Original article

The length of mesh used in sacrocolpopexy and subsequent recurrence of prolapse

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Abstract: Objective: to determine the incidence of recurrent prolapse in different length categories of mesh along the vagina at sacrocolpopexy, performed in the division of urogynaecology in a university teaching hospital. Patients and Methods: A retrospective analysis was done from a urogynaecological data base, reviewing 301 patients who underwent sacrocolpopexy. They were analysed twice: firstly for the anterior mesh and secondly for the posterior mesh. Both anteriorly and posteriorly, they were categorized into three groups: with mesh from the vaginal vault, from the mid-vagina and from the vaginal introitus, both anteriorly and posteriorly, extending to the sacrum. The recurrence rate for prolapse was determined for each category. Results: Of the 301 patients, all were followed postoperatively for a mean period of 34 months (range 9-63 months). For each category, the recurrence rate for prolapse was as follows: anterior from vault (A1) 15.4% (n=26), from mid-vagina (A2) 8.3% (n=193), and from introitus to sacrum (A3) 2.4% (n=82). Posteriorly, the recurrence rates were as follows: from vault (P1) 23.7% (n=38), from mid-vagina (P2) 22.8% (n=44) and from introitus (P3) 3.2% (n=219). Statistically significant differences were found between A1 and A3, as well as between P1 and P3. Conclusion. With extension of the mesh along the vaginal walls during sacrocolpopexy, the incidence of recurrent prolapse decreased significantly.

Key words: Length of Mesh; Sacrocolpopexy; Prolapse; Recurrence.

INTRODUCTION

Randall and Nichols introduced abdominal sacrocolpopexy (SCP) in 1971.[1] Subsequently, SCP, together with sacrospinous fixation (SSF), has become the most commonly performed surgical procedures for middle and posterior compartment pelvic organ prolapse.[2] SCP delivered slightly better results concerning recurrent prolapse with equal quality of life results, but the operative time and peri-operative morbidity were increased, compared to SSF.[2-4] In a more recent study, however, recurrent prolapse was similar for SCP and SSF.[2]

Abdominal SCP is a procedure where the vaginal vault is suspended to the anterior longitudinal ligament of the sacrum. Synthetic mesh or other forms of suspension material are used.1 It adequately elevates and supports the vaginal vault, but not the anterior and posterior vaginal walls. Therefore, the incidence of post-operative anterior and posterior compartment prolapse was quite high and occurred in more than 25%.[5,6] Gradually, a need was recognised for extending the mesh along the anterior and posterior vaginal walls for increased support.[6,7] However, the optimal length of mesh along the anterior and posterior vaginal walls for the prevention of recurrent vaginal prolapse has not been determined. This study was designed to calculate different lengths of mesh along the vagina with recurrent prolapse as the main end point. Secondary end points were quality of life and mesh erosion.

PATIENTS AND METHODS

From the urogynaecologic data base of the Department of Obstetrics and Gynaecology, University of the Free State in Bloemfontein, South Africa, 301 consecutive patients were selected for inclusion in the study based on abdominal SCP with available follow-up data. The only exclusion criterion was uncertainty about the extent of mesh along the vagina. The data base was constructed from data forms completed for every patient on discharge from hospital and during follow-up. The following data were collected for each patient: demographic information, previous surgery, complaints, findings on examination, current surgery and complications peri-operatively. The follow-up data were gathered from forms completed at each follow-up clinic visit. These covered complaints, findings on examination and complications such as mesh erosion. The forms were verified during weekly staff meetings and the data entered into a computer data base (Epi-Info 6.0; CDC, Atlanta, Georgia).

The patients were classified into six groups according to length of mesh along the vagina, either anteriorly or posteriorly. The groups are listed in Table 1 and illustrated in figure 1. Group A1 was a special category created for analysis purposes only, where no mesh was placed anteriorly of the vagina; only posteriorly (any length). Where mesh was attached to the vaginal vault only, it was categorized as P1.

