

# The "Pumping Probe Technique" - a simple method for the detection of fistulae

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**Introduction:** Ureteral fistulas may occur as complications of pelvic surgeries. The incidence of iatrogenic ureteral injuries during gynecologic surgery is 0.4% to 2.5%. The ureterovaginal fistula is most common ureteral fistula. In the past CT and X-Ray were the most helpful modalities to diagnose a fistula. The aim of the study is to introduce a novel ultrasonographic technique. "Pumping Probe Technique" (PPT) is an alternative method of detecting fistulas per ultrasound. In order to represent the ureter exactly, we use the "Kung Fu Technique" (KFT). The use of a new intramural complete sealing ureteric stent prevents leakage, covers the ureter tissue and helps the tissue to regenerate without further interventions. The stent is then removed atraumatically after tissue regeneration and wound healing is achieved.

**Materials and method:**

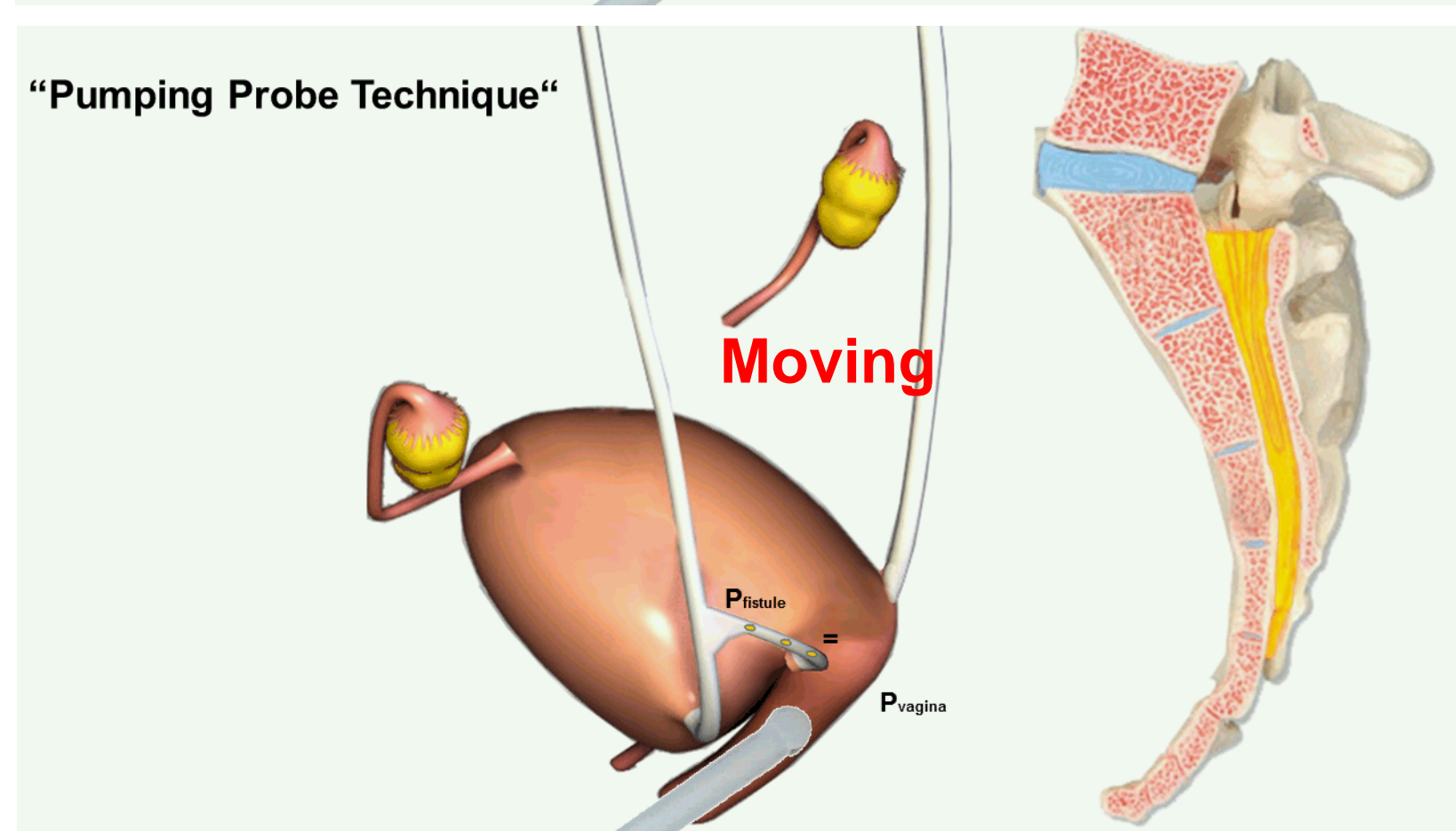
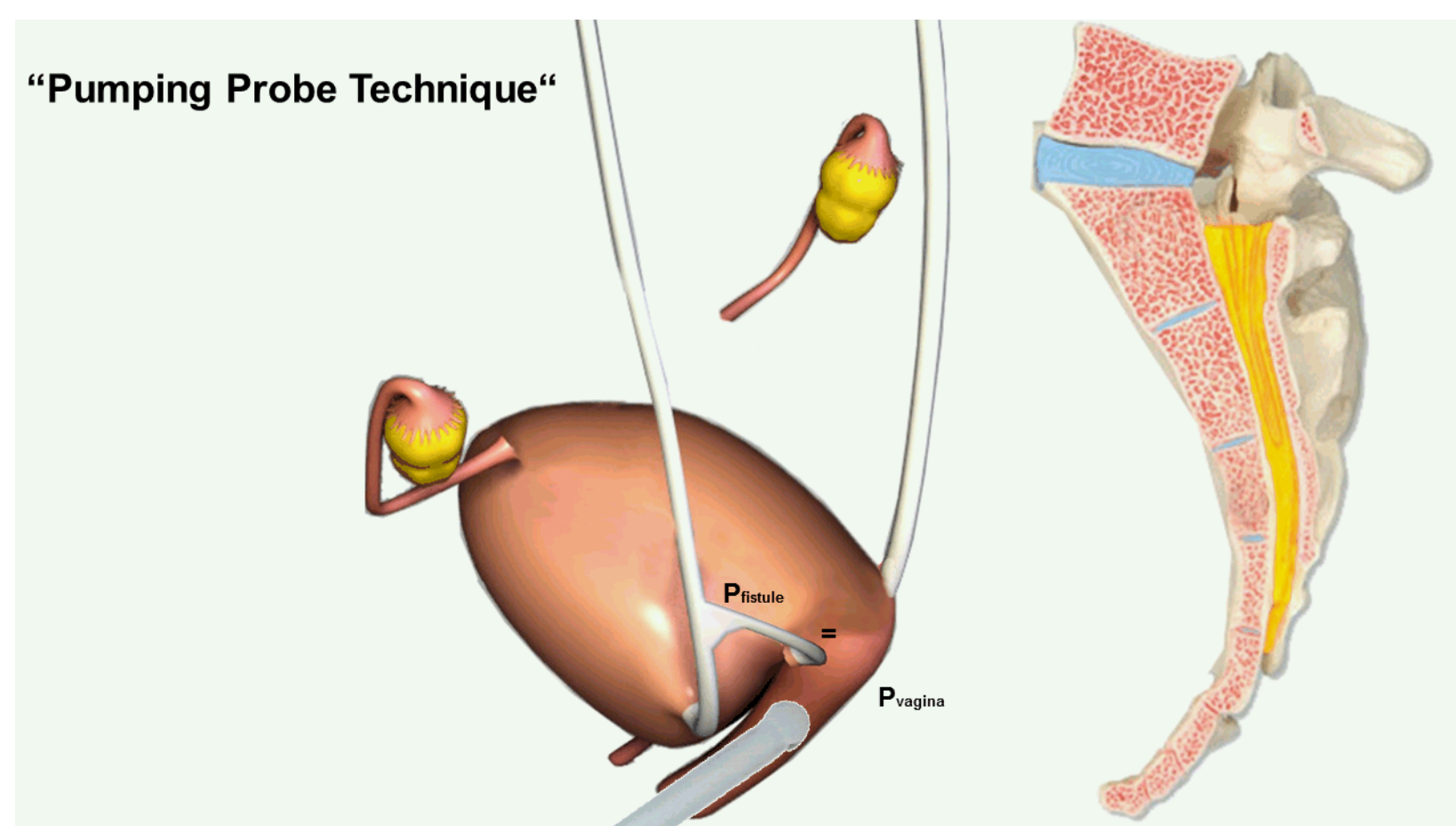
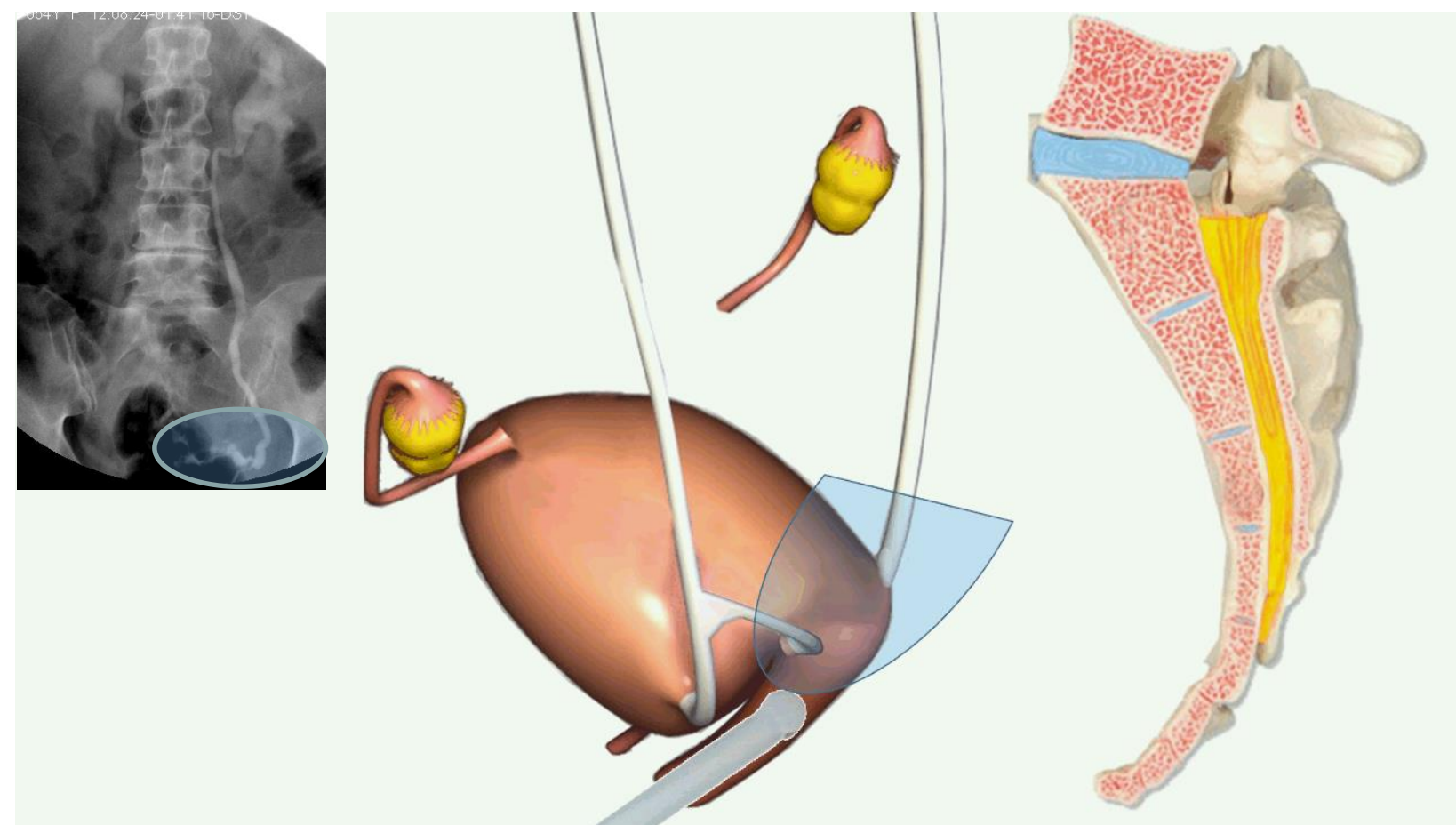
- 84 patients were diagnosed between June 2012 to February 2019
- Methods of diagnosis: US- PPT and KFT vs. X- RAY and CT using the new PPT in both endoluminal sonography and elastography to visualize ureteric fistulas.
- PPT involves the forward and backward movement of An ultrasound probe to generate higher air pressure in the fistula. This leads to a movement of the fluid within so that it can be detected by the US.
- The "Kung Fu Technique" (KFT) is used in order to represent the ureter accurately, simply and safely by the US. The right ureter is seen by a 45 degree turn to the outside of the entire probe in its distal total length of 6 cm. The left ureter is seen the same way but opposite rotation. The ureter to the arteria iliaca communis is visible transrectally in a length of 11cm. After a detailed presentation of the ureter, the pumping probe test was performed to visualize the fistula.
- After diagnosing fistula each patient was treated with the implantation of a 200x9 mm or 120x10 mm, 30Fr self-expanding covered polymeric stent (Allium (TM)) under radiological control.



