Utility of the Robson Ten Group Classification System to determine appropriateness of caesarean section at a rural regional hospital in KwaZulu-Natal, South Africa

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Background. High caesarean section (CS) rates are not only costly but associated with significant perinatal and maternal morbidity and mortality. It has recently been suggested that structured auditing of CSs may identify those groups in the obstetric population that contribute substantially to the high rates and for which focused interventions may bring about change.
Objective. To evaluate the utility of the Robson Ten Group Classification System (RTGCS) in determining appropriateness of CS at a regional rural hospital in KwaZulu-Natal Province, South Africa.
Methods. A retrospective review of the hospital records of women delivered by CS over a 3-month period was performed. The RTGCS was used to categorise women according to parity, age, past obstetric history, singleton or multiple pregnancy, fetal presentation, gestational age and mode of onset of labour/delivery.
Results. There were 2 553 hospital births over the 3-month study period. The CS rate was 42.4% (1 082/2 553). According to the RTGCS, groups 1 (*n*=296, 27.4%), 5 (*n*=186, 17.2%) and 10 (*n*=253, 23.4%) were substantial contributors to the overall CS rate. The main indications for CS were fetal distress (36.5%) and cephalopelvic disproportion (26.8%).
Conclusion. The RTGCS is a useful tool with which to identify patient groups warranting interventions to reduce high CS rates in a rural regional hospital setting. Group 1 (nullipara: single cephalic term pregnancy; spontaneous labour) warrants the most attention. Applying stricter criteria and due diligence in decision-making for primary CS may decrease the high CS rates.

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Caesarean section (CS) rates continue to increase globally. The current CS rate at our institution (Lower Umfolozi War Memorial District Hospital, KwaZulu-Natal Province (KZN), South Africa (SA)) in a low- and middle-income country (LMIC) approaches 50% (institutional statistics) and has been increasing steadily over time. There is concern about increasing numbers of women with a history of previous CS undergoing CS with subsequent pregnancies. Reducing the CS rate would decrease maternal morbidity without affecting perinatal mortality rates.

Marked differences in CS rates between district, regional and tertiary public sector hospitals in SA have been documented, largely reflecting the effect of high-risk pregnancies on the rate.[1] In a tertiary hospital in Durban, CS rates of >30% have been reported, the explanation being the large numbers of high-risk patients.[2]

The World Health Organization (WHO) states that CS rates should be between 10% and 15%.[3] It has been reported that if the CS rate were reduced to 15%, there would be worldwide cost savings of around USD2.32 billion.[4] However, others argue that reasons for CS should be assessed to evaluate whether high rates are appropriate or not, rather than focusing on the rates themselves.[5] Rates can be affected by the population of patients served and the expertise of the attending clinician. Auditing of events prior to CS, indications for CS and outcomes can provide insight into the appropriateness of abdominal deliveries.[5]

The Robson Ten Group Classification System (RTCGS) is a structured auditing method that has been used for monitoring CS rates in Europe.[5,6] This ten-category classification system is based on the following obstetric concepts: category of the pregnancy; previous obstetric record; course of labour and delivery; and gestational age. The system is said to be easily reproducible and is not dependent on whether the population is at low or high risk.[5,6] Although promoted by a Pretoria research group that has reported on the use of RTGCS in urban health facilities,[1,7] our impression is that such auditing methods are limited in rural health facilities in SA.

Objective

To use the RTGCS to identify the leading patient categories contributing to high CS rates in a rural regional hospital.

Methods

This was a retrospective chart review of all patients who had a CS over a 3-month period at Lower Umfolozi War Memorial District Hospital, a regional hospital in northern KZN. Most of the decisions for emergency CS at the study site were made and the procedures carried out by medical officers. Specialist obstetricians performed or supervised those CSs that were expected to be surgically difficult. In general, obstetric management followed that described in the maternity care guidelines of SA.[8] Fetal heart rate monitoring was carried out by intermittent fetal cardiography, and labour management included the use of the partogram (labour graph).[8]

Data collection followed a structured format and included all relevant clinical information. Data were entered into a computer database using Microsoft Excel software. Windows SPSS version 21 was used for analysis. Results were presented as percentages, means and frequencies.

Table 1. Demographic characteristics of the study population

Variables	
Age (years), median, mean (SD), range	24, 25.3 (6.2), 15 - 48
Parity, mean (SD), range	1 (1), 0 - 7
Gestational age (weeks), mean (SD), range	37.5 (3.3), 22 - 43
HIV status	
Infected (positive), *n* (%)	377 (38.4)
CD4 count (cells/μL), mean (SD), range	369.8 (198.8), 29 - 1 045
Uninfected (negative), *n* (%)	690 (63.8)
Result unknown or untested, *n* (%)	15 (1.4)

SD = standard deviation.

Institutional ethical approval to conduct the study was obtained (BE: 308/13, Biomedical Research Ethics Committee, University of KwaZulu-Natal).

