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Cesarean Section Rate based on The Robson 10-group Classification at Rajavithi Hospital from 2015-2018

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ABSTRACT

Objectives: To analyze cesarean section (CS) rates based on the Robson 10-group classification system (TGCS) and to examine the trends of cesarean section rates at Rajavithi Hospital (RH) between 2015 and 2018.

Materials and Methods: This cross-sectional study included all deliveries in RH between 1st January, 2015 and 31st December, 2018. The TGCS was used to categorize cesarean deliveries and all data collected.

Results: A total of 19,840 deliveries were analyzed. The annual CS rates were 35.5% (1,710/4,813), 36.6% (1,809/4,949), 35.2% (1,836/5,223) and 34.8% (1,689/4,855) in 2015, 2016, 2017 and 2018, respectively. The trend of the CS rates in each group and that of relative and absolute contributions were similar within the study period (p = 0.290). Group 1, 3 and 10 accounted for almost 70% of the study population and multiparous women with previous CS in group 5 formed the highest relative contribution of the overall CS rate (30.8%, 32.6%, 31.9% and 31.9%; p = 0.718), followed by group 2 (17.5%, 18%, 18.9% and 17.9%; p = 0.506) and group 1 (16.1%, 16.8%, 14.4% and 15.2%; p = 0.211), respectively.

Conclusion: The overall CS rate during the four-year period 2015-2018 varied between 34.8% and 36.6%, and the highest relative and absolute contribution to the overall CS rate at Rajavithi Hospital was made by group 5 in every year (2015-2018). The trends of CS rates in terms of relative and absolute contribution in each group were similar during the study period, as were the CS rates.

Keywords: cesarean section rate, The Robson 10-group classification, Rajavithi Hospital.

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อัตราการผ่าตัดคลอดในโรงพยาบาลราชวิถีระหว่างปี พ.ศ. 2558-2561 จำแนกตาม The Robson 10 group classification

ศิรประภา ขรวงศ์, เอกชัย โควาวิสารัช

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาอัตราการผ่าตัดคลอดจำแนกตาม The Robson 10 group classification (TGCS) และแนวโน้มอัตราการผ่าตัดคลอดในโรงพยาบาลราชวิถีระหว่างปี พ.ศ. 2558-2561*

วัสดุและวิธีการ: *การศึกษาภาพตัดขวางนี้โดยเก็บรวบรวมข้อมูลหญิงตั้งครรภ์ทั้งหมดที่มาคลอดในโรงพยาบาลราชวิถี ในวันที่ 1 มกราคม พ.ศ. 2558 ถึงวันที่ 31 ธันวาคม พ.ศ. 2561 แล้วจำแนกข้อมูลตาม TGCS*

ผลการศึกษา: *ในปี พ.ศ. 2558-2561 มีหญิงตั้งครรภ์ที่คลอดในโรงพยาบาลราชวิถี ทั้งหมด 19,840 คน โดยพบอัตราการผ่าตัดคลอดเฉลี่ยต่อปีเท่ากับร้อยละ 35.5 (1,710/4,813), 36.6 (1,809/4,949), 35.2 (1,836/5,223) และ 34.8 (1,689/4,855) จากปี พ.ศ. 2558-2561 ตามลำดับ แนวโน้มอัตราการผ่าตัดคลอดเฉลี่ย และอัตราการผ่าตัดคลอดในแต่ละกลุ่มตาม TGCS ในแต่ละปี ไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ (p = 0.290) ร้อยละ 70 ของหญิงตั้งครรภ์ทั้งหมด อยู่ในกลุ่ม 1, 3 และ 10 พบอัตราการผ่าตัดคลอดเมื่อเทียบกับอัตราการผ่าตัดคลอดทั้งหมดสูงสุดในหญิงตั้งครรภ์กลุ่มที่ 5 ที่มีประวัติผ่าตัดคลอดมาก่อนเท่ากับร้อยละ 30.8, 32.6, 31.9 และ 31.9; p = 0.718 ในปี พ.ศ. 2558-2561 ตามลำดับ อัตราการผ่าตัดคลอดที่พบรองลงมาคือ หญิงตั้งครรภ์ในกลุ่มที่ 2 (ร้อยละ 17.5, 18, 18.9 และ 17.9; p = 0.506) ตามด้วยหญิงตั้งครรภ์ในกลุ่มที่ 1 (ร้อยละ 16.1, 16.8, 14.4 และ 15.2; p = 0.211)*

