

Study of Amniotic fluid index during pregnancy

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Summary

Amniotic fluid has marked effects on fetal and neonatal well being, both deficiency and excess are hazardous. Prenatal estimation of the volume of amniotic fluid, by physical examination alone is difficult and often inaccurate and non-reproducible. The present study evaluated the ultrasound guided four quadrant semi-quantitative technique for estimation of amniotic fluid, Amniotic fluid Index (AFI) in the Indian population. Study comprised of total 560 patients. Norms of AFI were established for Indian population for different gestational age. Mean AFI was 13.57 ± 2.43 cm between 17 to 41 weeks, in total population group. Initially AFI gradually rises till 21 weeks. 1st peak was noted at 21 weeks, and then there were smaller peaks at 23, 25 and 29 weeks.

In patients with high risk factors after excluding the cases of hydramnios there were only 2 peaks 1st at 20 weeks and 2nd at 26 weeks. In both groups there was a decline in AFI after 36 weeks. These findings are similar to another Indian study (Cheema 1994) but the profile is somewhat different from the reported Western Studies as they did not receive any peak at 21 weeks (Moore and Cayle 1990, Jeng et al 1990, Hallak et al 1993).

Introduction

Amniotic fluid fills amniotic cavity during gestation. It is protective to foetus, acts as shock absorber protecting fetus from possible extraneous injury and infection, maintains an even temperature, distends amniotic sac and thereby allows for growth and free movement of foetus. Study of amniotic fluid volume serves as an important parameter in the assessment of fetal well being. It has become an important part of fetal surveillance. Perinatal morbidity and mortality are significantly increased with oligohydramnios and polyhydramnios (Pritchard and MacDonald, 1980). Comprehensive quantitative and qualitative assessment of amniotic fluid by amniotic fluid index as described by Phelan et al. (1984) is done in present study in Indian patients.

Material and Method

Total of 560 pregnant patients with known date of last menstrual period were registered randomly for the study from antenatal clinic and admitted in Queen Mary's Hospital, K.G. Medical College, Lucknow. A detailed history was taken and complete general, systemic and obstetric examination was done in all the patients at the time of registration. A specific note was made regarding presence of certain high risk factors e.g. intrauterine growth retardation, preeclamptic toxemia, hydramnios, oligohydramnios, BOH, diabetes, Rh incompatibility etc.

Besides routine investigations like haemogram, blood group, VDRL and complete urine examination, some specific investigations were also done depending

Table I
Pattern of AFI in Different Study Groups During Pregnancy

	Total population (n=560)		Patients without risk factor (n=321)		Patients with risk factor. (Excluding 20 Patients of Hydramnios) (n=219)	
	AFI (cm)	Gest Wks	AFI (cm)	Gest Wks	AFI (cm)	Gest Wks
Mean±SD	13.57±2.43		12.99±1.79		12.17±2.08	
1 st Peak	19.57	21	16.45	21	16.3	20
2 nd peak	16.94	23	16.23	23	15.3	26
3 rd Peak	16.99	25	14.58	25		

COMPARATIVE GRAPHICAL REPRESENTATION OF MEAN AFI DURING PREGNANCY IN TOTAL NO. OF PTS., HR GROUP (Excluding Hydramnios) AND WITHOUT HR FACTOR

