

Clavicle Fractures in Kosovar Neonates: Incidence and Associated Risk Factors

Kosova Yenidoğanlarında Klavikula Kırıkları: Sıklığı ve İlişkili Risk Faktörleri

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ABSTRACT Objective: Neonatal clavicle fracture is the most common form of birth trauma, considering the benign nature of this birth trauma. Fractured clavicle in the newborn has been the subject of many publications aiming to define what causes it and looking at the prognosis, with varied and sometimes conflicting findings. The aim of this study is to determine the incidence and the main risk factors involved in neonatal clavicle fracture, in Kosovar neonates, in a population with high parity. **Material and Methods:** A retrospective review of 42 272 live births from January 2005 to December 2008 was performed to determine the incidence and risk factors associated with fractures of the clavicle in the newborn. **Results:** One hundred fractures (100 patients) were identified, for an incidence of 2.4 clavicle fractures per 1000 live births. The incidence of fracture was in relation with the weight of the newborns, multiparity and induced delivery. There were significant differences in occurring of the clavicle fracture between newborns with >3500 gram / ≤ 3500 gram (P<0.001). The plexus brachial palsy as an associated injury was present in 46% newborns. **Conclusion:** The incidence of the clavicle fracture and of the risk factors is similar to incidence in developed countries. Babies with higher birth weight, born from multiparities and induced vaginal deliveries are at greater risk for this birth trauma.

Key Words: Incidence; risk factors; clavicle; infant, newborn

ÖZET Amaç: Yenidoğan klavikula kırıkları, doğum travmasının yaygın bir formu olup, doğum travmalarının en benign olanı olarak kabul edilebilir. Yenidoğanın klavikula kırığı birçok çalışmada ele alınmış olup, nedenleri ve prognozu incelenmiş, ayrıca karıştııcı değişken bulgulardan da söz edilmiştir. Bu çalışmada amaç, doğurganlığın yüksek olduğu Kosova popülasyonunda, yenidoğanlarda köprücük kemiği kırıklarının sıklığını ve ilgili ana risk faktörlerini belirlemektir. Retrospektif bu çalışmada Ocak 2005 ile Aralık 2008 tarihleri arasında 42 272 canlı doğum araştırma kapsamına alınmış olup, yenidoğanlarda klavikula kırıklarının sıklığı ile nedenleri üzerinde durulmuştur. **Bulgular:** 100 olguda 100 kırık vakası saptanmıştır, bu da her 1000 canlı doğumda 2,4'lük klavikula kırığı insidansı olduğunu göstermektedir. Kırık insidansı yenidoğanın ağırlığı, multiparite ve doğum indüksiyonundan etkilenmektedir. 3500'den küçükler ile ≤3500 olan yenidoğanlar arasında önemli istatistiksel farklılıklar vardır (P<0.0001). Yenidoğanların %46'sında plexus brahial felç, bağlantılı hasar olarak tespit edilmiştir. Sonuç: Klavikula kırığının sıklığı ve risk faktörleri gelişmiş ülkelerdekilerle benzer bulunmuştur. Doğum ağırlığı fazla olan, multiparilerden ve indüklenmiş vajinal yoldan doğan yenidoğanlarda doğum travması riski daha fazladır.

Anahtar Kelimeler: İnsidans (sıklık); risk faktörleri; klavikula; bebek, yenidoğan

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Neonatal clavicle fracture is the most common form of birth trauma and most of newborns with fractures have no symptoms and minimal physical findings during the first days of life, making repeated examination necessary.¹ Although it sounds serious, fracture of clavicle usu-

ally heals very quickly, often with no need of treatment. Nevertheless, this complication is important because of the concern it raises in parents and the occasionally associated neurologic trauma.² Birth fracture of the clavicle occurs in approximately 0.4% to 10% of vaginal births.³ Earlier works have associated neonatal clavicle fracture with a range of procedural, fetal and maternal risk factors.⁴⁻¹⁴ Fractured clavicle in the newborn have been the subject of many publications aiming to define their causes and looking at their prognosis, with varied and sometimes conflicting findings.⁵ We undertook this study in a primary care setting of a developing country, in a population with high parity, aiming to determine the incidence of this injury and of possible risk factors in our obstetrical population.