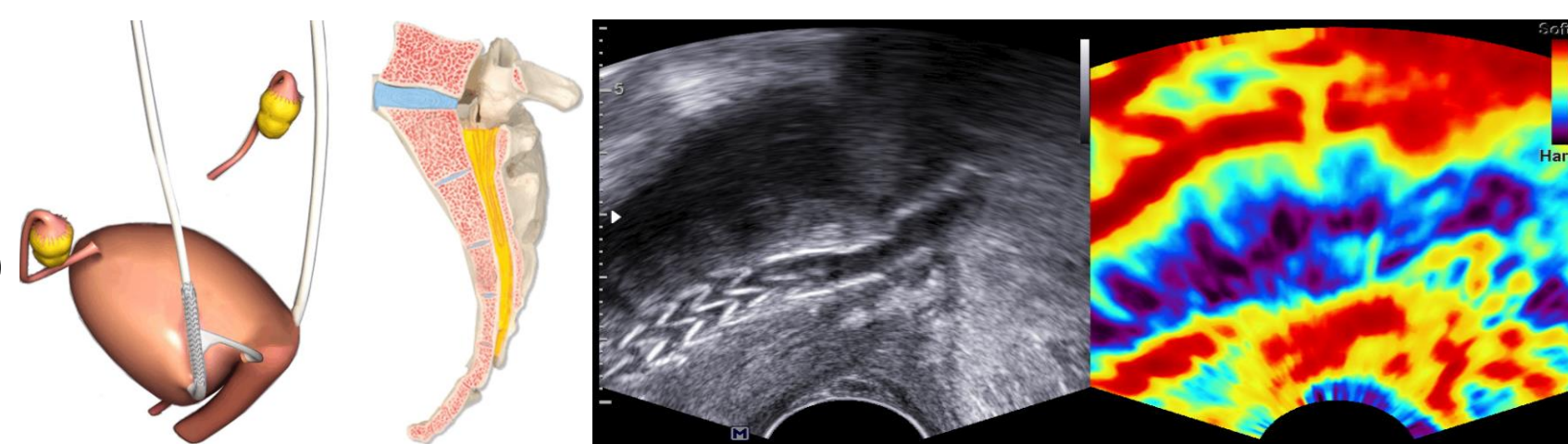
**Results:**

- A fistula was detected by elastography in 44/84 of the cases ultrasound 72 of 84 were diagnosed both imaging modalities were performed with PPT.
- Subtypes of fistulas: 45 ureterico-vaginal fistulae, 16 ureteric-douglas fistulae, 12 ureteric-enteric fistulae and 11 arterio-ureteric fistula
- In 76 / 84 cases the fistula was successfully closed after inserting an Allium stent as treatment
- Stent removing after 8-12 weeks
- No strictures were found.

