

Blood pressure  $\geq 140/90$  (OR = 1.3), age  $\geq 35$  years (OR = 1.2), pure African race (OR = 1.3) and group A blood (OR = 1.3), have all appeared to slightly increase the risk of recurrent miscarriage. As the study was very small, a larger study is needed to either confirm or refute any possible causal relationship.

Age  $< 35$  years (OR = 0.89), Arabic race (OR = 0.7), history of contraceptive use (OR = 0.06), blood group other than group A (OR ranging from 0.78 to 1.08), and Rhesus factor positivity or negativity (OR = 0.90 and 1.09) are not associated with increased risk of recurrent miscarriage. Contrary to the belief of many Sudanese women, contraceptive use does not increase the risk of recurrent miscarriage.

The presence of ACL antibodies is a risk factor for recurrent miscarriage among Sudanese women (OR = 2). It is therefore, important to offer women with recurrent miscarriage investigation for APL syndrome. Ethnic origin seems to play little or no role in the prevalence of APL syndrome. Most of the other risk factors did not seem to increase the risk of recurrent miscarriage significantly, however, more studies are needed to evaluate some risk factors that were shown to increase the risk slightly such as age, blood pressure and blood group A.

Received 23rd December 2003. Accepted for publication in final form 28th March 2004.

From the Department of Obstetrics and Gynecology (Ortashi), Poole Hospital, Department of Obstetrics and Gynecology (Abdelmagied), North Middle Sex Hospital, London, United Kingdom, Department of Obstetrics and Gynecology (Ahmed), Malakal General Hospital, Department of Obstetrics and Gynecology (Ramzi), University of Khartoum, Sudan. Address correspondence and reprint requests to Dr. Osman M. Ortashi, Department of Obstetrics and Gynecology, Poole Hospital, BH15 2JB, United Kingdom. Tel. +44 7919621686. Fax. 1202442487. E-mail: osmanortashi@hotmail.com

## References

1. Stirrat GM. Recurrent miscarriage. *Lancet* 1990; 336: 673-675.
2. Regan L, Braude PR, Trembath PL. Influence of past reproductive performance on risk of spontaneous abortion. *BMJ* 1989; 299: 541-545.
3. Rai R, Backos M, Rushworth F, Regan L. Polycystic ovaries and recurrent miscarriage. *Hum Reprod* 2000; 15: 612-615.
4. Lockwood CJ, Romero R, Feinberg RF, Glyne LP, Coster B, Hobbins JC. The prevalence and biologic significance of lupus anti coagulant and anticardiolipin antibodies in general obstetrics population. *Am J Obstet Gynecol* 1989; 161: 369-373.
5. Daya S. Meta analysis of controlled trials in recurrent miscarriage. *Br J Obstet Gynaecol* 1989; 96: 275-280.

## The relationship between intrapartum amniotic fluid index, fetal distress and fetal acidemia

Badreldeen Ahmed, MD, MRCOG (UK),  
Zahra Ghaffari, RM, MA (UK), Mohd Z. Abukhalil, MD.

Intrapartum assessment of amniotic fluid index (IAFI) has been observed to be as efficacious as fetal heart rate (FHR) tracings in determining women who are at risk for meconium-stained amniotic fluid or cesarean delivery for fetal distress.<sup>1,2</sup> Rutherford et al,<sup>3</sup> in a high-risk patient group observed an increase in the incidence of cesarean section for fetal distress in women with an amniotic fluid index  $\leq 5$ cm. They observed an incidence of cesarean section for fetal distress in their 27 patients with an amniotic fluid index  $\leq 5$ cm to be 11%. However, Baron et al,<sup>4</sup> in a mixed group of patients observed a 4.1% incidence of cesarean section for fetal distress in their 170 patients with an amniotic fluid index  $\leq 5$ cm. Robson et al,<sup>1</sup> observed a cesarean section incidence for fetal distress in 8 of 14 patients (57%) with an amniotic fluid index  $< 6.2$ cm. We reported a 17% (7 of 46 patients) cesarean section incidence for fetal distress. Their data confirmed that a low amniotic fluid index determined intrapartum is associated with an increased risk for a cesarean section for fetal distress. Meconium-stained amniotic fluid has been reported by many investigators to be increased in patients with an amniotic fluid index of  $\leq 5$ cm.<sup>1-3</sup> An increased incidence of FHR tracings exhibiting late variable decelerations have been observed in the presence of low amniotic fluid volumes.<sup>1-3,5</sup>

In this study, we sought to determine the relationship between IAFI, fetal distress and fetal acidemia in a group of women undergoing fetal blood sampling as a result of repeated deceleration. Women with gestational age of  $\geq 37$  weeks, cephalic presentation, in active labor and ruptured membranes at the time of IAFI determination and had undergone fetal blood sampling for persistent decelerations, composed the study group. Patients excluded were those with multifetal gestations, with an imminent delivery, with polyhydramnios, in whom no amniotic fluid index was performed due to staff unavailability. Amniotic fluid volume was determined with a linear 3.5 MHz transducer, using 4-quadrant amniotic fluid index technique. All IAFI determinations were performed by the same person. The study group was divided into 2 groups and designated as having oligohydramnios with an amniotic fluid index  $< 6.2$ cm, and normal with an amniotic fluid index  $> 6.2$ cm. We used this threshold on the basis of earlier studies by Robson et al,<sup>1</sup> of amniotic fluid index distributions after either spontaneous ruptured membranes or an amniotomy. All subjects had continuous electronic FHR monitoring and tocodynamometry throughout labor. The FHR tracings were reviewed and coded by Robson,<sup>1</sup> who was unaware of the IAFI

measurements. Krebs intrapartum FHR scoring system is used for cardiotocograph analysis. According to the criteria of Krebs classification, decelerations were graded as late and variable decelerations and moderate decelerations. All patients were in labor and were ultimately delivered during the same hospital admission that the IAFI determination was performed. Umbilical arterial blood gas determinations were also performed for all subjects within 15 minutes of delivery after double clamping of the cord. The oligohydramnios group was individually compared with the normal group with regard to fetal acidemia, mode of delivery, umbilical arterial pH, 1 and 5-minute Apgar scores and admission to the neonatal intensive care unit.