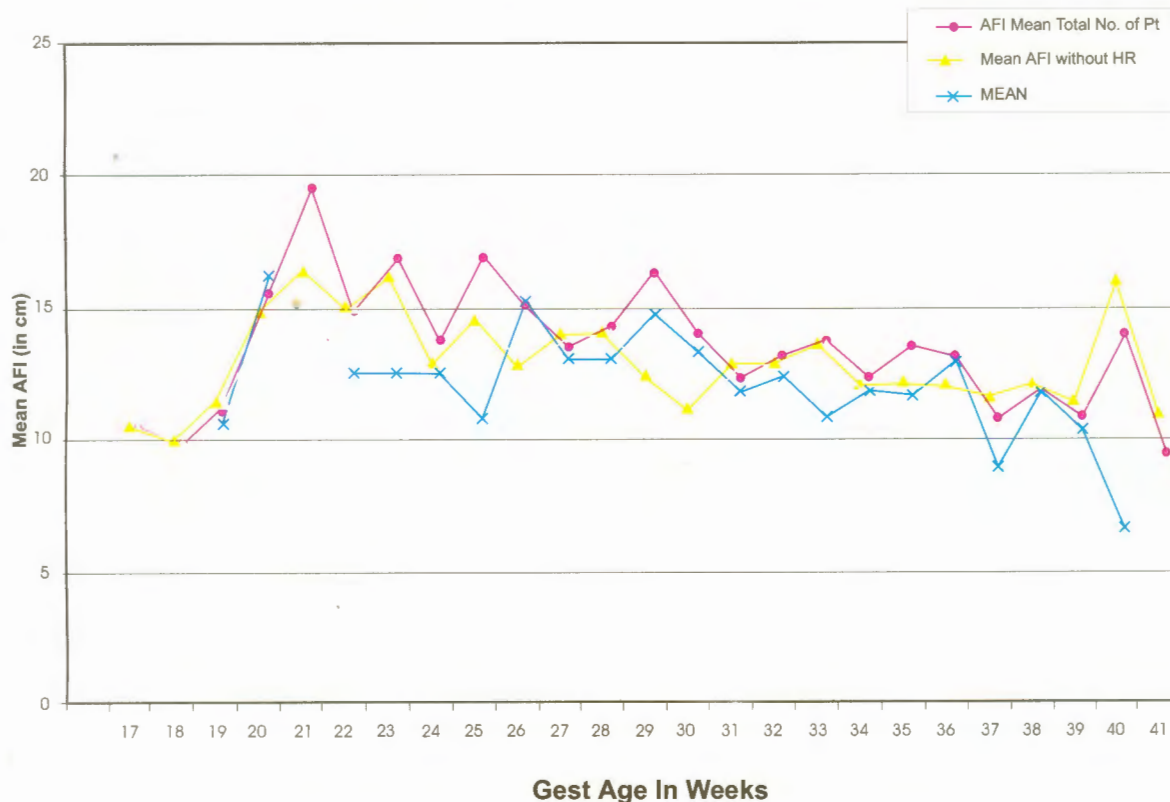


Fig 1: Comparative graphical Representation of Mean AFI during Pregnancy in total no. of pts. High Risk Group (Excluding Hydramnios) and Without High Risk Factor

on their history and high risk factor e.g. GTT, blood urea, serum creatinine, platelet count, fundus examination etc. Each patient was evaluated ultrasonographically for amniotic fluid assessment by doing amniotic fluid index at the time of registration and on subsequent visit.

AFI was done with Network ultrasound scanner model Nebula 202 point 5 with curvilinear abdominal transducer of 3.5 Megahertz. Method used for estimation of AFI was the one originally described by Phelan et al. (1984) with some modifications of the technique.

Each patient was asked to empty urinary bladder and was asked to lie in supine position. Uterus was divided into four equal quadrants. The linea nigra was used as the midline to divide the uterus into right and left halves. The mid point between fundus and pubic symphysis was obtained and straight line through the mid point and perpendicular to the linea nigra divided the uterus into upper and lower halves. Phelan et al (1984) used the umbilicus as reference point to divide the uterus into upper and lower halves and obtained only two halves before 20 weeks. In contrast, in our

study uterus was divided into four nearly equal quadrants irrespective of gestational age. Ultrasound transducer was placed on maternal abdomen along the longitudinal axis i.e. aligned longitudinal with patient's spine. With medium pressure over transducer, vertical depth of the largest clear amniotic fluid pocket was measured in each of four quadrants in millimeters. The sum of four values in cm was taken as AFI, for that gestational age. If a clear amniotic fluid pocket was not present in any of the quadrants, then a pocket with one limb or cord loop was taken but vertical depth of pocket was measured from upper limit of cord or limb.

