WCE 2019
29 October - 2 November
ABU DHABI, UAE

URETEROSCOPIC DOPPLER ULTRASONOGRAPHY: WHERE IS THE LEAST VASCULAR RENAL ACCESS SITE FOR PERCUTANEOUS NEPHROLITHOTOMY?

Roshan M. Patel[1], Vinay Cooper[1], Luke Limfueco[1], Shlomi Tapiero[1], David Regan[2], Jaime Landman[1], and Ralph V. Clayman[1]

[1]Department of Urology, University of California, Irvine, USA
[2]Vascular Technology Incorporated, Nashua, USA

INTRODUCTION

Herein, we provide the first report regarding *in vivo* porcine renal forniceal, papillary, and infundibular blood flow at the urothelial level using a novel ureteroscopic Doppler transducer.

MATERIALS AND METHODS

- A 3Fr Doppler transducer (Vascular Technology, Inc.) was passed through the working channel of a flexible dual channel ureteroscope (Wolf Cobra) (Figure 1A).
- Pyeloscopy was performed in 11 female juvenile Yorkshire pigs.
- Blood flow was mapped at the 3, 6, 9, and 12 o'clock forniceal positions, the center of the papilla and along the major infundibulae (Figure 1B).
- A 365µ holmium laser fiber was passed through one channel and activated (1J and 10Hz) until it penetrated approximately 1cm into the previously mapped area of the urothelium (Figure 1C).
- Bleeding time at each site of laser deployment was recorded.

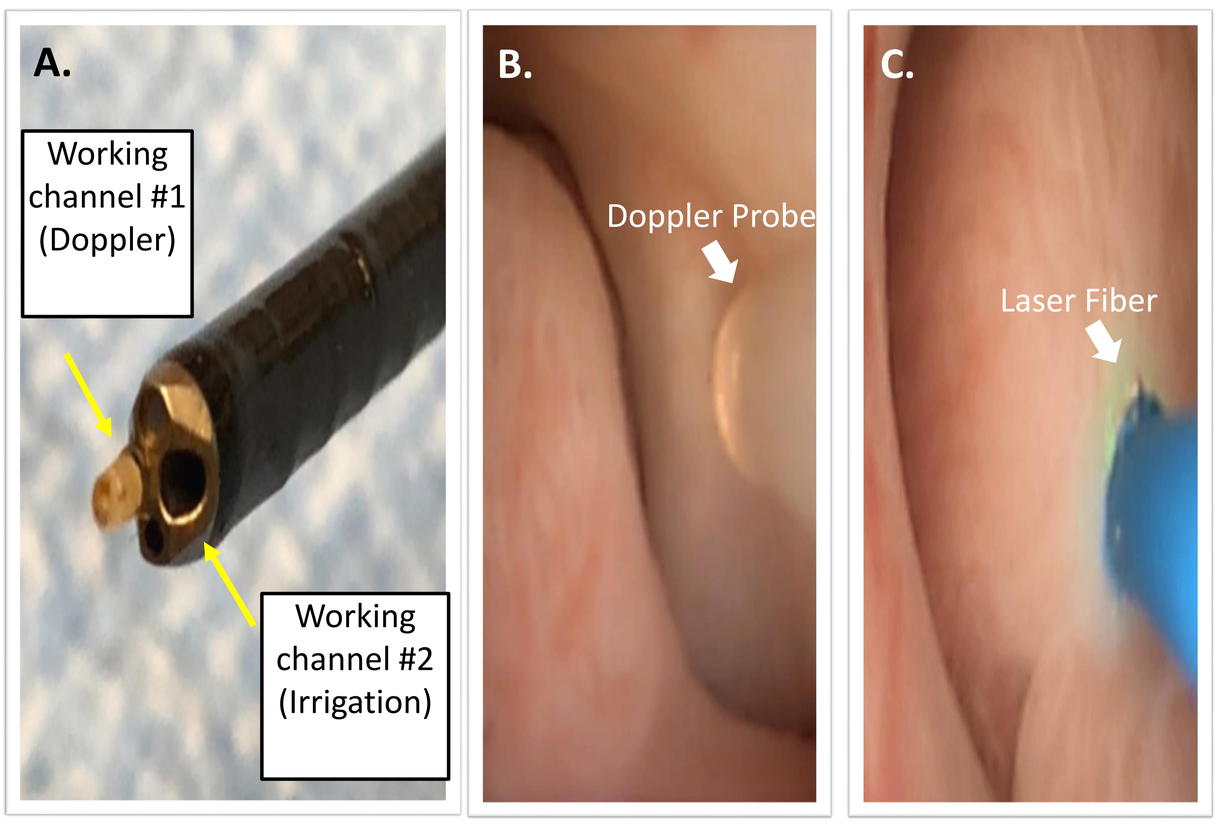

Figure 1.
A. Doppler transducer extending out of the ureteroscope. The second channel provided continuous flow of irrigant.
B. Ureteroscopic view with the Doppler transducer extended.
C. Ureteroscopic view during laser deployment.

