PD07-02

Initial Evaluation of Novel Flexible Ureteroscope with omni-directional bending using JOYSTICK unit (URF-Y0016); In Ex-vivo Research

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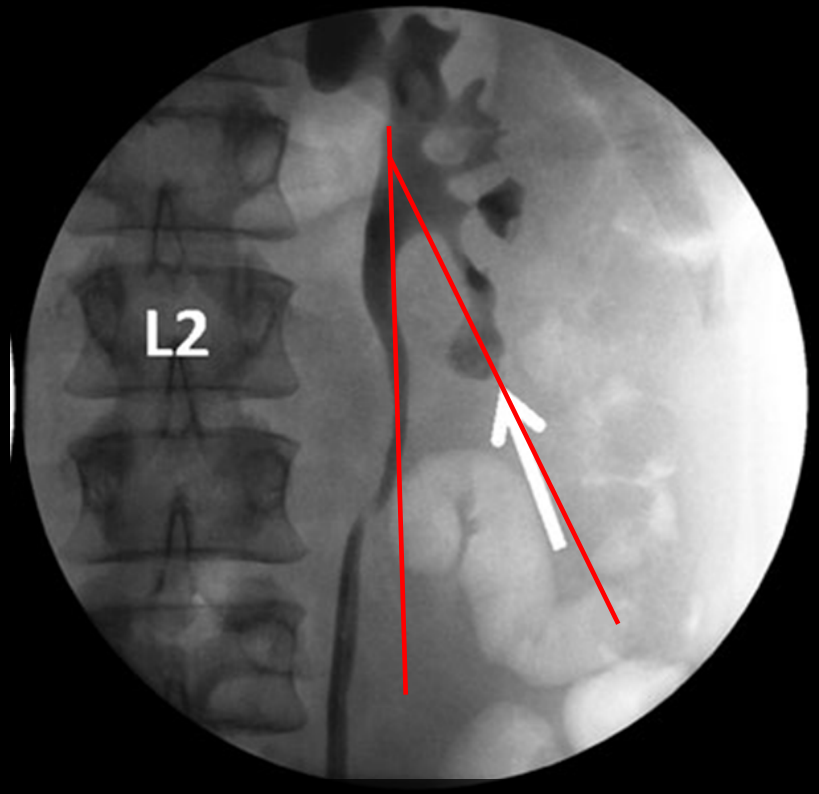
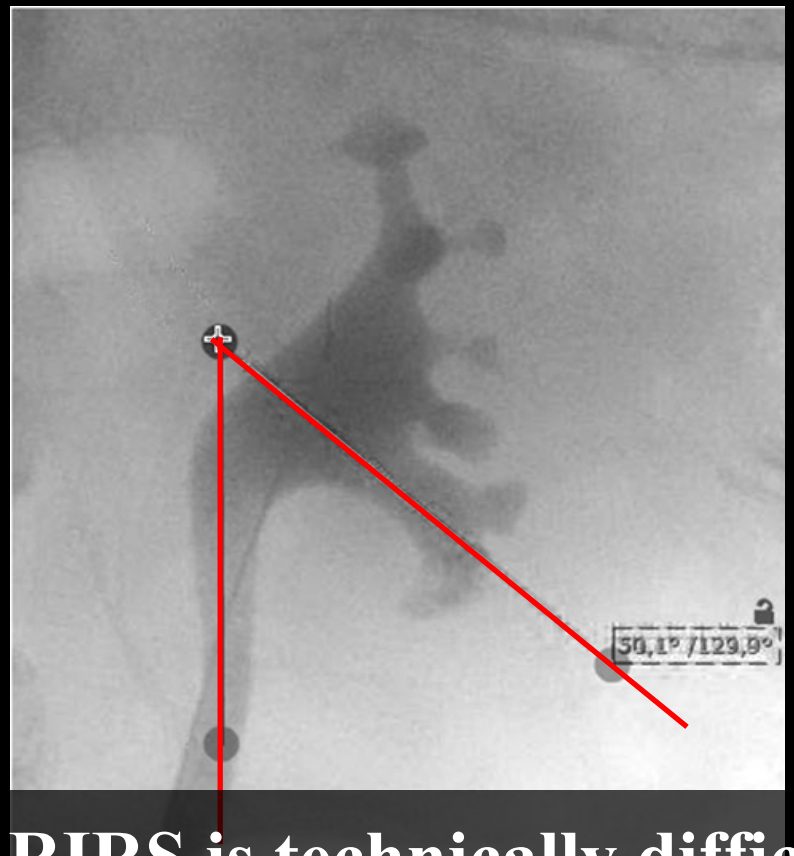
Introduction





The treatment of lower pole stones using RIRS is technically difficult due to the restricted range accessible in the lower pole calyx when using a retrograde ureteral access with a flexible ureteroscope having two-directional tip deflection.

