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Comparison of Different Laparoscopic Sacrocolpopexy Procedures: A Retrospective Dual Center Analysis

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Rezumat

Comparația a două tipuri de sacropexie: analiza retrospectivă a două centre

Introducere: Prolapsul organelor pelvine (POP) afectează până la 50% dintre femei şi are un impact semnificativ asupra calității vieții. Sacrocolpopexia abdominală este tratamentul standard de aur pentru prolapsul bolții, iar sacrocolpopexia laparoscopică are multe avantaje. Acest studiu şi-a propus să compare rezultatele a două proceduri laparoscopice de sacrocolpopexie efectuate în două centre chirurgicale diferite.

Material şi metode: Obiectivul principal al acestui studiu retrospectiv a fost acela de a evalua fezabilitatea intervenției chirurgicale, precum şi rata complicațiilor asociate procedurilor de sacrocolpopexie efectuate în Centrul A (folosind plasă auto-fixantă) şi Centrul B (folosind plasă ce necesită mijloace auxiliare de fixare). Obiectivele secundare au inclus evaluarea duratei spitalizării, rata de readmisie şi rezultatele chirurgicale. Studiul a inclus pacienți tratați între ianuarie 2019 şi octombrie 2023.

Rezultate: Au fost incluşi treisprezece pacienți, şase de la Centrul A şi şapte de la Centrul B. Caracteristicile pacienților, cum ar fi vârsta şi indicele de masă corporală, au fost similare între cele două grupuri. Timpul operator şi durata spitalizării nu au fost semnificativ diferite. Centrul A a raportat o complicație postoperatorie (eroziunea plasei), care a apărut la doi ani după sacrocolpopexie şi a necesitat înlăturarea acesteia, realizată pe

cale laparoscopică. Centrul B a raportat, de asemenea, o conversie la laparotomie din cauza acidozei metabolice şi a hipercapniei.
Concluzie: Cele două tehnici de sacrocolpopexie laparoscopică au fost sigure şi eficiente pentru tratarea POP, iar studiul nostru a confirmat importanța opțiunilor de plasă şi fixare. Sunt necesare cercetări suplimentare pentru a îmbunătăți înțelegerea acestor tehnici chirurgicale.

Cuvinte cheie: prolapsul organelor pelvine, sacrocolpopexie laparoscopică, complicație legată de plasă, plasă auto-fixantă

Abstract
Introduction: Pelvic organ prolapse (POP) affects up to 50% of women and has a significant impact on quality of life. Abdominal sacrocolpopexy is the gold standard treatment for vault prolapse and laparoscopic sacrocolpopexy has many advantages. This study aimed to compare the results of two laparoscopic sacrocolpopexy procedures performed at two different surgical centers.
Materials and methods: The primary objective of this retrospective study was to assess surgical feasibility and complication rates associated with sacrocolpopexy procedures performed at Center A (using self-fixating mesh) and Center B (using sutured mesh). Secondary objectives included assessment of length of hospital stay, readmission rates, and surgical outcomes. The study included patients treated between January 2019 and October 2023.
Results: Thirteen patients, six from Center A and seven from Center B, were included. Patient characteristics, such as age and body mass index, were similar between the two groups. Operative time and length of stay were not significantly different. Center A reported one post-operative complication (mesh erosion), which occurred two years after surgery and required laparoscopic intervention. Center B also reported one conversion to laparotomy because of metabolic acidosis and hypercapnia.
Conclusion: The two laparoscopic sacrocolpopexy techniques were safe and effective for treating POP and our study confirmed the importance of mesh and fixation choices. Further research is needed to improve understanding of these surgical techniques.

