Fetal Laceration Injury at Caesarean Delivery

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Abstract

Objective: The purpose of this study was to investigate the incidence, type, location, and risk factors of accidental fetal lacerations during caesarean delivery.

Material and Methods: Total deliveries, caesarean deliveries, and neonatal records for documented accidental fetal lacerations were reviewed retrospectively in four university hospital. The gestational age, the presenting part of the fetus, the type of incision, and maternal age and parity were recorded. Caesarean deliveries were divided into elective and emergency procedures. Fetal lacerations were grouped according to the location and the need for surgical intervention.

Results: Of 19217 deliveries, 8840 women were delivered by caesarean birth (46%). Neonatal records documented 87 accidental fetal lacerations. Of these accidental lacerations, 16 needed surgical repair and 62 recovered by dressing. Head and neck was the most common site of laceration (64.1%). The overall rate of accidental fetal laceration per caesarean delivery was 0.88%. The rate of emergency caesarean was 45 (56.69%) and for elective procedures was 33 (42.4%). The risk for fetal accidental laceration was higher in foetuses who underwent emergency caesarean birth (P<0.001).

Conclusion: Fetal accidental laceration may occur during caesarean delivery and its incidence is significantly higher during emergency caesarean delivery. The patient should be counselled about the occurrence of fetal laceration during caesarean delivery to avoid litigation.

Keywords: Fetal laceration, Caesarean Section, Birth trauma

Introduction

The rate of caesarean delivery has increased in the last 35 years. Many text books describing the technique of caesarean delivery address the issue of potential laceration injury of the fetus and describe measures to avoid these complications, but the incidence is rarely reported (1).

Cesarean delivery is performed for several indications, both maternal and fetal, to decrease maternal and fetal morbidity and mortality rates. Complications that are related to caesarean delivery are increased risk of infections, transfusion, and prolonged hospitalization (2).

The incidence and type of fetal injury identified at caesarean delivery is not well characterized. The most
commonly identified injury at caesarean delivery is fetal laceration, and its incidence has been reported to be as high as 3% (3). Information on other types of injuries seen at caesarean delivery is limited to case reports or small case series and the overall rate of fetal injury at caesarean delivery is unknown (4). One might hypothesize that the risk of fetal injury at caesarean delivery is low, especially considering that caesarean delivery is purported to limit birth trauma in certain scenarios (eg, breech presentation) (5). This supposition is supported by the observation that major birth trauma has decreased over the last several decades in response to rising caesarean rates (3). Authors reported a decrease in fetal injury associated with rising caesarean rates but present data that suggest improved surgical technique, not caesarean delivery itself, explains the decrease in birth trauma over time (6). Others have observed that certain injuries such as clavicular fracture appear to be unrelated to the mode of delivery and can be seen with caesarean as well as vaginal delivery, making the point that fetal injuries commonly attributed to vaginal delivery can be seen with caesarean delivery as well (2).

The frequency of fetal laceration during C/S appears to be related to several factors such as the surgeon’s experience; the most common situation is a well–thinned–out lower uterine segment in a patient with ruptured membranes, in this case the uterus at the incision may be only 2 to 3 mm thick. Slow transverse uterine incision, active labor, emergent/urgent C–section and non–vertex presentation are other predisposing factors (7).

Usually these lacerations are of cosmetic importance for the newborn infant, yet a small number of papers have reported fetal injury during caesarean delivery that cause newborn infant handicap or death (8).

While most of lacerations reported to date have been superficial, some have required suturing and or plastic surgery intervention. Consistent with the clinical literature approximately 70% of the laceration occurred on the face, head, and ear. Approximately 20% of the lacerations occurred below the waist (buttocks, leg, ankle), while 10% were on the back. Emergency sections were documented in 20% of the reports (7).

The aim of the study was that to investigate the incidence of laceration, the type of accidental fetal lacerations during caesarean delivery that were performed in four University Hospital, and the risk factors that may contribute in determining the lacerations.