สรุป: *อัตราการผ่าตัดคลอดทั้งหมดในช่วงเวลาปี พ.ศ. 2558 - 2561 เท่ากับร้อยละ 34.8-36.6 อัตราการผ่าตัดคลอดในแต่ละกลุ่มตาม TGCS เมื่อเทียบกับอัตราการผ่าตัดคลอดทั้งหมดในโรงพยาบาลราชวิถี พบอัตราสูงสุดในกลุ่มหญิงตั้งครรภ์กลุ่มที่ 5 ในทุกปี (พ.ศ.2558 - 2561) แนวโน้มอัตราการผ่าตัดคลอดโดยรวมและอัตราการผ่าตัดคลอดในแต่ละกลุ่มตาม TGCS ไม่แตกต่างกันระหว่างปี พ.ศ. 2558-2561*

คำสำคัญ: *อัตราการผ่าตัดคลอด, The Robson 10-group classification, โรงพยาบาลราชวิถี*

Introduction

Cesarean section (CS), a common obstetric procedure, is being increasingly utilized around the world in every continent. In Thailand, the CS rate increased from 15.2% in 1990 to 34.1% in 2007-2008[1] and Rajavithi Hospital (RH), the biggest governmental hospital of the Ministry of Public Health of Thailand, which carries out of 5,000 deliveries annually, also witnessed an increase in CS rates from 20.5% in 1996[2] to 34.7% in 2011[3]. The World Health Organization (WHO) recommends an optimal CS rate of 10-15%[4, 5], and believes a rate higher than 15% is not beneficial in terms of reducing maternal and neonatal mortality and morbidity[6]. Concerns about increasing CS rates have led to WHO's implementation of effective tools to monitor its use. In 2015, the WHO recommended the use of the Robson 10-group classification system (TGCS) as a worldwide monitoring tool which could be utilized to compare cesarean rates between hospitals[7].

TGCS has been employed as a tool for monitoring CS rates in RH for the past few years. Only two studies of TGCS in Thailand have been previously reported: the first was performed in 24 government hospitals in Khon Kaen Province, in the northeast region of Thailand in 2014[8], and the other was conducted in a very big university hospital in Bangkok, Siriraj Hospital, in 2017[9]. The objective of this research was to analyze the CS rates based on the TGCS and to determine the trend of CS rates in RH between 2015 and 2018.

Materials and Methods

This was a cross-sectional study of all deliveries in Rajavithi Hospital, Bangkok, Thailand between 1st January, 2015 and 31st December, 2018. Pregnant women with gestational age below 22 weeks, neonatal weight less than 500 grams, or incomplete medical records were excluded from the study. After the approval of the Institutional Research Committee of Rajavithi Hospital (number 61097) was received, the medical data were retrospectively reviewed in case where the deliveries had occurred before 3rd July, 2018 and were prospectively collected after participants had given written informed consent.

Data were reviewed from electronic medical records comprising, 6 basic obstetric variables: gestational age; parity; number of fetuses; fetal lie and presentation; history of previous CS; and type of labor onset (spontaneous labor, induced labor or pre-labor CS). All data were divided into TGCS classification (Table 1) using the flow chart of manual classification[7]. Overall cesarean rates, relative size of each group, cesarean rates in specific groups and relative and absolute contributions of each group to the overall rate were analyzed. Trends in CS rates were compared from 2015-2018.

Statistical analysis was performed using SPSS version 22. Chi-squared test for trends was used to compare trends of CS rates in each group as well as the overall CS rate. A p value < 0.05 was considered to be statistically significant.

Results

Between 2015 and 2018, 21,406 women gave birth at RH: 1,566 (7.31%) deliveries were excluded due to incomplete information, and the remaining 19,840 women's medical records were reviewed. The overall cesarean section rates were 35.5%, 36.6%, 35.2% and 34.8% in 2015, 2016, 2017 and 2018, respectively. No significant change in CS rates was observed during the four-year period ($p = 0.29$). Table 2 shows the number of CS and the CS rates of each group annually distributed by TGCS. Almost 70% of the study population was in groups 1, 3 and 10.

Relative and absolute contributions of each group to the overall CS rate are shown in Table 3. Multiparous women with previous CS in group 5 (30.8%, 32.6%, 31.9% and 31.9%) had the highest rates, followed by nulliparous women in spontaneous labor or induced labor onset (groups 1 and 2). There was no significant change in relative contributions to CS rates in four years. Women with previous CS (group 5), breech presentation (group 6 and 7), transverse/oblique lie (group 9) and nulliparous with induced labor onset (group 2) all had CS rates of more than 90%, as shown in Table 2. The lowest CS rate was observed in group 3 (6.8%, 7.1%, 5.1% and 5.6% in 2015, 2016, 2017 and 2018; respectively). The relative and absolute group contributions to the overall CS rates are shown in Table 3.

