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AUA VIRTUAL EXPERIENCE



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A new simulator for all steps PCNL training

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Conflict of Interest

Nothing to disclose



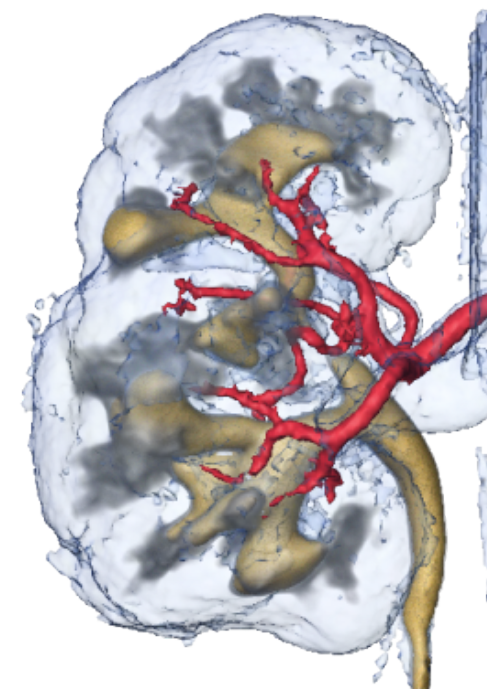
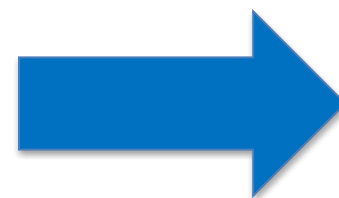
Background

- PCNL for severe urolithiasis can be challenging for even a skilled urologist.
- 3D-printing technology may help trainees understand the anatomy, stone properties and PCNL procedures better.
- We have created a patient-specific renal model containing a 3D-printed human torso and human kidney and evaluated the feasibility and utility of this model as an educational tool.

