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Clinical Outcomes of Laparoscopic Repair of Paravaginal Defects

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Abstract

In the era of minimally invasive surgeries, laparoscopic approach has been adopted in many surgical procedures as a successful alternative. Laparoscopic paravaginal repair is a good approach for surgical treatment of lateral type cystoceles. This prospective study was done to investigate whether laparoscopic paravaginal repair might be a reasonable alternative to open or vaginal routes in terms of success rate, operative and postoperative outcomes.

Fifty patients with clinically diagnosed paravaginal defect were included in this study. The overall success rate in our study was 88 % after one year according to prolapse staging. This is nearly comparable to the results of most studies.

Dividing the overall outcome into favorable and unfavorable, we reported that the unfavorable outcome was 22%. Unfavorable outcome includes cases of recurrence, persistent symptoms or appearance of new complaints.

***Conclusion:** Although laparoscopic paravaginal repair offers an alternative method with shorter hospital stay, less postoperative pain and quicker recovery, but it still has its drawbacks. It needs long learning curve and has prolonged operative time.*

Introduction

Anterior colporrhaphy has been the standard surgical option for anterior vaginal wall prolapse. However, it is associated with a 50% recurrence rate**.** This is because the classical anterior colporrhaphy primarily focuses on central defect, while paravaginal repair targets fascial defects. Since the central defect alone is rare [1].

The other concern with the vaginal approach to prolapse repair is that it produces scars and distortion of the vagina, potentially leading to sexual unsatisfaction, especially in younger women [2].

Permanent mesh kits have been introduced in an attempt to increase success rates, but their use has been limited by complications and long-term sequelae related to the techniques and materials used [3].

Paravaginal repair was initially done as a vaginal route, subsequent it has been performed abdominally and lastly as a laparoscopic procedure. Vaginal paravaginal repair (v.PVR) has a success rate ranging from 67.1% to 100% but higher complication are reported (including intraoperative bleeding, hematoma, abscess, severe postoperative blood loss, and bilateral ureteric occlusion) [4].

Laparoscopic paravaginal defect repair (P.VdR) regains the normal lateral support of the puboceirvical fascia to the archus tendineus fascia pelvis (ATFP) of the pelvic sidewall and gives good anatomical repair of the fascial defect cystocele [5].

Aim of the Work

Evaluation of use of laproscopy as a method in repair of anterior vaginal wall prolapse due to paravaginal defect regarding operative and postoperative short-term results.

Patients and method

Fifty patients complaining of lateral type of anterior vaginal wall prolapse or paravaginal defect were enrolled in this study that was carried out from January 2018 to December 2019 at the Obstetrics and Gynecology Department, Benha University. Egypt patients were selected from those attending the Obstetrics and Gynecology and Urology Outpatient Clinics. All patients had given a written informed consent to share in the study.

Inclusion criteria

Cases of anterior vaginal wall prolapse proved clinically as displacement type (paravaginal defect) by:

a. Inspection of anterior vaginal wall while the patient is straining in a lithotomy position and with separation of labia, reveals presence of anterior vaginal wall sulci and preserved mucosal rugae of the vagina over the prolapsed part.
b. Elevation of the anterior vaginal wall by Sim's speculum while the patient is straining in a lithotomy position, fails to correct the prolapse.
c. Elevation of the lateral aspects of the anterior vaginal wall by curved ring forceps while the patient bears down in lithotomy position, corrects the prolapse completely.

Exclusion criteria

1- Cases of anterior vaginal wall prolapsed proved clinically as distension type (central defect).
2- Patients with stress urinary incontinence.
3- Patients with associated uterine prolapse.
4- Previous surgery in retropubic space.
5- Contraindications of laparoscopy as cardiopulmonary diseases, more than previous two laparotomies, history suggesting peritonitis or pelvic endometriosis and Body Mass Index (BMI) $\geq$ 35 kg/m^2.

Methods

(A) Preoperative evaluation:

All patients had a standardized pre-operative asessment that include:

1- Detailed Taking of history

II- Physical examination:

All points except the tVL were recorded with the patients performing maximal Valsalva maneuver, patients were then assigned a POPQ stage:

- **Stage (0):** prolapse is not demonstrated
- **Stage (I):** The most dista part of the prolapse is more than 1 centimeter above hymenal ring.
- **Stage (2):** The most distl part of prolapse isles or equal to 1 centimeter proximl or distl to the hymenal ring.
- **Stage (3):** The most distl part of the prolapse is more than 1 centimeter below plane hymenal ring but bulges no more than two centimeters less than the tVL.
- **Stage (4):** complete eversion of the whole lower genital canal is observed.

