

Cesarean Section Rate at a Tertiary University Hospital in Egypt in Five Years Period (2008 -2012)

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ABSTRACT

Objective: A descriptive retrospective archival study aiming to measure the incidence of cesarean section (CS) at Cairo university hospital from January 2008 till December 2012.

Materials and Methods: In an attempt to define the causes of the increased cesarean section rate, indications and complications of cesarean section, we used merged data files of the cesarean sections in the time period from January 2008 till December 2012 from causality unit of obstetrics and gynaecology, Cairo University, Cairo, Egypt.

Results: Cesarean sections were performed in 38.84% of deliveries in 2008, 37.88% in 2009, 39.08% in 2010, 37.72% in 2011 and 41.17% in 2012. Repeat cesarean section (RCS) was the main indication and a large proportion of patients were having previous one cesarean section with an incidence of about 43.5% in the past 5 years.

Conclusion: There is an increase in CS rate in Cairo University hospital but still comparable to developed countries; and the increase was mainly due to increase in the primary CS rate.

Keywords: cesarean section rate; cesarean section; Egypt; tertiary University hospital

INTRODUCTION

There has been a marked increase in the number of cesarean sections in many countries during the last few decades (1). Cesarean sections are now performed in over 22 percent of all births in Great Britain (2) and in 30 percent of all births in USA as cesarean section is now the most common major surgical procedure for women in the USA (3).

With this increase in the number of cesarean sections, the cost of maternity care has also markedly increased. A previously done systematic review found that the cost of a cesarean delivery is about twice the cost of a normal delivery (4). Also there is an increased risk of adverse side effects with cesarean section, particularly if the medical indications are weak (5). It was stated

that cesarean section rate in Egypt has increased to 22% with higher rates in private hospitals (6).

Only very few studies were done before to study cesarean section rates in Egyptian hospitals. This is perhaps due to the lack of reliable and complete records at our hospitals. However, studying cesarean section rates will help in providing the initial step to assess the situation and to establish a local protocol at our institution to reduce the formerly noted high cesarean section rate. The aim of this retrospective archival study was to review the incidence, indications and complications of cesarean section deliveries at the tertiary University Hospital of Cairo University over a 5 years

period from January 2008 to December 2012.

MATERIALS AND METHODS

This is a descriptive study in which data were collected from the archival records at Cairo university hospital during the time period between January 2008 and December 2012. Patient's demographic, obstetric and medical details including age, parity, period of gestation, indication of cesarean delivery and complications were explored. Incidence of cesarean section was obtained from statistics department of the hospital for the year of study. The study particularly examined cases admitted through the emergency department, which was the main route of admission for cases of cesarean section.

The incidence of cesarean section was calculated as a percentage of total number of deliveries at the same hospital for each year. The incidence was also calculated as regards different maternal parameters as the age, the parity, body mass index and the gestational age. Indications for cesarean section were listed for each mother who underwent CS that was divided in to fetal and maternal indications.

Fetal indications included malpresentation, multiple pregnancy, fetal distress and congenital anomalies. Maternal indications included cephalopelvic disproportion, obstructed labor, and previous cesarean section, medical disorders as diabetes, hypertension and cardiac disease. Complications as bladder injury, intestinal injury, the need for blood transfusion, ICU admission and cesarean hysterectomy were documented. In addition fetal complications were recorded as transient tachypnea of the new born and the need for NICU admission.

Statistical Analysis

Data was summarized using mean, and standard deviation for quantitative variables and frequency and percentage for qualitative ones.

Comparison between groups was performed using independent sample t-test for quantitative variables and Chi square or Fissure exact test for qualitative ones. Pearson or Spearman correlation coefficients were calculated to get the association between quantitative or ordinal variables respectively.

Time series plot was performed to explore the trend of cesarean sections in the period from January 2008 till December 2012. P values less than 0.05 were considered statistically significant, and less than 0.01 were considered highly significant.

Pre-coded data was entered on the computer using "Microsoft Office Excel Software" program (2010) for windows. Data was transferred to the Statistical Package of Social Science Software program, version 21 (SPSS) to be statistically analyzed.

RESULTS

Our study is an analytical study that was obtained from Cairo university hospital medical statistics record. Data were obtained from the records over the past 5years (2008-2012). A total of 68581 births were recorded over the past 5 years. The total incidence over the past 5 years and the incidence of cesarean sections (CS) for each year were calculated.

We found that the total incidence of CS over the past 5 years was 39%. The highest incidence was in 2012 (41.1%); and the least incidence was in 2011 (37%). There was a significant increase in cesarean section rate (CSR) from 2008 to 2012 as shown in table (1) and table (2).