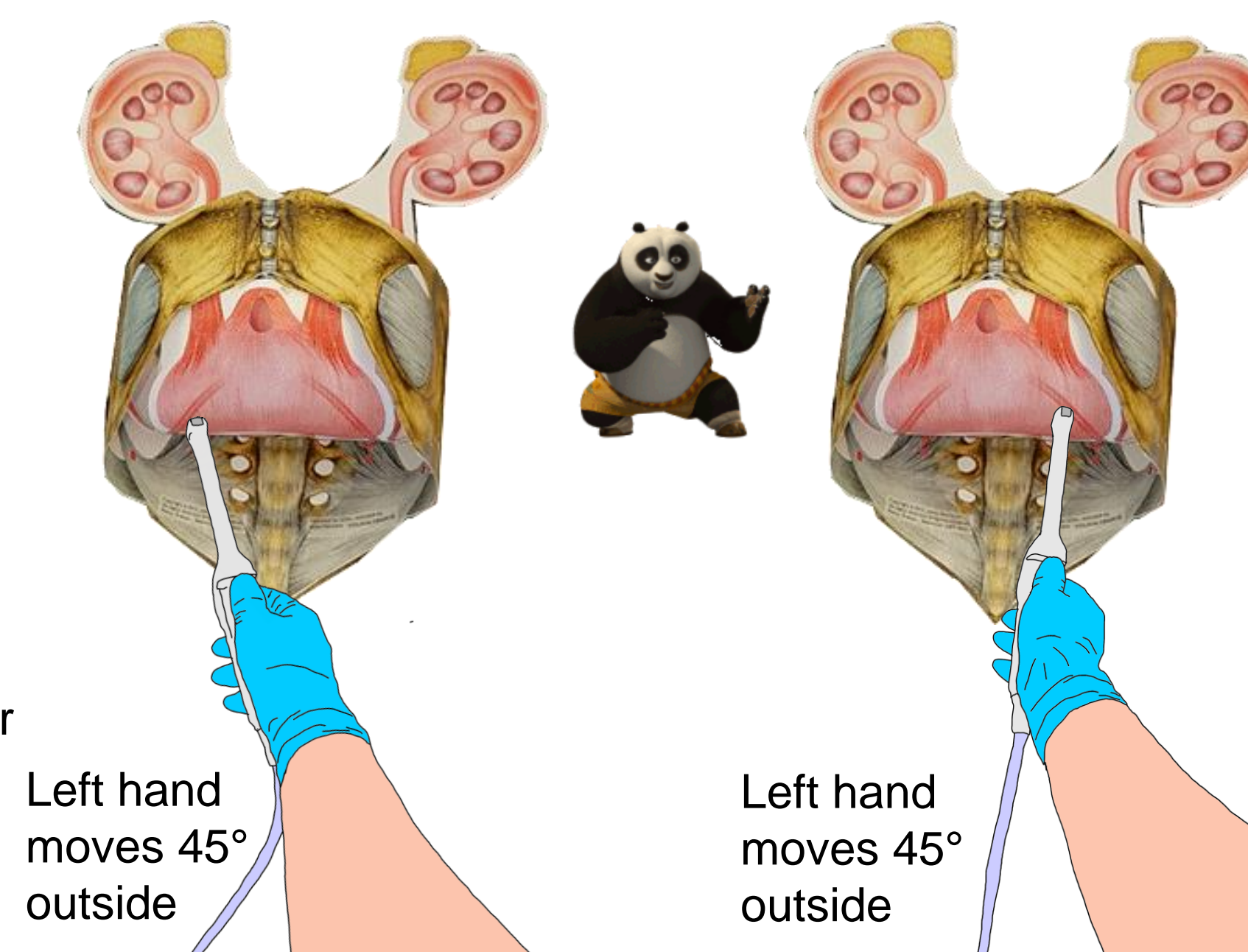
**Conclusions:** Endoluminal sonography and elastography using PPT detected approximately 91% of the fistula cases. The subsequent management of ureteric fistulae with stents can be performed gently, safely and quickly. The cure rate following tissue regeneration was high at 90.5%. However, long term studies have to be done to evaluate its superiority over other treatments.



Movement of the probe generated negative pressure in the sinus and the fistula was detected and visualized.



Allium Ureteric Stent: a metal self-expanding, large caliber stent which is made of nitinol and covered with a bio-compatible, biostable Elast-Eon polymer to make it a nonpermeable tube



Left hand moves 45° outside

Left hand moves 45° outside