International Journal of Surgery 43 (2017) 131–136

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original Research

A new laparoscopic technique of inguinal ligament suspension for vaginal vault prolapse

Zhiyuan Dai [a, *, 1], Chunbo Li [a, 1], Xipeng Wang [a], Huimin Shu [a], Kai Zhang [b], Chenyun Dai [c]

[a] Department of Gynaecology and Obstetrics, Shanghai First Maternity and Infant Hospital, Tongji University School of Medicine, Shanghai, China
[b] Department of Anatomy, Tongji University School of Medicine, Shanghai China
[c] Department of Biomedical Engineering, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

HIGHLIGHTS

- We firstly introduce a new technique of LILS for the treatment of pelvic organ prolapse.
- The new technique could be performed easily and safety.
- The technique is an alternative method for other surgeries for the treatment of vaginal vault prolapse.

ARTICLE INFO

Article history:
Received 10 April 2017
Received in revised form
16 May 2017
Accepted 31 May 2017
Available online 3 June 2017

Keywords:
Vaginal vault prolapse
Laparoscopic inguinal ligament suspension
Minimally invasive surgery
Mesh in gynecology

ABSTRACT

Introduction: The aim of the study was to evaluate the efficacy and safety of laparoscopic inguinal ligament suspension (LILS) as a new surgical technique for the treatment of vaginal vault prolapse.
Methods: From Feb 2014 to Mar 2016, 21 symptomatic women with grades III-IV vaginal vault prolapse were enrolled. All patients underwent LILS procedure in which a bifurcated mesh was used to suspend the vaginal vault to inguinal ligament. The perioperative parameters including surgical time, blood loss, and hospitalization time were recorded. At a minimal 12-month follow-up, the primary outcome measures, such as the anatomical cure rate and patients' satisfaction were respectively evaluated according to Pelvic organ prolapse questionnaire (POP-Q) and Patient Global Impression of Improvement (PGI-I) scale. The secondary outcomes including the impact on symptom severity, quality of life and sexual activity were also recorded.
Results: The mean surgical time was 130.71 ± 16.07 min, the mean estimated blood loss was 53.57 ± 48.43 ml, and the mean hospital stay was 6 days (range: 5–8 days). After a minimal 12-month follow-up (range: 12–36 months), the rate of anatomical success and the subjective satisfaction were 100% and 90.5%. The symptom severity, quality of life and sexual activity also presented significant improvement. In addition, no serious peri- and postoperative complications occurred.
Conclusions: LILS was a potential method for the treatment of vaginal vault prolapse. The technique could be performed easily and might be an alternative to other POP surgeries. However, further studies were required to focus on its long-term efficacy.

1. Introduction

Post-hysterectomy vaginal vault prolapse, was defined as prolapse recurrence after women underwent primary hysterectomy for genital prolapse. The incidence rate with a wide variation from 0.5% to 6.52% results from the differences in surgical techniques, age, parity, weight, and financial considerations [1]. Many techniques have been created to treat vaginal vault prolapse; however, the success rates differ widely. One of the most popular procedures is the sacroscolpopexy based on the route (open, laparoscopic, or robotic), which has been accepted as the gold standard for pelvic organ prolapse [1,2]. This technique appears satisfactory, with a low recurrence rate, vaginal anatomy axial direction and function maintained. In addition, sexuality and bowel function are affected little after the operation [2–5].

* Corresponding author. Department of Gynaecology and Obstetrics, Shanghai First Maternity and Infant Hospital, Tongji University School of Medicine, 536 Changle Road, Shanghai, China.
E-mail address: daizhiyuan@51mch.com (Z. Dai).
[1] Zhiyuan Dai and Chunbo Li contributed equally to this work.

http://dx.doi.org/10.1016/j.ijsu.2017.05.071
1743-9191/

However, dissection via any approaches at the sacral promontory may be a challenging, particularly in women with obesity, or when an anatomical variation exists [6,7]. In addition, patients with vaginal vault prolapse usually have some degrees of abdominopelvic adhesions, which further increase the operating difficulty. These issues may result in the operation to be hazardous and time-consuming for the expose of anterior longitudinal ligament, even for an experienced surgeon who has underwent a long-term learning curve. The limitation prevents the widespread use of the technique [6]. To avoid the potential risks associated with dissection at the sacral promontory, exploring a safe and easily-exposed suspension point is of importance.

Round ligament is a significant ligament which maintains uterus in anteversion position, The round ligament was cut off and the remaining portion was abandoned during the hysterctomy. Laparoscopic ventroversion procedure using the round ligament has been reported that it can only yield short-term benefits [7]. The major issue of this procedure is the higher recurrence rate of the prolapse due to excessive elasticity of the round ligament. Hsieh considered that when a non-absorbable line was sutured and attached next to round ligament, the round ligament would be less likely to stretch and might be efficacious in the long run [7].

The structure of inguinal ligament plays an important role for surgery, which acts as a strong anchor or origin for the abdominal wall musculoaponeurosis [8]. In hernia surgery, the inguinal ligament is introduced as an attachment point of conjoined tendon and transversus abdominis muscle-tendon to enhance front and back wall of inguinal canal [9]. Thus, the inguinal ligament has a relative fixed position and powerful tension. In addition, from an anatomical perspective, only several small neurovascular structures adjoin into the portion of inguinal ligament between inguinal canal and anterior superior iliac spine, especially for the part located at 1–2 cm away from anterior superior iliac spine. Thus, we hypothesized that this part of inguinal ligament could be used as a new anchor point for suspending the vaginal vault.

