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C Section Rates Analysis During COVID Pandemic Using Robson Ten Group Classification System (RTGCS): A Moroccan Pilot Study

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Abstract

Caesarean section(CS) is a surgical procedure that can effectively prevent maternal and neonatal mortality when used for medically indicated reasons. Although it is a life-saving treatment, it comes with short- and long-term dangers for x mothers and newborns, higher healthcare expenditures, and repercussions for future pregnancies.

The World Health Organization (WHO) announced that the ideal rate for C-sections is between 10% and 15% of all births. When exceeded it doesn't improve maternal and foetal morbidity and mortality.

To better analyse this phenomenon, The World Health Organization (WHO) officially adopted the Robson classification system in 2010, as a global standard for categorizing and comparing caesarian section rates across different countries and healthcare settings, it allows healthcare providers to identify and monitor patterns and trends in C-section rates and to develop targeted interventions to reduce unnecessary C-sections and improve maternal and neonatal outcomes.

In this article we present a Moroccan pilot study done during the COVID Pandemic to analyse, compare and report our obstetrical activity using Robson ten group classification system.

Introduction

Caesarean section(CS) is a surgical procedure that can effectively prevent maternal and neonatal mortality when used for medically indicated reasons, when vaginal birth is neither possible or hazardous1.

Even while CS can be a life-saving treatment, it comes with short- and long-term dangers for the mother and newborn, higher healthcare expenditures, and repercussions for future pregnancies3. Furthermore, perinatal and maternal mortality reductions at the population level were never connected with CS rates higher than 10% (World Health Organisation (WHO) 2015)2,12

Reports showed that CS rates are comparatively high among more educated women who live in urban areas , and those who have high socio-economic status.

Whereas in rural and remote areas, the rates dropped because of the lack of access to proper healthcare facilities, as well as a shortage of staff and equipment, contributing to an increased maternal and neonatal morbidity and death5.

According to the World Health Organization (WHO), the ideal rate for C-sections is between 10% and 15% of all births 2. However, C-section rates have been increasing globally, and in some countries, they are much higher than the recommended rate.

In the same report, the global average C-section rate was found to be 18.6%. However, there were significant regional variations, with the highest rates in Latin America and the Caribbean (44.3%), followed by North America (32.3%) and Europe (27.2%). The lowest rates were in Africa (7.3%) and Southeast Asia (17.2%) 2.

The WHO reports several medical reasons for which C-section may be necessary, such as fetal distress, multiple births, and previous C-sections. However, there is also evidence that unnecessary C-sections can pose risks to both the mother and the baby.

Thus C-sections are to be performed only when medically necessary and efforts need to be made to reduce unnecessary C-sections while maintaining positive maternal and neonatal health outcomes. 2,12,16

To better analyse this phenomenon, The World Health Organization (WHO) officially adopted the Robson classification system in 2010, as a global standard for categorizing and comparing caesarian section rates across different countries and healthcare settings 2,12. This classification system allows healthcare providers to identify and monitor patterns and trends in C-section rates and to develop targeted interventions to reduce unnecessary C-sections and improve maternal and neonatal outcomes. It consists of ten groups, based on five basic obstetrical characteristics: maternal history, onset of labour, foetal presentation, number of foetuses, and gestational age. The Robson classification is widely used in many countries as a tool to analyse and monitor caesarean section rates and to identify areas where quality improvement efforts are needed.8,9,10,11

The Caesarean section (C-section) rate in Morocco has been increasing over the years. According to a study published in BMC Pregnancy and Childbirth in 2019, the national C-section rate in Morocco was 25.6% in 2011, and it increased to 29.7% in 2015 in the public sector, and over 90% in the private sector. 5,6,7

As one of the WHO collaborating centres in North Africa, our maternity hospital Les Orangers, participated together with other centres of the Eastern Mediterranean Region: Egypt, Iran, Lebanon, and Pakistan, in the TGCS implementation and evaluation program led by the World Health Organisation representatives.

To the best of my knowledge this work represents a first in Morocco. The purpose of this study was to apply the modified RTGCS to all births within our tertiary maternity hospital between January 1st and December 31st , 2020; during the COVID pandemic in order to identify the impact it had on our CS rates and work tendencies.

Research Methods

We conducted an observational retrospective study, in our tertiary referral center Les Orangers Maternity Hospital, for twelve months, from January 1st to December 31st , 2020. We applied the TGCS to all deliveries that occurred during this period. We gathered data from patients paper records, using data collection sheets and a Robson TGCS platform created for this purpose by our IT team.