Key words: pelvic organ prolapse, laparoscopic sacrocolpopexy, mesh complication, self-fixating mesh

Introduction

Pelvic organ prolapse (POP) is one of a group of pelvic floor disorders that include pelvic pain and sexual dysfunction as well as urinary and fecal incontinence (1). It affects up to 50% of women and can significantly reduce quality of life (2). POP occurs when the pelvic floor muscles or the connective tissues weaken, leading to the descent or bulging of pelvic organs such as the uterus, rectum, bladder, small intestine, or vaginal vault after hysterectomy into or beyond the vaginal introitus (3).

Management of POP has evolved over the years, with various treatment options available depending on severity and patient preference. Among these approaches, abdominal sacrocolpopexy is considered to be the gold standard for vault prolapse (4). Laparoscopic sacrocolpopexy was introduced in 1994 by Nazhat et al, who reported an objective cure rate of 100% (5). Since the introduction of this approach, many studies have reported

advantages such as lower recurrence rates, shorter hospital stays and recovery times, and a lower incidence of dyspareunia (4-6).

Our retrospective study aimed to evaluate and compare the intraoperative feasibility and complication rates of laparoscopic sacrocolpopexy procedures performed at two different surgical centers. The procedures used two different types of mesh: one was self-fixating and the other required sutures for fixation. The secondary aim was to evaluate surgical outcomes postoperatively.

Materials and Methods

This retrospective comparative study was conducted to investigate and compare the outcomes of sacrocolpopexy procedures performed at two geographically distinct surgical centers: Center A and Center B.

Study Objectives

The primary objective was to evaluate the intraoperative efficacy and complication rate of laparoscopic sacrocolpopexy. The secondary objective of the study was to assess length of hospital stay and readmission rates.

Study Design

Center A was Surgical Clinic 1 at the Emergency Clinical County Hospital in Târgu Mureş, Romania. Laparoscopic sacrocolpopexy procedures at this center were typically performed by a multidisciplinary team that included general surgeons, a urologist, and a gynecologist. Center B was Surgical Clinic 1 at the Emergency County Hospital in Craiova, Romania. Procedures were typically performed by a surgical team that included preoperative gynecologic and urologic specialists.

Surgical failure was defined as POP recurrence above grade I, according to POP Quantification System (7). Complications were considered to be short-term if they occurred within six months after surgery, and long-term if they occurred after six months. Surgical time was calculated from the time of the skin incision to closure. Length of hospital stay was calculated as the time from admission to discharge. Both centers used the same pelvic prolapse quantification system according to Pelvic Organ Prolapse Quantification system, which classifies prolapse as: stage 0- no prolapse is observed; stage I- the most distal part of the prolapse is located 1-centimeter above the hymen; stage II- the prolapse is situated between 1 cm above and below the hymen; stage III - the most part of the prolapse is 1 cm beyond the hymen, but it is not everted completely; stage IV - complete eversion or eversion within 2 cm of the total vaginal length of the lower genital tract (7).

Surgical Procedure

Sacrocolpopexy in Center A

The procedure in Center A was performed using the Parietex ProGrip™ Self-Fixating Mesh (Medtronic, Minneapolis, MN, USA). In all cases, four trocars were used: one 10 mm trocar in the right paraumbilical region; one 10 mm trocar below the umbilicus, lateral to the epigastric vein on the right side; and two 5 mm trocars in the lower quadrants. The peritoneal cavity was first examined to assess any abdominal pathology. In cases where the patient had had a previous hysterectomy, we proceeded with sacrocolpopexy; otherwise, we performed a total extracapsular hysterectomy. The uterus was first mobilized by incision of the broad ligaments and we continued by identifying and ligating the uterine vessels. The uterus was then excised and removed from the pelvic cavity. Hemostasis was maintained and continuous barbed sutures were used for vaginal cuff closure. We then mobilized the bladder by incising the peritoneum anterior to the uterus and the vesicouterine peritoneal fold. The sacral promontory was identified and used as a reference point for subsequent dissection. Then, the rectum and mesorectum and posterior vaginal wall were mobilized, ensuring adequate vaginal length for mesh attachment. Dissection of the pararectal

