Taiwanese Journal of Obstetrics & Gynecology 55 (2016) 499–502

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Original Article

The changing indications and rates of cesarean section in one academic center over a 16-year period (1997–2012)

Samuel Lurie [a, b, *], Amir Shalev [a], Oscar Sadan [a, b], Abraham Golan [a, b]

[a] Department of Obstetrics and Gynecology, Edith Wolfson Medical Center, Holon, Israel
[b] Sackler School of Medicine, Tel Aviv University, Israel

ARTICLE INFO

Article history:
Accepted 8 December 2014

Keywords:
cesarean section
indications for cesarean section
primary cesarean section rate
secondary cesarean section rate

ABSTRACT

Objective: To compare trends and rates of cesarean section delivery by indication in one academic center.
Materials and Methods: A retrospective analysis of the indications of all cesarean sections performed in Edith Wolfson Medical Center, Holon, Israel, a tertiary healthcare university facility, during 1997–2012 was done. Each delivery was assigned to the primary indication noted for that pregnancy, regardless of other indications reported. Whenever more than one indication was present, the principle indication chosen by the attending obstetrician was chosen for the analysis.
Results: The cesarean section rate gradually rose from 15.29% in 1997 to 21.10% in 2012, with an overall cesarean section rate of 20.66%. The cesarean section rate between 1997 and 2000 was 17.52%, between 2001 and 2004 was 18.5%, between 2005 and 2009 was 22.86%, and between 2009 and 2012 was 22.07% ($p < 0.001$). The five leading primary indications across the years were previous cesarean section (26.0%), non-reassuring fetal heart rate pattern (18.1%), malpresentation (16.9%), labor dystocia (8.8%), and suspected macrosomia (7.2%).
Conclusion: Previous cesarean section persistently increased and was the leading indication throughout the years. Any attempt to reverse this trend must be based on reduction of the primary cesarean section rate.

Introduction

The indication of the first documented cesarean delivery dating to the 23rd year of King Hammurabi of Babylon (1795–1750 BC) was postmortem delivery of an alive child [1]. For centuries thereafter, the postmortem or perimortem was the principal indication for performing a cesarean section, although sporadic evidence during the course of history had suggested other indications. In modern times, it was François Rousset (1530–1603 AD), a French obstetrician, who suggested cesarean section on living women, and therefore proposed maternal (contracted pelvis) as well as fetal (macrosomia, malformation, malposition, or twins) indications [1]. During the 20th century, with the introduction of anesthesia, improved surgical techniques, asepsis, antibiotics, and modern transfusion techniques, cesarean section became safe for the health and livelihood of both mother and child. Towards the end of the 20th century, the multiplicity of indications for cesarean section steadily increased and included maternal and neonatal safety objectives. The major "contributors" to the increasing cesarean section rates were maternal request, breech presentation, decreasing rate of trial of previous uterine scar, and electronic fetal heart rate monitoring [2].

During recent years, the attitude towards these and other indications has been modified [2]. Most of the "classic" indications such as cephalopelvic disproportion, placenta previa, labor dystocia, or high order gestation remained unchanged [2]. Side by side, "new" indications have emerged, such as planned cesarean section for term breech presentation [3] or maternal choice cesarean without a medical indication (i.e., cesarean on demand) [4]. The latter is a result of a motion to act in accordance with the mother's desire and preference, in addition to action on behalf of health and safety regulations of both mother and child [5]. Concurrently, improvements in definition and interpretation of common situations leading to cesarean section have taken place. More strict criteria for diagnosis of fetal distress were introduced and applied [6,7].

* Corresponding author. Department of Obstetrics and Gynecology, Edith Wolfson Medical Center, Ha-Lokhamim St 62, Holon, Israel.
E-mail address: drslurie@hotmail.com (S. Lurie).

http://dx.doi.org/10.1016/j.tjog.2014.12.014

Vaginal birth after cesarean delivery (VBAC) emerged from the 1980 National Institute of Health consensus report [8] as a mechanism to safely reduce cesarean section rates. After initial enthusiasm for trial of labor after cesarean birth (TOLAC), concerns about medical liability claims after catastrophic complications (uterine rupture and need for emergency hysterectomy) contributed to a sharp decline in VBAC rates in the beginning of the 2000s [9]. Thus, a "step back" was carried out towards the longstanding dictum suggested by Craigin in 1916 [10]: "once a cesarean always a cesarean".

The objective of this study was to identify the main indications and to examine the trend of cesarean rate and indications over a 16-year period (1997–2012) in one university affiliated tertiary medical center.

Materials and methods

This retrospective study is based on data concerning method of delivery and indications for cesarean delivery at Edith Wolfson Medical Center, Holon, Israel, a university affiliated tertiary healthcare facility, in the years 1997–2012. The study protocol was approved by the Edith Wolfson Institutional Review Board Committee (protocol number WOMC 0151-12). There were a total of 55,390 deliveries between January 1, 1997 and December 31, 2012. Of those, 11,455 (20.66%) were accomplished by a cesarean section.

