Association Between Obstetric Conjugate Diameter Measured by Transabdominal Ultrasonography During Pregnancy and the Type of Delivery

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1. Background

Cesarean is a word usually used in midwifery to describe live embryo parturition through laparotomy and hysterotomy. Cesarean progressively increased in USA from 1965 to 1988 (1). C-section rate has been steadily rising from 35% in 2000 to 40% in 2005 in Iran (2). Meanwhile, the size and shape of the bony pelvis are important factors determining the progress of labor and delivery. Most morphological disorders of the pelvis result from a small anterior-posterior diameter or obstetric conjugate diameter (OCD) (3). Different methods are used to measure this diameter including clinical examination, X-ray pelvimetry, CT scan and MRI (4). Ultrasound (US) is another technique to measure OCD. It is also accessible in many centers and considered as an exact way to determine OCD (4, 5).

3. Patients and Methods

In this descriptive study, 200 pregnant women without a previous problem in the third quarter of pregnancy who were experiencing their first gestation were studied. A transabdominal US scan was done using GE Logiq Alpha 200/Logiq 200 PRO, US machine (General Electric Medical Systems; Milwaukee, USA) with a 3.5 MHz curvilinear probe. The internal end of the superior periphery of the pubic bone to the sacral promontory was measured as the OCD (Figure 1 A and B) (6). Examination was performed in two stages (once in 25-30 weeks and then in 30-35 weeks). Factors such as maternal age, pregnancy age, fetal manifestation, accompanied diseases and type of parturition (vaginal [V] or cesarean [C]) were considered. The biparietal diameter (BPD) was measured concurrently with the measurement of OCD. Exclusion criteria included non-cephalic manifestation, pre-eclampsia, diabetes, high or low birth weight, elective cesarean, cesarean due to other reasons rather than cephalopelvic disproportion (CPD), and a BPD higher than 95% and less than 5% of the standard deviation (SD) at the same age of pregnancy (to-
tally 56 patients were excluded; 32 in V group and 24 in 
C group). The SPSS software (SPSS Inc., Chicago, Illinois, 
USA) was used for statistical analyses. A P value < 0.05 was 
considered statistically significant.

3. Results

The mean age of the studied mothers was 24.12±4.94 
years (15-40) (Table 1). On the first examination, the aver-
age OCD in groups V and C was 125.27±8.30 mm (105-144) 
and 112.70 ± 8.58 mm (96-135), respectively. The mean OCD 
in group C was significantly lower (P<0.001). At the sec-
ond time, OCD in groups V and C was 125.74±8.44 mm 
(105-145) and 113.29±8.53 mm (97-134), respectively so that 
the average OCD in group C was significantly less than 
group V (P<0.001). The mean OCD of both sonographies 
in groups V and C was 125.51±8.35 (105-144.5 mm) and 
112.99±8.53 (96-134.5 mm), respectively, which was signifi-
cantly lower (p < 0.001) in group C. But the values of first 
and second OCD measurements were not significantly 
different (P=0.065). The optimal cut-off point of OCD in 
the prediction of vaginal birth was ≥ 119.75mm. The sen-
sitivity and specificity of OCD to predict vaginal delivery 
was 80% and 78.5%, respectively. Based on the OCD and the 
number of C or V births, all cases were classified as Table 2. 
The OCD was significantly high in the V group (P<0.001). 
It is noteworthy that the causes of cesarean delivery are 
not determined here.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Types of Delivery</th>
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<tbody>
<tr>
<td>Cesarean (%)</td>
<td>Vaginally (%)</td>
</tr>
<tr>
<td>Group 1: OCD ≥ 120 mm</td>
<td>14 (11.5)</td>
</tr>
<tr>
<td>Group 2: OCD &lt; 120 mm</td>
<td>51 (65.4)</td>
</tr>
<tr>
<td>Group 3: OCD &lt; 110 mm</td>
<td>24 (77.4)</td>
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<tr>
<td>Group 4: OCD &lt; 100 mm</td>
<td>5 (100)</td>
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4. Discussion

There was no significant difference in OCD between the 
two measurements or during pregnancy in this study 
(P>0.05). Moreover, Gottlicher et al. (5) demonstrated 
that no substantial clinically significant increase of the 
OCD can be found during pregnancy and in repeated 
pregnancy. We used the mean size of both measured as 
sonographic OCD value. This value was significantly less 
in the cesarean group compared with the vaginally de-
livered group (112.99±8.53 versus 125.51±8.35). Our results 
are consistent with the study conducted by Adadevoh 
et al. (7) in which the mean OCD in a group that needed 
cesarean was significantly less than those who were de-
livered vaginally. Considering the optimal cut-off point 
(OCD ≥120 mm), the sensitivity and specificity of this 
method in predicting vaginal delivery was calculated as 
80% and 78.5%, respectively. In this study, 118 women with 
an OCD greater than 120 mm and 82 with an OCD smaller 
than 120mm, cesarean was performed in 14 (11.9%) and 
51 (62.2%) women, respectively, showing a significantly 
high number in the second group (P<0.001). In this re-
gard, our results are similar to the study carried out by 
Katonozako et al. (6). In the current study, all the cases 
with an OCD smaller than 100 mm necessitated cesarean
section; while in the cases with an OCD<120 mm, vaginal birth was done in 27 cases and in the women with an OCD greater than 120 mm cesarean was required in 14 cases. As mentioned previously, the reasons for cesarean delivery were not specified clearly. Therefore, only in women with an OCD smaller than 100 mm, the necessity for cesarean could be expected strongly. We did not measure the OCD by x-ray due to ethical problems. Meanwhile, the comparative studies indicated the highly significant correlation between US and x-ray measurements for OCD (6, 8). Measuring OCD by MRI, CT scan or transvaginal sonography have been studied with acceptable results (9-11), but among all these modalities, US pelvimetry is more objective than clinical pelvimetry; more safe than x-ray and CT because of ionizing radiation absence and cheaper than MRI. In this study, despite our best effort to eliminate biases, we had no access to exact data regarding the cause(s) of cesarean surgery. So, this study cannot be considered as a study for evaluating different methods, or assessing their diagnostic value in comparison with the method studied here. Nevertheless, according to our attempt for eliminating bias, it seems that the results of this study as a preliminary study could be constructive for upcoming better and precise studies in order to evaluate the diagnostic value of OCD measured by US. Considering these points, this technique can be used as a simple, feasible, noninvasive, and inexpensive method that can be implemented at the bedside of laboring woman to assess the pelvic inlet for predicting the type of delivery.

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Authors’ Contribution
All authors have participated equally at the present study.

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There is no conflict of interest.

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References