ORIGINAL ARTICLE

A Study of Early Abnormal Neurological Findings in Birth Asphyxia and Low Birth Weight Infants

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ABSTRACT
BACKGROUND AND OBJECTIVES: Aim of the study was to assess the early abnormal neurological findings in high risk low birth weight infants at 1 month, 3 months and 6 months of age- A Prospective Study. **METHODS:** 55 infants were assessed on basis of abnormal neurological findings in form of inconsolable crying, clenched fist, persistent asymmetric tonic neck reflex, head circumference, adductor angle, dorsiflexion angle of foot, popliteal angle and Scarf sign at 1 month, 3 months and 6 months of age from February to December 2016. **RESULTS:** Incidence of inconsolable crying in birth asphyxia and low birth weight infants was 7.2%, Persistent asymmetric tonic neck reflex was 45.4% and for clenched fist, it was 21.8% at 6 months of age. Incidence of abnormal adductor angle was 10.9%, abnormal popliteal angle was 23.6%, Dorsiflexion angle of foot was 5.4% and scarf sign was 30.9% in birth asphyxia with low birth weight infants. High risk low birth weight infants who had head circumference less than 3 SD were 27.2%. **CONCLUSION:** Transient tone abnormalities were found at 1 and 3 months of age which decreased at 6 months of age probably due to early intervention in form of physiotherapy in lower limbs. But in upper limbs, there had been increase in number of infants who had presence of ATNR and clenched fist from 1 and 3 months of age to 6 months of age. This was probably due to failure to provide active intervention. Although predictive power of isolated neurological signs is not great, certain abnormal findings were associated with greater frequency with abnormal outcome. Aim of stimulation was detection of transient abnormalities and minimization of persistent abnormalities and prevention of developmental delay.
Keywords: High risk low birth weight infants, early abnormal neurological findings, Study at 1, 3 and 6 months of age, early stimulation.

INTRODUCTION

There has been a tremendous advance both in the understanding and the availability of technology for effective and rational management of high-risk new born babies. It is important to remember that the aim and goal of new born care is not only to reduce neonatal mortality; but more importantly to ensure their intact survival.

High risk new born:

Any neonate regardless of birth weight, size, and gestational age, who has greater than average chance of morbidity and mortality, especially within first 28 days of life. The risk factors include pre-conceptional, prenatal, natal or postnatal conditions that interfere with normal birth process and impede adjustment to extra uterine growth and development.

Neurodevelopmental outcome (progress) in low birth weight new born are affected by factors like consanguinous marriage, mother's age, number of pregnancies ,twin gestation, maternal irradiation, infection during pregnancy etc...

The paediatricians should be able to identify neurological abnormalities and early markers of neuromotor disability by clinical examination.

Neurological examination and developmental assessment by the paediatrician can readily identify the following early clinical markers of cerebral palsy. In experienced hands they have a high degree of specificity as a screening tool. These findings may include-

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- Episodes of inconsolable crying, chewing movements and excessive sensitivity.
- Persistence of asymmetric tonic neck posture beyond 4 weeks.
- Clenched fist (cortical thumbs).
- Abnormalities in tone, e.g. Hypertonia in lower limbs and hypotonia in upper limbs.
- Persistence of primitive reflexes beyond 4-5 months.
- Slow head growth.

Several studies have addressed the issue of individual neonatal measures such as abnormalities in tone, persistence of primitive reflexes, measurements of head circumference. However several factors occur together in the same baby. So it is relevant to examine the long term outcome of high risk nursery graduates as a group. So, it is important to evaluate our own system and to find out lacunae so that we can improve our services, best to those who need it most.

MATERIALS AND METHODS

Patient discharged from EXTRAMURAL NICU and INTRAMURAL NICU of SSG HOSPITAL and Department of Paediatrics, Medical College, Baroda, fulfilling inclusion and exclusion criteria. Data collection for 3 months and patients were followed up to 6 months of corrected age (from February to December 2016).

Inclusion Criteria were babies with birth weight less 2500 gram irrespective of their gestational age, Birth asphyxia. **Exclusion Criteria** were Prematurity, Small for date, Large for date-Weight for gestation age is more than 97th centile, Mechanical ventilation for than 6 hours, Hypoxic ischemic encephalopathy grade 2 and 3 according to sarnat and sarnat classification,Symptomatic,hypoglycaemia , Symptomatic hypocalcaemia, Neonatal seizure, Meningitis, Shock requiring inotropic/ vasopressor support, Hyperbilirubinemiar equiring exchange transfusion, Major morbidities such as chronic lung diseases, intraventricular haemorrhage and periventricular leukomalacia, Twin with intrauterine death of co-twin and Abnormal neurological examination at discharge, Major congenital anomalies, Chromosomal anomalies, External trauma after birth, Unwilling parents or guardians.

- High-risk low birth weight babies were followed up longitudinally for a period of 6 month. A detailed subjective examination of the early neurological examination was done at one, three and six months of age (corrected age in case of preterm babies) in form of...

