ORIGINAL ARTICLE

The inter-system association between the simplified pelvic organ prolapse quantification system (S-POP) and the standard pelvic organ prolapse quantification system (POPQ) in describing pelvic organ prolapse

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Abstract

Introduction and hypothesis The objective of this study is to determine the association between the POPQ and a simplified version of the POPQ.

Methods This was an observational study. The subjects with pelvic floor disorder symptoms underwent two exams: a POPQ exam and a simplified POPQ. To compare with the simplified POPQ, vaginal segments of the POPQ exam were defined using points Ba, Bp, C, and D. Primary outcome was the association between the overall ordinal stages from each exam.

Results One hundred forty-three subjects with mean age of 56 +/− 13 years. Twenty three subjects were status post-hysterectomy. The Kendall's tau-b statistic for overall stage was 0.80, for the anterior vaginal wall the Kendall's tau-b was 0.71, for the posterior vaginal wall segment the Kendall's tau-b was 0.71, for the cervix the Kendall's tau-b was 0.88, for the posterior fornix/vaginal cuff the Kendall's tau-b was 0.85.

Conclusions There is substantial association between the POPQ and a simplified version of the POPQ.

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Introduction

In 1996, an international committee published a document describing the pelvic organ prolapse quantification system (POPQ) [1], which was reviewed and adopted by the membership of the International Continence Society (ICS), American Urogynecologic Society (AUGS), and the Society of Gynecologic Surgeons (SGS). Reviews of selected gynecology and urology literature to evaluate the adoption of the POPQ system have shown that it continues to gain popularity and is now the classification system cited in over 80% of scientific research on the topic [2, 3]. The POPQ is now accepted as the standard classification system for reporting pelvic organ support defects. The advantages of the POPQ are that it is

a very specific and objective system for quantifying and describing pelvic organ prolapse. However, this specificity and the perceived difficulty in using the system are also the major drawbacks to this system. The POPQ is a relatively complex system and the document describing the technique for obtaining the nine measured points is seven pages in length, requiring a very thorough reading to understand how certain measures are derived. Therefore, while the POPQ system has become the scientific standard, there is less acceptance of the system outside of the field of urogynecology, as it is interpreted as being difficult to learn and incorporate into daily practice. Even among experts in the field, there are several studies demonstrating techniques to do a more simplistic version of the exam for clinical expediency [4]. In response to this, the International Urogynecological Association (IUGA) Standardization of Terminology Committee has devised a simplified version of the POPQ (S-POP) classification system that retains the ordinal stages of the POPQ system but simplifies the terminology and reduces the number of points measured. In 2006, a single-center pilot study showed good inter-examiner agreement of a simplified POPQ classification system and good inter-system association with the POPQ in a one-institute study [5]. However, before this system can be advocated, it must be studied in a prospective, blinded, and multicenter study comparing it to the standard POPQ to validate its use as a simplified system for clinical application.

Objective

The objective of this study is to determine the association between two classification systems used for classifying pelvic organ prolapse: the simplified pelvic organ prolapse quantification system (S-POP) and the Pelvic Organ Prolapse Quantification system (POPQ) as described by the International Continence Society.

Methods

This was an observational study involving women aged 18 and older presenting to four urogynecology clinics (Brazil, Denmark, Argentina, Thailand) as part of a multicenter study investigating the utility of a simplified POPQ exam in clinical practice. All sequential subjects with pelvic floor disorder symptoms were approached for participation. We did not record the number or any characteristics about subjects who declined to participate. All investigators are urogynecologists and use POPQ routinely in their clinics. The inclusion period was June 2007 through December 2008. Inclusion criteria were

women presenting with symptoms attributable to pelvic floor disorder; i.e.,

– A sense of something coming or falling out of the vagina
– The ability to feel a bulge coming out of the vagina
– Urinary incontinence
– Fecal or anal incontinence
– Pelvic fullness or pressure, particularly when upright
– Having to push up on the perineum or digitate the vagina in order to urinate or defecate

Each center obtained approval from an institutional review board for human research (IRB). After written informed consent was obtained, the subject was asked to empty their bladder and then underwent the pelvic exam in the lithotomy position. The subjects had two separate pelvic examinations by two clinical investigators at each site. One exam was a standard POPQ exam and the other a simplified version of the POPQ exam where only the stage of each segment was recorded. Investigators were instructed to review a DVD describing the simplified POPQ exam and a DVD describing the POPQ exam before participation as investigator/examiners.

