Comparison of Maternal-Infant Attachment in Cesarean Delivery Based on Robson Classification: A Cross-Sectional Study

Abstract

Background: The Robson criteria allows for standardized comparisons of data and possible driving changes in Cesarean Section (C/S) rates and complications. The aim to compare maternal-infant attachment in C/S based on Robson Classification. Materials and Methods: This cross-sectional prospective study was conducted on 369 women who had undergone C/S in Hazrate Zeinab Peace Be Upon Him (PBUH), Hafez, and Shoosh hospital affiliated to Shiraz University of Medical Sciences. Iran from April 2018 to March 2019. The study data were collected using a demographic form, an obstetric form, and Avant Checklist (AC) at postpartum and pre-discharge stages. Each participant was placed in each Robson Classification, and a comparison was made among the 10 groups. The data were analyzed into the SPSS 16 software and using descriptive statistics and paired t test. Results: The total mean (SD) score of attachment was 38.73 (18.65) at 1–7 h postpartum and 90.52 (23.79) at pre-discharge. The lowest total mean (SD) score of attachment was observed in group 10 (12.79 (2.37) at 1–7 h postpartum and 45.44 (7.99) at pre-discharge). Conclusions: Obstetric characteristics in Robson Classification, parity, previous C/S, gestational age, onset of labor, fetal presentation, and number of fetuses were effective in clarifying information. The use of this system is necessary to determine the causes of increased C/S cases in low-income and middle-income countries.

Keywords: Attachment, cesarean section, classification, delivery, infant

Introduction

Increasing rate of cesarean delivery around the world has been a source of concern, especially in developed countries.[1] In a systematic review and meta-analysis on 197514 pregnant women, the prevalence of Cesarean Section (C/S) was estimated at 48% in Iran.[2] The prevalence of cesarean delivery was found to be 31.3%, 31.6%, and 48.4% in Ireland, the USA, and Brazil, respectively.[3,4] This rate was 58.6% and 72% in Shiraz and Tehran (Iran), respectively.[5,6]

Cesarean classification indications were difficult in the past due to inappropriate definitions for most indications and led to undesirable and poor comparisons.[7] Since 2001, the Robson Classification (also called the 10-group classification) has been used in many facilities and countries as a tool for monitoring the incidence of cesarean delivery in their populations as well as for examining the impact of changes in clinical management that may change the rate of C/S.[8-10] Robson Classification system divides women into ten groups based on the five parameters of parity, onset of labor, gestational age, fetal presentation, and number of fetuses [Table 1].[11] Robson Classification has recently been used extensively due to the simplicity of its design, validity of its purpose, its ease of implementation, and directness of initial interpretation.[12]

Cesarean delivery may affect mother–infant attachment due to such issues as the side effects of anesthesia and delivery location in the operating room.[13] In cesarean deliveries, long-term separation of mothers and infants occurs due to such complications as pain, bleeding, and infection.[14] Bowlby used the term attachment in relation to the mother–infant bonding for the first time. How to cite this article: Rookesh Z, Kaviiani M, Zarshenas M, Akbarzadeh M. Comparison of maternal-infant attachment in cesarean delivery Based on Robson Classification: A cross-sectional study. Iran J Nurs Midwifery Res 2021;26:500-7.

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Research showed that mother–infant attachment status directly affected infants’ emotional, sentimental, and neonatal dimensions and behavioral problems. In addition, children with insecure parenting attachment had lower emotional and mental developmental characteristics, poor social relationships, school escape attempts, and aggression. Animal studies also indicated that the health, intelligence, and ability to learn throughout the life cycle were reduced in the infants who received the lowest level of contact care from their mothers. Mother–infant attachment and its impact on the development of the baby have been widely studied in the recent decades. Thus, the early postpartum period is a critical and sensitive period for the close relationship between the mother and her infant which may be affected by their separation at birth and type of delivery. According to Lai et al., women with induced caesarian delivery had higher postpartum fatigue scores compared to those with natural delivery. The higher postpartum fatigue score was associated with more problems in infant care. This in turn led to a weak mother–infant attachment during the first 3 days after delivery.

