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Increasing Caesarean Section Rates in a Teaching Hospital in Sri Lanka and the use of a Modification of Robson Ten Group Classification System for Caesarean Sections

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SUMMARY

Background. The increasing Caesarean Sections (CS) rates in the Academic Obstetric Unit at Teaching Hospital Mahamodara Galle, Sri Lanka, needed to be studied.
Methods. The rates of CS from 1985 to 2014, and the indications for CS during 1999 and 2010 to 2014 were studied. A modified version of Robson 10 Group Classification of CS(TGCS) was used to study the CS from 1st March to 31st December 2010, 1st July 2011 to 31st March 2012, 1st February 2013 to 31st January 2014 and 1st February to 31st July 2014.
Results. The CS rate had increased from 13% in 1985 to31.4% in 2014.In 1999, and 2010 to 2014,previous CS remained as the leading indication for CS while fetal distress and failure to progress in labour as indications decreased. Multiparae at term with one previous CS and a singleton fetus in a vertex presentation (Group 5A), Nullipara having a singleton fetus in a vertex presentation (NTSV) who underwent antepartum CS (Group 2B), NTSV in spontaneous labour undergoing CS (Group 1), NTSV with Induction of Labour (Group 2A) and Multipare with >1 previous CS scarand having a singleton fetus in a vertex presentation (Group 5B) contributed more than 60% of the high CS rates during 2010-2014.
Conclusion. The CS rate in the unit had significantly increased from 1985 to 2014.Groups 5A, 2B, 2A, 5B and 1 contributed more than 60% of the high CS rates during 2010-2014. Indepth analyses are needed to identify the underlying reasons for high CS rates in these groups, to enable the adoption of appropriate measures to reduce the increasing CS rates. Similar studies could be carried in any unit prospectively as well ascomparisons made at local, regional, national and international level.
Key words: Modified Robson Ten Group Classification System; Caesarean Section; Sri Lanka

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INTRODUCTION

During the last two decades, the caesarean section (CS) rates have been rapidly increasing worldwide [1-7]. This is causing great concern as increased CS rates have been shown to be positively associated with maternal mortality and severe morbidity even after adjusting for risk factors [8-10]. Use of the Robson Ten Group Classification System(TGCS), introduced in 2001, is considered as being the most appropriate method to audit and monitor CS rates nationally as well as internationally [11-13]. It is inappropriate to suggest a universally acceptable or optimal CS rate as numerous factors and circumstances will affect the CS rate, and these factors will vary between units as well as between hospitals, regions and countries. Therefore these contributory factors must also be studied [11,12].

Robson classified all pregnant women undergoing CS into 10 prospectively determined, mutually exclusive, totally inclusive and clinically relevant groups of women [11]. He also suggested that these 10 groups should be further subdivided when more detailed information about the group was needed [11,12]. In the Academic Obstetric Unit of the Teaching Hospital Mahamodara Galle (THMG) Sri Lanka, we have modified Robson's TGCS by including sub divisions to some of these groups in order to facilitate easy analysis and comparison. These subdivisions are primarily to separate CS after induction of labor (IOL) from CS prior to onset of labor and CS after one previous CS from CS after more than one previous CS. Subdivisions have also been introduced to separate women with a previous CS scar from women without a previous CS scar if it is a multiple pregnancy, breech presentation, transverse or oblique lie or

a preterm delivery (tab.1.). The reasons for these subdivisions is the tendency for routine repeat CS in cases of more than onepreviousCS, and in cases with one previous CS with a multiple pregnancy, breech presentation, transverse or oblique lie or preterm labour.

Using this modified 10 TGCS it is possible to study the indications and factors leading to CS in one unit during a particular period and compare the data prospectively [14], as well as carry out comparisons with any other unit which has adopted this classification [15]. This would enable audits and comparisons at local, regional, national and even international level. This would also enable each unit to decide whether its CS rate needs to be reduced and if so how it could be reduced. The objective of the current study was to describe the trends in CS from 1985 to 2014. and to describe the use of a modification of Robson's TGCS to study the clinical practice of caesarean sections in the academic unit of the THMG during 2010 to 2014.

