for all hospital doctors and staff. Various sites are used for central venous access. An important factor in choosing the best site is the operator's own knowledge and experience, as the chance of failure and complications increases if the operator is unfamiliar with the particular technique.[1,5]

Table 4. Finder needle use by attend and resident anesthesiologist.

Operator	catheterization time(min) †	Finder needle used ‡	Finder needle not used	One try* §	Two try*	Three try or Chang to SCV	Total
Resident anesthesiologist	9.1 ± 3,5	72(91%)	7(9%)	75 (83.5%)	4(16.5%)	2(2.5%)	79
Attend anesthesiologist	6.4 ± 2.7	76(31.1%)	168(68.9%)	233(95.4%)	11(4.6%)	2(0.8%)	244
total	7.1 ± 3.26	148 (45.8%)	175 (54.2%)	308(95.3%)	15(4.7%)	4(1.2%)	323

*Numbers of try to IJV catheterizations † P=0.004 (difference between Residents and Attendings)
‡ P=0.001 (difference between Residents and Attendings) § P=0.52 (difference between Residents and Attendings).

Carotid artery puncture during IJV catheterization is reported to occur 2%–17% of the time[5] and stroke and death has been reported rarely.[5-10] Finder needle, a small 22-gauge 1 ½ inch, is usually used for reducing IJV catheterization complications.[5]

Table 5. Finder needle use in male and female patients.

	Catheterization time (min) *	male†	Female	
Finder needle used	8.6 ± 3.4	114 (55.9%)	61(51.3 %)	175
Finder needle not used	5.8 ± 2.2	90 (44.1%)	58 (49.7 %)	148
	7.1 ± 3.26	204	119	323

*P=0.002 †P=0.42

When locating IJV, using surface anatomical landmarks, with a small finder needle, accidental arterial puncture will result to a small controllable hemorrhage or hematoma. Recently, IJV cannulation under two dimensional ultrasound guidance provided a quicker and safer method than the landmark method in both adults and children.[4,5] But its use is not popular because it needs sufficient ultrasound machines and staff training.[4] However, it is important that "operators maintain their ability to use the landmark method and that the method continues to be taught alongside the 2-D ultrasound guided technique."[4,11]

Table 6. Rate of complication for internal jugular vein catheterization.

	Arterial puncture	hematoma	Sore throat/ dysphasia	Neck pain	pneumothorax	emphysema	malposition
Finder needle used	11	1	9	32	-	-	-
Finder needle not used	5	1	16	30	-	-	-
total	16 (4.9%)	2 (0.6%)	25 (7.7%)	62 (19.2%)			
P	0.07	0.71	0.29	0.21			

In our study, only in 45.8 % of patients Finder Needle was used. When catheterization is performed by well trained, experienced clinicians, success rate and serious immediate complications are infrequent.[1,5,12] The incidence of mechanical complications after three or more insertion attempts is six times the rate after one attempt.[1] In this study, resident anesthesiologists used finder needle in 91% versus 31.1 % comparing to attendings. Using finder needle did not change complication and success rate, but increased procedure time.

Common immediate complications of procedure include vascular injury, cardiac tamponade, respiratory compromise, nerve injury, arrhythmias, arterial thrombosis and embolism, pulmonary embolism and catheter or guidewire embolism, however, many result from operator error.[5,13] Sore throat/ dysphasia and neck pain were reported in 7.7% and 19.2% respectively.[14] Damage may occur to the brachial plexus, stellate ganglion, phrenic, laryngeal nerve or vocal cords.[15] Chronic pain syndromes have been attributed to this procedure as well.[16] In this study, neck pain usually at epsilateral site was the most common symptom that was usually relieved after catheter removal. In conclusion, when operator is an experienced clinician, use of finder needle can be omitted from procedure without increasing risks.

REFERENCES

1. McGee DC, Gould MK. Preventing Complications of Central Venous Catheterization. N Engl J Med 2003;348:1123-1133
2. Domino KB, Bowdle TA, Posner KL, Spitellie PH, Lee LA, Cheney FW. Injuries and liability related to central vascular catheters: a closed claims analysis. Anesthesiology 2004;100:1411–8.
3. Bailey PL, Whitaker EE, Palmer LS, Glance LG. The accuracy of the central landmark used for central venous catheterization of the internal jugular vein. Anesth Analg 2006;102:1327-1332
4. Bailey PL, Glance LG, Eaton MP, Parshall B, McIntosh S. A survey of the use of ultrasound during central venous catheterization. Anesth. Analg 2007;104(3):491-497
5. Mark JB, Slaughter TF. Cardiovascular monitoring. In: Miller RD: Miller anesthesia, vol 1, 6th ed. Churchill Livingstone, Pennsylvania , 1286-1296.

6. Eckhardt WF, Iaconetti DJay, Kwon1JS, Brown Emery, Troianos CA. Inadvertent carotid artery cannulation during pulmonary artery catheter insertion. J Cardiothorac Vasc Anesth 1996;10:283-90.
7. Benter T, Teichgraber UK, Kluhs L, Dorken B. Percutaneous central venous catheterization with a lethal complication. Intensive Care Med 1999;25:1180-2
8. Saxena N, Sharma M. Cerebral infarction following carotid arterial injection of adrenaline. Can J Anaesth 2005;52:119.
9. Arthur ME, Castresana MR, Paschal JW, Patel VS. Acute cerebellar stroke after inadvertent cannulation and pulmonary artery catheter placement in the right vertebral artery. Anesth Analg 2006;103:1625-1626
10. Inamasu J, Guiot BH. Iatrogenic vertebral artery injury. Acta Neurol Scand 2005:112: 349–357
11. National Institute for Clinical Excellence. Guidance on the use of ultrasound locating devices for placing central venous catheters. London: NICE, 2002. [NICE Technology Appraisal No 49.]
12. Editorial. Toward safer central venous access: ultrasound guidance and sound advice. Anaesthesia 2005;60:1-4
13. Cavatorta F, Campisi S, Fiorini F. Fatal pericardial tamponade by a guide wire during Jugular catheter insertion. Nephron 1998;79:352-352
14. Strickland NH, Weir J. Sore throat after central venous cannulation. J R Soc Med 1999;92:386
15. Salman M, Potter M, Ethel M, Myint F. Recurrent laryngeal nerve injury: A complication of central venous catheterization. Angiology 2004;55(3):345-346
16. Dubey PK, Kumar. Pain in the ear resulting from misplaced subclavian dialysis catheter into ipsilateral internal jugular vein. Anesth Analg 2002;94:1460-1