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ORIGINAL RESEARCH

Laparoscopic Sacrohysteropexy for the Management of Uterovaginal Prolapse: a Pilot, Single-Center Experience from Saudi Arabia

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Background: Laparoscopic sacrohysteropexy is an emerging uterine-preserving strategy for management of uterovaginal prolapse (UVP). The literature on laparoscopic sacrohysteropexy for management of UVP is very scarce from Saudi Arabia. This research examined the feasibility, clinical utility, and safety of laparoscopic sacrohysteropexy in a Saudi setting.

Methods: A retrospective study was conducted, including all patients who met the inclusion criteria. The laparoscopic sacrohysteropexy technique was adapted with modifications from the "Oxford hysteropexy". The primary endpoint was overall success, defined as anatomical success in all vaginal compartments (UVP grade 0 or 1 postoperatively). The secondary endpoint was the mean change in point C. Descriptive data were summarized with numbers and percentages, while numerical data used means ± standard deviations. Fisher's exact and Student's *t* tests were used for univariate analyses. Significant surgical outcome predictors were identified via logistic regression, with $p < 0.05$ considered statistically significant.

Results: Overall, 21 patients met the inclusion criteria. The most frequent indication for laparoscopic sacrohysteropexy was UVP without anterior or posterior wall prolapse (n = 15, 71.4%), whereas the most frequent grade of UVP was grade III (n = 13, 61.9%). One patient (4.8%) required switch to laparotomy due to severe adhesions. No perioperative complications were recorded. The mean change in point C and hospital stay were 5.8 ± 2.1 (range: 0–8) and 1.4 ± 0.6 days (range: 1–3), respectively. Surgical success was achieved in 18 patients (85.7%). Only three patients experienced recurrences (one, two, and six months postoperatively). The mean change in point C was significantly higher in successful cases contrasted with the failed cases (6.5 versus 1.3).

Conclusion: Laparoscopic sacrohysteropexy for management of uterovaginal prolapse revealed technical feasibility, safety, and beneficial utility of the procedure. Further large-sized and multicentric investigations are important to gather additional pertinent information on laparoscopic sacrohysteropexy.

Keywords: pelvic organ prolapse, uterovaginal prolapse, sacrohysteropexy, surgical failure, success rate

Introduction

The lifetime risk of pelvic organ prolapse (POP) operation for women varies from as low as 10% to as high as 20%.[1,2] It has been depicted that roughly half of women aged over 50 years are diagnosed with uterovaginal prolapse.[3,4] As populations age, surgical intervention rates are expected to rise.[5] Vaginal hysterectomy with apical suspension remains the favored surgical tactic for uterine prolapse among urogynecologists, acknowledging its association with the more frequent anterior wall prolapse and apical drop.[6,7] Nonetheless, findings from a high-quality clinical trial indicate a potential drawback, with this approach showing an elevated surgical failure frequency close to 35% at two years postoperatively.[8] The probability of undergoing a succeeding reoperation for post-hysterectomy vault prolapse ranges from 5% to 20%.[9,10] Given the choice, many women with uterine prolapse would rather to dodge hysterectomy if similarly efficient substitutes were existing.[11]

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Indeed, the idea of preserving the uterus during uterovaginal prolapse surgery has gained significant popularity.[12,13] Various techniques, including laparoscopic, abdominal, and vaginal approaches, have been illustrated, each with differing success rates.[14] These procedures not only maintain fertility in women but also hold the prospective to substantially enhance prolapse symptoms, psychological health, and sexual activity.[14] Moreover, by utilizing non-absorbable tools to add force to weakened connective tissues and ligaments, they may also help decrease the jeopardy of apical prolapse reappearance.[14]

Along these lines, laparoscopic sacrohysteropexy is a safe uterine-preserving alternative which involves attaching the uterus to the sacrum using mesh and other sustaining materials to provide support and prevent further descent.[13,15–20] Overall, the literature on laparoscopic sacrohysteropexy for management of POP is insufficient from Saudi Arabia.[15] There is a significant necessity to document single-center experiences on laparoscopic sacrohysteropexy. Such research reports play a crucial role in enriching the limited literature and serve as valuable benchmarks to encourage the adoption of laparoscopic sacrohysteropexy nationwide.

