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Comparison between Laparoscopic High Uterosacralligament Suspension and Laparoscopic Sacrocolpopexy: A Retrospective Study

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ABSTRACT

Background: Pelvic organ prolapse is a latent disease that may take origin after injury of the connective tissue. This investigation aims to compare the surgery outcome of the Laparoscopic High Uterosacral ligament suspension (LHULS) and the Laparoscopic Sacrocolpopexy (LSC).

Materials and Methods: This is a retrospective study. Fifty-three participants with pelvic organ prolapse stage ≥II referring to pelvic organ prolapse quantification (POP-Q) system were desirable in this study. Thirty participants underwent LSC, twenty-three others experienced the LHULS surgery. The surgery outcomeand patient's satisfaction were assessed by the POP-Q system, and the pelvic floor questionnaires PFDI-20, PFIQ-7, PISQ-12, respectively. Whitney-Test was utilized to analyze the pre-and post-operative results between groups, while the Wilcoxon signed rank test was used to compare the pre-and post-operative outcomes.

Result: The POP-Q score improved significantly for both groups postoperatively. LSC was superior to LHULS in the anterior compartment, the postoperative mean for Ba was (2.54 ±0.56 Vs -2.39± 1.47). The LSC was superior to The LHULS in the posterior compartment as well; Bp(2.50± 1.96 Vs-2.08±1.3, P<0.05). The LHULS had a higher patient satisfaction especially in urinary symptoms (P<0.05). The LSC has a longer operation time and inpatient day, as well as an extended catheterization time (P<0.05). Moreover, the LSC has a higher amount of bleeding and a higher occurrence of hysterectomy (P<0.05).

Conclusion: The LSC technique demonstrated his superiority in anterior and posterior compartment than LHULS. The LHULS-surgery had a higher patient satisfaction for urinary symptoms.The LSC has a longer operation time and in-patient day compared to LHULS.

Key Words: Laparoscopic, Sacrocolpopexy, Uterosacral ligament suspension, Effectiveness

INTRODUCTION

Pelvic organ prolapse is a latent disease that may take origin after injury or abnormalities of the connective tissue, Levatorani muscles, nerve, and vessels. Over time, these disturbances will increase and become obvious later in life [1-4]. The demand for prolapse treatment is increasing as longevity increases. After menopause, the probability to suffer from prolapse is estimated to be as higher as 50 percent [5].

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The challenge of surgeons is to care and cure the affected population with different kinds of techniques, provided that those techniques proof their effectiveness [6].

Abdominal Sacral colpopexy (ASC) has a reputation for being the cornerstone in repairing the vault prolapse [7], furthermore, it has an important place in restoring the multicompartment pelvic organs herniation [7], and the recurrence protruded organs. The laparoscopic approach has highlighted the increasing benefit of this procedure by magnification and minimal invasion [7]. Studies conducted to compare the laparotomic and the laparoscopic sacrocolpopexy(LSC) concluded that the surgery outcomes were similar with some limitation for both sides. The laparotomic surgery's and hospitalization time was higher than the laparoscopic approach [7, 8]. The Laparoscopic technique, however, minimizes these issues. Moreover, the manipulation of the gut is less [7]. Nevertheless, the LSC requires an experience [8].

On the other hand, the laparoscopic high uterosacral ligament suspension (LHULS) has shown good anatomic outcome for vault prolapse [9-12]. Interestingly, this procedure does not require any graft, therefore, the concerns about the graft-related complications are dispelled [11]. Furthermore, it has an advantage of better view by magnification and being less aggressive [9].

MATERIALS AND METHODS

This is a retrospective study. Fifty-three partients with pelvic organ prolapse stage ≥II referring to pelvic organ prolapse quantification system were desirable in this study between April 2014 and May 2017.Thirty patients underwent LSC and twenty-three others experienced LHULS at Dalian Gynecology and Obstetrical (Maternal and child health care) Hospital. The womenwithtroublesome prolapse, and with pelvic prolapse stage equal or greater II were included in this investigation. The smoking women and patients who were not acandidatefor laparoscopic surgery to treat prolapse were excluded. The LSC surgery was done by two gynecologists, one of the two gynecologists also performed the LHULS surgery. The analysis was done for afollow up of 12months.