III- Investigations:

- Laboratory studies in the form of urine analysis and culture, renal and liver function tests, complete blood picture, coagulation profile and blood grouping.
- Electrocardiography to exclude any cardiac problem.
- Pelvic ultrasound to exclude any pelvic pathology.

IV- Preoperative preparations:

1. Treatment of any associated urinary tract infection.
2. Treatment of any associated genital infection.
3. Treatment of precipitating factors.
4. Patients were evaluated by anesthesiologist.
5. Informed written consent before procedure was obtained.

(B) Operative procedure:

Anesthesia*:* A general anesthesia was used.
Position: The patient's legs were placed in the lithotomy position in adjustable stirrups with the arms are tuckd to the patient's sides, and Foley catheter was placed in the bladder.

Room setup: The patient should be in low dorsal lithotomy position

Steps of procedure:

- Creation of pneumoperitoneum:
- Trocar placement: infraumbilical 10 mm trocar was passed into the abdomen through the umbilical aponeurosis.
- Developing the retropubic space:

Identification of loose areolar tissue confirms dissection in the correct plane . The loose areolar tissue and fat in this space were swept away until we reach the pubic bone. As small vessels encountered, they were coagulated. Once we reach the pubic bone , the overlying loose tissue was bluntly dissected away to expose the bone and Cooper's ligament. Blunt dissection is continued until the retropubic anatomy is visualized. The anterior wall of the vagina and its points of lateral attachments from their origins at the symphysis pubis to their insertions in the ischeal spine can be viewed.

Sutures placement

The first stictch is placed nearly in the apex of the vaginal wall through the paravesecal part of the pubocervecal fasciae. The needle must pass through the same sided obturatour internal muscle and fasciae around the archus tendineous fasciae at teh origin one to two cm distl to the ischeal spine .

- **Closure of parietal peritoneum:**

We remove all the trocars under vision. CO_2 allowed to escape gradually, then the last trocar was removed under vision. Lastly, we close the skin using silk suture which is removed after 7 days.

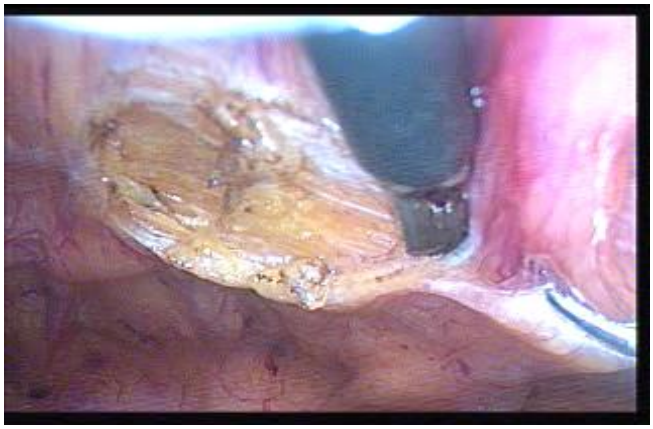

Figure 1: Parietal peritoneum incision.

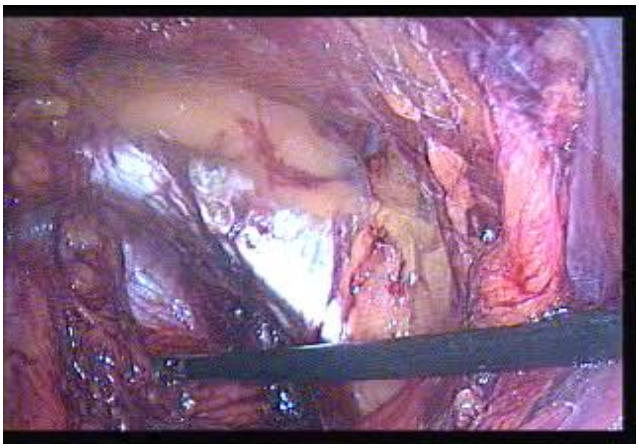

Figure 2: Enterance of retropubic space as an access to paravaginal defect.