Table 1. Robson 10-Group Classification System[7].

Group	Obstetric population
1	Nulliparous women with a single cephalic pregnancy, ≥ 37 weeks' gestation in spontaneous labor
2	Nulliparous women with a single cephalic pregnancy, ≥ 37 weeks' gestation who had labor induced or were delivered by CS before labor
3	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥ 37 weeks' gestation in spontaneous labor
4	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥ 37 weeks' gestation who had labor induced or were delivered by CS before labor
5	All multiparous women with at least one previous CS, with a single cephalic pregnancy, ≥ 37 weeks' gestation
6	All nulliparous women with a single breech pregnancy
7	All multiparous women with a single breech pregnancy including women with previous CS(s)
8	All women with multiple pregnancies including women with previous CS(s)
9	All women with a single pregnancy with a transverse or oblique lie, including women with previous CS(s)
10	All women with a single cephalic pregnancy < 37 weeks' gestation, including women with previous CS(s)

CS: cesarean section

Table 2. Number of deliveries and size of group and CS rate in each The Robson Group Classification.

Group	2015			2016			2017			2018			p value*
	Total n overall: 4,813	Size of group (%)	CS rate in group (%)	Total n overall: 4,949	Size of group (%)	CS rate in group (%)	Total n overall: 5,223	Size of group (%)	CS rate in group (%)	Total n overall: 4,855	Size of group (%)	CS rate in group (%)	
1	1,433	29.8	19.3	1471	29.7	20.7	1,496	28.6	17.1	1,430	29.5	17.9	0.144
2	331	6.9	90.6	342	6.9	90.1	377	7.2	92	344	7.1	88.1	0.350
3	1,424	29.6	6.8	1,474	29.8	7.1	1,657	31.7	5.1	1,515	31.2	5.6	0.062
4	105	2.2	73.3	82	1.7	67.1	101	1.9	72.3	87	1.8	79.3	0.354
5	528	11.0	99.6	589	11.9	100	585	11.2	100	540	11.1	99.8	0.256
6	109	2.3	91.7	101	2.0	96	120	2.3	95.8	104	2.1	94.2	0.481
7	84	1.7	91.7	96	1.9	93.8	106	2.0	94.3	110	2.3	90	0.617
8	65	1.4	78.5	95	1.9	74.7	93	1.8	75.3	94	1.9	67	0.381
9	12	0.2	91.7	9	0.2	100	10	0.2	90	7	0.1	100	0.667
10	722	15.0	27	690	13.9	26.4	678	13.0	27.7	624	12.9	27.2	0.955

CS: cesarean section, Total n: total number of deliveries, * p value: compared from CS rate in each group between 2015 and 2018.

Table 3. Relative and absolute contribution of group to overall cesarean section rate.

Group	2015		2016		2017		2018		p value*
	RC [a]	AC[a] overall: 35.5%	RC[a]	AC[a] overall: 36.6%	RC[a]	AC[a] overall: 35.2%	RC[a]	AC[a] overall: 34.8%	
1	16.1	5.7	16.8	6.1	14.4	5.1	15.2	5.3	0.211
2	17.5	6.2	17	6.2	18.9	6.6	17.9	6.2	0.506
3	5.7	2	5.7	2.1	4.6	1.6	5	1.7	0.340
4	4.5	1.6	3	1.1	4	1.4	4.1	1.4	0.143
5	30.8	10.9	32.6	11.9	31.9	11.2	31.9	11.1	0.718
6	5.8	2.1	5.4	2	6.3	2.2	5.8	2.2	0.716
7	4.5	1.6	5	1.8	5.4	1.9	5.9	2	0.308
8	3	1.1	3.9	1.4	3.8	1.3	3.7	1.3	0.436
9	0.6	0.2	0.5	0.2	0.5	0.2	0.4	0.1	0.821
10	11.4	4.1	10	3.7	10.2	3.6	10.1	3.5	0.511

CS: cesarean section, RC: relative contribution of group to overall CS rate, AC: absolute contribution of group to overall CS rate, *p value: compared from relative contribution of group between 2015 and 2018.

Discussion

Two previous studies at RH showed that rates of CS increased from 20.52% in 1996 to 24.05% in 2000[2] and from 25.48% in 2002 to 34.70% in 2011[3]. It is notable that CS rates at RH in the present study (35.5%, 36.6%, 35.2% and 34.8% in 2015, 2016, 2017 and 2018, respectively) were quite stable compared with those in the period 2002-2011[3].

