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Reimers C[1], Stær-Jensen J[1], Siafarikas F[2], Saltyte-Benth J[2], Bø K[3], Ellström Engh M[2]
1. *Akershus University Hospital, Department of Obstetrics and Gynaecology, Lørenskog, Norway,* ***2.*** *Institute of clinical medicine, University of Oslo, Norway,* ***3.*** *Department of sports medicine, Norwegian school of sports sciences, Oslo, Norway*

PELVIC ORGAN SUPPORT ASSESSED DURING PREGNANCY AND POST PARTUM; A COHORT STUDY FOLLOWING 229 NULLIPAROUS PREGNANT WOMEN FROM MID-PREGNANCY UNTIL ONE YEAR POST PARTUM USING POP-Q

Hypothesis / aims of study

The association between vaginal childbirth and development of pelvic organ prolapse (POP) later in life has been known for a long time. Since caesarean section is not fully protective against developing symptoms later, an effect of the pregnancy itself on pelvic organ support has been suspected. Studies of short term effects of pregnancy and delivery on pelvic organ support are few and results are conflicting (1, 2). The aim of the present study was to evaluate changes in pelvic organ support from mid-pregnancy until one year post partum among nulliparous pregnant women using the pelvic organ prolapse quantification system (POP-Q).

Study design, materials and methods

This prospective cohort study was conducted from December 2009 to December 2012 at a university hospital with approximately 4,500 deliveries per year. All nulliparous pregnant women were invited to participate when they attended their second trimester ultrasound screening. Inclusion criteria were singleton pregnancy, no prior pregnancy of more than 16 weeks and ability to speak the native language.

Exclusion criteria during the study were premature delivery before gestational week (gw) 32 and stillbirth. Post partum the women were excluded if they were more than 6 weeks pregnant at the time of examination.

The participants were examined at gw 22 and 37, and at 6 weeks, 6 and 12 months post partum (pp) using POP-Q. They were examined in the supine lithotomy position after voiding. All examinations were performed by one of two gynaecologists blinded to the women's previous POP-Q measurements, symptoms and obstetric history.

To be able to use estimates for women not attending all five time points, changes in terms of time-trends in the pre and postpartum periods were calculated for the nine individual POP-Q points using a linear mixed model with random intercepts for patients, fixed effects for time variable, and unstructured covariance model. Pre and post partum periods were defined by a dummy variable. A non-linear time component as well as interaction between pre/post partum dummy variable were included if significant. It was not possible to fit the delivery into the time trend model. Paired-samples T-test was therefore used to analyse changes between gw 37 and 6 weeks pp. Results with p-value less than 0.05 were considered significant. All calculations were made using SPSS 15.0 and SAS v 9.2.

Results

In total 229 women were included in the study.

The number of women examined with POP-Q at each time point were: gw 22: n= 229, gw 37: n= 205, 6 weeks pp: n=214, 6 months pp: n=196, and 12 months pp: n=178.

178 women participated at all 5 examinations.

Of the women lost to follow-up five were excluded owing to stillbirths or premature deliveries, and 13 were excluded owing to new pregnancies in the post partum period. The other women lost to follow-up chose not to continue.

Characteristics of the study population were; mean age: 28.7 years (range 19-40), mean BMI pre pregnancy 23.9 kg/m^2 (range 16.7-39.1). Eighty-one percent (174/215) of the women delivered vaginally and 19 %(41/215) by caesarean section. Mean birth weight was 3.453 kg (range 1.432-4.950 kg). Mean values for the nine POP-Q measurements at the different time points are shown in Table1

Table 1. Mean POP-Q measurements in cm with standard deviations (SD) for the five different time points.