MATERIALS AND METHODS

The overall CS rates from 1985 to 2014, and the indications for CS during the years 1999, 2010, 2011/2012, 2013 and 2014 in the Academic Obstetric Unit of the THMG, were studied. The modified version of Robson's TGCS (tab.1.) was used to study the practice of CS in the unit from 1st March to 31st December 2010, 1st July 2011 to 31st March 2012, 1st February 2013 to 31st January 2014 and 1st February to 31st July 2014.

RESULTS

The overall CS rate had progressively increased from 13% in1985 to reach a high rate of 32% in 2007. Thereafter it had fluctuated between25.8% to 32.2% and was 31.4% in 2014 (Fig.1.).

The trends in the modes of delivery and the maternal and perinatal outcome from 2009 to

Tab. 1. Modified 10 Group Classification System for Caesarean Sections

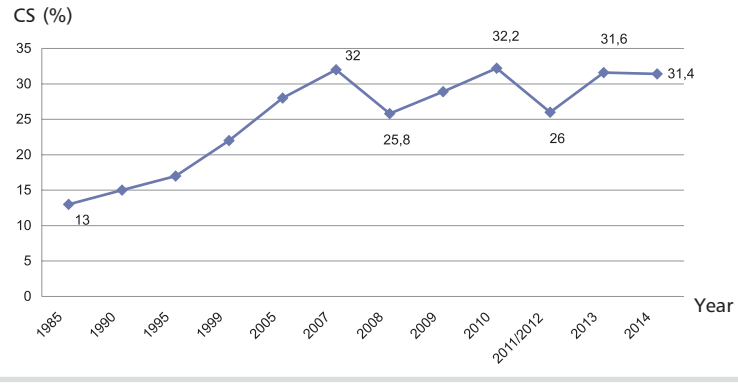
Group		Description
1		Nullips with a single cephalic pregnancy, at≥37weeksgestation, with SOL.
2	2A	Nullips with a single cephalic pregnancy, at ≥37weeksgestation,whohave IOL.
	2B	Nullips with a single cephalic pregnancy, at ≥37 weeks gestation, delivered by CS prior to onset of labor.
3		Multips, without a previous uterine scar, with a single cephalic pregnancy≥37 weeks gestation, with SOL.
4	4A	Multips, without a previous uterine scar, with a single cephalic pregnancy at ≥37 weeks gestation, who have IOL.
	4B	Multips,with out a previous uterine scar, with a single cephalic pregnancy at ≥37weeksgestation,deliveredby CS prior to the onset of labor.
5	5A	Multips,with one previous uterine scar and a single cephalic pregnancy at ≥37weeks gestation.
	5B	Multips,with more than one previous uterine scar and a single cephalic pregnancy≥ 37 weeks gestation.
6		Nullips with single breech pregnancy.
7	7A	Multips with a single breech pregnancy, without previous uterine scar/s
	7B	Multiparous women with a single breech pregnancy, with previous uterine scar/s
8	8A	Women with multiple pregnancies without previous uterine scar/s
	8B	Women with multiple pregnancies with previous uterine scar/s
9	9A	Women with a single pregnancy with a transverse or oblique lie, without previous uterine scar/s
	9B	Women with a single pregnancy with transverse or oblique lie, with a previous uterine scar/s
10	10A	Womenwithasinglecephalicpregnancy≤36weeksgestation,withoutprevious uterine scar/s
	10B	Women with a single cephalic pregnancy at≤36weeksgestation, with previous uterine scar/s

Nullip (Nulliparous women); Multip (Multiparous women); SOL (Spontaneous onset of labour); IOL (Induction of Labour); CS – Caesarean Section