Results

There were 2 553 deliveries during the study period. The total number of CSs was 1 085; 1 082 files were analysed as three files were missing, giving a CS rate of 42.4%.

Table 1 shows the demographic characteristics of all patients who had a CS, and Table 2 shows RTGCs of all patients who had CSs and the percentage contribution by each group to the overall CS rate.

Table 3 shows the indications for CS per RTGC group. Group 1 was the leading group, with the combination of fetal distress, cephalopelvic disproportion, hypertensive disorders of pregnancy (HDP) and abruptio placentae being the commonest indications. Group 10 (singleton pregnancies ≤37 weeks' gestational age) was the second leading group, with the additional indication of failed induction of labour.

RTGC group 5, totalling 186 patients with a scarred uterus, contributed 17.2% to the overall CS rate (Table 4). The majority of

Table 2. RTGC and percentage contribution by each group to the overall CS rate[5,6]

RTGC	*n*	Contribution to overall CS rate (%)
Group 1. Nullipara: single cephalic term pregnancy*; spontaneous labour	296	27.4
Group 2. Nullipara: single cephalic at term; planned CS or induced labour	85	7.9
Group 3. Multipara without uterine scar: single cephalic at term*; spontaneous labour	164	15.2
Group 4. Multipara without uterine scar: single cephalic term pregnancy*; planned CS or induced labour	66	6.1
Group 5. Multipara with a scarred uterus: single cephalic term pregnancy*	186	17.2
Group 6. Multipara: singleton breech presentation	10	9
Group 7. Multipara: singleton breech presentation (including women with a scarred uterus)	5	5
Group 8. All multiple pregnancies (including women with a scarred uterus)	17	1.6
Group 9. All women with single oblique or transverse pregnancy (including women with a scarred uterus)	0	0
Group 10. All women with a singleton cephalic preterm pregnancy <37 weeks' gestational age at delivery	253	23.4

*At least 37 completed weeks of pregnancy.

Table 3. Indications for CS as per the RTGCS

	Indications								
RTGC group	FD	CPD	Failed IOL	Bx	HDP	Prev. CS	Abruptio	Twin	Total
1	155	130	0	1	6	0	4	0	296
2	44	18	13	1	9	0	0	0	85
3	48	101	13	0	0	0	2	0	164
4	9	31	14	0	7	0	5	0	66
5	0	0	0	0	0	186	0	0	186
6	0	0	0	10	0	0	0	0	10
7	0	0	0	5	0	0	0	0	5
8	0	0	0	0	0	0	0	17	17
9	0	0	0	0	0	0	0	0	0
10	152	12	16	4	22	0	23	24	253
Total	408	292	56	24	44	186	34	38	1 082

FD = fetal distress; IOL = induction of labour; Bx = breech; Abruptio = abruptio placentae.

Table 4. Indications for CS, categorised as elective and emergency, in RTGC group 5 (*N*=186)

Indications for CS	*n* (%)
Elective CS (*N*=147)	
Prev. CS (declined VBAC)	78 (53.1)
Prev. CS × 2	39 (26.5)
Prev. CS × 3	6 (4.1)
Estimated fetal weight >3 500 g	8 (5.4)
HDP	6 (4.1)
Post dates	8 (5.4)
Other	2 (1.4)
Emergency CS (*N*=39)	
Fetal distress	11 (28.2)
CPD	17 (43.6)
Abruptio placentae	2 (5.1)
HDP	6 (15.4)
Other	3 (7.7)

Table 5. Neonatal and perinatal outcomes, *N*=1 120 births

Outcomes	
Singleton pregnancies (*N*=1 044)	
Alive, *n* (%)	1 025 (98.2)
Stillbirths, *n* (%)	19 (1.8)
Neonatal birth weight (g), mean (SD), range	2 902 (745), 1 120 - 4 980
Twin pregnancies (*N*=38)	
Alive	
Twin 1	38
Twin 2	36
Stillbirths (fresh stillbirth, twin 2)	2
Neonatal birth weight (g), mean (SD), range	
Twin 1	2 270.8 (524.2), 1 140 - 3 350
Twin 2	2 125.5 (545.7), 1 000 - 2 960

SD = standard deviation.

these CSs were elective (*n*=147, 79.0%), and of these patients 53.1% qualified for vaginal birth after their previous CS, but declined.

Emergency CSs made a very small proportion of group 5 (*n*=39, 21.0%). Of the emergency CSs, 43.6% were due to cephalopelvic disproportion (CPD) and 28.2% to fetal distress (Table 4).

Neonatal and perinatal outcomes are shown in Table 5. There were 1 120 births; 1 099 were live births, which included 1 025 singletons and 74 twins. There were 21 stillbirths (1.9%).

Discussion

Our findings show a CS rate of 42.4% over the study period. This is almost three times higher than the 15% recommended by the WHO.[3] However, it is in keeping with the high CS rate of 40.2% reported for the whole of KZN.[9] Our study site was a referral centre for 17 district hospitals and local clinics, and the fact that all high-risk cases were referred to this hospital may explain the high CS rate. It is important to note that we calculated the CS rate for deliveries at the study site alone and not for the entire geographical population within the hospital's referral area.