The highest contributor to the overall CS rate in the present research was group 5 (term previous CS), and this is similar to the findings of many previous studies conducted in Thailand[8, 9], Italy[10], Australia[11] and Brazil[12]. The relative contribution of group 5 to the overall CS rate varied from 10.9%[11] to 28.9%[9] in previous studies[8-12] while our rates were from 30.8% in 2015 to 31.9% in 2018. In contrast, the highest relative contributor to the CS rate in China[13] was group 2 (35% and 26.7% in 2014 and 2015, respectively) while the cases in group 5 amounted to 17.2% and 23.7% in 2014 and 2015, respectively.

In Thailand, most obstetricians and pregnant women prefer repeat cesarean delivery after primary CS in three instances: first, where there is an institutional policy of repeat CS in group 5 cases; second, where the labor room and operating room are located far from each other, in which case immediate CS in case of uterine rupture is practically impossible; and third, where the threat of law suits is high in the event of adverse outcomes. The CS rate in group 5 in a previous Thai study was very high at 99.4%[7] and was similar to the finding of our study (about 99.6-100%). Fortunately, group 5 constituted a small proportion of the total number of CS (8.2%) in previous Thai studies and just 11.0-11.9% in the present research.

When CS rates in each group were further investigated, group 2 and 1 were found to be the second and third ranked in relative contribution to the overall CS rate at 17-18.9% and 14.4-16.8%, respectively (Table 3). The CS rate in group 1 was a little higher than the WHO recommended rate (15%)[7, 14, 15] while that of group 2 (term single cephalic pregnancy who had labor induced or were delivered by CS before labor) was extremely high at 88.1-92%. This group should be carefully scrutinized, especially with regard to indications for and methods of induction of labor, as well as for indications for CS in case of non-induction. Group 4

also had a high CS rate (67.1-79.3%) and was different from group 2 only in that these women were multiparous, and this group should also be scrutinized in the same way as group 2. Subgroup analyses into group 2a and 4a (induced nulliparous and multiparous women, respectively) or 2b, and 4b (pre-labor CS nulliparous and multiparous women, respectively) can also be used to gain a better understanding if there are problems with induction of labor or pre-labor CS; however, our study had limitations in categorizing deliveries into these subgroups because most data were retrospectively reviewed, so that it was difficult to explore the details of these cases.

With regard to the size of the groups, groups 1-4 accounted for more than 70% of deliveries, and the contributions of CS in groups 2 and 4 were extremely high at 88.1%-92% and 67.1%-79.3%, respectively. This might be associated with the women's apprehensions, as many of them were concerned about labor pain and birth canal injury from vaginal delivery; furthermore, they lacked awareness of potential adverse outcomes from CS, and these mindsets may have resulted in unnecessary CS. Providing accurate information about delivery and potential adverse outcomes of CS to the women with appropriate indications may reduce the overall CS rate.

The higher CS rate of breech pregnancy in groups 6 and 7 was a result of fear of potential law suits in cases of morbidity and mortality after vaginal breech delivery, causing a decline in the number of birth using this method in Thailand. In Brazil[12], Australia[11], China[13], Italy[10] as well as Thailand[8, 9] there are also high CS rates in these groups. The large CS rate in group 8 could be for reasons similar to those of groups 6 and 7, namely, poor performance in multifetal pregnancy, especially in cases of vertex and non-vertex presentation. Planned vaginal delivery in twin pregnancies in Thailand is usually performed only in cases of vertex and vertex presentation, with the other types of multiple fetal pregnancy delivered by CS. Group 9 deliveries were typically by CS because of obstructed labor, so that its very high CS rate was not surprising; however, the relative contributions of group 6, 7, 8 and 9 were quite low and did not have a large impact on the total CS rate (Table 3). Strategies for reducing CS include encouraging vaginal birth after cesarean section in selected cases to lower the CS rate in group 5[16] and strictly defining indications for induction of labor in groups 2 and 4. External cephalic version should also be considered in cases of breech presentation pregnancy without cesarean scar[8], but, nowadays this procedure is rarely performed in Thailand because of lack of experience and skill in its use. External cephalic version, however, is still a policy in breech presentation pregnancy in RH after appropriate counseling.

