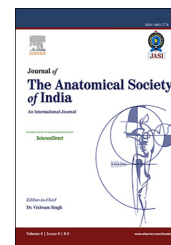


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Case Report

Anatomical variation in the anterior jugular veins and its clinical implications – A case report



Dinesh Premavathy, Prakash Seppan*

Department of Anatomy, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani campus, Chennai 600 113, India

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ABSTRACT

Introduction: Paired anterior jugular veins were present on either side of the midline of the neck, connected by a transverse (jugular) venous arch in the suprasternal space and drains into the external jugular vein (EJV) and subclavian vein (SV).

Method: The current variations were found in approximately 50-year-old female cadaver during routine dissection in the Department of Anatomy.

Observation: In present case, the anterior jugular venous system presents a variant formation, course and termination. Anterior jugular veins (AJVs) formed “V1” at the level of third tracheal ring; the major part of the “V1” deviated towards right side and joined with EJV forming “V2”. The “V2” finally drained into the right jugulo subclavian junction. Clinically, the variant arrangement of AJV may involve malposition of the catheter and misinterpretation of the examination of cardiovascular system.

Conclusion: Knowledge of such variations of AJV is important for medical professionals to avoid any clinical mismanagement during cardiac examination, vascular surgeries, anesthetic and radiological procedures.

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1. Introduction

Embryological establishment of venous system of head and neck is due to the formation of superficial capillary plexus, which extends towards the cephalad and distal part of the precardinal vein.¹ Anatomically, paired triple jugular venous system involved in the drainage of head and neck, the deep IJV becomes the dominant one because it drains the brain and the superficial veins includes the external jugular vein (EJV) and anterior jugular vein (AJV) drains the head and

neck, aside from AJV involves in the venous collateral network. Paired AJV are formed by the union of small tributaries from the submandibular region or in submental region. After formation, the AJV runs downwards beside the midline of the neck and pierces the investing layer of deep cervical fascia and drains into the EJV or subclavian vein (SV) under the sternocleidomastoid muscle just above the clavicle, in the suprasternal space, and the two AJV were joined by a JVA.² The variation in the formation, course, and termination rarely involves in the AJV system compared to other veins in the neck. The present case study reports an

* Corresponding author.

E-mail address: seppanprakash@yahoo.com (P. Seppan).<http://dx.doi.org/10.1016/j.jasi.2015.06.003>

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anatomically varied AJV and correlates it with the various clinical procedures.

2. Method

During routine dissection in the Department of Anatomy, parenthetically, a variant in the formation, course and drainage of AJV were observed in approximately 50-year-old female cadaver.

3. Observations

AJV in the neck were formed by superficial submandibular veins and also contributed by facial veins in submandibular region. Interestingly, while reflecting skin over neck, the left AJV crossed midline of the neck and joined with right AJV to form a common anterior jugular vein (CAJV) named as "V1" at the level of 3rd tracheal ring which was appeared as typical "y" shaped form. A small innominate vein (SIV) arising from left AJV runs downwards and parallel to the left AJV and ultimately drained into JVA on left side of the neck (Fig. 1). Furthermore, the "V1" runs downwards deviated towards laterally near the origin of right sternocleidomastoid muscle, and again the "V1"

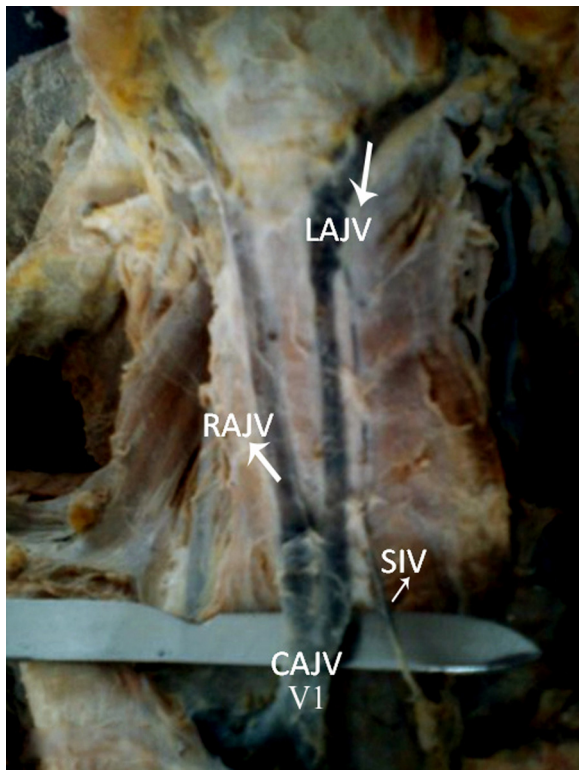


Fig. 1 – Gross photograph demonstrating the variations in venous drainage as follows: left AJV crossing the midline of the neck and joined with the right AJV to form a CAJV (V1). A small Innominate vein arising from the Left AJV is draining into the small JVA. Abbreviations: LAJV – left anterior jugular vein; RAJV – right anterior jugular vein; SIV – small innominate vein; V1-CAJV – common anterior jugular vein.

