Laparoscopic placement of peritoneal dialysis catheter
- technique and results of a novel method

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Peritoneal dialysis catheters according to Tenckhoff oder Opreopoulos-Zellermann are traditionally implanted by a trans-rectal laparotomy. Laparoscopy offers not only minimally-invasive catheter implantation, but also inspection of the peritoneal space with the option to correct intraperitoneal pathologies minimally invasively.

Patients
In 80 patients (39 female, 41 male, Alter 45-21 [5-63] years, BMI 26,5-5,1 [22,2-35,1]) 10 Tenckhoff catheters and 70 Opreopoulos-Zellermann-catheters were placed using the newly described method.

Method
After intubation narcosis, a 10 mm port is inserted after right transrectal mini-laparotomy, a pneumoperitoneum is created and a 12 mm suprapubic port is inserted under laparoscopic vision. Then, after left supraumbilical stab incision, the left rectal sheath is tunneled under laparoscopic vision with a newly developed pull-through instrument (Fig. 1). The peritoneum is then perforated with the instrument at the level of the arcuate line and the incutent is pushed intraperitoneally and then lead out of the abdomen through the suprapubic port (Fig. 2a-2e).

The detachable tip of the instrument is screwed off and the oral end of the peritoneal catheter is connected with the instrument (Fig 1a, 1c+2d). Now, the pull-through instrument with the connected catheter are pulled into the peritoneum (Fig. 2e-g), and the oral part of the catheter is then pulled retrogradely through the rectal sheath tunnel out of the abdomen.

Results
There were no intraoperative complications. The average procedure time was 25±12 [15-45] minutes. Adhesiolysis was performed in 12 cases, a Spiegellian hernia was corrected in one case. Indirect hernias were closed by simple sutures of the inner inguinal ring in 5 cases.

Postoperatively, 2 catheter leakages and 1 epigastric vessel bleeding were noticed, both being treated conservatively. There were no more leakages, after introducing the measure to apply the first dialysis not before 5 days after catheter implantation.

15 catheters were explanted after successful renal transplantation. Catheter infections or exit site infections lead to catheter explantations in 5 patients.

All catheters are working free of complications with a cumulative usage time of 1277 [15,9±13,2 [1-67]] months.

Discussion
A safe and reliable access to the peritoneal space is mandatory and of specific significance for peritoneal dialysis patients. In many patients under chronic ambulatory peritoneal dialysis (CAPD), this access has to be used for many years.

Our newly developed method with the pull-through-tool allows safe and quick placement of any type of peritoneal catheter, which is the major difference to other methods of laparoscopic peritoneal catheter placement.

The low rates of leakage, exit site- and tunnelinfections are due to the long cranked tunnel through the rectal sheath with no contact of the catheter to the skin during implantation.

Another very significant advantage is the gain in diagnostic information on intraabdominal pathologies with potential minimally invasive therapy.

Conclusion:
This newly developed method of minimally invasive peritoneal dialysis implantation catheters allows quick and safe intraperitoneal placement of any type of PD-catheter with the additional option to recognize and correct intraperitoneal pathologies. Functional results are excellent.