COMMENTARY

DEVELOPMENT OF SURGICAL GUIDELINES FOR LAPAROSCOPIC PERITONEAL DIALYSIS ACCESS: DOWN A LONG AND WINDING ROAD

While surgical laparoscopy has been utilized to create peritoneal access since the early 1990s, it has only recently gained momentum as a catheter insertion technique. The percentage of catheters implanted laparoscopically in the USA has doubled, from 26% in 2007 to 52% in 2013, accounting for more than twice the proportion of any other insertion method (1). With this dramatic change in surgical practice, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recently undertook the task of formulating guidelines for laparoscopic peritoneal dialysis (PD) access surgery (2). Since the laparoscopic procedure for catheter insertion is still evolving, with almost as many versions of the technique as there are surgeons performing it, SAGES is to be commended for their effort to bring order and guiding principles to this method.

Perhaps out of necessity, given that this was a first endeavor to establish laparoscopic-specific guidelines for peritoneal-access surgery, a considerable portion of the SAGES document was devoted to summarizing non-laparoscopic techniques in an attempt to provide contrast and perspective. The downside of this approach was the creation of a cumbersome treatise of burdensome length that often obscured the relevant aspects of laparoscopy and impeded its handiness as a reference guide. On the encouraging side, these guidelines provide evidence that a major surgical society, representing a specialty that has long been perceived as aloof to the importance of providing optimal peritoneal access, has finally become engaged.

The essential point that should be taken from the guidelines is that when the laparoscope is used only to witness the position of the catheter tip, the outcomes are no different than any other catheter insertion method (3–7). Using the laparoscope simply to locate the catheter is an underutilization of this modality and should be viewed as substandard practice. The advantages of laparoscopy over every other technique are the adjunctive procedures enabled by this method, principally rectus sheath tunneling, omentopexy, adhesiolysis, epiploectomy, salpingectomy, and colopexy (8–11). When these techniques are applied effectively, the laparoscopic approach can both prevent and resolve most of the common mechanical problems that complicate insertion of PD catheters.

As is appropriate when developing guidelines, the SAGES authors detailed their literature search strategy and methodology to grade the evidence. The misstep, however, was in not first framing the relevant questions for their systematic review and guidelines, choosing the significant outcomes, and deciding on their relative importance (12). The consequence of this omission was a frequent replication of outcomes according to different management strategies instead of a comparison of alternative management strategies to develop a guideline for a particular outcome. At other times, outcomes were mischaracterized, leading to guideline recommendations that were well off the beaten path of best practices, ending up astray down a long and winding road. The SAGES committee will need to find their way back to the International Society for Peritoneal Dialysis (ISPD) best practices for optimal peritoneal access—longstanding practices that remain valid irrespective of the catheter insertion method (13,14). The most obvious of SAGES's departures from recognized best practices require further comment, some being unrelated to laparoscopy *per se*. The following commentary represents an expansion of an editorial by the author previously published at the invitation of the SAGES Guidelines Committee (15).

SAGES concluded that the value of bowel preparation prior to the catheter insertion procedure has not been demonstrated. This assumption stems from the skepticism that the surgical community currently holds for mechanical bowel preps. Clinical trials reveal that mechanical bowel prep prior to colorectal surgery does not lower the complication rate; however, SAGES has mistakenly extrapolated this evidence to peritoneal access surgery. While mechanical bowel prep for colorectal surgery was aimed at lessening the risk of anastomotic leak, infection, and mortality, peritoneal access surgery is concerned with avoiding catheter flow complications from extrinsic compression of catheter side drainage holes or displacement of the catheter tip to a position of poor drainage function by distended fecal-filled bowels. Constipation is a common problem among chronic kidney disease patients. Postoperative narcotic analgesic requirements further aggravate this underlying propensity for constipation. Any experienced PD practitioner will affirm that constipation is the most common reason for post-procedure catheter

flow dysfunction, having been noted in 68% of patients with constipation at first dialysis, compared with only 13% in patients without constipation (16). Moreover, the necessity for acute treatment of postoperative constipation may lead to transmural migration of bacteria, resulting in peritonitis (17). Therefore, bowel preparation and avoidance of constipation are of paramount importance to reduce the risk of injury during percutaneous catheter placement, prevent postoperative catheter flow dysfunction, and minimize the occurrence of peritonitis (13,14,17).