For the POPQ exam, the nine standard measures were taken in centimeters in the standard fashion previously described [1]. In order to define vaginal segmental stages, to compare with the simplified POPQ exam results, following the POPQ exam, each vaginal segment was given an ordinal stage using the following criteria:

1. The anterior vaginal segment was staged using point Ba.
2. The posterior vaginal segment was staged using point Bp.
3. The cervix was staged using point C.
4. The apex/posterior fornix was staged by using point D in the non-hysterectomized patient and point C in the hysterectomized patient.

For the S-POP, the four areas examined included the anterior and posterior vaginal walls, the apex, and the cervix. If a subject was status post-hysterectomy, then only three measurements were taken: the anterior and posterior vaginal walls and the cuff scar/apex. No measuring devices were required for the S-POP, and the investigators had to use estimates for identifying those points on the anterior and posterior vaginal segments that were used to represent the respective walls. For examination of the anterior vaginal segment, the speculum was placed into the vagina and the posterior vaginal wall was retracted to allow for full visualization of the anterior vaginal wall. A point or fold approximately halfway up the anterior vaginal wall or approximately 3 cm proximal to the urethral meatus/hymenal remnants was identified. The subject was then

Table 1 Intersystem reliability between the standard POPQ vs simplified pelvic organ prolapse classification system: overall stage

Standard POPQ stage	Simplified POPQ stage			
	Stage 1	Stage 2	Stage 3	Stage 4
Stage 1	5	1		
Stage 2	10	78	9	1
Stage 3		2	21	4
Stage 4				11

Kendall's tau-b statistic 0.80

instructed to Valsalva or cough in a forceful fashion, and where that point descended in relation to the hymenal remnants was recorded as the ordinal stage of the anterior vaginal wall. The posterior segment was examined in a similar fashion. The point chosen to represent the posterior vaginal segment was identified in a similar fashion, except that the point was approximately halfway up the posterior vaginal wall or approximately 3 cm proximal to the hymenal remnants. The cervix was evaluated by placing a Sims or a disarticulated Graves speculum in the vagina and directly observing its descent during a Valsalva or cough to determine its stage in relation to the hymenal remnants. The vaginal apex or cuff scar was visualized in a similar fashion. If the cervix, apex, or cuff scar went beyond the hymenal remnants with Valsalva or cough, then a speculum was not employed during their evaluation.

The staging system for each segment is:

Stage 1: Prolapse where the given point remains at least 1 cm above of the hymenal remnants.

Stage 2: Prolapse where the given point descends to the introitus, defined as an area extending from 1 cm above to 1 cm below the hymenal remnants.

Stage 3: Prolapse where the given point descends greater than 1 cm past the hymenal remnants, but does not represent complete vaginal vault eversion or complete procidentia uteri. This implies that at

Table 2 Intersystem reliability between the standard POPQ vs simplified pelvic organ prolapse classification system: anterior vaginal wall

Standard POPQ stage	Simplified POPQ stage			
	Stage 1	Stage 2	Stage 3	Stage 4
Stage 1	17	5		
Stage 2	12	69	5	1
Stage 3	1	3	14	5
Stage 4			1	10

Kendall's tau-b statistic 0.71

Table 3 Intersystem reliability between the standard POPQ vs simplified pelvic organ prolapse classification system: posterior vaginal wall

Standard POPQ stage	Simplified POPQ stage			
	Stage 1	Stage 2	Stage 3	Stage 4
Stage 1	61	8		
Stage 2	12	45	3	
Stage 3	1	3	2	1
Stage 4		2	1	4

Kendall's tau-b statistic 0.71

least some portion of the vaginal mucosa is not everted.

Stage 4: Complete vaginal vault eversion or complete procidentia uteri. This implies that the vagina and/or uterus are maximally prolapsed with essentially the entire extent of the vaginal mucosa everted.