MATERIAL AND METHODS

DESIGN AND STUDY POPULATION

We reviewed the medical records of all live-born singleton infants with clavicle fracture in singleton-term deliveries from January 2005 to December 2008, in our hospital; the Neonatology Department, at the Gynecologic and Obstetric Clinic in Prishtina. All neonates were examined by pediatricians soon after birth and prior to discharge home any time after the first 24 hours. Loss of continuity or tender swelling over the clavicle, crepitations and local tenderness reflected by the baby's cry were signs that indicated clavicle fracture. X-rays also were carried out to rule out a fracture of the clavicle in all infants, which were suspected for brachial plexus palsy.

Using a retrospective observational approach, we examined medical records and evaluated data of maternal, pregnancy, neonatal and delivery-related in 100 cases of fractured clavicle of the newborn.

VARIABLES

Variables extracted from medical records were:

1. Maternal and pregnancy: age, numbers of pregnancy, illness and complications during pregnancy (gestational diabetes, major infections and Pregnancy Induced Hypertension-PIH syndrome), meconium-stained liquor.

2. Neonatal: sex, side of injury, vertex or breech presentation, birth weight, umbilical cord around the baby's neck, Apgar-score and associated injuries.

3. Mode of delivery: delivery modes (stimulated and spontaneous), delivery types (vacuum extraction, cesarean section, delivery by Smeli-Weit and Bracht), duration of delivery (prolonged labor-longer than 12 hour).

STATISTICAL ANALYSIS

Statistical analysis was done with the statistical package InStat 3. Of statistical parameters is calculated structures index, the arithmetic mean and standard deviation. The chi-squared test was used to compare proportions by sex, affected side and birth weight. The difference was significant if $P < 0.05$.

RESULTS

From the 42 272 live births at our medical center during the period of the study, 100 infants were diagnosed to have clavicle fracture, giving an incidence of 2.4 per 1000 live births. Out of these, there were 68 (68.0%) with right side injury $p < 0.01$, and 59.0% affected males (Table 1).

Three of the analyzed variables of the three groups: multiparity (51.0%), high birth weight (26%) and stimulated delivery were as most presented variables as in close relation to the occurrence of neonatal clavicle fracture. Nevertheless, out of the 14 vacuum extraction deliveries, 9 of the newborns had clavicle fracture (Table 2).

TABLE 1: Proportion of infants with clavicle fracture by sex and side of injury.

Injury side	N (%)	X ² -test p-value
Right	68 (68.0)	X ² =12.96
Left	32 (32.0)	p<0.01
Neonatal sex		
Male	59 (59.0)	X ² =3.24
Female	41 (41.0)	p>0.05

The most frequent associated injury in these newborns was the plexus brachial palsy (46%) (Table 2).

The average birth weight was 3731.5 ± 476.5 and there was significant difference in occurring of the clavicle fracture between newborns with >3500 / ≤ 3500 ($P < 0.001$) (Table 3).

TABLE 2: Maternal neonatal and peripartum characteristics of the clavicle fracture.

	Variables	N (%)
Maternal and pregnancy	Mother age > 35 year	5 (5.0)
	Primipara vetusta	5 (5.0)
	Multiparity	51 (51.0)
	Illness during pregnancy	25 (25.0)
	Meconium-stained liquor	25 (25.0)
Neonatal	Birth weight >4000 g	26 (26.0)
	Breech presentation	4 (4.0)
	Umbilical cord around neck	23 (23.0)
	Apgar score 5 min < 7	33 (33.0)
Mode of delivery	Prolonged delivery	11 (11.0)
	Spontaneous delivery	44 (44.0)
	Inducted delivery	53 (53.0)
	Vacuum extraction	9 (9.0)
	Cesarean deliveries	1 (1.0)
	Smeli-Weit	2 (2.0)
Associated injuries	Bracht	2 (2.0)
	Paralysis plexus brachial	46 (46.0)*
	Caput succedaneum	14 (14.0)
	Cephalhaematoma	3 (3.0)
	Haematoma faciei	4 (4.0)

* newborns evaluated with x-rays

TABLE 3: Clavicle fracture in newborn according to birth weight.

Birth-weight in grams	N (%)
2501-3000	8 (8.0)
3001-3500	25 (25.0)
3501-4000	41 (41.0)
4001-4500	19 (19.0)
4501-5000	7 (7.0)
Mean \pm SD	3731.5 ± 476.5
Range	2550 - 4800
X ² -test	
>3500 / ≤ 3500	X ² =10.9, P<0.001

DISCUSSION

Newborn infants with clavicle fracture rarely have symptoms¹ and in most cases no long-term problems are detected/present.⁶

The incidence of fractured clavicle in our study was 2.4 per 1000 live births, compared to 2-18.7/1000 in other reports.^{1,2,7} The frequency we observed is close to the incidence reported in developed countries, since the incidence of cases has remained the same despite technological advancement. This incidence could be due to the expert obstetrician team, which manages deliveries in our hospital center.