2014 are shown in Tables 2 and 3 respectively. The neonatal mortality rate had markedly decreased from 8.8 per 1000 live births in 2009 to 0.3 per 1000 live births in 2014 ($p < 0.001$) but the proportion of neonates admitted to the special care bay unit did not change during this period. Maternal admissions for intensive care had decreased from 6 % in 2009 to 2.4 % in 2014 ($p < 0.001$). The indications for CS during the period 1999 to 2014 are shown in Table 4. Among the indications for CS during this period repeat CS as an indication decreased from 38.3% in 2011/12 to 27.3% in 2013/14 but increased again to 36.2% in 2014 ($p < 0.001$). Fetal distress as an indication for CS increased from 13% in 1999 to 21.2% in 2014 ($p < 0.001$) and failure to progress in labour decreased from 9% in 1999 to 3.9% in 2014 ($p < 0.001$).

Multiparae at term with one previous CS and having a singleton fetus in a cephalic (vertex) presentation (Group 5A) had the largest contribution to the total CS rate(21% to 24.9%) during the periods of study from 2010-2014 (Tab.5). The proportion having a successful trial of labour after CS (TOLACS) had increased from 15% in 2010 to 25.8% in 2011/12 but had decreased again to 14.9% in 2013 ($p< 0.001$). Of the nulliparae who underwent CS during 2010 - 2014, the proportions at term,having a singleton fetus in a cephalic (vertex) presentation (NTSV) increased from 31.4% in 2010to 37.3% in 2014 ($p <0.05$). The NTSV who underwent antepartum CS (Group 2B) had the second largest contribution to the CS rate (14.2% to 17%). NTSV having spontaneous onset of labour (SOL) and undergoing CS (Group 1) increased from 9% in 2010 to 17.2% in 2014 ($p < 0.001$) and the contribution to the overall CS rate from this Group1 increased from 6.5% in 2010 to 14.3% in 2014 ($p < 0.001$). The two other groups which contributed significantly to the high CS rates during 2010-2014 were NTSV who had Induction of Labour(IOL) (Group 2A) and Multipare with >1 previous CS scarand having a singleton fetus in a cephalic (vertex) presentation (Group 5B) (Tab.5). The contribution to the overall CS rate

Fig. 1.Caesarean Section Rates: 1985–2014



Tab. 2. Modes of Delivery: 2009–2014

	2009 (12 m)	2010 (10 m)	2011/2012 (12 m)	2013 (12 m)	2014 (6 m)	p
Total Deliveries	5021	4689	6353	6383	3174	
Normal Vaginal Deliveries (%)	3468 (69,1)	3069 (65,4)	4548 (71,6)	4152 (65,0)	2094 (65,9)	< 0,001**
Caesarean Sections (%)	1452 (28,9)	1493 (31,8)	1653 (26)	2016 (31,6)	996 (31,4)	< 0,001**
Forceps Deliveries (%)	21 (0,4)	26 (0,6)	49 (0,8)	109 (1,7)	41 (1,3)	< 0,001**
Vacuum Deliveries (%)	40 (0,8)	43 (0,9)	65 (1)	69 (1,1)	27 (0,9)	NS
Assisted Vaginal Breech Deliveries (%)	40 (0,8)	24 (0,5)	38 (0,6)	37 (0,6)	16 (0,5)	NS

**(Chi Square trend)

by multiparae who underwent antepartum CS having a singleton fetus in a cephalic (vertex) presentation at ≥37 weeks(Group 4B) increased from 5.8 % in 2010 to 8.1 % in 2013 and 6.9 % in 2014 (P < 0.01) (Tab.6).