The identification of the indications for cesarean delivery was through the Edith Wolfson Medical Center registry in accordance with International Classification of Disease (ICD-9) codes. The selection of the underlying reason or indication for cesarean delivery was based on the primary indication for cesarean delivery as stated by the attending obstetrician. Each delivery was assigned to the primary indication noted for that pregnancy, regardless of other indications reported. All cesarean deliveries were allocated to one of 10 categories: previous cesarean section, labor dystocia, fetal distress [non-reassuring fetal heart rate pattern (NFHRP)], malpresentation, hemorrhage, multiple gestation, macrosomia (and/or cephalopelvic disproportion), failed induction, cesarean on demand (i.e., maternal-choice) and "other."

In our department, labor is managed by standard departmental protocols, with direct supervision by the senior obstetric faculty. In 2000, refreshment courses of the criteria of indications of cesarean deliveries were undertaken in our department. It was followed by quality control program assessment of indications of cesarean deliveries in 2001 and 2002. In 2001, a policy of labor induction at 41 weeks' gestation instead of 42 weeks for otherwise uncomplicated singleton pregnancies was introduced.

The category previous cesarean section includes all repeated cesareans, i.e., post one, two, three, and more previous cesareans. The category labor dystocia includes all types of obstructed or nonprogressive labors. In our department, the diagnosis of failure to progress was made in accordance with the guidelines of the American College of Obstetricians and Gynecologists. NRFHRP (i.e., fetal distress) was defined as severe variable decelerations, late decelerations, prolonged decelerations (3–10 minutes), or baseline bradycardia of < 100 beats/min. The category malpresentation includes singleton breech presentation or transverse lie. Since 2001, a policy of planned cesarean section for term breech presentation was introduced in our department in accordance with recommendations of the Term Breech Trial Collaborative Group study [3]. The category hemorrhage includes placental abruption and placenta previa. Until the end of 2005, parturient women with complete placenta previa were delivered by a cesarean section, while those with partial or marginal were allowed to have a trial of vaginal delivery [11]. Since 2006, all women with prelabor diagnosis of either complete, or partial or marginal placenta previa were scheduled for a cesarean section. Until 2011, suspected macrosomia was defined as ultrasonographic or clinical estimation of fetal weight of > 4250 g, and since then as > 4500 g. Women who requested a cesarean section on demand were interviewed by a senior obstetrician and if after they have received and understood all the necessary information and still maintained the request for a cesarean section, their wish was granted. The category "other" includes all other indications for cesarean delivery.

Statistical analysis was performed by Chi-square calculations. Significance was set at $p < 0.05$.

Results

Table 1 summarizes the rate of cesarean sections in the years 1997–2012 in Edith Wolfson Medical Center. The lowest rate (15.29%) was in 1997, while the highest (24.12%) was in 2007. The cesarean section rate between 1997 and 2000 was 17.52% (1858 out of 10,606), between 2001 and 2004 was 18.5% (2252 out of 11,630), between 2005 and 2009 was 22.86% (3431 out of 15,008), and between 2009 and 2012 was 22.07% (4004 out of 18,146) ($p < 0.001$). The cesarean section rate between 1997 and 2004 was 18.03% (4010 out of 22,236) as compared to the 22.43% (7435 out of 33,154) rate between 2005 and 2012 ($p < 0.001$).

Table 2 summarizes the distribution of indications for cesarean sections in the years 1997–2012 in Edith Wolfson Medical Center. In total, the five leading primary indications were previous cesarean section (26.0%), NFHRP (18.1%), malpresentation (16.9%), labor dystocia (8.8%), and suspected macrosomia (7.2%). The leading primary indication for cesarean delivery differed across the years: it was previous cesarean in 1997–2000 and 2006–2012 (68.7%); malpresentation in 2001–2004 (25.0%); and NFHRP pattern in 2005 (6.3%). Malpresentation contribution to cesarean section rate was 14.3% (76/530) and 24.5% (114/464) in 2000 and 2001, respectively ($p < 0.05$). Malpresentation contribution to cesarean section rate was 14.1% (262/1858) between 1997 and 2000, and 17.5% (1674/9587) between 2001 and 2012 ($p < 0.05$).

Discussion

During the 16-year study period (1997–2012) the overall cesarean section rate at Edith Wolfson Medical Center was 20.66%. The cesarean section rate in Israel in the 1960s was 1.8% [12]. Since then, the national cesarean section rate steadily increased and was

Table 1
Cesarean section rates in the years 1997–2012.

Year	Deliveries (*n*)	Cesareans (*n*)	Cesareans (%)
1997	2688	411	15.29
1998	2691	476	17.69
1999	2607	441	16.92
2000	2620	530	20.23
2001 *	2669	464	17.38
2002 *	3000	530	17.67
2003	2951	562	19.04
2004	3010	596	19.80
2005 **	3463	794	22.93
2006	3630	738	20.33
2007 ***	3785	913	24.12
2008	4130	986	23.87
2009	4308	967	22.45
2010	4363	1008	23.10
2011	4522	984	21.76
2012	4953	1045	21.10
Total	55390	11,445	20.66

* $p < 0.05$ when compared to the rate in 2000.
** $p < 0.05$ when compared to the rate in 2004.
*** $p < 0.05$ when compared to the rate in 2006.