360

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SURGICAL ANATOMICAL OUTCOMES USING POSTERIOR REPAIR QUANTIFICATION (PR-Q) TO IDENTIFY DEFECTS

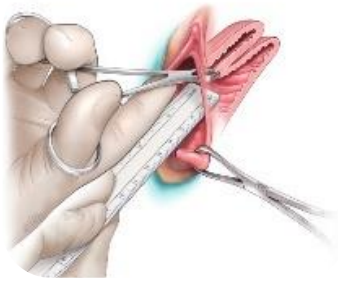
Hypothesis / aims of study
Posterior repair quantification (PR-Q)[1-3] provides a clear, alternate set of four measurements to the equivalent POP-Q[2] posterior compartment measurements. Using PR-Q (and POP-Q) measurements, posterior compartment defects have been found more at the vaginal vault (Level I) and vaginal introitus (Level III) than at the mid-vagina (Level II)[1,3]. We hypothesize that the use of PR-Q as surgical indicators might facilitate consistent postoperative surgical anatomical outcomes.

Study design, materials and methods
In a prospectively conducted study of 300 consecutive posterior repairs (PRs), mostly following prior or concomitant hysterectomy, the following were measured pre- and immediately postoperatively: (i) from POP-Q[2]: points C, Ap and Bp and genital hiatus (GH); from PR-Q[1:] perineal gap (PG), posterior vaginal vault descent (PVVD), mid vaginal laxity (MVL) vault undisplaced, rectovaginal fascial laxity (RVFL –n/a postop) – see Figures. The range of other demographic and surgical factors noted included: age; parity; weight; height; BMI. Surgical initiatives such as (i) excision of the perineal defect (PG); (ii) vault suspension (sacrospinous colpopexy – SSC); (iii) vaginal skin excised; (iv) rectovaginal fascial suturing were recorded and compared with surgical outcomes.

KAI 1
Perineal gap (PG)

KAI 3 Mid-vaginal laxity (MVL) - vault undisplaced

KAI 4 Recto-vaginal fascial laxity (RVFL)



KAI 2 Posterior vaginal vault descent (PVVD) = Total posterior vaginal length (TPVL - on left) minus PG to Moynihan (on traction) measurement (right)

Results
Demographic data for the 300 – Number (range) Standard deviation (SD) were; (i) Age(years): 63.6 (31-91) SD11.8; Weight (kg) 71.7 (44-141) SD 14.6; Height (cm) 162.9 (142-187) SD 7.1; BMI (Kg/m^2) 26.7 (18.6-41.3) SD 5.0; Parity 2.6 (0-8) SD 1.2.

Table 1 shows the pre-operative and postoperative measurements for the respective (i) PR-Q[1]; (ii) POP-Q[2] prolapse markers. Table 2 shows the PR-Q[1,3] markers used as surgical indicators with (i) our guidelines for repair action based on the defect noted[3]; (ii) the percentage of cases that surgical action was required; (iii) the surgical outcome (change) based on PR-Q[1] measure; (iv) the surgical outcome (change) based on POP-Q[2] measure.

Interpretation of results
PR-Q[1-3] provides clear surgical measurements: suitable for pre- and postoperative use, the former also as surgical indicator, the latter to assess surgical outcomes. A statistical interpretability advantage over the equivalent POP-Q[2] measurements is that all results are positive. ***Level III:*** Identification and excision of the perineal gap restores the anterior perineum, eliminating the thinned

out medial tissue (in other studies containing no ligaments /muscle and 88% showing histological change). Further support is noted with the 35%↓ in GH. ***Level I:*** Defect (PVVD) identification and vault fixation (84% SSC) results in near elimination of this defect. ***Level II:*** We have previously noted[1,3] the defects here are relatively small with the vault reduced. PR-Q[1-3] and POP-Q[2] evidence shows further major reductions in the mean size of the defects with the Level I and Level II repair components.
CONCLUSION: PR-Q[1-3] posterior prolapse surgical markers facilitate (i) identification of anatomical defects at the different ***Levels I-III***; (ii) exact surgical planning for each ***Level***; (iii) consistently good and statistically interpretable anatomical surgical outcomes for each ***Level***.

TABLE 1: Pre-op and postop results for (i) PR-Q[1-3] and (ii) POP-Q[2] surgical markers

	Mean	SD	Min	Max	Mean	SD	Min	Max
PR-Q POSTERIOR PROLAPSE MARKERS	***PRE-OP***				***POST – OP***			
Perineal gap - PG (cm) – Level III	2.9	1.0	0.3	6.0	0.0	0.0	0.0	0.0
PVVD (cm) (overall) - Level I	6.0	2.0	0.3	15.0	0.1	0.3	0.0	2.0
PVVD (cm) (SSC Performed) – Level 1	6.6	2.0	4.5	15.0	0.03	0.1	0.0	1.0
PVVD (cm) (No SSC Performed – Level 1	3.7	1.0	1.0	5.3	0.6	0.4	0.0	2.0
MVL, undisplaced (cm) – Level II	1.3	0.6	0	3.5	0.2	0.1	0.0	0.5
Recto-vaginal fascial laxity (RVFL) Level II	1.1	0.7	0	4.0	n/a		n/a	n/a
POP-Q POSTERIOR PROLAPSE MARKERS	***PRE-OP***				***POST-OP***			
Pre-op point C (cm) - Level I	-0.9	2.3	-8.0	8.0	- 6.2	2.2	-2.5	-8.5
Pre-op point Ap (cm) - Level II	1.0	1.4	-3.0	5.0	- 2.9	0.3	-1.0	-3.0
Pre-op point Bp (cm) - Level II	1.0	1.5	-3.0	6.0	-2.9	0.4	-2.0	-3.0
Genital Hiatus (GH) pre-op (cm)-Level III	3.7	0.9	1.5	6.5	2.6	0.76	1.5	4.5

TABLE 2: Surgical actions, percentage employed and surgical outcomes (change) based on PR-Q[1-3] posterior prolapse markers; surgical outcomes (change) based on POP-Q[2] markers at same level.

PR-Q Marker	Our **Guideline** for Repair Action	**Percentage** of cases action used	**Result** of action	**POP-Q** – equivalent Level
Perineal Gap (PG)	Excise PG	100%	100% excised	35%↓ in GH
Posterior vaginal vault descent (PVVD)	SSC if PVVD > 5cm	84% SSC (mean pre-op 6.0cm to mean postop 0.1cm)	SSC performed – 99% ↓ PVVD No SSC - 84%↓ PVVD	Point C from mean minus 0.9 to mean minus 6.2
Mid-vaginal laxity (MVL) – vault undisplaced	Vaginal skin excision just under half MVL bilaterally	96% (67% requiring under 0.5cm bilaterally)	85% mean reduction MVL (1.3cm preop to 0.2cm postop)	Points Ap,Bp from 1.0 to minus 2.9 mean
Recto-vaginal fascial laxity (RVFL)	Plicatory suturing if RVFL > 0.5cm. No RVF dissection.	76% (mean preop 1.1cm)	Optimize plication though postop RVFL not applicable	

References
1. Int Urogynecol J 2014, 25(12):1665-1772; Neurourol Urodyn 2014, 33(6):900-901.
2. Neurourol Urodyn 2016, 35(2):137-168; Int Urogynecol J 2016, 27(2):165-194.
3. Int Urogynecol J 2016, DOI: 10.1007/s 00192-015-2874-7

Disclosures
Funding: None Applicable **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** St Vincent's Hospital HREC LNR/13/SVH/408 **Helsinki:** Yes **Informed Consent:** Yes