INTRA PARTUM FOETAL DISTRESS

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INTRODUCTION
The occurrence of neonatal asphyxia at Baragwanath Hospital is a daily problem. The question was raised as to whether intra partum foetal distress, apgar scoring at birth and the biochemical analysis of blood acid base status from the chorionic arteries can predict any short-term neurological defects.

AIMS OF THE STUDY
• To detect factors directly related to the incidence of asphyxia neonatorum.
• To detect factors coincidentally related to the incidence of asphyxia neonatorum.
• To establish parameters to detect complications with their sequelae.
• To reduce the occurrence of asphyxia neonatorum thus improve the quality of life.

THE HYPOTHESIS
There is no correlation between apgar scoring, biochemical analysis of chorionic arterial blood and short-term neurological defects within the first twenty four hours of neonatal life.

This research project won the 1984 Juta Nursing Research Prize for students on courses leading to a post-registration diploma or certificate in Nursing. The researchers were studying for the Diploma in Advanced Midwifery and Neonatal Nursing Science at Baragwanath Hospital.

TYPE OF STUDY
A prospective clinical study consisting of asphyxiated and non-asphyxiated groups was undertaken. Twenty-nine mothers with clinical signs of foetal distress (these represented the asphyxiated group) were monitored during labour. The non-asphyxiated group consisted of twenty-nine mothers who were also monitored during labour; of these twenty-six presented later with only one of the clinical signs of foetal distress when the second stage of labour was imminent. The subjects chosen were full term and the babies' birth weights had to exceed 2,2 kilograms.

The investigators assessed both maternal and foetal condition and obtained the following data from the mother's clinical records.

Data directly related to the study

• Clinical signs of foetal distress: These are listed in table 1.

• Technological signs of foetal distress
  The asphyxiated group only was monitored with internal cardiotocography. The foetal heart rate and the uterine contractions were plotted on the Philpott charts as indicated in table 1.

Two heparinised syringes were used to withdraw blood from both umbilical arteries within fifteen minutes of expulsion of the placenta. These samples were immediately taken for analysis to the acid base machine (Radiometer ABI 3).

In a pilot study concern was raised because of difference in acid base status between blood from the two chorionic arteries of the same placenta. Because of this phenomenon, specimens were taken in each case from both chorionic arteries and the results compared.

Data co-incidentally related to the study

• Medical History
  Hypertension
  Cardiac disease
  Anaemia
  Diabetes mellitus
  Other

• Obstetrical Data
  Ante-partum haemorrhage
  Poly-hydramnios
  Pre-eclampsia
  Other

Booking status

Number of ante-natal clinic visits
| NAME: | AGE: | PARITY: | STILLBIRTHS: | EDD: | BOOKED | No. of ANC visits | Medical Problems |
|-------|------|---------|-------------|------|--------|------------------|-----------------|
|       |      |         |             |      |        |                  | Hypertension YES NO |
|       |      |         |             |      |        |                  | Cardiac YES NO |
|       |      |         |             |      |        |                  | Anaemia YES NO |
|       |      |         |             |      |        |                  | Diabetes YES NO |
|       |      |         |             |      |        |                  | Other            |

| Obstetrical Problems |
|----------------------|
| APH                  |
| Polyhydramnios       |
| Pre-eclampsia        |
| Other                |

| Blood Tests |
|-------------|
| RH          |
| Group       |
| Antibodies  |
| Rubella     |

| Clinical Signs of Foetal Distress |
|----------------------------------|
| — meconium stained liquor        |
| — foetal bradycardia             |
| — foetal trachycardia            |
| — excessive foetal movement      |
| — decreased foetal movements     |
| Cardiotocograph                  |

| DATE: | TIME: |
|-------|-------|
|       |       |

| Rupture of membranes: |
|-----------------------|
| Colour of Liquor:     |
| Clear                 |
| Meconium stained      |
| Liquor on inspection: |
| Thick                 |
| Medium                |
| Thin                  |
| Delivery:             |
| Normal                |
| Forceps               |
| Vacuum                |
| C/S                   |

