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ORIGINAL ARTICLE

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The development of pelvic organ prolapse following isolated Burch retropubic urethropexy

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Abstract The purpose of our study was to examine the incidence of prolapse in a group of women who had had an isolated Tanagho modification of the Burch colposuspension performed without significant pelvic organ prolapse preoperatively. Sixty women were identified who underwent an isolated Burch procedure for genuine stress incontinence between 1991 and 1999. Thirty-four women returned for postoperative Pelvic Organ Prolapse Quantification (POP-Q) staging evaluation. Overall, 6 (17.6%) had stage II anterior prolapse. Eleven (32.4%) had stage II posterior prolapse. Three (8.8%) had stage II uterine prolapse. None of these patients with identified support defects was symptomatic. Two patients had subsequently undergone vaginal hysterectomy. One had this performed for dysfunctional uterine bleeding 3 years after her Burch procedure. One patient developed symptomatic uterine prolapse and underwent a vaginal hysterectomy 5 months after her Burch procedure. The majority of patients undergoing an isolated Tanagho modification Burch procedure without preoperative prolapse do not appear to be placed at increased risk for subsequent operative intervention.

Keywords Burch procedure · Pelvic organ prolapse

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Introduction

The Burch colposuspension is considered by many gynecologists to be the 'gold standard' against which all other operations for incontinence should be compared. A review of the literature on the success of Burch colposuspension revealed a long-term success rate of 69%–90% when it was performed as a primary procedure, with a 60%–82.4% success rate when performed as a repeat procedure for genuine stress incontinence [1]. Several long-term studies have shown its durability, with a cure rate consistently higher than 80% [2, 3, 4].

In 1961, when Burch first described his modification to the Marshall–Marchetti–Krantz urethropexy, he recommended performing prophylactic culdoplasty during the procedure to prevent future enterocele formation [5]. The development of pelvic organ prolapse following Burch colposuspension has an estimated incidence of between 7.6% and 66% [6]. Stanton [7] found a 13% incidence of enterocele in his series of 450 women with 5-year follow-up. Wiskind et al. [8] concluded that postoperative genital prolapse does occur significantly following a Burch colposuspension, with a postoperative risk of 36% for cystocele formation, 66% for rectocele formation, 32% for enterocele formation and 28% for uterine descent. The majority of these support defects were classified as mild. Concomitant procedures such as hysterectomy, culdoplasty or posterior repair did not reduce the incidence of subsequent prolapse surgery in this cohort [8]. Other studies have also found an increased incidence of rectocele formation post Burch colposuspension, ranging from 29.5% to 65.4% [3, 9].

Previous observational studies have been limited by a lack of standardized terminology in pelvic floor

disorders. Many grading systems that are commonly used have a subjective nature to their descriptions, as well as a lack of guidelines regarding the clinical significance of the grade. The Pelvic Organ Prolapse (POP-Q) staging system, as proposed by the International Continence Society, is an attempt to standardize descriptions of pelvic organ support defects [10]. This system has been found to have high inter- and intraobserver reproducibility [11]. The purpose of this study was to look at a cohort of women undergoing isolated Burch retropubic urethropexy without significant concurrent prolapse to evaluate the effect of the operation on the development of urogenital prolapse by applying objective measurements to the degree of prolapse following an isolated Burch colposuspension.

Materials and methods

The study group consisted of 60 women who underwent an isolated Burch colposuspension, identified through a review of operative scheduling records from 1991 to 1999. These records are a complete listing of all procedures scheduled for the senior author (P.K.S.). All available office charts for these patients were then reviewed. These women were contacted by telephone and asked to return for follow-up pelvic examination for Quantitative Pelvic Organ Prolapse (POP-Q) assessment. Patients had been examined preoperatively with the modified Baden–Walker halfway system. The protocol was approved by the Evanston Northwestern Healthcare Institutional Review Board.