Contrary to SAGES's guideline statement, pain during PD is not rare, especially drain pain. Clinically significant drain pain has a reported incidence of 13 to 25% of patients (18,19). Drain pain occurs when visceral structures siphon up to the catheter tip and impact it against the exquisitely sensitive parietal peritoneum. The phenomenon occurs more frequently with cycler PD where hydraulic suction rather than gravity is used to drain the dialysate. Drain pain is more likely to occur when the catheter tip is implanted too low in the pelvis, wedging it between the rectum and uterus or rectum and bladder, leaving it susceptible to early termination of dialysate outflow and abrupt contact of the catheter tip with the peritoneum. A common cause of the catheter being implanted too deep in the pelvis is when the operator uses a single catheter type for all patients, inserting it at a fixed site relative to the umbilicus without consideration of catheter dimensions or patient body habitus. This is why ISPD guidelines state that the umbilicus should not be used as a reference mark for catheter insertion (13). Pain from excessively low placement of the catheter tip in the pelvis that is not improved by tidal PD or by conversion to non-cycler PD using gravity-only drainage may lead to catheter removal, often with the patient abandoning PD altogether. There is no satisfactory surgical salvage procedure short of replacement for a catheter implanted too deep in the pelvis. Prevention of the problem can be achieved by employing methodology during preoperative planning to select the most appropriate catheter type and using the catheter itself to determine the insertion site that produces optimal pelvic position of the catheter tip (20).

Knowing that most surgeons begin their laparoscopic experience with midline periumbilical insertion of the Veress needle and laparoscope, SAGES has soft-peddled the importance of avoiding the midline in PD patients, leaving it to the discretion of the operator. However, periumbilical midline port sites are prone to develop hernias and leaks in PD patients due to the elevated intraperitoneal hydrostatic pressure associated with dialysis solution. Port site hernias in PD patients have a reported incidence of 3 to 9% (21–24). Furthermore, the conventional periumbilical region for laparoscope placement is too close to the catheter insertion site to be practical. This close proximity results in port conflict, poor visibility, and frustration with the procedure. For optimal visualization and ergonomic use of laparoscopic instruments, the laparoscope and accessory ports should be placed off of the midline and at a sufficient distance from the catheter insertion site. There is no legitimate reason not to adhere to the ISPD recommendations

that all peritoneal entry points should be lateral to minimize the risk of herniation and fluid leaks (13).

Omental entrapment with flow obstruction of the PD catheter is a common adverse outcome. In developing a guideline, SAGES should have compared alternative management strategies to prevent this complication instead of duplicating the listing of outcomes according to management approaches. Techniques for avoiding omental wraps include partial omentectomy by teasing the omentum out of the catheter insertion incision, laparoscopic omentectomy, and laparoscopic omentopexy. A guideline recommendation must be based on the effectiveness of the employed technique, the potential harm created by the procedure, and the cost of the intervention (25). If these factors are properly considered, it becomes apparent that omentopexy should be the recommended management strategy from the standpoint of its efficacy, simplicity, avoidance of the postoperative risk of hemorrhage, and reduced operative time and cost (26). Omentopexy is employed selectively since it may be unnecessary when the omentum is short or adherent to previous upper abdominal surgical sites (27). There is no reason that omentopexy cannot be performed in the pediatric population; it just does not appear to have been tried, yet. An additional argument supporting preservation of the omentum by using omentopexy as opposed to its resection is that omental milky spots (clusters of leukocytes) appear to have a role in the peritoneal cavity immune response, especially in the pediatric population (28).