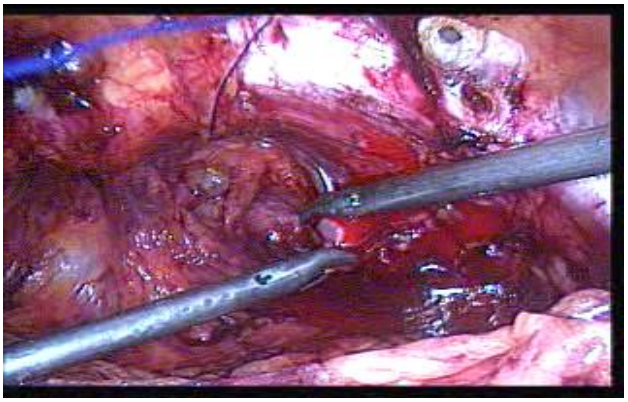

Figure 3: Suture placement in ATFP and obturator muscle and fascia.

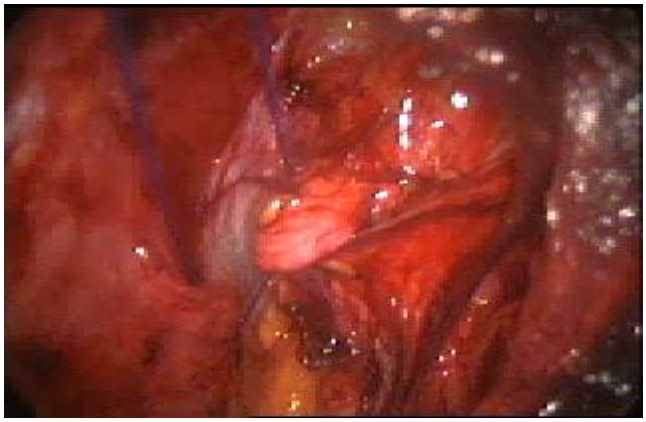

Figure 4: Approximation of the defect edges.

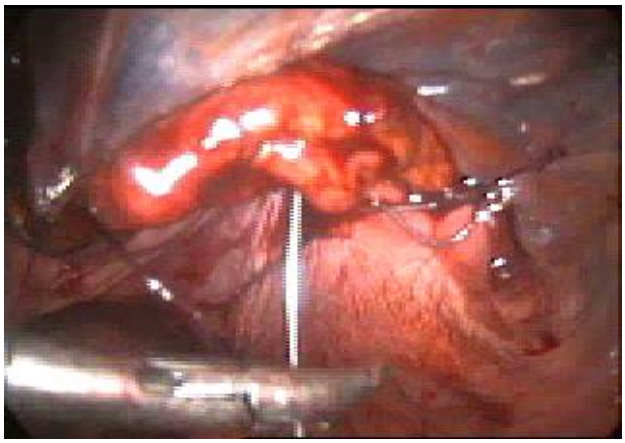

Figure 4: Closure of the peritoneum.

(C) Post operative Care:

All cases received Diclofenac potassium 100 mg and meperidine hydrochloride 50 mg intramuscular with anaesthesia recovery and 12 hours later second dose of diclofenac potassium was given.

Thromboprophylaxis in the form of 40-60 mg Enoxaparin (Clexane) is given 6-12 hours postoperatively as SC injections.

Foley's catheter was removed 6 hours postoperative except in complicated cases with bladder injury, removed 5-7 days after operation.

Discharge of patients once they could withstand post-operative pain and were tolerating regular diet and walk independently.

(D) Outcome measures:

A- The primary outcomes: includes

1- Operative outcomes

A) Operative time.
B) Blood loss:
The amount of blood loss was estimated by the amount in the suction container after subtracting the amount of fluid used for washing.
C) Operative morbidity: as bladder injury, intestinal or vascular injuries, anesthetic complications.

2- Post-operative outcomes:

A) Hospital stays.
B) Post-operative pain was assessed by Revised Faces Pain score through 12 hours postoperative period according to Revised Face Pain Scale (R-FPS) [6].

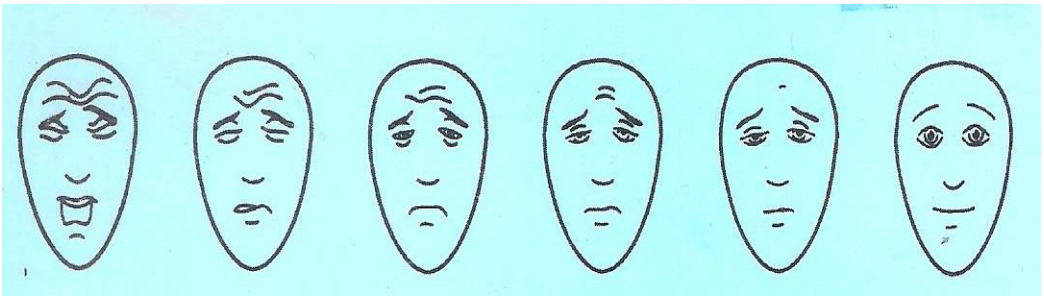

Figure 5: Revised Face Pain Scale (R-FPS).