spaces. We measured the thickness of the rectum and mesorectum and prepared the self-fixating mesh by making the middle opening approximately 2-2.5 cm greater than the diameter of the rectum and mesorectum. The mesh was then placed in the peritoneal cavity protected by a non-adhesive filter. This was needed to protect the microgrips on the mesh, which adhered to nearby organs. Mesh fixation to the vaginal cuff and the promontory was achieved by the application of pressure with a surgical instrument. The fixation resembled a hammock on which the rectum was positioned (*Fig. 1*). Drainage of the pelvic cavity. Finally, the peritoneum was sutured and the skin was closed.

Sacrocolpopexy in Center B

The main surgical steps performed in Center B were the same as those described for the laparoscopic sacrocolpopexy in Center A. The main differences between the two procedures were the mesh used and the fixation method. In Center B, two meshes were used: one was sutured to the posterior vaginal cuff and the second to the anterior vaginal cuff; both were then sutured to the sacrum (*Fig. 2*). For mesh fixating a 2.0 braided non-absorbable suture material was used. Drainage of the pelvic cavity. The peritoneum was then sutured to cover the mesh, the pneumoperitoneum was released, and the incisions were closed.

Study Duration

Data were collected over four years and 10 months (from January 2019 to October 2023).

Data Collection and Statistical Methods

Electronic medical records were used to collect preoperative assessments, operative reports, and postoperative follow-up notes.

The GraphPad Prism version 6.0 for windows (GraphPad Software, Boston, Massachusetts USA) was used for statistical analysis. Descriptive statistics including means, medians, standard deviations, and percentages was used to summarize the data. Chi-square and t-tests were used to compare data between the two centers. Differences were considered statistically significant at $P<0.05$.

Results

A total of 13 patients were included; six were treated in Center A and seven in Center B. The mean age of the patients in Center A was 71.17 ± 5.0 years, ranging from 64 to 76 years, and the mean age in Center B was 67.57 ± 8.85, ranging from 55 to 78 years. Four of the 13 patients had grade III POP. The characteristics of the patients in the two groups were similar, although two patients from Center A had had a laparoscopic

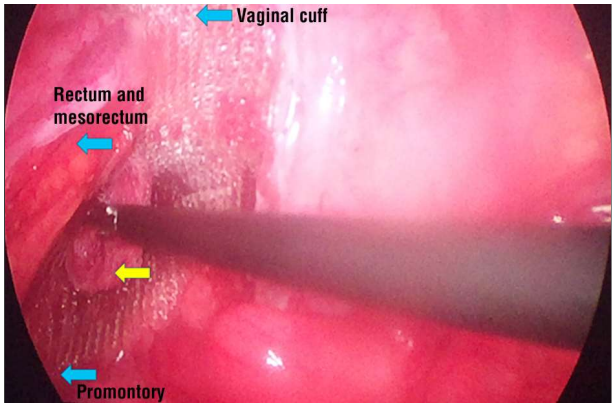

Figure 1. The yellow arrow indicates the mesh fixation by application of pressure using a surgical instrument.
*Photo from the Center A archive