Table 1: Incidence of Cesarean Section (CS) in the Last 5 Years in Cairo University Hospital

| | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | Total | |
|------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Cesarean Section | 5196 | 38.84 | 4732 | 37.88 | 5271 | 39.08 | 5303 | 37.72 | 6244 | 41.17 | 26746 | 39.00 |
| Vaginal Delivery | 8181 | 61.16 | 7761 | 62.12 | 8216 | 60.92 | 8754 | 62.28 | 8923 | 58.83 | 41835 | 61.00 |
| Total | 13377 | 100.00 | 12493 | 100.00 | 13487 | 100.00 | 14057 | 100.00 | 15167 | 100.00 | 68581 | 100.00 |

Table 2: Comparison between Years 2008 & 2012 as Regards Cesarean Section Incidence

| Year | 2008 | | 2012 | | P value |
|------|------|-------|------|-------|----------------------|
| | N | % | N | % | |
| CS | 5196 | 38.84 | 6244 | 41.17 | < 0.001 ^a |
| NVD | 8181 | 61.16 | 8923 | 58.83 | |

^a Statistically significant

The characteristics of our studied population as regard the maternal age, BMI, and gestational age at time of CS were estimated and presented as mean and standard deviation were as follows: maternal age was 26.7 ± 5.5 years; BMI was 32.1 ± 2.9 ; gestational age was 38.1 ± 2.3 weeks.

We also found that the highest percent of cesarean section was 84.4% among the age group between 20 years & 35 years old, 42.8% among multigravida and 75.5% between 37 & 40 weeks of gestation.

Among our studied sample 77.5% of the mothers were medically free. The highest proportion for medical disorder associated with pregnancy was 10.6% due to pregnancy associated hypertension;

followed by diabetes mellitus by 3.5%. Other medical disorders included bronchial asthma (3%), heart disease (2.8%), rheumatoid arthritis (2.3%), epilepsy (0.3%) and thyroid disorders (0.1%).

Different indications of CS, and how does each indication contribute to the total CSR was shown in table (3); the commonest indication for CS was previous CS (43.5%) the second most common indication was malpresentation (9.7%). Maternal indications contribute 59.7% to the total CSR and fetal indications contribute 40.3%.

There was no statistically significant difference observed regarding patient characteristics between 2008 & 2012 (tables 4 & 5).

Table 3: Description of the Studied Sample as Regard Indications of Cesarean Section

| | | |
|---------------------------------|-------|------|
| | | |
| Previous Cesarean Section | 11646 | 43.5 |
| Malpresentation | 2600 | 9.7 |
| Drained Liquor | 2200 | 8.2 |
| Past Date | 1890 | 7.1 |
| Preeclampsia | 1830 | 6.8 |
| Placenta Praevia | 965 | 3.6 |
| Cephalopelvic Disproportion | 735 | 2.7 |
| Twins | 605 | 2.3 |
| Oligohydramnios | 600 | 2.2 |
| Infertility | 590 | 2.2 |
| Fetal Distress | 560 | 2.1 |
| Others | 2525 | 9.6 |
| Indications Of Cesarean Section | | |
| Maternal | 15981 | 59.7 |
| Fetal | 10765 | 40.3 |

Table 4: Comparison between Year 2008 and 2012 as Regard Patients Demographic Characteristics (Quantitative Variables)

| | 2008 | 2012 | P value |
|-------------------------|--------------|--------------|---------|
| Maternal Age (Years) | 26.70 ± 5.52 | 26.71 ± 5.50 | 0.9 |
| Gestational Age (Weeks) | 38.14 ± 2.25 | 38.14 ± 2.24 | 1.0 |
| Weight (Kg) | 83.63 ± 8.13 | 83.56 ± 8.18 | 0.6 |
| Height (M) | 1.61 ± 0.04 | 1.61 ± 0.04 | 0.8 |
| BMI | 32.11 ± 2.90 | 32.09 ± 2.89 | 0.7 |

Data presented as mean and standard deviations

Table 5: Comparison between Year 2008 and 2012 as Regard Patients Demographic Characteristics (Qualitative Variables)

| | 2008 | | 2012 | | P value |
|-------------------------|------|------|------|------|---------|
| | N | % | N | % | |
| Maternal age (years) | | | | | |
| < 20 years | 270 | 5.2 | 299 | 4.8 | 0.4 |
| 20 – 35 years | 4386 | 84.4 | 5264 | 84.3 | |
| > 35 years | 540 | 10.4 | 681 | 10.9 | |
| Gravidity | | | | | |
| Primi-gravida | 1453 | 28.0 | 1718 | 27.5 | 0.9 |
| Second gravida | 1516 | 29.2 | 1837 | 29.4 | |
| Multi-gravida | 2227 | 42.9 | 2689 | 43.1 | |
| Gestational age (weeks) | | | | | |
| < 37 weeks | 724 | 13.9 | 893 | 14.3 | 0.5 |
| 37 – 40 weeks | 3974 | 76.5 | 4793 | 76.8 | |
| > 40 weeks | 498 | 9.6 | 558 | 8.9 | |

A significant increase in incidence of cesarean section when comparing 2008 & 2012 as in 2008 it was 38.84% and in 2012 was 41.17% with P value < 0.001 as shown in table (2).