This study was conducted to gauge the feasibility, effectiveness, and safety of laparoscopic sacrohysteropexy in a Saudi setting while also identifying factors that predict failure/recurrence. We hypothesized that laparoscopic sacrohysteropexy would be a feasible, safe, and effective method for managing patients with uterovaginal prolapse.

Materials and Methods

We carried out a retrospective study at the Department of Obstetrics and Gynecology, King Faisal Specialist Hospital and Research Center, Jeddah, Saudi Arabia. There was no formal sampling calculation as the research considered all research subjects who met the eligibility criteria. The research protocol was granted ethical approval by the local Institutional Review Board (IRB).

The inclusion criteria were as follows: (i) women who underwent primary laparoscopic sacrohysteropexy for the treatment of uterovaginal prolapse, (ii) procedures performed between January 1, 2014, and July 31, 2023, (iii) patients with a confirmed clinical or radiological diagnosis of uterovaginal prolapse, (iv) patients with a follow-up period of at least six months, and (v) patients with complete data. Patients who did not meet any of these criteria were excluded.

The technique for laparoscopic sacrohysteropexy was adapted with modifications from the "Oxford hysteropexy".[21] Patients are informed and counseled about the risks and benefits associated with the surgical procedure. All procedures were performed by a single surgeon who had specialized fellowship training, in addition to help from two assistants. All patients followed a clear fluid diet and bowel preparation the evening before procedure. Intraoperative antibiotics and paracetamol were administered. After administering sufficient anesthesia and positioning the patient in dorsal lithotomy, an indwelling catheter and uterine manipulator were inserted. Pink pads were regularly employed to prevent patient slippage in the Trendelenburg position. Entry into the peritoneal cavity was facilitated using a Veress needle technique either in the umbilical area or in the left upper abdominal quadrant. A 5-mm trocar was placed supra umbilically as well as two 5-mm lower lateral ports. The 10-mm port was inserted at the Palmer point. This port is used for mesh insertion and suturing port. The landmark of the sacral promontory was recognized; the superimposing peritoneum was dissected with a harmony device and the incision continued caudally, staying medial to the right ureter and aiming toward the right uterosacral ligament in the right pararectal space. When the anterior longitudinal sacral ligament was identified, a rectangular shape of polypropylene mesh (Gynecare) measuring approximately 5–6 cm was brought to the operative field. The caudal end of the mesh was attached to the posterior cervix with a synthetic, monofilament, non-absorbable 2.0 prolene suture, a total of 5–6 interrupted stitches using extracorporeal technique. The upper end of the mesh was cut and secured to the sacral promontory using 4 protacks, ensuring minimal tension while positioning the cervix at the plane of the ischial spines. Unwarranted tension was averted to reduce the hazard of vaginal deviation, new-onset stress incontinence, recurrent prolapse, and cervical extension. The peritoneum was closed using an absorbable suture with 0 V-Loc barbed sutures. Hemostasis was secured in the retroperitoneal space as well as the right ureter was inspected for peristalses. Patients were discharged the day after procedure and scheduled for outpatient visits in 14–21 days.

We gathered three categories of data. First, the preoperative data comprised patient's age, body mass index (BMI), parity, coexisting morbidity, coexisting cancer, history of previous surgery, type of uterovaginal prolapse, and degree of uterovaginal prolapse.[22] Second, the intraoperative data comprised duration of surgery, estimated intraoperative blood

loss (EBL), conversion to open laparotomy, intraoperative blood transfusion, mesh type, simultaneous surgery, and occurrence of intraoperative complications. Third, the postoperative data comprised the anatomical success and failure rates (based on the POP-quantification, POP-Q),[22] onset of failure, relapse rate, length of hospital stay, mean change in point C, and postoperative complications. Anatomical success in each vaginal compartment (apical, anterior, and posterior) was defined as achieving a grade of 0 or 1. The primary endpoint was overall success, defined as anatomical success in all vaginal compartments (UVP grade 0 or 1 postoperatively). The secondary endpoint was the mean change in point C.

