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Maternal Serum Alpha Feto Protein Level in Fetal Distress

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OBJECTIVE - To determine the maternal serum alpha fetoprotein level in fetal distress, to correlate it with the fetal outcome and to compare it with the normal pregnancy level. **METHODS** - MSAFP (Maternal serum alpha fetoprotein) level was determined using ELISA test in 50 control cases of normal pregnancy in third timester or in labor and 50 subjects with fetal distress (Criteria : decreased fetal movements, change in fetal heart rate, meconium in the amniotic fluid). Conservative management (intermittent oxygen inhalation, left lateral position, 5% dextrose solution intravenously) was applied wherever possible. The fetal outcome was noted in terms of type of delivery, Apgar score, birth weight and neonatal problems. **RESULTS** - The MSAFP levels in the controls near or at term ranged from 111-196 ng/ml. There was a significant rise in MSAFP levels in fetal distress (range : 178-292ng/ml). However, no correlation was observed between the elevated MSAFP level and any specific sign of fetal distress. There was a statistically significant (z-value 6.94) increased incidence of cesarean section (94%) in the subjects as compared to the control group (26%).The Apgar score was low in neonates born after clinical signs of fetal distress especially if meconium staining was present. **CONCLUSION** - MSAFP rises significantly in cases of fetal distress.

Key words : fetal distress, maternal serum alpha feto protein

Introduction

Detection of fetal distress has always been a challenge to obstetricians. It is a common indication for cesarean section. The diagnosis of fetal distress depends mainly on the clinical parameters. The study of maternal serum alpha fetoprotein levels at term may anticipate in utero fetal hypoxia leading to fetal distress.

Materials and Methods

The present study was conducted on 100 antenatal women who were divided into two groups.

Control group A (Controls)

Fifty women with normal pregnancy in their third trimester or in labor.

Study group B (Subjects)

Fifty women in their third trimester of pregnancy or in labor with fetal distress.

Exclusion Criteria

Women with congenital malformation detected by ultrasonography, pregnancy induced hypertension, intrauterine growth retardation, multiple gestation, oligohydramnios, diabetes in pregnancy were excluded from the study.

Signs of fetal distress noted were :

A. Fetal movements - Decreased – (less than 10 fetal movements counted in 10 hours)[1].

B. Fetal heart rate - Bradycardia – (baseline fetal heart rate under 120 bpm that lasts 15 minutes or longer)

C. Tachycardia - (baseline fetal heart rate of 160 bpm or greater or variable').

D. Meconium in the amniotic fluid :

Five ml. venous blood samples was collection in a dry plain vial for estimation of alpha fetoprotein level. After separation of the serum, the quantitative immunological assay for AFP was performed by ELISA test. The results obtained were statistically analysed using the student's t-test, Chi-square (X^2), coefficient of correlation (r) and the test of proportions (Z).

Results

The controls and subjects were statistically compared for age, area distribution and period of gestation. Single sign of fetal distress was noted in 44 (88%) subjects of whom decreased fetal movements was present in 2(4.5%), change in fetal heart rate in 38 (86.36%) and meconium staining of the amniotic fluid in 4 (9.09%) subjects. Multiple signs of fetal distress were present in 6 (12%) subjects.

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Conservative management (intermittent oxygen inhalation, left lateral position, 5% dextrose intravenously) was not given in 6 (12%) subjects i.e. who had presented with meconium staining of the liquor. Out of the 44 (88%) subjects who were put on conservative management, 2 (4.5%) delivered vaginally and the rest 95.5% underwent a cesarean section i.e. the conservative management employed was unsuccessful.

Table I shows the mode of delivery in the two groups. There was a significant increase in the incidence of cesarean section in the subjects (Z value 6.94).

Table II shows the various findings at the delivery/LSCS in the two groups. No gross findings were detected as a cause of fetal distress in 38% subjects.

Among the subjects, low Apgar score (1-6) at 1 minute was observed in 12 (24%) neonates. Apgar Score was low in all the subjects who had meconium staining of the amniotic fluid.

Table III shows a significant rise in the MSAFP level in the subjects (range 178-292 ng/ml) as compared to controls (range 111-196 ng/ml).

Table - I : Type of Delivery in the Two Groups.

Type of delivery	Control group (A)		Study group (B)		Z-value
	No	%age	No.	%age	
NVD with episiotomy	32	64	3	6	6.08*
Forceps extraction	5	10	—	—	2.29*
LSCS	13	26	47	94	6.94*
Total	**50**	**100**	**50**	**100**	

NVD - Normal vaginal delivery LSCS - Lower segment cesarean section * - Significant

Table - II : Findings at the Delivery /LSCS in the Two Groups

Findings	Control group (A)		Study group (B)		Z-value
	No	%age	No.	%age	
Cord around the neck	9	18	16	32	1.62^{NS}
Meconium staining of amniotic fluid	—	—	14	28	4.03*
Staining of umbilical cord and placenta	—	—	1	2	1.01^{NS}
No gross finding	41	82	19	38	5.08*
Total	**50**	**100**	**50**	**100**	

NS - Non-significant * - Significant

Table - III : Maternal Serum Alpha Fetoprotein Levels in the Two Groups

Maternal Serum Alpha Fetoprotein (ng/ml)	Control group (A)		Study group (B)		Z-value
	No	%age	No.	%age	
≤ 150	22	44	—	—	5.31*
151-180	24	48	1	2	5.31*
181-210	4	8	6	12	0.67^{NS}
211-240	—	—	19	38	4.84*
>240	—	—	24	48	5.62*

NS - Non significant * - Significant

Table IV shows that no correlation was observed between the elevated MSAFP level and any particular sign of fetal distress whether single or multiple.

