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Original Research Article

A two-year retrospective study of infants with Erb-Duchenne's palsy at a tertiary centre in Rajasthan, India

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ABSTRACT

Background: Brachial plexus injury (BPI) has prevalence of between 0.5 and 4.4/1000 live births. It is commonly believed to be attributed to extensive lateral traction during difficult neck delivery. This paper aims to look at one aspect of birth injuries, Erb-Duchenne palsy, its incidence and contributing factors.

Methods: All infants sustaining Erb-Duchenne palsy during birth were identified at Department of OBGY, NIMS Hospital, Jaipur. The notes of the infants and mothers were reviewed. Special attention was given to the known risk factors for birth trauma such as ethnicity, parity, antenatal care, history of diabetes etc.

Results: During the two-year period 2013 to 2015, there were 6 infants diagnosed with Erb-Duchenne palsy, giving an incidence of 0.79 in 1000 live births. Out of six, four were primigravidae. All pregnancies were singleton, cephalic/vertex undergoing vaginal deliveries; none required forceps or ventouse deliveries. The mean infant birthweight was 4.378 kg with a median value of 4.48 kg (range 3.51-4.78). Four infants were classified as macrosomic i.e. birthweights greater than 4 kg, four infants had birthweights of 4 kg to 5 kg; none weighed over 5 kg. Three of the deliveries were documented as difficult shoulder delivery/shoulder dystocia. Five of the infants had APGAR scores that were less than seven.

Conclusions: This study suggested that Erb-Duchenne palsy is strongly associated with fetal macrosomia and shoulder dystocia. Diabetes was not significant in causing macrosomia as only single mother was found diabetic. Fetal macrosomia contributed to shoulder dystocia in the majority of cases.

Keywords: Brachial plexus birth injuries, Erb-Duchenne palsy, Shoulder dystocia

INTRODUCTION

Brachial plexus birth injuries are a regular feature of pediatric practice in the delivery room and the newborn nursery. Unlike many other birth injuries of the nervous system, they have a good prognosis, and the more severe injuries can be palliated by reconstructive microsurgery. Brachial plexus injury (BPI) has prevalence of between 0.5 and 4.4/1000 live births¹. It is commonly believed to be attributed to extensive lateral traction during difficult neck delivery.² Doctors, dating back to the 1700's, have

described brachial plexus palsy as a paralysis of the arm. Dr. Wilhelm Heinrich Erb, a German neurologist, located the most common injury resulting in brachial plexus palsy, in the nerves present at the fifth and sixth cervical vertebrae (C-5 and C-6).

In 90 percent of cases, there is damage to the C5-6 nerve roots causing Erb or Duchenne paralysis (Volpe, 1995). Injuries with breech delivery are normally of this type, whereas the more extensive lesions follow difficult cephalic deliveries (Ubachs, 1995). The C5-6 roots join

to form the upper trunk of the plexus, and injury leads to paralysis of the deltoid, infraspinatus, and flexor muscles of the forearm. The affected arm is held straight and internally rotated, the elbow is extended, and the wrist and fingers flexed. Finger function usually is retained. Because lateral head traction is frequently employed to effect delivery of the shoulders in normal vertex presentations, most cases of Erb paralysis follow deliveries that do not appear difficult. Damage to the C8-T1 roots supplying the lower plexus results in Klumpke paralysis, in which the hand is flaccid. Total involvement of all brachial plexus nerve roots results in flaccidity of the arm and hand, and with severe damage, there may also be Horner syndrome.³ This paper aims to look at one aspect of birth injuries, Erb-Duchenne palsy, its incidence and contributing factors.

The objectives of the present study were to study the association of Erb-Duchenne palsy with different risk factors like Diabetes, fetal Macrosomia, shoulder dystocia etc. and to improve perinatal outcome and to reduce perinatal mortality and morbidity.

METHODS

A retrospective study of 7542 infants delivered at Department of OBGY, NIMS hospital, Jaipur between 2013 and 2015 revealed 6 cases with upper Erb’s palsy (C5-C6 palsy).

All infants sustaining Erb-Duchenne palsy during birth were identified at Department of OBGY, NIMS hospital, Jaipur. The notes of the infants and mothers were reviewed. Special attention was given to the known risk factors for birth trauma such as ethnicity, parity, antenatal care, history of diabetes, history of macrosomia, presentation of the fetus, prolonged gestation, oxytocin use, duration of labour, presence of meconium, mode of delivery, birthweight of infants and APGAR scores. All 6 cases did not have any primary surgery and had a minimum follow-up of 2 years after the decision for surgery made at the of age 4 months.