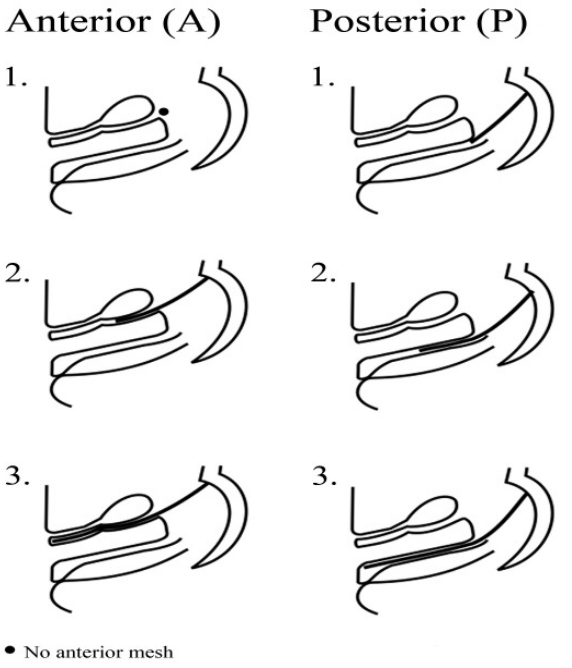

Figure 1. – Mesh length categories representing the six subgroups A1–3 and P1–3.

Bladder symptoms were based on careful clinical history taking and clinical examination. Multichannel urodynamic investigations were not utilized because a minority of patients were subjected to this procedure.

Staging was done according to the pelvic organ prolapse quantification system (POP-Q).[8] On follow-up, recurrent prolapse was regarded as prolapse stage 2–4. Patients who did not return for follow-up, were contacted (mainly by telephone) and requested to present themselves for follow-up.

The surgical technique for the A3/P3 categories was as follows. A laparotomy was done, followed by a cystostomy. With a finger in the bladder and deviation of the vaginal vault posteriorly, a space was created in the vesicovaginal fascia to the level of the bladder neck. A suprapubic catheter was inserted when the cystostomy was closed. The second step was mobilization of the rectum from its medial side and the rectovaginal space was partly opened. From below, a midline incision was made over the distal half of the anterior vaginal wall following hydrodissection. The solution used was 200ml saline with two 1ml ampules of ornipressin. Following a midline incision, the vesicovaginal space was opened between the distal urinary tract and the vagina, until the space already made from above, was reached. A mesh measuring 15 X 3 cm was inserted from below. The mesh used was either Vypro (polyglactin and polypropylene 1:1; Johnson and Johnson, Brussels, Belgium) or Ultrapro (polyglecaprone and polypropylene 1:1; Johnson and Johnson, Brussels, Belgium). Distally, it was fixed para-urethrally at the level of the mid-urethra. The vagina was closed. Posteriorly, a similar incision was made following hydrodissection. The rectovaginal space was opened. This space was connected with the space already made from above. Following a posterior repair (where necessary), a second mesh strip (15 X 3cm) was inserted from below and attached distally to the perineal body. The vagina was closed. Abdominally, the two strips of mesh were fixed to the vaginal vault and then to the sacrum at S1. The rectum was pulled upwards and fixed to the mesh on its anteromedial side. Finally, the peritoneum, which was trimmed, was closed over the mesh and the abdomen was closed.

When shorter lengths of mesh was used (P1, P2 and A2), the mesh was introduced abdominally and fixed to the vagina. A posterior repair was done seperately where necessary.

Only two surgeons were involved (HSC and JAAdeB), with both following the same techniques. The choice of the length of mesh to be inserted depended on two factors: the surgical experience of the surgeons and the degree of vaginal prolapse. With increasing experience, the surgeons more readily extended the length of mesh along the vaginal walls when a SCP was indicated. When stage 3-4 prolapse was present in the anterior and/or posterior compartments, the length of mesh increased as well.

In the early phases of the study, mesh was placed only on the side of the prolapse. Following the observance of cases where prolapse subsequently developed in the opposite (unaffected) vaginal compartment, mesh was inserted routinely on both sides of the vagina. This may be seen as a preventative step in preventing future prolapse on the unaffected side.

The length of mesh for each case was determined retrospectively during the analysis. Every patient's file contained a detailed operative report from which it was determined what the length of mesh was.

On follow-up, recurrent prolapse was regarded as prolapse stage 2-4. Patients who did not return for follow-up, were contacted (mainly by telephone) and requested to present themselves for follow-up.

Statistical analysis consisted of the chi-squared test for categorical data (Fisher's exact test for small numbers) with 95% confidence intervals (CI). The study was approved by the Ethics Committee of the Faculty of Health Sciences, University of the Free State.

RESULTS

The median age of the 301 patients was 58 years, with a range of 35-86 years. The median parity was three (range 1-8) and 93.4% of the patients were Caucasian. Previous surgery for pelvic organ prolapse was performed in 38.3% of the patients. These variables did not differ significantly between the six subgroups.

TABLE 1. – Classification of patients and description of subgroups according to the length of mesh along the anterior and posterior vaginal walls.