We analyzed data using the Social Package for Social Sciences software. Numbers and percentages were used to summarize descriptive data, whereas means ± standard deviations (ranges) were used to summarize the numerical data. Univariate analyses of categorical and numerical data were accomplished using Fisher's exact and student's *t* tests, respectively. We identified significant predictors of surgical outcome through logistic regression analysis, controlling for age, obesity, diabetes, grade of POP severity, and type of mesh. All analyses were two-sided and statistical significance was set at a p-value less than 0.05.

Results

Twenty-one patients were analyzed. Table 1 summarizes the preoperative data. The average age was 44.1 ± 13.2 years (range: 19–65), whereas the average BMI was 21.8 ± 9.2 kg/m^2 (range: 16.4–48.7), respectively. Seven patients (33.3%) were categorized as obese at the time of operation. Twelve patients (57.1%) had previous surgeries. The most frequent indication for laparoscopic sacrohysteropexy was uterine prolapse without anterior or posterior prolapse (n = 15, 71.4%), whereas the most frequent grade of POP was grade III (n = 13, 61.9%).

Table 2 summarizes the intraoperative data. Eleven patients had concomitant procedures besides the laparoscopic sacrohysteropexy (47.6%). The average operative time was 199.3 ± 59.4 min (range: 105–300), whereas the EBL was 156.2 ± 133.4 mL (range: 30–500). The most frequent used type of mesh was single polypropylene mesh (n = 18, 58.7%). Three patients (n = 3, 41.3%) received double polypropylene mesh layers because the operating surgeon subjectively sought greater support, enhanced durability, and better stress distribution to minimize the risk of mesh

Table 1 The Preoperative Details of All Patients

Age (years), mean ± standard deviation (range)	44.1 ± 13.2 (19–65)
Body mass index (kg/m^2), mean ± standard deviation (range)	21.8 ± 9.2 (16.4–48.7)
Parity, mean ± standard deviation (range)	3.62 ± 2.4 (0–8)
Obesity (≥30 kg/m^2), n (%)	7 (33.3)
Previous pelvic and/or abdominal surgery, n (%)	12 (57.1)
Previous vaginal delivery, n (%)	16 (76.2)
Coexisting morbidity, n (%)	10 (47.6)
Coexisting diabetes, n (%)	5 (23.8)
Coexisting occult stress incontinence, n (%)	6 (28.6)
Type of uterovaginal prolapse	
Uterine prolapse, n (%)	15 (71.4)
Uterine prolapse and anterior wall prolapse, n (%)	5 (23.8)
Uterine prolapse and posterior wall prolapse, n (%)	1 (4.8)
Grade of uterovaginal prolapse	
Grade II, n (%)	2 (9.5)
Grade III, n (%)	13 (61.9)
Grade IV, n (%)	6 (28.6)

Table 2 The Intraoperative Details of All Patients

Operative time (min), mean ± standard deviation (range)	199.3 ± 59.4 (105–300)
Estimated blood loss (mL), mean ± standard deviation (range)	156.2 ± 133.4 (30–500)
Conversion to laparotomy, n (%)	1 (4.8)
Type of mesh	
Single polypropylene layer, n (%)	18 (85.7)
Double polypropylene layers, n (%)	3 (14.3)
Intraoperative complications, n (%)	
Blood transfusion, n (%)	0 (0)
Ureteric injury, n (%)	0 (0)
Vessel injury, n (%)	0 (0)
Bowel injury, n (%)	0 (0)
Bladder injury, n (%)	0 (0)
Vaginal laceration, n (%)	0 (0)
Concomitant procedures, n (%)	
None	11 (52.4)
Anterior wall repair	2 (9.5)
Tension-free vaginal tape	3 (14.3)
Anterior wall repair + tension-free vaginal tape	1 (4.8)
Posterior wall repair + tension-free vaginal tape	1 (4.8)
Anterior wall repair + ovarian cystectomy	1 (4.8)
Anterior wall repair + tension-free vaginal tape + bilateral salpingo-oophorectomy	1 (4.8)
Removal and insertion of new intrauterine contraception device	1 (4.8)

detachment or migration. One patient (4.8%) required switch to laparotomy due to severe adhesions. No intraoperative complications were recorded inclusive of injuries to vagina, ureter, bowel, urinary bladder, or blood vessel.

