

Incidence and associated risk factors of birth fractures in the newborns

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ABSTRACT

Objective: The term of birth fracture (BF) is used to describe the skeletal fracture that newborns suffer during delivery and birth process. The aim of this study was to determine the types and incidence of BF in two teaching hospitals.

Methodology: In a retrospective study all of the delivery files were reviewed in the birth and nursery rooms in two teaching general hospitals from Aug. 2006 to Sept. 2007. Parameters related to mothers and neonates including the type of delivery presentation, long bone fractures, birth weight, and the known diseases of mother were recorded

Results: During one year, 10722 deliveries occurred, 7823 of them were by vaginal and 2899 others by cesarean section. Twenty one deliveries were complicated by fractures (1.96%), 15 in clavicle and 6 in humerus. No statistically significant risk factors were noted with respect of known risk factors.

Conclusion: Clavicle was the most common site of birth fracture, and many of these injuries occurred without a known risk factors. We conclude that most birth fractures are unavoidable or unpredictable, but every effort must be made to detect the high risk mothers and neonates before delivery. In these cases the cesarean section may be preferred as a safe method for neonate delivery.

KEY WORDS: Birth fracture, Newborn, Clavicle fracture, Difficult Delivery.

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INTRODUCTION

Birth related fractures are avoidable or unavoidable injuries which occur during the process of labor and delivery. The prevalence of these fractures are related to many factors including maternal, fetal and skills of the obstetrician. It has been reported between 2 to 7 per 1000 live birth.^{1,2} Birth related trauma was suggested to be mostly due to difficult vaginal delivery especially with the shoulder in the vertex presentation and extended arms in a breech delivery, shoulder dystocia, and use of forceps instruments.^{3,4} However, such fractures may also occur when a baby is of average weight and the delivery is not complicated.

Despite advances made in the obstetrical care and management of delivery process, BF can occur and may be a source of medico legal problems for doctors, midwives or other medical staff. Although

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a variety of risk factors are known to produce BF, some of these injuries occur in the absence of any predisposing factors.^{5,6} BF is usually diagnosed by obstetrician or paediatricians after birth or in the nursery room and refers to orthopedist or traumatologist for further management. This study was conducted to determine the prevalence rate and associated risk factors of birth fractures among the live births at two referral general hospitals in Ahwaz city in Iran.

METHODOLOGY

This retrospective study was carried out during one year from Sep 2007 to Aug 2008, at two referral major hospitals in Ahwaz city in south west of Iran with city population of 1/200/000 people.

All the live newborns delivered in these teaching hospitals were examined after birth by a paediatrician, and in the case of suspected or obvious fracture, consultation with orthopedist for further treatment was sought. The diagnosis of BF was based on Pseudoparalysis, loss of continuity, tenderness, swelling, deformity and was confirmed by radiography of the affected extremity.

The newborns with brachial plexus injury or pathologic fractures such as seen in osteogenesis imperfecta were excluded. We reviewed the medical files of the mothers with respect of any existing disease such as diabetes mellitus, hypertension. Other parameters including delivery type (vaginal or caesarian section), presentation (vertex or Breech), dystocia, difficult birth and live birth weight were recorded. With respect of weight birth it was defined in three groups. A :> 4000 grams, B: 3000-4000gr and C :< 3000 gr. The study was approved by medical ethics committee at our university.

RESULTS

A total of 10722 live birth newborn took place in both the centers. There was 7822 newborn with vaginal and 2899 others by caesarian section. Twenty one newborns were diagnosed to have a BF and all were the results of vaginal delivery giving an incidence of 0.196% or 1.96 per 1000 live births. Clavicular fracture was seen in 15 and humerus fracture in 6 newborns. There were 15 affected males (71.4%) and

Table-I: Risk factors in Birth fracture.

