

Prognostic Significance of Volume Measurement of Cord-Containing Amniotic Fluid Pocket During Amniotic Fluid Index Assessment in Patients with Oligohydramnios

OÜGHİDRAMNİOSLU HASTALARDA AMNİOTİK SIVI İNDEKSİ BELİRLENİRKEN KORDON İÇEREN AMNİOTİK SIVI CEBİNİN HACMİNİN ÖLÇÜLMESİNİN PROGNOSTİK ÖNEMİ

Alı ÇETİN*, Mustafa ŞAHİN*, Meral ÇETİN*

* Dept. of Obstetrics and Gynecology, Cumhuriyet University School of Medicine, Sivas, TURKEY

Summary

Objective: The aim of this study was to evaluate the prognostic significance of volume calculation of largest cord-containing amniotic fluid pocket during amniotic fluid index assessment in patients with oligohydramnios who admitted for labor.

Institution: Cumhuriyet University School of Medicine, Department of Obstetrics and Gynecology

Materials and Methods: In patients with oligohydramnios who had an amniotic fluid index no greater than 5 cm, we performed volume measurement of the largest pocket of cord-containing amniotic fluid. Perinatal outcome were recorded with respect to cesarean delivery for fetal distress, meconium staining, 5-min Apgar score <7, admission to neonatal unite, and total complication number.

Results: Thirty-one patients with oligohydramnios who had gestational ages of 33-41 were included in the study. With a receiver operating characteristic curve analysis, a 20-Cm³ cutoff was chosen for the best prediction of perinatal outcome. Seventeen patients had a cord-containing pocket less than or equal to 20 cm³ (small-pocket group). Fourteen patients had a cord-containing pocket more than 20 cm³ (large-pocket group). The mean amniotic fluid index was not significantly different between the small- and large pocket groups (4.3 vs. 3.7, p >0.05). There was a significantly higher incidence of cesarean section for fetal distress in the small-pocket group (47 vs. 7.1%, p < 0.05). There was also a significant difference between the small- and large pocket groups with respect to overall complications (58.2 vs. 42.9%, p <0.05).

Geliş Tarihi: 28.01.1997

Yazışma Adresi: Dr. Alı ÇETİN
3. Sok. No: 1/5
Sangııl Apt. C Blok
Yenişehir 58100 SİVAS

Özet

Amaç: Bu çalışmanın amacı doğum için kabul edilen oligohidramnioslu hastalarda amniotik sıvı indeksinin belirlenmesi sırasında kordon içeren en büyük amniotik sıvı cebinin hacminin ölçülmesinin prognostik önemini değerlendirmektir.

Çalışmanın Yapıldığı Yer: Cumhuriyet Üniversitesi Tıp Fakültesi, Kadın Hastalıkları ve Doğum Anabilim Dalı.

Materyal ve Metod: Amniotik sıvı indeksi 5 cm'den az olan oligohidramnioslu hastalarda kordon içeren amnion sıvısının en büyük cebinin hacmini ölçtük. Fetal distress nedeniyle sezaryen yapılması, amnion sıvısının uuekoyunlu olması, 5. dakika Apgar skorunun <7 olması, yenidoğan ünitesinde takip edilmesi ve total komplikasyon sayısı kaydedildi.

Bulgular: Gebelik haftası 33-41 olan 31 oligohidramnioslu hasta bu çalışmaya alındı. Bir receiver operating characteristic curve analizi ile 20 cm³'lük bir sınır değer perinatal sonucu en iyi ortaya koyan değer olarak seçildi. On yedi hasta 20 cm³ ve daha küçük kordon içeren cebe (küçük cep grubu), 14 hastada 20 cm³'den büyük kordon içeren cebe (büyük cep grubu) sahipti. Ortalama amnion sıvı indeksi gruplar arasında farklı bulunmadı (4.3 vs. 3.7, p>0.05). Küçük kordon cebi içeren grupta fetal distress nedeniyle sezaryen insidansı anlamlı olarak yüksek bulundu (%47'ye karşın %7.1, p<0.05). Keza tüm komplikasyonlar yönünden ele alındığında küçük kordon cebi olan ve büyük kordon cebi olan gruplar arasında istatistiksel olarak fark anlamlı bulundu (%58.2'ye karşın %42.9, p<0.05).

Sonuçlar: Amniotik sıvı indeksi 5 ve daha küçük olan ve kordon içeren cep hacmi 20 cm³'den daha fazla olan hastalarda daha az perinatal komplikasyon saptandı. Bu sonuçlar uygulamaya konulduğunda oligohidramnioslu

Conclusions: *In patients with an amniotic fluid index less than or equal to 5 cm, a cord-containing pocket volume > 20 cm³ indicates fewer perinatal complications. Application of these results could provide additional guidelines in defining the intrapartum management and therapy of patients presenting for labor and delivery who had oligohydramnios.*

Key Words: Amniotic fluid index, Oligohydramnios

T Klin J Gynecol Obst 1998, 8:74-77

Sufficient amniotic fluid (AF) volume is considered an important aspect of fetal well-being. The consistent association of decreased AF volumes with less than optimal fetal outcomes such as intrauterine fetal growth restriction, postmaturity, and fetal distress in labor has resulted in the inclusion of AF volume evaluation in several techniques of antepartum surveillance (1,2). The assessment of AF volume also plays an essential role in the evaluation of fetal well-being in intrapartum period. The amniotic fluid index (AFI) is increasingly used in the evaluation of AF volume, because of its superiority in identifying abnormal AF volume (3,4). Phelan et al. (5) described oligohydramnios as an AFI less than or equal to 5.0. Sarno et al. (6) investigated the role of the intrapartum AFI with respect to perinatal outcome. They found that an intrapartum AFI less than or equal to 5.0 was a risk factor for perinatal morbidity and abnormal fetal heart rate patterns in labor.