All data were compiled and analysed using EPI-INFO Software package designed by WHO Geneva. For each gestational age 2.5, 25, 50, 95, 97.5 percentile value of AFI were calculated.

Results

Study comprised of total 560 patients, 321 had no high risk factor and 239 patients had one or more high risk factor (IU GR, PIII, postdatism, BOH, diabetes and Hydramnios). Out of 239 patients with HR factor 20 patients were having hydramnios and have not been included in the analysis. Amniotic fluid index was measured in total study population. Values of AFI were then stratified according to gestational age for total population and then separately for the patients with risk factors and for the patients without high risk factors. Norms of AFI were established for Indian population for different gestational age.

In total population (i.e. patients with and without high risk factor) during the period between 17 to 41 weeks mean AFI was 13.57 ± 2.43 cm with minimum of 1.8 cm to maximum 45 cm. Starting from 17th week, there was a gradual rise of AFI till 20 weeks and first peak was present at 21 weeks, followed by little decline. Then there were smaller peaks at 23, 25 and 29 weeks followed by a plateau till 36 weeks and then there was a gradual decline.

In normal pregnant females (i.e. without any high risk factor) when studied throughout the pregnancy, 3 peaks of AFI were detected, first at 21 weeks, 2nd at 23 weeks, 3rd at 25 weeks and then there was a gradual decline.

In patients with one or more high risk factors but excluding the cases of hydramnios, 1st peak was at

20 weeks, the 2nd peak was delayed till 26 weeks. The 3rd peak was blunted and a decline was noted thereafter (Table I and Fig. 1.)

Discussion

Phelan et al (1987) obtained AFI in 197 patients at different gestations and demonstrated peak at 27-29 weeks with relative plateau until term. In the present study highest values of AFI in normal pregnancy i.e. 16.45, 16.23 and 14.58 were obtained at 21, 23 and 25 weeks respectively. In another Indian study Cheema (1994) demonstrated highest values of 19.1, 18.1 and 18 mm at 22, 23 and 25 weeks respectively and another peak at 32 weeks.

Moore and Cayle (1990) concluded that mean AFI curve rises slowly from 16-27 weeks attains peak at 27 week plateaus until 33 weeks and then declines steadily. Jeng et al. (1990) found that AFI rose progressively from 13 weeks gestation until 26 weeks. From 26 to 38 weeks, the AFI demonstrated little variation and the peak AFI appeared at 29-30 weeks. After 38 weeks the AFI declined progressively. Hallak et al (1993) found that AFI rose progressively and peaked at 30 weeks followed by gradual decline.

In patients with high risk factor, after excluding the cases of hydramnios, first peak of AFI was present at 20 weeks and 2nd peak was delayed till 26 weeks instead of 23 weeks. Second peak of this group was little smaller than normal and instead of 3rd peak there was a gradual decline thereafter. These findings may have significance in predicting the risk during pregnancy and labour.

References

1. Cheema R., J. of Obst. & Gyn of India, 41, 7; 1994
2. Hallak M., Kirshon B., Smith F. O., Brain, Cotton D.B. The J. of Rep. Medicine, 38: 853; 1993
3. Jeng, C.J., Jou, T. J., Wang, K.G., Yang, Y.C., Lee, Y. N., Lan, C.C., J. of Rep Medicine, 35: 674, 1990
4. Moore, T.R., Cayle, J.F., Am. J. Obst. & Gyn 162: 1168-1990.
5. Phelan J.P., Platt, L.D., Yeh, S., Am J Obst. & Gyn 154: 1984.
6. Phelan J.P., Smith C.V., Broussard P, Small M. J. Reprod. Med, 32: 540; 1987
7. Pritchard, J.A., Mac Donald P.C., William Obstetrics, 16th edition 1980, 581, Appliton Century Crafts.