Amniotic Fluid Particles and Optical Density at Term - A Case Report

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Abstract

We report a case of pregnancy at full term and transabdominal ultrasonography (USG) revealed minute amniotic fluid particles prior to onset of spontaneous labor. Amniotic Fluid Optical Density (AFOD) estimation for fetal lung maturity was done. AFOD was 0.43 in uncentifuged and 0.14 in centrifuged samples at 650 nm. USG at onset of labor detected amniotic fluid particles of 3-4 mm size corresponding to AFOD of 1.40 (uncentrifuged sample) at ARM. The rapid increase in the size of the echogenic amniotic fluid particles simultaneously with optical density may be able to serve as an index of physiological process that contributes to the onset of labor.

INTRODUCTION

Previous studies of fetal lung maturity vary from ability to read news prints across test tubes containing Amniotic Fluid to quantitative LS ratio estimation [1]. Cetrulo et al concluded that centrifuged amniotic fluid samples with optical density of 0.15 and above corresponds to fetal lung maturity [2]. Narendran et al studied the lung skin interactions that causes the rise in turbidity of Amniotic Fluid. The pulmonary surfactant causes vernix detachment. Simultaneously there is a surge in sebaceous gland activity [3]. Also amniotic fluid cells (fetal corneocytes / sebocytes) are able to produce cytokines like IL-1,IL-6,IL-8 which contribute the onset of labor [4,5,6,7,8,9,10]. Sonological studies have shown that AF particles in third trimester are nothing but vernix (100 % sensitivity) and less likely due to meconium but the possibility of meconium stained liquor cannot be ruled out fully [11,12]. Although there is no definitive ideal sonological marker for fetal lung maturity the assessment of echogenic amniotic fluid particles can contribute towards non invasive estimation of fetal lung maturity culminating in onset of Labor.

CASE REPORT

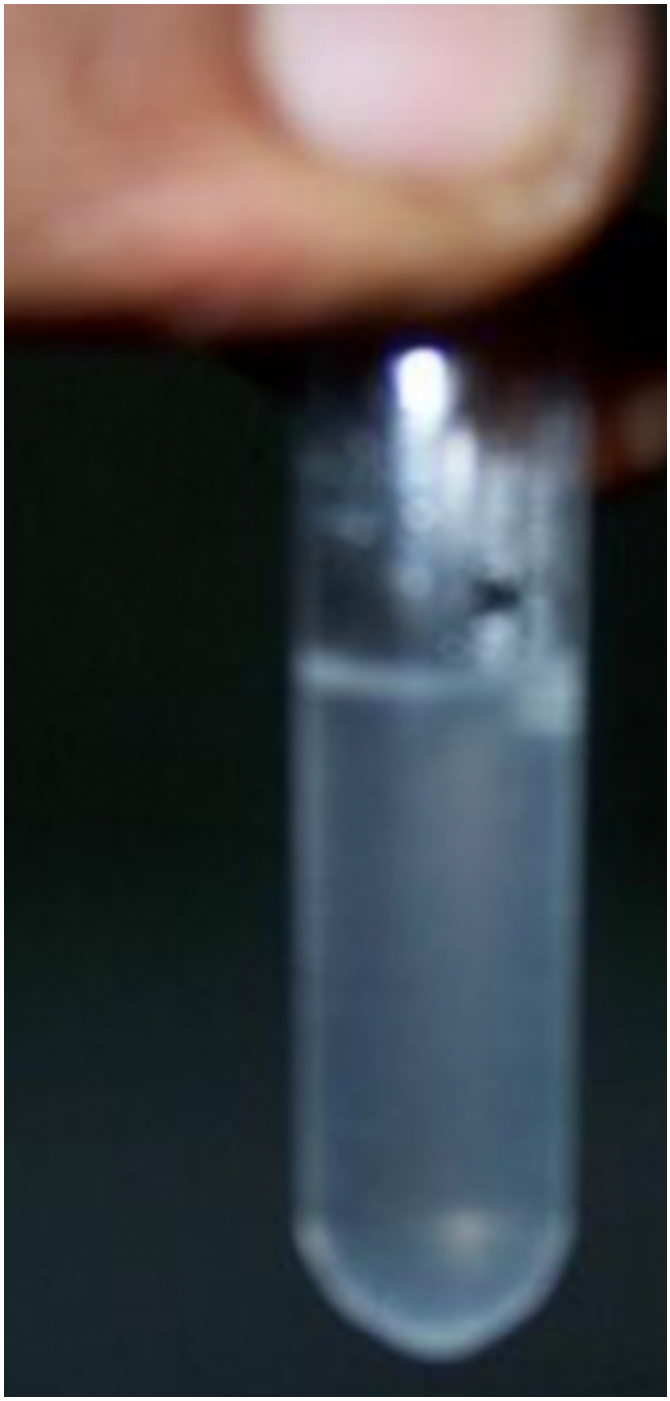
A 28 yr old primigravida with reliable dates of LMP (confirmed by CRL and BPD measurements in first and second trimester), no co-morbidities, on regular antenatal checkups presented for follow-up in OPD at 40wks 3days of gestational age. Bishop score was unfavourable.Transabdominal USG evaluation was done. Placenta had grade 2 maturity and AFI was 13 cms. Biophysical Profile was normal. Numerous wandering minute flakes of AF particles were detected in the deepest vertical pool of amniotic fluid (Figure 1a). 2ml of amniotic fluid was obtained from the most superficial AF pocket under continuous USG guidance [13] with 2cc syringe and 23G needle for assessment of fetal lung maturity. Prior written informed consent was taken as per declarations of Helsinki. The procedure was uneventful. Uncentifuged fresh amniotic fluid sample thus obtained had an AFOD of 0.43 at 650 nm (Figure 1b). Centrifuged sample (2000xg) showed AFOD of 0.14 at 650 nm. Newprints read across the test tube containing sample of AF appeared blurred.

