MATERNAL SERUM ASPARTATE AND ALANINE AMINOTRANSFERASE ACTIVITY IN RELATION TO THE TYPE OF DELIVERY

by

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Introduction

Estimation of Serum Aspartate aminotransferase (Asp.T) and Alanine aminotransferase (Ala.T.) activity in maternal serum during labor is not new. Several reports are now available in the literature on the subject (Meade and Rosalki, 1963; Chinsky *et al*, 1956; Glending *et al*, 1955; West and Zimmerman, 1958; Knutson *et al*, 1958; Stone *et al*, 1960; and Theisen *et al*, 1961). However, no author under review has discussed the effect of different types of abnormal deliveries on maternal serum aspartate and alanine aminotransferase activity. To this there is one exception in the study of Bhatia *et al* (1977) where the authors have tried to evaluate the effect of foetal status on maternal serum enzymatic levels. Foetus is a complete parasite on the mother with exchanges taking place at placental level. During pregnancy and labour the bodily composition of mother changes due to the effect of developing foetus. This gives rise to certain biochemical changes which are measurable and to some extent help to keep the mother and foetus in best condition of health.

Certain serum enzymes increase during pregnancy, obviously the rise is due to the direct effect of developing foetus on the maternal metabolism (Rani *et al* 1978); as the foetus is undergoing rapid metabolic changes this may also effect the maternal metabolism and in turn the maternal serum enzymatic activity.

The Asp. T. and Ala. T. enzymes are key enzymes in proteincarbohydrate metabolism and are widely distributed throughout the body. They are supposed to be affected first by foetal metabolic changes.

The aim of the present study was to determine the change in maternal serum Asp. T. and Ala. T. activity due to various types of abnormal deliveries and to find out if these enzymatic values have any clinical significance in determining the type of delivery.

Material and Method

The present study was conducted at the State Zenana Hospital Jaipur (Rajasthan). Fifty-eight randomly selected mothers were taken for study who delivered from March 1978 to December 1978.

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For the purpose of study following groups were made:

1. Normal or controls—normally delivering mothers with vertex presentation (F.T.N.D.).....33 cases.

2. Abnormal—mothers who delivered by abnormal presentation or by abnormal method ..... 25 cases.

Only mothers with 28 weeks of pregnancy and above were included in the study. A detailed history was taken in all the cases and mothers with obvious systemic diseases and multiple births were excluded from the study.

Five ml of blood was collected in dry sterile vial from each mother immediately after the birth of newborn. The estimation of Asp. T. and Ala. T. activity was done by colorimetric technique of Reitman and Frankel (1957). The results were analysed statistically to see the effect of abnormal delivery in comparision to normal delivery on maternal serum enzymatic activity.

Observations

The distribution of cases is shown in Table I. The mean maternal serum Asp. T. and Ala. T. activities in various abnormal delivery groups and their comparison with normally delivered cases is shown in Table II. It is evident from Table II that in forceps group ($N = 12$) the mean enzymatic values are higher in comparison to controls. However, statistically they are not significant. Similarly, in breech group ($N = 8$) the mean enzymatic values are higher as compared to controls but here only Asp. T. activity is significantly higher ($P < 0.05$) than controls.

In caesarean section group the mean values were higher when compared to controls although they were not significant statistically.

It is also evident from Table II that mean enzymatic values are higher in abnormally delivered cases when taken together as a group and compared to controls. This clearly depicts that maternal serum enzymatic values in abnormally delivered groups go high due to some specific maternal and/or foetal factor which is common to all cases delivered abnormally.

Discussion

In the present series a rise in Serum Asp. T. and Ala. T. activity over control was noted in all the abnormal delivery cases. However, only Asp. T. activity in breech cases was found statistically significant.

