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Bony pelvis dimensions in women with and without polycystic ovarian syndrome

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Abstract
To test the null hypothesis that bony pelvis dimensions are different in women with and without polycystic ovarian syndrome (PCOS). In this case-control study all subjects underwent hysterosalphingography examination. The interspinous, intertuberous diameters and subpubic angle were measured from the images independently by author blinded to the clinical and laboratory data of the patients. Women with PCOS had shorter interspinous diameter. There was no significant differences in the length of intertuberous diameters and subpubic angles between the two groups. Significant difference in interspinous diameter was identified when comparing reproductive-aged women with PCO and their similar aged controls.

Keywords: Hysterosalphingography, pelvis, polycystic ovary syndrome, reproductive

Introduction

The polycystic ovary syndrome (PCOS) is a common endocrinopathy that affects from 5 to 8% of women of child-bearing age [1]. Cardinal features of the syndrome are ovulatory dysfunction, infertility and hyperandrogenism. Some affected women may have increased risk for metabolic syndrome and type 2 diabetes mellitus, [2,3]. Pregnancy complications including gestational diabetes, pregnancy-induced hypertension, pre-eclampsia, and preterm birth are also increased in women with PCOS [4]. The origin of PCOS is still unknown. Genetic and environmental factors have an impact in the etiology [5]. The adipose tissue in PCOS women has aberrant morphology, distribution and function. Androgen excess may be related to altered body fat [5,6] . In our clinical practice, we frequently observe that women with PCOS have higher caesarean section rates. previous meta analyses have also confirmed this [4,7]. Attention has been focused on hormonal and metabolic aspects of PCOS and bony pelvis dimensions have not been studied. We hypothesized that hormonal differences may contribute to differences in pelvic dimensions in women with PCOS, playing an important role in mechanics of labor and delivery.

Our aim was to test if women with PCOS had different bony pelvic dimensions from those of the control group. Pelvic images for pelvic dimensions were obtained with Hysterosalpingography (HSG) which is performed in the evaluation of infertility.

Material and Methods

This case-control study was conducted at Mugla Sitki Kocman University, Turkey and Private Novafertil IVF Clinic, Konya, Turkey, between May 2013 and December 2014. A total of 101 radiographs of women (PCOS group, n=50, control group n=51) complaining of infertility and undergoing HSG were included into the study. Each patient's clinical information was extracted from the request cards and case notes. Patients in our study and control group had similar age, BMI, race and they were all nullipar. PCOS was diagnosed according to the revised consensus on diagnostic criteria (2003 revised Rotterdam criteria) [8]. Pelvis radiographs were obtained via Siemens Artis Zee fluorosvopy machine in the anteroposterior projection during injection of the contrast agent Ultravist (Iopromide - by Bayer Schering) into the uterine cavity. Pelvic dimensions including the interspinous diameter (Figure 1), intertuberous diameter (Figure 2), subpubic angle (Figure 3), were measured for each subject. All measurements were made independently by radiologist using Sisopacs software (ODTU Teknokent Ankara, Turkey). The average value of each pelvic dimension was used for analysis. Radiographs containing inadequate pelvic images for pelvic dimensions were excluded from the study. The local ethics committee approved the study. Informed consent was also obtained from all patients.

The SPSS package (SPSS Inc, Chicago, IL, United States) was

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used to perform statistical analysis. Distribution of the groups was assessed with one sample Kolmogrov–Smirnov test. Students' two-tailed t test and Mann-Whitney U test were used for testing differences between groups. A p value <0.05 was considered statistically significant.