Objective

- To address this limitation, we developed a novel flexible ureteroscope that uses a joystick unit (URF-Y0016) to provide omni-directional bending of the tip.

- Our aim in this study was to evaluate the usefulness of the URF-Y0016 flexible ureteroscope for the treatment of lower pole stones.

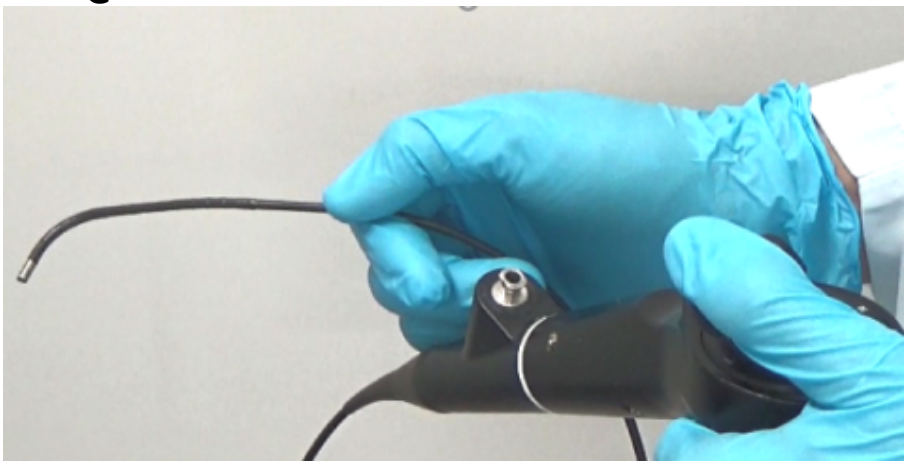
Novel flexible ureteroscopy

Armamentarium of novel flexible ureteroscope with JOYSTICK unit (URF-Y0016)