C) Post-operative complications: as return to operative theatre, voiding difficulties, fever, haematuria, wound infection or urinary tract infection.

B- Follow up and re-evaluation (secondary outcomes):

All patients will be checked 6 months and one year after operation.
Success was defined as POPQ stage 0 and absence of surgical re-intervention for prolapse while anatomic failure was defined as a POPQ stage I or more or surgical intervention to repair recurrence of vaginal prolapse or to manage complication as fistula.

Finally, the results were tabulated in an investigative result form and statistical tests for descriptive and analytical data were performed.

Statistical analysis:

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences version 16.0. (**SPSS V16).** According to the type of data qualitative represent as number and percentage, normally distributed quantitative data represented as mean ± SD, and not normally distributed data represented as median and range.

Ethical Considerations

1. Written consent was obtained from all patients after full explanation of benefits and hazards of the surgical procedure that was performed for each patient, before getting them involved in the study.
2. The surgical procedure used in the present study have no harmful effect or threatening the patient's life and it is used in clinical practice.
3. Patients were informed about any abnormal results of the procedure performed, instructed and treated accordingly.
4. Patients had the right to refuse participation without affecting the medical core expected to be offered to them.
5. Confidentiality of all data and tests of the studied population was preserved.
6. Intraoperative photos and videos were taken routinely after patient consent for imaging and publishing.

Results

In this study, we studied 50 cases of anterior vaginl wall prolapse due to paravaginal defects & we found the following results:

Table 2 shows that mean operative time, blood loss, hospital stay and pain score were 117.6±14.01 minutes, 109.7±18.1 ml, 26.42±10.77 hours and 3.7±1.5 .the major complication among studied group was fever 26% followed by hematuria then bladder injury, vascular injury and lastly anesthetic complications (including one case of intra-operative arrhythmia and the other was delayed recovery from anesthesia) and there was no one suffered from intestinal injury. Table 3 shows that there was no significant difference between 6 month and one year follow up regarding complains, prolapse staging and long term complications except in urinary symptoms as it improved after one year. Unfavorable outcome includes cases of recurrence (6 cases), persistent symptoms (4 cases were still suffering from urinary and/ or sexual problems) or appearance of new complaints (1 case developed stress urinary incontinence). Table 4 shows that favorable outcome and unfavorable outcome groups are significantly different regarding anesthetic complications and fever as anesthetic complications were higher in unfavorable group but fever was lower in the same group. Table 6 shows that parity more than 4 is only independent predictor for unfavorable outcome.

		N=50	%
Age	**20-30**	**2**	**4.0**
	30-40	**36**	**72.0**
	>40	**12**	**24.0**
	Mean± SD (Range)	**38.3±3.58 (27-44)**	
Parity	**Two**	**8**	**16.0**
	Three	**12**	**24.0**
	Four	**18**	**36.0**
	Five	**10**	**20.0**
	Six	**2**	**4.0**

Table (1): Age and parity distribution of studied group.

	Operative time (min.)	**Blood loss (ml)**	**Hospital stay (hrs)**	**R-FPS**
Mean	**117.6±14.01**	**109.7±18.1**	**26.42±10.77**	**3.7 ± 1.5**
Range	**(90-145)**	**(80-200)**	**(16-65)**	**(2-6)**

intra-operative and immediate post-operative complications		**N**	**%**
Bladder injury	NO	**46**	**92.0**
	YES	**4**	**8.0**
Vascular injury	NO	**49**	**98.0**
	YES	**1**	**2.0**
Intestinal injury	NO	**50**	**100.0**
	YES	**0**	**0.0**
Anesthetic complications	NO	**48**	**96.0**
	YES	**2**	**4.0**
Fever	NO	**37**	**74.0**
	YES	**13**	**26.0**
Hematuria	NO	**43**	**86.0**
	YES	**7**	**14.0**

Table (2): Operative time, blood loss, hospital stay and pain score distribution Frequency distribution of intra-operative and immediate post-operative complications among studied group.

