VALUE OF COMPUTED TOMOGRAPHY PELVIMETRY IN PATIENTS WITH A PREVIOUS CESAREAN SECTION

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A case-control study was conducted at the Department of Obstetrics and Gynaecology, King Abdulaziz University Hospital, Jeddah, Saudi Arabia, to determine the value of computed tomography pelvimetry in patients with a previous cesarean section. Between January 1993 and December 1995, 219 pregnant women with one previous cesarean section met the criteria for vaginal birth after cesarean delivery. One hundred women had antenatal CT pelvimetry for assessment of the pelvis. One hundred and nineteen women did not have CT pelvimetry and served as control. Fifty-one women (51%) in the CT pelvimetry group delivered by cesarean section. Twenty-three women (23%) underwent elective cesarean section for contracted pelvis based upon the findings of CT pelvimetry and 28 women (28%) underwent emergency cesarean section after trial of labor. In the group who did not have CT pelvimetry, 26 women (21.8%) underwent emergency cesarean section. This was a statistically significant difference (P=0.02). There were no statistically significant differences in birthweight and Apgar scores in either group. There was no perinatal or maternal mortality in this study. Computed tomography pelvimetry increased the rate of cesarean delivery without any benefit in the immediate delivery outcomes. Therefore, the practice of documenting the adequacy of the pelvis by CT pelvimetry before vaginal birth after cesarean should be abandoned. *Ann Saudi Med 1998;18(1):9-11*.

A recent survey in the U.K. revealed that radiological pelvimetry is a test still commonly used to predict the outcome of labor.[1] The benefit of pelvimetry in predicting the outcome of labor in cephalic presentation is controversial.[2-4] Both Krishnamurthy et al.[5] (in a retrospective study in 1991) and Thubisi et al.[6] (in a prospective randomized study in 1993) reported that x-ray pelvimetry in women with one previous cesarean section increases the the rate of subsequent delivery by cesarean section, and is a poor predictor of the outcome of labor. Nevertheless, technological advances (CT and MRI) offer simplicity, reduction or absence of ionizing radiation, reliability and accuracy.[7] Therefore, these features caused a resurgence in pelvimetry. In our unit, based on published local data,[8] some staff champion the approach of documenting the adequacy of the pelvis by low-dose CT pelvimetry before allowing vaginal birth after cesarean delivery (VBAC). The objective of this study was to determine the impact of low-dose CT pelvimetry in women with a previous cesarean section who fulfil the criteria for VBAC.

Subjects and Methods

Between January 1993 and December 1995 the hospital records of all pregnant women who attended the antenatal clinic at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia, with one previous cesarean section, were examined. Inclusion criteria of the study were: 1) request of the couple for VBAC; 2) single pregnancy with cephalic presentation; 3) estimated fetal weight less than 4 kg; and 4) no medical or obstetrical contraindications (diabetes mellitus, history of classical or inverted T-incision, or presence of placenta previa). Two hundred and nineteen women fulfilled the criteria. One hundred women had antenatal low-dose CT pelvimetry for assessment of the pelvis before VBAC, based upon the practice of some consultant obstetricians, while 119 did not have pelvimetry and served as the control group.

The CT pelvimetry was performed using the low-dose technique described by Federle et al.[9] and modified by Akeil et al.[10] with a Siemens Somatton DR3 CT scanner. An anteroposterior scout view measured the transverse diameters of the pelvis. Women who had CT pelvimetry were categorized into those with adequate pelves and those with inadequate pelves, according to the measurements of the normal pelvis of Saudi Arabian women.[10,11] An adequate pelvis was defined as a pelvis with anteroposterior and transverse diameters of the inlet of 11 cm and 12 cm, respectively, anteroposterior diameter of the outlet of 11 cm, and interspinous diameter of 10.5 cm. Inadequate pelvis was defined as a pelvis with anteroposterior diameter of the inlet of less than 11 cm, and/or interspinous diameter of less than 10 cm. Women with inadequate pelvis based upon the findings of CT pelvimetry were delivered by elective cesarean section.

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Women with adequate pelvis, as well as women who did not have pelvimetry, underwent VBAC.

Labor and delivery were managed by the registrar-on-call, who was aware of the planned management. Intramuscular analgesia (pethidine and phenergan) were used for pain relief. Continuous fetal heart monitoring was achieved by electronic means in all subjects. Oxytocin augmentation was used in cases of dysfunctional labor at a starting dose of 1 mU/minute and was increased to 1 mU/minute every 30 minutes until three uterine contractions were noted in a 10-minute period. Emergency cesarean section was performed for obstetric indications.