Group	Subgroup	Description
Group A Mesh anterior of the vagina	A1	No mesh anterior of the vagina; only posteriorly from the vault to the sacrum (any length).
	A2	Mesh placed anterior of the vagina, from the mid-vagina to the sacrum.
	A3	Mesh placed anterior of the vagina, from mid-urethra to sacrum.
Group P Mesh posterior of the vagina	P1	Mesh from the vaginal vault (posteriorly) to the sacrum.
	P2	Mesh placed posterior of the vagina, from the mid-vagina to the sacrum.
	P3	Mesh placed posterior of the vagina, from the perineal body to the sacrum.

TABLE 2. – Pelvic organ prolapse pre-operatively among sacrocolpopexy patients.

Prolapse (Stage 3 and 4)	Group*											
	A1 (n=26)		A2 (n=193)		A3 (n=82)		P1 (n=38)		P2 (n=44)		P3 (n=219)	
	n	%	n	%	n	%	n	%	n	%	n	%
Anterior compartment	22	84.6	122	63.2	55	67.1	38	100	20	45.5	141	64.3
Middle compartment	16	61.5	93	48.2	26	31.7	24	63.2	32	72.8	79	36.0
Enterocele#	7	26.9	96	49.7	41	50.0	8	21.1	23	52.3	113	51.6
Rectocele#	8	30.7	74	38.3	26	31.7	17	44.7	10	22.7	81	37.0

TABLE 3. – Incidence of recurrent prolapse among sacrocolpopexy patients.

Subgroup	Compartment	95% confidence interval (CI)	
	Anterior (cystocele)		
A1 (n=26)	4 (15.4%)	-3.3% ; 25.5%	1.9% ; 31.2%*
A2 (n=193)	16 (8.3%)		
A3 (n=82)	2 (2.4%)	-10.9% ; 0.9%	
	Any compartment		
A1 (n=26)	6 (23.1%)	-4.2% ; 28.5%	1.4% ; 35.1%*
A2 (n=193)	27 (14.0%)		
A3 (n=82)	6 (7.3%)	-2.1% ; 13.5%	
	Posterior (enterocele)		
P1 (n=38)	4 (10.5%)	-15.0% ; 14.2%	2.3% ; 22.8%*
P2 (n=44)	5 (11.4%)		
P3 (n=219)	3 (1.4%)	-3.1% ; 22.6%*	
	Posterior (rectocele)		
P1 (n=38)	5 (13.2%)	-12.8% ; 17.3%	3.5% ; 25.5%*
P2 (n=44)	5 (11.4%)		
P3 (n=219)	4 (1.8%)	-2.6% ; 22.2%	
	Any compartment		
P1 (n=38)	9 (23.7%)	-16.9% ; 19.4%	2.9% ; 30.4%*
P2 (n=44)	10 (22.7%)		
P3 (n=219)	20 (9.1%)	-2.7% ; 28.2%*	

*p ≤ 0.05; difference between groups is statistically significant.

On examination pre-operatively, 82.7% of the patients presented with anterior compartment prolapse, 70% with middle compartment prolapse and 72% with posterior compartment prolapse (POPQ stages 1-4) (the figures were mutually inclusive). Table 2 shows the types of stage 3 and 4 prolapse in each subgroup. There were no statistically significant differences between these groups.

Follow-up data were available for all patients with a median duration of follow-up of 34 months (range 9-63 months). The median duration of follow-up for the six subgroups were as follows: A1 40 months, A2 27 months, A3 20 months, P1 48 months, P2 45 months, and P3 24 months. The incidence of recurrent prolapse within the six subgroups is summarised in Table 3. In group A (mesh placed anteriorly of the vagina or no mesh anteriorly), the differences between A1 and A2, as well as between A2 and A3, were not statistically significant, both for recurrent anterior compartment prolapse and any type of recurrent prolapse (including the posterior compartment). However, the difference between A1 and A3 was statistically significant, both for recurrent anterior compartment prolapse and any type of prolapse (Table 3). Similarly, a statistically insignificant difference in recurrent prolapse was found between P1 and P2, as well as between P2 and P3, but the difference between P1 and P3 was statistically significant, both for recurrent posterior compartment prolapse and any type of prolapse (Table 3).

Post-operative quality of life is summarised in Table 4 in terms of bladder symptoms, obstructive defecation and dyspareunia. Although no statistically significant differences were found between the subgroups, there was a tendency towards more cases of overactive bladder (urinary urge) symptoms with increasing length of mesh along the vagina, both for mesh anteriorly and posteriorly of the vagina. Mesh erosion also increased with increasing length of mesh, although the differences between the subgroups were not statistically significant (see Table 5).