### Materials and Methods

All deliveries and the caesarean delivery rate in four University Hospital were reviewed retrospectively from January 2005 to February 2007. In the group that had caesarean delivery, the following data were assessed: gestational age, presenting part of the fetus at the moment of caesarean delivery, the type of uterine incision, mother’s parity, neonatal gender, maternal age, location of injury, Apgar score, and need for surgical repair of laceration. All caesarean deliveries were performed by resident physicians under staff’s supervision. Caesarean deliveries were divided into 2 groups: elective, and emergency. Elective caesarean deliveries were defined as caesarean deliveries that were performed in a scheduled time and day. The emergency caesarean delivery was defined as a procedure to be done within 20 minutes because of fetal distress or due to dystocia or presence of contraction in scared uterus. Neonatal records were reviewed in their entirely for documentation of laceration injuries, admission and discharge notes by pediatricians, nurses notes by neonatal nursing staff, and discharge summaries. Neonatal data were available from the Neonatal Department of four University Hospital, and neonatal gestational age and Apgar score at 5 minutes were assessed in all the newborn infants who were delivered by caesarean. Neonatal data were reviewed for the presence of accidental fetal lacerations; on its occurrence, the type and location of laceration were

### Table 1: Fetal laceration in caesarean sections according to university hospitals (2005–2007)

<table>
<thead>
<tr>
<th>University hospitals</th>
<th>Caesarean section (n)</th>
<th>Fetal lacerational n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vali–e–asr</td>
<td>2242</td>
<td>19 (1.03)</td>
</tr>
<tr>
<td>Arash</td>
<td>1999</td>
<td>17 (0.85)</td>
</tr>
<tr>
<td>Mirza Koochak Khan</td>
<td>2472</td>
<td>21 (0.84)</td>
</tr>
<tr>
<td>Shariati</td>
<td>2127</td>
<td>21 (0.98)</td>
</tr>
</tbody>
</table>

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recorded. Fetal lacerations were divided according to the location of injury and need for surgical intervention.

Statistical analysis was performed with SPSS 13 and a probability value of p<0.05 was considered statistically significant. Continuous variables were compared by using the Wilcoxon rank–sum test. Categorical variables were compared with the use of the x² or Fischer exact, where appropriate.

**Results**

From January 2005 to February 2007, a total of 19217 deliveries occurred in four University Hospital. Of these, 10377 births (54%) were vaginal delivery, and 8840 births were by caesarean delivery (46%). Neonatal records of the 8840 caesarean deliveries were available from the Neonatal Unit of four Universities Hospital and a total of 78 accidental fetal lacerations that occurred during caesarean delivery were recorded. The mean gestational age at the time of caesarean delivery was 38.67 weeks of gestation (range, 29–42 weeks of gestation). The type of uterine incision that was performed was a transverse low uterine incision in 8613 caesarean deliveries and a T–inverted incision in 227 cases. In the group with fetal accidental lacerations 78 cases were occurred, a low transverse uterine incision has been performed in 75 women but in 3 cases the latter was extended in an inverted T incision. 52 (66.7%) women were multipar and 26 (33.3%) cases were nullipara. Maternal age in 55 cases were <30 years old and 23 cases >30 Y/O.

Neonatal gestational age at delivery was <37 weeks in 30 (38.5%) cases of neonates with laceration and >37 weeks in 48 (61.5%) cases, and neonatal Apgar score at 5 minutes was 0–3 in 5 (6.4%) cases and 4–7 in 12 (15.4%) and 7–10 in 61 (78.2%) cases. Table 1 gives the rate of caesarean delivery per year in four hospitals, and the number of fetal lacerations. The percentage of fetal lacerations per 8840 caesarean was 0.88%. The elective caesarean deliveries were 33 (42.3%) and emergency caesarean delivery, in 45 (57.6%) cases of fetal laceration had been done. There was a statistically significant difference between the rates among the 2 groups (P<0.001); thus, the risk for fetal accidental lacerations was higher in fetuses who underwent emergency caesarean delivery 45 (56.69%) and was lower for the elective caesarean delivery group 33 (42.4%).

Moreover, in the group of premature rupture of membranes (PROM) 22 case of fetal laceration were observed but 56 (71.8%) of fetal laceration were in neonates that were not PROM. Fetal accidental lacerations were significantly higher.