Based on what was mentioned above, the necessity to conduct this study can be expressed as follows: the average rate of caesarean delivery was 27% in four countries in South East Asia whereas the latest statistics in Iran showed the rate to be 40.6%. Moreover, an increased risk of postpartum complications has been reported in planned caesarean delivery. A previous study demonstrated that maternal complications, such as hemorrhage and severe rupture of the cervix, vagina, or perineum, were related to the type of delivery. Complications of childbirth might in turn have a negative effect on the mother–infant attachment due to their separation. It should be noted that the behavior domains that are measured in mother–infant attachment include emotional behaviors, proximity behaviors, close contact between mother and baby, and caring behaviors that have been described in details in the ‘Materials and Methods’ section. Up to now, limited studies have assessed the prevalence and mother–infant attachment scores based on Robson Classification. Hence, this study aims to compare mother–infant attachment in caesarean delivery based on Robson Classification in the selected hospitals of Shiraz University of Medical Sciences in 2019.

### Materials and Methods

This cross-sectional, descriptive study was a part of a larger study conducted on women undergoing caesarean delivery in three teaching hospitals (with maternity wards and delivery rooms), namely Hazrate Zeinab Peace Be Upon Him (PBUH) \((n = 158)\), Hafez \((n = 137)\), and Shooshtari \((n = 74)\), affiliated to Shiraz University of Medical Sciences (Iran) from April 2018 to March 2019. Considering the prevalence of caesarean delivery as 60% (according to Dadipour et al.), power of 80%, constant \(z\) value \((1.96)\) equal to 95 percentiles, expected incidence \((p)\) of 0.6, and accuracy of 5%, a 369-subject sample size was determined for the study. The participants were selected through convenience sampling according to the number of referrals for delivery. Sampling was completed within 3 months from April to June 2018. The inclusion criteria of the study were having undergone caesarean delivery by spinal anesthesia, having the ability to read and write in Persian, not smoking, lack of drug addiction, absence of spouse abuse, not having the current or recurrent history of health problems (hypertension, diabetes, postpartum hemorrhage, etc.) or mental illnesses (according to the mother’s records and self-report), good midwifery history (no previous abortion, dead fetuses, or neonatal death), mother’s full consciousness after childbirth (having the ability to breastfeed the infant), planned pregnancy, and lack of adverse events and marital problems. The exclusion criteria were Apgar score of less than 7 at 5 min, infant abnormalities, maternal bleeding, and hospitalization with midwifery indications for more than 48 h.

The data were collected using an interview form (including personal information and pregnancy and mental health data) and Avant’s attachment behavior checklist for observing and measuring the level of mother–infant attachment. Avant’s attachment behavior checklist included three groups of mother and infant attachment behaviors, including emotional behaviors (staring, caressing, kissing, talking, laughing, and rocking a cradle), proximity/contiguous behaviors (looping the arms firmly around the infant and sticking it to herself and close contact with infant’s body), and caring behaviors (burping the infant and changing its

### Table 1: Robson’s ten-group classification system

| Number | Groups |
|--------|--------|
| 1      | Nulliparous, singleton, cephalic, ≥37 weeks of gestation, in spontaneous labor |
| 2      | Nulliparous, singleton, cephalic, ≥37 weeks of gestation, induced labor or caesarean section before labor |
| 3      | Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks of gestation, in spontaneous labor |
| 4      | Multiparous without a previous uterine scar, singleton, cephalic pregnancy, ≥37 weeks of gestation, induced or caesarean section before labor |
| 5      | Previous caesarean section, singleton, cephalic, ≥37 weeks of gestation |
| 6      | All nulliparous with a single breech |
| 7      | All multiparous with a single breech (including previous caesarean section) |
| 8      | All multiple pregnancies (including previous caesarean section) |
| 9      | All women with a single pregnancy in transverse or oblique lie (including those with previous caesarean section) |
| 10     | All singleton, cephalic, <37 weeks of gestation pregnancies (including previous caesarean section) |
In this study, the mean (SD) age of the mothers was 27.39 (5.90) years. Most mothers were within the age range of 20–30 years. The most frequent education level was high school diploma (58.99%). Among infants, 185 (50.10%) were female and 295 (9.90%) weighed equal to or greater than 2500 grams. A total of 231 cases (62.60%) had an emergency C/S [Table 2].

