

Clavicular fracture: its prevalence and predisposing factors in term uncomplicated pregnancy

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Abstract. – BACKGROUND AND OBJECTIVES: Our aim was to evaluate fetal and maternal predisposing factors associated with clavicular fracture.

PATIENTS AND METHODS: In this study we reviewed all term uncomplicated deliveries in our Hospital between January 2009 and April 2010. The diagnosis of clavicular fracture was established by physical examination and in clinically diagnosed patients confirmed by radiology. We compared deliveries with clavicular fracture (study group) with a sample of 150 patients (control group) matched for time at active phase of labor from all vaginal deliveries. The data included maternal age, gestational age, fetal weight, and infant sex, presence of gestational diabetes, labor duration and induction and shoulder dystocia.

RESULTS: In the Unit 16819 deliveries occurred during the period. The study included 9700 uncomplicated pregnancies at $>$ or $=$ 37 weeks of gestation delivered vaginally. We identified 73 cases of clavicular fracture with an prevalence of (73/9700) 0.75%. The study group had a significantly higher prevalence of shoulder dystocia (6.8% vs. 0.6%). Logistic regression analysis revealed maternal age and fetal weight as significant risk factors influencing clavicular fractures.

CONCLUSIONS: Main risk factors for clavicular fracture identified from our study seem as maternal age and birth weight.

Key Words:

Clavicle fracture in the newborn, Bone injuries, Vaginal birth, Maternal age, Birth weight, Shoulder dystocia.

Clinical importance of clavicular fractures remains uncertain. Our aim was to evaluate fetal and maternal predisposing factors associated with clavicular fracture.

Patients and Methods

In this work we reviewed all term uncomplicated deliveries in our Hospital between January 2009 and April 2010. The study was carried out at the main maternity Hospital in Ankara. Our Hospital as a tertiary center in Turkey has approximately 17000 deliveries per year of which include 5000 high risk pregnancies. Due to our Hospital's feature of being a reference Hospital high risk pregnancy and cesarean section rates are high. Neonatology Unit also works as an education center. Normal spontaneous deliveries are generally conducted by junior assistant in Obstetrics Department under supervision of obstetricians. The obstetric team goes on duty every 8 hours (08-16, 16-08, 24-08). All newborns are examined by pediatric staff in the delivery room and reexamined 2 or 3 times before discharge from Hospital. In the postnatal period the infants can be followed up at the Outpatient Unit for monitorization of jaundice and feeding problems. The diagnosis of clavicular fracture was established by physical examination and in clinically diagnosed patients the diagnosis was confirmed by radiology.

In the Unit 16819 deliveries occurred during the period. We included only singleton pregnancies with a fetus presenting cephalic, resulting in a live birth. Patients with high risk pregnancies like hypertension, complicated diabetes mellitus were excluded. The study included 9700 uncomplicated pregnancies at $>$ or $=$ 37 weeks of gestation delivered vaginally. Seventy three patients with clavicular fracture were identified. We compared deliveries with clavicular fracture with a

Introduction

Clavicular fracture in the newborn is common among bone injuries complicating vaginal birth. The prevalence of neonatal clavicular fracture in the published reports varies from 0.2%-4.5%¹⁻⁴. In most cases, clavicle fractures occur spontaneously during vaginal delivery and rarely in infants delivered by cesarean section. In addition clavicular fracture is sometimes associated with shoulder dystocia.

sample of 150 patients matched for time at active phase of labor from all vaginal deliveries in this time period. The maternal and neonatal records of the cases were reviewed from labor charts. Data of control group were collected and analyzed from Sarus Hospital data base computer program.

The data included maternal age, gestational age, and fetal weight, and infant sex, presence of gestational diabetes, labor duration and induction and prevalence of shoulder dystocia. The diagnosis of shoulder dystocia was made if, after delivery of the fetal head, additional maneuvers other than gentle downward traction and episiotomy were required.

Statistical Analysis

Statistical analyses were performed by with SPSS software (version 13.0; SPSS Inc, Chicago, IL, USA). Statistics included Student's *t* test for parametric and chi-square tests for categorical variables. Multivariate logistic regression analysis with backward elimination was performed on variables proven to be statistically significant for discriminating between study and control groups. *p* values < 0.001 were considered significant.

Results

During the study period there were 9700 deliveries and 74 live born infants with confirmed clavicular fracture. Only one of them was delivered by cesarean section and excluded from the analysis. This case was a 30 year-old, pregnant woman undergoing cesarean section for repeated cesarean with breech presentation with estimated fetal weight of 4000 g. Therefore, we identified 73 cases of clavicular fracture with a prevalence of (73/9700) 0.75%.

There were no differences in mean gestational age and fetal height between the study group and

controls (Table I). Among the 73 patients with clavicular fracture, eight had a birth weight > 4000 g and oxytocics were documented in 23 of the 73 patients. Prevalence of gestational diabetes mellitus and weight gain during pregnancy in patients with clavicular fracture was significantly higher than the control group. Patients with clavicular fracture had shorter labor duration than the control group (Table II). The two groups had similar percentage of neonatal jaundice and meconium. However, the study group had a significantly higher prevalence of shoulder dystocia (6.8% vs. 0.6%).

Distribution of fetal weight is seen in Figure 1. Birth weight in the study group varied from 2520 to 4230 g, with a mean value of 3545 g. Birth weight in the control group varied from 2300 to 5040 g, with a mean value 3277 g. When we looked at the distribution of birth weight in the two groups, 61.7% of clavicular fractures were seen over 3500 g.

