Rising Cesarean Sections Rate

Naeema Ahmed A. Mahmood, CABOG, MBBS* Khalid Abdulla M. Sharif, MRCP, MD** Ayesha Khalid Sharif***

Objective: To identify cesarean section (CS) rate in Bahrain and evaluate the reasons for the rise of CS rate.

Design: A Retrospective Cross-Sectional Analysis.

Setting: Salmaniya Medical Complex, Kingdom of Bahrain.

Method: All CS performed from 1 May 2011 to 31 October 2011 were included. The following patients' characteristics and clinical data were documented: age, nationality, maternal weight, parity, gestational age, number of gestation, birth weight and presentation. In addition to primary or repeat CS, indications of the procedure, uterine incision, type of anesthesia provided and immediate complications were documented.

Result: One thousand five hundred thirty-five women had CS. Five hundred fifty-eight CS who had complete data were included in the study. The mean maternal age was 32 years ± (SD 5.8). Three hundred seventeen (56.8%) patients were Bahrainis. The mean gestational age was 37.1 weeks ± (SD 2.7) with a mean neonatal birth weight of 3,012 grams ± (SD 0.750). One hundred sixty-one (28.9%) were primiparous and 397 (71.1%) were multiparous. Forty-six (8.2%) were performed for multiple gestations. Two hundred eighty-six (51.3%) were primary CS and 272 (48.7%) were repeat CS. The main indications for the procedure were repeat CS in 176 (31.5%), failure to progress in 104 (18.6%), non-reassuring fetal heart rate in 100 (17.9%) and breech presentation in 80 (14.3%).

Conclusion: CS rate is increasing in Bahrain; more than 30% of deliveries in Bahrain are by CS. Physicians should aim to reduce CS rate by lowering primary CS and allowing trial of scar in patients with previous CS.

Bahrain Med Bull 2017; 39(3): 154 - 158

The rate of Cesarean section (CS) has increased worldwide; in England, CS rate has increased from 9% in 1980 to 21% in 2012[1-6]. In addition, there is a wide variation in the rate of CS between countries and even within the same country[1-8]. That could be explained by advancing maternal age at first pregnancy, repeat CS, malpresentation (mainly breech), multiple gestations and performing CS upon maternal request[7,9].

CS is not without risks; the risks include hemorrhage, infection and thrombosis. Repeat CS are associated with maternal complications such as uterine rupture, injuries to visceral organs, placenta previa and accrete, as well as neonatal complications such as transient tachypnea of the newborn, difficulty bonding and breast feeding[7,9-15].

CS rate has doubled in Bahrain in the last ten years; it rose from 16% in 2004 to 31.5% in 2015 in the Ministry of Health Hospitals[16-18].

Royal College of Anesthesia (RCA) and Royal College of Obstetricians and Gynecologists (RCOG) classify CS as follows: "emergency if there is immediate threat to the life of the mother or fetus, urgent: included maternal or fetal compromise, but is not immediately life-threatening, scheduled CS: when early delivery is needed but there is no maternal or fetal compromise and elective procedure to be undertaken at a suitable time for the maternity unit"[19-22]. Primary CS was defined as CS for women who have not had a previous section CS regardless of parity[2].

The aim of this study is to identify CS rate in Bahrain and to evaluate the reasons behind the rise.

METHOD

A retrospective study of CS between 1 May 2011 and 31 October 2011 was performed. The age, nationality, maternal weight, parity, number of gestation, gestational age, presentation, the urgency of procedure, indications, uterine incision, anesthesia, blood transfusion and maternal complications were documented. Neonatal data included birth weight, Apgar scores at 5 and 10 minutes and transfer to the Neonatal Intensive Care Unit (NICU).

All data were analyzed using SPSS statistical package version 23. Descriptive statistics were used to report the data as

* Assistant Professor, Consultant and Chairperson
Department of Obstetrics and Gynecology
** Consultant
Department of Hematology and Oncology
Salmaniya Medical Complex
*** Medical Student
Arabian Gulf University
Kingdom of Bahrain
E-mail: naeemamahmood@gmail.com

frequencies, mean, standard deviation (SD) and percentage. P-value of 0.05 was considered to be statistically significant.