The following data were collected: diabetes mellitus in the mother, the presentation of the baby, method of delivery, history of shoulder dystocia, and the presence of concurrent injuries (such as phrenic nerve palsy, asphyxia, skull injury, and clavicular/long bone fractures). The authors do not routinely do nerve conduction, electromyography (EMG), or magnetic resonance imaging (MRI) in infants with obstetric brachial plexus palsy; hence, such data were not available for collection.

At our center, motor assessment of the affected limb is documented at every visit for all infants with obstetric brachial plexus palsy, and the authors have criteria for what they consider as a “satisfactory function.” In upper Erb’s palsy, relevant functions are shoulder abduction and external rotation (the motor function of the C5 root)

and elbow flexion (the motor function of the C6 root). Table 1 shows the assessment methods as well as the definitions of satisfactory functions used in the current study. Ethical approval was gained from the ethical committee of NIMS University Jaipur.

Table 1: Motor assessment in children with upper Erb’s palsy.

Function	Scoring of measurement of function	Definition of a satisfactory functional outcome
	Measured as degrees of shoulder abduction	
Shoulder abduction	1 = the head reaches the abdomen or thorax, 2 = the hand reaches the mouth,	Abduction of 120° or more
Shoulder external rotation	3 = the hand reaches the ear, 4 = the hand reaches the occiput, and 5 = normal external rotation	A score of 3 or more
Elbow flexion	0 = no motion, 1 = active motion with gravity eliminated, 2 = active motion against gravity, 3 = active motion against resistance reaching ≤1/2 normal range, 4 = active motion against resistance reaching ≥1/2 normal range and 5 = normal	A score of 4 or 5

RESULTS

During the two-year period 2013 to 2015, there were 6 infants diagnosed with Erb-Duchenne palsy. The number of live births in this same period was 7542, giving an incidence of 0.79 in 1000 live births.

The mean maternal age was 31.3 years, with a median value of 32 years (range 18-43). The body mass index could not be calculated due to incomplete data recording in the medical notes.

All patients had antenatal care at NIMS hospital, Jaipur. Out of six, four were primigravidae. Only one had a history of diabetes mellitus in the current pregnancy and displayed signs of clinical diabetes mellitus. All pregnancies were singleton, cephalic/vertex undergoing vaginal deliveries; none required forceps or ventouse deliveries.

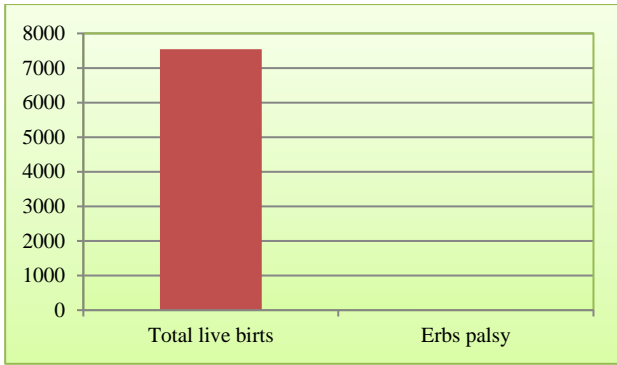


Figure 1: Incidence of Erb-Duchenne palsy.

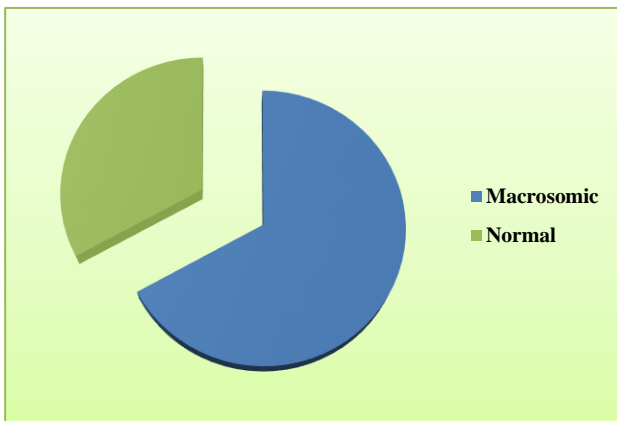


Figure 2: Incidence of Macrosomia in infants with Erb-Duchenne palsy.