Logistic regression analysis revealed maternal age and fetal weight as significant risk factors influencing clavicular fractures (Table III).

Discussion

Clavicular fracture is a mild birth trauma usually without late sequel. Newborn infants with clavicular fracture rarely have symptoms, generally heal well and most have no long-term morbidity. However, this complication is important because of the concern it raises in parents (anxiety) and the occasional associated neurological trauma.

In our study the neonatal clavicular fracture rate was 0.75%. The frequency of clavicular fracture (7.5 per 1,000 infants) in our Hospital is slightly higher than the figures reported by Parkland Memorial Hospital⁵. Our prevalence is, however, lower than that reported from Israel⁶. The variability in this percentage was comment-

Table I. Demographic characteristics of clavicle fractures versus all deliveries.

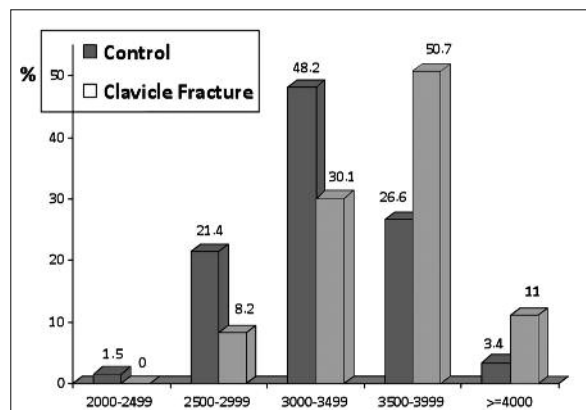
	Intact clavicle (n = 9626)	Clavicle fractures (n = 73)	<i>p</i>
Maternal age (years)	26.68 ± 5.36	29.62 ± 5.76	0.0003
Gestational age (weeks)	39.01 ± 1.17	38.93 ± 1.48	0.557
Multiparity (n, %)	64.5	61.6	0.613
Fetal weight (> 4000 g)	3.4%	11%	0.001
Fetal height (cm)	50.1 ± 1.65	49.9 ± 1.32	0.413
Female/male	4856/4770	40/33	0.462

Table II. Clinical characteristics of clavicle fractures vs. 150 control patients.

	Control group (n = 150)	Clavicle fractures (n = 73)	p
Gestational diabetes (n, %)	12 (8)	15 (20)	< 0.01
Labor augmentation (n, %)	66 (44)	23 (31)	NS
Pre-pregnancy body mass index (kg/m ²)	25.18 ± 4.66	25.10 ± 5.10	0.910
Shoulder dystocia (n, %)	1 (0.6)	5 (6.8)	0.003
Weight gained during pregnancy (kg)	12.46 ± 4.38	14.44 ± 5.36	0.007
Labor duration			
First stage in active phase (hour)	3.96 ± 1.49	3.14 ± 1.35	0.0001
Second stage (min)	26.17 ± 10.82	23.96 ± 11.43	0.161

ed to result from the way in which neonates were screened for clavicular fracture, whether the study was prospective or retrospective or was as a result of improved care in the last few decades⁶. Some of the clavicular fractures are related to the particular technique used for the delivery of the shoulders⁷. Similar to Beall et al⁴ we feel that on our service, the perception of an increase in the prevalence of clavicle fracture may be due to more complete ascertainment of the injury by the pediatric service.

Birth weight of over 3500 g, and to a greater extent over 4000 g, was found to be an independent factor associated with clavicular fracture⁶.

**Figure 1.** Distribution of birth weight between two groups.

Our data seem to confirm these findings. In our report, macrosomia was an important risk factor for clavicular fracture. Birth weight in the study group varied from 2520 to 4230 g, with a mean value of 3545g. Birth weight in the control group varied from 2300 to 5040 g, with a mean value 3277 g.

In our work, logistic regression analysis revealed maternal age and fetal weight as significant risk factors influencing clavicular fractures. Beall et al⁴ also found that clavicle fracture was significantly associated with increased maternal age and birth weight greater than 4 kg. Lam et al⁸ revealed the independent risk factors as shoulder dystocia and vacuum extraction. In a study by Gudmundsson et al⁹, a highly significant relationship was found between newborn birthweight and maternal height and the frequency of complications (Table IV). Although fractures occurred more often in heavier babies, and were associated with a greater incidence of abnormal progress of labor, and lower Apgar score-the majority of fractures occurred in cases not identified by any of the high risk parameters¹⁰. Lam et al¹¹ advocates that neonatal clavicular fracture is of little clinical significance and it does not reflect quality of delivery process. It is not possible to predict most cases of fracture before birth, since the majority of fractures occur in cases not identified by any of the studied parameters.

Table III. Factors influencing clavicular fractures*.

	Odds ratio	95% CI	p
Maternal age	1.094	(1.053-1.138)	0.0001
Fetal weight > 4000 g	3.55	(1.689-7.41)	< 0.001

*Binary and multivariate logistic regression results.

Table IV. Comparison of risk factors for clavicle fracture.

	Our study	Roberts, 1995⁵	Lam, 2002⁸	Gudmundsson, 2005⁹
Incidence (%)	0.75	0.4	1.6	1.4
Risk factors	Maternal age Birth weight	Birth weight Shoulder dystocia Gestational age	Shoulder dystocia Operative delivery	Short maternal height Birth weight

Conclusions

Main risk factors for clavicular fracture identified from our study seem due to maternal age and birth weight.

Conflict of Interest

None declared.

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