

# ELECTROCARDIOGRAPHIC FINDINGS AT TERM, LABOUR AND IMMEDIATE POST PARTUM

(A preliminary study among Manipuris)

by

A. D. SINGH  
LAKSHMI DEVI  
LOKENDRA SINGH  
RANDHONI DEVI

and

JATISWAR SINGH

## SUMMARY

Electrocardiographic findings of 50 normal pregnant women taken before, during and after labour are studied and analysed. At term the most common heart position is semivertical with an electrical axis of  $+60^\circ$ .  $Q_3$ , and flat or inverted  $T_3$  are very common. No significant difference is observed during the three phases of recording. Cardiac arrhythmia is seen in two cases only.

### Introduction

Pregnancy imposes many important changes involving the heart and circulation with additional functional load. It has been estimated that the resting cardiac output increases by about 30 to 40 per cent at the end of the first trimester, only slightly during the second trimester and thereafter remains unaltered until term (Barnas, 1976). This basal increase has been further enhanced by physical activity and demand of the advancing pregnancy. Further, each uterine contraction is accompanied by a transient rise in arterial blood pressure and oxygen consumption with frequent ectopic beats during the second stage of labour.

With advancing pregnancy, the heart gradually assumes a more horizontal position which can be radiologically and electro-graphically detected. Left axis deviation and  $T_3$  inversion have been described in the first two (Benjamin, 49). A deep  $Q_3$  and inverted  $T_3$  is encountered in a small percentage of cases probably due to the altered position of the heart (Friedberg, 1966). Significant variability of T wave during pregnancy has been already reported. S-T segment depression and flattening of T wave have also been reported. The duration of Q-T interval is usually normal in spite of the changes in the circulatory dynamics (Kissin et al 1970). Disturbances of the cardiac rhythm in the absence of organic heart diseases are not uncommon. Atrial and ventricular extrasystoles at times

From: Regional Medical College, Imphal (Manipur).

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bigeminal rhythm are frequently seen. Increased susceptibility to paroxysms of supraventricular tachycardia during pregnancy has also been observed (Lees, 1967, Talwar and Wahi 1979). This paper reports the electrocardiographic changes at term, during labour and immediate postpartum period.

#### *Material and Methods*

Fifty normal pregnant women having no organic cardiac disease were selected at random from among the cases admitted for delivery in the antenatal ward of the Regional Medical College Hospital, Imphal. Period of gestation were from 38 completed weeks to 41 weeks. Twelve leads electro-cardiograms (ECG) were taken before the onset of labour at term, during labour and within first twelve hours of delivery. Attempts to take ECG during the phase of uterine contraction were abandoned as muscular contraction interfered with the ECG recording.

All cases underwent a thorough clinical examination followed by obstetrical assessment to exclude any organic heart disease and obstetrical complications. Particular attention was given to the age, height, weight, parity, fundal height, presentation of the foetus and foetal heart sound in addition to routine blood pressure and pulse recordings. During labour, the stage of the labour was noted just before the ECG recording.

Routine urine and haematological examinations were carried out. The birth weight, anthropometric measurements of the baby and the placental weight were recorded.

#### *Observations*

The age of the cases varies between 17 to 37 with an average of 26 years. Aver-

age height was 151.5 cm and weight of 58 kg. None was obese.

There were 22 primis and 28 mults with parity 1 to 6. Nine cases had blood pressure above 140/90 mm of Hg and 8 of them had other signs of pre-eclamptic toxæmia. Most of them were anaemic. The Hb level ranged from 7 gm% to 12 gm% with an average of 8.6gm%. Presentation was vertex in all the cases. The birth weights of the babies varied from 2.5 kg. to 3.5 kg. giving an average birth weight of 3.1 kg.

#### *ECG Analysis*

Rhythm was sinus in origin with normal conduction except in 2 cases. Paroxysmal supraventricular tachycardia was seen in 1 case and alternate accelerated conduction type A Welff-Parkinson-White syndrome (WPW syndrome) in another.

Rate: All the cases show sinus tachycardia varying between 100 to 110 per minute before and during labour. During the immediate post-partum period, the cardiac rate drops slightly to an average of 98 per minute, except in 2 cases who had cardiac arrhythmia during labour.

P-R interval: It varied from 0.1 sec. to 0.2 sec.

QRS interval: It varied from 0.66 sec. (22 cases) to 0.1 sec. (1 case).

QT interval: As corrected for heart rate at 60 per minute from the monogram (Morriett, 1968). QT interval was on an average 0.42 sec.

P-wave: This was normal in all the cases except in 1 who showed supraventricular tachycardia where it is not well discernible.

