

Comparative Analysis of Caesarean Delivery Rates in a Tertiary and a Secondary Hospitals Using Robson Ten Group Classification

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ABSTRACT

Background: There is no justification for any reason to have a caesarean delivery (CD) rate higher than 10–15%. CD rates higher than 10% are not associated with substantial decrease in maternal and neonatal mortality rates. Robson Group Classification System has the advantage of analyzing the caesarean delivery rate in well-defined sub-groups of women that are totally inclusive and mutually exclusive.

Objective: The aim of the current work was to make comparative analysis of increasing trends of caesarean delivery in two hospitals at Assiut Governorate in Egypt.

Patients and methods: This retrospective cross-sectional study included a total of 2702 cases, attending for delivery at Assiut University Hospital; a tertiary hospital and Assiut Police Hospital; a secondary hospital, both present in Assiut Governorate. This study was conducted over 3-month between Jan 2016 to Mar 2016.

Results: Robson Group 5 constituted the most in both hospitals regarding the relative size of the group with higher and significant percentage at the secondary hospital (53%) compared to (32.3%) at the tertiary one. Robson Group 5 contributed the most in both hospitals regarding the overall CD rate with higher and significant percentage at the secondary hospital (74.8%) compared to (49.4%) at the tertiary one. Robson Group 5 also contributed the most in both hospitals regarding the absolute contribution rate of all deliveries with higher and significant percentage at the secondary hospital (50%) compared to (28.7) at the tertiary one.

Conclusion: On the basis of the study, TGCS is only a starting point, but it is important to have a common starting point. Having implemented TGCS, we have concluded that Group 5 (previous caesarean delivery) is the largest of the overall CD rate in both secondary and tertiary hospitals.

Keywords: Caesarean delivery, Assiut Governorate, Robson Ten Group Classification

INTRODUCTION

Caesarean delivery (CD) has become the most common obstetric operation worldwide. When medically indicated, it can effectively reduce maternal and neonatal morbidity and mortality⁽¹⁾. But, the rate of CD is increasing dramatically both locally and internationally exceeding World Health Organization (WHO) recommendation of a rate not more than 10-15% without a clear understanding of the main drivers⁽²⁾. An ecological study showed that out of 137 countries, approximately 50% have CD rates of more than 15%. Of these, 46 countries have a rate of more than 20%⁽³⁾. Another ecological study was performed (according to nationally representative CD rates from 2000 to 2012) and concluded that CD rates higher than 10% are NOT associated with substantial decrease in maternal and neonatal mortality rates after controlling of socio-economic conditions⁽⁴⁾.

Women who experience CD are at risk of classical complications such as surgical injury, post-partum haemorrhage and uterine rupture as well as increasing risk of complications of placentation in subsequent pregnancies such as placenta accreta and caesarean scar ectopic pregnancy⁽⁵⁾.

Furthermore, CD represents substantial cost to countries. According to WHO, the cost of global excess CD (caesarean deliveries beyond the recommended rate of 15%) was estimated to approximately US\$ 2.32 billion (all costs were denominated in 2005 constant \$)⁽³⁾.

In the light of these issues, WHO, in 2011, conducted a systematic review of systems used to classify CD and concluded that Robson Ten Group Classification System (TGCS) is the most appropriate system to fulfill current international and local needs⁽⁶⁾.

In 2014, WHO conducted another systematic review of the experience of Robson classification and proposed TGCS as a global standard for assessing, monitoring and comparing CD rates within health care facilities over time and between facilities⁽⁷⁾.

The aim of the current work was to make comparative analysis of increasing trends of caesarean delivery in two hospitals at Assiut Governorate in Egypt, one is a tertiary hospital, and the other is a secondary one, to understand the ongoing rise of caesarean delivery rate.

PATIENTS AND METHODS

This retrospective cross-sectional study included a total of 2702 cases, attending for delivery at Assiut University Hospital; a tertiary hospital and Assiut Police Hospital; a secondary hospital, both present in Assiut Governorate. This study was conducted over 3-month between Jan 2016 to Mar 2016.

Inclusion criteria:

All women delivered in the two mentioned hospitals including both vaginal and caesarean deliveries irrespective of obstetric indication, medical history, or other maternal factors as BMI.