The trends of relative and absolute contributions of each group to the overall CS rate were similar throughout the period studied (Table 3), and trends of CS in each group also did not differ greatly (Table 2). Even though, the CS rate in the present study was quite similar to those at the national level (34.1% in 2007-2008)[1], overall CS rates in these years were still markedly higher than the optimal CS rate recommended by WHO (10-15%)[4, 5], and the high CS rate in RH is therefore still an important problem to cope with. A study conducted in China found that CS rates increased in group 2 from 27.3% to 31.4% in 2014 and 2015[13], respectively, but results for group 5 were similar to ours (76.2% and 76.9% in 2014 and 2015, respectively).

The strength of our study was its large sample size and the fact that the data collection process was performed in a cross-sectional study, enabling us to determine trends of CS rates in each group as well as the overall rate. However, its limitations were that two thirds of the data were collected from retrospective review, and that incomplete data were excluded, so that, about 7.31% was unclassifiable. To reduce these incidences, health institutes may need to add a data collection form containing the 6 basic obstetric characteristics of the Robson 10-group classification to evaluate pregnant woman before delivery.

Conclusion

The overall CS rate at RH during 2015 and 2018 was 34.8%-36.6%, which is higher than the optimal

rate, and the relative and absolute contributions to overall CS rate were highest in group 5 in every year. The trend of CS rates in relative and absolute contribution and CS rate in each group were similar throughout the study period.

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Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Lumbiganon P, Laopaiboon M, Gulmezoglu AM, Souza JP, Taneepanichskul S, Ruyan P, et al. Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007-08. Lancet 2010;375:490-9.
2. Tansupasiri A, Kovavisarach E, Saenhorm P. Ceasarean Section Rate at Rajavithi Hospital from 1996-2000. Bull Dept Med Serv 2002; 27:433-8
3. Wachiratarapadorn N, Kovavisarach E. Trend in mode of delivery in Rajavithi Hospital: a ten-year analysis (2002-2011). J Med Assoc Thai 2013;96:768-72.
4. World Health Organization. Appropriate technology for birth. Lancet 1985;2:436-7.
5. Betran AP, Torloni MR, Zhang J, Ye J, Mikolajczyk R, Deneux-Tharaux C, 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. Souza JP, Gulmezoglu A, Lumbiganon P, Laopaiboon M, Carroli G, Fawole B, et al. Caesarean section without medical indications is associated with an increased risk of adverse short-term maternal outcomes: the 2004-2008 WHO Global Survey on Maternal and Perinatal Health. BMC Med 2010;8:71.
7. World Health Organization. Robson classification: Implementation manual. In. Geneva: World Health Organization; 2017.
8. Kankoon N, Lumbiganon P, Kietpeerakool C, Sangkomkamhang U, Betran AP, Robson M. Cesarean rates and severe maternal and neonatal outcomes according to the Robson 10-Group Classification System in Khon Kaen Province, Thailand. Int J Gynaecol Obstet 2018;140:191-7.
9. Anekpornwattana S, Yangnoi J, Jareemit N, Boriboonhirunsarn D. Cesarean Section Rate in Siriraj Hospital According to the Robson Classification. Thai J Obstet Gynaecol 2020;28:6-15.
10. Triunfo S, Ferrazzani S, Lanzone A, Scambia G. Identification of obstetric targets for reducing cesarean section rate using the Robson Ten Group Classification in a tertiary level hospital. Eur J Obstet Gynecol Reprod Biol 2015;189:91-5.
11. Tanaka K, Mahomed K. The Ten-Group Robson Classification: A Single Centre Approach Identifying Strategies to Optimise Caesarean Section Rates. Obstetrics and Gynecology Int 2017:ID5648938.
12. Ferreira EC, Pacagnella RC, Costa ML, Cecatti JG. The Robson ten-group classification system for appraising deliveries at a tertiary referral hospital in Brazil. Int J Gynaecol Obstet 2015;129:236-9.
13. Zhang Y, Gu N, Wang Z, Zheng M, Hu Y, Dai Y. Use of the 10-Group Classification System to analyze how the population control policy change in China has affected cesarean delivery. Int J Gynaecol Obstet 2017;138:158-63.
14. Souza JP, Betran AP, Dumont A, de Mucio B, Gibbs Pickens CM, Deneux-Tharaux C, et al. A global reference for caesarean section rates (C-Model): a multicountry cross-sectional study. BJOG 2016;123:427-36.
15. Souza JP, Gulmezoglu AM, Vogel J, Carroli G, Lumbiganon P, Qureshi Z, et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. Lancet 2013;381:1747-55.
16. Martel M-J, MacKinnon CJ. No. 155-Guidelines for Vaginal Birth After Previous Caesarean Birth. J Obstet Gynaecol Can 2018;40:e195-e207.