

# RELATIONSHIP OF THE INTERNAL JUGULAR VEIN TO THE COMMON CAROTID ARTERY IN HEMODIALYSIS PATIENTS: A COLOUR DOPPLER STUDY



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## INTRODUCTION

Internal jugular vein (IJV) is the most common site for placement of a hemodialysis (HD) catheter in chronic kidney disease (CKD) patients. IJV cannulation is associated with complications in upto 5-15% of cases.<sup>1</sup> These complications include carotid artery puncture, hematoma formation and pneumothorax/hemothorax.

The position of IJV in relation to common carotid artery (CCA) is variable. In comparison to the blind external landmark technique, ultrasound-guided cannulation has been shown to be superior.<sup>2</sup>

Various factors implicated in difficult IJV cannulation include anterior location of the IJV relative to the carotid artery, small IJV size, neck obesity and difficult surface landmarks.<sup>3</sup>

IJV insertion can be done safely under ultrasound guidance.

## METHODS

**Aim:** To determine the anatomical characteristics and relation of IJV to common carotid artery (CCA) using ultrasonography (USG) and colour Doppler.

**Study Design:** Prospective Observational

**Study duration:** 18 months

**Study site:** Department of Nephrology, Kasturba Hospital, Manipal.

**Study subjects:** 593

**Inclusion criteria:** Patients who were to undergo IJV HD catheter placement.

**Exclusion criteria:** Those with a previous neck surgery, torticollis, neck mass.

**Data Analysis:** On SPSS version 15 with p value less than 0.05 considered significant.

**Procedure:** The subject was placed in the supine position and neck rotated 30° to the contralateral side of cannulation. Ultrasound probe was placed at the apex of the Sedillot triangle (formed by medial and lateral heads of the sternocleidomastoid and base by medial end of the clavicle). Doppler ultrasound was done in Gray scale and Colour mode and location, diameter and depth of IJV was recorded.

Location of IJV in relation to CCA was recorded as lateral, anterolateral, anterior, anteromedial, medial, posteromedial, posterior and posterolateral.

Any position other than lateral and anterolateral was defined as dangerous position.

Maximum diameter of IJV  $\leq 7$  mm was defined as small sized.

## RESULTS

**Table 1 : Demographic characteristics**

Characteristics	Number
Age (years)*	47 (34 to 59)
Gender- male	409 (68.9%)

\*Median with Inter quartile range

**Table 2: Location of IJV in relation to CCA**

Location of IJV relative to CCA	Right side (%)	Left side (%)
Lateral	53 (8.9)	47 (7.9)
Anterolateral	447 (75.4)	426 (71.8)
Anterior	85 (14.3)	109 (18.5)
Anteromedial	3 (0.5)	3 (0.5)
Medial	0	0
Posteromedial	0	0
Posterior	0	0
Posterolateral	5 (0.9)	8 (1.3)
Safe position	84.3 %	79.9 %
Dangerous position	15.7 %	20.1 %

**Table 3: Measurements of IJV**

Parameter	Right side; mean (SD)	Left side; mean (SD)
Transverse diameter of IJV (mm)	13.7 (3.2)	11.3 (2.9)
Anteroposterior diameter of IJV (mm)	10.2 (1.6)	9.8 (1.5)
Depth of IJV from skin surface (mm)	15.1 (3.6)	14.7 (3.4)
Adequate size [Number (percentage)]	220 (98.2)	215 (96)
Small size [Number (percentage)]	4 (1.8)	9 (4)

## CONCLUSIONS

➤ A significant proportion of patients (16-20%) in our study had a dangerous relation of the IJV with common carotid artery and 1.8-4% had small sized IJV which may end up in inadvertent arterial puncture while cannulating the IJV with landmark guided approach.

➤ Due to anatomical and size variations, ultrasound guided IJV cannulation should become the standard of care.

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