Ethical approval

The Ethics committee of Gynecology and Obstetrical (Maternal and child health care) Hospital and Dalian Medical University approved the study.

Patients evaluation

All participants had a complete clinical examination before surgery**.** The surgery outcome was evaluated by the pelvic prolapse quantification (POP-Q) system, the satisfaction of patients was assessed by the pelvic floor questionnaires including the Pelvic floor distress inventory-20, pelvic floor impact questionnaire-7 and pelvic prolapse incontinence sexual questionnaire-12, respectively PFDI-20, PFIQ-7, PISQ-12. We assessed the intraoperativedetails and surgical complications.

Operation procedure

1. Laparoscopic Sacral Colpopexy

The general anesthesia was used. The patient was placed in the recumbent position, legs flexed and sustained by stirrups. Theskin disinfection, the sterile draping, and urinary catheterization were then performed.Firstly, we placed four trocars on the abdomen. The initial 10mm at the umbilicus, twolateral 5mm trocars at one-third of the umbilical-spinous line at either sideand the last trocar was inserted 4cm ascendant from the left lateral 5mm trocar. A hysterectomy was done when required. The vesicovaginal and the rectovaginal pouch were opened at the lowest part of the prolapse. Then, the promontory dissection was completed by the incision of the paravertebral peritoneum and the retroperitoneum fat, after identification of the L5-S1, the right ureter, and iliac vein. Hence, the anterior longitudinal ligament was visible. Furthermore, the incision of the peritoneum at the sacral promontory was extended medially. Therefore, the Y-shape mesh was used (monofilament, macroporous polypropylene mesh GYNECARE of U.S.A. and Budd Company of Germany). With two columns of six interrupted sutures,we then sutured the arms of the mesh at the anterior and the posterior compartment. Finally, we attached the mesh on the anterior sacral longitudinal ligament with non-absorbable suture. The peritoneum closure was achieved by a running suture. The patientswere recommended the useof vaginal estrogen cream at least for six months after surgery. And they could start sexual life after three months and encouraged to use

2. Laparoscopic High Uterosacral ligament suspension

Under general anesthesia, we disinfected and covered with sterile clothes the patient which liedin the lithotomy position. We began to insert four trocars in the abdomen, one on the umbilicus of 10mm, two laterals 5mm each and another midway between the umbilicus and the external iliac spine. Then, we identified the uterosacral ligaments and ipsilateral ureter. We made an incision in the peritoneum between the ligament and the ureter to avoid ureter damage. A non-absorbable suture was placed in running mode through the proximal, middle and distal of either uterosacral Ligament. The uterus sacral ligament was folded and shortened. The shortened uterosacral ligament was sutured at the vaginal part of the cervix (if the uterus is preserved) or to the vaginal cuff (when a hysterectomy has been performed).

The patients were prescribed a vaginal estrogen cream after surgery for a duration of six months and more and attempt sexuality three months later.

Follow up process

After surgery, the patients were reviewed. The surgery outcome and the patient's satisfaction were assessed as well. We examined the patient to exclude any bulge, mesh exposure, and urine leakage by the cough test. The subjective outcome was assessed by the valid quality of life questionnaire short form PFDI-20, PFIQ-7, PISQ-12.

Statistics Analysis

The data are described as a mean ± standard deviation, median (range), rate as fitting. The Mann Whitney-Test was utilized to analyze the pre- and post-operative results between groups, while the Wilcoxon signed rank test was used to compare the pre-and post-operative outcomes withingroup. Then, we used the chi-square (Pearson chi-square, continuity correlation, Fisher exact accordingly) for categorical data. We used the IBM SPSS statistics version 21, the $P< 0.05$ was considered as statistically significant.

Result

The baseline characteristics of the patients are shown in table 1. The LSC group have a higher rate of menopaused women than the LHULS group, (P=0.01). There were no difference in age, BMI, and other risk factors.