Delivery data were collected from Medical Record Departments in both hospitals. Formal consent was sought from the head of Women's Health Hospital and the head of Assiut Police Hospital. The results were tabulated according to the Ten Group Robson Classification System which is based on five parameters: parity, onset of labor, fetal presentation, gestational age and number of fetuses, (figure1). Then, the results were interpreted to calculate the relative size of each Robson group, the caesarean delivery in each Robson group, the absolute and relative contributions made by each group to the overall caesarean delivery rate.

Strengths of the study: It is simple, reproducible, mutually exclusive and totally inclusive. It also avoids subjectivity.

Limitations: It does not take into account maternal factors as maternal morbidity, age, BMI and so.

Ethical Consideration:

An approval of the study was obtained from Assit University academic and ethical committee. Written informed consent of all the subjects was obtained. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis:

Statistical package for social sciences (IBM-SPSS), version 24 IBM- Chicago, USA (May 2016) was used for statistical data analysis. Data expressed as mean, standard deviation (SD), number and percentage. Mean and standard deviation were used as descriptive value for quantitative data, while number and percentage were used to describe qualitative data. Student t test was used to compare the means between two groups, and one-way analysis of variance (ANOVA) test was used to compare means of more than two groups. Mann Whitney test was used in stead of Student t test in case of non parametric data. Pearson Chi square was used to compare percentages of qualitative data, and Fisher's Exact test was used for non parametric data. Pearson correlation test was used to compare two quantitative variables. P value < 0.05 was considered significant.

RESULTS

Table (1) shows that the vast majority of our cases were from the Assiut University hospital (hospital A), 2536 cases (93.9%) compared to only 166 cases (6.1%) were from Assiut Police hospital (hospital B).

Table (1): Total number of study cases in both hospitals

	No	%
University Hospital	2536	93.9
Police Hospital	166	6.1
Total	2702	100.0

More than half of the overall cases, 1585 cases (58.7%) delivered by caesarean delivery, compared to 1117 cases (41.3%) delivered through normal vaginal delivery. The overall CD rate at Assiut University Hospital was 58% (1474 cases out of 2536) and 66.9% (111 cases out of 166) at Assiut Police Hospital. It is evident that group 5 (All multiparous with at least one previous uterine scar, with single cephalic pregnancy, ≥37 weeks gestation) contributed the most to the overall number of deliveries of both hospitals which was seen in more than one third of the cases (908 cases; 33.6%). This was followed by group 3 (Multiparous without a previous uterine scar, with single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor) seen in 554 cases (20.5%).

Then, group 1 (Nulliparous with single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor) seen in 320 cases (11.8%). In the fourth place was group 10 (All women with a single cephalic pregnancy <37 weeks gestation, including women with previous scars) seen in 303 cases (11.2%).

These 4 groups accounted for more than three quarters of the cases, with the remaining one quarter was divided between the remaining 6 groups, with group 4 (163 cases; 6%), then group 2 (155 cases; 5.7%), then group 8 (152 cases; 5.6%), then group 7 (97 cases; 3.6%), then group 6 (38 cases; 1.4%) and lastly group 9 (12 cases; 0.4%). Around 29% of cases in hospital A were nulliparous with single cephalic pregnancy, ≥37 weeks gestation (group 1 and group 2 collectively), compared to only 4.8% among hospital B, with a highly significant difference (Table 2).

Table (2): Total deliveries (caesarean and vaginal) in both hospitals classified into Robson Ten Groups.

	No	%
Mode of delivery	Vaginal delivery	1117 41.3%
	Caesarean delivery	1585 58.7%
Robson group number	1	320 11.8%
	2	155 5.7%
	3	554 20.5%
	4	163 6%
	5	908 33.6%
	6	38 1.4%
	7	97 3.6%
	8	152 5.6%
	9	12 0.4%
	10	303 11.2%

Regarding the Robson group classification, there is highly significant difference between the two hospitals. Among hospital A cases, the most common Robson group was 5 (32.3%), followed by 3 (19.8%), then 1 (12.5), then 10 (11.8%). On the other hand, among hospital B cases, the most common Robson group was 5 (53%), followed by 3 (31.3%), then 2 (3.6%), then 4, 7 and 8 (3% each) (Table 3).