The urgency of CS was divided into four groups based on the Royal College of Anesthesia (RCA) and Royal College of Obstetricians and Gynecologists (RCOG).

Departmental policy dictates that women with breech are offered CS; similarly, patients who had previous CS are allowed trial of scar.

RESULT

The total deliveries between 1 January 2011 and 31 December 2011 was 4,928. Three thousand three hundred ninety-three (68.9%) were vaginal deliveries, while 1,535 (31.1%) were delivered via CS. Therefore, the CS rate for the year 2011 was 31%.

Seven hundred fifty-five (15.3%) CS were performed between 1 May 2011 and 31 October 2011; only 558 (11.3%) of the CS had complete data and included in the study. Incomplete forms were excluded, see figure 1.

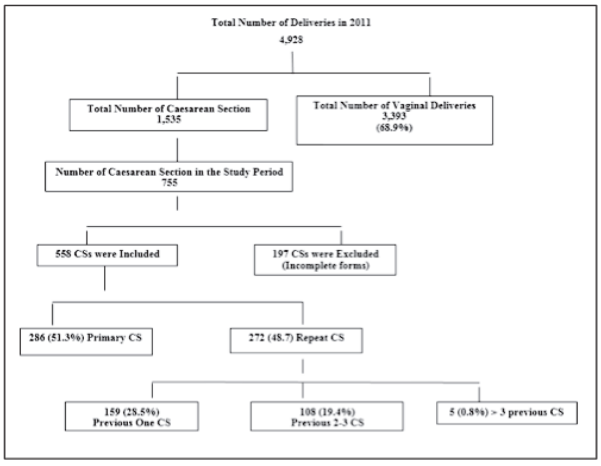

Figure 1: Cesarean Sections Performed in the Year 2011

Five hundred fifty-eight patients were included in the study between 1 May 2011 and 31 October 2011. The mean maternal age was 32 years ± (SD 5.8 years), the youngest mother was 16, and the eldest was 49. One hundred eighty-four (33%) patients were 35 years or older, and 43 (7.7%) were older than 40 years. Three hundred seventeen (56.8%) of the participants were Bahrainis. The mean gestational age was 37.1 weeks ± (SD 2.7 weeks), ranging from 24 to 42 weeks. One hundred thirty-six (24.4%) were performed for preterm babies; 13 (2.3%) babies were extremely preterm. The mean neonatal birth weight was 3.012 kilograms ± (SD 0.750 kg) ranging from half kg to 5 kg.

Three hundred forty-seven (62.2%) mothers weighed between 50 kg and 90 kg, whereas, 139 (24.9%) were weighing between 91 kg and 130 kg. Fourteen (2.5%) were heavier than 130 kg but less than 170 kg. One hundred and sixty-one (28.9%) were primiparous and 397 (71.1%) were multiparous. Two hundred seventy-two (48.7%) patients were multiparous with previous CS compared to 125 (22.4%) multiparous with no previous scar. Five hundred twelve (91.8%) of the pregnancies were singleton, while 39 (7%) were twins. There were five sets of triplets and four sets of quadruplets, 0.9% and 0.7%, respectively. Additionally, 456 (81.7%) of our sample were cephalic presentation while 80 (14.3%) were breech and 22 (3.9%) had other presentation such as transverse, oblique and cord presentation, see table 1(A) and 1(B).

Table 1(A): Maternal Personal Characteristics

Maternal Characteristics	Mean	± *SD*	Min	Max
Maternal Age	32	5.8	16	49
Gestational Age (Weeks)	37.1	2.7	24	42
Parity	2.2	1.3	1	9
Birth Weight in kg	3.012	0.750	0.500	5
Total Units of RBCs Received	4.73	0.960	1	5