		6 Month Post-OP		**One year Post-OP**		**Z**	**P**
		N	**%**	**N**	**%**		
Urinary problems	NO	35	70.0	43	86.0	2.84	0.005*
	YES	15	30.0	7	14.0		
Sexual problems	NO	46	92.0	44	88.0	1.41	0.15
	YES	4	8.0	6	12.0		
Prolapse stage	NO	37	74.0	44	88.0	0.91	0.56
	One	9	18.0	2	4.0		
	Two	4	8.0	4	8.0		
Urinary Incontinence	NO	48	96.0	49	98.0	0.57	0.36
	YES	2	4.0	1	2.0		
Fistula	NO	50	100.0	50	100.0	0.00	1.00
	YES	0	0.00	0	0.00		
Others (Hernia, recurrent UTI)	NO	50	100.0	50	100.0	0.00	1.00
	YES	0	0.0	0	0.0		
Recurrence	NO	37	74.0	44	88.0	0.91	0.56
	YES	13	26.0	6	12.0		
	Total	50	100.0	50	100.0		

Table (3): Comparison between 6 month and one year follow up regarding complains, prolapse staging and long term complications among studied group.

		Favorable outcome N=39		Unfavorable outcome N=11		X^2	P
		N	%	N	%		
Bladder injury	No	36	92.3	10	90.9	1.56	0.21
	Yes	3	7.7	1	9.1		
Vascular injury	No	38	97.3	11	100.0	0.58	0.44
	Yes	1	2.7	0	0.0		
Anesthetic complications	No	39	100.0	9	81.8	7.38	0.007*
	Yes	0	0.0	2	18.2		
Fever	No	26	66.7	11	100.0	4.95	0.026*
	Yes	13	33.3	0	0.0		
Hematuria	No	34	87.1	9	81.8	2.29	0.13
	Yes	5	12.9	2	18.2		

Table (4): Comparison between favorable and unfavorable outcome groups regarding operative and immediate post operative complicatoins among studied group.

	Favorable outcome N=39	Unfavorable outcome N=11	t	P
Operative time	115.2±13.2	125.9±14.1	-2.319	0.025*
Blood loss	108.58±19.4	113.63±12.6	-0.810	0.422
Hospital stay	25.58±10.8	29.36±10.4	-1.026	0.310
R-FPS	3.7±1.59	3.7±1.36	0.00	1.000

Table (5): Comparison between favorable and unfavorable outcome groups regard operative time, blood loss and hospital stay.

	Wald	P	OR	95% C.I. for EXP(B)	
				Lower	Upper
Increase Operative time	0.110	0.741	1.012	0.942	1.087
Parity > 4	4.410	0.036*	3.395	1.085	10.625
Anesthetic complications	0.030	0.999	3.185	0.050	240.25
Fever	0.010	0.998	0.205	0.060	22.32

Table (6): Multivariate logistic regression analysis for independent predictor for unfavorable outcome of prolapse management.

Discussion

The overall success rate of laparoscopic paravaginal repair reported in the literature was ranging from 89 to100 %. Reports suggest that the operative time and the incidence of intraoperative complications relay on the learning curves and decline with increased surgical skills**.** In the current study the mean operative time is 117.6±14.01 min. It was comperable to the results of Chalia and Khullar (2005) [7].

On the other hand, our mean operative time was shorter than that reported by Grady et al. (2009) who consumed 2.9 hours as a mean operative time. This is explained by that they investigated the effect of both laproscopic Burch colposuspension plus paravaginal repair in treatment of cystocele [5].

In comparison to vaginal paravaginal repair, Viana et al (2006) results show no significant difference between the mean operative time of both approaches [8]. While Maggiore et al (2012) showed lower operative time of the vaginal route as they used Capio suture-capturing device [4].

As regards the mean amount of estimated blood loss in our study, it was 109.7±18.1 ml. This amount is calculated by subscriping of the amount of the fliud in the suction apparatus from the amount of fliuds used to wash the field. This result coincide with the results of Beker et al (2008) [9] but more than that was reported by Miklos and Kohli (2000) [10]**.** By the way, there was on case of vasular injury, namely superficial epigastric vessels during entery of one of the two lateral ports. This may expalin elevation of the mean amount of estimated blood loss in our study.
In comparison to vaginal route for paravaginal repair, Viana et al (2006) concluded that the estimated blood loss was

higher with risk of blood transfusion and postoperative haematomas formation [8].