The Incidence of different complications due to CS shown in table

(6); the highest complication was ICU admission. Other complications as wound infection, intestinal and bladder injury 0.88% over the past 5 yrs, the total incidence of complications due to CS were 3.05%.

Table 6: Description of the Studied Sample as Regard Documented Complications Of Cesarean Section

| | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | Total | |
|-------------------|------|------|------|------|------|------|------|------|------|------|-------|------|
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Blood Transfusion | 35 | 0.67 | 29 | 0.61 | 32 | 0.61 | 25 | 0.47 | 40 | 0.64 | 161 | 0.60 |
| CS Hysterectomy | 9 | 0.17 | 7 | 0.15 | 5 | 0.09 | 4 | 0.08 | 12 | 0.19 | 37 | 0.14 |
| ICU Admission | 89 | 1.71 | 74 | 1.56 | 80 | 1.52 | 65 | 1.23 | 75 | 1.20 | 383 | 1.43 |
| Others | 20 | 0.38 | 70 | 1.48 | 35 | 0.66 | 50 | 0.94 | 60 | 0.96 | 235 | 0.88 |
| Total | 153 | 2.94 | 180 | 3.80 | 152 | 2.88 | 144 | 2.72 | 187 | 2.99 | 816 | 3.05 |

DISCUSSION

In this study, it was found that the average incidence of delivery by cesarean sections at Cairo university hospital over the past five years was 39%. There was an increase in the incidence rate compared to the last decade⁶. Moreover, this study showed a significant increase in CS rates from 2008 to 2012; as in 2008 it was 38.8% and reached 41.17% by 2012.

The CSR shows a dynamic increase over the time period of the study; CSR increased from 38.8% in 2008 to 41.1% in 2012. When comparing different maternal parameters in 2008 and 2012, there was no significant change in the maternal age or gravidity, BMI between the two groups. Increase in CSR secondary to increased previous CSR reflects change in the obstetric practice at Cairo university hospital. Nowadays, there is decreased use of instrumental delivery as the upcoming generations are not trained to use forceps and Ventouse when indicated, and tend to performing cesarean section instead. The concept of using safe obstetrics had changed the attitude of many obstetricians towards vaginal birth after cesarean section (VBAC). The improved fetal surveillance with early detection of fetal distress increased the liability of cesarean section. It is obvious that instrumental delivery is a lost art among our hospital. Indeed, there were no reported cases of failed or even attempted instrumental deliveries in cases of acute fetal distress with the cervix fully dilated or in cases of prolonged second stage with the head engaged.

In accordance to our results Barber et al in 2011 analyzed rates of primary and repeat cesarean delivery, including indications for the procedure, among 32,443 live births at a major academic hospital between 2003 and 2009. He found that cesarean delivery rate increased from 26% to 36.5% between 2003 and 2009; Primary cesarean births

accounted for 50% of the increasing cesarean rate. Among primary cesarean deliveries, more subjective indications (non reassuring fetal status and arrest of dilation) contributed larger proportions than more objective indications (malpresentation, maternal-fetal, and obstetric conditions) (7).

The increase in number of CS shows a positive correlation with maternal age and gravidity with r value 0.118 and 0.659 respectively and a significant statistical difference. The increase in number of CS with maternal age could be explained by increased gravidity with the advance of the maternal age and hence the number of previous CS. In addition medical disorders as hypertension and diabetes increase with age. As the gravidity increases, malpresentations as shoulder presentation are common, risk factors associated with obstructed labor increase as uterine dystocia, fetal macrosomia which all are managed by CS.

In this study, the relationship between the (CSR) and body mass index (BMI) was not clear. According to a study by Berendzen and Howard in 2013, performed retrospective cohort study to evaluate the association between CSR and BMI for their patients over 1 year; they found that there was an increased rate of cesarean delivery as BMI increased. Increased BMI is also associated with other pregnancy complications, including hypertensive disorders and diabetes (8).

Declercq et al 2006 examined factors contributing to shifts in primary cesarean rates in the United States found that More than half (53%) of the recent increase in overall cesarean rates resulted from rising primary cesarean rates and were not related to shifts in maternal risk profiles (9).

In accordance to our results; Menacker et al 2006 found that the rate of primary cesarean delivery is increasing rapidly for women of all ages, races, and

medical conditions, as well as for births at all gestational ages. Since a first cesarean section virtually guarantees that subsequent pregnancies will be cesarean deliveries (the repeat cesarean delivery rate is now almost 91%) (10).