Theisen *et al* (1961) and Meade and Rosalki (1963) reported slight rise in serum enzymatic activity during labour

TABLE I
Distribution of Cases

S. No.	Type of delivery	Sub-type of delivery	No. of cases	Percentage of cases
1.	Normal	Vertex	33	56.9
		Low cavity	6	10.34
2.	Forceps	Mid-cavity	3	5.17
		High cavity	3	5.17
3.	Breech	Incomplete	3	5.17
		Complete	5	8.62
4.	Caesarean	Lower segment	5	8.62
Total			58	100

TABLE II

Mean Maternal Serum Aspartate and Alanine Aminotransferase Activity in Different Types of Deliveres

S. No.	Type of delivery	No. of cases	Asp.T. units/ml		Ala. T. units/ml	
			Mean	± S.D.	Mean	± S.D.
1.	Normal	33	25.54	7.00	14.87	5.62
2.	Forceps	12	27.91	6.84	17.50	5.33
	't'	—	0.98		0.54	
	'P' 1 vs 2	—	>0.05		>0.05	
3.	Breech	8	31.75	7.88	17.87	8.13
	't'	—	2.04		0.98	
	'P' 1 vs 3	—	<0.05		>0.05	
4.	Caesarean	5	28.6	4.61	18.2	3.96
	't'	—	1.27		1.64	
	'P' 1 vs 4	—	>0.05		>0.05	
5.	Total abnormal group (2+3+4)	25	29.28	6.79	17.76	5.91
	't'	—	1.64		1.45	
	'P' 1 vs 5	—	>0.05		>0.05	

when compared to the values in third trimester. Because of this slight rise noted during labour we compared our values with the normally delivered cases to nullify the effect of labour as such

Taking the various abnormal delivery groups one by one it was seen that in cases of:

1. Forceps group the mean enzymatic values were higher when compared to controls, this may be due to the prolonged muscular exertion during second stage of labour which is the usual indication for forceps (in present series all the forceps were applied due to prolonged second stage). Muscular exertion is known to increase the serum Asp, T. and Ala. T. activity. (Schlang and Kirkpatric (1961) and Remmers and Kaljot (1963). It is also probable that there is enzymatic leak from foetus and placenta, as foetal anoxia is a high probability when forceps is applied and anoxia is also known to cause rise in serum enzymatic activity without causing cellular death (Zieler (1956, 1957 and 1958) and Crisp *et al* (1959)).

In this group the mean values were higher than those in controls, however, they were not statistically significant ($P > 0.05$). When mean enzymatic values were analysed with the type of forceps (low, mid or high cavity), the values were found highest in high forceps group when compared to controls, mid forceps and low forceps groups. This again suggests that foetal anoxia is somehow related to the maternal enzymatic values. No comparable data could be found in the reviewed literature for these values.

2. In breech presentation, the mean enzymatic values were also higher in comparison to controls. However, only Asp. T. values were statistically significant ($P < 0.05$ and $t = 2.04$). Probably this increase in enzymatic activity is due to maternal muscular exertion which is usually associated with breech deliveries. It is known that moderate exercise increases the serum enzymatic activity as

suggested by Remmers and Kaljot (1963) and Schlang and Kirkpatric (1961).

There was no significant difference in mean enzymatic values in incomplete or complete breech cases. However, a final conclusion cannot be drawn because of small number of cases. We propose that this aspect should be further explored to the depth as we could not find any comparable data in the reviewed literature.

3. In caesarean section group, the mean enzymatic values were higher when compared to controls. However, the difference was not statistically significant ($P > 0.05$). The higher values noted here may also be due to the same reasons as discussed for the forceps group. We could not find comparable data in the reviewed literature for these figures.

4. Total abnormal delivery group—in abnormal deliveries as a whole the mean values were higher in comparison to controls; however, the difference was not significant statistically ($P > 0.05$) for Asp. T. and ($P > 0.05$) for Ala. T. (Table II).

Conclusions

1. The mean maternal serum Asp. T. and Ala. T. values are apparently high in abnormal deliveries, however, there is no statistically significant rise in comparison to controls (except for Asp. T. in breech group).

2. There is no correlation between type of delivery and the mean Asp. T and Ala. T. activity.

3. The slight rise noted in enzymatic activity may be due to (a) Maternal muscular excertion during abnormal delivery (b) leak of enzymes from foetal or placental tissues during prolonged second stage of labour into the maternal circulations. (c) Tissue anoxia with associated leak of enzymes from uterine and skeletal muscles.

4. At present it is not possible to determine the type of delivery by measuring the maternal serum enzymatic values.

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