In the present study, we presented a new technique that the vaginal vault was attached into inguinal ligament with a non-absorbable inelastic mesh along the route of round ligament. We hypothesize that the mesh tried to recreate a completely new and inelastic ligament that linking vaginal vault and inguinal ligament and could reserve partial function of round ligament. In addition, the suspension point of inguinal ligament was stable and could achieve a long-term efficacy in suspending the prolapsed organ. The purpose of this study was to introduce the new surgical technique and evaluated its efficacy and safety in the correction of vaginal vault prolapse.

2. Materials and methods

After receiving approval from the medical ethics committee of our committee, 21 patients with a symptomatic stage 3–4 vault prolapse (Pelvic organ prolapse Quantification system (POP-Q)) point C $\geq$ 1 cm beyond the hymen] were selected for this study between Feb 2014 and Mar 2016. All patients were followed up with a minimal 12 months. Patients were excluded if they met any of following conditions: (1) a history of prior prolapse surgery with absorbable mesh or biological graft repair; (2) inability to comprehend questionnaires, return for evaluation or give informed consent.

Demographics, medical, and obstetric history, previous pelvic floor or gynaecological surgeries and perioperative information including operating time, estimated blood loss, and intra- and postoperative complications were collected using standardised questionnaires. The operative effect of each patient was evaluated via the comparison between several main pre- and postoperative indicators of the outcomes. Meanwhile, the follow-up information at 12-month was systematically compared to represent the results of the proposed technique in this study. The primary outcome was anatomical cure defined as less than stage 1 (all vaginal sites at least 1 cm above the hymen on Valsalva), as scored by the POP-Q system and subjective satisfaction rate according to the Patient Global impression of improvement (PGI-I) scale, which integrates bladder, bowel, prolapse, sexual function domain, severity, bothersomeness, and condition-specific quality of life. Patients were considered satisfied if they claimed “very much better” or “much better” on the PGI-I scale [10]. Secondary outcomes included the impact on symptom severity, quality of life and sexual activity according to the Pelvic Floor Distress Inventory (PFDI-20), Pelvic Floor Impact Questionnaire (PFIQ-7) and Pelvic Organ Pro-lapse/Urinary Incontinence Sexual Questionnaire (PISQ-12) scores at baseline and post-operation at 12 months. The PFDI-20 and PFIQ-7 questionnaires consist of three subscales each [12]. PFDI-20 reflected different perspectives of bulging symptoms (POPDI-6), bowel problems (CRADI-8), and urinary leakage and other lower urinary tract symptoms (UDI-6). PFIQ-7 described the different impacts on a woman's social life related to urinary tract (UIQ-7), bowel or rectal (CRAIQ-7), and vaginal or pelvic (POPIQ-7) symptoms. PISQ-12 described sexual function in relation to prolapse or urinary incontinence. Increasing scores of PFDI-20 and PFIQ-7 indicate impaired function, whereas in PISQ-12, a higher score indicated better sexual function [12].

2.1. Operative technique

The schematic diagram of LILS technique was showed in Fig. 1. The technique was completed laparoscopically and the step-by-step procedure was presented in supplementary video. In brief, after a vaginal vault cone was inserted into vagina, the anastomotic stoma of vaginal vault was exposed. Then, surface membrane of vaginal vault was opened and both bladder and rectum were mobilized away from the vagina down to the level of the trigone cervix vesicae and the levator ani plate, creating the vesico-vagina space anteriorly and the recto-vaginal space posteriorly, respectively. Following that, the bottom of a self-shaped cross-shaped polypropylene mesh (Aspide Medical, France) (Fig. 2) was sutured to the top of the vaginal fornix and two short-arms of mesh were sutured to anterior and posterior vaginal wall with four polyglycolic 1-0 sutures, respectively. Then, the round ligament of the uterus was used as anatomic landmark for an area of inguinal canal and anterior superior iliac spine was identified as a landmark for original of inguinal ligament. The suspension area of inguinal ligament between the inlet of inguinal canal and anterior superior iliac spine was identified. The portion of inguinal ligament that was 1–2 cm distance from anterior superior iliac was exposed completely (Fig. 3A). An extraperitoneal tunnel along the round ligament between the suspension points and the vaginal vault was created. The long-arms of mesh were introduced outside peritoneum along the round ligament to the suspension points of inguinal ligament and then fixed into the inguinal ligament/fascia (Fig. 3B). At last, the peritoneal incision was closed so as to place the suspension mesh outside the peritoneum (Fig. 3C). Tension-free vaginal tape-obturator (TVT-O) was performed in individuals who were diagnosed as stress urinary incontinence (SUI) pre-operatively. Digital rectal examination was performed to confirm that the integrity of the rectum had not been injured. Prophylactic antibiotic was used in all patients according to the hospital guidelines. An indwelling catheter draining the bladder for 48 h postoperatively was used in each patient.

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.ijsu.2017.05.071.