Increased Rates of Caesarean Delivery at Mansoura University Hospital; an infuriating concern concluded from a prospective observational study

Abdelhady Abdelhady Zayed and Sondos Abdelati Mohamed El-Diasty
Department of Obstetrics &Gynecology, Mansoura university hospitals' Mansoura .Egypt.

Abstract

Background: Caesarean section (CS) rates increased nowadays all over the world. This increase raises the concern of un-necessary CS that increases maternal and fetal morbidity and mortality.

Objective: This study aimed to assess the rates, the indications of caesarean delivery and to find out why the rates are continuously increasing at a tertiary health care hospital in Egypt.

Methods: A prospective observational design was selected for this research. A cohort of 750 hospital deliveries were prospectively followed up intra-partum in the obstetric unit of Mansoura university hospital (MUH).Cases' history, labor anddelivery events were prospectively recorded bythe study team who just observed provided no intervention.

Results: an overall CS rate of 65.2% (489/750) was recorded in this cohort, vaginal delivery in the remaining (34.8%). Most CS were antepartum 59.1% (289/489) vs. (40.9%) intra-partum and those done intra-partum were mostly in the latent phase 78% (156/200) vs. (22%) in the active phase .This high CS rate (65.2%) has significantly exceeded the previous CS rate published from the same unit in 2013 47.25% (16348/34598). Compared with the previous study published from the same unit the CS rate increased significantly: odds ratio & 95% CI is 2.092 (1.797 to 2.434). Relative Risk & 95% CI is 1.380 (1.308 to 1.456, P<0.0001). Although we found no significant differences in maternal and neonatal morbidity and mortality between vaginal and CS deliveries in this study (probably due to small sized cohort) .The risks of maternal and neonatal morbidity has been emphasized in larger studies.

Conclusion: The study concluded that CS rates in our hospital has significantly increased in the last few years which implies increased risks to the mother and neonate and also imply a burden on the forecoming pregnancy(ies).

Key words: Cesarean section, rates, Mansoura university hospital.

Corresponding author:
Abdelhady Zayed; Assistant professor of Obs.&Gyn. Mansoura university hospital, Mansoura .Egypt.
E-mail:Zayed_hady@yahoo.com
Mobil phone number: 002 01009542893

Introduction

Caesarean section(CS) is a surgical procedure in which fetus, placenta and membranes delivered throughoutan abdominal and uterine incision **(BasketetaL.,2007)**. The first modern CSwas performed by German gynecologist Ferdinand Adolf Kehrer in 1881 **(BasketetaL.,2007)**. Historically, this surgery has always been performed to save the baby rather than the mother; but indeed when it

is adequately indicated, it can prevent poor obstetric outcomes and be a life-saving procedures for both the mother and her fetus. However, at a time when the caesarean delivery rate; as a percentage of live births, is poved to be rising globally there is a growing concern about un-necessary caesarean sections and attention shuld be made **(SouzaJP & Gülmezoglu A 2010)**. Un-necessary CS rates already increase the risk of maternal morbidity, maternal mortality, neonatal admission to an intensive care unit, and even neonatal deaths **(Villar J, 2006)**. There is no consensus on the "optimal" rate of caesarean delivery at the population level although values between 5% and 15% of live births have been suggested **(Aelvoet et al., 2008)**. The basis on which these thresholds have been proposed is not clear despite the World Health Organization (WHO) has suggested that a caesarean delivery rate of 15% should be taken as a threshold that should not be exceeded, rather than a target to be achieved **(Aelvoet et al., 2008)**. Little research exists on trends of caesarean section delivery for any country in the Arab world. A descriptive study in Egypt carried out by **(Khawaja, et al., 2004)** supported the view that a significant risein caesarean deliveries occurred for all births, from alow of 4.6% in1992 to10.3% in 2000. Although the caesarean section rate was slightly higher in private hospitals, the rate also increased consistently in public hospitals. Also the high and exceptional increase in caesarean section rates may be partly resorted to non medical indications of CS suggesting physician practice patterns, financial incentives or other profitability factors, and patient preferences. This study aimed to assess the rates and the indications of caesarean delivery and to find out why the rate is continuously increasing at a tertiary health care hospital compared with previous years.