The order of exams was randomized using block randomization, and the examiners were blinded to each other's results. Throughout the study, one investigator always performed a POPQ exam and the other always performed the S-POP exam. The two exams occurred on the same day of the same visit. If during the first of the two exams it was felt that the subject was too uncomfortable to undergo a second exam, the patient would be discontinued from the study. Once the data forms were completed, they were entered into an online data base that was set-up prior to initiating the study. The database was secure and each site was issued a password for data entry. Centers could not be able to perform data retrieval until the study was closed. Each site retained a copy of the informed consent and the data collection sheets in a secure location with access limited to the co-principal investigators and the study coordinator.

Demographic information was described using basic statistics. Primary outcomes were the overall ordinal stages from each examiner, as well as ordinal stages from the

Table 4 Intersystem reliability between the standard POPQ vs simplified pelvic organ prolapse classification system: cervix

Standard POPQ stage	Simplified POPQ stage			
	Stage 1	Stage 2	Stage 3	Stage 4
Stage 1	84	2		
Stage 2	1	7	3	
Stage 3	1	1	6	3
Stage 4			1	4

Kendall's tau-b statistic 0.88

Table 5 Intersystem reliability between the standard POPQ vs simplified pelvic organ prolapse classification system: posterior fornix/cuff

Standard POPQ stage	Simplified POPQ stage			
	Stage 1	Stage 2	Stage 3	Stage 4
Stage 1	115	4		
Stage 2	4	2	2	
Stage 3		4	1	1
Stage 4			1	6

Kendall's tau-b statistic 0.85

anterior, posterior, cervix, fornix, and apical vaginal segments. Correlation between S-POP and POPQ stages was determined by Kendall's tau-b statistical analysis. In certain instances where the rows or columns for certain measures had a zero sum, weighted Kappa statistics were used to evaluate the inter-observer association.

For Kendall's tau-b values between 0.81 and 1.0 indicate almost perfect association, values between 0.61 and 0.80 indicate substantial association, values between 0.41 and 0.6 indicate moderate association and values below 0.4 indicate poor association [6]. For Kappa statistics, a value that falls between 0.81 and 1.0 is considered to indicate excellent agreement beyond chance, between 0.61 and 0.80 substantial agreement, and below 0.40 moderate to poor agreement.

Results

From four urogynecology clinics, 143 subjects were recruited. The mean age of the subjects was 56 +/− 13 years. Median gravidity was three (range 0–14) and the median parity was two (range 0–14). Twenty three subjects were status post-hysterectomy. According to the POPQ system, pelvic organ prolapse stages 1, 2, 3, and 4 were demonstrated in 6 (4.2%), 98 (68.5%), 27 (18.9%), and 12 (8.4%) subjects, respectively. Regarding the inter-system association, Kendall's tau-b statistic for overall stage was 0.80 (Table 1). For all subjects, the variation in overall

staging was more than one stage different in only one subject, and in 115 (80.4%), the overall stage was identical between examiners. The inter-system association for the anterior vaginal wall Kendall's tau-b was 0.71, for the posterior vaginal wall segment was 0.71, for the cervix was 0.88, for the posterior fornix was 0.81, and for posterior fornix/vaginal cuff was 0.85 (Tables 2, 3, 4, and 5).

The results of the inter-system association for the four centers are reported in Table 6. The overall association values varied from 0.55 to 0.86. The substantial association was shown for the anterior vaginal wall and cervix. The almost perfect association was found for the cuff in hysterectomized subjects.

Discussion

The POPQ system is a standard system that represents a reliable and internationally accepted tool for describing the anatomical position of the pelvic organs and can assist clinicians, direct quality care, and provide evidence-based practice [1]. Although the benefits of the system have been described, the perceived difficulty in using the system may initially inhibit clinicians from employing it in clinical practice. In response to this concern, the International Urogynecology Association (IUGA) standardization of terminology committee has recommended a simplified pelvic organ prolapse quantification system (S-POP) based on the ordinal stages of the POPQ. This multicenter, observational study from four continents demonstrated that S-POP demonstrates good association with the POPQ.