Another study by Menacker & Hamilton in 2010 found that cesarean rate rose by 53% from 1996 to 2007, reaching 32%, the highest rate ever reported in the United States. From 1996 to 2007, the cesarean rate increased for mothers in all age and racial and Hispanic origin groups. The pace of the increase accelerated from 2000 to 2007. Cesarean rates also increased for infants at all gestational ages (11).

In our study, the average incidence of complications recorded due to cesarean sections was 3.05%; where ICU admission was the complication that was recorded at the highest incidence 1.43%. Other complications as bladder injury, intestinal injury and wound infection only comprised 0.88%, blood transfusion 0.6% and CS hysterectomy 0.14%. The increased incidence of ICU admission as a complication due to CS is due to the fact that it is a tertiary centre for dealing with high risk and complicated cases referred from primary and secondary care units all over the governorate and even the surrounding urban and rural areas.

Villar et al found that the median rate of cesarean delivery was 33% with the highest rates of cesarean delivery noted in private hospitals institution-specific rates of cesarean delivery were affected by primiparity, previous cesarean delivery. Increase in the rate of cesarean delivery was associated with an increase in fetal mortality rates and higher numbers of babies admitted to intensive care for 7 days or longer. They concluded that High rates of cesarean delivery do not necessarily indicate better perinatal care and can be associated with harm (12).

In our study the incidence of neonatal ICU admission was 9.6%, however there were no documents showing the incidence of each cause for NICU admission; whether due to prematurity; transient tachypnea of the new born (TTN), or congenital anomalies. So, the indications for NICU admission was not clear.

Zanardo et al found that infants born by elective cesarean delivery at term are at increased risk for developing respiratory disorders compared with those born by vaginal delivery. A significant reduction in neonatal RDS would be obtained if elective cesarean delivery were performed after 39 + 0 gestational weeks of pregnancy (13).

Our study showed that over 50% of cesarean sections were performed for two main reasons; repeated CS 43.5% and malpresentations 9.7%. Chanthasenanon et al in 2007 performed cross-sectional study for the pregnant women who underwent cesarean section between January 2003 and December 2005 at Thammasat University Hospital in Thailand; they found that cesarean section rate was (27.31, 27.94, and 29.26%) in 2003, 2004 and 2005 respectively; the major indication was previous cesarean section (29%). Cephalopelvic disproportion (CPD), and elective cesarean section were second, and third most common indication (24.64%, 11.23%) respectively (14).

As a result of the shift in obstetric practice from vaginal to CS birth, the proportion of women with previous CS had increased substantially (15). The CSR for women with previous CS usually ranges from 51% to 83% in other studies (15) compared to our study which is 43%.

Breech presentation comprised 8.4% of the total incidence of fetal presentations, shoulder 2.4%. A feature of modern obstetrics is increased rate of elective cesarean for breech. This trend

has implications not for the index pregnancy but increases the chance of repeat CS in subsequent pregnancies. Practice of external cephalic version to turn a breech baby to head first position reduces the likelihood of a Cs. Danielian in his study recommended policy of selective, planned vaginal delivery for breech with no increase in infant morbidity (16).

Our study shows that females with medical disorders undergoing CS represent only 22.5% of the total number of females undergoing CS. Hypertension was the most common medical problem (10.6%), followed by diabetes mellitus (3.5 %).

In our study, the incidence of cesarean section due to fetal distress was found to be 2.1%. This was very close to a study done by Chauhan et al. where the overall risk of fetal distress was shown to be 3.1% in an unselected population (17).

One of the big studies done by Lei et al to assess determinants of a high Cesarean delivery rate in a remote population in China, a prospective cohort study including 20,891 women who gave birth between January 1, 1997, and June 30, 1998 was done. He concluded that Non-medical causes, including a woman's insurance status and her personal and social demands, accounted for a large proportion of elective Cesarean deliveries (18).

From our study we concluded that there was an increase in the total cesarean section rate in Cairo University hospital over the past five years. The increase was mainly due to increase in the primary cesarean section rate. Further studies are needed to focus on the factors that lead to increase in the primary cesarean section rate, in order to overcome the increase in the total CSR and hence complications due to CS.

For decreasing cesarean section rate we recommend many policies to be taken as encouraging (VBAC, external cephalic

version for uncomplicated singleton breech, induction of labor beyond 41 weeks gestation).

These recommendations go with accordance to the recommendations of Zhang et al to decrease cesarean delivery rate in the United States, reducing primary cesarean delivery is the key. Increasing vaginal birth after previous cesarean rate is urgently needed (19).

For future research in the same field we recommend that data recording in Cairo University hospital should be computerized for better future data retrieving and analysis.

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