Table (3): Classification of deliveries of each hospital separately into the Robson Ten Groups

		University Hospital (Hospital A)	Police Hospital (Hospital B)	Chi square	P value
Group number	1	318(12.5%)	2(1.2%)	70.431	<0.001 (HS)
	2	149(5.9%)	6(3.6%)		
	3	502(19.8%)	52(31.3%)		
	4	158(6.2%)	5(3%)		
	5	820(32.3%)	88(53%)		
	6	38(1.5%)	0		
	7	92(3.6%)	5(3%)		
	8	147(5.8%)	5(3%)		
	9	12(0.5%)	0		
	10	300(11.8%)	3(1.8%)		

Regarding the number of individual group cases relative to the total number of cases recruited from the two hospitals, we found that hospital B had a higher and significant percentages of group 5 and 3, being 53% and 31.3%; respectively, compared to only 32.3% and 19.8% among hospital A cases; respectively. On the other hand, Hospital A showed higher prevalence of groups 1 and 10, being 12.5% and 11.8%; respectively, compared to only 1.2% and 1.8%; respectively among hospital B cases.

The other 6 groups showed non significant differences between the two hospitals. Regarding the percentage of CD done in each individual Robson group relative to the total number of cases in the same group, we found that; in hospital B cases, all of the cases in groups 1 and 4 delivered through Caesarean delivery (100% each) compared to only 27.4% and 51.3% among hospital A cases; respectively. On the other hand, the remaining groups showed non significant differences between the two hospitals, taking in consideration that the p value could not be calculated in groups 6 and 9 because there were no cases in these groups among hospital B cases (Table 4).

Table (4): Comparison between the two hospitals regarding relative size of the Robson Groups and caesarean delivery rate in each Group

Robson Group	No. of group cases/Total No.			% of CD/N of each group		
	Hosp. A	Hosp. B	P value	Hosp. A	Hosp. B	P value
1	318/2536 (12.5%)	2/166 (1.2%)	<0.001 (HS)	87/318 (27.4%)	2/2 (100%)	0.022 (S)
2	149/2536 (5.9%)	6/166 (3.6%)	0.225 (NS)	114/149 (76.5%)	6/6 (100%)	0.177 (NS)
3	502/2536 (19.8%)	52/166 (31.3%)	<0.001 (HS)	57/502 (11.4%)	3/52 (5.8%)	0.217 (NS)
4	158/2536 (6.2%)	5/166 (3%)	0.092 (NS)	81/158 (51.3%)	5/5 (100%)	0.032 (S)
5	820/2536 (32.3%)	88/166 (53%)	<0.001 (HS)	728/820 (88.8%)	83/88 (94.3%)	0.110 (NS)
6	38/2536 (1.5%)	0/166 (0%)	0.112 (NS)	29/38 (76.3%)	0	-
7	92/2536 (3.6%)	5/166 (3%)	0.679 (NS)	74/92 (80.4%)	4/5 (80%)	0.981 (NS)
8	147/2536 (5.8%)	5/166 (3%)	0.131 (NS)	105/147 (71.4%)	5/5 (100%)	0.160 (NS)
9	12/2536 (0.5%)	0/166 (0%)	0.374 (NS)	11/12 (91.7%)	0	-
10	300/2536 (11.8%)	3/166 (1.8%)	<0.001 (HS)	188/300 (62.7%)	3/3 (100%)	0.183 (NS)

Regarding the percentage of CD cases in each group relative to the total number of CD in each hospital, we found that group 5 showed higher and significant percentage among hospital B cases (74.8%) compared to hospital A cases (49.4%). On the contrary, group 10 showed higher and significant percentage among hospital A cases (12.8%) compared to hospital B cases (2.7%). All of the other 8 groups showed non significant differences between the two hospitals.

Also, regarding the percentage of CD cases in each group relative to the total number of cases in each hospital, we found that group 5 showed higher and significant percentage among hospital B cases (50%) compared to hospital A cases (28.7%). On the contrary, group 10 showed higher and significant percentage among hospital A cases (7.4%) compared to hospital B cases (1.8%). All of the other 8 groups showed non significant differences between the two hospitals (Table 5).