Another instance in which SAGES should have considered comparing alternative management strategies to address a specific outcome is with the development of a guidelines recommendation for prevention of catheter tip migration. Laparoscopic strategies to prevent catheter tip migration include rectus sheath tunneling of the catheter, lower abdominal suture sling around the catheter, and suturing the catheter tip to a pelvic structure. Again, the guidelines recommendation should be based on effectiveness of the technique, the potential for harm to the patient, and resource utilization. Rectus sheath tunneling effectively keeps the catheter oriented toward the pelvis, eliminates pericatheter hernias, and reduces the risk of pericatheter leaks (8–10). Other than the laparoscope port, it does not require additional working ports, and it obviates the need for a suture sling or stitching the catheter tip to a pelvic structure. These latter maneuvers require extra ports and/or transabdominal puncture wounds, take more time to perform, and do nothing to reduce the incidence of pericatheter hernia or leak. In the case of suturing the catheter tip to a pelvic structure, 6 to 9% of these sutures erode from the tissues during the short term, resulting in an unacceptable incidence of catheter tip migration (21,29). On occasion, it has been reported that the anchoring suture held and required a laparoscopic procedure to cut the stitch to permit catheter removal (30).

An inordinate portion of the SAGES document is devoted to a meandering discussion of non-surgical management of various complications, detracting from what should be the real focus, that is, laparoscopic rescue and salvage procedures for

TABLE 1
Laparoscopic-Specific Guidelines for
Peritoneal Catheter Implantation

No midline abdominal entry points for laparoscopic ports
Immobilize catheter toward pelvis by rectus sheath tunneling (no pelvic anchoring stitches)
Omentopexy performed for redundant omentum
Adhesiolysis performed to enable catheter placement and/or to eliminate recognized intraperitoneal compartmentalization that can impede dialysate drainage
Laparoscopic port wound is not used as a catheter skin exit site
Irrigation test completed before removal of laparoscopic ports in case additional interventions required
Suture closure of all laparoscopic port sites regardless of port size if acute or urgent dialysis is anticipated

mechanical and infectious catheter problems. After constipation, tubing kinks, and intraluminal fibrin clots have been excluded as a cause for catheter flow dysfunction, appropriate assessment of alternative management strategies would support a guidelines recommendation of laparoscopic exploration as the next step in the management sequence (31). Radiologic guidewire manipulation has been disappointing, requiring multiple sessions with low success rates, being difficult or impossible to perform with swan neck or presternal catheters, and not permitting diagnosis or treatment of the principal causes. Laparoscopy allows identification of the underlying problem and applicable treatment through the use of procedures such as omentopexy, adhesiolysis, epiploectomy, salpingectomy, colopexy, and catheter redirection with suture-sling immobilization. The SAGES guidelines failed to even mention the indications and laparoscopic technical considerations for simultaneous catheter replacement for peritonitis and exit-site/tunnel infections.

It is important for SAGES to acknowledge that surgeons are frequently faced with operating room access issues that prevent a timely response to requests for providing peritoneal access. With emphasis on acute and urgent PD starts, it has become clear that the line to the radiology suite is often shorter than the line to the operating room. In response to the need for timely placement of PD catheters, interventional radiology has played a more prominent role as access provider in the United States, now placing approximately 22% of catheters (1). Nonetheless, interventionalists, whether radiologists or nephrologists, require surgical backup for complications that cannot be remedied by non-laparoscopic methods. It is highly beneficial to patients for SAGES to promote a culture where surgeons and interventionalists work collaboratively to develop common pathways and techniques to provide timely peritoneal access and to resolve PD complications.

Absent in the SAGES document is a recommendation for periodic audits of PD catheter outcomes by the entire PD team,

including access providers. There is high grade evidence that audit improves practice (32). When it comes time to update the guidelines, SAGES will want to suggest laparoscopic-specific audit standards for catheter-related complications.

Finally, it should be stressed that there is nothing about laparoscopic PD access surgery that transcends the validity of any of the previously established ISPD guidelines for optimal peritoneal access. Table 1 summarizes best practices that should be considered in addition to existing ISPD guidelines that are specific for laparoscopy (33).

DISCLOSURE

JHC has served as a consultant for MedComp, Inc., and Baxter Healthcare and as a member of the speakers' bureau for Baxter Home Therapies Institute, DaVita Healthcare Partners, and Fresenius Medical Care Advanced Renal Education Program.

John H. Crabtree

Society for Education and Research in
Peritoneal Access Surgery
Walnut, California
Visiting Clinical Faculty
Division of Nephrology and Hypertension
Harbor-University of California Los Angeles Medical Center
Torrance, California, USA

email: johncrabtree@sbcglobal.net

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