During ultrasonographic evaluation, we observe the AF pockets traversed by loops of umbilical cord. The rules for exclusion of these cord-containing AF pockets from the AF measurement were not established uniformly. The extensive study by Phelan et al. (7) validating the AFI have provided an important new tool for the evaluation of AF volume. The method of AFI measurement, as described by Phelan et al. (5) involves summing the maximum vertical pockets from each of four quadrants of the uterus. The methodological detail about AF pocket allowed measurements of pockets that contain brief appearances of the umbilical cord or a fetal extremity. In a study by Jeng et al. (8), even a brief appearance of the umbilical cord or a fetal extremity was avoided in measuring the AF pockets.

hastaların doğum eylemi ve doğumda utrapartum yaklaşım ve tedavide kılavuzluk yapacaktır.

Anahtar Kelimeler: Amniotik sıvı indeksi, Oligohidramnios

T Klin Jinekoloj Obst 1998, 8:74-77

The purpose of this study was to evaluate the usefulness of the measurement of the cord-containing AF pocket volume in the early intrapartum period in oligohydramniotic patients for the prediction of fetal distress during labor and subsequent fetal morbidity.

Materials and Methods

Between March 1995 and September 1996, this prospective study was performed at Cumhuriyet University Hospital in Sivas. We studied oligohydramniotic patients at a gestational age of 35 or more weeks who presented for induction of labor or in spontaneous labor. Exclusion criteria included ruptured membranes before the initial ultrasound study, abruptio placentae, placenta previa, and multiple pregnancy, evidence of fetal distress before the initial ultrasound examination.

All patients were evaluated upon presentation to labor and delivery to confirm membrane status, assess cervical status, and obtain an initial fetal monitoring strip. An ultrasound examination was then performed. We made a four-quadrant assessment of the AF volume according to the guidelines described by Moore et al (5). We defined cord-containing pocket of AF according to Sadovsky et al (9). We measured vertical, transverse and longitudinal diameter of the largest cord-containing pocket and calculated its volume. The volume measurement data of the deepest cord-containing AF pocket were not used for intrapartum management decisions. Pregnancy outcome was assessed with respect to the incidences of meconium staining, Apgar score of less than 7 at 5 minutes, neonatal intensive care unit admissions, cesarean delivery for fetal distress. Fetal distress was defined as bradycardia, or repetitive late or severe variable

decelerations associated with a loss of variability, necessitating operative delivery.

Dichotomous variables were analyzed using the χ^2 test or Fisher exact test as appropriate. Significance was set at $p < 0.05$.

Results

There were 31 patients included in the study. A receiver operating curve was constructed for the cord-containing pocket measurement and a 20-cm³ cutoff was chosen for the best prediction of perinatal outcome. Seventeen patients had a cord-containing pocket less than or equal to 20 cm³ (small-pocket group). Fourteen patients had a cord-containing pocket more than 20 cm³ (large-pocket group). Table 1 presents maternal and fetal characteristics and indications for the AFI measurement and volume calculation of the largest cord-containing AF pocket. All the patients delivered within 2 days of the recent AFI and cord containing pocket measurement. There were no significant differences between the small-pocket and large-pocket groups with respect to maternal age, parity, gestational age at examination, indication for AFI measurement, AFI, and neonatal weight ($p > 0.05$). There was significant difference between the small-pocket and large-pocket groups with respect to cord-containing pocket volume ($p < 0.05$).

Table 2 shows the delivery and neonatal outcome characteristics. There was a significantly higher incidence of cesarean section for fetal distress in the small-pocket group compared with the

large-pocket group (47 vs. 7.1%, $p < 0.05$). There was also a significant difference between the small- and large pocket groups with respect to overall complications (88.2 vs. 42.9%, $p < 0.05$).

Discussion

The AFI has been shown to be a useful tool in the area of fetal surveillance. The finding of oligohydramnios, as defined by an AFI (< 5.0 cm, in the early intrapartum period should alert the clinician to an increased risk of perinatal morbidity and abnormal fetal heart rate patterns in subsequent labor (6). An evaluation in early labor differentiating the fetus most likely to tolerate the stress of labor from the fetus in a compromised state seems preferable to the intrapartum risk assessment since an immediate evaluation of the current fetal condition could be obtained.