The Burch colposuspension was performed using four 2/0 polytetrafluoroethylene sutures (Gore-Tex; W.L. Gore & Associates Inc., Flagstaff, AZ) using the Tanagho modification [12]. The sutures were tied after a cotton swab applicator had been placed within the urethral meatus at the level of the urethrovesical junction, applying tension with tying to create a 0 to −5° angle with the horizontal. All procedures were performed under the direct supervision of the senior author (P.K.S.).

All patients had undergone preoperative urogynecologic evaluation, including a detailed history, urine culture, Q-tip testing to evaluate bladder neck mobility, and multichannel urodynamic testing. The authors performed all pre- and postoperative evaluations. Preoperative assessments of pelvic organ prolapse were recorded from the review of the patient's office chart. These assessments all used the Baden–Walker modified halfway grading system [13] at maximum Valsalva effort to describe preoperative prolapse. Following the Burch procedure, time to follow-up ranged from 12 to 121 months postoperatively, with a mean of 55.2 ± 30.3 months and a median of 54 months. Patients gave informed consent to participate in this investigational review board-approved protocol. Evaluation consisted of examination in the supine lithotomy position using the Pelvic Organ Prolapse staging system (POP-Q) as proposed by the International Continence Society Committee on Terminology [10]. Measurements were taken in centimeters of the genital hiatus (height of introitus), perineal body and vaginal length. Assessments of points Aa, Ba, Ap, Bp, C and D were made at maximal Valsalva effort in the supine position using the hymeneal ring as a fixed point of reference. Each patient's age, weight, parity, menopausal status, symptoms of pelvic organ prolapse, and any subsequent operative interventions were noted.

Results

Sixty patients were identified as having had an isolated Burch colposuspension between 1991 and 1999. Twenty-six women (43.3%) did not have a POP-Q evaluation following their Burch colposuspension. Sixteen of these 26 could not be contacted. One patient had died of unrelated causes. Nine of these patients were contacted and interviewed by phone, but not examined. On the telephone interview, these women were asked if they experienced urinary leakage with coughing, lifting or straining, or symptoms of pelvic pressure or bulging from the vagina. Of the 9 patients who were contacted, 3 asymptomatic patients missed several scheduled appointments, 4 asymptomatic patients cited time-related reasons for not returning for examination, 1 with recurrent genuine stress incontinence declined because she recently had undergone brain tumor removal, and 1 declined because she had undergone subsequent vaginal hysterectomy for prolapse 5 months after the Burch procedure. Patients who did not have a POP-Q evaluation were younger at the time of their Burch procedure than those who did have POP-Q evaluation (average age 45.6 years vs. 57.5 years, respectively; $P < 0.001$) and correspondingly less likely to be menopausal ($P < 0.001$). They did not differ in terms of parity (2.3 vs. 2.9, $P = 0.15$) or weight (170.0 lb vs. 154.9 lb, $P = 0.15$).

Thirty-four women (56.7%) had POP-Q evaluation following their Burch colposuspension. Of the 34 who returned for follow-up, the mean age was 57.5 years ± 11.23 at the time of their Burch procedure. The average weight was 154.9 ± 30.6 lb. Average parity was 2.9 ± 1.5. Two patients had undergone previous total abdominal hysterectomy (both for uterine leiomyomas), 2 had had vaginal hysterectomies (both for prolapse), and 1 had a prior laparoscopically assisted vaginal hysterectomy (for dysfunctional uterine bleeding).

Eleven (32.4%) patients had no support defects identified (stage 0). Ten of the 34 patients (29.4%) had only stage I prolapse of any compartment. Thirteen of 34 patients (38.2%) had stage II prolapse of some compartment. Six women (17.6%) had stage II anterior compartment prolapse. Eleven (32.4%) had stage II posterior compartment prolapse. Three (8.8%) had stage II uterine prolapse. No patients had either stage III or IV prolapse. None of the patients examined was symptomatic from the identified support defects.