The results of paired $t$ test indicated that the total mean (SD) score of attachment was 38.73 (18.65) at 1–7 h after cesarean delivery and 90.52 (23.79) before discharge. Among mother–infant attachment behaviors, the highest mean score was related to proximity behaviors followed by emotional and caring behaviors. In addition, in all components and sub-components, the mean score of mother–infant attachment was higher before discharge compared to 1–7 h after C/S [Table 3]. Besides, the mean difference was statistically significant in both the score of attachment components and the total score of attachment. ($t_{508} = -64.61, p < 0.001$). The highest total

### Table 2: The demographic characteristics of the study population

| Variables           | Group          | $n$ (%) |
|---------------------|----------------|---------|
| Maternal age (year) | <20            | 37 (10) |
|                     | 20–30          | 231 (62.60) |
|                     | >30            | 101 (27.40) |
| Education level     | <Diploma       | 123 (33.34) |
|                     | Diploma        | 214 (58.99) |
|                     | >Diploma       | 32 (8.67) |
| Neonate’s sex       | Female         | 185 (50.10) |
|                     | Male           | 184 (49.90) |
| Neonate’s weight    | <2500          | 74 (20.10) |
|                     | ≥2500          | 295 (79.90) |
| Delivery mode       | Emergency CS*  | 231 (62.60) |
|                     | Elective CS    | 138 (37.40) |

*Cesarean section*
Table 3: Comparison of the mean scores of mother-infant attachment and its variables during postpartum and pre-discharge stages

| Attachment variables | Postpartum Mean (SD) | Pre-discharge Mean (SD) | t test | df | p  |
|----------------------|----------------------|--------------------------|--------|----|----|
| Looking              | 6.02 (3.19)          | 13.37 (3.09)             | -38.42 | 368 | 0<0.001 |
| Cuddling             | 0.89 (1.72)          | 6.33 (3.28)              | -31.73 | 368 | 0<0.001 |
| Kissing              | 0.13 (0.40)          | 1.26 (0.94)              | -23.04 | 368 | 0<0.001 |
| Speaking             | 0.96 (1.68)          | 6.94 (3.47)              | -35.60 | 368 | 0<0.001 |
| Laughing and rocking the cradle | 1.64 (2.78) | 10.14 (4.94)             | -35.34 | 368 | 0<0.001 |
| Emotional behaviors  | 9.63 (8.22)          | 38.5 (14.06)             | -43.17 | 368 | 0<0.001 |
| Hugging              | 5.77 (4.28)          | 12.53 (3.83)             | -29.27 | 368 | 0<0.001 |
| Close contact between mother and baby | 10.42 (0.40) | 14.09 (2.46)             | -18.21 | 368 | 0<0.001 |
| Looping the arms around the baby | 7.58 (4.18) | 13.58 (3.21)             | -30.28 | 368 | 0<0.001 |
| Proximity behaviors  | 23.77 (11.38)        | 40.20 (8.88)             | -31.05 | 368 | 0<0.001 |
| To kick the baby back for exit of stomach air | 1.31 (1.63) | 3.06 (1.83)              | -20.67 | 368 | 0<0.001 |
| Changing diapers and clothes | 0.67 (1.34) | 2.96 (1.44)              | -28.24 | 368 | 0<0.001 |
| Mother’s attention to the baby | 3.35 (2.43) | 6.24 (1.94)              | -20.95 | 368 | 0<0.001 |
| Care behaviors       | 5.33 (4.20)          | 12.27 (3.79)             | -42.69 | 368 | 0<0.001 |
| Total attachment score | 38.73 (18.65) | 90.52 (23.79)            | -64.61 | 368 | 0<0.001 |

Discussion

In this research, the mean score of the behaviors was higher before discharge compared to 1–7 h after C/S, and the mothers showed more attachment behaviors during this period. Among the attachment behaviors, the highest mean score was related to proximity behaviors followed by emotional and caring behaviors. The results revealed a significant difference between the two time periods in terms of emotional, proximity, and caring behaviors.