Table 2 demonstrates the POP-Q result showing that there was a statically significant amelioration in POP-Q scores, except for the point Ba in LHULS group and for TVL and PB for both LHULS and LSC groups; when comparing the preoperative to postoperative outcomes. The two groups were different in all compartments before surgery, except for Ap, GH, TVL, PB. The postoperative POP-Q measurement demonstrated a significant difference in mean Aa, which was -2,40±1.3 versus -2.86±0.46 respectively for LSC and LHULS(P=0.04), while the mean postoperative for the point Bp improved better in LSC compared to LHULS group (-2.50± 1.96 versus -2.08±1.3, (P=0.008). The genital hiatus(GH) was greater for LSC group (3.75 ± 1.13 versus 2.78 ± 1.38, (P= 0.004). Similarly, the point Ba improved more in LSC group (-2.54 ±0.56 Vs-2.39± 1.47); as shown in table 2. We defined the surgery success as POP-Q Aa, Ba, C, Ap, Bp less than -1. There was no difference in success rate between groups. In all sites, we obtained a success rate of 87% and 87% for both LHULS and LSC respectively. Moreover, no difference was detected in relapse rate (13.33% versus13.04%) for LSC and LHUSL respectively.

The patients' satisfaction assessment is seen in Table 3. The PFDI-20 improved significantly for both groups, except for the CRADI-8 domain. The PFIQ-7 did not improve significantly in all domains for LSC group, while in the LHULS group, there was an improvement for the PFIQ-7 questionnaire in total and for the UIQ-7 domain. For both groups, there was no difference after surgery in CRAIQ-7domain.

The operation's details and complications are shown in Table 4. LSC held an extended surgical time than LHULS (177[50-350] versus 115 [70-190], P<0.001), alonger hospitalstays (6[4-9] versus 5[4-7], <0.001), a higher blood loss 50[20-150] versus 30[20-50] ,P<0.001, and a longer vesical catheterization (1 [1-2] versus 1 [1 -2] P= 0.006). Except the difference seen in de novo incontinence 16.7(5/30) versus 0(0/23), P=0.04, there was no difference in dyspareunia, pelvic pain, vaginal infection between the groups after surgery. The LSC group has a higher rate of hysterectomy than LHULS.

DISCUSSION

The surgery outcome as assessed by the POP-Q Measurement showed no difference between the groups in thecentral compartment postoperatively.This result is differentto previous reports [13, 14]. This can be explained by the difference of point C before operation among the groups.In our study, the uterine prolapse was more severe in LSC group before surgery. Although the two groups were different in POP-Q score before surgery, indicating that the prolapse in all compartments in the LSC group was more severe than in the LHULS group; Nevertheless, the postoperative outcome for LSC surgery demonstrated his superiority in the anterior and posterior compartment in our study. These findings are in accordance with a study conducted by Rondini et al detected that LSC was superior in posterior compartment than LHULS [14].Another comparison study between the ASC surgery and the vaginal uterosacral ligament suspension demonstrated that ASC was better in apical compartment than vaginal uterosacral ligament suspension. [15]We did not have a difference in relapse rate that supports a recent study from 2017 [16].

In the present analysis, LHULS gave better satisfaction in the PFDI-20 score when compared to LSC. We noticed that neither the patients of LSC group nor those of the LHUSL group were satisfied in the CRADI-8 and CRAIQ-7, thus indicating that the Colorectal-anal symptoms remained the same after both surgeries. A previous study from 2018 that compared the robotic-assisted uterosacral ligament suspension and the robotic-assisted sacrocolpopexy also did not find any statistical significance in bowel function [17].Similarly, a recent study using vaginal uterosacral ligament vault suspension did not find a significant improvement in bowel function [18].

In our study, the LSC group had a longer surgery time, a longer hospital-stay than LHULS group. This is similar to preceding reports [14, 19]. The present study also found that LSC held an extended time of catheterization and high blood loss than LHULS, although none of the patients required a blood transfusion.

We did not have a postoperative complication in the LHULS group.Our success rate of uterosacral suspension is between arange of the reported result [20].

Our study demonstrates that both LSC and LHULS are effective in the treatment of apical compartment prolapse. Importantly, the LHULS uses anative tissue, thus do not possess any mesh-related complication. Nevertheless, many studies have reported the superiority of LSC to address the more severe prolapse [19]. The risk of mesh erosion with laparoscopic approach range between 0 to 12% [22], thus the benefits of mesh use must always outweigh the risk. The selection of patients for mesh surgery is critical. Moreover, theexperience of the surgeon is the goal of the satisfactory outcomes.

The strength of this study was that all the surgeries were done by two gynecologists. We used the POP-Q to assess the treatment outcomes and the valid pelvic floor quality of life questionnaires for patient's satisfaction.