In our study, we presented the proportion of the risk factors with newborn clavicle fracture, as a possible risk factor based in other studies.⁴⁻¹⁴ Some authors support that these historic risk factors have only 10% positive predictive value for brachial plexus injuries and associated injuries-clavicle fracture.¹⁴⁻¹⁸

Males were slightly more affected than females^{5,10} and the right clavicle was significantly more frequently fractured than the left one as in the study of authors.⁵

The most present risk factor in the group of maternal and pregnancy risk factor was multiparity, possibly since the data are from a country with a population with high parity. Multiparity was in significant correlation with clavicle fracture¹¹ nevertheless the studies^{7,12} show that there was no important correlation.

During our work, we encountered difficulties in terms of insufficient data of medical records of newborns and their mothers (as maternal body weight, pelvic anatomical dimensions of the mother).

According to the authors,^{5,19} diabetes or obesity of the mother (conditions which are associated with high birth weight of newborns) were relevant factors for brachial plexus palsy, but not for clavicle fracture. While in the studies of the authors^{4,20} association between gestational diabetes and clavicle fracture were not detected despite the relatively high proportion of diabetic mothers. Our

study shows that, among the mothers, there were only two cases with diabetes (the ones we presented along with other diseases of the mother during pregnancy), we could not describe any accordance of this factor with clavicle fracture. Mother's body weight as possible risk factor, was not possible to present due to incomplete data.

Fractures of the clavicle were associated with heavy neonates and we found it to be a significant risk factor. High birth weight has been shown as a significant risk factor in other studies.^{4,7-12}

The incidence of depressed five-minute Apgar score was relatively in high correlation with clavicle fracture but as we did not test its significance, we could not conclude the importance. The authors in other studies^{5,11} did not find a significant relation between depressed Apgar-score and clavicle fracture.

Meconium stained liquor did not show important significance as a risk factor for fracture clavicle in newborns either. For the first time, we presented an incidence of cordon umbilical presence around the baby's neck which had relatively high incidence.

In our study clavicle fracture was more frequently found among the infants born by induced delivery and it was also found in high proportion at spontaneous deliveries 58.4% (babies born in a normal and natural way). A similar trend was noted in other studies.^{5,7,11} The incidence of fracture had relation to breech delivery (Smeli-Weit, Bracht modes of delivery) and to vacuum extraction, as in the studies.^{10,13} The use of forceps, prolonged second stage of labor and multiparity status were not significantly associated with neonatal clavicle fracture.¹² In the study of the authors⁴ neonatal clavicle fracture was presented as significantly and directly related to the duration of the second stage of labor. Prolonged second stage of labor (longer than 60 minutes) has been identified as a risk factor. We could not assure the data of this stage, therefore as prolonged delivery we considered all births lasting more than 12 hours, based on the study of the authors.²¹

Even clavicle fracture is a transient event that normally leaves no sequel, it may become a more serious injury if it is accompanied with other injuries like brachial plexus palsy.

In our study the incidence of brachial plexus palsy as an associated injury was higher according to other studies.^{5,8,10,11,13}

Whereas in the study of the authors Hudic I et al.,²² in total of thirty-nine newborns, 45.2% were diagnosed with a fracture of the clavicle, which was the most frequently combined damage with brachial plexus injury.

Some consideration should be given to the limitations of the study. While we were able to capture data from the Neonatology Department, at the Gynecologic and Obstetric Clinic in Prishtina, the design was retrospective but we wanted to present the incidence of clavicle fracture respectively the incidence of risk factors of clavicle fracture in the newborns of the developing country of Kosovo, in a population with high parity.

Our goal was also to gain an understanding of variables that contribute to the failure or success in delivery. We would have to test the significance of all potential risk factors for clavicle fracture, to measure the overall effects of each variable.

CONCLUSION

The incidence of clavicle fracture and of risk factors is similar to incidence in developed countries. Babies with higher birth weight, born from multiparities and induced vaginal deliveries are at greater risk for this birth trauma.

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