After 37 weeks of gestation to term (P < 0.003). Cephalic presentation of the fetus determined a significantly higher risk for the occurrence of fetal accidental lacerations. Low uterine transverse incision was correlated with a greater risk for fetal accidental lacerations. There were not statistically significant differences between female and male neonate regarding laceration (n=39 for both female and male).

**Discussion**

Although caesarean delivery may play a role in decreasing birth trauma in certain clinical circumstances, it does not eliminate its occurrence. Furthermore, the fact that caesarean delivery itself can cause injury such as laceration countermands some of the potential benefit of caesarean delivery in reducing birth trauma. The decision to perform caesarean delivery may not be altered by the possible occurrence of accidental fetal laceration, women should be informed about the aforementioned complications, because of litigation problems (8).

The present retrospective study has been performed to investigate fetal accidental injuries that may occur during caesarean delivery. In this study of 8840 caesarean deliveries, the fetal laceration rate was 0.88%. Authors reported an incidence of fetal accidental laceration was 0.88%.

**Table 2:** Fetal laceration according to fetal presentation at caesarean delivery

<table>
<thead>
<tr>
<th>n (%)</th>
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<tbody>
<tr>
<td>Cephalic</td>
<td>60 (76.9%)</td>
</tr>
<tr>
<td>Breech</td>
<td>13 (16.7%)</td>
</tr>
<tr>
<td>Face</td>
<td>2 (2.6%)</td>
</tr>
<tr>
<td>Transverse</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>78 (100%)</td>
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</table>

The present retrospective study has been performed to investigate fetal accidental injuries that may occur during caesarean delivery. In this study of 8840 caesarean deliveries, the fetal laceration rate was 0.88%. Authors reported an incidence of fetal accidental laceration was 0.88%.
ries of 1.9% of a total of 896 caesarean deliveries that were performed (9). Others described an occurrence of 1.5% of 876 caesarean deliveries that were performed. The latter investigators did not find a correlation between fetal lacerations and caesarean delivery indications (10).

The difference between the present study and the aforementioned investigations may be related to a larger sample group that was considered. There is a correlation between fetal accidental lacerations and caesarean delivery indications because the former were more common during emergency caesarean delivery compared with elective procedures (9).

Moreover, in the group of emergency caesarean delivery, fetal distress during labour with PROM and PROM without labor constituted a risk factor for fetal accidental lacerations, probably being related to the critical short time period that is available to perform the caesarean delivery to avoid the risk of fetal morbidity and death. In addition, an incision at the level of the low uterine segment in these circumstances usually is rapid, and the surgeon may pay little attention to potential fetal lacerations that may be created during the opening of the uterus with a scalpel.

Furthermore, an incision at the level of the low uterine segment, which may be only 2 to 3 mm thick, and the absence of amniotic fluid because of PROM may constitute a further predisposing factor in the determination of fetal lacerations. However in this study PROM was not more common in fetal laceration group and we think the incidence of PROM in this study was not high. Other risk factors are the length of the skin incision-to-delivery time, and the type of uterine incision. The fetuses at highest risk of injury were those born after an unsuccessful trial of forceps or vacuum delivery, and those at lowest risk were in women undergoing repeat caesarean delivery without an attempt at vaginal birth (11). Authors believe those procedures done under the most pressing clinical circumstances, for example, unsuccessful trial of operative vaginal delivery and caesarean deliveries for fetal distress, where short skin incision-to-delivery times are necessary, are the most likely to be associated with injury to the fetus. Maternal size as well as infant macrosomia, although potential cofactors for more clinically difficult caesarean delivery, were not significantly associated with fetal injury in this study laceration was higher in neonates >37 weeks.

Fetuses with injury identified at caesarean delivery were not only at risk for sequel from the injury itself, but these cases were also associated with compromised newborn condition as indicated by a cord pH less than 7.1 or diagnosis of intraventricular haemorrhage, in this survey Apgar score <7 at 5 minutes were observed in 21.8% of neonates.