Table 3 summarizes the postoperative data. The mean change in point C and hospital stay were 5.8 ± 2.1 (range: 0–8) and 1.4 ± 0.6 days (range: 1–3), respectively. Surgical success was achieved in 18 patients (85.7%). Only three patients experienced recurrences, which had onsets at one, two, and six months postoperatively. The grades of POP among the failed cases comprised grades II, III, and IV, and none of these patients experienced cervicovaginal elongation. The treatment plans for the failed cases included conservative management in one patient and hysterectomy + sacrocolpopexy in two patients. Notably, all the three patients who experienced recurrences had uterine prolapse without anterior or posterior wall prolapse. No patient experienced postoperative complications.

Table 4 summarizes the results of the rate of success according to various numerical variables. The mean change in point C was significantly higher in successful cases contrasted with the failed cases (6.5 versus 1.3). However, the rate of success did not significantly differ according to age, BMI, parity, duration of operation, EBL, and length of hospitalization. Table 5 summarizes the results of the rate of success according to various categorical variables. The findings revealed that the rate of success was not significantly correlated with obesity, parity, previous vaginal delivery, diabetes

Table 3 The Postoperative Details of All Patients

Difference in point C, mean difference ± standard deviation (range)	5.76 ± 2.1 (0–8)
Length of hospital stay (d), mean ± standard deviation (range)	1.4 ± 0.6 (1–3)
Postoperative complications, n (%)	0 (0)
Success rate, n (%)	18 (85.7)
Failure rate, n (%)	3 (14.3)

Table 4 The Numerical Intraoperative and Postoperative Outcomes of Patients According to Rate of Success of Laparoscopic Sacrohysteropexy

Outcome	Success	n	Mean	SD	MD	SE of MD	95% CI		p value
							Lower	Upper	
Age (years)	No Yes	3 18	45.33 43.89	5.132 14.179	1.444	8.428	−16.196	19.085	0.866
Body mass index (kg/m^2)	No Yes	3 18	27.33 20.83	16.166 7.861	6.500	5.674	−5.377	18.377	0.266
Parity	No Yes	3 18	2 3.89	3.464 2.22	−1.889	1.485	−4.998	1.220	0.219
Operative time	No Yes	3 18	233.33 193.61	85.196 55.248	39.722	36.867	−37.442	116.887	0.295
Estimated blood loss (mL)	No Yes	3 18	200 148.89	259.808 112.296	51.111	84.564	−125.883	228.105	0.553
Hospital stay (d)	No Yes	3 18	1.33 1.44	0.577 0.616	−0.111	0.382	−0.910	0.687	0.774
Mean change in point C	No Yes	3 18	1.33 6.5	1.155 0.924	−5.167	0.593	−6.407	−3.926	<0.001

Notes: The Student's *t*–test was used for univariate analysis of numerical data.
Abbreviations: CI: confidence interval, MD: mean difference, SD: standard deviation, SE: standard error.

Table 5 The Categorical Intraoperative and Postoperative Outcomes of Patients According to Rate of Success of Laparoscopic Sacrohysteropexy

Variables		Rate of success		
		No (n=3)	Yes (n=18)	p value
Obesity	No, n Yes, n	2 1	12 6	1
Parity	No, n Yes, n	2 1	2 16	0.08
Previous vaginal delivery	No, n Yes, n	2 1	3 15	0.128
Diabetes mellitus	No, n Yes, n	2 1	14 4	1
Type of uterovaginal prolapse	Uterine prolapse, n Uterine prolapse and anterior wall prolapse, n Uterine prolapse and posterior wall prolapse, n	3 0 0	12 5 1	0.497
Severity of uterovaginal prolapse	Grade I–II, n Grade III–IV, n	1 2	1 17	0.271
Type of mesh	Single, n Double, n	3 0	15 3	1

Notes: The Fisher's exact test was used for univariate analysis of numerical data.

mellitus, type of POP, grade of POP, and type of mesh. Because of the limited number of cases (n = 3), multivariable regression analysis to identify predictors of recurrence following laparoscopic sacrohysteropexy could not be performed.

Discussion

In our retrospective analysis, we documented our experience at a single center, involving laparoscopic sacrohysteropexy for the management of 21 patients with uterovaginal prolapse. Our findings demonstrated the technical feasibility, safety, and beneficial utility of the procedure.

