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Apical descent in the office and the operating room: the effect of prolapse size

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Abstract

Objectives—The support of the uterine cervix assessed in the clinic with Valsalva or cough and operating room (OR) with traction often differs. The objective of this study is to test the null hypothesis that the difference between preoperative and intraoperative values of POP-Q (Pelvic Organ Prolapse Quantification) point C is not related to prolapse size, and to determine if other factors exist that predict this difference.

Methods—This is a retrospective review of women who had a vaginal hysterectomy in the FPMRS (Female Pelvic Medicine and Reconstructive Surgery) division between 2005 and 2011 and had preoperative and intraoperative POP-Q point C recorded. A difference of 5 cm was established by a panel of urogynecologists as clinically significant. Student t-tests and chi-squared analyses were used and a logistic regression performed.

Results—There were 206 subjects included. The mean difference in point C between the two clinical settings was 3.5 cm. A difference of 5 cm was present in 33%. The mean difference in point C was larger for women with lesser stages of prolapse (stage 1: 5.8 cm, stage 2: 3.0 cm, stage 3/4: 1.4 cm, $p < .001$). A difference of 5 cm in point C was more often present in women with lesser stages of prolapse—70.3% of women with stage 1, 9.3% for stage 2 and 8.5% for stage 3 ($p < 0.001$).

Conclusions—We reject our null hypothesis. A difference of 5 cm between POP-Q point C in the clinic and the operating room occurred more frequently in women with lesser stages of prolapse.

Keywords

cervical traction; pelvic organ prolapse; prolapse staging

Introduction

The role of the apex in overall vaginal support is well established [1-3]. Apical support is commonly assessed in the clinic with Valsalva or cough and also in the operating room (OR)

after administration of anesthesia with traction on the cervix. These assessments often provide two very different findings.

Both personal observation and clinical studies [4, 5] have shown that there is often more cervical descent in the operating room than in the clinic. In a well-designed study by Vierhout, et al [5], the difference in the Pelvic Organ Prolapse Quantification (POP-Q) stage preoperatively and intraoperatively was compared in subjects undergoing a prolapse procedure. This showed a worsening of the POP-Q stage for the anterior, apical and posterior compartments with traction in the operating room. Previous studies have quantified the mean amount of cervical descent. However, the factors associated with the magnitude of this difference have not previously been evaluated to determine who is most likely to have the largest difference in apical support between the two settings. Surgical plans are usually made in the office based on the amount of cervical descent seen with Valsalva. However, sometimes the surgical plan is changed when a very different exam is obtained with traction in the operating room [7]. Therefore, further information on the degree of difference of point C between these two settings is needed.

Our null hypothesis is that the difference in point C between the office and the OR is not related to prolapse size in women undergoing vaginal hysterectomy. We also aimed to determine if other factors exist that predict which subjects are more likely to have a substantial difference between the office and the operating room exam.

Materials and Methods

This study is a retrospective chart review of women who underwent a vaginal hysterectomy by one of two specialists in Female Pelvic Medicine and Reconstructive Surgery (FPMRS) at the University of Michigan (DMM and JOLD) between 2005 and 2011. These two urogynecologists routinely measured POP-Q point C (location of the cervix in relationship to the hymen) in the clinic with maximum Valsalva or cough and in the operating room with traction, using a tenaculum on the cervix. All measurements were made using a ruler and recorded in centimeters. The Institutional Review Board of University of Michigan approved the study (HUM00045328). Patients were retrospectively identified using CPT codes for vaginal hysterectomy (58260 and 58262) and were included in the study if POP-Q point C was available in the clinic and operating room notes. Subjects were excluded from the analysis if they had a previous apical suspension. A chart review was conducted to collect information regarding demographics, surgical history, examination in the clinic and operating room, type of anesthesia and use of neuromuscular blockade agents, and concomitant procedures. Cervical descent was assigned a stage based on POP-Q point C by the surgeon.

A panel of experienced urogynecologists discussed what magnitude of difference would be considered clinically significant and chose 5 cm. Therefore, a difference in point C between the clinic and operating room was defined as a change in point C greater than or equal to 5 cm if point C in the operating room was at or below the hymen. Continuous variables were compared using student t-tests and categorical variables were compared with chi-square analyses. A multivariable model was developed to adjust for variables that we suspected

may influence cervical descent. STATA v9.2 (College Station, Texas) was used for all analyses.

