Neonatal Clavicle Fracture: A Review of Fourteen Cases in East Coast Peninsular Malaysia

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ABSTRACT

Introduction: The purpose of this study is to identify the incidence of clavicle fractures in newborn associated with fetal, maternal and process of deliveries in Kuantan General Hospital from June 2012 until January 2014. This study is to determine epidemiological data of clavicle fractures, maternal and baby risk factors associated with clavicle fractures of newborn and its' outcome. **Methods:** This is a prospective study. 13 patients were identified to fulfill the inclusion criteria of the study. The data of sociodemographic, associated fetal and maternal risk factors and the outcomes were recorded using proforma. The statistical data analysis was done using SPSS 12.0. **Results:** Out of 20,257 live births at our centre during the study period, 13 infants were diagnosed to have clavicle fractures, giving an incidence of 0.64 per 1000 live births. There were 5 (38.5%) left, 7 (53.8%) right and one (7.7%) bilateral fracture. All fractures located at the mid shaft of the clavicle and none have associated brachial plexus injuries. All infants were delivered through vaginal delivery (61.5%); five through assisted delivery (instrumental); 2 (15.4%) forcep and 3 (23.1%) vacuum. Two of the babies developed shoulder dystocia. The average birth weight was 3371 grams (SD 0.269) and mean gestational age was 38.7 weeks (SD 1.16). Five of the mothers (38.5%) were primigravida and eight (61.5%) were multigravida in which,7 (53.8%)were healthy without other co-morbidty, 5 (38.5%) having gestational diabetis and one (7.7%) hypertension. The average maternal weight was 62.0 kg and height 1.58 metres with average BMI of 24.16 (3.29SD). All eventually had a complete recovery at 6 weeks with clinical and radiological evident of fracture union. **Conclusions:** In conclusion, all patients with clavicle fractures were found following vaginal delivery. There were no associations between neonatal clavicle fractures with maternal or baby risk factors. All fractures healed without any complications.

KEYWORDS: Brachial plexus, shoulder dystocia, clavicle fractures

INTRODUCTION

Birth related fractures are a known complication of labour with neonatal clavicle fracture being the most frequent, at a rate of 0.2 to 3.5% of all deliveries.[1,2,3] The discrepancy of the percentages may reflect a real difference between different programs, or it may reflect the difficulties of full ascertainment of the injury. Early reports implicated a range of fetal high birth weight, shoulder dystocia, procedural induction of labor, post-term pregnancy, prolonged labor and instrumental vaginal delivery as well as maternal variables such as older age, obesity, diabetes and short stature.[2,3,4] More recent studies have suggested that no one or a combination of risk factors can be firmly identified.[3,4] In general, it is unpredictable and unavoidable complication of normal birth.[3]

The presence of clavicle fracture is suspected by identifying known risk factors, pseudo-paralysis of the upper extremity, deformity or tenderness around the clavicle. The diagnosis is made by physical examination.[5] Although displaced clavicle fracture is relatively easily diagnosed clinically, non -displaced fractures may be apparent only if all neonates are subjected to x-ray studies or multiple physical examinations by trained examiners.[1] It has been reported that the diagnosis remain undetected

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at the time of discharge from hospital in up to 40% of cases.[6] It is fortunate that the fractures healed spontaneously without deformity.

Although the long-term sequelae of clavicle fractures are generally limited, the occurrence of this fracture may be particularly distressing to both parents and medical personnel.[1,2] Though perhaps inappropriate, many obstetrical services use fracture of the clavicle as an indicator for quality review of the patient's care.[1] Furthermore, both the legal and medical communities have tended to equate clavicle fracture with obstetrical mismanagement.[1]

From our review, there is no local data or similar study has been conducted in Malaysia. Even though we have a small sample size, taking into consideration the case are not uncommon but very important, we hope the local data will provide us a basic understanding and can help our obstetrician colleague managing the cases especially when dealing with an anxious parents.

METHODOLOGY

This is a prospective review of neonatal clavicular fracture for the duration of eighteen months from June 2012 until January 2014. The study was conducted at Hospital Tengku Ampuan Afzan, Kuantan, as the referral hospital for the state of Pahang; located at the east coast of Peninsular Malaysia. All live newborns are examined by experienced medical officers and in cases suspected or obvious fractures; consultation with orthopaedist for further treatment was sought. The diagnosis of clavicular fracture was based on pseudo-paralysis, swelling and tenderness and later confirmed by radiograph.

We recorded the data of mothers and antenatal problems such as existing diseases such as diabetes mellitus, hypertension, polyhydramnios and oligohydramnios. Mothers' body mass index (BMI), parity, and previous maximum baby weight were also recorded. The perinatal data collected were the delivering physicians, method of deliveries; either spontaneous or instrumental using forcep or vacuum, complications; including shoulder dystocia and brachial plexus injuries. For the infant, the data includes birth weight, gender and location of the fracture.