One patient who had previously undergone a laparoscopically assisted vaginal hysterectomy had stage II anterior compartment prolapse identified. The 2 patients who had previously undergone total abdominal hysterectomy had no pelvic support defects identified. Of the 2 patients with previous vaginal hysterectomy, 1 had no pelvic support defects and the other had a stage I posterior prolapse identified.

Two patients had subsequent pelvic surgery following their Burch urethropexy. One patient who had a subsequent vaginal hysterectomy for dysfunctional uterine bleeding 3 years after her Burch procedure had a stage I posterior compartment defect identified. One patient underwent vaginal hysterectomy 5 months after her Burch procedure for reported 3º uterine prolapse. This patient declined an invitation to return for examination.

Table 1 Demographic characteristics and comparison of women with stage 0 and 1 versus stage II prolapse following isolated Burch procedure

	Stage 0-1 prolapse	Stage 2 prolapse	Significance
No. of patients	21	13	
Mean age (yrs)	59.1 ± 11.6	54.9 ± 10.6	$P = 0.30$
Mean parity	2.6 ± 1.5	3.3 ± 1.5	$P = 0.17$
Mean weight (lb)	142.8 ± 47.3	162.8 ± 23.0	$P = 0.17$

Nine patients had pelvic organ prolapse identified preoperatively. Seven of these women had 2° cystoceles to the midvaginal plane diagnosed preoperatively. One patient had a distal 3° cystocele, which was only evident at maximal Valsalva effort. After counseling, the patient opted to undergo a Burch procedure without concomitant repair, as she was asymptomatic and the cystocele could be partially corrected by the Burch alone. One patient had both a 2° cystocele and a 2° rectocele identified. One patient had only a 2° rectocele identified. Of the 7 patients identified with a preoperative 2° cystocele, 5 (71.4%) had stage 0 or I anterior vaginal wall prolapse postoperatively, and 2 (28.6%) had stage II anterior wall prolapse present postoperatively. The patient with the 3° cystocele preoperatively had a stage II anterior prolapse postoperatively. The 2 patients with 2° rectoceles preoperatively continued to have asymptomatic stage II posterior prolapse noted postoperatively.

There were no significant differences identified between those patients with stage 0 and I defects and those with stage II defects identified with respect to age, parity and weight. These results are summarized in Table 1.

Discussion

The development of pelvic organ prolapse is a significant problem in an aging population of women. Olsen et al. [14] estimated that by the age of 80 women had a lifetime risk of up to 11.1% needing a surgical procedure for prolapse or incontinence, with a reoperation rate of nearly 30%. Very often pelvic organ prolapse and genuine stress incontinence occur concomitantly. A recent review by Ng et al. showed that up to 42% of women referred to a tertiary urology practice undergoing a surgical procedure for genuine stress incontinence underwent a concomitant procedure for pelvic organ prolapse [15]. The importance of identifying these defects preoperatively has been well recognized as contributing to the overall success of the surgery [16, 17].