Table 1(B): Clinical Data

	Total No (558)	% (100)
Maternal Age (Years)		
16-24	53	9.5
25-34	321	57.5
35-44	175	31.4
45-49	9	1.6
Total	**588**	**100**
Gestational Age (Weeks)		
24-28	13	2.3
29-32	25	4.5
33-36	98	17.6
37-42	422	75.6
Total	**558**	**100**
Nationality		
Bahraini	317	56.8
Non-Bahraini	241	43.2
Total	**558**	**100**
Maternal Weight in kg		
< 50 kg	7	1.3
50-90	347	62.2
91-130	139	24.9
131-170	14	2.5
Not Documented	51	9.1
Total	**558**	**100**
Parity		
Primiparous	161	28.9
Multipara with previous CS	272	48.7
Multipara with no CS	125	22.4
Total	**558**	**100**
Fetal Presentation		
Cephalic	456	81.7
Breech	80	14.3
Others	22	3.9
Total	**588**	**100**
Number of Gestation		
Singleton	512	91.8
Twin	39	7
Triplets	5	0.9
Quadruplets	2	0.4
Total	**558**	**100**
Neonatal Birth Weight in kg		
0.5-1	15	2.7
1.1-2.5	115	20.6
2.6-3	143	25.6
3.1-5	285	51.1
Total	**558**	**100**

Two hundred and eighty-six (51.3%) were primary CS and 272 (48.7%) were repeat CS. One hundred fifty-nine (28.5%) had one previous CS and 108 (19.4%) had two to three previous CS, see figure 1. One hundred seventy-nine (31.5%) were repeat CS. Failure to progress were 104 (18.6%), non-reassuring fetal heart rate were 100 (17.9%) and breech presentation were 80 (14.3%). Medical disorders complicating pregnancy such as sickle cell disease (SCD), pre-eclampsia toxemia (PET) and diabetes mellitus (DM) were 62 (11.6%) cases, while placenta previa and abruption placenta were 14 (2.5%) cases, see table 2.

Table 2: The Main Indications for Cesarean Section

Indication	Total (558)	Percentage (%)
Repeat CS	176	31.5
Failure to progress	104	18.6
Fetal distress	100	17.9
Breech presentation	80	14.2
Medical disorders complication pregnancy	62	11.1
Placenta previa and abruption	14	2.5
Other Presentation	22	3.9
Total	**558**	**100**

Three hundred twenty-eight (58.8%) of CS were emergency, while 213 (38.2%) were elective. Only 17 (3%) were considered immediate section. Five hundred fifty-five (99.5%) were lower segment CS and three (0.5%) were classical CS. Cesarean hysterectomy was performed as life-saving procedure in four (0.4%) cases. Furthermore, regional, mainly spinal block was the most common type of anesthesia provided in 480 (86%) cases; 73 (13.1%) had general anesthesia. However, five (0.9%) of parturient have had both modalities.

Five hundred twenty-nine (94.8%) patients had no complications. Documented maternal complications included: 3 (0.5%) extended tears, 4 (0.7%) return to theatre, 4 (0.7%) peripartum hysterectomy and one (0.2%) unplanned admission of the mother to ICU. On the other hand, neonatal complications included transfer of term baby to NICU, 15 (2.7%) and Apgar scores < 7 at 10 minutes, 4 (0.7%).

Forty-six (8.2%) patients received blood transfusions. Nine (1.9%) patients had SCD. Other patients either presented with heavy vaginal bleeding or bled intraoperatively due to placental previa, 12 (2.2%) and abruption placenta, 2 (0.4%). The total number of units transfused was 40, with a mean of 4.7 units ± (0.963) ranging from 1 to 5 units.

Mothers younger than 25 years old were more likely to undergo primary CS compared to older mothers. However, the difference was not statistically significant except when compared to mothers older than 44 years of age (P-value 0.052). Bahrainis and increasing maternal weight increase the likelihood ratio of primary CS, but the difference was not statistically significant. Nevertheless, multiple gestations, breech and other non-cephalic presentation, such as transverse, oblique and cord presentation significantly increased the likelihood ratio of primary CS (P-value of 0.025, 0.000 and 0.023, respectively). Similarly, extreme prematurity significantly increased the likelihood ratio of primary CS compared to term pregnancy (P-value 0.06), see table 4.