In our study the mean duration of hospital stay was 26.42 ± 10.77 hours. This coincides with most studies as Beker (2008). Also, it was significantly shorter than both open abdominal and vaginal approaches. The vaginal route for reapir usually needs 24- 48 hours vaginal pack and urinary catheterization with mean hospital stay (4.9 days) reported by Viana et al (2006) [8,9].

In our study all patients received Diclofenac potassium 100 mg and meperidine hydrochloride 50 mg intramuscular with anesthesia recovery and 12 hours later second dose of diclofenac potassium was given. The pain score; using the revised faces pain scale; 3.7 ± 1.5 (table 7). That coincides with Gomelsky and Dmochowski (2012) [11]. Chaliha and Khullar (2005) also found laparoscopic technique was significantly less painful than open and vaginal ones but pain assessment was according to type and doses of analgesic given [12].

Regarding the incidence of intraoperative and postoperative complications as shown in table (8), our study showed four cases of intraoperative bladder injuries during dissection of the retropubic space that represents 8% which is nearly comparable to most of literatures as Beker (2008) and Chaliha and Khullar (2005) [9,12]. All cases were diagnosed intra-operatively and were repaired laparoscopically. The incidence of bladder injuries in the vaginal route showed by Viana et al (2006) and Maggiore et al (2012) is 7.1% and 7.8 % respectively which is insignificantly lower than that of laparoscopic route of repair [4,8].

One case of superficial epigastric vessels injury during entry was recorded in our study which was controlled by cauterization. Two cases of intraoperative anesthetic complications in form of intraoperative arrhythmia and other delayed recovery from anesthesia. Both had no impact on overall outcome.

Regarding postoperative complications in our study, the most frequent was fever which represents (26%) as shown in table 8. Most of cases were controlled by antipyretic and subsided maximally after 48 hours postoperatively. Hematuria was another postoperative complication affected (14%) of cases which explained by cases of bladder injury and manipulation beside the bladder during maneuver.

Hosni et al (2013) reported that there was no significant difference between the incidence of postoperative fever and hematuria between the different three methods of paravaginal repair (13).

The postoperative outcome recorded in our follow up period as shown in table 9 and 10 shows that there was significant improvement in urinary, sexual symptoms as well as stage of prolapse between preoperative and either 6 month or one year postoperatively. This result coincides with most of the studies as Gomelsky and Dmochowski (2012) [11]. By the way, all cases included in our study were less than stage 3 according to POPQ classification system as the advanced stages of anterior vaginal wall prolapse were either associated with uterine prolapse or concomitant urinary incontinence and both are excluded from the study as these cases need additional surgical procedures that may affect the overall outcome.

As comparison between outcome in 6 month and one year follow up as shown in table 11, there was no significant difference except in urinary symptoms as it was improved from 30% of cases still suffering at 6 months to 14 % at one year follow up period.

As shown in table 11, there were 2 cases of stress urinary incontinence appeared after six months; one of them was detrusor hyperactivity; diagnosed by urodynamics and was completely improved with treatment, and the other was sphincteric urinary incontinence associated with recurrent prolapse.

The overall success rate in our study was 88 % after one year according to prolapse staging. This is nearly comparable to the results of Nguyen and Burchett (2008) that reported success rate 89% [14].

In our study, there were 8 cases of recurrence after 6 months improved to be 6 cases only after one year. Cases of stage 1 or more according to POPQ classification system were considered recurrent cases. The explanation of recurrent cases in our opinion was either misdiagnosis of cases as paravaginal defect while they actually were central or mixed defect, or association of early uterine prolapse which increased subsequently and was proved clinically later on.

Dividing the overall outcome into favorable and unfavorable, we reported that the unfavorable outcome was 22% after one year. Unfavorable outcome includes cases of recurrence (6 cases), persistent symptoms (4 cases were still suffering from urinary and/ or sexual problems) or appearance of new complaints (1 case developed stress urinary incontinence).

Searching for the possible causes of unfavorable outcome, we noticed that the unfavorable outcome group were significantly longer than favorable group regarding operative time as shown in table 14. While accidently, postoperative fever was slightly commoner in favorable group. Lastly in **table 15,** we proved that parity more than 4 is the only independent predictor for unfavorable outcome.

Conclusion

Although laparoscopic paravaginal repair offers an alternative method with shorter hospital stay, less postoperative pain and quicker recovery, but it still has its drawbacks. It needs long learning curve and has prolonged operative time.

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