We didn't need the approval of the ethic comity to conduct this study, since there was no patient intervention.

We focused on the distribution of the C sections performed in the 10 groups of the classification, and analysed the different indications.

Our results were discussed and analysed during 2 virtual workshops in the presence of Dr Michael Robson, and the other representatives of the WHO collaborating centres of the eastern Mediterranean region in June 2021.

Group	Obstetric Population
1	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
2	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who had labour induced or were delivered by CS before labour
2a	Labour induced
2b	Pre-labour CS
3	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
4	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation who had labour induced or were delivered by CS before labour
4a	Labour induced
4b	Pre-labour CS
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)

World Health Organization. Robson Classification: Implementation Manual. 2015

Table 1: Robson ten groups classification system

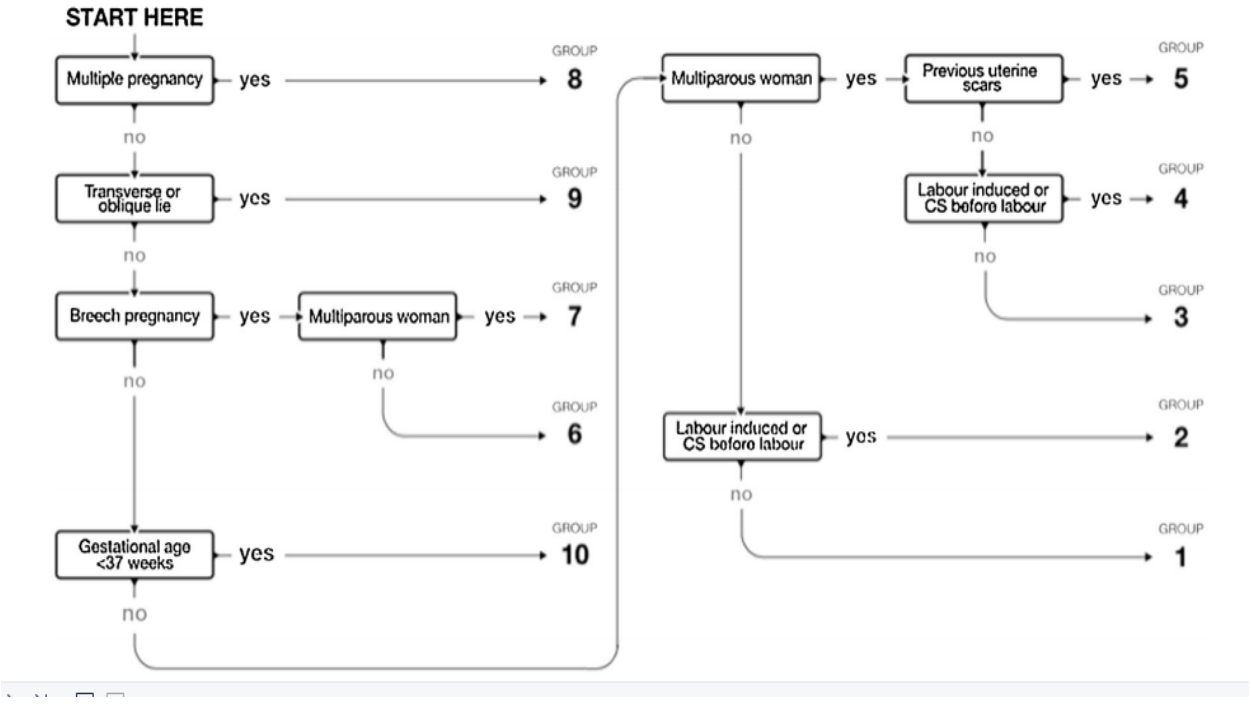

Figure 1: Flow chart used to create the TGCS Robson table.

Source: Adapted from Nassar LF, Sancho HD. Instrucción de Robson. v.0.1-1. 2015/06/08. Caja Costarricense de Seguro Social.

Results

During the study period, 7323 women delivered in our maternity hospital, 2407 by

C section, with a rate of 32,87 %.

In our results (Table 2), Groups 3 (multiparas,singleton,cephalic, >=37 wks in spontaneous labour) had the largest size (48.16%) due to our population high fertility rate, followed by Group 1 (Nulliparas, singleton, cephalic, >=37 wks in spontaneous labour (35,76%).

The induction/programmed c section groups (2,4) were small, respectively (4.34% and 2.51%).

The size of group 5 (Previous caesarean section, singleton, ceph >= 37 wks) was limited (6.07%) in our population.