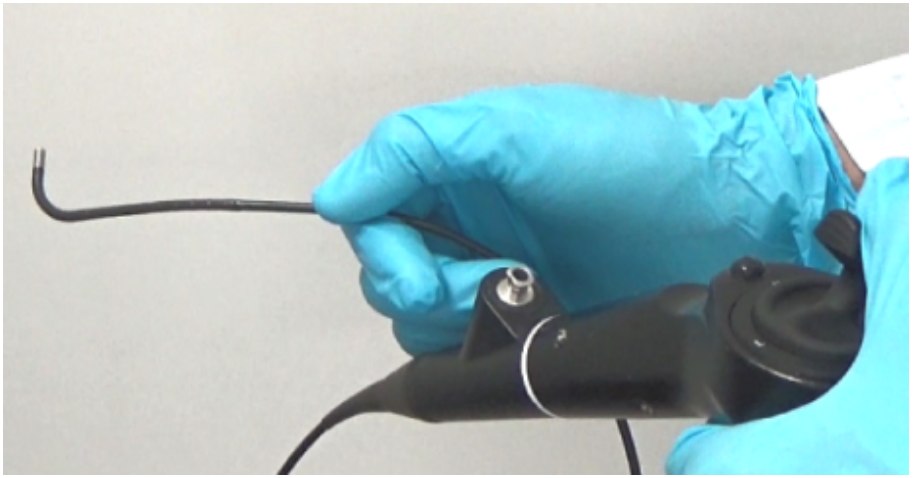
A

B

C



D

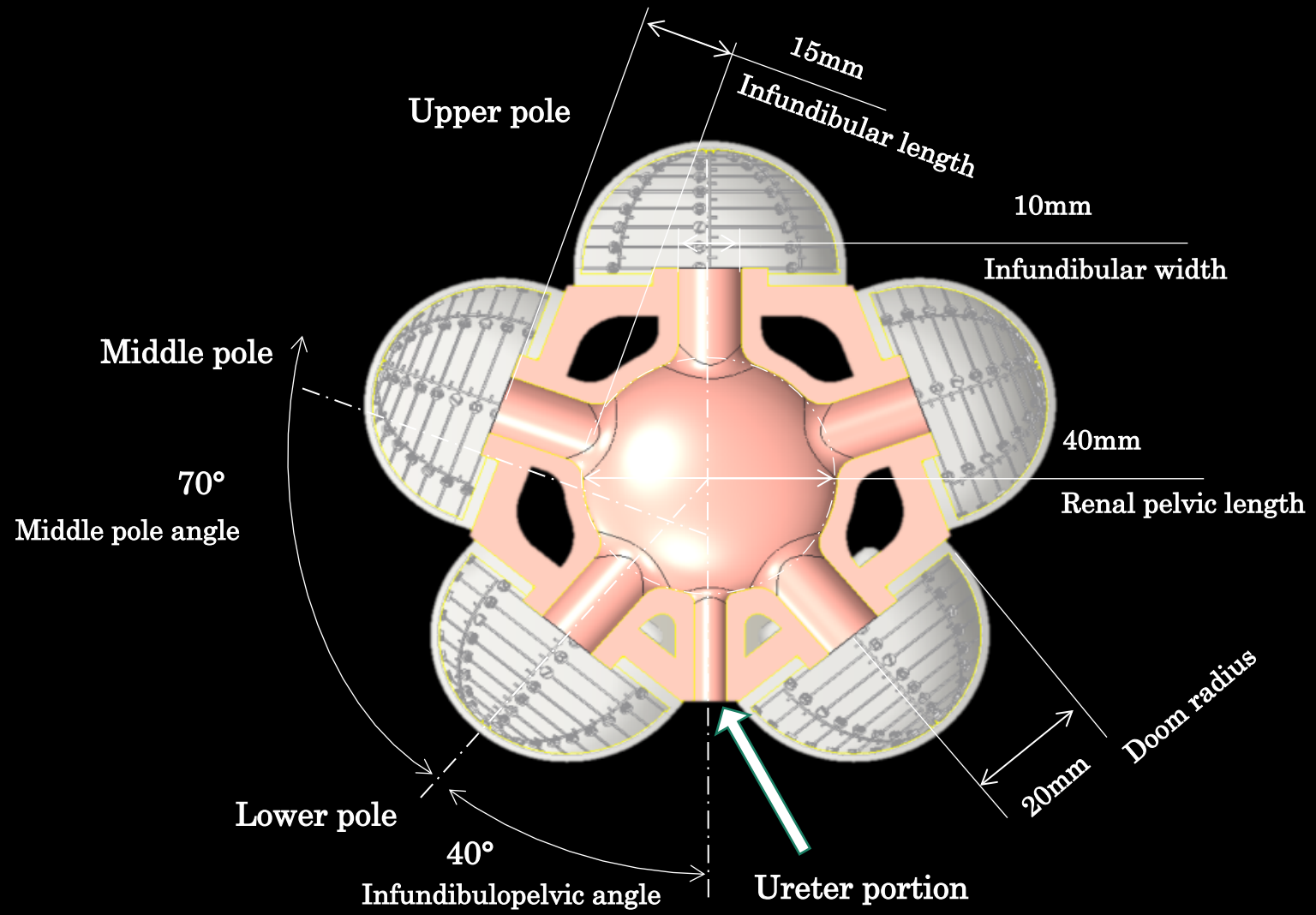


Methods and Material

To evaluate the URF-Y0016…

- We compared the accessible range of **the URF-Y0016** to **the URF-P6** (Olympus, Japan), which is commonly used in practice, using our **3D pyelocaliceal model** immersed in water as an *ex-vivo* model.
- Four surgeons, experts evaluated the accessible range of both scopes along the 8 directions, in the upper, middle, and lower calyx.
- For all measurement, the flexible ureteroscope being evaluated was inserted via the ureteral portion of the 3D pyelocaliceal model.
- Basket forceps (Flex-Catch NT 1.9Fr, Olympus) were inserted through the working channel of each scope and fixed to the tip of the scope.
- The index of reachability for each scope was determined by the furthest point contacted along all 8 directions.