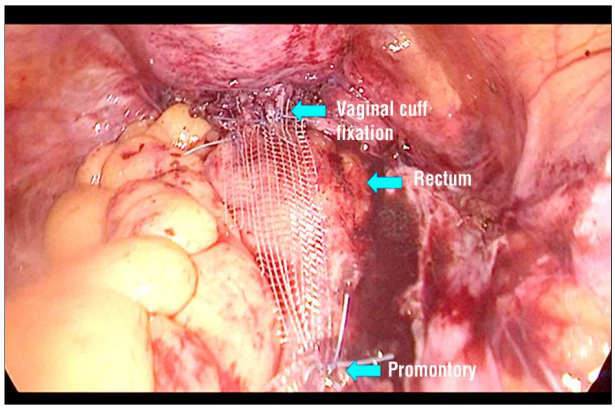

Figure 2. Mesh fixation in Center B.
*Photo from the Center B archive

Table 1. Perioperative characteristics and complications

	Center A (N=6)	Center B (N=7)	P
Age (year, mean ± SD)	71.17 ± 5.0	67.57 ± 8.85	0.3982
BMI (kg/m^2, mean ± SD)	29.36±1.89	30.89 ± 2.51	0.2474
POP grade			
I 0	0		
II 5	4		
III 1	3		
IV 0	0		
Parous (%)	83.33%	71.43%	
Post-menopausal (%)	100%	100%	
Operative time (minutes, mean ± SD)	146.67 ± 28.05	157.14 ± 42.71	0.6187
Hospital stay (days, mean ± SD)	6.67 ± 0.52	7.57 ± 2.82	0.4574
Concomitant surgical procedures			
Hysterectomy	33.33%	100%	
Adhesiolysis	100%	100%	
Hernia repair	0	1	
Intraoperative complication	0	0	
Postoperative complication	0	1	
Conversion	0	1	

BMI, body mass index; POP, pelvic organ prolapse; SD, standard deviation.

hysterectomy. There were no significant differences found between the two groups of patients in age, body mass index, operative time or length of hospital stay (*Table 1*).

One postoperative complication occurred in the group of patients treated in Center B. Two years after the procedure, a mesh erosion was reported (Clavien-Dindo IIIb) that required removal of the mesh. The procedure was performed using a laparoscopic approach (*Figs. 3, 4*).

In the group treated in Center B, one conversion to laparotomy was reported because the patient developed metabolic acidosis and hypercapnia. No intraoperative accidents or incidents and no readmissions were reported in Center A.

Discussion

The results of this retrospective study comparing surgical data from two surgical centers provide insights into the feasibility, complication rates and operative outcomes of laparoscopic sacrocolpopexy procedures.

Analysis of surgical feasibility and complication rates revealed several notable findings. Although no significant differences were found

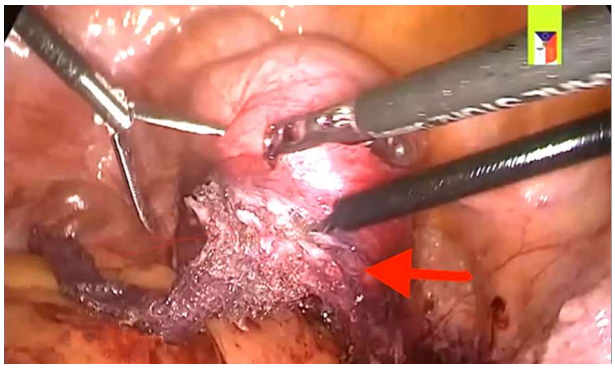

Figure 3. Removal of the mesh (red arrow indicates the mesh protruding into the vagina). *Photo from the Center B archive

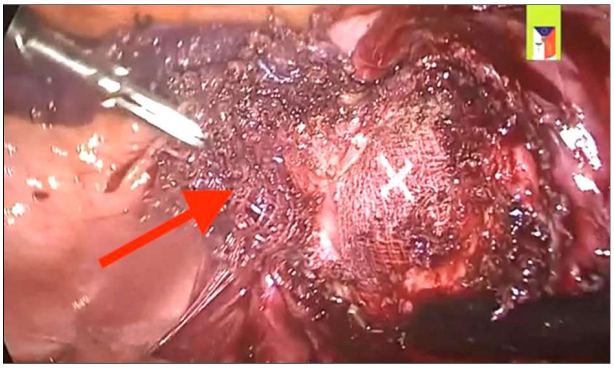

Figure 4. Removal of the mesh (red arrow indicates the mesh; white X indicates a white grouse introduced into the vagina to improve exposure). *Photo from the Center B archive

in patient age or BMI, operative time, or length of hospital stay between the two centers, there were considerable differences in the mesh used and the fixation methods. In Center A, Parietex ProGrip™ Self-Fixating Mesh (8) was used while Center B used a monofilament, macroporous polypropylene type I mesh. In addition, Center A used a self-fixating mesh while Center B used sutures to fix the mesh to the sacrum. Notably, Center B reported one postoperative complication involving mesh erosion, which occurred two years after the procedure and required subsequent laparoscopic intervention. This difference in postoperative complications between the two procedures highlights the importance of evaluating the choice of mesh and fixation method, although both techniques aim to maximize vaginal support.