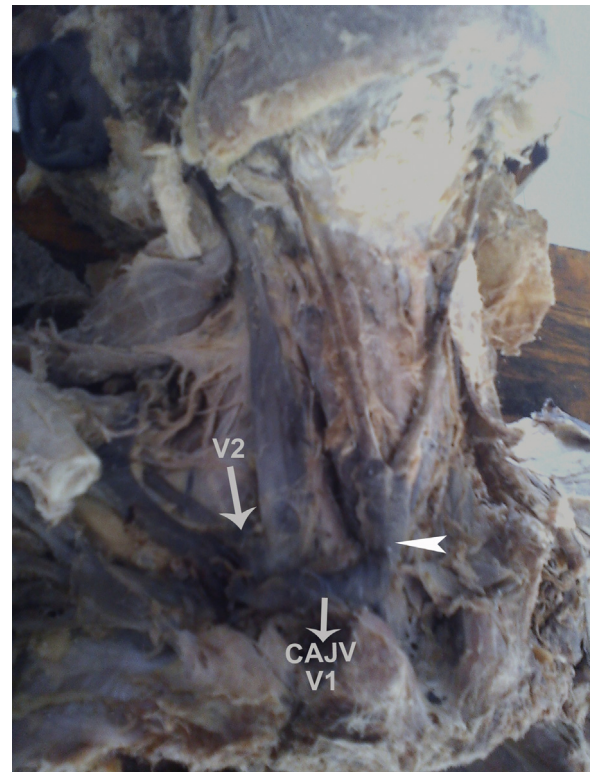


Fig. 2 – Gross photograph of neck showing the deviation of CAJV (V1) towards laterally and joined with the right EJV to form a common trunk called "V2". The arrow mark indicating the "V2" that drained into the right JSJ. Arrowhead indicates the fusion of two AJV. Abbreviations: v2 – common trunk formed by V1 and right external jugular vein; V1-CAJV – common anterior jugular vein.

joined with the right EJV to form a common trunk named as "V2". Finally, the "V2" drained into the confluence of right jugulo subclavian junction (JSJ) was observed after medial claviculectomy. Even though, the "V1" was fully deviated towards right side, a small portion of it communicated to the right side of the JVA, which was very small in the suprasternal space (Fig. 2). A communicating vein between left IJV and left AJV near its commencement was also noticed (Fig. 3). The present variations of the AJV were clearly demonstrated by a line diagram (Fig. 4), which was compared with its normal anatomy given by a standard book (Fig. 5).

4. Discussion

Clinically, the jugular veins are considered as important veins for ligations during neck dissections, used for venous manometers, to assess cardiac diseases³ and catheterization.⁴ The present case reported that the two AJV formed a single trunk (V1) or midline trunk² at the level 3rd tracheal ring. Akin to our reporting, a specimen demonstrated a connecting venous channel called V1 connecting the FV and single AJV was reported.⁵ A case showed a wide array of AJV variations; they are (a) facial vein continued as AJV as in our case, (b) more

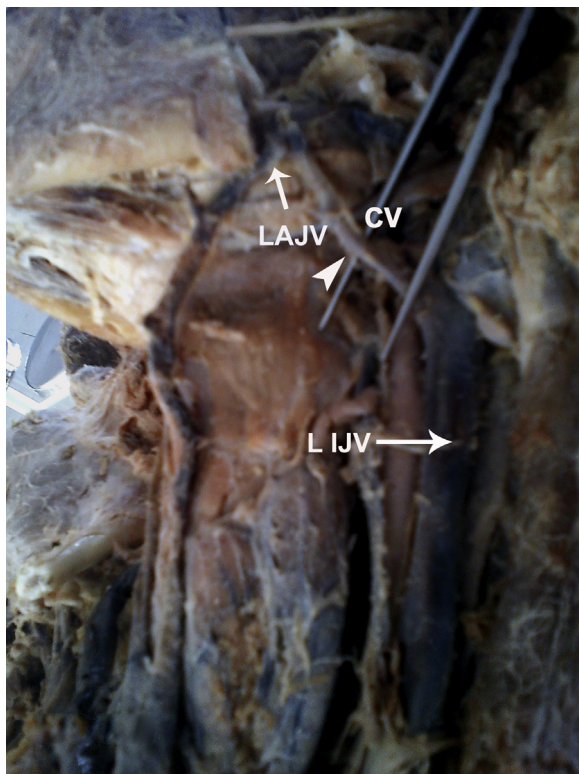


Fig. 3 – Gross photograph of the lateral aspect of the neck demonstrating that (indicated by arrowhead) a communicating vein is present between IJV and commencing part of the AJV on left side. Abbreviations: LAJV – left anterior jugular vein; LIJV, left internal jugular vein; CV – communication vein.