In a previous study, 52 mothers and infants were divided into two groups of Normal Vaginal Delivery (NVD) and C/S. The infants born through NVD were placed next to their mothers immediately after birth, whereas those born via C/S had an average separation of 2.8 (1.0) days. The mother–infant interaction was assessed by direct observation of mothers’ behaviors during feeding, (b) observation of mothers’ behaviors during assessment of infants’ behaviors based on the Neonatal Behavioral Assessment Scale (NBAS), and (c) mothers’ interview using attachment questions. The results demonstrated that the mothers in the NVD group were more affectionate compared to those in the C/S group and were more involved in caring for their infants, indicating that mothers and infants were more attached in the vaginal delivery.[36] In another study, 5-year (2011 to 2015) data were analyzed and the results indicated that the ratio of infants transferred to the Neonatal Intensive Care Unit (NICU) for examination after skin-to-skin contact immediately after C/S was significantly different from the group with no mother–infant contact. These results supported immediate, uninterrupted skin-to-skin contact for all mothers regardless of birth mode.[37] However, two studies showed that skin-to-skin contact between the mother and her infant during the first hour after delivery did not affect the mother’s attachment behaviors 36 h and 3 months after delivery.[38,39] The studies that examined emotional, proximity-seeking, and caring behaviors after C/S in one or two steps were not comparable. A study examining emotional, proximity-seeking, and caring behaviors at 1 h and 2 months postpartum showed that only proximity-seeking behaviors were significantly different at 2 months postpartum.[40] These results were similar to those of this study and the only difference was in the type of delivery. The mean score of proximity behaviors in another study was also consistent with that reported in the current investigation.[41] In contrast, Eslaminia et al.[42] evaluated attachment among women with unwanted pregnancies in two stages and came to the conclusion that the two study groups were significantly different with regard to emotional and caring behaviors in the first hours after delivery, but proximity-seeking behaviors were the same in both groups. Given the importance of mother–infant attachment and its impact on the mother’s sense of adequacy as well as its pleasant experience for mothers, the need for initial contact should be taken into account. Training healthcare workers, especially nurses and midwives, as well as parents about these behaviors before infant’s birth can be a major step in promoting parent-infant relationships. If these behaviors are established in all mothers, one can hope that people will have a better mental health status in future.

In the current study, the highest total attachment score was observed in group 6 of Robson Classification at 1–7 h after C/S and pre-discharge. Scarce information
is available regarding the consequences of long-term delivery with breech presentation. However, evidence has suggested that cesarean delivery is safer than vaginal delivery in case of breech presentation.[43-45] Hence, cesarean delivery is preferred in breech pregnancies to reduce the complications of the prenatal period. Studies have indicated a significant relationship between attachment and pregnancy complications. The mean score of attachment was also lower in the mothers with high complications. A study demonstrated that an atmosphere full of stress and discomfort in high-risk pregnancies might reduce maternal attachment behaviors. Adaptation to changes in pregnancy in normal conditions was considered a crisis, as well. In case of a health risk for the mother or the infant, conditions would be more difficult, requiring more flexibility and patience.[46] In
In the current study, the mother–infant attachment scores were lower in groups 3 and 4 of Robson Classification. Although these women had at least one normal vaginal delivery experience and hoped for the next natural delivery, their mother–infant attachment decreased due to the traumatic event during labor and emergency cesarean delivery. The results of the previous studies indicated that aggressive actions, such as emergency C/S, appeared to be traumatic.[47] Moreover, Smith et al.[49] indicated that emergency cesarean delivery due to maternal (failure in labor progression or cephalopelvic disproportion) or fetal (fetal distress) causes were important stressors for women, and these stressful events were anticipated to increase the risk of change in the mother–infant attachment. Another study suggested that childbirth stress was classified as severe in the psychosocial stress tables. In this period, it is possible to experience neuroticism, depression, and anxiety. Moreover, mothers who experience traumatic births or a problem with themselves or their infants during delivery may review the fear and anxiety of delivery in their minds over the next few years and experience cognitive, physical, and emotional symptoms of anxiety.[50]

One of the strengths of this study was that it was the first study in Iran and other countries to compare mother–infant attachment in cesarean delivery based on Robson Classification. However, one of the limitations of the study was the mothers’ reluctance to participate in the study and the need for a suitable place to submit and complete the questionnaires. Another study limitation was the probable observer bias. Nevertheless, completion of all checklists by one person helped control and reduce the bias.

As natural infant development depends partly on the exchange of a series of emotional responses between the infant and its parents that make them closer to each other physiologically and psychologically, midwives and nurses in charge of taking care of mothers and newborns are recommended to provide the ground for establishment of long-term interactions at early moments after cesarean delivery and allow mothers to have skin-to-skin contact with their infants and build long-term initial interactions. Furthermore, it is necessary to conduct further studies on mother–infant attachment in cesarean delivery based on Robson Classification to find a better level of attachment in the study groups.

**Conclusion**

This study showed that mother–infant attachment in cesarean delivery increased over time. Thus, the mean score of attachment behaviors before discharge was higher compared to 1–7 h after C/S. Moreover, the mean score of neonatal attachment in the two stages was highest in group 6, lowest in group 10, and decreased in groups 3 and 4. The mother–infant attachment can be increased by controlling the labor more efficiently (groups 3 and 4) and planning for cesarean deliveries in case of abnormal presentations (group 6) and preterm deliveries (group 10).
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Conflicts of interest

Nothing to declare.

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