Variable	N	%
Vaginal delivery	21	100
Vertex	13	61.9
Breech	8	38.1
Diabetic mother	3	14.29
Hypertensive "	2	9.06
Shoulder dystochia	1	4.8
Birth weight >4000 g	6	28.57

6 females (28.6%). Right sided limb was affected in 13, left in 8 and no bilateral limb fractures were recorded. The average birth weight of the newborns without fracture was 3735 (SD=485), and for newborns with BF was 3850 grams (SD=425) of the clavicular fractures. Three neonates were borne from diabetic and two others from hypertensive mothers. Shoulder dystocia was present in one neonate. None of the BF had forceps delivery. Table I, II, III shows more details of the results.

DISCUSSION

Based on our study, the overall prevalence rate of birth fracture and clavicle fracture was 1.96 and 1.4 per 1000 live births respectively that shows a similar or low frequency rate in comparison with most studies reported in the literature.^{7,8} Clavicle was the most common site of BF, followed by humerus. In spite of the fact that all of newborn deliveries in our hospitals were conducted by senior and junior residents, it seems that the level of resident training had no impact on incidence of these fractures. We found direction between the sex of newborns and births fracture ($P<0.05$), but with respect of body weight this difference was not significant. ($P>0.05$)

BF has been reported with a varying incidence. Clavicular fracture was the most common bone injury with an overall incidence of 3-42% among the skeletal birth fractures.⁹⁻¹¹ Niropam et al found the rate of birth injuries in 6/1000 live births.¹² In a study by Oppenheim the rate of clavicular fracture was noted in 2.7/1000 newborn.¹³ In another study by Hughes the most common birth injuries were skull trauma and clavicle fracture with a rate of 9.5/1000 live births.¹⁴ Fractures of femur and humerus are rare

Table-II: Rate of BF and fetus presentation.

Fracture	Frequency (N)	%	Prevalence	Breach	Vertex
Clavicle	15	71.43	0.140%	N= 5	N= 10
Humerus	6	28.57	0.056%	N= 3	N= 3
Total	21	100	1.96%	N= 8	N= 13

Table-III: Birth weight of neonates with fracture.

Fracture	3000-4000gr	>4000gr
Clavicle	N= 11 (73.33%)	N= 4 (26.67%)
Humerus	N= 4 (66.67%)	N= 2 (33.33%)
Total	N= 15 (71.43%)	N= 6 (28.57%)

occurrence during delivery. Morris et al reported the incidence of the femoral fracture in 0.13 per 1000 live birth.^{15,16}

The following predisposing factors may increase the risk of birth injuries or fractures: Macrosomia. In a study by Nasser et al the incidence of birth injury was reported 7.7% in newborns with a mean birth weight > 4500 gr.¹⁷

Obesity of mother with BMI > 40 and shoulder dystocia are known risk factors for birth injuries.¹⁸ In cases of breech presentation cesarean section will reduce the risk of BF. Forceps instruments and vacuum extraction also have been associated with a high risk of birth injuries.^{19,20} Prolonged or too short labor, maternal pelvic anomalies and skills of obstetrician may also contribute in occurrence of these injuries.^{21,22}

In our study 42.9% of the BF occurred without any predisposing factors making it all the more important to increase awareness among the parents that in most of the cases this injury cannot be predicted prior to delivery and also the fracture heals completely in all of the instances. We did not find any infant to have BF delivered by caesarian section. Despite this fact that many of the neonates with BF can be seen without a risk factor, the identification of the high risk mothers, the fetus, and also the appropriate labor management may be effective to reduce the rate of this injury. We did not find a direct relation between BF and breech presentation of delivery. Because most of fractures occurred during a vertex presentation, vaginal delivery may be a risk factor for BF in comparison with cesarean section. The risk ratio in vaginal delivery group was 0/27%.

CONCLUSION

In our teaching hospitals with a varying level of resident training the incidence of BF was the similar or lower than reported elsewhere. Clavicle was the most common BF, and many of these injuries occurred without any known risk factors. We conclude that most birth fractures are unavoidable or unpredictable, but every effort must be made to detect the high risk mothers and neonates before delivery. In these conditions the cesarean section may be selected as an alternative safe method for delivery.

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