

A Comparison of Different Pelvic Reconstruction Surgeries Using Mesh for Pelvic Organ Prolapse Patients

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This study was carried out in order to compare the effects in different surgeries using mesh in pelvic organ prolapse patients whose leading points were C. Thirty-nine patients were categorized into 3 groups: group A pelvic reconstruction with hysterectomy; group B hysterectomy prior to pelvic reconstruction; and group C pelvic reconstruction with uterus preserved. At first visit, POP-Q stage was determined, and age, BMI, admission days, operation time, post-operative stage and complications were observed and results were analyzed and compared. All patients who were operated upon converted to stage one month following the operation, and no further change was observed except in one patient. Group admission days were not significantly different, but tended to be lower in group C. Group average operation times between 'group A and B' and 'group A and C' were statistically different. No significant difference was observed in post-operative complications between the groups, but 3 members of group A developed erosion, whereas no erosion occurred in groups B and C. Pelvic reconstruction using mesh is a highly efficient method of treating pelvic organ prolapse. Improvements in stage and post-operative complications were not significantly different in the groups. However, uteropexy showed a shorter operation time, fewer admission days, and less erosion due to mesh than conventional pelvic reconstruction with hysterectomy.

Key Words: Pelvic organ prolapse, pelvic reconstruction, mesh

INTRODUCTION

Pelvic organ prolapse is a prolapsed state of

intrapelvic organs such as uterus, bladder, rectum and some digestive organs due to damaged intrapelvic organ supporting tissue at a defective site of the vaginal wall. Pelvic organ prolapse is caused by dysfunction of the fibromuscular tissue that localizes the pelvic structure in the pelvic cavity.¹ In view of the proximities of female genitals, lower urinary tract, and lower digestive system, it is can be presumed that the pelvic organ prolapse can affect the functions of the bladder, urinary tract and rectum. Moreover pelvic organ prolapse causes not only cause urinary incontinence, but is also related to urinary track occlusion and bowel disorders that may induce recurrent urinary tract infections, rectocele, hydronephrosis, or urinary disturbance.²

In view of a report³ that pelvic organ prolapse, which is associated with quality of life rather than being directly associated with life itself, occurs more frequently on aging and at the time of menopause, and in about 50% of women with a delivery history, it is an important gynecological problem in aged women. Moreover, an effective treatment for pelvic organ prolapse becomes more necessary given the extended average life span, and provides a more active social life for women, it also substantially enhances the quality of life.

Olsen et al.⁴ reported that the causes of pelvic organ prolapse are aging, menopause, delivery history, obesity, smoking history, and chronic pulmonary disease. Kim⁵ reported that pelvic organ prolapse is caused by various factors that induce the weakening of the supporting functions of the fundus pelvis, such as, genetic factors, gynecological surgery history, vaginal delivery, neurological damage, smoking, obesity, internal factors,, and

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internal defects of the urethral sphincter. In addition, Parker et al.⁶ indicated the genetic collagenous tissue disease is one of the important latent causes of t prolapse, having found that pelvic organ prolapse shows different frequencies by races and family history, and that is commonly coexists with hiatal hernia and abdominal striae.

According to a report by Olsen et al., 1 in 11 American women need surgery for pelvic organ prolapse before the age of 80 years, and 30% of women operated upon need reoperation due to prolapse recurrence.⁴ Moreover, the frequency of pelvic organ prolapse after hysterectomy was reported to be 0.2 - 1% by Cruikshank and Cox in 1990,⁷ Lefranc et al. reported frequency 18.2% in 2002 and stated that pelvic organ prolapse is associated with bladder prolapse or rectocele.⁸ In view of fact that most women with pelvic prolapse undergo only preservative treatment, or do not receive any treatment, then more women will probably experience prolapse. Since the pelvic urethral bladder sling operation was performed by Marshall et al. in 1949, many pelvic reconstruction surgery methods have been developed. However, an unacceptable number of cases require retreatment due to a high rates of postoperative recurrence.⁹

Mesh has been used in abdominal prolapse correcting surgeries in our department of general surgery for a some time, and is now used to fix pelvic organs to the posterior pelvic cavity in pelvic organ prolapse and urinary incontinence surgeries. It is also used in the urethral slings and in similar surgical modalities in gynecology field.