The major contributor in the overall c section rate was the group 1 of nulliparas (12,14%), followed by group 5 (previous c section), and then group 3 of multiparas in spontaneous labour.

The size of the breech Groups 6 and 7 were of 2.25% which is within the expected range for breeches. The contribution of groups 8,9 and 10 in the overall c sections rate was very feeble.

We also looked into C section indications (Table 3): Labour dystocia (during first or second stage, including failed instrumental delivery and failure of induction of labour) was the most frequent reason for c sections in our population (33.15%), then foetal heart rate abnormalities (31,4%), repeat CS (16.32%), maternal conditions (preeclampsia, anemia, thyroid abnormalities, gestational diabetes complications) (9.2%), malpresentation (5.3%), suspected placental abruption, placenta previa/accreta/vasa previa(3.1%), previous pregnancy or gynaecological complications and uterine rupture or other(1.8%)

	C section rate in each gr	Size of group %	C/S rate in each gp %	Contribution of each gp in c section rate
1. Nullip single ceph >=37 wks spontanous labor	889/2619	35.76%	33.94%	12.14%
2 .Nullip single ceph >=37wks induction or CS before labor	313/318	4.34%	98.43%	4.27%
3. Multip (excl prev caesarean sections) single ceph >=37 wks spontanous labor	402/3527	48.16%	11.3%	5.49%
4. Multip (excl prev caesarean sections) single ceph >=37wks induction or CS before labor	184/184	2.51%	100%	2.51%
5. Previous caesarean section single ceph >= 37 wks	413/445	6.07%	92.80%	5.64%
6 .All nulliparous breeches	71/71	0.96%	100%	0.96 %
7. All multiparous breeches (incl previous caesarean sections)	85/94	1.28 %	90.42%	1.16 %
8 .All multiple pregnancies (incl previous caesarean sections)	32/38	0.51 %	84.21 %	0.43 %
9. All abnormal lies (incl previous caesarean sections)	5/5	0.06 %	100 %	0,068 %
10. All single ceph <= 36 wks (incl previous caesarean sections)	13/22	0.30 %	59.09 %	0.17 %

Table 2: Distribution of Caesarian Section in terms of Robson's TGCS.

Indications	*Numbers and percentages*
Labour dystocia	**798/2407 (33.15%)**
Fetal heart rate abnormalities	**756/2407 (31,4%)**
Repeat CS	**393/2407 (16,32%)**
Maternal conditions	**222/2407 (9.2%)**
malpresentation	**128/2407 (5.3%)**
Placental abnormalities	**65/2047(3.1%)**
Others	**45/2407(1.8%)**

Table 3: Indications of C sections in our population during COVID pandemic

Discussion

The COVID-19 pandemic has had a significant impact on healthcare systems worldwide, including obstetric care and delivery practices. There have been reports of increased rates of caesarean sections (C-section) during the pandemic due to various factors, such as fear of infection, staff shortages, and adaptive changes in clinical practices.

A study published in the Journal of Perinatal Medicine in October 2020 analysed data from 44 countries and found that the overall C-section rate during the COVID-19 pandemic was 10.8% higher compared to the same period in the previous year. The study also found that the increase in C-section rates was more pronounced in private hospitals compared to public hospitals.17

Another study published in the American Journal of Obstetrics and Gynecology in January 2020 analysed data from a large academic medical center in the United States and found that the C-section rate during the COVID-19 pandemic was 5.1% higher compared to the same period in the previous year. The study authors suggested that the increase in C-section rates may be due to changes in clinical practices, such as earlier induction of labour or more frequent use of C-sections for maternal or foetal indications.19

The data we obtained from our study showed that our overall c section rate has slightly increased during the pandemic from 27% to 32.8%, which is higher than recommended by the WHO. 83.92% of the patients who had a c section came in, in advanced stages of labour. More than 80% of the women population who delivered in our Maternity in 2020, never had a prenatal consult before, because of the fear of contamination and the national containment measures applied during the first months of the pandemic in Morocco.

Analysing our data we found that the size of Group 1 and Group 2 of nulliparas was 40.10% which was within the expected range. The ratio of the sizes of Group 1/Group 2 was 8 which indicates that the number of inductions and programmed C sections was reduced compared to the year before. The size of Groups 3 and 4 of multiparas was 50.67%. This Rate was higher than the reference in the WHO manual, It indicates that our hospital serves a population with high fertility rate. The ratio of Group 3/Group 4 was 19 since we couldn't perform inductions of labour and programming. The small size of group 5 (6.07%) showed our previous efforts to limit c section indications although we expect an increase considering the tendency of C section rates in group 1 and 3 demonstrated in our data.