RESULT

A total of 20,257 live births newborn took place in our center. Thirteen newborns with 14 clavicle fractures were recorded, giving an incidence of 0.69 per 1000 live births. There were 8 affected males and 5 females; five on the left, seven on the right and one was bilateral. All fractures located at the midshaft of the clavicle and none of the newborns have associated brachial plexus injuries. Seven newborns were delivered through spontaneous vaginal delivery; six through instrumental delivery; 3 forceps and 3 vacuums assisted. None of them delivered through caesarean section. Two of the newborns developed shoulder dystocia. Four of the newborns were delivered by consultants, eight by medical officers and one by a trained midwife. The average birth weight of affected newborns was 3600 grams and mean gestational age was 38.7 weeks.

Five of the mothers were primigravida and eight were multigravida; 7 were healthy without any co-morbidity, 5 mothers were having gestational diabetes and one hypertension. The average maternal weight was 62.0 kg and height 1.58 metres with average BMI of 24.16. All affected newborns were diagnosed between day 1 and 5 of delivery through physical examination and confirmed with plain radiographs. They were regularly reviewed and eventually had a complete recovery at 8 weeks of life with clinical and radiological evidence of fracture union. None of them developed any complication or required surgery. The callus is completely remodeled at three months. Figure 1 and 2 below showing the radiograph of the patient with bilateral clavicle fracture at birth and after 6 weeks.

Figure 1: Plain radiograph showing a neonate with bilateral clavicle fracture at birth

Figure 2: Radiograph after six weeks shows abundant of callus in a bilateral clavicle fracture

DISCUSSION

Newborn with clavicle fracture rarely have symptoms and most have no long-term implication.[3] Nevertheless, this complication is important because of the concern it raises in parents and the occasional associated neurologic trauma.[3] Fortunately, the incidence of neonatal clavicular fractures is low at a rate of 0.2 to 3.5% of all deliveries.[1,2] In five years retrospective study by Lai et al,[7] they reported the incidence of neonatal fracture of 0.65%, whereas Nasab et al. in one year retrospective study recorded 15 cases out of 10722 live births.[8] The large discrepancy between these reported rates may be due to the fact that 40% of clavicular fractures are not identified until after discharge from the hospital.[5,6] We recorded 13 babies with 14 clavicular fractures (0.69 per 1000 live births) for period of eighteen months in our institution, 8 males and 5 females.

Fetal birth weight was reported to be an important factor in newborn clavicle fracture. Ozdener et al. showed that birth weight of over 3500g and to a greater extent over 4000g, were found to be an independent important factor associated with clavicle fracture.[9] Similar finding was reported by Lai et al who showed macrosomic babies with birth weight of 4000g to 4999g has significant risk factor to developed clavicle fractures.[7] We noticed in our series, the fetal birth weight was from 2900g to 4000g with the average was 3600g.

The use of instrumentation during delivery such forceps or vacuum extraction was reported to have a risk for clavicular fracture. A study by Ahn et al concluded that major risk factor of clavicle fracture was vacuum delivery, mother with advanced age and high birth weight.[10] Similar finding was proposed by Lam et al, in which they reported 151 of 9540 (1.6%) clavicle fractures occur in their series and it was associated with increased incidence of instrumental delivery and shoulder dystocia.[2] Oppenheim also demonstrated that forceps deliveries and shoulder dystocia have a higher risk to develop clavicle fracture and brachial plexus injury.[11] However, this finding was not concurred by other author. We recorded six cases clavicle fractures, which were associated with instrumental assisted delivery; three through vacuum extraction, and three through forceps deliveries.

Shoulder dystocia was reported to have a significant association with newborn clavicle fracture. Mehta et al. concluded that maternal obesity in their population was associated with an increased risk of neonatal injury after shoulder dystocia.[12] During 5-year period, they recorded 206 cases of shoulder dystocia out of 25995 deliveries.[12] Of these there were 19 cases of Erb's palsy and six cases of clavicular fracture.[7] On the other hand, Beal at al. in their study was unable to demonstrate an association between clavicular fracture and shoulder dystocia.[1,2] In our series, two cases of shoulder dystocia were recorded with the birth weight of 3400g and 4000 g each. None of them developed brachial plexus injury.

Fracture of the clavicle has been shown to be associated with maternal parity. However, the reports have been variable. In the series reported by Brown, nulliparous has a higher risk compared to multiparous in developing neonatal clavicle fractured.[13] Other studies found multiparity to be a significant risk factor. Hassib et al in their series have an equal number of cases in both multiparous and nulliparous.[14] In our series, we observed, eight-clavicle fracture occurred in muliparity and five in nulliparity.