Patients & Methods

A prospective observational design was selected for this research. Such design fits the nature of the study under investigations, in which we assess the rates,the indications of caesarean delivery and to find out why the rateis continuously increasing at atertiary health care hospital at Mansoura Univeresity, Egypt.The hospitals are considered as tertiary care center that serves the population inthe middle of Delta, Egypt. The study was approved by the University Ethics Committee and the Institutional Research Ethical Committee of the concerned hospital. Permissions were granted from the head of the obstetrics & gynecology department as well as the Director of Mansoura University Hospitals. The objectives of the study were explained to the study subjects and their verbal and written consents were obtained from all. Patientsin the study were observed during the period from October 2015 to October 2016 and data were recorded. No intervention would be under taken, only data collection including personal data as name, age, menstrual history last menstrual period (LMP) and expected date of delivery, obstetrical history as parity, prior vaginal births, as well as full details about the previous CS, past medical history, family history, present history. A special sheet was settled by the researcher to collect the previous data and also for that belonging to the findings of the general, abdominal, local and per vaginal examinations of the participants. This was necessary to obtain the diagnosis of labor and any problem that might be encountered on woman admission to the Labor and DeliveryUnit.The partograph should theoretically be used for every participant to record data about fetal condition, labor progress "cervical dilatation and fetal descent", uterine contractions as well as the drugs and intravenous (IV) fluidsgiven and the maternal condition; vital signs and the results of laboratoryinvestigations performed. Evaluation of the neonates was achieved by neonatologists after delivery, who decided if neonates well or needed Neonatal Intensive Care Unit (NICU). Then; rates of CS, indications, spontaneous and assisted vaginal deliveries were recorded as well as neonatal fetal conditions. These are compared with national and international standards.

Statistical analysis

A prospective observational design was selected Data were analyzed with SPSS version 21. The normality of data was first tested with one-sample Kolmogorov Smirnov test. Qualitative data were described using number and percent. Association between categorical variables was testedusing Chisquaretest. Continuous variables were presented as mean±SD (standard deviation) for parametric data and Median for non-parametric data. The two groups were compared with Student t test (para-

metricdata) and Mann–Whitney test (non parametric data). For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level (p-value). sgnificant when the probability of error is more than 5% ($p > 0.05$). Significant when the probability of erroris less than 5% ($p < 0.05$). Highlysignificant when the probability of error is less than 0.1% ($p < 0.001$). The smaller thep-value obtained, the more significant are the results.

Results

Table (1) sho w that the mean age of CS was significant older in CS group, and the CS rate was higher among older than younger population and the same with gravidity also. Gravidity is higher among CS population. Gestational age tends to be lower in CS, preterm delivery also is associated with high CS ($p \leq 0.001$ in both). Degree of parity show no significant difference in either groups (p 0.104).

In table (2) method and time of delivery in those delivered by CS were estimated. It shows that overall CS rate 65.2%, of which 59.1% was performed in the ante-partum period and 40.9% was emergent CS, 78% was during the latent phase of the first stage, and 22% during the active phase. No CS cases were performed during the second stage of labor. Vaginal delivery rate was 34.8%, 81.2% was spontaneous delivery, 10.3 was induced and 8.5% was vaginal birth after casaerean section (VBAC).

Table (3) is setteled to compare between overall CS rates from same obstetric unit in Mansoura in 2 different dates, our study and Helal et al (2013); our study showed very high and percentage of CS rate compared by the previous one despite our cohort involved lower number of patients (489 "65.2%" vs 16347 "47.25%" respectively and $p < 0.0001$).

Table (4) shows the indications of CS. It reveals that repeat CS was the commonest indication, which represented 62.4%, followed by medical disorders affecting the mother 13.3%. Mal presentations 10.6%, placenta praevia 6.3% , multiple pregnancy 3.9%, Cephalo-plevic disporportion "CPD" 5.3%, antepartum haemorrhage "APH" 2.45%,and failure to progress (2.04%) and finally unreported causes which represented 5.7%.

Table (5) showed again a significant difference between our study and the previous one by Helal etal 2013 as regard to repeat CS rate, CS for antepartum hemorrhage and CS for failure to progress ($p<0.0001$).

Regarding the neonatal outcome between vaginal and caesarean delivery, our data showed that there is no significant difference (p 0.76) as evidenced in table [6].