Figure 1. Hysterosalpingography (HSG) illustrating the interspinous diameter

Figure 2. Hysterosalpingography (HSG) illustrating the intertuberous diameter

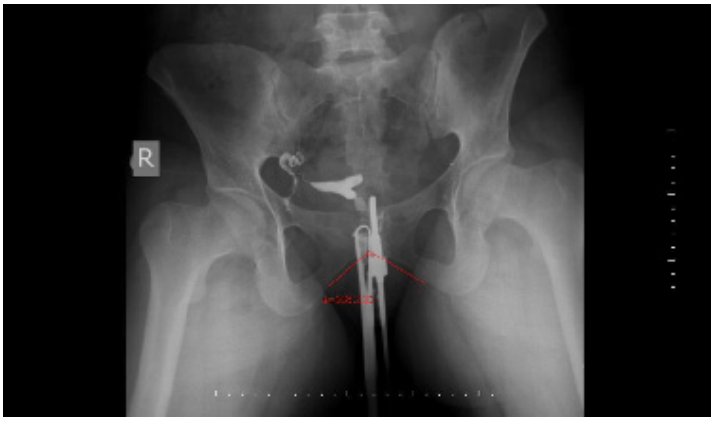

Figure 3. Hysterosalpingography(HSG) illustrating the subpubic angle

Results

The age of our patients ranged from 27 to 36 years, with a mean of 29.58 for PCOS group and 28.34 for the control group. Demographics of the subjects were similar among two groups. Patients in our study and control group were in the evaluation of infertility and had similar age, BMI, race and they were all nullipar. Their level of education, socio-economical status were also similar. Analysis of pelvic dimensions indicated the significant difference in interspinous diameter between the two groups. There was no significant difference in intertuberous diameters and subpubic angles (Table 1).

Table 1. Bony pelvis dimensions of PCOS and control subjects

	PCOS (n=50)	Control (n=51)	P Value
Interspinous diameter (mm)	99.01±2.66	104.9±7.13	0.024
Intertuberous diameter (mm)	118.03±13.69	118.79±13.34	0.080
Subpubic angle (°)	90.02±10.62	90.53±11.34	0.545

mm: milimeter °:degree

Discussion

In our current study we aimed to investigate bony pelvis dimensions in women with and without PCOS and to test the hypothesis whether bony pelvis dimensions diverge in women with PCOS. There are several methods to measure a woman's pelvic size including clinical examination, X rays, computed tomography, and magnetic resonance imaging (MRI) [9]. In our study we obtained pelvic dimensions by using HSG, routinly performed as a part of an infertility work-up. Since infertility is one of the main features of PCOS, there were available HSGs belonging to women with PCOS. In the present study, we witnessed significant differences in interspinous diameter between PCOS and control groups. Interspinous diameter is the narrowest distance between the ischial spines at mid-pelvis. Mid pelvis is important because narrow mid-pelvis may obstruct the progress of labor. In our study women with PCOS had shorter interspinous diameter. There was no significant differences in intertuberous diameters and subpubic angles. A recent systematic review and meta-analysis by Qin et al.[4] showed that women with PCOS had increased risk of adverse pregnancy and neonatal outcomes including higher caesarean section rate. Difference in pelvic dimensions may account for higher caesarean rates.

The aim of pelvimetry is to predict which group of patients will have cephalopelvic disproportion to help determine the outcome of labor. Data regarding the effect of pelvimetry on method of delivery and on maternal perinatal mortality and morbidity is conflicting [9, 10] . Our aim was not to assess the value of pelvimetry. We aimed to investigate if patients with PCOS had different pelvic dimensions than matched controls by using HSGs obtained from patients on infertility work up. Magnetic resonance imaging may provide better information about pelvic dimensions by midline sagittal, and oblique coronal views of the pelvis, but it is very expensive. There have been numerous studies performed associated with endocrine and metabolic effect of PCOS. To our knowledge pelvis shape and size is yet to be studied in women with PCOS and this is the first study evaluating the Pelvic dimensions. Besides mode of delivery, bony pelvis dimensions may also be involved in urinary incontinence [11], requiring further investigation. Patients in

our study and control group had similar age, BMI, race and they were all nullipar, a remarkable pro. The limitations of the study includes: its small sample size, the inherent limitations of image analysis and lack of lateral pelvic views.

Conclusion

In conclusion, possible anatomical differences may exist between women with and without PCOS, meaning further studies with larger samples and better imaging techniques are required to investigate these differences.

Competing interests
The authors declare that they have no competing interest

Financial Disclosure
The financial support for this study was provided by the investigators themselves.

Ethical approval
Before the study, permissions were obtained from local ethical committee.

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