However, the use of mesh, an alien substance, can cause dysuria, erosion in the lower urinary tract, vagina, or abdominal tissue, and can induce synechia in the intestines leading to intestinal occlusion.^{9,10} Accordingly, the ideal mesh should be bio-compatible and durable, to maintain steady tension, but should not cause allergic reactions or induce infection. Mesh should also be aseptic, non-carcinogenetic, strong enough to be endure mechanical impact, it should also be readily available and corrosion resistant.⁹ Nevertheless, we lack the objective information on the side effects of using mesh.

Current topics of discussion in pelvic reconstruction surgery using the mesh are, should the

uterus be resected,² and should a healthy organ be eliminated or not due to an uterine disease. However, no study has compare the postoperative effects and complications of pelvic reconstruction using mesh between in performing together with hysterectomy and in preserving the uterus. Therefore, we designed this study to investigate patients with pelvic organ prolapse, a leading point C, who underwent pelvic reconstruction using mesh, and compared the results in cases that underwent pelvic reconstruction together with hysterectomy, hysterectomy prior to pelvic reconstruction, or only uteropexy with uterus preservation.

MATERIALS AND METHODS

We conducted retrospective analysis on a 39 patients with a chief complaint of pelvic organ prolapse who were admitted to the Department of Gynecology and Obstetrics at Yonsei University Severance Hospital and who underwent pelvic reconstruction using mesh between March 1, 1999 and May 2002, and who were followed-up for more than 1 year. This study was approved by the hospital's institutional review board.

Patients were categorized into 3 groups. Group A underwent hysterectomy and pelvic reconstruction together; Group B underwent hysterectomy prior to pelvic reconstruction; and Group C underwent only pelvic reconstruction with uterus preservation. We performed whole hysterectomy, pexis through abdomen, sacrum and vagina, vaginal wall surrounding revision, colpoplasty, suprapubic cystotomy and cytoscopy on group A; pexis through abdomen, sacrum and vagina, vaginal wall surrounding revision, colpoplasty, suprapubic cystotomy and cytoscopy on group B; and uteropexy, vaginal wall surrounding revision, colpoplasty, suprapubic cystotomy and cytoscopy on group C.

The POP-Q stage of each patient was determined by a conducting thorough physical examination and by confirming medical history, age, delivery history, body mass index (BMI), menopause state, and abnormal urinogenital symptoms at the first hospital visit,¹¹ Admission days, operation times and postoperative acute hemorrhage

levels were observed during hospitalization. Patients were interviewed at an outpatient clinic for the postoperative POP-Q disease stage change, complications, and urogynecologic problems 1, 3, 6, 9, and 12 months after release from hospital.

The Kruskal-Wallis test was used to compare ages, delivery histories, BMIs, admission days, operation times and hemoglobin concentration changes. Fisher's exact test was used to compare preoperative urogynecologic symptoms and pelvic prolapse stage. The level of significance was set at $p < 0.05$.

RESULTS

Of 39 study subjects, 19 patients belonged to group A, and group B and C contained 10 patients each. Patient's age, delivery history and BMI distribution was not statistically significant between groups, and neither was the existence or absence of the preoperative urogynecologic disease. Many patients in group A were in stage IV. All patients excluding 1 case in group C were in menopause (Table 1).

Group admission days were not significantly different, but were shorter in group C. The mean operation time was significantly longer in group A. Hemoglobin concentrations at the 1st postoperative day was not significantly different from preoperative values.

As for postoperative acute complications, post-

operative fever was observed in total 11 of the 39 cases, and group A showed this complication most in 8 cases. In addition, transfusion due to postoperative hemorrhage was conducted in 10 cases, and urination promoter (cholinergic medication and alpha receptor blocker) was used in 19 cases with postoperative dysuria. In addition, second abdominal suturing was performed in 3 cases because of the dehiscence. Intestinal obstruction occurred in 2 cases and 1 case showing cystitis symptoms and was readmitted to hospital for treatment. However, no cases of phlebothrombosis or pulmonary artery embolism occurred, which are generally found postoperatively (Table 2).

All of the 21 (54%) patients in stage IV became stage 0 during the 1st postoperative month. Of these, 1 (5%) case was stage II at the 3rd postoperative month and this stage was subsequently for 1 year. All 17 (44%) cases in preoperative stage III, and 1 (2%) case in preoperative stage II achieved stage 0 at the 1st postoperative month, and all were maintained through the 1-year follow-up (Table 3).

