

ACCELERATED CLOTTING TIME AS A DETERMINANT OF FETAL MATURITY AND ITS VALUE IN DIAGNOSING POST DATED PREGNANCY

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SUMMARY

Accelerated clotting time (ACT) was performed on amniotic fluid samples of 75 pregnant patients of 34-42 wks or more gestation with a reliable menstrual history and was correlated with other amniotic fluid tests of fetal maturity viz. Nile blue sulphate test and bubble stability test. ACT was found to decrease gradually as pregnancy advanced. Mean ACT at 36-37 wks was found to be 112 sec., which was taken as the critical value for maturity. An ACT value of 112 sec. or less predicted a healthy neonatal respiratory status in 98.33% cases. A significantly abrupt fall of ACT was seen after 40 wks of gestation in all cases. The test was also found to correlate well with other amniotic fluid tests of fetal maturity.

Introduction

Correct timing of delivery to avoid complications of prematurity or of suspected postdated pregnancy and proper timing of termination of high risk pregnancies when indicated, specially in cases of uncertain menstrual dates has remained an obstetric problem. The accelerated clotting time (ACT) which measures the thromboplastic activity of amniotic fluid was initially evaluated by Hastwell (1974)

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as an index of fetal maturity. Yaffe et al (1981) reported on the value of the test in diagnosing postdated pregnancy, thus enhancing the value of the test over other tests currently in vogue.

The present study has been undertaken to evaluate ACT as an index of fetal maturity specially in postdated pregnancy.

Material and methods

The present study was conducted in the Department of Obstetrics & Gynaecology, Lady Hardinge Medical College & Associated Smt. Sucheta Kriplani Hospi-

tal. Seventy five pregnant patients with gestation periods varying from 34 wks to 42 wks or more, admitted in Maternity Wards & Labour Room between Aug. 1985 & March 1986 were included in the study.

Amniotic fluid was collected by one of the following methods (i) Abdominal amniocentesis (ii) Transuterine aspiration at the time of caesarean section (iii) Aspiration of the membranes per vaginum at the time of artificial rupture of membranes.

The test was performed as described by Hastwell (1974). 1 cc of fresh amniotic fluid was collected in a clean dry test tube. 4 cc of blood was withdrawn from the same patient. 1.5 cc was added to the test tube containing amniotic fluid and 2.5 cc was placed in a second test tube. Both tubes were placed in a water bath at 37° C. The clotting time of the first tube with amniotic fluid was taken as the accelerated clotting time and that of the second served as a control.

All patients included in the study were followed up till the time of delivery.

Following delivery clinical maturity and respiratory status of the neonate were determined in each case. The results of the test were correlated with period of gestation, birth weight, clinical maturity of the baby at birth and its respiratory status. The test was also correlated with other tests of fetal maturity viz. bubble stability test and Nile blue sulphate test.

Observations

Table I shows range of ACT, mean ACT values and standard deviations at various periods of gestation. Between 34-35 wks mean ACT was 141 seconds. At 36-37 wks mean ACT was 112.16 sec. After 40 wks there was a marked decrease in ACT, mean ACT after 42 wks being 40 sec.

ACT of 112 seconds was taken as the critical value for maturity in the present study and mean ACT of 50.54 sec +10.76 sec. was concluded to be suggestive of postdated pregnancy. Applying student's 't' test for significance P was .001 on comparing group I (34-36 wks) with group II (36-40 wks), Group II (36-40 wks) with

TABLE I
RELATIONSHIP OF ACT WITH PERIOD OF GESTATION

Period of Gestation in wks	No. of cases	Range of ACT in sec.	Mean ACT in sec.	S.D
34-35	5	125-165	141	15.57
35-36	4	110-136	120.25	11.26
36-37	6	100-140	112.16	14.49
37-38	11	85-140	105	14.81
38-39	13	85-120	99.07	9.58
39-40	16	75-105	92.12	9.97
40-41	8	43-85	57.12	12.86
41-42	10	40-55	47.2	5.90
>42	2	35-45	40.00	7.07

TABLE II
RELATIONSHIP OF ACT WITH BIRTH WEIGHT & MEAN CLINICAL MATURITY

Weight in gms	No. of cases	Mean maturity according to POG	Mean clinical maturity	Mean ACT in sec.	SD
1000-1499	1	34.1	33	165	
1500-1999	4	35.12	35.10	127.75	15.74
2000-2499	13	37.12	37.12	107.69	25.25
2500-2999	45	39.25	39.45	84.31	25.82
3000-3499	12	40.13	40.07	76.25	25.86

group III (>40 wks) and group I with group III. This indicates that the data is statistically significant.

Mean ACT decreases as birth weight and mean clinical maturity increase, as shown in Table II.

Table III shows false results with ACT, taking ACT value of 112 sec. as an index of fetal maturity. False positive results were 11.11% and false negative results were 10.09%. Thus the sensitivity

of the test is 89.91% and specificity is 88.89%.

Table IV illustrates the value of ACT in predicting RDS, taking 112 sec. as the critical value. An ACT of 112 sec. or less predicts a healthy baby in 98.33% cases with RDS occurring in only 1.66% cases and there were no neonatal deaths. With ACT of more than 112 sec., RDS occurred in 35.11% cases of which one (6.66%) died. 64.29% babies were healthy.

TABLE III
FALSE NEGATIVE AND FALSE POSITIVE RESULTS WITH ACT

Period of Gestation in weeks	No. of cases	ACT in seconds		False positive		False negative	
		>112	≤ 112	No.	%	No.	%
≤ 36 wks	9	8	1	1	11.11	-	-
> 36 wks	66	7	59	-	-	7	10.09

TABLE IV
VALUE OF ACT IN PREDICTING RDS IN LIVE BABIES

ACT in sec	Total No. of cases	No. of cases with RDS		No. of healthy babies		Died	
		No.	%	No.	%	No.	%
> 112 sec	14	5	35.11	9	64.29	1	6.66
≤ 112 sec	60	1	1.66	59	98.33	-	-

Discussion

The estimation of amniotic fluid accelerated clotting time is an *in vitro* test that demonstrates the reduction in clotting of maternal whole blood on addition of her fetus's amniotic fluid. A known amount of amniotic fluid is mixed with maternal whole blood and the clotting time is determined. Larger amounts of thromboplastins available in more mature amniotic fluid therefore gives a lower value of ACT & vice versa in an immature fetus.

In the present study the thromboplastic activity of amniotic fluid was studied and was found to increase significantly with advancing gestation.

The critical value of ACT in the present study was found to be 112 sec which was taken as the index of fetal maturity. The findings were comparable to those of other workers, Hastwell (1974, 1978) 110 sec, Karna (1984)-15 sec.

ACT showed a significantly abrupt fall after 40 wks of gestation in all cases, thus offering a distinct advantage over other tests in diagnosing postdated pregnancy. Mean ACT of 50.54 sec \pm 10.76 sec was concluded to be suggestive of postdated pregnancy. Similar results were reported by Yaffe et al (1981) viz 42.3 sec. and by Verma et al (1985) viz 61 sec. The test was found to be simple, quick, inexpensive, with reliable results in both normal and complicated pregnancies and compared well with other tests of foetal maturity.

References

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