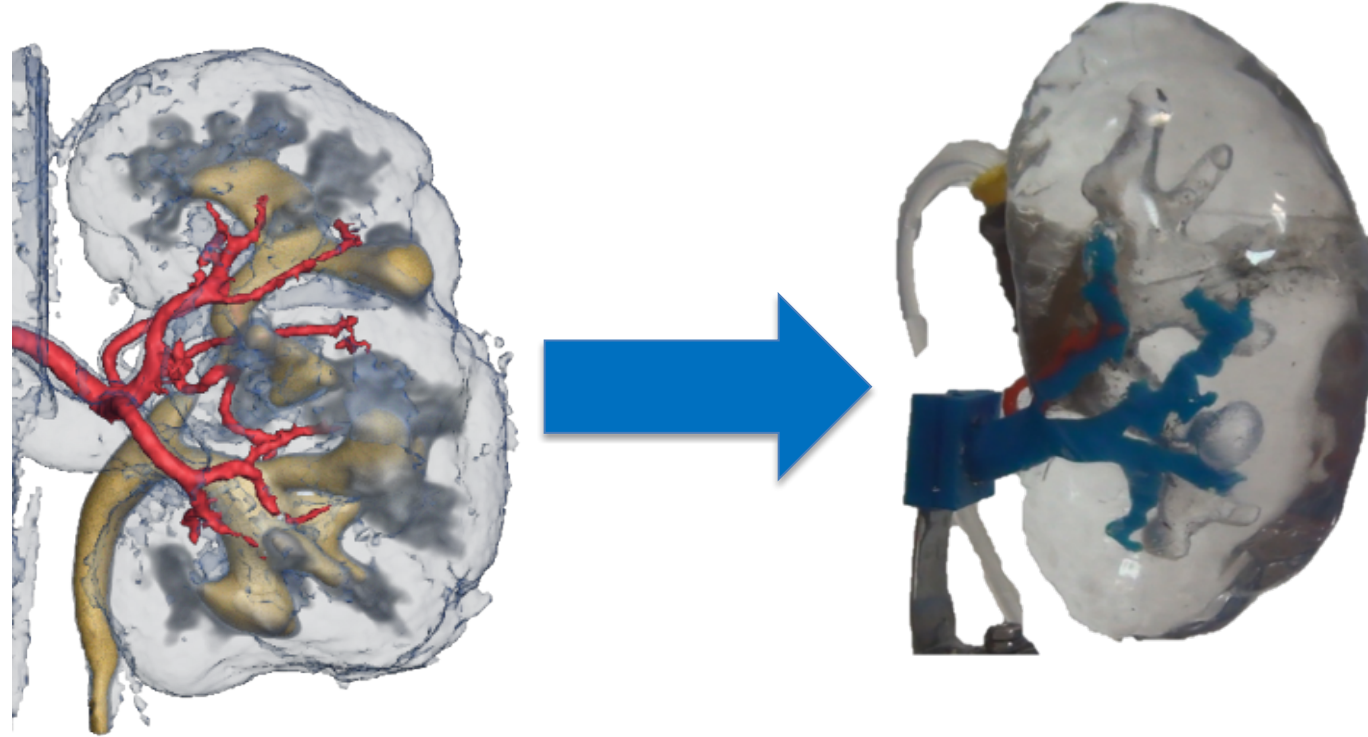
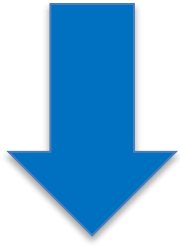
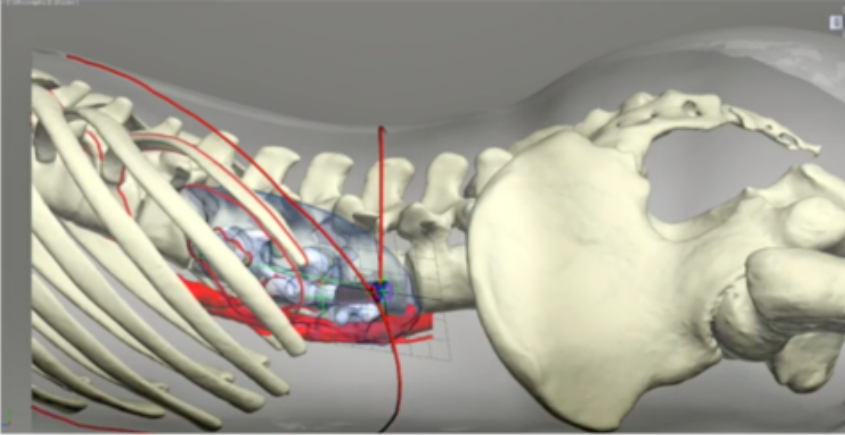


Methods I

- We used medical imaging software (Amira, Thermo Fisher Scientific, US) to convert 64 serial axial CT images into a 3D computer-aided design of calculi and kidney anatomy.