Table 4: Odds Ratios of Cesarean Section for Maternal Characteristics

	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Maternal Age (Years)			
The reference category is 45-49 years			
16-24	4.5	0.98 - 20.46	**0.052***
25-34	0.90	0.24 - 3.12	0.878
35-44	0.48	0.13 - 1.86	0.29
Gestational Age (Weeks)			
The reference category is 37-42 weeks			
24-28	3.495	0.95 - 12.88	**0.000***
29-32	1.864	0.81 - 4.31	0.146
33-36	1.287	0.83 - 2.0	0.263
Nationality			
The reference category is Bahraini			
Non-Bahraini	0.876	0.63 - 1.23	0.439
Maternal Weight in kg			
The reference category is maternal weight > 170			
50-90	1.38	0.31 - 6.29	0.67
91-130	1.13	0.25 - 5.27	0.86
131-170	1.177	0.28 - 11.12	0.53
Fetal Presentation			
The reference category is cephalic presentation			
Breech	2.83	1.68 - 4.75	**0.000***
Others#	3.04	1.169 - 7.92	**0.023***
No of Gestation			
The reference category is singleton pregnancy			
Multiple gestation	2.08	1.09 - 3.95	**0.025***

*P-value statistically significant
#Others include transverse, oblique and cord presentation

DISCUSSION

In our study, CS rate was approximately 31%. Bahrain is no exception because CS rate is increasing globally[1,2,7,23-26].

It was proposed that advanced maternal age at the first pregnancy increases the rate of CS[7,10,19]. However, our study revealed that the rate of CS increased with maternal age up to 34 years, and then it declines. Nevertheless, this study highlights that more than one-third were 35 years or older; 43 (7.7%) patients were older than 40 years of age. That indicates that mothers in Bahrain are contemplating pregnancy at an advanced age, which might be associated with more maternal complications. It also shows that mothers younger than 25 years are more likely to undergo primary CS compared to other age groups.

Body mass index (BMI) has been suggested to influence CS rate; CS rate was noted to rise with maternal obesity (defined as BMI >30 kg/m)[10]. However, BMI is not routinely recorded on antenatal data; therefore, we used maternal weight as an alternative. Our study found that increased maternal weight increases the likelihood ratio of primary CS, but the difference was not statistically significant. However, it identifies the growing risk of maternal obesity, which is a contributing factor for postoperative morbidity[6,11-13,27].

CS in nulliparous women was performed on 161 (29%) patients; CS in this group of patients should be viewed with concern as it would have an implication for repeat CS. In addition, CS was found to be higher in multiparous mothers with previous scar than without scar.

In this study, there was a higher proportion of preterm babies and low birth weight babies (<2.5 kg) compared to other studies[6]. In our study, 98 (17.6%) of mothers delivered at 33-36 weeks and 38 (6.8%) delivered at less than 33 weeks compared to 6% and 2% respectively in the UK[6]. One hundred thirty (23.6%) babies in our study had low birth weight and 15 (2.7%) had extremely low birth weight (<1 kg) compared to 7% and 0.9% respectively in the UK[6].

Indications for CS need to be viewed with caution, such as previous CS and breech presentation. The main indication for CS in our study is similar to other studies[6,23-26,28-33].

The most frequently reported indication was repeat CS; this could be contributed largely to the increase in CS rate. The other most frequent indication was abnormal fetal heart rate or fetal distress. Continuous electronic fetal heart monitoring without fetal blood sampling is found to raise CS rate without an improvement in perinatal mortality[6,33].

CS has been classified into elective and emergency procedure. The Royal College of Anesthesia and the Royal College of Obstetrics and Gynecology recommend reclassifying CS into four categories based on the urgency to facilitate communication and is more representative[19-22]. Our overall elective and emergency procedure rate was consistent with other studies[2]. There was less utilization of other categories, mainly immediate and scheduled.

Other proposed classification of the urgency of CS was decision-to-delivery interval; it was proposed to be within 30 minutes. There is little evidence to suggest that this interval improves fetal outcome. Classifying the urgency of CS is important to ensure maternal safety without compromising the fetus and allowing time for the anesthetist to decide the best option[6,10,11,22,34].

Although CS is considered to be a safe procedure, complications do still occur. In our study, the maternal and neonatal complication rate was 29 (5.2%). However, this study only included short-term complications intraoperatively or in the immediate postoperative period. Long-term complications were outside the scope of this study.

In this study, mothers younger than 25 years compared to mothers older than 44 years were more likely to undergo primary CS. In contrast, multiple gestations, non-cephalic presentation, breech presentation and extreme prematurity significantly increase the likelihood ratio of primary CS.