In Saudi Arabia, the rate of POP is relatively high, ranging from 20% to 25% according to recent statistics from large-sized cross-sectional studies.[23,24] The application of laparoscopic sacrohysteropexy as a potential management strategy is very limited in Saudi Arabia. It is the standpoint of the authors that it appears that the employment of laparoscopic sacrohysteropexy program faces a multitude of challenges attributable to administrative disagreement, reduced patient willingness, insufficient public awareness, and deficiency of national surgical proficiency. In 2023, Alsahabi et al conducted a pioneering investigation to scrutinize the effectiveness and safety of sacrocolpopexy/sacrohysteropexy in a Saudi setting.[15] The study also aimed to identify indicators of recurrence in this context. During the period from 2009 to 2021, the authors tracked all women who had undergone sacrocolpopexy (n = 144) and sacrohysteropexy (n = 56). For the treatment of anterior, apical, and posterior vaginal prolapse, the success rates (defined as postoperative prolapse grade of 0 or 1) were 96.8%, 99.4%, and 85.2%, respectively. Among the 27 failure cases, the occurrence of failure occurred between 40 days and 11.5 years post procedure. After accounting for potential confounding factors, older age and the presence of diabetes were identified as the sole significant factors associated with operation failure. Regarding morbidities, six cases mandated reoperation. Also, two cases experienced bowel obstruction which took place two and seven years postoperatively. Additionally, one patient encountered vaginal mesh exposure postoperatively.[15]

On the other hand, Daniels et al assessed the role of laparoscopic mesh sacrohysteropexy on 157 patients with symptomatic prolapse, based on the experience of an Australian setting.[17] The primary endpoint measured the success rate based on the POP-Q system. Secondary endpoints included the rates of complication and the outcomes of patients with stages III–IV prolapse. Among the patients, 134 patients underwent laparoscopic sacrohysteropexy with simultaneous vaginal prolapse repair, while four patients had isolated laparoscopic sacrohysteropexy. Postoperatively, the average change from preoperative point C was 7.6 cm. At the postoperative 4–6-week follow-up, 136 out of 136 patients had stage 0 POP-Q scores, indicating successful outcomes. Among them, 22 patients experienced prolapse recurrence, while cure was observed in 116 patients at their latest follow-up. The recurrence of prolapse was associated with anterior vaginal mesh, number of vaginal deliveries, prior prolapse operation, and pre-surgical advanced stage III–IV disease.[17]

A minimum 7-year follow-up randomized study was performed to compare the clinical utility of laparoscopic mesh sacrohysteropexy and vaginal hysterectomy with apical suspension in treating uterine prolapse in 101 women.[13] None of the participants reported any adverse events associated with the mesh. The objective success rate based on apical reoperation was 83% after vaginal hysterectomy and 94% after laparoscopic mesh sacrohysteropexy. The hazard of reoperation for apical prolapse was significantly reduced in laparoscopic mesh sacrohysteropexy arm compared with vaginal hysterectomy arm (6.1% vs 17.2%). In addition, laparoscopic sacrohysteropexy demonstrated a longer total vaginal length (9 cm versus 6 cm) and a higher apical suspension (POP-Q point C −5 versus −4.25) and a compared with vaginal hysterectomy. The study concluded that laparoscopic sacrohysteropexy and vaginal hysterectomy with apical suspension exhibit similar rates of reoperation and patient-reported endpoints. Moreover, laparoscopic sacrohysteropexy offers potential advantages, such as a reduced odd of apical reoperation, enhanced apical reinforce, and higher total vaginal length.[13]

Using the abdominal approach for sacrohysteropexy, Khan et al reported a 100% success rate among 60 patients with POP.[16] In contrast, Moiety et al reported subjective and objective success rates of 82% and 94%, respectively, at six months postoperatively.[19]