Discussion

Over the last years, there has been rapid increase in CS rates all over world. Wide variations are present among countries, regions and even hospitals within the same area and with similar socioeconomic status and patient characteristics. This suggests that there are no sharp rules to do CS, with a consequent overuse of this surgical obstetric intervention **(Aelvoet et al., 2008)**. Egypt,being a part of the world, is affected by thisand a significant rise in CS rates is observed and recorded in recent years.(Khawaja et al.,2004). Lastly, the Egyptien Demographic and Health Survey (EDHS) 2008 showed that more than 25% of deliveries in the five-year period before that survey were by CS and about 37% percent of urban births were CS compared to 22% of rural births **(El-Zanaty and Associates, 2009)**. Our present hospital based cohort study showed even higher rate of CS compared to many published data reporting CS rates ranging between 24 and 38 % **(Dobson 2001, Khawaja, et al.2004 , Helal etal, 2013)**. This increase in CS rate is even higher than the increase in CS rates allover world & even higher than CS rate (47.25%) reported from the same institute in a previous study **(Helal et al, 2013)** (table 3). However Helal et al (2013) study was retrospective, and missing data were significant defect in the records which were the source of that study. Our study, which is prospective observational cohort, revealed higher rates of CS in older, higher gravidity females and in those with preterm babies (table 1). This comes in agreement with some previous studies **(Gomes ,et al.1999, Freitas et al.2005, Baskett et al 2007).**

The significantly higher gravidity and not parity among CS deliveries compared to vaginal deliveries in our study refers to the probability of higher

early pregnancy losses among CS deliveries which renders these fetuses (precious babies) a common label for CS delivery. The higher ratio of preterm deliveries can be explained by the indications of CS deliveries (antepartum haemorrhage due to placenta previa, hypertensive disorders, diabetes mellitus all of which are significantly associated with preterm delivery). In this study 59.1 % of CS cases were done ante-partum and the remainder (40.9%) were done intra-partum (table 2) .

So most of CS cases had been ante-partum. This high percentage of ante-partum CS may be explained by the fact that Mansoura University hospital is a tertiary care center in Egypt delta serving large area of population and receiving referrals from private and publichospitals . These referrals are mostly high risk cases that needed intervention before the onset of labor. On the other hand 40.9% of CS were intra partum, in the first stage of labor. Since repeated CS comprise 62.4% of the overall indications of CS in our cohort (table 2) it is logic that ante-partum CS well be higher than intra-partum ones. All intra-partum CS in this cohort were done in the first stage mainly in the latent phase (table 2) . This comes in accordance to results of **Zhang, et al. (2010)** reporting that 53% of inductions were terminated by CS due to failure of progress very early in labour (before 5 cm cervical dilation). That the minority of CS deliveries were intra-partum and also early in labour was reported by **Boyle Reddy et al; (2013)**; who found that only 1 in 3 (35%) of cases of CS had been done due to failure of labor progress very early in labor.

We can speculate that most of the intra-partum CS performed in this study were performed for doctor convenience not in the patient or fetus interests. The decision of CS is initiated by an over worked resident who wants to finish his shift with minimum effort and minimum complications. A notification about (failed of progress) is an accepted label to gain approval on CS via phone call with the senior staff on duty.

We failed to document intra-partum monitoring data to document "protracted cervical dilation". Defensive obstetrics has now become a common reason for high rates of CS. It has been observed that 82% of physicians performed CS to avoid negligence claims **(Birchard K.1999)**. This is closely related to daylight obstetrics for the obstetrician's convenience. It takes usually 20-30 minutes to perform a CS while conducting a vaginal birth may need 12 hours or more heavily taxing on the obstetrician's time and patience. Litrop et al (2015) reported in a semi-structured individual in-depth interview study that residents often missed support from their senior colleagues when making decisions, and felt that midwives pushed them to perform CS. Many care givers stated that their fear of blame from colleagues and management in case of poor outcomes made them advocate for, or perform CS on doubtful indications.

In our study; no CS had been done in the second stage of labor.This disagrees with **Gifford DS, et al.(2000)** who found that one-fourth of the primary CS were performed in the second stage of the labor . This difference may be partially explained by the fact that most cases in our study were high risk cases that cannot sustain prolonged trial of vaginal delivery. Also our data showed tha VBAC comprises 8.5% of vaginal births (table 3) and this rate does not much differ from the figure reported by **Mc Dorman, et al 2011**. It is clear that even Mansoura University Hospitals was unable to adopt strategy of VBAC although it has more facilities, more knowledge and provide more observational care than many other institutes as most of patients are unable to provide records for description of their previous CS.This may be the main explanation why VBAC is not strongly recommended in our hospital. So, the author's openion is that; reduction of primary CS rate should be our main strategy to reduce repeat CS.

