

# Various Laparoscopic Techniques in Pelvic Organ Prolapse Surgery

Antonette Ramos Pesebre\*, Masayoshi Nomura, Divina Yumul Soliza, Purim Ruanphoo, Moeko Kuriyama, Tomoka Obuchi, Mika Nagae, Shino Tokiwa, Kojiro Nishio, Tokumasa Hayashi

Urogynecology Center, Kameda Medical Center, Chiba, Japan

## Abstract

In the past, transvaginal surgery, native tissue restoration, or obliterative methods have been used in the majority of pelvic organ prolapse (POP) surgeries. Since laparoscopy has gained popularity, other procedures have been created to provide additional POP repair alternatives. Laparoscopic technique offers many advantages compared to open or transvaginal surgery when it comes to anatomical and surgical outcomes, recurrence rates, and patient's acceptance. Furthermore, we encouraged incorporating different laparoscopic techniques into urogynecology training to attract young gynecologists. Based on our own clinical and surgical experience, we present various laparoscopic techniques for treating POP. We think that by giving patients a variety of surgical alternatives, we can treat them all more effectively.

**Keywords:** Laparoscopic sacrocolpopexy, pelvic organ prolapse, transvaginal mesh surgery

## INTRODUCTION

Pelvic organ prolapse (POP) is a condition wherein one or more pelvic organ bulges or protrudes into the vagina and is influenced by multiple causes. Most cases have clinical evidence of downward displacement of pelvic organs such as uterus and/or the different vaginal compartments or adjacent organs such as the bladder, rectum, or bowel.<sup>[1]</sup>

Management of POP greatly depends on its severity and the impact of symptoms to the patient's quality of life. Treatment options can be nonsurgical (vaginal pessaries and pelvic muscle floor training) or surgical which includes obliterative or reconstructive procedures. Surgery is performed in cases of failed conservative management or if it is the patient's choice. In previous years, most POP surgeries are performed through native tissue repair (NTR), obliterative procedures (e.g., colpocleisis), or transvaginal mesh surgery. NTR is a technique when only pelvic organ support tissues are used and "augmented repair" when some

other material (prosthesis or graft) is used to reinforce the defective support system.<sup>[2]</sup> However, there had been reports that NTR has a higher risk of prolapse recurrence, repeated surgeries, and less favorable anatomical success compared to sacrocolpopexy (SCP), and the only advantage was a shorter operating time compared to SCP.<sup>[3]</sup> Colpocleisis is an effective surgical treatment for POP in elderly women who do not wish to preserve the vagina for sexual function, and overall patient satisfaction is nearly >90%. Transvaginal mesh surgery, on the other hand, uses surgical mesh that reinforces the weakened pelvic support tissues. However, on April 16, 2019, the Food and Drug Administration ordered mesh manufacturers to stop selling the devices for transvaginal repair of POP because of several reports associated with surgical mesh complications including mesh erosion, infection, pain, urinary problems, and recurrence of prolapse and/or incontinence. Because of this, traditional vaginal procedures are being gradually

**Address for correspondence:** Dr. Antonette Ramos Pesebre, 7105 P, Burgos St, La Huerta Paranaque City, 1700, Metro Manila, Philippines.

E-mail: tonsesebre.md924@gmail.com

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replaced by laparoscopic techniques, offering anticipated benefits in reduced recurrence and complication rates.

## RESULTS

At our center, we have performed TVM surgery and NTR for POP for the past 13 years. However, in 2013, we started using laparoscopy, and since then, more and more patients choose to undergo laparoscopic method than the conventional repair. In April 2022, we started doing robotics as another option, and at present, almost 80% of POP repairs are performed by laparoscopic or robotic surgery in our institution.

During the past years, laparoscopy was uncommon because it faced many challenges, including the level of difficulty performing the procedure, mesh issues, and equipment availability. However, laparoscopy is now a common treatment for POP because more hospitals are purchasing laparoscopic tools, and more surgeons have shown interest in the procedure and training. In spite of the controversy on the use of mesh during transvaginal procedures, more surgeons are beginning to favor laparoscopy as a more effective method of treating POP.