Results

Between January 2005 and September 2011, 224 subjects had a vaginal hysterectomy performed for prolapse by one of the two subspecialists in Female Pelvic Medicine and Reconstructive Surgery. Excluded from the analysis are 15 women due to missing cervix location data in either the clinic or operating room and three women who had a prior apical suspension procedure. The remaining 206 subjects are included. Age, BMI, parity, history of prior surgery for anterior or posterior prolapse, and concomitant procedures are displayed in Table 1. Concomitant prolapse procedures at the time of the vaginal hysterectomy include an anterior repair for 82% (n=170), a posterior repair for 87% (n=179), and an apical suspension procedure for 52% (n=107).

Differences in point C between the clinic with Valsalva and the operating room with traction were evaluated. The mean difference in point C between the clinic and the operating room was 3.5 ± 2.5 cm. More apical prolapse was observed in the operating room than in clinic for 84% of women as demonstrated by the scatterplot in Figure 1. The difference in point C between the office and the operating room was between 1 and 6 cm for 69% of women, however there was a range of differences of up to 9 cm (Figure 2).

A difference in point C of 5 cm or more was present in 33% (68/206). In 6 women the value in the OR was more than 1 cm higher than in clinic; a factor probably related to measurement technique rather than the uterus actually descending more in the clinic than the OR. In testing our null hypothesis we analyzed the mean difference in point C by POP-Q stage determined by cervical descent in clinic, and the mean difference in point C was larger for women with lesser stages of prolapse (stage 1: 5.8 ± 2.5 cm vs. stage 2: 3.0 ± 1.7 cm vs. stage 3: 1.4 ± 2.1 cm, $p<.001$). A difference of 5 cm or more in point C was more often present in women with lesser stages of prolapse—70.3% of women with stage 1 (57/81) versus 9.3% (4/43) for Stage 2 and 8.5% (7/82) for stage 3 ($p<0.001$) (see Figure 3).

Age, BMI and history of previous prolapse surgery were not associated with differences in point C of 5 cm or more, and the stage of prolapse remained significant when these variables were controlled for in a logistic regression model. Those women with a difference of 5 cm or more were not more likely to have an apical suspension procedure performed at the time of the hysterectomy, nor were they more likely to receive a neuromuscular blockade agent during surgery. The mean length of time between the office measurement and the operating room measurement was 3 months, and length of time between measurements was not associated with a greater difference between point C in the office and the OR.

Discussion

This study of women undergoing vaginal hysterectomy for pelvic organ prolapse quantifies the differences in cervical descent between the clinic and operating room and identifies those most likely to have differences in descent of 5 centimeters or more. We reject the null hypothesis that the difference in preoperative and intraoperative point C is not related to

prolapse size. The mean difference in the descent of POP-Q point C between the clinic and the operating room is 3.5 cm, and there is a five centimeter or more difference in cervical descent among 33%. Interestingly, the difference of five centimeters or more in cervical descent was present among women with POP-Q point C stage I prolapse about ten times more often than among those women with prolapse of stage 2 or higher. At the present time, there are no quantitative data to explain this difference. It may plausibly be related to the properties of the supportive ligaments of the uterus and their interactions with downward forces placed by Valsalva versus traction, but at this time we need a greater understanding about ligament properties and differences in traction versus Valsalva force to be able to generate and test further hypotheses about this finding.

The mean difference we report and the percentage of women with a difference of more than 5cm in cervical descent is consistent with previous reports. Chao et al compared preoperative point C without traction to intraoperative point C with traction [6] and found a mean difference of ~3.5 cm and a 3 cm or greater difference in 57%. Both studies confirm that there is a significant difference in cervical descent between the preoperative and intraoperative exam.

Previous studies have also examined how frequently more prolapse is observed when comparing intraoperative and clinic exams. Vineyard et al showed that 32% had a higher Baden-Walker grade in the operating room compared to the clinic [4]. In another study, Vierhout et al observed that 41% of those with POP-Q stage 1 cervical support based on clinic exam were stage 2 in the operating room [5]. Vierhout also found that no patients with preoperative point C POP-Q stage of 1 or 2 had a stage 3 or higher exam with traction in the operating room. This finding is in contrast to our study. We found that 56% and 76% of those women with stage 1 or 2 apical support by clinic exam had stage 3 prolapse in the operating room, respectively. The reason for this large difference may be the amount of traction applied in the operating room. In the Vierhout study, a standardized 0.5 kg of force was applied to the cervix to determine the amount of descent. However, the average traction applied by surgeons in the operating room is likely greater, as demonstrated by Foon et al [7] who reported that the average traction applied by a series of 10 gynecologists was 3.5 kg.