Postoperative urologic complications were, constipation in 6 (15%) cases after 1 postoperative month, detrusor instability in 4 (10%) cases, urgent urination in 3 (8%) cases, and frequent urination in 2 (5%) cases. There were not significantly different but were most common in group A. At the 3-month postoperative follow-up cases in

Table 1. General Characteristics of Operation Patients

	A (n=19)	B (n=10)	C (n=10)	Chi-square (p-value)
Age (yrs)	66 (59 - 85)*	63 (59 - 81)	65 (33 - 78)	1.06 (0.588) [†]
Parity	4 (1 - 7)	4 (2 - 7)	4 (2 - 8)	0.47 (0.792) [†]
BMI (kg/m ²)	23.4 (17.8 - 31.0)	23.0 (19.4 - 28.1)	23.6 (17.6 - 29.1)	0.68 (0.712) [†]
Urologic Sx	15/19	9/10	8/10	0.58 (0.872) [†]
Preoperative stage				12.04 (0.008) [‡]
2	0 (0.0%)	0 (0.0%)	1 (100.0%)	
3	4 (23.5%)	6 (35.3%)	7 (41.2%)	
4	15 (71.4%)	4 (19.0%)	2 (9.5%)	

* median (interval).

[†] Kruskal-Wallis test.

[‡] Fisher's exact test.

Table 2. Results of Operation

	A* (n=19)	B† (n=10)	C‡ (n=10)	Chi-square (p-value)
Admission day (days)	12 (9 - 60) [§]	12 (8 - 21)	11 (8 - 14)	2.63 (2.268)
Op time (min)	220 (180 - 250)	175 (130 - 210)	180 (170 - 240)	17.64 (0.0001)
Hb loss (mg/dl)	1.7 (0 - 5)	2.65 (-0.5 - 3.7)	2.5 (1.8 - 3.6)	2.07 (0.35)
Acute complication				
Fever	8	2	1	
Transfusion	5	3	3	
2° closure	2	1	0	
Re-admission	1	0	0	
Ileus	0	1	1	
UTI	1	0	0	
Urethral dilatation	0	0	1	

*TAH, Abdomino-sacral colpopexy with mesh, Paravaginal repair, A-P repair, Burch colposuspension, Suprapubic cystostomy, Cystoscopy.

† Abdomino-sacral colpopexy with mesh, Paravaginal repair, Burch colposuspension, P-repair, Suprapubic cystostomy, Cystoscopy.

‡ Abdomino-sacral uteropexy with mesh, Paravaginal repair, P-repair, Burch colposuspension, Suprapubic cystostomy, Cystoscopy.

[§]median(interval).

^{||} Kruskal-Wallis test.

Table 3. The Change of POP Stage (n=39)

	Stage	Preop	1 months	3 months	6 months	12 months
Group A (n=19)	0		19	18	18	18
	I					
	II			1	1	1
	III	4				
	IV	15				
Group B (n=10)	0		10	10	10	10
	I					
	II					
	III	6				
	IV	4				
Group C (n=10)	0		10	10	10	10
	I					
	II	1				
	III	7				
	IV	2				

Table 4. Postoperative Complication

	A(n=19)	B (n=10)	C (n=10)
1 month later			
Constipation	4 (21%)	1 (10%)	1 (10%)
Detrussor instability	2 (11%)	1 (10%)	1 (10%)
Urgency	1 (5%)	2 (20%)	
Frequency	1 (5%)	1 (10%)	
3 month later			
Vaginal erosion	3 (16%)		
Urgency	2 (11%)		
Constipation	1 (5%)	1 (10%)	
Frequency	1 (5%)		1 (10%)
Urinary incontinence	1 (5%)	1 (10%)	
6 month later			
Vaginal erosion	3 (16%)		
Frequency	1 (5%)		
Urinary incontinence	2 (11%)	2 (20%)	
12 month later			
Vaginal erosion	3 (16%)		
Frequency	2 (11%)	1 (10%)	
Urinary incontinence	1 (5%)	1 (10%)	

group A showed the vaginal erosion, constipation, frequent urination, and urinary incontinence. In the subsequent follow-up, frequent urination, incontinence, and vaginal erosion were continuously observed, but these symptoms and frequencies reduced with time (Table 4). No recurrence occurred during the follow-up period.