We think that one way to address the issues of traditional POP repair surgeries is by using laparoscopy, which offers many advantages over the traditional surgical treatment for POP repair. Laparoscopic technique is necessary for urogynecology because it offers better vision, less pain, faster recovery, less recurrence, less impact on sexual intercourse, and better patient's acceptance compared to transvaginal or open surgeries. In laparoscopic POP surgery, mesh fixation site (promontory or iliopectineal ligament), approach method (abdominal or vaginal), and instruments used (conventional laparoscopy or robotic) are various. Therefore, using laparoscopy, other approaches to POP surgeries are made possible. Another importance of laparoscopy is that it has become suitable for education. We advise the urogynecologists to actively incorporate laparoscopic techniques into the training to make the said field more attractive to young gynecologists.

## DISCUSSION

Here, we present various laparoscopic techniques to treat POP based on our surgical experience:

First is laparoscopic sacrocolpopexy (LSC) – most doctors think that LSC is the same as laparoscopy in general, maybe because LSC is the most evaluated and most famous procedure for laparoscopic POP surgery. However, there are also various laparoscopic techniques that had been developed, and nowadays, a large number of laparoscopic procedures are possible. Laparoscopic subtotal hysterectomy with LSC requires fixation of the apex to the sacral promontory (L5-S1)

with the use of mesh. This is applicable to those patients who still wish to preserve part of their uterus or those without uterine pathology. Its advantage offers the most superior and probably the strongest support for apical suspension and has the highest anatomical and subjective success rates. In 2021, we reported the surgical outcomes of LSC in our hospital ( $n = 2180$ ), the anatomical success rate of LSC was 96.9%, the subjective success rate was 94.1%, and the re-operation rate for recurrence or complications was only 0.6%.<sup>[4]</sup> However, the technique also has its disadvantages and has been limited to some surgeons as it requires extensive dissection and advanced suturing skills and has longer hours of operation. Promontory fixation is a challenging step as most of the large vessels are present in the area and anatomical landmarks vary from one patient to another that even minute error during dissection can lead to serious bleeding. Kotani *et al.* has presented measures for safe LSC procedure by performing preoperative computed tomography scan and perioperative ultrasound of the promontory to prevent separation of a wide presacral area.<sup>[5]</sup>

Second, laparoscopic lateral suspension (LLS) – in which mesh arms are fixed to the abdominal wall, is useful as an alternative to difficult cases of promontory fixation with favorable clinical outcomes. Reports have shown that in 417 patients, 78.4% of patients were asymptomatic after 1 year and anatomic success rates were 91.6%, 93.6%, and 85.3% for the anterior, apical, and posterior compartments, respectively.<sup>[6]</sup> In 2019, we performed LSC converted to LLS successfully due to difficulty in mesh fixation at the appropriate position due to weakness of the anterior longitudinal ligament of the sacrum. Both LSC and LLS ensure a high satisfaction rate and effectiveness postoperatively; however, it is still unknown which method is more superior because no comparative study has been reported yet.<sup>[7]</sup>

Third is laparoscopic pectopexy – which requires fixation of the mesh arm into the iliopectineal ligament. Same with LLS, this is a better alternative to avoid promontory fixation. The mesh follows natural structures (round and broad ligaments) without crossing sensitive areas, such as the ureter or bowel. This technique helps reduce the complications of the sacrocolpopexy, operation time, and learning curve. It is also a great alternative surgery for recurrent POP or failed NTR or mesh POP surgery.<sup>[8]</sup> Pectopexy, just like LSC, is an effective surgical option for apical prolapse patients. In a prospective randomized study in 62 patients, surgical outcomes in terms of POP-Q, P-QOL, and FSFI scores following LSC and pectopexy were compared, and results have shown almost similar improved scores. Both procedures had similar post-operative complications except for constipation after surgery. The constipation rate in the pectopexy group (3.2%) was significantly lower than the LSC

group (20%). This is because during pectopexy, the technique requires less complex dissection and does not reduce pelvic space resulting in a favorable advantage and almost absent defecation disorders postoperatively.<sup>[9]</sup>

Fourth, laparoscopic sacrospinous ligament fixation (LSSLF) with mesh or laparoscopic Uphold. Just like the laparoscopic SSLF without mesh fixation, the surgical approach exposes the sacrospinous ligament by dissecting the retropubic space and the pelvic sidewall space bilaterally. However, this approach requires extensive stripping and is associated with high risk of bleeding and prolonged duration of surgery.<sup>[10]</sup> Although LSSLF with mesh fixation is not well established, we still perform this procedure in our center whenever it is indicated. It mimics the same procedure as in laparoscopy, and we use the same mesh kit in TVM surgery and fix the arm to the sacrospinous ligament with a metal tucker. The only drawback in this method is the difficulty in exposing the sacrospinous ligament.