Figure 1

Figure 1a: Transabdominal USG shows neumerous minute echogenic amniotic fluid particles in the deepest vertical pool prior to onset of labor.

Figure 2

Figure 1b: Less turbid uncentifuged amniotic fluid (AFOD - 0.43 at 650 nm) obtained for fetal lung maturity estimation 36 hrs prior to onset of spontaneous labor.



No RBCs were found in HPF microscopy. Patient was under observation in the Labor admission ward. Routine blood investigations and general examination were within normal limits.

After 36 hrs she had spontaneous onset of labor pains. Per vaginum findings were soft cervix with 75 % effacement, 3

cms dilated with bulging bag of membranes, no CPD, uterine contractions lasting for 30-40s 3 times in every 10 minutes. Transabdominal USG showed distinct 3-4 Amniotic fluid particles ranging from 2-5 mm in the deepest vertical pool (Figure 2a).The magnified view is shown in Figure 2b. The contrast brightness and sharpness of the real time USG were kept constant.

Figure 3

Figure 2a : Amniotic fluid particles 3-4 mm in size detected at onset of Labor

Figure 4

Figure 2b : Magnified view of the amniotic fluid particles.

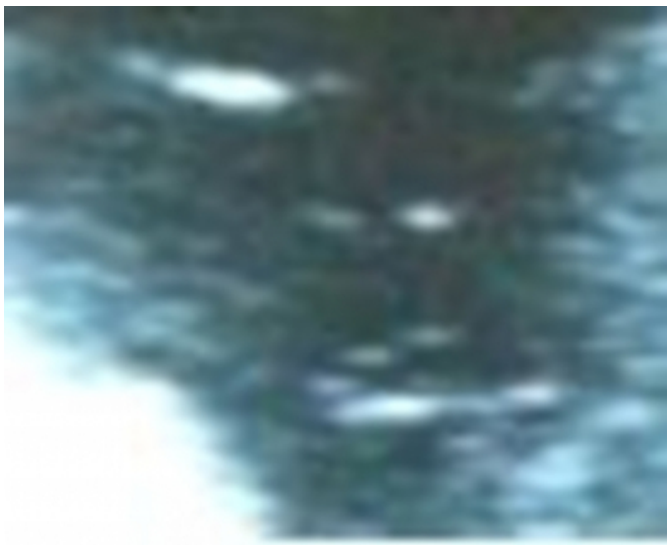


Figure 5

Figure 2c : Turbid amniotic fluid with AFOD of 1.40 (uncentifuged) at 650 nm at labor.

The AFI was 10 cms. Under speculum examination 2 cc of AF was obtained for AFOD estimation with 23 G spinal needle from BOM. 23G needle was used as vernix particles may interfere with calorimetric estimation. ARM was done after the sample was obtained. The liquor had curdy precipitates of vernix & was not meconium stained. News

prints across the test tube containing the sample were not readable. AFOD of uncentrifuged fresh sample obtained was found to be 1.40 at 650 nm (Figure 2c). Centrifuged sample –showed AFOD of 0.47 at 650 nm.

She progressed well during active phase of labor and delivered a live female baby with APGAR 8/9 at 1/5 min and birth weight of 3.1 kg. Neonatal examination was normal. There were very scanty vernix caseosa adherent on the skin surface at birth (Figure 3).

Figure 6

Figure 3 : Fully mature baby with very little vernix caseosa adherent on the skin surface at birth.

DISCUSSION

The mature levels of pulmonary surfactant are usually present after 35 weeks of gestation[14]. The levels of surfactant protein A, 1L-1beta are increased in AF during labor [15]. Also there is an increase in the lamellar body count towards the end of gestation [16] .The lung skin interactions (vernix detachment) and surge in sebaceous gland activity corresponds to rise in turbidity of AF. AF cells synthesize cytokines and such a cytokine rich Amniotic Fluid initiates Labor. In this case the AFOD was 0.43 prior to the onset of Labor and over 36 hrs there has been a rapid increase in the AFOD to 1.40 at the time of ARM (Uncentrifuged samples).This phenomenon is visualized as the increase in the size of amniotic fluid particles.

This knowledge can be applied in predicting the onset of labor enabling institutional monitoring in prepartum period and improve the perinatal outcome. This can guide us in elective termination of pregnancy in post LSCS pregnancies, pregnancies with recurrent indications for LSCS and to avoid dysmaturity, thereby optimizing labor.

CONCLUSION

A rapid increase in the size of the echogenic amniotic fluid particles in third trimester after 35 weeks of gestation is consistent with rapid vernix detachment and suggests a rise in amniotic fluid optical density (surge) towards complete fetal maturity and onset of labor. The missing links in the mechanism of labor need to be explored further in light of advanced sonography.

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