DISCUSSION

The reasons behind the reduction in CS rate from 2007 to 2008 are not known. Consequent to the results of an audit in 2010, several measures were adopted with the aim of reducing the high CS rate in the unit [14]. Although the CS rate in the unit decreased significantly in 2011/2012, unfortunately it has increased again thereafter, and is a cause for concern. Although the CS rates have increased during 2013 to 2014, maternal admissions for monitoring and intensive care have not increased after its significant reduction from 2009 to 2010. The significant and progressive decrease in neonatal mortality rates from 2009 to 2014 is encouraging. This is probably due to improved neonatal care facilities in the hospital and

Tab. 3. Maternal and Perinatal Outcome: 2009–2014

	2009	2010 (10 m)	2011/2012 (12 m)	2013 (12 m)	2014 (6 m)	p
Still Birth Rate / 1000 deliveries	8,8	8,5	6,8	7,7	6,9	NS
Neonatal Mortality Rate (NMR) / 1000 Live Births	8,8	5,6	4,8	1,7	0,3	< 0,001**
< 28weeks NMR / 1000 Live Births	2,0	1,5	0,8	0,3	0	-
Perinatal Mortality Rate / 1000 Deliveries	13,9	13,6	11,5	9,4	6,8	NS
Admissions to special care baby unit (%)	6,3	6,2	5,3	6,4	6,2	NS
Maternal Admissions for Monitoring and Intensive Care (%)	6,0	2,8	1,7	2,0	2,4	< 0,001**
Maternal Deaths	2	1	1	1	0	-
Total live births	4977	4793	6310	6334	3152	-

**(Chi Square trend)

Tab. 4. Indications for Caesarean Sections: 1999–2014

	1999 (03 m)	2010 (10 m)	2011/2012 (12 m)	2013/2014 (12 m)	2014 (6 m)	p
Total Caesarean Sections (%)	349 (22)	1493 (31,8)	1653 (26)	2016 (31,6)	996 (31,4)	< 0,001**
Previous Caesarean Section (%)	112 (32)	531 (35,6)	633 (38,3)	550 (27,3)[a]	361 (36,2)[a]	< 0,001**
Fetal Distress (%)	45 (13)	333 (22,3)	316 (19,1)	568 (28,2)	211 (21,2)	< 0,001**
Failure to Progress in Labour (%)	31 (9)	16 (10,8)	233 (14,1)	96 (4,8)	39 (3,9)	< 0,001**
Failed Induction oflabour (%)	28 (8)	37 (2,5)	37 (2,2)	47 (2,3)	19 (1,9)	NS
Severe Pre-eclampsia (%)	31 (9)	52 (3,5)	78 (4,7)	81 (4)	38 (3,8)	NS

m (months); **(Chi Square trend); [a] (p < 0.001 with Chi Square)

Tab. 5. Main contributions to the high caesarean section rates 2010-2014

Group	Description	% of CS (2010)	% of CS (2011/ 2012)	% of CS 2013 (8 m)	% of CS 2014 (6 m)	p	% of total CS (2010) n = 1493	% of total CS (2011/2012)	% of total CS (2013) (12 m)	% of total CS (2014) (6 m) n = 996	p
5A	Multip 1 previous CS, single, cephalic , ≥ 37 weeks	313 (85)	412 (74,2)[a]	268 (85,1)[a]	221 (85,6)	< 0,001**	(21)	(24,9)[b]	(22,1)[#]	(22,1)	NS
2B	Nullip, Single cephalic, ≥37 weeks, CS before labour	212 (100)	258 (100)	171 (100)	169 (100)	—	(14,2)	(15,6)	(14,9)	(17)	NS
2A	Nullip, Single cephalic, ≥37 weeks, who have IOL	160 (29)	211 (28,6)	96 (42,5)[a]	60 (29,4)[b]	< 0,001**	(10,7)	(12,8)	(8,2)	(6,0)	< 0,001**
5B	Multip >1 previous CS , single cephalic , ≥ 37 weeks	146 (86,4)	172 (99,4)	111 (100)	106 (100)	—	(9,8)	(10,4)	(9,5)	(10,6)	NS
1	Nullip, Single cephalic, ≥ 37 weeks, with SOL	98 (9)	120 (7,9)	120 (11,7)	143 (17,2)	< 0,001**	(6,5)	(7,2)	(11,3)	(14,3)	< 0,001**

