Effect of prone vs. supine positioning and hydration on lower extremity venography

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Introduction: Narrowed but patent veins on MR venography of the lower extremity vasculature typically performed supine may be suspicious for chronic deep vein thrombosis which has healed with residual narrowing. However, we have noticed small caliber common femoral veins, the most anterior vein, with supine positioning may appear normal on subsequent ultrasound. We hypothesize MR venography sometimes shows small antedependent veins due to underfilling. Typically, patients are instructed to arrive for the MR scan with nothing by mouth beforehand, which can also contribute to underfilling of antedependent veins. This study determines the effect of supine vs. prone and level of hydration on common femoral vein luminal size.

Materials and Methods: After obtaining written informed consent, 7 healthy adult volunteers were asked to participate in the study. Each subject was imaged supine and prone while at their baseline hydration status and while dehydrated, defined as nothing to eat or drink for at least 8 hours before the scan. Pelvic and upper thigh veins were imaged in the axial plane using balanced steady-state free precession (SSFP) in an 8-channel body array coil at 1.5 Tesla (GE Medical Systems, Milwaukee). Scanning parameters: TR/TE/Flip=~4/~1.7/75°, FOV=40cm, slice thickness=5mm, slice spacing=0mm, bandwidth=±83.33 kHz, Matrix=192x320. Cross-sectional area of each common femoral vein was measured at a location immediately distal to the bifurcation of the ipsilateral common femoral artery and compared using student's t-test for paired data.

Table 1. Mean Common Femoral Vein Cross-sectional Area (±SD), mm^2

	Baseline	Dehydrated
Supine	64±26	48±17
Prone	80±29	79±33
	p=0.02	P=0.001

Results: The mean common femoral vein cross-sectional area at baseline hydration was 64 mm^2 when supine and increased to 80 mm^2 when prone, resulting in an average increase of 16 mm^2 (p=0.02) going from supine to prone (Table 1). The mean common femoral vein cross-sectional area while dehydrated was 48 mm^2 when supine and increased to 79 mm^2 when prone, resulting in an average increase of 31 mm^2 (p=0.001) going from supine to prone. The mean common femoral vein cross-sectional area while supine was 48 mm^2 when dehydrated and increased to 64 mm^2 when at baseline hydration, resulting in an increase of 16 mm^2 going from dehydrated to baseline hydration (p=0.04). The mean common femoral vein cross-sectional area while prone did not change with hydration status (79 mm^2 dehydrated vs. 80 mm^2 baseline hydration).

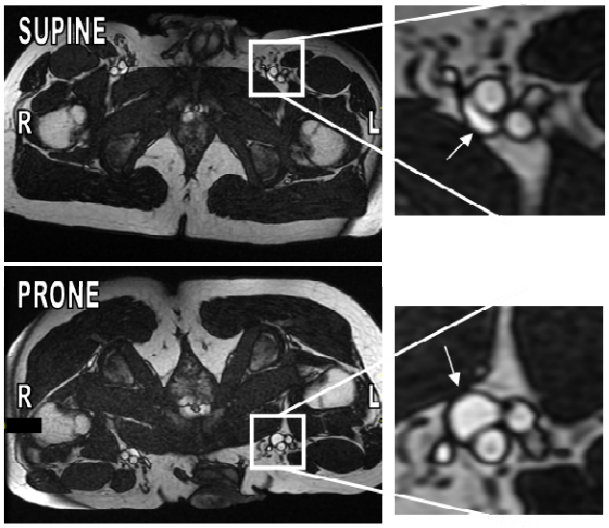

Fig 1. Supine and prone images of the common femoral vein (arrow) at the level of bifurcation of the common femoral artery. (R=right, L=left)

Discussion/Conclusion: These data demonstrate that the antedependent common femoral vein changes in size with hydration status and supine vs. prone positioning. A dehydrated subject may have a small common femoral vein, giving the impression of abnormality. However, when the subject is imaged prone such that the common femoral vein is dependent, its lumen cross-section is maximally dilated independent of hydration status. This suggests that MR venography should be performed in a fully hydrated state. Routine "npo" (nil per os, nothing by mouth) recommendation should not be used prior to lower extremity MR venography. Furthermore, any antedependent veins that appear narrowed with supine positioning could be imaged prone to distinguish physiological underfilling from pathological narrowing.

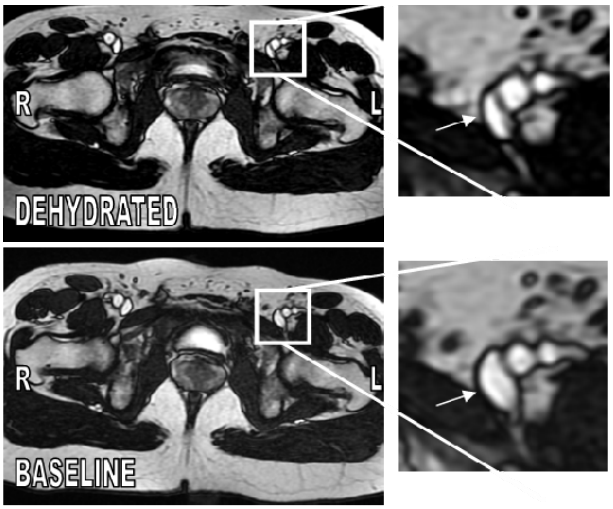

Fig 2. Dehydrated and baseline images of the common femoral vein (arrow) at the level of bifurcation of the common femoral artery. (R=right, L=left)

References: [1] Lindquist et al. AJR 2010; 194(5):1357. [2] Cantwell et al. J Vasc Interv Radiol 2006; 17(11 Pt 1):1763. [3] Polak et al. Semin Ultrasound CT MR 1999; 20(1):36. [4] Spritzer. Prospect Vasc Surg Endovasc Ther 2009; 21(2):105. [5] Ono et al. MRM 2010; 64(1):88.