The CS rates in group 6 and 7 were high, 100% and 90% each, since breeches are associated with the highest risk of complications, especially when the patients present in advanced stages of labour.

The biggest contributor in c sections was found to be group 1 of nulliparas, in spontaneous labour, and the most common indication was dystocia and fetal heart abnormalities.

The definition of labour dystocia used within our facility is the one introduced by Friedman with his partogram in the 1950s (Friedman 1954) and adopted later on by the WHO. However recent evidence suggests that this definition does not accurately take into consideration the recent data on cervical dilation pattern of labour. Labour has been suggested to progress slower, with a later onset of active phase 22,23. The WHO now recommends against labour acceleration prior to 5 cm cervical dilatation, provided foetal and maternal conditions are reassuring.

We are still using Freidman's partogram which contributes to a premature diagnosis of labour dystocia and CS indication in women who may have otherwise had a safe vaginal birth.

The second most commun indication for c section in our study was foetal heart abnormalities. Several studies have investigated the association between foetal heart monitoring and the likelihood of C-section delivery. One study found that the use of continuous electronic foetal monitoring (CEFM) during labour was associated with a significantly higher rate of C-section delivery compared to intermittent monitoring. We use continuous monitoring in our facility and thus this may offer an explanation for the high number of c sections performed in this indication. The efforts we intend to make to decrease c section in this group are to switch to intermittent monitoring and offer training sessions to our staff, to improve their foetal heart tracing interpretation skill.

And also to update our clinical protocols on labour management to follow the latest partogram recommendations of the world health organisation.

The relative size of group 5 was (6.07%) which was less than the 10% expected (WHO 2017), although the CS rate in the group was 92.80% which was very high, this indicates that there were few vaginal births after caesarian (TOLAC: trial of labour after c section) in our study population and very rare inductions in this group. The practice of Trial of labour after CS (TOLAC) has been declining worldwide due to concerns of increased maternal and foetal complications including uterine rupture and perinatal death 24. CS convenience, medico-legal implications and patient perception represent other barriers to TOLAC uptake.

Qualitative studies showed that information on TOLAC risks and advantages, shared decision making with the couple, are important factors influencing TOLAC acceptance24. These results showed that we need to improve our TOLAC practice and protocoles, to maintain our c section rates in the recommended rates.

Although the CS rate in Group 8 was high (84.21%), the group size was small, as the number of multiple pregnancies is limited in our population, thus it didn't contribute much to the overall rate of c sections.

The group 10 of preterm births contribution to c sections was the lowest, due to the fact that we usually accept vaginal delivery in this category, as of the WHO (2015) recommendations against routine CS for pre-term infants.

For maternal and foetal outcomes during COVID pandemic, our maternity hospital didn't register any maternal death. Although foetal outcomes were more dire, we registered 28 foetal demise ,40 neonatal deaths and 21 case of hypoxia.

The increase in foetal morbidity and mortality could be imparted to the major limitations, the patients faced to access prenatal care during the pandemic.

The modified RTGCS is an effective method for evaluating comparable contributors to C sections in different times and settings. We chose to evaluate our activity in a tertiary maternity hospital during the pandemic of COVID. Nulliparas with term, cephalic,singleton,in spontaneous labour (Group 1) and previous CS (Group 5) ,were the greatest contributors to our CS rate which was comparable to our findings in previous years though the numbers of c sections increased during the pandemic.

Future efforts should focus on reducing CS rates within these groups in order to meaningfully reduce the overall CS rate in our facility. This may be achieved by critically evaluating our labour protocols and partograms, to redefine the indication of labor dystocia , improve our staff's foetal heart tracing interpretation by offering more training and appropriately promoting the trial of labour in women with a previous C Section «TOLAC « practices.

Conclusion

To our knowledge this study is the first large study conducted in Morocco to analyse the C Section rate in a referral tertiary maternity using Robson ten group classification system RTGCS. Therefore it provides a valuable addition to the existing scientifique evidence. Our strength is that our study covers a 12 months period and a large number of patients. However it's a one center retrospective study and we did not consider Influential factors such as demographic details (socio-economic status, education, BMI etc) which are known to affect the overall maternal and perinatal outcomes. These factors represent a limitation to the generalisation of our results .

Following this study, a multi-centric trial involving 8 maternity hospitals (4 regional and 4 university hospitals) has been planned to analyse CS rates from various regions of Morocco

In future work, these details along with maternal and foetal outcome from each group should be collected to determine the overall quality of healthcare for mother and child.

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