

# Drainage of the External Jugular vein Into the Internal Jugular Vein-A Rare Variation

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## ABSTRACT

There are a number of variations of the superficial veins of the head and neck reported so far. Some are commonly found and some are present rarely. These are influencing the performance of surgeons operating in the head and neck region, clinicians as well as radiologists. Material and Methods-The present variation was noticed during routine dissection of head and neck of 48 year old male adult cadaver in the Department of Anatomy, Sri Guru Ram Das Institute of Medical Sciences and Research Vallah (Punjab). A rare variation of the drainage of the external jugular vein directly into the internal jugular vein on the right side was noted. The formation of the right external jugular vein was found normal. The veins on the left side were normal. The sites for long term central venous catheterization are the external jugular vein, internal jugular vein or subclavian vein. The present rare variation will alert clinicians and surgeons performing neck, vascular or reconstructive surgery about unexpected variations of the external jugular vein in the hope of preventing inadvertent injury.

**Keywords:** Variation, External, Internal, Jugular.

## INTRODUCTION

Veins of head and neck are classified into superficial and deep veins. Superficial veins include anterior jugular, external jugular and posterior jugular vein and deep veins are internal jugular vein and subclavian vein.<sup>[1]</sup> External jugular vein formed by the union of posterior division of the retro mandibular vein and the posterior auricular vein. It begins at the angle of the mandible and descends obliquely superficial to the sternocleidomastoid muscle to drain into the subclavian vein. The internal jugular vein which is formed as the continuation of the sigmoid sinus descends in the carotid sheath and unites with the subclavian vein posterior to the sternal end of the clavicle to form the brachiocephalic vein.<sup>[2]</sup> A number of anatomical variations of the external jugular vein are found either in its formation, course, tributaries or termination.<sup>[3]</sup> Clinically the external jugular vein is approached for the cannulation,<sup>[4]</sup> surgical central venous pressure measurement and various radiological procedures.<sup>[5]</sup> So any variations in the formation, course and drainage of the external jugular vein can influence the outcome of the surgeons, clinical and radiologists. The present variation of the drainage of the external jugular vein can help the clinicians in central venous catheterization.

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## MATERIALS AND METHODS

During the superficial dissection of the head and neck on the right side of a 48 year old male cadaver, the formation, course and drainage of the external jugular vein was carefully dissected on the both sides in detail. The formation of the right external jugular vein was by right posterior division of the right retro mandibular vein and right posterior auricular vein. It descended superficial to the sternocleidomastoid muscle and instead of draining into subclavian vein, drained into the right internal jugular vein 3 cm above the midpoint of clavicle. All the tributaries draining into the right internal jugular vein were found normal. All the superficial veins on the left side were also found normal.

## DISCUSSION

The communication of the external jugular vein with the internal jugular vein is described as a rare variation,<sup>[1]</sup> present only in one third cases.<sup>[2]</sup> Bergman et al noticed several variations of the external jugular vein.<sup>[6]</sup> The variations that they have noted include:

1. Its formation merely by the posterior auricular vein.
2. Receiving the facial, lingual or the cephalic veins as tributaries.
3. Passing over the clavicle and open into the cephalic, subclavian or internal jugular veins.
4. Doubling of the vein.
5. Formation of an annulus around the clavicle.

In one study by Deslaugier et al,<sup>[7]</sup> mode of drainage of external jugular vein was studied in detail. In 60% of cases the external jugular vein drained into jugulo-subclavian confluence, in 36% of cases it drained into subclavian vein and in 4% of cases it drained into internal jugular vein. Rosse and Rosse described the communication of external jugular vein with the upper part of the internal jugular vein.<sup>[8]</sup> Nayak also described a case with the anterior jugular vein which is continued above as the facial vein and lower down drained into internal jugular vein.<sup>[9]</sup> There was a large communicating channel between anterior jugular vein and internal jugular vein. The present case showed the right external jugular vein draining directly into the right internal jugular vein without any communicating channel and the level of drainage was 3 cm above the midpoint of right clavicle not after descending over the clavicle as noted by Bergman et al.<sup>[6]</sup> The drainage of the external jugular vein into the internal jugular vein was superficial to sternocleidomastoid muscle. Same findings were noted by Skandalakis,<sup>[1]</sup> Lalwani but Dhivya and Chitra noted the communicating channel connecting external jugular vein with the internal jugular vein passed deep to the sternocleidomastoid muscle.<sup>[11,12]</sup>

### Embryology

Embryologically blood vessels of the head and neck consist of a close meshed capillary plexus drained on each side by precardinal vein. Cranial part of the precardinal vein later become the internal jugular vein. The external jugular vein develops from a tributary of cephalic vein from the tissues of the neck. Cephalic vein forms a venous ring around the clavicle by which it is connected to the caudal part of the precardinal vein. The deep segment of the venous ring forms the subclavian vein and receives the definitive external jugular vein.<sup>[13]</sup> The possible explanation of present variation is persistence of communication between

cephalic vein and precardinal vein. The percutaneous venous catheterization is done using anatomical landmarks which are vague in nature. The anatomical variations in the venous system will complicate the catheterization procedure. Ultrasound guided catheterization assist in cases of jugular venous system variations.<sup>[14]</sup> It is essential for the anaesthetists, radiologists and surgeons to be aware of these anatomical variations to avoid misinterpretation and to avoid injury and subsequent hematoma formation. There are a number of clinical implications of the external jugular vein in various fields e.g. Jugular venous pulse for estimating the central venous pressure hemodialysis for diagnosis of the cardiac diseases trans jugular approach for liver biopsy and trans hepatic cholangiography.<sup>[13-18]</sup>

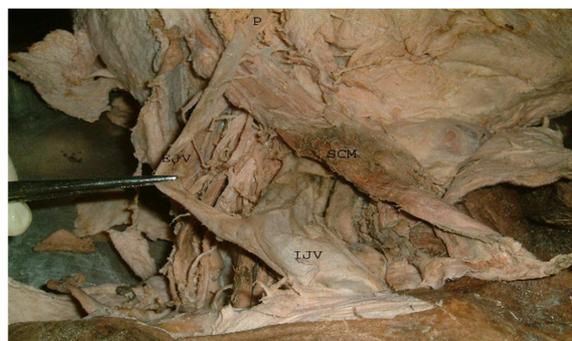


Figure: External jugular Vein (EJV) draining directly into Internal Jugular Vein (IJV).

EJV = External Jugular Vein  
IJV = Internal Jugular Vein  
SCM = Sternocleidomastoid  
P = Parotid Gland

## CONCLUSION

Central venous catheterization is indicated if peripheral access is either not possible or if hypertonic, irritant or vasoconstrictor solutions are to be injected. The preferred sites for long term central venous access are the external jugular vein, internal jugular vein or subclavian vein. The surgeons, clinicians and radiologists should be aware of all the variations of jugular venous system. The present variation can help the physicians approaching external jugular vein for catheterization.

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