A recent study by Brazell et al examined the role of neuromuscular blockade and descent in the operating room and found that patients that had neuromuscular blockade had a larger difference in point C between the clinic and the operating room (3.4 cm with neuromuscular blockade and an endotracheal tube and 0.5 cm in those with a laryngeal mask airway) [8]. We did not find that use of a neuromuscular blockade agent affected the magnitude of the difference in point C in the office and the OR. However, there are many differences between the two studies that may account for our divergent findings. Our population includes women with symptomatic pelvic organ prolapse undergoing surgery, while the population in the Brazell study includes both women with symptomatic prolapse as well as women undergoing surgery for other benign gynecologic issues. Also, fewer of the patients in our study had surgery without a neuromuscular blockade agent (10% vs 24%) which may have limited our ability to detect a difference between groups.

The location of point C with traction in the operating room is often used to make decisions about the need for surgical planning with respect to hysterectomy and apical suspension. These decisions are not based on published evidence, due to a paucity of data regarding long-term outcomes after prolapse repair with and without concomitant hysterectomy and/or an apical suspension procedure. The recent study by Foon et al is one of the first to shed light on this important issue [7]. The mean difference between point C in the office and with traction in the operating room was 4.8 cm in that study and 35 women had descent of the cervix within a centimeter of the hymen. These patients had symptomatic anterior compartment prolapse, and a native tissue anterior colporrhaphy without hysterectomy. At three months, only one patient required a subsequent vaginal hysterectomy for prolapse, and the mean point C value at the three month postoperative check was similar to that at the preoperative visit (-4.7 cm compared to -4.8 cm). We look forward to the long-term results of this study to further address the role that the intraoperative exam with traction should play in regards to surgical decision-making.

Limitations and strengths of this study should be recognized. It is a retrospective clinical study. Although the force used during the operative measurements was not standardized, both surgeons pulled with maximal force until there was no further descent of the uterus. There was however remarkable consistency in the collection of the data with more than ~90% of cases having the necessary data to be included in the study. There is variability in the shape and orientation of the cervix and this led to slightly different measurements in a few patients. The eight women in whom the measurements in the OR were less than in clinic are probably the result of slightly different locations on the cervix being selected. This also includes only women who had a vaginal hysterectomy as part of surgery for prolapse. This may slightly overestimate the mean difference in point C between the office and operating room.

In summary, this study addressed the effect of prolapse size on the amount of cervical descent seen in the operating room with traction compared to the clinic with Valsalva. We have shown that the mean difference between the two settings is 3.5 cm, and that the difference is greater in women who have stage I apical descent compared to those with higher stages of apical descent. This information can help surgeons anticipate a large difference with traction in the operating room, specifically in women with smaller prolapses. However, long-term outcomes data is still needed to determine the role that traction in the operating room plays in choosing a prolapse procedure and the likelihood of its long-term success.

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Figure 1. Scatterplot of location of Point C in the office and in the OR. The diagonal line represents the same location of Point C in the office and in the OR

Figure 2. Overall difference in Point C between the clinic and OR (cm)

Pre op POP-Q Stage	Mean difference in cm (SD)
Stage I	5.8 (2.5)
Stage II	3.0 (1.7)
Stage III/IV	1.4 (2.1)

Figure 3. Apical descent or < 5 cm by Point C stage and mean differences by Point C stage

Table 1
Demographics and Concurrent Procedures

	Overall (n=206)	<5 cm difference(n=138)	5cm difference (n=68)	P-value
Demographics				
Age (mean $\pm$ SD)	59 $\pm$ 11	59 $\pm$ 12	59 $\pm$ 11	.72
BMI (kg/m ² , mean $\pm$ SD)	28.5 $\pm$ 7.0	28.7 $\pm$ 5.4	28.1 $\pm$ 9.4	.45
Parity (median)	3	3	3	
History of prolapse surgery for cystocele or rectocele (not apical suspension) n(%)	13 (6)	11 (8)	2 (3)	.16
Concurrent Procedures				
Anterior colporrhaphy n(%)	170 (82)	110 (80)	60 (88)	.13
Posterior colporrhaphy n(%)	179 (87)	117 (85)	62 (91)	.20
Apical suspension n(%)	107 (52)	77 (56)	30 (44)	.12