Table (5): Comparison between the two hospitals regarding total caesarean delivery rate and absolute contribution rate of all deliveries

Robson Group	% of CD/total N of CD			% of CD/N of all births		
	Hosp. A	Hosp. B	P value	Hosp. A	Hosp. B	P value
1	87/1474 (5.9%)	2/111 (1.8%)	0.070 (NS)	87/2536 (3.4%)	2/166 (1.2%)	0.120 (NS)
2	114/1474 (7.7%)	6/111 (5.4%)	0.371 (NS)	114/2536 (4.5%)	6/166 (3.6%)	0.593 (NS)
3	57/1474 (3.9%)	3/111 (2.7%)	0.535 (NS)	57/2536 (2.2%)	3/166 (1.8%)	0.709 (NS)
4	81/1474 (5.5%)	5/111 (4.5%)	0.657 (NS)	81/2536 (3.2%)	5/166 (3%)	0.896 (NS)
5	728/1474 (49.4%)	83/111 (74.8%)	<0.001 (HS)	728/2536 (28.7%)	83/166 (50%)	<0.001 (HS)
6	29/1474 (2%)	0/111 (0%)	0.136 (NS)	29/2536 (1.1%)	0/166 (0%)	0.166 (NS)
7	74/1474 (5%)	4/111 (3.6%)	0.506 (NS)	74/2536 (2.9%)	4/166 (2.4%)	0.704 (NS)
8	105/1474 (7.1%)	5/111 (4.5%)	0.295 (NS)	105/2536 (4.1%)	5/166 (3%)	0.476 (NS)
9	11/1474 (0.7%)	0/111 (0%)	0.361 (NS)	11/2536 (0.4%)	0/166 (0%)	0.395 (NS)
10	188/1474 (12.8%)	3/111 (2.7%)	0.002 (S)	188/2536 (7.4%)	3/166 (1.8%)	0.006 (S)

DISCUSSION

Regarding our study, more than half of the cases, (58.7%), delivered by caesarean section in both hospitals. The CD rate was 66.9% at Assiut Police Hospital and 58% at Assiut University Hospital. These rates are far higher than the 15% recommended by the WHO.

It is evident that group 5 contributed the most to the overall number of deliveries of both hospitals by more than one third of the cases (33.6%), followed by group 3 (20.5%), then, group 1 by (11.8%) and group 10 by (11.2%).

The same arrangement was seen among hospital A cases, with percentages 32.3, 19.8, 12.5, 11.8 for groups 5, 3, 1, 10 respectively.

On the other hand, among hospital B cases, the most common Robson group was group 5 by (53%), followed by group 3 by (31.3%), then group 2 by (3.6%), then groups 4, 7 and 8 (3% each).

In comparison, **Abdel-Aleem et al.**⁽⁸⁾ study showed that most women belonged to group 3 both in 2008 and 2011 with group 1 and group 5 being the second and third largest groups, respectively.

Similarly, Group 3 was the largest group of the obstetric population in a study conducted at the National Maternity Hospital in Dublin, by 32.3%. This was followed by group 1 and group 5, respectively⁽⁹⁾.

The same pattern was observed in Singapore with group 3 representing the highest proportion of all deliveries by 29.1%⁽¹⁰⁾.

In our study, most women belonged to Group 5 that has jumped to the first place over group 3 in most previous published studies. It seems that “Once a caesarean, always a caesarean” holds true.

Regarding the overall CD rate calculated by dividing caesarean deliveries in each group relative to the total number of caesarean deliveries in each hospital, we found that group 5 showed the largest contribution to the overall CD rate in both hospitals, with

higher and significant percentage among hospital B cases (74.8%) compared to hospital A cases (49.4%).

This result is in agreement with results reported from other studies from Egypt and other different countries.

In Egypt, two clinical audits of women delivered at Assiut University Hospital, conducted in 2008 and 2011, showed that Group 5 made the greatest contribution (30%) to the overall CD rate⁽⁸⁾.

Another Egyptian study based on Robson Classification was conducted at Benha University Hospital reached the same result that Group 5 is the largest contributor to the overall CD rate by 36%⁽¹¹⁾.

In Latin America study, Group 5 was also the largest contributor to the overall CD rate (26.7%)⁽⁹⁾.