During the study period IAFI assessment was performed on 94 laboring women who underwent fetal blood sampling for persistent decelerations. The main characteristics of the cohort included a mean age of 26.7 (SD  $\pm$  4.5), mean gravity 2.1 (SD  $\pm$  1.2) and mean gestational age 39.9 (SD  $\pm$  1.3). Twenty-six women had IAFI of  $<$  6.2 (oligohydramnios) and 68 had normal IAFI at the time of measurements. Although, there was a trend towards increase incidence of variable decelerations (0 in Krebs' intrapartum fetal heart rate scoring system), during labor in the low IAFI group, this difference was not statistically significant (53.8% versus 51.4%;  $p=0.02$ ). Amnioinfusion was used for the oligohydramnios group in whom a considerable improvement in the FHR was observed following amnioinfusion. Abnormal fetal blood scalp pH ( $<$  7.2) was more frequent in the low IAFI group; this difference was statistically significant (26.9% versus 4.4%  $p=0.23$ ). There was no difference in the rate of operative delivery in the 2. The mean umbilical artery pH and the mean Apgar score were similar in the 2 groups. No infant required admission to the special care baby unit (Table 1).

On the basis of our data, fetal acidemia is more likely to develop in women with IAFI  $<$  6.2cm than in those with IAFI  $>$  6.2cm. We believe that the intrapartum determination of oligohydramnios, amniotic fluid index  $<$  6.2cm, is a helpful tool in determining who is at risk for potentially adverse outcome during the ensuing labor and delivery. We believe this technique would help identify patients who should be cared for in a unit with the capability of performing emergency cesarean delivery, as has been reported in many randomized, controlled trials.<sup>6-8</sup> An amnioinfusion in oligohydramnios patients could result in a significant reduction of cesarean sections for fetal distress and potentially adverse perinatal outcome.

**Acknowledgment.** We would like to thank Prof. SC Robson, Royal Infirmary Hospital, Newcastle, Upon Tyne, for helping with CTG

**Table 1** - Descriptive variables of women undergoing intrapartum amniotic fluid index assessment.

Variables	Low IAFI n=26	Normal IAFI n=68
FBS pH $<$ 7.2*	7;26.90%	3;4.40%
FBS pH $>$ 7.2*	19;73.08%	65; 95.59%
Umbilical pH**	7.26 $\pm$ 0.07	7.24 $\pm$ 0.07
Late and variable deceleration*	14;53.85%	35;51.47%
Moderate deceleration*	12; 46.15%	33;48.53%
1-minute Apgar score**	8.7 $\pm$ 1.4	8.9 $\pm$ 1.4
5-minute Apgar score **	9.5 $\pm$ 0.3	9.7 $\pm$ 0.2

IAFI - intrapartum assessment of amniotic fluid index, FBS - fetal bovine serum, \* - data are given as numbers and percentages, \*\* - data are given as mean and standard deviation

interpretations and Mr. Kim Hinshar, Sunderland Royal Hospital, England, UK, for his help with performing amnioinfusion.

Received 22nd February 2004. Accepted for publication in final form 27th March 2004.

From the Royal Infirmary Hospital, Newcastle, Upon Tyne, England, UK. Current address for correspondent and reprint requests to Dr. Badredeen Ahmed, Department of Obstetrics and Gynecology, Women's Hospital, Hamad Medical Corporation, PO Box 3050, Doha ZZ1 1QA, Qatar. Tel. +974 4393956 / 4393958. Fax. +974 439395. E-mail:

## References

1. Robson SC, Crawford RA, Spencer JAD, Lee A. Intrapartum amniotic fluid index and its relationship to fetal distress. *Am J Obstet Gynecol* 1992; 166: 78-82.
2. Sarno AP Jr, Ahn MO, Brar HS, Phelan JP, Platt LD. Intrapartum Doppler velocimetry, amniotic fluid volume, and fetal heart rate as predictors of subsequent fetal distress. I. an initial report. *Am J Obstet Gynecol* 1989; 161: 1508-1514.
3. 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: 353-356.
4. Baron C, Morgan MA, Garite TJ. The impact of amniotic fluid volume assessed intrapartum on perinatal outcome. *Am J Obstet Gynecol* 1995; 173: 167-174.
5. Gabbe SG, Ettinger BB, Freeman RK, Martin CB. Umbilical cord compression associated with amniotomy: laboratory observations. *Am J Obstet Gynecol* 1976; 126: 353-355.
6. Miyazaki FS, Nevarez F. Saline amnioinfusion for relief of repetitive variable decelerations: a prospective randomized study. *Am J Obstet Gynecol* 1985; 153: 301-306.
7. Strong TH Jr, Hetzler G, Sarno AP, Paul RH. Prophylactic intrapartum amnioinfusion: a randomized clinical trial. *Am J Obstet Gynecol* 1990; 162: 1370-1375.
8. Schrimmer DB, Macri CJ, Paul RH. Prophylactic amnioinfusion as a treatment for oligohydramnios in laboring patients: a prospective, randomized trial. *Am J Obstet Gynecol* 1991; 165: 972-975.