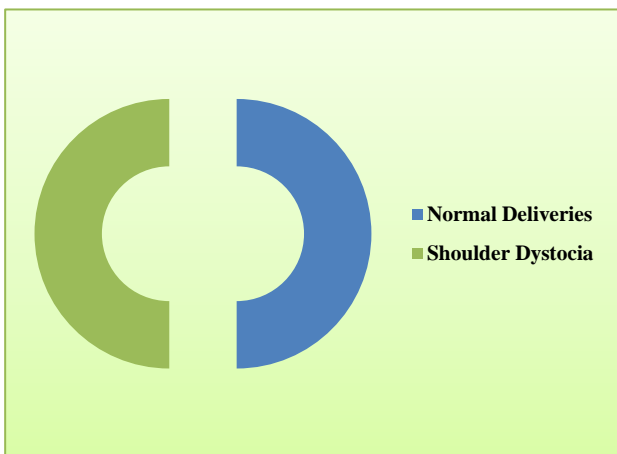


Figure 3: Incidence of Shoulder Dystocia in infants with Erb-Duchenne palsy

The mean infant birthweight was 4.378 kg with a median value of 4.48 kg (range 3.51-4.78). Four infants were classified as macrosomic, i.e. birthweights greater than 4 kg, four infants had birthweights of 4 kg to 5 kg; none weighed over 5 kg.

Three of the deliveries were documented as difficult shoulder delivery/shoulder dystocia. Five of the infants had APGAR scores that were less than seven.

DISCUSSION

Erb's Palsy (Brachial Plexus and Shoulder Dystocia) is a condition that results from damage to the brachial plexus nerves. These are a series of nerves that travel from the spinal cord into the arm. The birth injury generally occurs when the delivering party exerts excessive force on the baby's head and neck during a vaginal birth. In 90 percent of Brachial Plexus Palsy cases, traumatic stretching of the infant's plexus during birth causes the palsy. One out of every one thousand births results in a brachial plexus injury. One out of every ten represents an injury serious enough to require some form of treatment.

Many writers have expressed the hope that improved obstetric techniques, including the more frequent use of caesarian section, might lower this figure but recent data have not substantiated this hope.⁴⁻⁷ Maternal diabetes, large birth weight for other reasons, prolongation of the second stage of labor, the use of forceps, shoulder dystocia, primiparity, older maternal age, and, curiously, grand multiparity are all risk factors.^{8,9} The incidence of Erb-Duchenne palsy at this hospital is 0.80 per 1000 live births which is in keeping with previous studies.¹⁰ Sixty seven per cent of the infants who sustained Erb-Duchenne palsy were macrosomic, with shoulder dystocia occurring in 50% of the deliveries.

In a similar five-year study by Perlow *et al*, there were 17 infants with BPI among 19370 live births.¹¹ In case of macrosomic babies the anterior shoulder becomes impacted against the pubic bone, and a downward force applied to the head to dislodge the shoulder puts the brachial plexus on the stretch.¹² In a similar study Doumouchtsis and Arulkumaran cited a 4-40% incidence of BPI following shoulder dystocia with a significant proportion secondary to in utero injury.¹³

All these patients had spontaneous vaginal delivery which asks the question: is caesarean section protective against these injuries? firstly, BPI can occur during elective caesarean section. Secondly, even though the Royal College of Obstetricians and Gynaecologists recommends that elective caesarean section be considered in diabetic women with a fetal weight (EFW) >4.5 kg and in non-diabetic women with an EFW greater than 5 kg, 443 caesarean sections would need to be performed to prevent one permanent BPI in diabetic women with an EFW of 4.5 kg and 3695 caesarean sections in the non-diabetic population.^{13,14} Thirdly, caesarean section carries inherent anaesthetic and surgical risks to the mother.

Ultrasound can be utilized in predicting fetal weight prior to delivery. Weeks et al stated that ultrasonography and labour induction for patients at risk for fetal macrosomia should be discouraged.¹⁵ The authors think that there is a role for ultrasonography in suspected macrosomia even though estimation may sometimes be inaccurate, since this allows for counselling of the patients in the antenatal period as per mode of delivery. Estimation of fetal size

would also alert the clinicians of the possibility of shoulder dystocia occurring during Erb-Duchenne's Palsy during labour and allow for optimal management of dysfunctional labour.

CONCLUSION

This study suggested that Erb-Duchenne palsy is strongly associated with fetal macrosomia and shoulder dystocia. Diabetes was not significant in causing macrosomia as only single mother was found diabetic. Fetal macrosomia contributed to shoulder dystocia in the majority of cases

Recommendations

Use of Partograms should be made compulsory. Partogram will detect any deviation from the normal progress of labour and thus will help in making early diagnosis of shoulder dystocia, thereby decreasing the possibility of BPI.

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