Pelvic organ prolapse affects women of all ages and negatively impacts their quality of life [7]. Evidence-based tools for consistent assessment of prolapse have been developed, validated, and used by many clinicians. Standardization of pelvic organ prolapse classification is a key feature for researching and improving quality of care [8]. The POPQ system has been validated and thoroughly studied, and it has been found that it is a precise and reproducible technique for describing pelvic organ prolapse [9–11]. However, while the POPQ system is being used in the majority of published papers on prolapse, it has not

Table 6 Kendall's tau and weighted Kappa statistics for inter-system association by center

Center (no)	Ant	Post	Cervix	Fornix	Cuff	Overall
Denmark (23)	0.70	0.54	0.68*	#	0.87*	0.55
Thailand (50)	0.77	0.87	0.73*	0.49	1.0*	0.77
Brazil (49)	0.68	0.68	0.89	0.87	#	0.86
Argentina (19)	0.88	0.76	#	#	#	0.74

The numbers without asterisks are Kendall's tau values, those with asterisks are weighted Kappa values, and the boxes with # could not be calculated due to too few data points

been universally adopted among the researchers in pelvic floor disorders, and there is little evidence it is being adopted by the generalist [3, 12, 13]. This may be due to several reasons: it is not a user-friendly system and it does not offer real statistical advantages over older, simpler classifications. In clinical practice, many individuals are anecdotally using an ordinal staging system similar to the POPQ with two stages of support at or above the introitus and two stages beyond the hymen. S-POP was developed with only four measured points using categorical staging and approximating the measures as opposed to directly measuring the points with a ruler. It is similar to the Baden and Walker system that for years was the system that was most commonly cited in the literature [2]. Therefore, a simple prolapse classification system that has good association with the scientific standard (the POPQ) would be a benefit to clinicians. This would allow clinicians not using the POPQ to interpret the literature and better employ it in their clinical practice.

This study accomplished what it set out to accomplish with overall numbers in a multi-center study. A further analysis of the data looks at individual centers to determine if one center skewed the data while a reasonable analysis lead to some interesting results. There was one center with very few data points, which made it difficult to determine if this center had poor association or just too few numbers, the other centers with adequate numbers demonstrated good association, which suggests but does not prove good association throughout the differing centers. The center with fewer numbers was included in the overall analysis, as we felt this was still appropriate for the overall study results. Also, for certain points, there was not as much association between classification systems as with other points. This is a combination of greater or lesser variation within certain points and the numbers of segments measured. For example, all subjects had an anterior and posterior segment and much fewer had a cervix, owing to hysterectomy in many subjects. Typically, there are more anterior support defects then posterior or apical, so these latter points were underrepresented. However, since the POPQ gives an overall stage (not a vaginal segment stage), it is appropriate to evaluate how well the simplified version agrees with the POPQ by overall stage. That is how the study was set up. It is encouraging to see that, for each vaginal segment, there was likewise good agreement, but we did not set out to determine individual segment association as the primary goal. Therefore, we did not select subjects based on their initial exam results. Also, there was more variation in the anterior segment (as there was more relaxation in this segment) than the apical or posterior segment, so the effect of different values between examiners is weighted differently in the statistical analysis, which explains a lot of the variation in Kendall's tau-b.

This study was a multinational study that demonstrated good association between the simplified POPQ system and the standard POPQ. The simplified POPQ or S-POP has the advantages of being relatively simple and should be easier to use clinically, but that has not been proven. The downside to adopting the S-POP is that the system is not as specific as the POPQ. Therefore, complex prolapse will not be described in appropriate detail. There were eight subjects in this study where points Aa or Ba were in different stages from points Ba or Bp, respectively. In other words, these subjects had high cystoceles (five) or high rectoceles (four). The S-POP identified the stage for that segment correctly in all eight subjects. So while the specific defect was not as well described using the S-POP, the overall extent or stage of the defect was appropriately described, suggesting the S-POP system is adequate. For research and for the specialists who treat pelvic floor disorder, the POPQ will remain the standard, but the S-POP may find a place among the non-specialist treating pelvic floor disorder.

Conclusion

There was substantial intersystem association between results of exams performed using the simplified pelvic organ prolapse quantification system and the Pelvic Organ Prolapse Quantification system for classifying the stages of pelvic organ prolapse in a clinical population. Since the S-POP is less complicated than the POPQ and correlated well with the POP-Q, it would be more applicable to clinical practice for the majority of healthcare providers worldwide.

Conflicts of interest None.

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