POP- Q point	Gw 22 n=229	Gw 37 n=205	6 weeks pp n=214	6 months pp n=196	12 months pp n=178
Aa	-2.70 (0.45)	-2.77 (0.43)	-2.43 (0.75)	-2.64 (0.49)	-2.77 (0.41)
Ba	-2.72 (0.51)	-2.78 (0.44)	-2.45 (0.74)	-2.63 (0.51)	-2.76 (0.44)
C	-7.59 (0.98)	-7.95 (1.01)	-6.38 (1.34)	-6.86 (1.22)	-7.11 (1.24)
Gh	3.16 (0.59)	3.44 (0.60)	3.50 (0.76)	3.15 (0.70)	3.13 (0.68)
Pb	3.96 (0.67)	4.43 (0.86)	3.92 (0.75)	3.51 (0.72)	3.33 (0.56)
Tvl	9.42 (0.83)	10.25 (0.74)	9.15 (0.97)	9.45 (0.93)	9.65 (0.94)
Ap	-2.85 (0.42)	-2.96 (0.16)	-2.88 (0.40)	-2.88 (0.29)	-2.91 (0.30)
Bp	-2.87 (0.41)	-2.96 (0.16)	-2.88 (0.40)	-2.90 (0.28)	-2.90 (0.34)
D	-9.06 (0.91)	-9.88 (0.87)	-8.31 (1.13)	-8.83 (1.21)	-9.14 (1.35)

Time-trend analysis showed statistical significant change over time for all 9 POP-Q points during pregnancy and post partum. For the period gw 37 to 6 weeks pp there was a significant change for all POP-Q points except for the genital hiatus (Gh) (Table 2)

All POP-Q-points in the anterior, posterior and apical vagina (Aa, Ba, Ap, Bp, C, and D) made a cranial shift from gw 22 to gw 37. At 6 weeks pp the POP-Q points had made a caudal shift towards the hymen (Table 2). From 6 weeks pp onward there was

a cranial shift that continued until the end of the observation at 12 months. (Aa, Ba, Ap, C, D; p<0.001: Bp; p=0.002). Total vaginal length (Tvl) increased from gw 22 to gw 37. At 6 weeks pp Tvl had shortened (Table 2), but lengthened thereafter until 12 months pp. (Tvl; p< 0.001)
The Gh and perineal body (Pb) lengthened from gw 22 to gw 37. At 6 weeks pp Gh had not changed while Pb had shortened (Table 2). Post partum there was a continuous shortening for both Gh and Pb until 12 months. (Pb, Gh; p<0.001).

Table 2. Paired samples test for difference in POP-Q points between gw 37 and 6 weeks pp.

Paired POP- Q points (n=201)	Mean difference for gw 37- 6wpp (cm)	95% Confidence interval of difference	p-value
Aa	-0.35	-0.44 -0.25	<0.001
Ba	-0.32	-0.42 -0.23	<0.001
C	-1.58	-1.80 -1.35	<0.001
Gh	-0.09	-0.20 0.03	0.151 (ns)
Pb	0.51	0.39 0.64	<0.001
Tvl	1.11	0.96 1.26	<0.001
Ap	-0.08	-0.13 -0.02	0.008
Bp	-0.08	-0.14 -0.02	0.006
D	-1.56	-1.74 -1.38	<0.001

Interpretation of results
To our knowledge this is the largest longitudinal study assessing changes in nulliparous women using the POP-Q system during pregnancy and post partum. The results showed a significant change over time for all POP-Q points both pre and post partum. The findings of a cranial shift of the anterior, posterior and apical vagina during pregnancy are contrary to previous findings which showed either no change (2) or a caudal shift(1).Post partum the results also differ from previous studies in that we found a continuous cranial shift of all POP-Q points in the anterior, posterior and apical vagina until one year post partum, whereas a caudal shift of several of these POP-Q points (Ap, Bp and D) within the same observation period has been found by others
Possible explanations for the diverging results from comparable studies might be differences in examination time-points, the way POP-Q were performed (left lateral versus dorsal lithotomy position)(3), and that data in one of the studies had been stratified according to delivery mode (3).

Concluding message
The pelvic organ support as measured with the POP-Q system is affected both by pregnancy and delivery and the restitution of the tissues continues at least up to one year after delivery.

References

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Disclosures

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