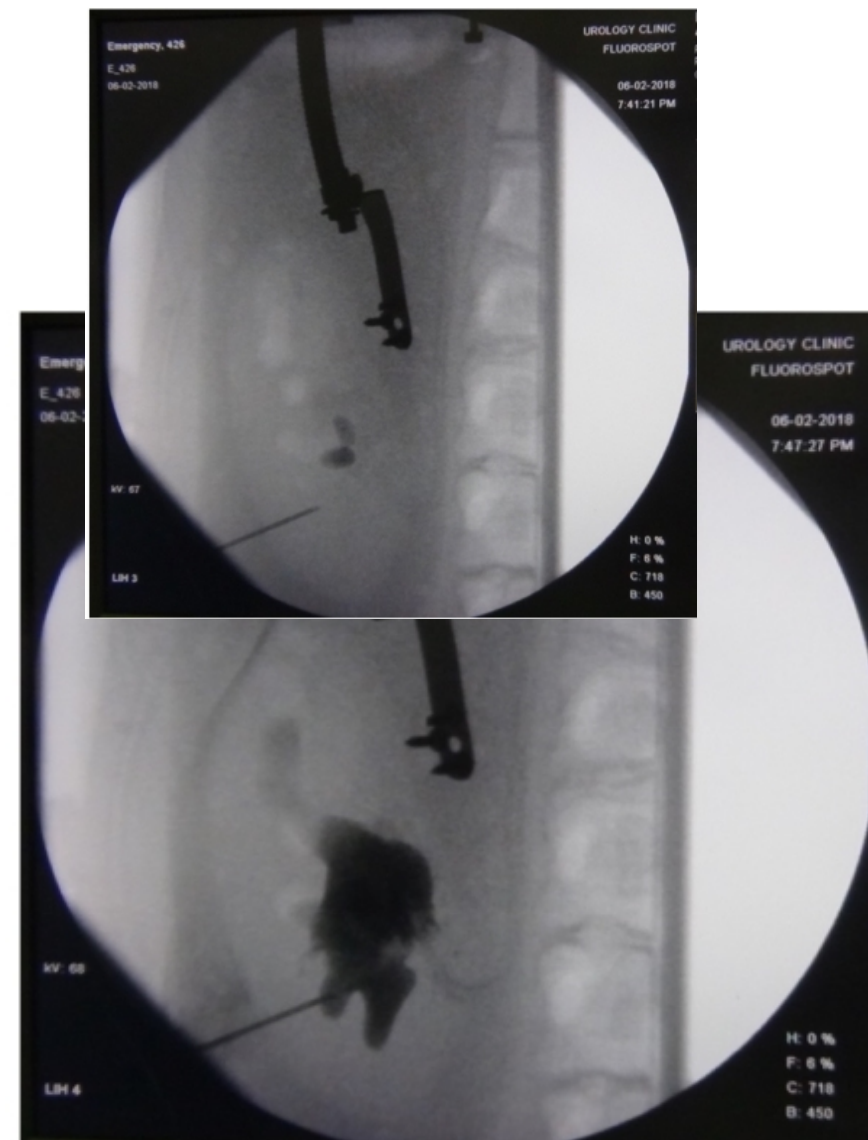
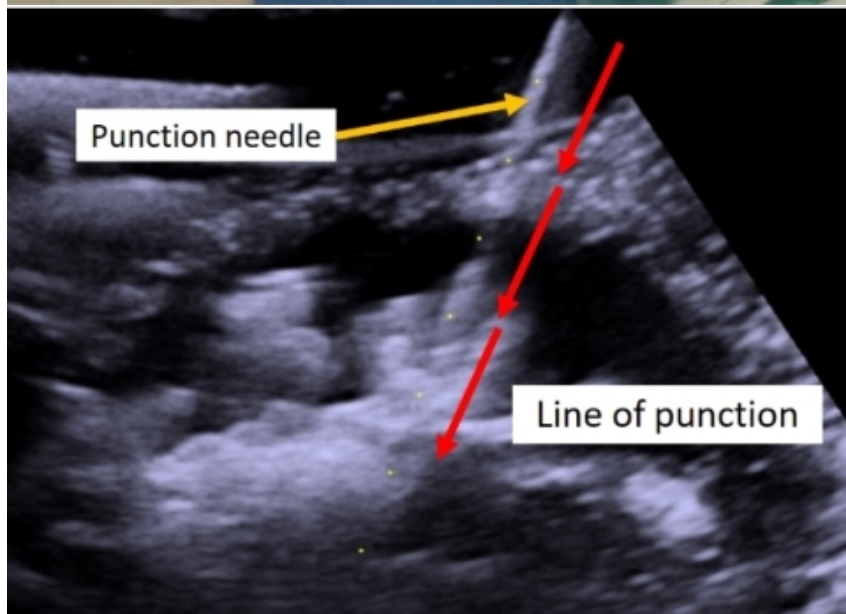
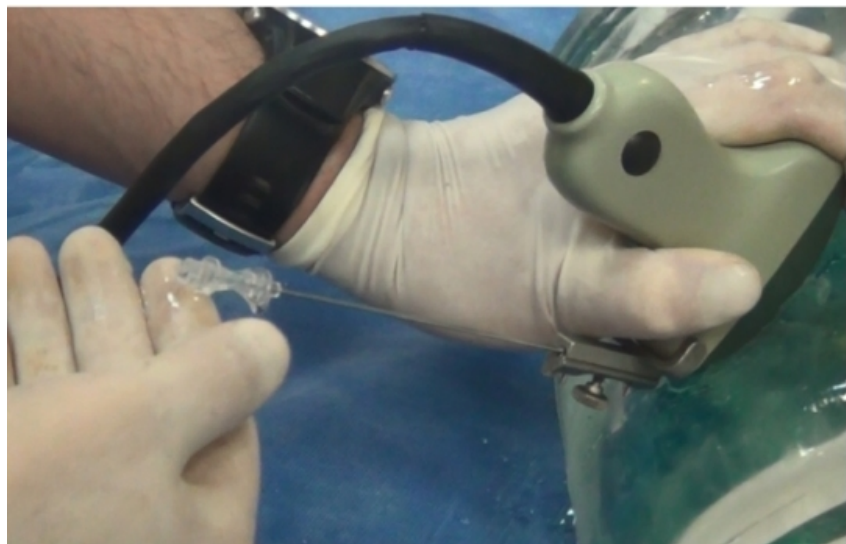
Methods II