In Australia, Group 5 was the single greatest contributor to the overall CD rate by 57% approaching our percentages⁽¹²⁾.

A study in Singapore showed that Group 5 represented 25.9% of the overall CD rate being the leading contributor to the overall CD rate⁽¹⁰⁾.

Our study showed that group 10 had higher and more significant percentage among hospital A cases (12.8%) compared to hospital B cases (2.7%).

This observation of relatively large contributing role by group 10 is similar to a study at the Singapore General Hospital from January 2008 to December 2011, where Group 10 had an overall CD rate of 16.1%⁽¹⁰⁾.

This group includes preterm labor that are usually performed in the presence of medical and obstetric complications such as severe preeclampsia, preterm premature rupture of membranes and antepartum haemorrhage.

Also, regarding the percentage of CD cases in each group relative to the total number of cases in each hospital (the absolute contribution of all deliveries), we found that group 5 showed higher and more significant percentage among hospital B cases (50%) compared to hospital A cases (28.7%).

Similarly, the greatest absolute contribution rate to all deliveries was made by Group 5 (8.2%) according to a study in Thailand conducted on 18043 deliveries in 2014 ⁽¹³⁾.

On the contrary, group 10 showed higher and significant absolute contribution to the overall CD rate among hospital A cases by (7.4%) compared to hospital B cases (1.8%).

So, Group 5 constituted the largest of all ratios in our study. Group 5 was the largest regarding the relative size to all deliveries in both hospitals. It was the largest regarding relative contribution to the overall CD rate in both hospitals. Also, Group 5 was the largest regarding the absolute contribution to the overall CD rate.

These results attract attention to the importance of trial of labor after caesarean delivery (TOLAC). TOLAC is the only remedy to decrease group 5 contribution to caesarean delivery rates but the criteria for TOLAC has never being straight forward and tends to be at the discretion of individual obstetrician and risk taking attitude and often times, counseling of the patient is undirected towards this attitude. And in the event of untoward outcome, labour wards staffs (residents and midwives) are so chastised so severely that it kills their initiative and boldness to manage such cases appropriately and so they tend to intervene too soon. The main risk of TOLAC are emergency cesarean delivery and uterine rupture. Making available blood and blood products as well as emergency drugs would be imperative ⁽¹⁴⁾.

In 1999, the American College of Obstetricians and Gynecologists recommended TOLAC should be attempted only in well-equipped hospitals with "immediate availability of emergency care" ⁽¹⁵⁾. In 2005, the Society of Obstetricians and Gynaecologists of Canada recommended that vaginal birth after cesarean deliveries be done in hospitals where a timely cesarean delivery was possible ⁽¹⁶⁾. This may be applicable at tertiary hospitals like Assiut University Hospital, but this is not the case at secondary hospitals where blood banks are not available.

Women should be counseled that successful rate of planned vaginal birth after caesarean delivery is 72-75% ⁽¹⁷⁾.

Our study showed high CD rates in groups 6, 7, 8 and 9 in both hospitals ranging from 71.4% to 100%. Despite the alarming rates, these groups have small relative sizes. Thus, these groups contributed relatively little to overall CD rates by 8.5% for Hospital A and 5.4% for Hospital B.

Although the evidence indicates that caesarean delivery is the most appropriate birth method in breech presentations ⁽¹⁸⁾, the practice of external cephalic version in term pregnancies should be implemented as a prevention measure to reduce CD rates in Groups 6 and 7 ⁽¹⁹⁾.

Twin pregnancies have a low rate of occurrence. In most cases, they are dichorionic diamniotic and the presentation of the first fetus is cephalic. The indication

for the method of birth is preferably obstetric and driven by the presentation of the first twin ⁽²⁰⁾. If it is applied, CD rates in Group 9 will be reduced.

CONCLUSION

It could be concluded that and on the basis of the study, TGCS is only a starting point, but it is important to have a common starting point. Having implemented TGCS, we have concluded that Group 5 (previous caesarean delivery) is the largest of the overall CD rate in both secondary and tertiary hospitals. Previous CD is a vicious cycle needs to be put to a stop which is possible only if CD is undertaken only after careful consideration and when the obstetric risk outweigh those of the procedure itself. Also, TOLAC needs to be encouraged.

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