DISCUSSION

The pelvic organ prolapse is a state whereby the uterus, bladder, or and some digestive organ is prolapsed from its normal anatomical location due to a defect in the intrapelvic organ supporting structure. Pelvic reconstruction is conducted to maintain urination and defecation continence and to allow sexual functioning by preserving the vagina by correcting those anatomical

defects caused by pelvic organ prolapse.^{10,12}

Generally, the most important causes of pelvic organ prolapse are related to damage caused during vaginal delivery or by hysterectomy. Vaginal delivery may damage nerves distributed in the pelvic fundus muscle due to direct pelvic muscle damage by the infant head, and secondarily may induce pelvic myoatrophy.¹² Pelvic surgeries like hysterectomy cause not only anatomical deformation but also neuro- and hemo-circulatory disorders that may generate pelvic myoatrophy.¹³

The principal treatment for pelvic organ prolapse is surgical correction if there is no contraindication to anesthesia or surgery. Preservative therapy using pessary is used in cases with surgical problems caused by accompanying internal disease or an advanced age, which increase surgical risk, or in those who do not feel comfortable

about surgery.^{14,15} However, despite its recent common use and its advantages laparoscopy is unstandardized as yet.¹⁶

Pelvic reconstruction using mesh is a highly effective method of the pelvic organ prolapse treatment because it shortens operation time, reduces viral infection, and decreases intravaginal cavity damage during the operation, thus increasing the likelihood of a postoperative sexual life.⁹ According to a retrospective study by Valaitis et al., the curative rate of pelvic reconstruction using mesh is 88%,¹⁷ and Costantini et al. reported that over 90% of the patients were satisfied with surgery.² In the present study, all patients achieved stage changes from IV to 0, exclusive of 1 case that achieved stage II, during the follow-up. Moreover, all urogynecologic diseases including urinary incontinence, complained of before surgery were improved. Adverse reactions after pelvic reconstruction using mesh include, intestinal occlusion, neurological damage, hemorrhage, intestine and bladder injuries, urinary incontinence, constrictor instability, dysuria, and infection and vaginal erosion caused by the mesh, in addition to phlebothrombosis and pulmonary embolism that can generally occur after major surgery.¹⁷ In particular, Podratz et al.¹⁸ and Kohlie et al.¹⁹ reported prevalences of vaginal erosion after surgery using mesh after hysterectomy of 4% and 8%, respectively.

We observed postoperative intestinal occlusion, hemorrhage, detrusor instability, constipation, urgent urination, frequent urination, urinary incontinence, and vaginal erosion. However, we did not observe principal complications of pulmonary embolism, phlebothrombosis, or neurological damage. Vaginal erosion was found in 3 cases, and all of these cases were included in group A.

Postoperative adverse reactions were acute symptoms but these were not significantly different between groups, except for group A, which showed the highest rate of postoperative fever and vaginal erosion as both chronic complications.

Uteropexy is indicated in cases where a young woman desires a future baby and preservative treatment for pelvic organ prolapse has failed, or in cases with a congenital deformation, or when a patient wishes to preserve the uterus. More-

over, uteropexy is a simpler method than colpoplasty after hysterectomy, and has the advantages of reducing the bleeding, operation time, and admission days. Although patient numbers were small, Constnatini et al. reported that patients were similarly satisfied with uteropexy in comparison with the colpoplasty after hysterectomy.² Banu et al. also reported that uteropexy performed on young women did not induce any postoperative complications or recurrence, and did not cause any problems in terms of future pregnancy.²⁰ Based on our results of uteropexy versus existing colpoplasty after hysterectomy, intraoperative bleeding was not considerably different, but the operation time was significantly shorter. Moreover, admission days tended to be reduced, as were postoperative adverse reactions. In particular, the uteropexy did not cause vaginal erosion, which can occur after mesh use in colpoplasty after hysterectomy.

The current study has some limitations in terms of postoperative and side effects comparisons, because of the small case numbers, the short follow-up period, and the predominance of stage IV patients in group A. However, this is the first study in Korea to observe the effects and side effects of pelvic reconstruction followed by hysterectomy. In comparison with other studies, this study shows the better surgical effects including better stage improvement. In addition, the present study showed fewer complications and side effects than other studies, no recurrence or principal complications such as phlebothrombosis or pulmonary embolism or neurological damage that can be shown after the big surgery.

In conclusion, it is necessary to consider a patient's uterine size, uterine disease, age, expectation of pregnancy, and selection for what. Uteropexy can be considered as an effective surgical method to treat pelvic organ prolapse patients, and shows fewer postoperative complications and side effects, and shorter operation times and admission days than the colpoplasty after hysterectomy. However, pelvic organ prolapse can recur after several years despite surgical correction, and therefore, further long-term follow-up is essential. Moreover, this would confirm the effectiveness of uteropexy.

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