CONCLUSION

Our results demonstrate that CS rate is rising in Bahrain. It highlights possible leading factors that need to be addressed. Efforts should be directed to reducing primary CS as well as repeat CS. Mothers with a previous scar should be allowed to undergo trial of scar and external cephalic version should be offered for breech presentation. There should be national policies towards reducing multiple gestations and premature deliveries. Future randomized controlled trials are recommended.

Author Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflicts of Interest: None.

Competing Interest: None.

Sponsorship: None.

Acceptance Date: 2 July 2017.

Ethical Approval: Approved by the Department of Obstetrics and Gynecology, Salmaniya Medical Complex, Bahrain.

REFERENCES

1. World Health Organization: Human Reproduction Program Research for Impact. WHO Statement on Caesarean Section Rates, WHO Press 2015. http://apps.who.int/iris/bitstream/10665/161442/1/WHO_RHR_15.02_eng.pdf?ua=1
2. J Thomas, S Paranjothy. National Sentinel Caesarean Section Audit Report. Royal College of Obstetricians and Gynaecologists Clinical Effectiveness Support Unit. RCOG Press 2001.https://www.rcog.org.uk/globalassets/documents/guidelines/research--audit/nscs_audit.pdf
3. Betrán AP, Merialdi M, Lauer JA, et al. Rates of Caesarean Section: Analysis of Global, Regional and National Estimates. Paediatr Perinat Epidemiol 2007; 21(2):98-113.
4. Ye J, Zhang J, Mikolajczyk R, et al. Association between Rates of Caesarean Section and Maternal and Neonatal Mortality in the 21st Century: A Worldwide Population-Based Ecological Study with Longitudinal Data. BJOG 2016; 123(5):745-53.
5. Betran AP, Torloni MR, Zhang J, et al. What is the Optimal Rate of Caesarean Section at Population Level? A Systematic Review of Ecologic Studies. Reprod Health 2015; 12:57.
6. National Institute for Clinical Excellence. Caesarean Section. RCOG Press at the Royal College of Obstetricians and Gynaecologists 2004.https://www.nice.org.uk/guidance/cg132/documents/caesarean-section-update-full-guideline2 Accessed on January 2016.