Fifth, laparoscopic NTR (LNTR) — which includes laparoscopic uterosacral ligament fixation or round ligament fixation, obviously uses native tissue only rather than mesh for fixation. Medium-term outcomes of laparoscopic vaginal stump-round ligament fixation (Kakinuma method) were reported recently in Japan wherein operative time, bleeding amount, and recurrence rate were compared to the conventional NTR.<sup>[11]</sup> It was indeed comparable and was proven safe and effective similar to conventional NTR; however, as compared to LSC or other mesh techniques, we believe that LNTR offers less tensile strength and the gravity of the suspension may not be good enough making it more prone to possible recurrence.

Sixth is LSC with laparoscopic ventral rectopexy (LSC + LVR) — this method fixes the anterior wall of the lower rectum to the sacral promontory with a mesh and is indicated for patients with concomitant rectal prolapse or severe POP. LVR can also be performed with pelvic autonomic nerve-sparing surgery, as introduced by D'Hoore *et al.* in 2004.<sup>[12]</sup> This has resulted in a lower postoperative constipation rate when compared to posterior rectopexy and has a good outcome for rectal intussusception. As with LSC, the widespread use of laparoscopic surgery has made laparoscopic rectopexy the standard for the treatment for external rectal prolapse (ERP). A similar study was done by Kiyasu *et al.* wherein seven patients underwent LSC + LVR and results have shown that not only anatomical abnormalities of pelvic organs but also functional defecation disorders were improved postsurgery. They have concluded that combined LVR and LSC is feasible for patients with coexisting POP and ERP.<sup>[13]</sup>

Seventh, the introduction of vaginal natural orifice transluminal endoscopic surgery, popularly known as

vNOTES has gained its popularity recently. As recommended by the American College of Obstetricians and Gynecologists and the American Association of Gynecologic Laparoscopists, vaginal hysterectomy is the recommended approach for POP whenever indicated and feasible. However, the rate of vaginal hysterectomies has steadily declined despite the recommendations because of common challenges such as lack of visibility and reduced access to the anatomy. This has led to the development of new and advanced access platforms that enable entry inside the peritoneal cavity through the vagina, effectively combining the benefits of both laparoscopic techniques and vaginal surgery.<sup>[14]</sup>

And finally, robotic-assisted laparoscopic procedures — similar techniques employed as mentioned above but with the use of robot. There is no clear advantage whether robot is better than conventional laparoscopy because of lack of studies supporting this. However, since we started doing robot-assisted laparoscopy for POP repair, especially in selected patients, particularly those with vault prolapse and severe adhesions, it is certainly useful. No intraoperative organ injuries have been documented in our 111 robotic sacrocolpopexy (RSC) procedures to date. Therefore, RSC offers the following advantages over LSC: Clear vision, firm traction and countertraction, precise monopolar technique, absence of tremor, and higher degrees of freedom in motion — which makes RSC most likely safer than LSC.

In conclusion, are the above-mentioned surgical procedures really necessary for POP repair? Our answer is YES. When treating POP patients, it should always be kept in mind that each patient has a different degree of POP as well as differences in age, general health, medical history, and personal preferences. Therefore, not all prolapse patients can benefit from the same surgical technique. Because of the diversity of POP, a single procedure cannot satisfy all POP patients. Laparoscopic techniques allow them to choose from different options. Furthermore, we want to emphasize that by using laparoscopy as a urogynecologic procedure, gynecologists and urogynecologists can improve treatment options and provide the best possible care for each patient. Finally, we think that once laparoscopy is widely accepted, what starts here in urogynecology can also revolutionize the entire Obstetrics and Gynecology field, women's health, and ultimately, the vitality of every country.

### Author contributions

Concept, design, definition of intellectual content: Masayoshi Nomura, Antonette Pesebre; Literature search, data acquisition: Divina Soliza, Antonette Pesebre; Manuscript preparation, manuscript writing and editing: Antonette Pesebre; All authors read and approved the final manuscript.

### Data availability statement

Data sharing is not relevant to this article as no datasets were generated or analyzed during the current study.

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### Conflicts of interest

There are no conflicts of interest.

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