Student's *t*-test and chi-squared test were used as appropriate. $P<0.05$ was considered significant. Statistical analysis was performed using SPSS-PC for Windows, version 6.1.

Results

There were no significant differences in maternal characteristics between the women who had antenatal CT pelvimetry and those who did not (Table 1). We found a statistically significant difference in the rate of cesarean section in the two groups ($P=0.02$). Fifty-one women (51%) in the CT pelvimetry group delivered by cesarean section. Twenty-three women (23%) underwent elective cesarean section for contracted pelvis based upon the findings of CT pelvimetry, and 28 women (28%) underwent emergency cesarean section after trial of labor. In the group who did not have CT pelvimetry, 26 women (21.8%) underwent emergency cesarean section. Likewise, vaginal delivery occurred in 49 out of 100 women (49%) who had CT pelvimetry, compared to 93 of 119 women (78.2%) in the control group ($P=0.02$).

Six women (6%) in the pelvimetry group and three (2.5%) in the control group underwent induction of labor with prostaglandins (prostin 2.5 mg intravaginal suppository). The small number of patients excludes any purposeful comparison. Interestingly, the duration of labor in those who delivered vaginally was shorter in the pelvimetry group (5.7 hours±4.6) when compared to the control group (7.5 hours±4.9) ($P=0.01$). There were no significant differences between the groups in the mean birthweight and Apgar scores. There was no perinatal or maternal mortality in this series. Women who delivered vaginally in the CT pelvimetry group and control group were discharged home earlier than those who underwent cesarean section.

TABLE 1. *Maternal characteristics.*

Variable	Study group (100)	Control group (119)	*P*-value
Age	28.0±5.1	28.9±5.2	NS
Parity	2.9±2.0	2.7±2.2	NS
Height (cm)	126±58.2	128.5±56.9	NS
Weight (kg)	63.2±22.5	62.4±23.7	NS

Data are presented as mean±SD; NS=not significant.

Discussion

Federle et al. popularized the low-dose CT pelvimetry technique[9] in 1982. It involves two low-dose digital radiographs generated on a CT scanner and one CT section. The absorbed dose from the CT section was 380 mrad. The reliability and reproducibility of the technique, as well as further reduction of the dose of radiation, were corroborated by other independent studies.[12,13] A recent "Committee Opinion" of the American College of Obstetricians and Gynecologists quotes the low-dose CT pelvimetry as 250 mrad.[14] Nevertheless, the advantages of CT pelvimetry is a different issue from its clinical usefulness as a diagnostic test.

Earlier studies had suggested that x-ray pelvimetry as an aid to decision-making is of limited value.[2-4] In 1991, Krishnamurthy et al. reported that 66% of women with one previous cesarean section and an "inadequate" pelvis judged by x-ray pelvimetry delivered vaginally. Subsequently in 1993, Thubisi et al. randomized women with one previous cesarean section into two groups.[6] One group (144 women) had x-ray pelvimetry at 36 weeks of gestation, while the other group (144 women) had a trial of labor without antepartum delivery. In the antepartum delivery group, only 23 women (16%) delivered vaginally, compared with 60 women (42%) in the control group.

In our study, we included all pregnant women with one previous cesarean section who were eligible for VBAC. Fifty-one women (51%) in the CT pelvimetry group delivered by cesarean section, compared with 26 women (21.8%) in the control group ($P=0.02$). Therefore, the success rate of VBAC in the CT pelvimetry group was 49%, while it was 78.2% in the group that did not have CT pelvimetry. The increase in the rate of cesarean section in the CT pelvimetry group was not associated with improvement in the immediate neonatal outcome. Further, 36% of the women judged by CT pelvimetry to have an adequate pelvis failed to deliver vaginally.

Vaginal birth after cesarean delivery is safe. Worldwide, the success rate of VBAC varies from 60%-80%.[15] The risk of rupture with a previous low transverse incision is well below 0.5%. Some may argue that CT pelvimetry is helpful in women who had previous cesarean section for cephalic disproportion. This is a relative rather than an absolute diagnosis. Further, it has been reported that the 60%-80% success rate of VBAC is unrelated to the indication for the previous cesarean section.[16] Our study showed that CT pelvimetry increased the rate of cesarean delivery without any benefit in the immediate delivery outcomes. Therefore, the practice of documenting the "adequacy" of the pelvis by CT pelvimetry before VBAC should be abandoned.

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