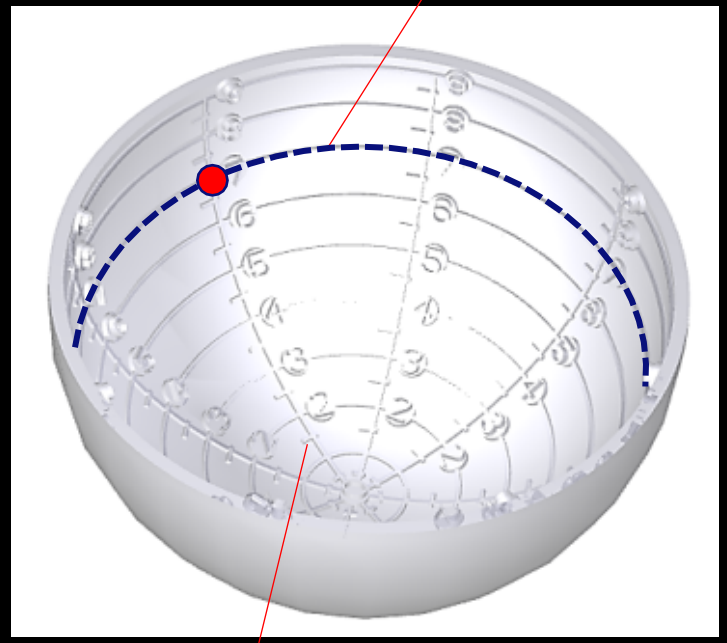
Three-dimensional pyelocaliceal model



Inside of calyx dome in the model

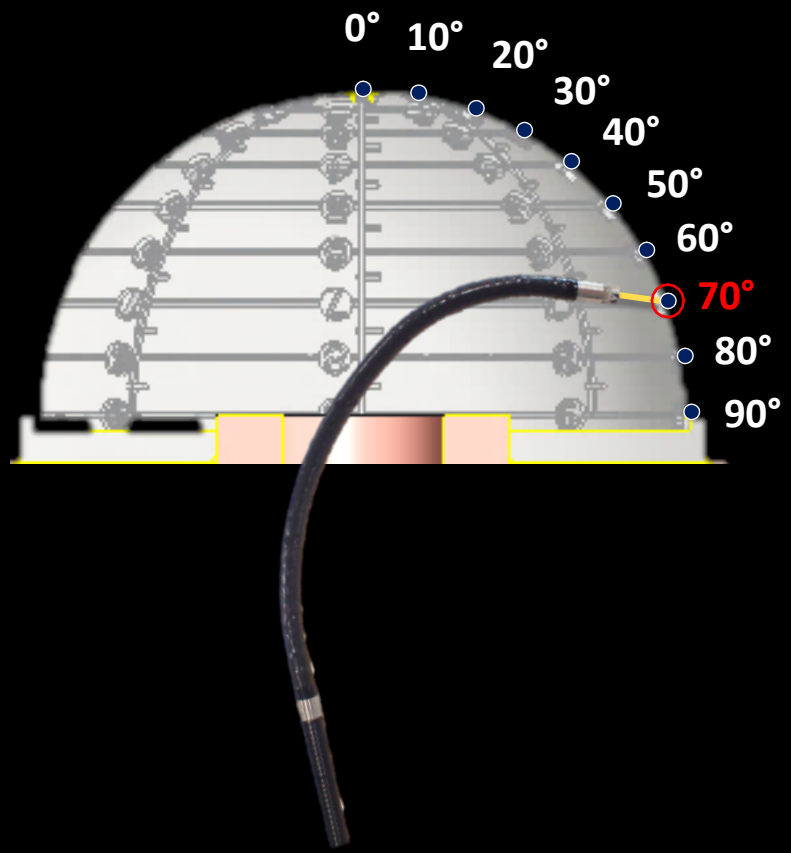
Index of reachability

Every 10° degrees interval



8 directions line

Image of evaluation

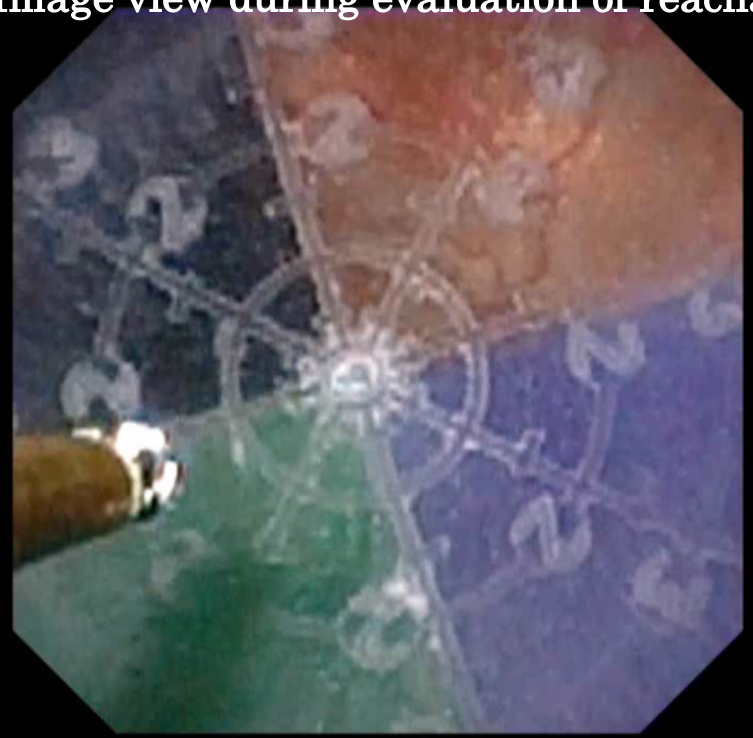


Methods and Material

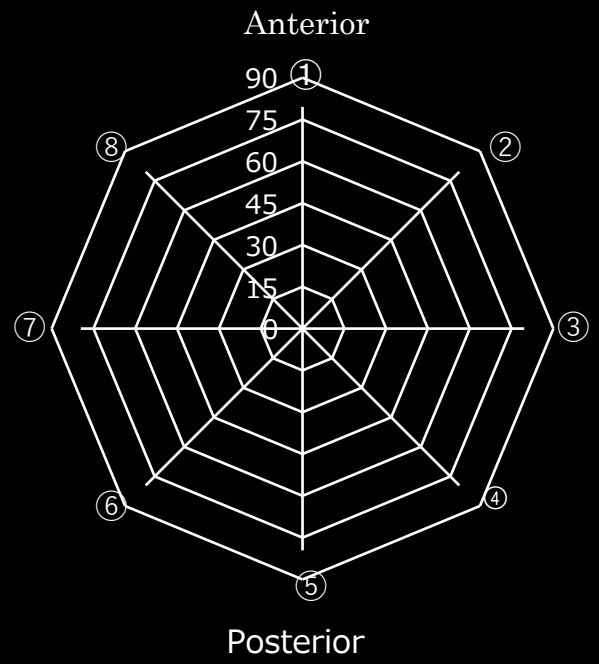
To evaluate the URF-Y0016…