The study has several limitations including the small sample size and we did not include the urodynamic study for our patients.

CONCLUSION

The LSC and LHULS surgeries are safe and effective for the treatment of pelvic organs prolapse. The LSC technique demonstrated his superiority in anterior and posterior compartment than LHULS. The LHULS surgery had higher patient satisfaction with urinary symptoms.The LSC has a longer operation time and inpatient day, as well as an extended catheterization time. Moreover, the LSC has a higher amount of bleeding and a higher occurrence of hysterectomy.

Abbreviations

PB: Perineal body
GH: Genital hiatus
TVL: Total vaginal length
LSC: Laparoscopic Sacral Colposcopy
ASC: Abdominal sacrocolpopexy
POP: Pelvic organ prolapse
POP-Q: Pelvic organ prolapse quantification
PFDI-20: Pelvic floor distress inventory
POPDI-6: Pelvic organ prolapses distress inventory,
UDI-6: Urinary destress inventory,
CRADI-8: Colo-rectal-anal destress inventory,
POPIQ-7: Pelvic organ prolapses impact questionnaire,
UIQ-7: Urinary impact questionnaire,
CRAIQ-7: Colo-rectal-anal impact questionnaire,
POPIQ-7 Pelvic organ prolapses impact questionnaire,
PISQ-12: Pelvic organ prolapse urinary incontinence sexual questionnaire.

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Authors contributions

J. Bakisololo Miyuna: Data conceptualization, collection, interpretation, analysis, and manuscript writing.

Wang Huali: Data conceptualization, collection, and interpretation.

A. Bazolona Muntanda: Data collection and analysis.

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Table 1: Baseline characteristics of the study population

	LSC (30)		LHUSL (23)		
Demographics	**Value**	**range**	**Value**	**range**	***P*- value**
Age (year)	53.77± 8.52	(39-73)	50.52 ± 9.03	(34-71)	0.1[a]
Gravidity	2,5	(1-7)	2	(1-6)	0.07[b]
BMI	24.7 ± 2.47	(19.4-28.7)	25.3 ± 2.86	(21.6-32.0)	0.5[a]
Parity	1	(1-5)	1	(1-3)	0.3[b]
Contraception	13.3	(4/30)	4.3	(1/23)	0.4[d]
Perineal laceration	10	(3/21)	0	(0/23)	0.3[d]
Chronic coughing	0	(0/30)	0	(0/23)	
Constipation	6.7	(2/30)	8.7	(2/23)	>0.99[d]
Menopause	60	(18/30)	26.1	(6/23)	0.01[c]

Employment					
Retired	56.7	(17/30)	47.8	(11/23)	0.2[b]
Home duties	16.7	(5/30)	30.4	(7/23)	
Bureaucrat	16.	(5/30)	30.4	(7/23)	
Farmer	10	(3/30)	0	(0/32)	
Education(high school)	100	(30/30)	100	(23/23)	
Marital status (married)	100	(30/30)	100	(23/23)	
Associated diagnostics					
Leiomyoma	30	(9/30)	39.1	(9/23)	0.4[c]
Diabetes	3.3	(1/30)	13.3	(3/23)	0.4[d]
Hypertension	20	(6/30)	8.7	(2/23)	0.4[d]
Previous operations					
Appendicectomy	13.3	(4/30)	8.7	(2/23)	0.9[d]
Hysterectomy	13.3	(4/30)	0	(0/23)	0.06[c]
Hemorrhoidectomy	3.3	(1/30)	4.3	(1/23)	0.6[e]

[a]student t-test, [b] Mann Whitney U test, [c] Pearson chi-square, [d] continuity correlation, [e] Fisher exact

Table 2: Objective outcomes assessed with POP-Q for patients who underwent LSC or LHUSL