Abnormal presentation of the fetus associated with increased risk of fetal laceration when compared with electively scheduled caesarean delivery. However in this study cephalic presentation was more common because our policy is elective caesarean for breech presentation and no trial of labor. Our findings of an association between emergency caesarean delivery and fetal laceration are consistent with those reported by others (12). In their study of accidental fetal laceration, a strong association was shown between emergency caesarean birth and fetal injury. They found an overall rate of fetal laceration of 3.12%, with 78% of the lacerations occurring when the caesarean delivery was performed emergently. These authors point out that, in circumstances where there is a critically short time period to effect delivery to avoid fetal morbidity and death, the surgeon may pay little attention to potential fetal lacerations that may be created when making the uterine incision. Another type of fetal injury identified in other study that may be related to the caesarean delivery itself is long bone fracture. Although there were only eight cases of this injury, none of them occurred in caesarean delivery for dystocia, two occurred in malpresentations, two in caesarean delivery for fetal distress, two in women who underwent elective repeat caesarean delivery, one in a failed operative delivery, and one in the other category of primary caesarean delivery, but in this survey there was no case of long bone fracture. Similar to fetal skin lacerations, long bone fractures seem more likely to occur in those circumstances where the caesarean delivery may be more technically difficult or when there is a need to affect delivery quickly. In addition to brachial plexus injury, these include cephalohematoma, clavicular fracture, and long bone fracture. This observation suggests that caesarean delivery does not, in and of itself, prevent major birth trauma (13).

The laceration was assumed to have been made during caesarean delivery since the neonates nurse observations was made immediately after caesarean. It is interesting to note that the laceration was indicated only in one operation note that was written by obstetrician. Most likely the obstetricians did not notice the lacerations at the time of delivery. It also may be due to obstetricians’ interest not to record this complication or incomplete examination of neonates after caesarean. Neonatal ward nurses have more time to
observe neonates during transferring them. Paediatricians only noted lacerations that they have sutured (12).

In the present study, all fetal lacerations occurred during low uterine transverse incision, except 3 cases with inverted T incision. Nowadays, in four university hospital, low transverse uterine incision is performed commonly; in the case of a difficult extraction of the fetus that may be related to prematurity, the incision usually is converted to an inverted T incision. As regards classic vertical uterine incision, it has not been performed since 1995 (10).

As regards laceration sequel, mild lacerations resolved spontaneously, with no need for plastic surgery, because they were superficial and involved only the skin. In our study most of laceration was mild and surgical intervention was not necessary. Most of them were of cosmetic significance and did not create functional sequel, and after local wound care, which consisted of sterile strip application, a slight scar persisted (13).

In one series, only 2 moderate fetal lacerations and 1 severe laceration occurred, all of which required plastic surgery to resolve the esthetic damage that was created. In 2 fetuses with moderate lacerations and in 1 fetus with severe lacerations, in which suture placement was required, a notable permanent scarring was recorded at 6 months of neonatal follow-up. Although in the present study accidental fetal lacerations constituted only cosmetic problems, it is to be borne in mind that severe complication (such as newborn infant handicap or death) may occur (14).

Several interventions may reduce the risk of this injury, including use of blunt instrumentation, moving the uterine wall away from the fetus prior to incision, and removing abdominal wall away retractors prior to delivery.

A common prevention strategy involves blunt entry into the uterine cavity. Blunt entry can be done using fingers or blunt-ended or bandage scissors. For example, scoring the uterus with a scalpel along the length of the proposed incision, the uterine cavity is then entered bluntly by inserting fingers into the central portion of the incision and moving the fingers in both directions laterally (15).

Frequent thorough suctioning at the time of entering the uterus increases visibility. Seeing fetal tissue, such as hair in vertex presentations, may help the surgeon to avoid that area when using sharp instrumentation.

Timely reporting and documentation of this occurrence may facilitate quality improvement. Several studies reveal an incidental finding during reviews of C-section: documentation of fetal laceration injuries was poor. A minority of obstetrics records contained documentation when such lacerations occurred. The exact location and dimension of the injury often was not specified. It is possible that such injuries may not be identified at the time of delivery and, therefore, may not be recognized by obstetricians.

Heightening awareness of staff to this complication may reduce the risk of injury. Interventions such as including prevention strategies in emergency C-section drills and providing blunt instrumentation in all C-section kits may help to mitigate risk. Documenting review of this occurrence prior to leaving the delivery room might be incorporated into an existing standardized checklist (16).

Acknowledgment

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References