- An analogue clock diagram was used to simply depict the full range of reach for each scope. The direction in these diagrams were classified as 1 through 8, with directions 1 and 5 along the anterior and posterior direction, respectively, in each calyx.

A **Image view during evaluation of reachability**



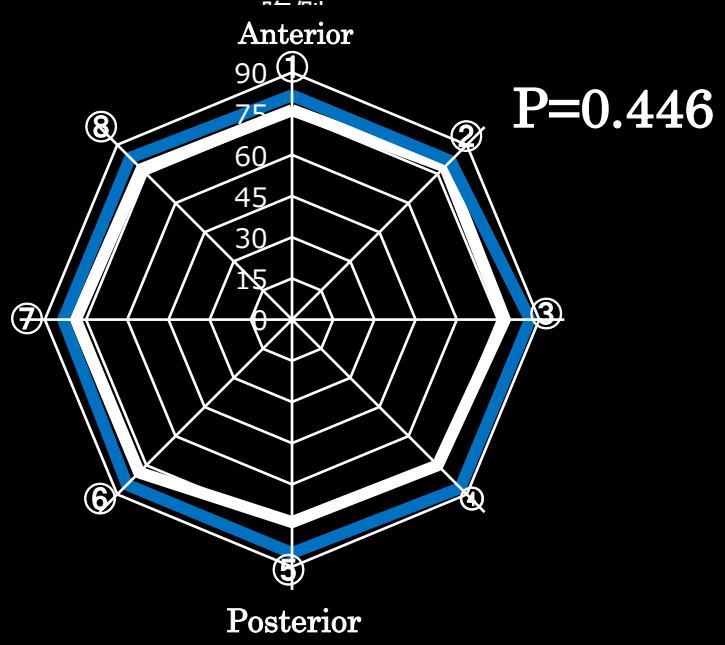
B **Outcome image after evaluation of reachability**