	LSC (N=30)			LHUSL (N=23)				
POPQ	**Preop**	**Postop**	***P*Value[b]**	**Preop**	**Postop**	***P*Value[b]**	***P* between Pre-groups[c]**	***P* between Post-groups[c]**
Aa	0.36± 1.95	-2,40±1.3	<0.001	-2.26± 1.2	-2.86±0.46	<0.04	<0.001	0.04
Ba	2.87 ± 2.25	-2.54 ±0.56	<0.001	-1.5± 2.09	-2.39± 1.47	0.09	<0.001	0.1
C	2.83 ± 2.59	-5.68± 2.76	<0.001	0.68±2.89	-6.30± 2.89	<0.001	0.007	0. 6
Ap	-1.73± 1.85	-2.60± 1.13	0.01	-2.60±0.7	-2.60±0.7	0.02	0.05	0.01
Bp	-0.37± 2.54	-2.50± 1.96	0.001	-2.08±1.3	-2.08±1.3	0.005	0.008	0.008
GH	4.47 ± 1.04	3.75 ± 1.13	0.001	3.87± 1.09	2.78 ± 1.38	0.004	0.05	0.004
PB	2.46 ± 1.41	2.45 ± 0.69	0. 9	2.72± 1.0	2.57 ± 0.51	0 .4	0.6	0.4
TVL	6.40± 0.62	6.52± 0.91	0.8	6.43±0.90	6.52± 0.67	0.4	0.6	0.6

[a]student t-test, [b]Wilcoxon signed rank test, [c]Mann Whitney-*U* test
Preop: preoperative, Postop: postoperative, *P* between Pre-groups: *p* value for preoperative groups, *P* between Post groups: *P* value for postoperative groups.

Table 3: Subjective outcomes assessed with PFDI-20, PFIQ-7 and the PISQ-12 scores between patients who underwent LSC or LHUSL surgery.

	LSC(N=30)			LHUSL(N=23)			
	Preop	**Postop**	***p* value[b]**	**Preop**	**Postop**	***p* value[b]**	***p* between post groups**
PFDI-20	72.43± 45.96	41.18± 36.30	<0.001[a]	76.49± 43.12	23.00± 29.95	< 0.001	0.01
POPDI-6	35. 97± 25.48	13.88± 13.59	< 0.001	32.20± 22.66	6.74± 11.05	<0.001	0.03
UDI-6	26.25± 21.25	18.89± 16.37	0.01	32.06± 22.76	9.60± 13.38	< 0.001	0.01
CRADI-8	10.20± 11.74	8.85± 8.01	0.4	12. 22± 13.00	6.65±9.62	0.06	0.3
PFIQ-7	29.20±42.32	16.19± 33.62	0.2	41.61± 60.57	17.17±25.94	0.02	0.3
UIQ-7	15.23± 27.80	5.23± 17.25	0.1	13.45± 19.50	4.96± 10. 4	0.01	0.005
CRAIQ-7	4.44± 10.46	3.96± 12.88	0.6	9.31± 17.61	3.10± 7. 81	0.8	0.9
POPIQ-7	9.52± 16.77	6.98± 17.32	0.3	18.83± 29.19	9.1± 16.84	0.1	0.3
PISQ-12	14.70± 4.85	13.81± 4.16	0.1	18.54± 11.44	11.36± 5.57	0.07	0.9

[a] student *t*-test, [b] Wilcoxon signed ranked test, [C] Mann Whitney test
Preop: preoperative, Postop: postoperative, *P* between postop groups: *P*-value forpostoperative groups.

Table 4: Intraoperative information and postoperative complications among the patients who underwent LSC and LHUSL surgery.

	LSC (N=30) Value[min, max]	LHUSL (N=23) Value [min, max]	*P*-value
Intraoperative details			
Median Operative time (min)	177[50-350]	115 [70-190]	<0.001[C]
Median Blood loss (ml)	50[20-150]	30[20-50]	<0.001[C]
Median Catheterization (day)	1 [1-2]	1 [1 -2]	0.006
Mean hospitalization(day)	6[4-9]	5[4-7]	<0.001[C]
Associated surgery			
Hysterectomy	93.3 (28/30)	69.6 (16/23)	0.02[d]
Postoperative complications			
Dyspareunia	7.1 (2/28)	13.6 (3/22)	0.4[d]
Vaginal infection	0 (0/30)	4.3 (1/23)	0.2[e]
Pelvic pain	3.3(1/30)	4.3 (1/23)	0.6[e]
De novo incontinence	16.7(5/30)	0(0/23)	0.04[d]
Recurrence	13.3(4/30)	13 (3/23)	0.9[e]

[a] Student*t*-test, [b] Mann Whitney -*U*, [c] Wilcoxon signed ranks test, [d] Chi-square, [e] Fisher exact test. OAB: Overactive bladder. TOT: transobturator tape