With the high risk of undergoing an additional procedure following a primary surgery for incontinence or pelvic organ prolapse, the importance of identifying procedures that may actually predispose to the development of new deficiencies is highlighted. By suspending the urethrovesical junction and elevating the anterior vaginal wall, the Burch colposuspension is thought to alter the axis of the vagina, making the posterior compartment of the pelvis more vulnerable to the development of a posterior compartment defect and predisposing to enterocele and rectocele formation [18]. Langer et al. [19] showed no difference in outcome for urinary stress incontinence between patients with and without concomitant hysterectomy with Burch colposuspension. Those patients with Burch colposuspension alone who did not undergo hysterectomy, however, had a 13.6% rate of enterocele formation. There were no support defects identified in those patients who had hysterectomy performed [19]. Defecography studies performed pre- and postoperatively following Burch colposuspension have found a significant difference in the distance between the apex of the vagina and the anterior rectal wall, confirming this theory. Defecography failed, however, to predict preoperatively those who will subsequently develop significantly symptomatic posterior prolapse following Burch colposuspension[20]. Burch himself advocated concomitant prophylactic culdoplasty to avoid subsequent enterocele formation [5], but subsequent studies have demonstrated conflicting results [8]. This discrepancy may in part be caused by the different techniques used for Burch colposuspension. In his original description, Burch used three pairs of sutures placed through the paravaginal fascia and vaginal wall and approximated these closely to Cooper's ligament [5]. This lateral splaying and elevation of the apical vagina was thought to be the cause of enteroceles seen postoperatively. Tanagho's modification of the procedure uses two pairs of sutures, one placed at the level of the midurethra and the second at the urethrovesical junction. Suture bridges are used with no attempt made to approximate the tissue to Cooper's ligament [12]. This technique, which does not tent the vagina as anteriorly or laterally, may in part account for the disparity in postoperative enterocele formation seen in different studies.

Recent attempts have been made to establish what constitutes 'normal' support in a general gynecology population. Samuelsson et al. [21] examined 641 Swedish women and determined that the prevalence of any degree of prolapse was 30.8%, with only 2% having prolapse reaching the introitus. The majority of women with prolapse were asymptomatic [21]. Swift [22] applied the Pelvic Organ Prolapse Quantification and staging system on 497 women seen for routine care at four gynecology outpatient clinics. He found that the vast majority of women had stage I (43.3%) or stage II (47.7%) prolapse. Even when looking at nulliparous patients, the rate of stage II prolapse was still found to be 14.6%. Stage III prolapse occurred much less frequently at a rate of 2.6% [22]. Both studies suggest that some degree of prolapse is found in the majority of women when specifically examined, but most women report no symptoms.

In our study population, 61.8% of the patients had stage 0 or 1 pelvic organ prolapse. Twenty-nine percent had only stage I and 38% had stage II prolapse identified. No patients had stage III prolapse or greater. No

patients who were examined and found to have pelvic organ prolapse were symptomatic from the identified support defects. The rates of prolapse seen in this cohort are consistent with the results of examinations of large, general gynecology populations, and may perhaps represent 'normal' findings [21, 22].

Weber et al. [23] proposed definitions of satisfactory anatomic outcomes based on the Pelvic Organ Prolapse staging system, with stage II prolapse or worse being deemed 'unsatisfactory'. Although their suggestions are a much-needed step towards standardizing our outcomes data, the high incidence of stage II prolapse seen in a general gynecologic population (47.7%) [22] demonstrates the difficulty in determining what is 'normal'. Only longitudinal studies with long-term follow-up will be able to determine the clinical significance of a given standardized stage and whether a natural progression exists to the development of worsening support defects.

Our rates of prolapse developed following isolated Burch colposuspension are similar to those found by Wiskind et al. [8]. Our rate of stage I and II anterior prolapse of 28.6% is similar to their rate of 'mild' cystocele of 34.3%. Our rate of stage I and II posterior prolapse of 45.6% is similar to their rate of 'mild' rectocele of 49.6%. Our rate of stage I and II uterine prolapse of 31.4% is similar to their rate of 'mild' uterine prolapse of 24.1%. We did not, however, see the incidences of 'marked' postoperative prolapse as seen in their study. No patients in our study group were identified with stage III prolapse, with the exception of the one woman who had a subsequent hysterectomy after her Burch procedure and did not return for follow-up. This perhaps can account for why none of the patients with prolapse examined for this study were symptomatic from their prolapse or required surgical correction. In addition, a much larger proportion of Wiskind's patient group had pelvic organ prolapse preoperatively, with over one-quarter of their patients having a 'marked' cystocele.