QRS complex: Electrical axis is shown in Table I. If we consider axis

TABLE I  
Electrical Axis in 50 Cases

| Electrical axis | -30° | 0° | +30° | +45° | +60° | +75° | +90° |
|-----------------|------|----|------|------|------|------|------|
| No. of cases    | 2    | 3  | 8    | 5    | 25   | 4    | 3    |
| Percentage      | 4    | 6  | 16   | 10   | 50   | 8    | 6    |

between 0° and + 90° as normal, only 2 cases in this series show slight left axis deviation of - 30° and the rest were within normal limits. The most common axis in this study is + 60°.

The electrical heart position as determined from lead aVL and aVF show semivertical heart position (axis + 60°) in 50% of the cases. Only 2 cases (4%) have horizontal heart position. QRS pattern was normal in 49 cases and 1 case showed typical features of Type A-WPW syndrome (Fig. 1).

Q wave: Q<sub>3</sub> of 1 mm or more was seen in 24 cases (48%).

ST segment: Either J point or ST segment was depressed 1-15 mm in the precordial leads in 10 cases (20%). None showed any ST segment elevation.

T wave: T<sub>3</sub> was flat in 22 cases (44%) and actually inverted in 17 cases (34%). Inversion of T wave was seen in aVF in 4 cases where QRS complex is less than

5 mm. No abnormal tall T wave was seen.

Cardiac Arrhythmia: One primi showed paroxysmal supraventricular tachycardia during labour which persisted for eight hours after delivery. Another case develops alternate accelerated conduction of the type of Type A-WPW syndrome during labour. The WPW syndrome was replaced by sinus tachycardia with a rate of 125 per minute in subsequent ECG recording after delivery.

Electrical heart axis and position on the basis of parity: The electrical axis in 22 primi is shown in Table II. The commonest heart position was semivertical with an axis of + 60°. None of the primi showed horizontal heart position. Among 28 multi, 2 cases showed horizontal heart position with an axis of -30°. Axis of the rest of the cases are shown in Table III.

TABLE II  
Electrical Axis in 22 Primis

| Electrical Axis         | -30° | 0°  | +30° | +45° | +60° | +75° | +90° |
|-------------------------|------|-----|------|------|------|------|------|
| No. of Primi (22 cases) | Nil  | 1   | 3    | 2    | 14   | 1    | 1    |
| Percentage              | —    | 4.5 | 13.6 | 9    | 63.6 | 4.5  | 4.5  |

TABLE III  
Electrical Axis in 28 Multis.

| Electrical Axis      | -30° | 0° | +30° | +45° | +60° | +75° | +90° |
|----------------------|------|----|------|------|------|------|------|
| Multipara (28 cases) | 2    | 2  | 5    | 3    | 11   | 3    | 2    |
| Percentage           | 7    | 7  | 18   | 10   | 39   | 10   | 7    |

### Discussion

In this study, electrical axis of  $+60^\circ$  corresponding to semivertical heart position was the commonest except in 2 multiparous women who showed horizontal heart position. Left axis deviation has been described during pregnancy as early as the first two trimesters. As observed by Szekely and Snaith, (1953, 1974) (Onam and Hold, 1961), we have noted less pronounced left axis deviation nearer term. This change in the electrical axis can be attributed to the diaphragm raising as pregnancy advances. Such changes are also seen in patients with ascites.

It is interesting to note that none of the primi showed horizontal heart position although one is tempted to assume that such position would be commoner because of the better abdominal muscle tone. While Carr and Palmer and Hollander and Crawford have reported deep  $Q_3$  and inverted  $T_3$  in a "small percentage" of cases. The present study reveals  $Q$  in 48 per cent and  $T_3$  either flat or inverted in 78 per cent of the cases.

Oram and Holt (1961) have found depression of ST segment in pregnancy. In this study, either the J point or ST segment itself was depressed more than 1 mm in the precordial leads in 10 cases (20%). Only 1 case of the series showed supraventricular tachycardia during labour which persisted for about eight hours after delivery. One case showed Type A-WPW syndrome during labour. However, the ECG taken 10 hours after the delivery showed only sinus tachycardia with disappearance of WPW syndrome pattern. It is well known that the WPW pattern completely disappears in the presence of tachycardia (Szekely and Snaith, 1953).

During the immediate post partum

period which is arbitrarily taken as the first 12 hours after delivery, the ECG pattern including electrical heart position remains more or less the same except for the rhythm disorders.

The antenatal findings and labour performance of these cases satisfactory.

### Conclusion

Horizontal heart position often thought to be common in pregnancy is seen in only 4 per cent of 50 cases studied at term, labour and immediate post-partum.  $Q_3$  and flat or inverted  $T_3$  are quite common being seen in 48 and 78 per cent of the cases studied. ST segment depression is seen in 20 per cent of the cases and persist for eight hours. Type A-WPW syndrome is also seen in one case (2%).

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