Looking to the commonest indication of CS we reported repeat CS(62.4%) whilest failure to progress was the lowest one (2.04%) as listed in table (4). This coincides with some other study **(Baskett et al 2007)** who considered 4 major indications accounting for more than 90% of indications of CS including previous CS, dystocia, fetal distress and lastly breech. In our study, there are no cases reported to be fetal distress because all intra-partum CS were done early in labor under the label of failure to progress. This verifies to our previous observation that most intra-partum CS were done for system convenience. The use of electronic fetal monitoring had been employed in 85% of labors in united states **(Martin et al, 2003)** and was implicated in the increased the rate of CS to as much as

40%, a method which is not adopted in our hospital and agin this may partially explain absence of acute fetal distress as an indication for intra- partum CS. Medical disorders are the next common indication of CS in our study (13.3 %.). This does not agree with **Baskett, 2007** who reported that medical disorders are not common indications for CS. Our explanation is that medical disordersare commonly reffered to our center,being a tertiary care hospital, from private clinics and general hospitals. Malpresentations comes as the third most common indication (10.6%) in our cases; table (4) and this approves the openion taken by (Young Johanson, 2001 and Levry et al,2005) who stated malpresentation, especially breech, in frequently meets criteria of a trial of vaginal delivery and be risky for the mother and baby, so it is an accepted indication for CS when facilities exist. Our results also documented that APH accounts for 6.3% (table 4) of the indications, which is a well known indication except in the very minor degree conditions as previously stated by **(Lukas et al, 2000)**. Cephalopelvic disproportion represents 5.3% of cases (table 4) and it is one of the undeniable indications of CS according to **Baskett et al (2007)**.

Comparing our study to the previous one in the same unit **Helal et al (2013)**; there is a significant difference as regard to increased ratio of repeat CS and CS for antepartum hemorrhage and less use of trial of vaginal delivery as attested to by significantly lower proportion of CS for failure of progress of labor in the current study table (5). Again, the decreasing rate of VBAC may be due to lack of experience of in new generations, less monitoring facilities, fearing of complications.

In our study there is no significant difference ($p > .05$, table 6) as regard to neonatal outcome between vaginal and CS delivery. There is general consensus that CS is associated with less risk of neonatal morbidity and this in many instances influence the choice of CS despite the associated maternal risks **(Cunnigham et al 2014)**.The relatively small sample size of our cohort may be insufficient to illicit differences in neonatal morbidity between CS and vaginal delivery groups. Some long term follow-up studies of infants have linked CS with some problems, for example, Josef Neu and **Jona Rushing, (2011)** found increased risk of bacterial colonization and repeat gastroenteritis as well as immune system troubles in CS than vaginal deliveries. Moreover; **Debbey et al (2005)** found increased childhood asthma for babies delivered by CS meanwhile Renz-Polster, et al 2005 found increased risk of allergic disorders in childhood for babies delivered by CS.

In our study we had only clinical data about very early neonatal status of the fetus. We had no data about later neonatal, infant development, or their microbiological culture, so we can not compare our cases with other studies in this respect.

This study revealed no cases of maternal morbidity or mortality after caesarean or vaginal delivery, this disagrees with other studies **(Sally C. Curtin, et al 2013)** which revealed that maternal morbidity was higher for Cesarean than vaginal deliveries. **Cunnham etal 2014**; reported maternal complications associated with low- risk planned CS compared with the planned vaginal deliveries among healthy women in Canada. The results showed that casarean delivery was associated with significantly higher complications than vaginal typeas regard, hysterectomy, anesthesia, cardiac arrest, venous thromboembolism, puerperal infection, wound disruption, wound hematoma. The same report showed however that vaginal delivery group had higher transfusions and higher maternal mortality compared to CS group. Absence of maternal morbidity & mortality in our study may be explained by the fact that most of our casarean deliveries were ante-partum (elective) with every thing (personnel and others) prepared and ready from the start to deal with the possible complications. Our patients did not reveal early or late maternal morbidity as the vaginal deliveries, as the the rule is discharging the case from the emergency unit within hours. The same thing occurs with low risk CS which are also discharged next morning. Definitely such complications do exist but are probably under reported or dealt with elsewhere; may be at a private or outpatient clinics.

Conclusions

There is an international and national rise in the rates of CS and our study witnessed significant increase in CSrate (47.25% in 2013) to (65% in 2016). Most of the operations were done ante partum (60%) while the remainders (40%) were intra

partum early in labor. Repeat CS rate is continuously increasing and efforts should be expended to incarse VBAC or decrase primary section in our unit.