Generally, the AF pockets are filled by loops of umbilical cord. There are not uniform criteria for exclusion of these cord-containing AF pockets from the AF measurement. These criteria are not even mentioned in some reports, and in others, they lack uniformity (8,10). Rutherford et al. reported that a brief appearance of the umbilical cord or extremity of the fetus was acceptable, but aggregation of either one to the exclusion of fluid should not be considered part of an AF pocket (2). Moore (3) suggested that the measurement of AF pockets containing only AF should be obtained during AFI assessment. We adopted the commonly used technique described by Moore et al. (3) and included the pockets that contained clear AF pockets for the

Table 1. Demographic and clinical data of study population

	Small-pocket group (<20 cm ³) (n=17)	Large-pocket group (>20 cm ³) (n=14)	Significance
Maternal age (y, mean and range)	29.0 (17-37)	24.5 (19-20)	NS
Parity (No., mean and range)	2.2 (0-5)	1.1 (0-3)	NS
Gestational age (wk, mean and range)	39.3 (38-42)	38.8 (36-40)	NS
Indication for AF index measurement			
Oligohydramnios	7	4	NS
Postmaturity	1	0	
Fetal growth restriction	3	2	
Decreased fetal movement	2	3	
Hypertensive disorders	1	2	
Non-reactive non-stress test	3	3	
Amniotic fluid index (mean and range)	4.3 (3.5-5)	3.7 (2-5)	NS
Cord-containing pocket volume (mean and range)	12.9 (8-19)	30.8 (24-44)	$p < 0.05$
Neonatal weight (gm, mean and range)	2736.4 (1350-3200)	2895.5 (2200-3500)	NS

NS: not significant

Table 2. Delivery and neonatal characteristics of study population

	Small-pocket group (<20 cm ³) (n=17)	Large-pocket group (>20 cm ³) (n=14)	Significance
Cesarean delivery for fetal distress	8 (47%)	1 (7.1%)	p<0.05
Meconium staining	2 (11.8%)	2 (14.3%)	NS
5-min Apgar score	4 (23.5%)	2 (14.3%)	NS
Admission to neonatal intensive care unit	1 (5.9%)	1 (7.1%)	NS
Total	15 (88.2%)	6 (42.9%)	p<0.05

NS: not significant

AFI measurement. The prospect of combining the measurement of cord-containing AF pocket volume is to decrease high-rate of false-positive results of AFI. Sadovsky et al. (9) suggested that the finding of a cord-containing AF pocket above 5 cm may decrease the false-positive rate of an abnormally low AFI and thereby reduce the need for induction of labor (9).

We suggest that an additional use of the measurement of cord-containing AF pocket volume as part of the initial screening is a useful test in patients who present for labor and delivery. The measurement of cord-containing AF pocket volume performed on admission to labor and delivery is potentially rapid, inexpensive, easily performed, clinically valuable test for predicting the risk of adverse perinatal outcome. The finding of a cord-containing pocket more than 20 cm³ may decrease the false-positive rate of an abnormally low AFI. It is helpful to incorporate the measurement of cord-containing AF pocket volume with the assessment of AFI.

REFERENCES

- Manning FA, Hill LAI, Piatt LD. Qualitative amniotic fluid volume determination by ultrasound: Antepartum detection of intrauterine growth retardation. *Am J Obstet Gynecol* 1981; 139:254-8.
- Rutherford SE, Phelan JP, Smith CV, Jacobs N. The four-quadrant assessment of amniotic fluid volume: An adjunct to antepartum fetal heart rate testing. *Obstet Gynecol* 1987; 70:353-6.
- Moore TR: Superiority of the four-quadrant sum over the single-deepest-pocket technique in ultrasonographic identification of abnormal amniotic fluid volume. *Am J Obstet Gynecol* 1990; 163:762-7.
- Croom CS, Baniyas BB, Ramos-Santos E, Devoe LD, Bezhadian A, Hiatt AK: Do semiquantitative amniotic fluid indexes reflect actual volume? *Am J Obstet Gynecol* 1992; 167:995-9.
- Phelan JP, Smith CV, Broussard P, Small M: Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks' gestation. *J Reprod Med* 1987; 32:540-2.
- Sarno AP Jr, Ahn MO, Phelan JP. Intrapartum amniotic fluid volume at term: Association of ruptured membranes, oligohydramnios and increased fetal risk. *J Reprod Med* 1990; 35:719-23.
- Phelan JP, Ahn MO, Smith CV, et al. Amniotic fluid index measurements during pregnancy. *J Reprod Med* 1987; 32:601-4.
- Jeng C, Jou TJ, Wang K, Lee Y, Lan C. Amniotic fluid index measurement with the four-quadrant technique during pregnancy. *J Reprod Med* 1990; 35:674-77.
- Sadovsky Y, Christensen MW, Scheerer L, Cromblholme WR. Cord-containing amniotic fluid pocket: A useful measurement in the management of oligohydramnios. *Obstet Gynecol* 1992; 80:775-7.
- Shmoys SM, Sivkin M, Dery C, Monheit AG, Baker DA. Amniotic fluid index: An appropriate predictor of perinatal outcome. *Am J Perinatol* 1990; 7:266-9.