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## **Anatomical variants of the upper arm vein and their clinical implications in vascular access placement**

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**Objectives:** The proportion of elderly patients with end-stage renal disease (ESRD) has significantly increased over the past decade. The duration of hemodialysis and overall survival has also increased, leading to a higher proportion of patients receiving multiple access placements. In particular, access placement using upper arm veins, including transposed basilic arteriovenous fistulas (TBAVF), has increased, warranting further investigation into the anatomical variants of the upper arm veins. The purpose of this study was to investigate the frequency of anatomical variations in the upper arm vein of patients with ESRD.

**Methods:** A total of 494 venograms from 258 patients who visited Hallym University Sacred Heart Hospital from June 2014 to June 2017 were reviewed in this single-center retrospective study. Anatomical variations were classified into eight subtypes based on the anatomical relationship between the brachial and basilic veins.

**Results:** Paired brachial veins drained separately into the basilic vein in 67.5% of venograms, whereas they merged into a single brachial vein before draining into the basilic vein in 13.1% of cases. A single brachial vein was present in 19.4% of cases. Bifid cephalic arches and brachial-basilic ladders were observed in 9.7% and 14.0% of cases, respectively. Of all the cases reviewed, 15.7% were considered to be not suitable for TBAVF access placement due to early confluence of the brachial and basilic veins

**Conclusions:** Anatomical variations in the upper arm veins can influence operative planning and outcomes, highlighting the importance of pre-operative examination via venography