| 1st Stage: DATE: | Hrs | mins. |
|-----------------|-----|-------|
|                 |     |       |

| Duration of 1st stage of Labour | Hrs | mins. |
|---------------------------------|-----|-------|
|                                 |     |       |

| Delivery: | Cord around the neck YES NO |
|-----------|-----------------------------|
|           |                             |

| Baby: Time of birth | IF yes number of times |
|---------------------|------------------------|
|                     |                        |

| Sex | M | F |
|-----|---|---|
|     |   |   |

| Weight | Tight or loose |
|--------|----------------|
|        |                |

| Condition | Alive | Fresh SB | True knots |
|-----------|-------|---------|-----------|
|           |       |         |           |

| Apgar | 1 min | 5 mins | 15 mins |
|-------|-------|--------|---------|
|       |       |        |         |

| Heart rate |
|------------|
| Absent     |
| L 100      |
| 100        |
| 2          |

| Respiratory Rate |
|------------------|
| None             |
| Slow or irregular|
| Good and regular |
| 0                |
| 1                |
| 2                |

| Muscle tone |
|-------------|
| Flaccid     |
| Slight flexion of Limbs |
| Active movement |
| 0            |
| 1            |
| 2            |

| Reflex Activity |
|-----------------|
| None            |
| Grimaces        |
| Coughs or sneezes |
| 0              |
| 1              |
| 2              |

| Colour |
|--------|
| Pale or blue |
| Body Pink  |
| Limbs Blue  |
| Pink all over |
| 0        |
| 1        |
| 2        |

| Total |
|-------|
|       |

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TABLE 1 (continued)

| RESUSCITATION          | YES | NO |
|-------------------------|-----|----|
| Suctioned               |     |    |
| If suctioned meconium in mouth/nose |     |    |
| Intubated               |     |    |
| If intubated meconium in trachea |     |    |
| IPPR                    | YES | NO |
| Time of first spontaneous breath | mins |
| Transferred to T/A ICU  | 66  | 67 |

PLACENTAL ARTERIAL BLOOD GASES FROM FOETAL SIDE OF PLACENTA

| First artery | Second artery |
|--------------|--------------|
| PH           | PCO₂         |
| PO₂          | HCO₃         |
| BE           |             |

NEUROLOGICAL ASSESSMENT AT 12-24 HOURS

| DATE OF ASSESSMENT | TIME OF ASSESSMENT |
|--------------------|--------------------|
|                    |                    |

1) Increase in level of apparent alertness | YES | NO |
2) Any seizure | YES | NO |
3) Apnoeic spells | YES | NO |
4) Jitteriness | YES | NO |
5) Weakness | YES | NO |
6) Proximal limb weakness | Upper limbs | Lower limbs | YES | NO | YES | NO |

Liquor

Colour, thickness and duration of rupture of membranes.

Labour

Duration of the first and second stages and the method of delivery. Special note was made of the occurrence of the cord around the neck — whether tight or loose, how many times, the presence of true knots in the cord.

Resuscitation

Whether the newborn was suctioned and characteristics of the secretations obtained. Whether intubated and the method of ventilation employed. Accurate timing of the occurrence of the first spontaneous breath.

Immediate examination of the neonate

Special note was taken of infarcts which became significant if they covered a large enough area to interfere with the uterine placental foetal exchange (1.p 591).

A retro-placental clot, which signifies premature separation of the placenta thus interfering with the uterine placental foetal exchange, was also noted.

Results and analysis

A total of fifty-eight patients in labour enrolled in the study. Comparisons were made between:

- the intrapartum non-asphyxiated group (N=28) and the intrapartum asphyxiated group (N=28)

- the subjects who had babies with apgar score ≥7 (N=36) and apgar score <7 (N=22).