- The data was first converted to computer-aided design (CAD) files, and two parts of the model were subsequently created with a 3D printer



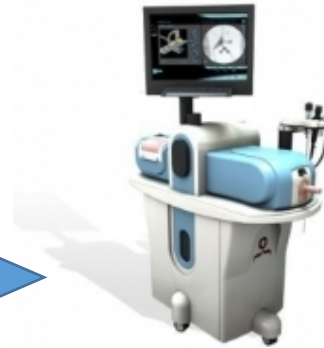
Methods III



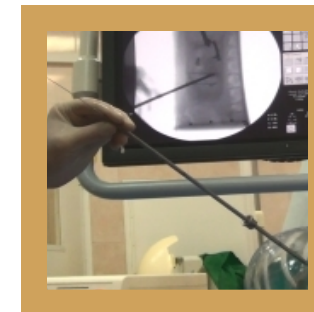
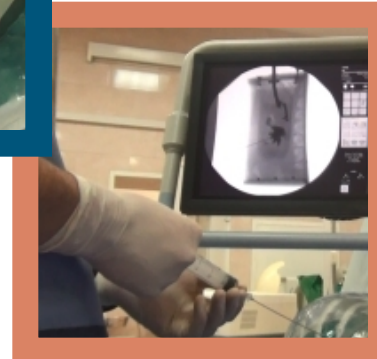


Methods IV

Group A, n=20



Group B, n=20





Results For X-ray training skills

Skills tested	Group A	Group B	p
X-ray guided puncture of the pelvicalyceal system	7.30	8.10	0.16
Guidewire placement	6.60	9.00	p<0.001
Identification of the correct calyx for a puncture	8.70	9.60	p<0.001
Distinguishing of the stone shape and its location	9.90	9.85	p<0.001
Nephrostomy tube placement	8.00	9.88	0.643
Kidney anatomy evaluation using X-ray imaging	8.60	9.85	p<0.001
Tissue model feed back	8.40	9.96	p<0.001
Post-training errors discussion	7.70	9.94	p<0.001
Total	65.20	76.18	p<0.001



Results For additional task

Skills tested	Group B
US-guided puncture of the pelvicalyceal system	8.9
Tract dilation	9.1
Lithotripsy Skill	9.6
Total	27.3



Conclusions

- We have successfully constructed patient-specific renal models containing renal pelvis calculi and human torso using conventional CT imaging and 3D-printing technology.
- Our first data correspond to the trend of employing 3D-printed models as useful educational and training tools for urology residents and fellows.



Thank you for your attention!