7. Bragg F, Cromwell DA, Edozien LC, et al. Variation in Rates of Caesarean Section among English NHS Trusts after Accounting for Maternal and Clinical Risk: Cross-Sectional Study. BMJ 2010; 341:c5065.
8. Festin MR, Laopaiboon M, Pattanittum P, et al. Caesarean Section in Four South East Asian Countries: Reasons for, Rates, Associated Care Practices and Health Outcomes. BMC Pregnancy Childbirth 2009; 9:17.
9. Mazzoni A, Althabe F, Gutierrez L, et al. Women's Preferences and Mode of Delivery in Public and Private Hospitals: A Prospective Cohort Study. BMC Pregnancy Childbirth 2016; 16:34.
10. Thomas J, Callwood A, Brocklehurst P, et al. The National Sentinel Caesarean Section Audit. BJOG 2000; 107(5):579-80.
11. Gyamfi-Bannerman C, Gilbert S, Landon MB, et al. Risk of Uterine Rupture and Placenta Accreta with Prior Uterine Surgery Outside of the Lower Segment. Obstet Gynecol 2012; 120(6):1332-7.
12. Curtin SC, Gregory KD, Korst LM, et al. Maternal Morbidity for Vaginal and Cesarean Deliveries, According to Previous Cesarean History: New Data from the Birth Certificate, 2013. National Vital Statistics Reports; 64(4).
13. Signore C, Klebanoff M. Neonatal Morbidity and Mortality after Elective Cesarean Delivery. Clin Perinatol 2008; 35(2):361-71, vi.
14. Black M, Bhattacharya S, Philip S, et al. Planned Cesarean Delivery at Term and Adverse Outcomes in Childhood Health. JAMA 2015; 314(21):2271-9.
15. National Collaborating Centre for Women's and Children's Health (UK). Caesarean Section. London: RCOG Press, 2011: NICE Clinical Guidelines, No. 132.https://www.ncbi.nlm.nih.gov/books/NBK115309/ Accessed on January 2016.
16. Health Information Directorates (HID), Ministry of Health. Annual reports. 2004.https://www.moh.gov.bh/Content/Files/Publications/Statistics/hs2004/hs2004_e.html
17. Health Information Directorate (HID), Ministry of Health Annual Reports. 2006.https://www.moh.gov.bh/Content/Files/Publications/statistics/HS2012/PDF/Secondary%20Health%20Care/Government%20Sector/CH09-maternity%20hospitals_2012.pdf
18. Health Information Directorate, Ministry of Health Department of Obstetrics and Gynaecology, Salmaniya Medical Complex Labour Room Statistics (2015). https://www.moh.gov.bh/Content/Files/Publications/statistics/HS2015/PDF/Secondary%20Health%20Care/maternity%20hospitals%20(government%20and%20private)_2015.pdf
19. Royal College of Obstetricians and Gynaecologists, Royal College of Anesthetists. Classification of Urgency of Caesarean Section - A Continuum of Risk. London: RCOG Press; 2010: Good Practice No. 11.
20. Thomas J, Paranjothy S, James D. National Cross-Sectional Survey to Determine Whether the Decision to Delivery Interval is Critical in Emergency Caesarean Section. BMJ 2004; 328(7441): 665.
21. Tuffnell DJ, Wilkinson K, Beresford N, et al. Interval between Decision and Delivery by Caesarean Section-Are Current Standards Achievable? Observational Case Series. BMJ 2001; 322(7298):1330-3.
22. Lucas DN, Yentis SM, Kinsella SM, et al. Urgency of Caesarean Section: A New Classification. J R Soc Med 2000; 93(7):346-50.
23. Naidoo N, Moodley J. Rising rates of Caesarean Sections: An Audit of Caesarean Sections in a Specialist Private Practice. SA Fam Pract 2009; 51(3):254-258.
24. Ji H, Jiang H, Yang L, et al. Factors Contributing to the Rapid Rise of Caesarean Section: A Prospective Study of Primiparous Chinese Women in Shanghai. BMJ Open 2015; 5(11):e008994.
25. Patel RR, Peters TJ, Murphy DJ, et al. Prenatal Risk Factors for Caesarean Section. Analyses of the ALSPAC Cohort of 12,944 Women in England. Int J Epidemiol 2005; 34(2):353-67.
26. Wilkinson C, Mcllwaine G, Boulton-Jones C et al. Is a Rising Caesarean Section Rate Inevitable? British Journal of Obstetrics and Gynaecology 1998; 105:45-52.
27. Alsayegh F, Al-Jassar W, Wani S, et al. Venous Thromboembolism Risk and Adequacy of Prophylaxis in High-Risk Pregnancy in the Arabian Gulf. Curr Vasc Pharmacol 2016; 14(4): 368–373.
28. Leitch CR, Walker JJ. The Rise in Caesarean Section Rate: The Same Indications but a Lower Threshold. Br J Obstet Gynaecol 1998; 105(6):621-6.
29. Matthews TG, Crowley P, Chong A, et al. Rising Caesarean Section Rates: A Cause for Concern? BJOG 2003; 110(4):346-9.
30. Barber EL, Lundsberg LS, Belanger K, et al. Indications Contributing to the Increasing Cesarean Delivery Rate. Obstet Gynecol 2011; 118(1):29-38.
31. Saha S, Saha S, Das R, et al. A Paradigm Shift to Check the Increasing Trend of Cesarean Delivery is the Need of Hour: But How? J Obstet Gynaecol India 2012; 62(4):391-7.
32. McCourt C, Weaver J, Statham H, et al. Elective Cesarean Section and Decision Making: A Critical Review of the Literature. Birth 2007; 34(1):65-79.
33. Alfirevic Z, Devane D, Gyte GM. Continuous Cardiotocography (CTG) as a Form of Electronic Fetal Monitoring (EFM) for Fetal Assessment during Labour. Cochrane Database Syst Rev 2006; (3):CD006066.
34. Intrapartum Care. Care of Healthy Women and their Babies during Childbirth. National Collaborating Centre for Women's and Children's Health. RCOG Press, 2007. https://www.nice.org.uk/guidance/cg190 Accessed in January 2016.