In our study, 53.1% of women who qualified for vaginal birth after CS (VBAC) ended up having an elective CS. Offering and carrying out VBAC is one way of decreasing CS rates, especially as a number of studies have shown VBAC success rates of ≥50% without increasing perinatal and maternal morbidity.[10] Our study highlights the fact that RTGC group 5 (repeat CS) contributes significantly to the high CS rates. Our impression is that insufficient counselling for VBAC occurs at the study site, meriting greater emphasis in offering VBAC and counselling all women with a previous CS to consider it if indicated.

The main contributors to the overall CS rate in our study were RTGC group 1 (*n*=296, 27.4%), group 5 (*n*=186, 17.2%) and group 10 (*n*=253, 23.4%). Of note, we found a high CS rate in group 10 (<37 weeks' gestation), the main indications for CS in this group being fetal distress, HDP and abruptio placentae. The high rate of CS in group 10 could reflect the many complications secondary to hypertension in our population. The indication of CPD is difficult to explain, as these pregnancies were <37 weeks. Further attention needs to be given to group 10 patients, for whom better decision-making may be possible at the hands of more experienced doctors and better-supervised juniors.

Studies evaluating CS using the RTGCS in LMICs are very limited. Suliman *et al.*[7] reported that groups 1, 3 and 5 were major contributors to CS (15.3%, 9.3% and 83.8%, respectively), accounting for 67.9% of CSs overall. These authors conducted their study in central and eastern Tshwane municipality, which is in an urban area with teaching hospitals. Group 5 was their biggest contributor to the CS rate (83.5%), which could be explained by the high-risk nature of their patients, among whom there was an overall CS rate of 58.2%.[7] This contrasts with our findings that group 5 contributed only 17.2% to the CS rate, of which 79% were elective CS, and among whom 53.1% qualified for VBAC but ended up with an elective CS. Only 21% of CSs in our group 5 were emergencies, of which 43.6% were due to CPD and 28.2% to fetal distress.

Recently Litorp *et al.*,[11] whose study was carried out in a large teaching hospital in a major city in Tanzania, reported a CS rate of 27%, with groups 1, 3 and 5 contributing 12%, 12% and 14%, respectively.[11] All the decisions regarding CS involved specialists, in contrast to our study setting where the majority of these decisions were made by non-specialist medical officers.

Our findings are similar to those of the above studies in that RTGC groups 1 and 5 were major contributors to overall CS rates. Group 1 is amenable to corrective measures during labour. Given the fact that fetal distress and CPD were the major indications for CS in group 1, close attention needs to be given to these factors, possibly ensuring strict criteria for CS and including training on interpretation of fetal cardiotocographic recordings, and proper use and interpretation of partograms. Such measures may be expected to play a role in reducing primary CSs. Furthermore, it is known that in KZN a significant proportion of women giving birth at regional hospitals are under the age of 24 years. As many of these pregnancies are unplanned, there is a clear need to improve contraceptive services, which would result in planned pregnancies and a probable reduction in primary CS rates and subsequent repeat abdominal deliveries.

In group 10, most of the indications for CS were fetal distress, HDP and abruptio placentae. This group must be investigated further, particularly as these findings are not in keeping with those of Suliman *et al.*[7] and Litorp *et al.*[11] However, since these authors' studies were undertaken in urban populations, it is possible that in the rural KZN setting late booking for antenatal care, delayed referral and poor transport systems resulted in a greater number of 'emergency cases' requiring CS.

We found that 106 (9.6%) of the infants born alive were admitted to the neonatal intensive care unit (NICU), compared with the 13.9% reported by Geller *et al*.[12] Prematurity complicated by birth asphyxia and transient tachypnoea of the newborn was the major indicator for admission. This is in keeping with the large number of preterm babies in group 10, which accounted for 23.4% of our overall CS rate. Although fetal distress was the leading indication for CS in our study, birth asphyxia was not the leading cause of admissions to the NICU, reflecting either timeous intervention by staff in the labour ward or unwarranted intervention due to lack of definitive diagnostic tests for fetal distress such as fetal scalp pH and lactate levels. A study from Tanzania revealed that many CSs were done on the basis of reliance on the CTG alone to diagnose fetal distress, without ready availability of invasive techniques such as fetal scalp pH and lactate levels to limit false-positive diagnoses.[13] There is also a risk that the habit of easy resort to CS, especially in low-resource settings, may act as a barrier to other more effective improvements in obstetric care.[13]

Our results confirm that use of the RTGCS is feasible for auditing CS rates in a rural regional health facility and results in findings different to those in an urban setting, potentially leading to target setting relevant to the local population. This work should encourage local rural health authorities to adopt the RTGCS in an endeavour to reduce high CS rates and improve child and maternal outcomes.

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