Though the MSAFP levels were elevated in the subjects, no correlation was observed between the elevated MSAFP level and low Apgar Score.

Table V shows low Apgar Score (<6) 3 (6%) in 12 (24%) subjects as compared to that in controls at 1 minute.

Forty (80%) neonates in the controls did not have any complication, 6 (12%) required special nursery care,

Table- IV : Correlation of Maternal Serum Alpha Fetoprotein Level with the Signs of Fetal Distress in the Study Group.

Signs of fetal distress	Study group (B) No.	MSAFP levels (ng/ml) Range	MSAFP levels (ng/ml) Mean ± S.D	t-value
Decreased fetal movements	2	225-287	250.50±23.14	1.10 NS
Fetal heart rate	38			
Bradycardia	6	2.9-282	251.57±22.78	0.37 NS
Tachycardia	16	178-292	239.55±27.98	0.60 NS
Variable	16	213-288	249.24±26.31	0.49 NS
Meconium in the amniotic fluid	4	213-282	247.40±26.31	0.52 NS
Multiple signs of fetal distress	6			
FHR + FM	4	225-282	249.50±22.14	0.84 NS
FHR + Meconium staining	2	209-288	252.50±22.78	0.52 NS

FHR - Change of fetal heart rate FM - Decreased fetal movement NS - Non significant

Table - V : Correlation of Maternal Serum Alpha Fetoprotein with Apgar Score

Apgar score at 1 min	Control group (A) No. of cases	Control group (A) MSAFP level (mg/ml) Range	Control group (A) MSAFP level (mg/ml) Mean±SD	Study group (B) No. of cases	Study group (B) MSAFP level (ng/ml) Range	Study group (B) MSAFP level (ng/ml) Mean±SD
0-3	1	196	-	1	209	209
4-6	2	153-158	155-50±2.50	11	178-292	240.55±32.82
7-10	47	111-187	150.87±1.99	38	209-288	242.55±25.11
	50			**50**		

	Mean MSAFP levels (mg/ml)	y-Value	P-value	
Control group	151.96±20.54	-0.09	>0.10	NS
Study group	241.44±27.45	0.074	>0.10	NS

NS - Non significant

Apgar score at 5 min	Control group (A) No. of cases	Control group (A) MSAFP level (ng/ml) Range	Control group (A) MSAFP level (ng/ml) Mean±SD	Study group (B) No. of cases	Study group (B) MSAFP level (mg/ml) Range	Study group (B) MSAFP level (mg/ml) Mean±SD
0-3	-	-	-	-	-	-
4-6	-	-	-	1	209	209.00±21.32
7-10	50	111-196	151.96±20.54	49	178-292	242.10±27.33
	50			**50**		

12%) had septicemia and 3 (6%) had neonatal jaundice; whereas in the subjects, 26 (52%) required special nursery care, 12 (24%) had septicemia, 5 (10%) had neonatal jaundice and 1 (2%) neonate died due to severe asphyxia. The difference in the nursery admission and incidence of septicemia, were statistically significant using the test of proportions ($p < 0.01$). There was no statistically significant difference in the birth weights of the two groups.

Discussion

The ultimate goal of modern obstetrics is to provide healthy babies as an outcome of pregnancy. Fetal distress is a major factor contributing to perinatal morbidity and mortality. The early detection of fetal distress and its timely management is the most important step to overcome this obstacle. Conservative management was tried in 88% of the subjects. It was successful in 4.5% who delivered vaginally. In the remaining 95.5%, cesarean section was done when conservative management was unsuccessful. In 12% of the subjects, conservative management was not employed because meconium staining of the liquor was detected. A statistically significant difference was observed in the type of delivery using the test of proportions. (Table I). An increased rate of cesarean section was associated with fetal distress.

Though the incidence of cord around the neck was more in the subjects (32%) as compared to that in the controls (18%) (Table II), the difference was not statistically significant. Thus the presence of cord around the neck may not always cause fetal distress. There was a statistically significant difference in the Apgar score at 1 minute in the controls and subjects ($p < 0.01$ where Apgar score was 4-6, $p < 0.05$ where Apgar score was 7-10). (Table V). The 5 minute Apgar score and the change between 1 and 5 minute scores reflects the effectiveness of resuscitation efforts. There was a significant decrease in the Apgar score with the presence of meconium in the amniotic fluid (100%). Thus, passage of meconium is a potential warning sign of fetal asphyxia. There was a statistically significant increase in the MSAFP level in the subjects (178-292 ng/ml) as compared to that in the controls (111-196 ng/ml) ($p < 0.01$) (Table III). Our values were comparable to those observed by Cohen et al[4] (>250 ng/ml) and Cahill et al[5] (> 250 ng/ml); whereas they differed with those of Seppala and Ruoslahti[6] (> 530 ng/ml). The values were also comparable to those of Garoff[7] and Garoff and Seppala[8] who had taken an Apgar score of 1-6 as a sign of fetal distress and found an increase in MSAFP level (> 250 ng/ml). A correlation of the elevated MSAFP level with a particular sign of fetal distress could not be obtained (Table IV).

The MSAFP rises significantly in cases of fetal distress. Because the present study was based on one sample taken for alpha fetoprotein, the relationship between the onset of fetal distress and elevation of MSAFP could not be established. Our results suggest that determination of MSAFP provides additional information of fetal wellbeing in utero. Timely intervention in normal term pregnancies with raised MSAFP levels can save many fetuses from hypoxic damage.

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