Results

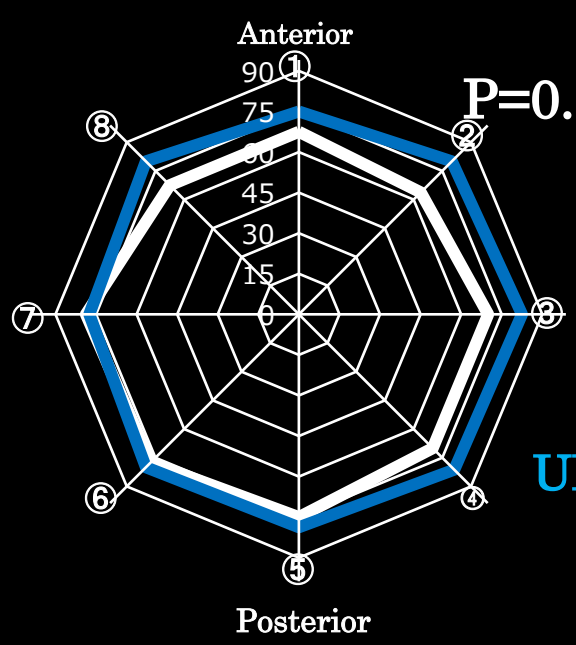
Reachable range in upper, middle, and lower calyx

Upper calyx



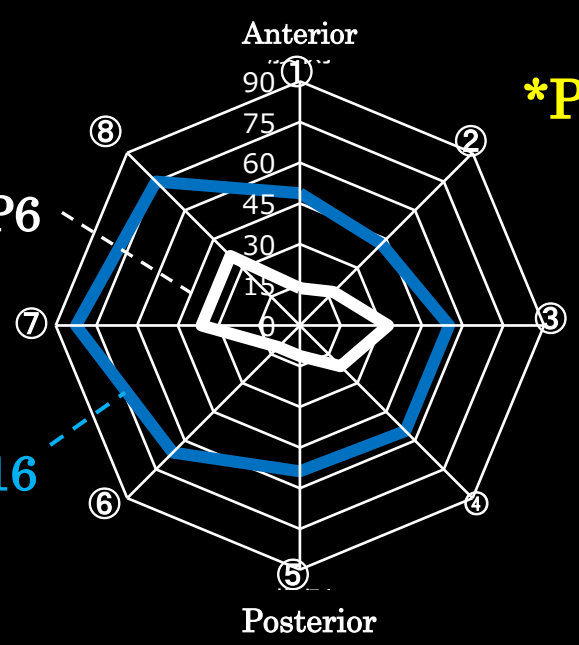
P=0.446

Middle calyx



P=0.295

Lower calyx



*P=0.002

URF-P6

URF-Y0016

*ANOVA; P<0.05

Results

Reachable angle between URF-Y0016 and URF-P6 in lower calyx according to 8 directions

Direction No	Clock position	Mean accessible angle; URF-Y0016, degree (SD)	Mean accessible angle; URF-P6, degree (SD)	*P-value
1	12:00	48.7 (8.5)	13.7 (2.5)	0.027*
2	1:30	42.5 (6.5)	17.5 (5.0)	0.009**
3	3:00	55 (5.8)	32.5 (13.2)	0.584
4	4:30	55 (12.2)	21.2 (7.5)	0.299
5	6:00	53.7 (7.5)	11.2 (2.5)	0.024*
6	7:30	66.2 (2.5)	11.2 (8.5)	0.007**
7	9:00	82.5 (5.0)	36.2 (17.0)	0.106
8	10:30	75 (4.1)	36.2 (21.4)	0.184

*ANOVA with Bonferroni correction; $P<0.05$

**ANOVA with Bonferroni correction; $P<0.01$

Conclusion

- We developed the URF-Y0016 as a novel flexible ureteroscope, providing omni-directional bending of the tip with an ergonomically-designed controller.

- The URF-Y0016 provides greater access to the lower pole calyx, particularly along the anterior-posterior direction.

- This increased reachability could improve treatment outcomes for calyceal stones in the lower pole in practice.