Conflict of interest

Authors stated that there is no conflict of interest.

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Results

Table (1): Patient features in CS vs. Vaginal delivery groups:

Items	Cesarean section group (n=489)		Vaginal delivery group (n=261)		Test of sig.	p-value
	No	%	No	%		
Age	27.67±5.32		26.75±4.16		t=2.42	0.016*
<35y	451	92.2	258	98.9	X^2=14.43	≤0.001**
≥35y	38	7.8	3	1.1		
Gravidity	2.69±1.53 2(1-11)		2.31±1.23 2(1-9)		Z= 2.47	0.013*
≤3	381	77.9	223	85.4	X^2= 6.14	0.013*
>3	108	22.1	38	14.6		
Parity	1.42±1.16 1(0 -7)		1.19±1.11 1(0-6)		Z=1.62	0.104
≤3	721	96.1	255	97.7	X^2= 2.64	0.104
>3	29	3.9	6	2.3		
G.A	37.77±2.03		38.06±1.91		t=1.92	0.055
≤37w	151	30.9	54	20.7	X^2= 8.89	≤0.001**
>37w	338	69.1	207	79.3		

ZforMann–Whitney test: ***significance≤0.05** ****high significance ≤0.001**

Data presented as mean (SD), $p < 0.05$ is considered significant.

Abbreviations: GA; gestational age.

Table (2): Method of delivery in the study cohort:

Method of delivery	Study cohort (n=750)	
	No	%
Cesarean section	489	65.2
Ante-partum	289	59.1
Intra-partum	200	40.9
First Stage	156	78%
Latent phase	44	22%
Active phase	No cases	
Second stage		
Vaginal delivery	261	34.8
spontaneous	212	81.2
induced	27	10.3
VBAC	22	8.5

Data presented as number (%), $p < 0.05$ is considered significant.
Abbreviations: VBAC; vaginal birth after cesarean delivery.

Table (3): Comparison between overall CS rates from same obstetric unit in Mansoura in 2 different dates:

	Current study (n = 750)	**Helal et al (2013) (n =34598)**	**P value**
Cesarean Section	489 (65.2%)	16347 (47.25%).	*P<0.0001 OR ,95% CI 1.67 (1.44 -1.95)
Vaginal delivery	261 (34.8%)	18251 (52.75%)	

*Fisher exact test
Data presented as mean (SD), $p < 0.05$ is considered significant.

Table (3): Indications of CS:

Indications of CS	Study cohort (n=750)	
	No	%
Repeated cs	305	62.4
Medical diseases	65	13.3
Malpresentation	52	10.6
Placenta previa	31	6.3
Multiple pregnancy	19	3.9
Cephalo-Plevic disporportion (CPD)	26	5.3
Other APH	12	2.45
Failure to progress	10	2.04
Unreported indication	43	5.7

Data presented as number (%), $p < 0.05$ is considered significant.
Abbreviations: CS; Caesarean Section; CPD, cephalo pelvic disproportion

Table (5): Comparison between CS indications in 2 different dates in the same obstetric unit in Mansoura:

	Current study (n = 489)		Helal et al (2013) (n = 16348)		P value*
	No	%	No	%	
Repeated CS	305	52.1	5849	35.78	<0.0001
Medical diseases	65	13.3	2330	14.25	0.549
Malpresentation	47	9.6	1618	9.9.0	0.891
Placenta previa	31	6.3	420	2.57	<0.0001
Multiple pregnancy	19	3.9	893	5.46	0.129
Other APH	12	2.45	239	1.46	0.074
Failure to progress	10	2.04	1696	10.4	P<0.0001
Other unreported	0		3303	20.2	

*Fisher exact test
Data presented as number (%), $p < 0.05$ is considered significant.
Abbreviations: CS; Cesarean Section; APH; antepartum hemorrhage

Table (6): Comparison between CS and VD regarding Neonatal Outcome:

Items	Cesarean Section		Vaginal delivery		Test of sig.	p-value
	No	%	No	%		
well	442	89.3	233	89.3	X^2= 0.53	0.76
NICU	52	10.5	28	10.7		
dead	1	0.2	0	0		

Data presented as number (%), $p < 0.05$ is considered significant.
Abbreviations: CS; Caesarean Section, VD; vaginal delivery, NICU; neonatal intensive care unite