Preserving the uterus is crucial for young patients, promoting pelvic floor support, maintaining fertility, as well as enhancing sexual function and overall well-being.[14] This approach reduces the risks associated with hysterectomy and can be completed more efficiently.[14] In our study, the technical feasibility of laparoscopic sacrohysteropexy was evident in the acceptable parameters for operative time, blood loss, duration of operation, and length of hospitalization. No major

intraoperative or postoperative morbidities were faced in our study, reflecting the safety of the operation. The low frequency of laparoscopic sacrohysteropexy-related morbidities is consistent with previous reports.[13,15–19]

Our results revealed that laparoscopic sacrohysteropexy achieved a success rate of 85%, which is consistent with previously published investigations ranging between 80% and 100%.[13,15–19] Several parameters have been depicted to impact the risk of recurrence or failure following surgery for POP. For example, young age has been documented as a notable risk factor for the recurrence of POP following surgery.[25,26] Nonetheless, Alsahabi et al reported a contradictory finding whereby older age was linked to higher rate of POP prolapse.[15] High BMI and tobacco smoking are additional substantial risk factors for POP recurrence.[27] Further risk factors associated with higher failure rates following POP surgery include anterior vaginal mesh, number of vaginal deliveries, prior prolapse operation, and pre-surgical advanced stage III–IV disease.[17]

Schiavi et al evaluated the effectiveness and safety of vaginal native tissue repair for symptomatic posterior compartment repair of rectocele in 151 patients.[28] With a median follow-up of 64 months, the median operative time was 55 minutes, and the median hospital stay was 2 days. There were no intraoperative complications. At follow-up, the objective cure rate was 88.2%, with 11.3% of patients experiencing recurrent posterior vaginal descent of stage II or higher. Significant improvements were observed in defecatory dysfunctions, vaginal digitation, and vaginal bulge. Quality of life, as measured by the Prolapse Quality-of-Life, Pelvic Floor Disability Index, and Pelvic Floor Impact Questionnaire, improved significantly post surgery. Additionally, the percentage of patients engaging in regular sexual activity increased, and instances of dyspareunia decreased. The study concluded that vaginal native tissue repair is a safe and effective treatment for symptomatic rectocele, offering low complication rates and enhancements in POP-related symptoms, quality of life, and sexual function.[28]

Our study has several strengths that should be acknowledged. First, the literature on laparoscopic sacrohysteropexy for management of POP is very scarce from Saudi Arabia and our current research aimed to bridge this gap. Second, a single surgeon conducted all surgeries, ensuring uniformity in surgical techniques across all cases. Third, we used objective tools to define the success rate of the procedure. Nonetheless, our study also has several limitations that should be admitted. First, the small sample size of our cohort represents the major limitation, which prevented us from arriving at powerful conclusions and performing reliable subgroup analyses. Second, our study was carried out exclusively on patients from a single hospital, all of whom underwent surgery performed by a sole surgeon, hence this limitation might hinder the generalization of our conclusions. Third, we did not explore the patients' self-reported improvement in their symptoms, which is also equally important to the objective assessment of surgical success. Fourth, we did not evaluate the preoperative and postoperative changes in POP-Q scores, including Ba, Bp, C, TVL, and Gh.

Our retrospective analysis from a single center underscores the technical feasibility, safety, and effectiveness of laparoscopic sacrohysteropexy in managing uterovaginal prolapse among 21 patients. These findings suggest that laparoscopic sacrohysteropexy is a viable option for patients with uterovaginal prolapse, offering significant clinical benefits. By contributing valuable data to the scarce Saudi literature, this research helps to fill gaps in the local context and supports the broader international understanding of the procedure. Future research should focus on larger, multicenter studies to validate these results and compare the long-term outcomes of laparoscopic sacrohysteropexy with other surgical interventions. Additionally, exploring patient-reported outcomes and quality of life measures will provide a more comprehensive understanding of the procedure's impact.

Conclusions

Laparoscopic sacrohysteropexy for management of uterovaginal prolapse revealed technical feasibility, safety, and efficacy of the procedure. Our results were in line with previous research. In view of the limitations presented, further large-sized and multicenter studies are needed to gather additional pertinent information on laparoscopic sacrohysteropexy.

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the local Institutional Review Board (IRB) and Research Advisory Council (RAC) at King Faisal Specialist Hospital and Research Center, Jeddah,

Saudi Arabia (RAC approval identifier: 2023-93). Informed consent was obtained from all study participants prior to study commencement.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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