DISCUSSION

This study was retrospective in nature, although the initial data collection was done prospectively (for the data base). SCP consisted of mesh from the vaginal vault to the sacrum in the early phases of the study. With increasing experience and the awareness of recurrent vaginal prolapse following SCP, the length of mesh was increased along the vaginal walls, first posteriorly and later on to both the anterior and posterior sides of the vagina. Following the publication of Sullivan's "total pelvic mesh repair",[7,9] the length of mesh was extended to the vaginal introitus (full vaginal length) (Figure 1).[10-12] This study confirmed that by extending the length of mesh along the vagina, the incidence of recurrent prolapse decreased. Extension only to the mid-vagina did not make a difference.

Hilger et al. noted recurrent prolapse in 26% of their patients when mesh was placed from the vaginal vault to the sacrum.5 This group also reported a gradual extension of the mesh along the vaginal walls as their experience increased. Several other groups reported similar experiences,[3,6,13] but none was as well documented as in this study.

Intra-operatively, morbidity mainly involved blood loss and trauma to other organs. These were not determined in this report, but previous reports from the same data base on other aspects of SCP, reveiled a blood loss of less than 300ml per patient. Injury to the bladder and rectum occurred in less than 2% of cases.[10-12, 14]

The increasing success in preventing recurrent vaginal prolapse must be weighed against morbidity, both intra- and post-operatively. In this study, the figures for postoperative morbidity was high: overactive bladder symptoms in 24-42% of patients, stress urinary incontinence in 15%, ob-

TABLE 4. – Post-operative morbidity among sacrocolpopexy patients.

	Group											
	A1 (n=26)		A2 (n=193)		A3 (n=82)		P1 (n=38)		P2 (n=44)		P3 (n=219)	
	n	%	n	%	n	%	n	%	n	%	n	%
Overactive detrusor symptoms	9	34.6	46	23.8	34	41.5	7	18.4	15	34.1	67	30.6
Stress urinary incontinence	5	19.2	44	22.8	30	36.6	9	23.7	17	38.6	53	24.2
Obstructive defecation	4	15.4	24	12.4	16	19.5	6	15.8	8	18.2	30	13.7
Dyspareunia	0	0	21	10.9	8	9.8	1	2.6	7	15.9	21	9.6

TABLE 5. – Occurrence of mesh erosion and repeat surgery required among subgroups.

	Group*											
	A1 (n=26)		A2 (n=193)		A3 (n=82)		P1 (n=38)		P2 (n=44)		P3 (n=219)	
	n	%	n	%	n	%	n	%	n	%	n	%
Mesh erosion	0	0	17	8.8	11	13.4	1	2.6	4	9.1	23	10.5
Suburethral sling	3	11.5	8	4.1	12	14.6	4	10.5	3	6.8	16	7.3
Anterior vaginal repair	0	0	3	1.6	0	0	0	0	2	4.5	0	0
Posterior vaginal repair	0	0	6	3.1	9	11.0	4	10.5	3	6.8	30	13.7
Repeat SCP	3	11.5	5	2.6	1	1.2	4	10.5	2	4.5	3	1.4
Incisional hernia repair	1	3.8	8	4.1	1	1.2	2	5.3	0	0	8	3.7

structive defecation in 12-20% and dyspareunia in 3-11% (Table 4). If a patient was seen several times postoperatively and any of these symptoms or signs occurred at any time, she was labelled with it whether it persisted, improved or cleared later on. The symptoms were also not graded. Over time the authors applied several modifications to the surgical technique in order to decrease postoperative morbidity. Unfortunately, these were not well documented and can't be reported on in detail.

Mesh erosion occurred in 3-14% of cases without a significant difference between the groups (Table 5). Most of these (97%) were minor in nature and treated in the consulting room by excision of the mesh followed by an estrogen containing vaginal cream. Efforts were made to decrease this incidence, but it was not possible to report on the success of these efforts.

A possible confounding variable is the increase of experience by the authors (HSC and JAAdB) over time. The more often a surgeon performs an operation, the better he/she gets at it. Since the length of mesh was increased over time, improved expertise could have contributed towards the lower incidence of recurrences. However, the absence of a decreasing trend in variables like overactive bladder and obstructive defecation with increased lengths of mesh do not support this possibility. We therefore conclude that improved expertise over time could have had an influence, but the increased length of mesh was most probably the more important factor.

In conclusion, by extending the length of mesh along the vaginal walls, less recurrent vaginal prolapse was encountered. However, the increase in morbidity with longer lengths of mesh is of concern, even though it was statistically insignificant. The overall incidence of post-operative morbidity was high and needs further investigation to clarify this important issue.

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