The mean operative time in this study was not significantly different between the two groups, but was numerically higher in Center B. This was because mesh fixation required sutures and because all patients required a total hysterectomy. In addition, operative time reflects surgical volume and the performance of concomitant procedures (9). The mean operative time for this procedure varies in the literature. Texeira et al reported an operative time of 198 min, while Schiegg reported a mean operative time of 131 min (range: 90–200 min), and Mourad et al reported an operative time of 109.7 min (6,10,11).

The mean hospital stay appeared to be slightly longer in Center B than in Center A, but the difference was not statistically significant. When compared with data from the medical literature, the mean hospital stay was longer in both centers. Coolen et al reported a mean hospital stay of 2 days, and Texeira and al. reported that patients were discharged on the fourth day (12,13).

No organ injuries were reported in the studied groups. Lower urinary tract injuries can occur during sacrocolpopexy ranging from 0.4% to 10.6% (14), while bowel injuries range from 0.4% to 2.5% (15).

There was one conversion to laparotomy in Center B because the patient could not tolerate the pneumoperitoneum and developed metabolic acidosis and hypercapnia. Capmas et al reported a 7.14% conversion rate for laparoscopic sacrocolpopexy (16).

All patients included in this study were post-menopausal and more than half were parous (83.33% in Center A, 71.43 in Center B). While two patients treated in Center A had a history of hysterectomy, all patients treated in Center B had a concomitant total hysterectomy.

Neither of our centers reported a prolapse recurrence. In contrast, Kotani et al reported a laparoscopic sacrocolpopexy recurrence rate of 2.8% and a cumulative recurrence rate after 10 years of 3.7% (17). Alsahabi et al reported a 12-year recurrence rate of 15.9% (18).

Laparoscopic sacrocolpopexy offers a low risk of mesh exposure, between 0.7-1.4% (19,20). The mesh erosion rate has been reported to vary from 2% after 4 years of follow-up, increasing to 10.5% after 7 years (18). In our study, Center B reported one case of mesh erosion, which was resolved by laparoscopic mesh removal. Data from medical literature show that the risk of mesh exposure is increased in patients having a concomitant total hysterectomy (20), and also, when the vagina is opened accidentally during the surgery (21).

There are a few limitations to consider in this study because of its retrospective design. The data used for analysis were collected from medical records, which could introduce some recall bias. Additionally, it is possible that some patients did not attend follow-up visits, those who did not experience any complications, or sought treatment in other medical centers. Another important aspect that needs to be taken into consideration is that the procedures were performed in different surgical centers by different surgical teams. Consequently, the findings of this study may not apply universally. It is imperative to conduct studies involving centers to gain more comprehensive insights.

Conclusion

The promising results and low complication rates reported at both centers suggest that laparoscopic sacrocolpopexy was safe and effective for the treatment of POP. Further studies are needed to obtain additional data on the two sacrocolpopexy procedures reported in this paper.

Author's Contribution

All authors contributed to the study's conception and design. MB, DP collected the data and wrote a draft form of the manuscript. CM, VS, DP reviewed the article and offered feedback. MB performed the statistical analysis and CVM interpreted the results. All authors revised the manuscript and approved the final form.

Conflict of Interests

The authors declare no conflict of interest.

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Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approvals from the Ethics Committee (no. 29708/2023). Informed consent was obtained from all the patients included in this study.

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