The women in Wiskind's group underwent a Burch colposuspension using Stanton's modification [24]. Like Burch's original description, this modification also approximates the paravaginal tissue to Cooper's ligament. Their rate of subsequent surgery for prolapse in women who underwent an isolated Burch procedure was 26.0% [8]. This study is often cited as evidence of the Burch procedure predisposing to subsequent prolapse formation. As mentioned earlier in this discussion, we performed Tanagho's modification of the Burch procedure on our patients, which uses suture bridges and makes no attempt to approximate the tissue to Cooper's ligament. Because the lateral splaying is less, this may account for the lower rate (4.7%) of subsequent surgery seen in our patient cohort.

The greatest limitation in interpreting the results of this study is that we were unable to contact 17 (28.3%) of the patients who had undergone an isolated Burch procedure to at least interview them about their symptoms, which is certainly one of the greatest difficulties in obtaining long-term follow-up. The 34 patients who returned for POP-Q evaluation were older at the time of their Burch procedure than the 26 patients who were unable to be examined (mean age of 57.5 years vs 45.6 years, respectively; $P < 0001$), and correspondingly more likely to be menopausal ($P < 0.001$). There was no significant difference in the average weight and parity between the two groups. This younger group of patients had more often moved from the last listed phone number and address that we had on our records, and public white page listings did not yield correct new contact numbers. If able to be contacted, this group of patients mainly cited time-related reasons for their inability to return for examination. Because age and menopause are both recognized risk factors for the development of pelvic organ prolapse, it is possible that the older group that was examined for this study was at higher risk for developing prolapse.

Of the 43 patients (71.7%) who were either examined or interviewed, 2 (4.7%) had subsequent pelvic operative procedures, only one of which was for symptomatic prolapse. We recognize that some of the patients who were only interviewed and not examined may in fact have significant but asymptomatic prolapse present. Although this is a possibility, this study was to determine whether the Tanagho modification Burch procedure puts these patients at greater risk of requiring a subsequent surgical intervention. By interviewing these patients we were at least able to determine whether they had undergone another procedure.

Previous surgery for pelvic organ prolapse has been found to be a risk factor for subsequent prolapse development [14, 22]. Collagen, in patients with stress incontinence, has been shown to be weaker in patients with bladder neck prolapse than those without [25]. This collagen deficiency in those identified with prolapse preoperatively may in fact be the putative reason for postoperative prolapse formation, rather than the prolapse being caused by the Burch procedure itself. The true progression of asymptomatic support defects identified is unknown. The prolapse rates found on examination following Burch procedure may perhaps be the result of a natural progression in an aging population, rather than of the procedure itself. In trying to identify this 'pure' cell of patients who did not have significant prolapse present preoperatively, we hoped to examine a group who is less 'destined' for future prolapse development. We did not find the high rates of enterocele occurrence that have been previously described [7, 8]. We did find a relatively high rate of asymptomatic stage II posterior compartment defects of 32.4% that is consistent with previously reported data [3, 9]. The incidence of postoperative prolapse seen in some women who have undergone Burch colposuspension with Tanagho's modification may not be related to the procedure itself, but perhaps to the underlying connective tissue weakness and neuromuscular dysfunction that may be inherently present. The majority of patients who underwent an

isolated Burch procedure using the Tanagho modification did not develop clinically significant prolapse. In this group, the Tanagho modification Burch procedure does not appear to have placed these women at risk for a subsequent operative procedure.

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Editorial Comment

The occurrence of de novo pelvic organ prolapse following Burch urethropexy, and the contribution of the Burch to its development remains unclear. Confounding from multiple-site pelvic floor defects makes it difficult to determine if the Burch was causative or merely associated. The authors report the outcomes of the Burch procedure done in a carefully selected group of patients without concomitant symptomatic prolapse, and found a low incidence of de novo prolapse in follow-up. While this descriptive study cannot provide comparative information on the contribution of the Burch to the development of prolapse, it does suggest that women undergoing an isolated Burch have a lower than expected requirement for prolapse surgery later.