RESULTS

- Each reading was categorized from 0 (no flow) to 3 (high flow) based on auditory intensity.
- The infundibular blood flow was more often noted to be high (i.e. 40-55% of the readings) than that of the calyceal fornices (11.9 – 15.8% of the readings) ($p < 0.01$).
- Distribution of blood flow did not differ significantly between anterior and posterior calyces nor along the length of the kidney.
- The 6 o'clock forniceal position had significantly more flow than the other forniceal locations ($p < 0.01$).
- The center of each papilla consistently had significantly less blood flow ($p < 0.01$) than the forniceal locations.
- A 3D reconstruction was created of calyces from an external point of view (Figure 2).

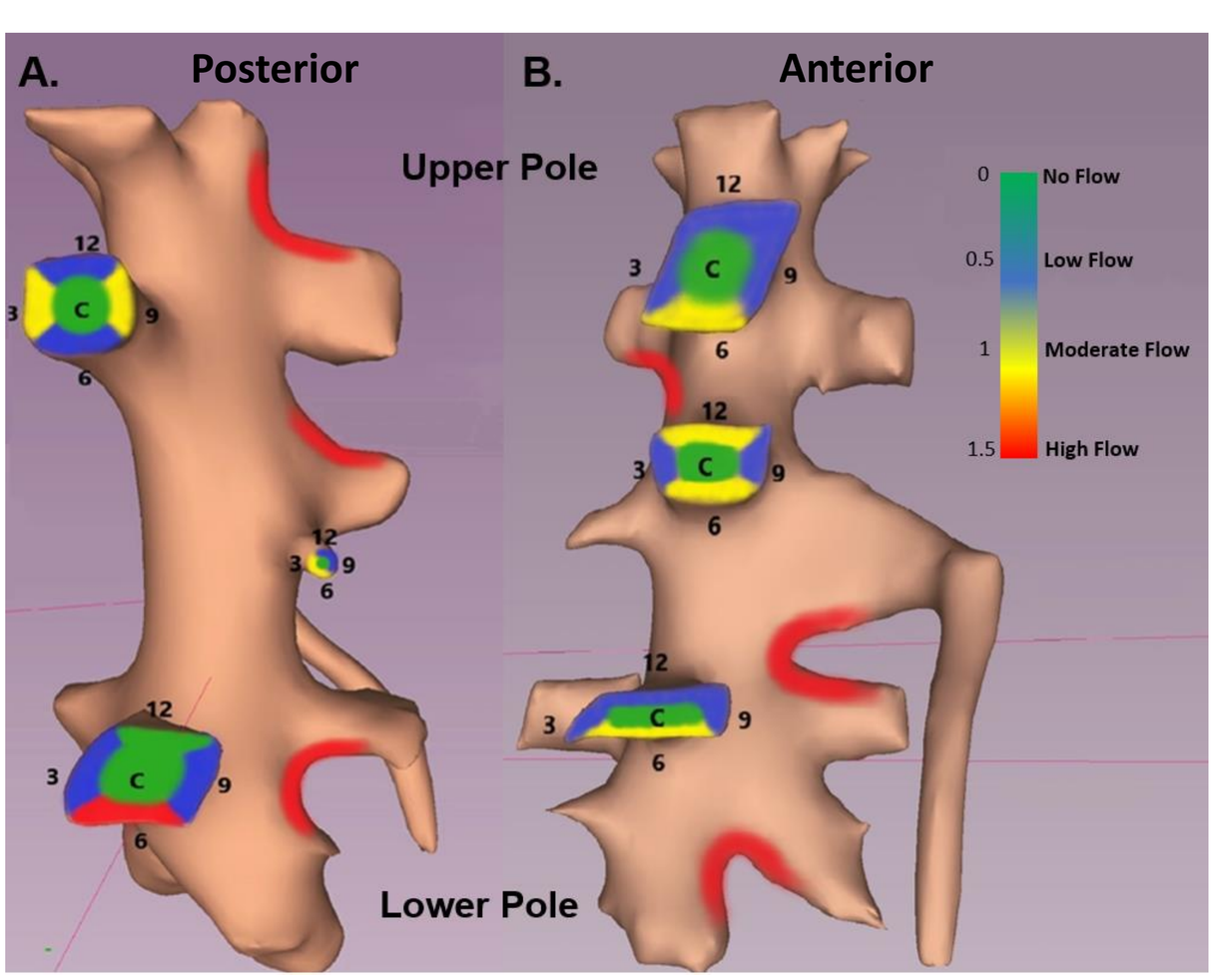

Figure 2.
A. 3D reconstruction of calyxes and infundibula with blood flow categorized by color in the **posterior** view.
B. 3D reconstruction of calyxes and infundibula with blood flow categorized by color in the **anterior** view.

CONCLUSIONS

- The center of the renal papilla presents the least vascular site within the calyx.
- Along the fornix, the 6 o'clock position has the highest blood flow.
- The infundibulae have the highest blood flow within the kidney.

UC Irvine Health
Department of Urology