1. **Inconsolable Crying:** identified by excessive crying for more than 3 hours in a day for more than 3 days in a week.
2. **Head Circumference**: Measurement of child's head around its largest area. It measures the distance from above the eyebrows and ears and around the back of the head.
3. **Primitive Reflexes:**

1)Clenched fist

2)Asymmetric tonic neck reflex

Age (months)	Adductor angle	Popliteal angle	Dorsiflexion angle	Scarf sign
0-3	40°-80°	80°-100°	60°-70°	Elbow does not cross midline
4-6	70°-110°	90°-120°	60°-70°	Elbow crosses midline
7-9	110°-140°	110°-160°	60°-70°	Elbow goes beyond axillary line
10-12	140°-160°	150°-170°	60°-70°	

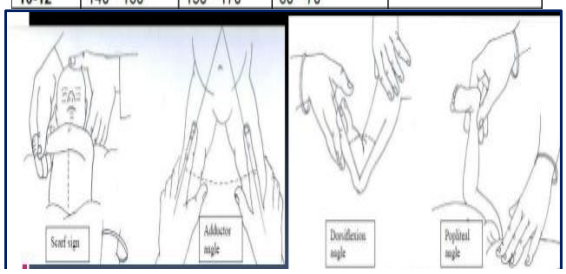


Figure Showimg Amiel-Tison Method With Demonstration Of Angle.

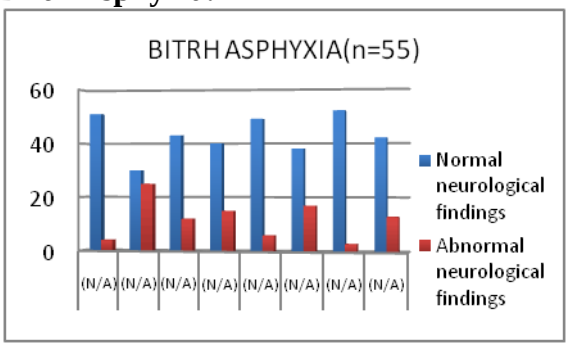
OBSERVATIONS

We had conducted prospective follow up study from February 2016 to December 2016 at High Risk Clinic. In our study, we found incidence of early abnormal neurological findings in high risk infants discharged from extramural and intramural NICUs. Incidence of inconsolable crying in birth asphyxia and low birth weight infants was 7.2%, Persistent asymmetric tonic neck reflex was 45.4% and clenched fist was 21.8% at 6 months of age. Incidence of abnormal adductor angle was 10.9%, abnormal popliteal angle was 23.6%, Dorsiflexion angle of foot was 5.4% and scarf sign was 30.9% in birth asphyxia with low birth weight infants. High risk low birth weight infants who had head circumference less than 3 SD were 27.2%.

Table 1: Table Showing Incidence of Abnormal Neurological Findings in Birth Asphyxia

Neurological findings at 6 months of age in Birth Asphyxia(n=55)			
Variables	**Normal**	**Abnormal**	**Percentage of Abnormality**
Inconsolable Crying(IC)	51	4	7.2
Asymmetric Tonic Neck Reflex(ATNR)	30	25	45.4
Clenched Fist(CF)	43	12	21.8
Head Circumference(HC)	40	15	27.2
Adductor Angle(A)	49	6	10.9
Scarf Sign(S)	38	17	30.9
Dorsiflexion Angle of Foot(D)	52	3	5.4
Popliteal Angle(P)	42	13	23.6

Figure 1: Table Showing Incidence Of Abnormal Neurological Findings In Birth Asphyxia.



3 month of age which decreased at 6 months of age probably due to early intervention in form of physiotherapy in lower limbs. But in upper limbs, there had been increase in number of infants who had presence of ATNR and Clenched fist from 1 and 3 month of age to 6 months of age. This was probably due to failure to provide active intervention. The neuromotor examination at discharge and at 1, 3 and 6 months of age has been used to predict CP at 1 year. Although predictive power of isolated neurological signs is not great, certain abnormal findings are associated with greater frequency with abnormal outcome. Early stimulation is important both for the growing brain and body. Aim of stimulation is detection of transient abnormalities and minimization of persistent abnormalities and prevention of developmental delay. Stimulation should be done only under strict supervision and has to be developmentally appropriate. The stimulation should be introduced gradually followed by a developmental assessment.

CONCLUSION

Transient tone abnormalities were found at 1 and 3 months of age which decreased at 6 months of age probably due to early intervention in form of physiotherapy in lower limbs. But in upper limbs, there had been increase in number of infants who had presence of ATNR and clenched fist from 1 and 3 months of age to 6 months of age. This was probably due to failure to provide active intervention. Although predictive power of isolated neurological signs is not great, certain abnormal findings were associated with greater frequency with abnormal outcome. Aim of stimulation was detection of transient abnormalities and minimization of persistent abnormalities and prevention of developmental delay.

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