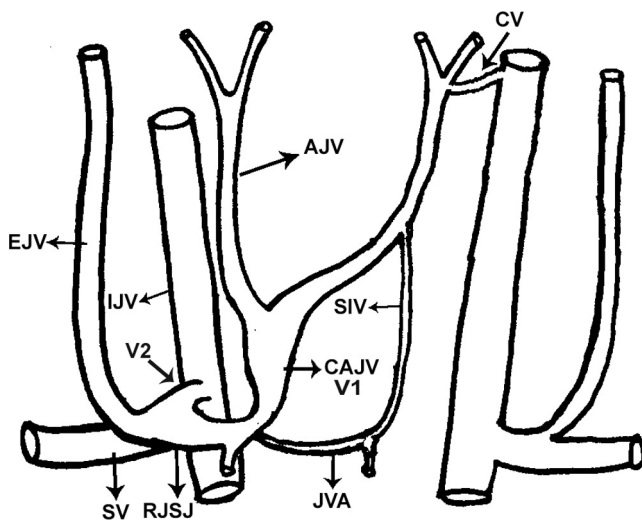


Fig. 4 – The line diagram demonstrating the variation in size, formation, course, communication and termination of AJV system. Abbreviations: AJV – anterior jugular vein; EJV – external jugular vein; IJV – internal jugular vein; CV – communication vein; SIV – small innominate vein; RJSJ – right jugulo-subclavian junction; SV – subclavian vein; JVA – jugular venous arch; V1-CAJV – common anterior jugular vein, V2 – common trunk formed by V1 and right external jugular vein.

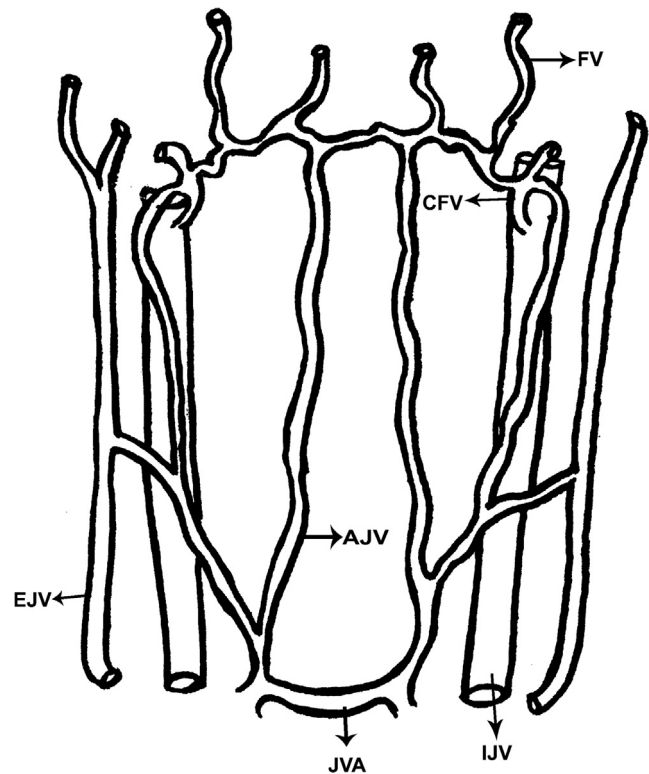


Fig. 5 – The line diagram showing a normal anatomy of jugular venous system in the neck. Abbreviations: AJV – anterior jugular vein; EJV – external jugular vein; IJV – internal jugular vein; JVA – jugular venous arch; FV – facial vein; CFV – common facial vein.

Adopted from Gray's Anatomy for students (Richard L. Drake, A. Wayne Vogl, Adam W.M. Mitchell, 2005).

or less the AJV is of same caliber with IJV and drained into the SV, (c) a large communication present between AJV and the anterior division of IJV, (d) large AJV covered the superior thyroid artery, this is important to consider during thyroid surgery, (e) the JVA also large and doubled forming circle of veins anterior to lower part of isthmus of the thyroid gland.⁶ In connection with U-shaped pattern of FV with the EJV, AJV formed N-shaped and a stepladder appearance.⁷ In our case, the ending of “V2” is at the right JSJ and a similar finding was also observed in another case, but on the left side AJV draining into left IJV.^{8,9} In one of the case, a variation was reported in the termination of seven veins including AJV at RJSJ or confluence of Pirogoff and formed the brachiocephalic vein, and the AJV was thicker and larger than EJV and IJV.¹⁰ Similarly, the present case also demonstrated thick AJV and more alike to EJV. The present reported and discussed variations advocated that anatomically AJVs showed high degree of variations. AJV has also been reported as a very important venous channel involved in maintenance of thoracic venous stability as an important collateral channel¹¹ and knowledge of its anatomical variations are essential for surgeons to avoid any complications during neck surgery and catheterization⁴ because of their attachment to the platysma above and the fascia below the superficial veins (AJV and EJV) do not retract,

bleeding from the veins may not cease easily and cause serious impact.¹² Prior and sound knowledge of such variations is of utmost important to clinicians, surgeons, anesthetists and radiologists for ease and safe approach during neck surgeries.

Conflicts of interest

The authors have none to declare.

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