Bilateral clavicle fracture is extremely rare as compared to unilateral. Kanik et al reported two cases of bilateral clavicle fracture in macrosomic babies who had shoulder dystocia and also developed brachial plexus injuries.[16] In our series, all infants developed fracture at the middle third of the clavicle. One of the infant had it bilaterally, however it was not associated with shoulder dystocia and brachial plexus injury. The infant was a baby boy with birth weight of 3600gm, delivered through spontaneous vaginal delivery by a consultant. The mother was a healthy multigravida without any co-morbidity The clavicle is easily fractured because of its subcutaneous, relatively anterior location and frequent exposure to transmitted forces.[17] The middle third or mid-shaft is the thinnest, least medullous area of the clavicle and thus the most easily fractured; the lack of muscular and ligamentous support makes it

vulnerable to injury.[17] Some newborns are asymptomatic; therefore, the diagnosis may be delayed or missed.[17] Fractures should be considered in any infant presenting with decreased upper extremity movement, crepitation, swelling, and/or bruising over the affected shoulder.[17] In our case series, the diagnosis made between day one and day five of deliveries. Infant who show sign suspected of fracture such as reduced movement of upper limb and absent Moro reflex were later confirmed with radiograph, where a clear fracture is readily apparent.[17]

The presentation of the babies during delivery may influence the site of clavicular fracture. The vertex is simply too large to pass through the maternal pelvis; consequently, excessive pressure is placed on the shoulder by the symphysis pubis because most infants deliver as left occipitoanterior, the majority of the burden is on the right shoulder, explaining the increased frequency of right clavicle fracture. Nasab suggested a vaginal delivery with a vertex presentation might be a risk factor for clavicle fracture compared to cesarean section.[8] In his series, the risk ratio in vaginal delivery group was 0/27%.[9] All thirteen patients in our series were delivered vaginally; eight fractures involved the right clavicle; five on the left and one had bilateral fracture.

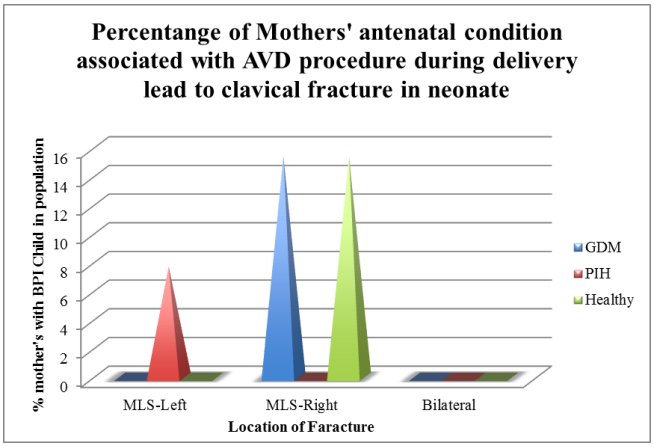
It has been shown that birth trauma decreases with experience.[12] Fewer and less experience medical staff works at night related to higher rate of birth trauma. As shoulder dystocia and brachial plexus injuries are unpredictable, the presence of older and experience consultant may influence the outcome of the babies.[12] In the case of clavicle fracture, Beall unable to identified any personnel of practices that were associated with and increased risk of neonatal clavicle fracture.[1,2] In our series, the delivering physician was consultant in 4 cases; medical officer in 8 cases and one was midwife.

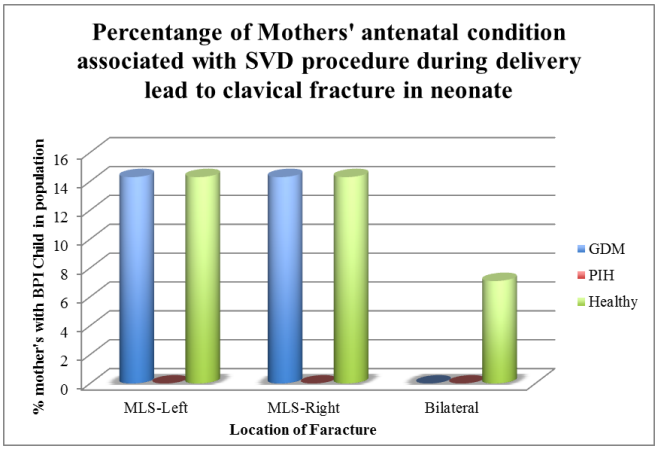
Although the long-term sequelae of clavicle fracture in newborn are generally limited, the delivery of newborn with a clavicular fracture or other birth-related injury is particularly distressing to parents, obstetricians and paediatricians.[5] In our series, seven of the babies were uncomplicated deliveries whereas the other six required instrumental delivery. All babies have full recovery clinically and radiologically at 8 weeks post delivery. There was no medico-legal implication as all cases were manage and followed-up properly under specialist orthopaedic clinic.

CONCLUSION

Neonatal clavicle fracture is not uncommon. All of them have a good prognosis recovered completely without any complications. However, it does raise concern among parents and providers that should be addressed properly to avoid any litigation. These concerns should be addressed and parents should be reassured about the self -limiting nature of the condition.[13]

Appendix





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