SOL (Spontaneous onset of labour); IOL(Induction of labour); CS (Caesarean Section); Multip (Multiparous women); Nullip (Nulliparous women); # (p < 0.05),[b](p < 0.01), [a](p < 0.001) – with Chi square ; ** (Chi Square trend)

Tab. 6. Other contributions to the high caesarean section rates 2010–2014

Group	Description	% of CS (2010)	% of CS (2011/ 2012)	% of CS 2013 (8 m)	% of CS 2014 (6 m)	p	% of total CS (2010) n = 1493	% of total CS (2011/2012)	% of total CS (2013) (12 m)	% of total CS (2014) (6 m) n = 996	p
10A	<37,single cephalic in nullip/multip without previous CS scar	90 (57)	81 (21,4)	90 (39)[#]	52 (31,9)	NS	90 (6)	81 (4,9)	118 (5,9)	52 (5,2)	NS
4B	Multip, single cephalic, ≥37 weeks, CS before labour	87 (100)	91 (100)	110 (100)	69 (100)	—	87 (5,8)	91 (5,5)	163 (8,1)[b]	69 (6,9)	< 0,001**
6	Primi Breech	77 (79)	87 (92,6)	46 (78)[b]	38 (88,3)	< 0,001**	77 (5,2)	87 (5,3)	71 (3,5)[b]	38 (3,8)	< 0,05**
4A	CS after Induction of Labour in Multip at ≥ 37 weeks	74 (24)	45 (10,2)	34 (21,9)[a]	9 (9,8)[b]	< 0,001**	74 (5)	45 (2,7)	54 (2,7)	9 (0,9)[a]	< 0,001**
3	Multip after Spontaneous Onset of Labour at ≥ 37 weeks	56 (4)	42 (2,4)	59 (4,7)[a]	44 (3,6)	< 0,001**	56 (3,8)	42 (2,5)	104 (5,2)[a]	44 (4,4)	< 0,001**
7A	Multi Breech	36 (95)	45 (67,2)	25 (69,4)	22 (66,6)	NS	36 (2,4)	45 (2,7)	38 (1,9)	22 (2,2)	NS
	All other groups : 7B, 8A, 8B, 9A, 9B, 10B	118 (77)	89 (74,5)	96 (80)	63 (70)	NS	118 (7,9)	89 (5,4)[#]	135 (6,7)	63 (6,3)	< 0,05**

CS (Caesarean Section); [#](p < 0.05); [b](p < 0.01); [a](p < 0.001) – with Chi square; **(Chi Square trend)

not directly proportionate to the progressively increasing CS rates because the proportion of neonates admitted to the special care baby unit have been virtually static from 2009 to 2014.

Groups 5A, 2B, 2A, 5B and 1 of the modified version of Robson's TGCS, had the largest contributionsto the high CS rates (totaling > 60% of the overall CS) in the unit. This is similar to reports from most other units[11,16-18]. Increased CS in NTSV (Groups 1, 2A and 2B) will inevitably lead to increased CS in Group 5 due to the snow balling effect. Therefore, further indepth analyses are needed to identify the underlying reasons for the high CS rates in these NTSV groups so that appropriate remedial measures could be adopted to reduce the primary CS rate and thereby reduce the rapidly increasing CS rates. Increasing TOLACS too should be considered in properly selected women with one previous CS scar. It is important to continuously audit and monitor the CS rates and study indepth the underlying factors which lead to a woman being delivered by CS.

CONCLUSION

Groups 5A, 2B, 2A, 5B and 1 of the modified version of Robson's TGCS, had the largest contributions to the high CS rates in the unit. Further indepth analyses are needed to identify the underlying reasons for the high CS rates in these groups, so that appropriate measures could be adopted to reduce the rapidly increasing CS rates. Similar studies could be carried in any unit prospectively as well as comparisons made at local, regional, national and international level.

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