- the blood values of the two chorionic arteries of all placentae

- intrapartum asphyxia, neonatal asphyxia and short-term neurological defects.

The t-test was used to test correlated samples and the chi-square for discrete data.

Findings

Intrapartum non-asphyxiated group versus intrapartum asphyxiated group

There was a significant difference between the two samples regarding:

- hypertension during pregnancy. More hypertension occurred in the experimental group (p=0,05)

- normal deliveries/caesarian section and intubation. Not surprisingly more caesarian sections (p=0,02) and intubations (p=0,05) were performed on cases from the experimental group

- cord around the neck. This was more common in the experimental group (p=0,05)

- apgar scores. Apgar scores at one minute (p<0,001), at 5 minutes (p<0,001) and at 15 minutes (p<0,01) were lower in the intrapartum asphyxiated group with the great correlation at 15 minutes

- birth weight. The birth weight in the experimental group was significantly lower (p<0,05).

There was no significant difference between the groups regarding:

- maternal age, parity, booking status, post dates (≥7 days past EDD), WR (Wasserman positive)
— hypertension during labour (diastolic ≥90), delay in cervical dilatation, instrumental deliveries (forceps and vacuum)
— chorionic arterial PH, CO₂ HCO₃ between the two chorionic arteries.

Apger ≥ 7 group versus 7< group

There was a significant difference between the two groups regarding:

— parity. Mothers of low parity occurred more in the neonatal asphyxiated group (p<0,05) primigravids as such were not compared, but this could have been a contributory factor.

— Chorionic blood pH. A low pH was found to be significantly different in the low apgar group (p<0,05). However the pH was influenced by one very low value (pH =6,71) and if this extreme subject is taken out, there was no significant difference.

There was no significant difference between the two groups:

— maternal age, booking status, post dates, WR and hypertension
— cervical dilatation, chorionic arterial CO₂ HCO₃ and cord around the neck.

Blood values of the two chorionic arteries of all placentae

No significant difference was found when comparing the pH, PCO₂ and HCO₃ between isoplacental chorionic arteries.

Asphyxia and short-term neurological defects

Only two neonates were judged to be neurologically abnormal at 24 hours of age. These small numbers prohibit statistical analysis.

LIMITATIONS

— Observations were made late in labour, a common problem in the hospital is that patients present late in labour.
— The unavailability of cardiotocographs for the non-asphyxiated group and even for six subjects in the foetal distress group.
— Loss of data for two asphyxiated subjects and two non-asphyxiated subjects because the acid base machine was out of order for twenty-four hours.

CONCLUSION AND DISCUSSION

• The presence of clinical signs of intrapartum asphyxia, as well as ante-natal factors, can predict low apgar scores.
• Although cord around the neck showed to be a predictor of intrapartum foetal distress, it could not be shown as a predictor of post-partum asphyxia (low pH).
• Queenan (Queenan: 27) states that foetus of high risk pregnancies showed significantly lower pH and high base deficits . . . The investigator’s finding also contradiicted Babson’s statement (Babson: 52) that there is an accurate correlation between the degree of foetal distress and foetal blood pH. Our findings disclosed a more accurate correlation between foetal distress and apgar scoring.

RECOMMENDATIONS

— To do a similar study in a larger group in order to test short-term neurological outcomes.
— An improvement in facilities and services to avoid a delay in implementing immediate action to facilitate delivery.
— Availability of proper functioning cardiotocographs and introducers to have made it possible for the investigators to use equal instruments for subjects in both groups.
— That mothers receive good antenatal care and vigilant monitoring during labour, followed by an accurate assessment of the newborn infant, especially with regard to apgar scoring.
— It would appear that it is unnecessary to provide acid base facilities to prevent or assess neonatal asphyxia.

SUMMARY

Low apgar scores can be predicted from the clinical diagnosis of intrapartum foetal distress but neither low apgar score nor intrapartum foetal distress correlated with arterial acid base changes.

Too few babies had neurological deficit to warrant analysis.

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