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A high rate of caesarean section at a newly opened university hospital

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Cesarean delivery is a common obstetric procedure. Approximately one in 4 pregnant women will deliver by cesarean section.[1] It is questionable if this high rate is associated with a decreased perinatal mortality rate.[2] However, it is certain that cesarean sections are associated with an increased rate of maternal mortality and morbidity.[3] The risk factors for having a cesarean section varies. The high incidence of cesarean section has been the cause of intense debate and analysis. While it is generally accepted that the overall incidence of cesarean section is high, it is felt that some cesarean sections are unnecessary.[4] A cut down on cesarean sections performed for indications were possible wide inter-observer variation may exist could have a noticeable impact on attempts at reducing the cesarean section rates. The purpose of our study was to determine the statistical status of these variable rates of indications for cesarean section in our population.

We conducted a retrospective review of the hospital obstetric records of all women who had a cesarean delivery between 1st January 2004 and 31st December 2004 at King Abdullah University Hospital (KAUH) of the Jordan University of Science and Technology in Irbid, North Jordan. This is a community-based tertiary referral center with a patient population cared for by public-sector specialist, university teaching staff physicians, obstetrics and gynecology residents. For the same period a similar review was conducted of all women who had a cesarean delivery at Princess Badea Teaching Hospital (PBTH) in Irbid, North Jordan, a National Health Service maternity hospital open to the general population. It is staffed with public-sector obstetrics and gynecology specialists and residents. Cesarean delivery indications were recorded for all deliveries. When more than one indication was found, a single diagnostic classification was assigned for statistical analysis. Demographics and significant aspects of the obstetric history were recorded. Antepartum obstetric complications were identified, including chronic hypertension, preeclampsia, preterm labor, premature rupture of membranes, preexisting and gestational diabetes, asthma and thyroid disease. Factors that could have an impact on the need for cesarean section were reviewed, which included the use of oxytocin (for either augmentation or induction), epidural anesthesia and amniotomy. Cervical dilatation at the time of primary cesarean delivery was also recorded. Fetal outcome variables were recorded. These included fetal weight and Apgar scores. During the time interval between 1st January 2004 and 31st December 2004, there was a total 1010 deliveries in KAUH. Of whom 368 had cesarean delivery (36.43%). Of these, 146 (39.7%) were elective and 222 (60.3%) were emergency procedures. Of the total number of patients who underwent cesarean section, 58% had booked for their antenatal care and delivery at the hospital, 23.9% were self referrals; the remaining 18.1% were referrals from other hospitals. There were 8362 deliveries at PBTH with a cesarean section rate of 18.32%. Elective cesarean delivery was performed in 22.1% of cases while emergency cesarean section was performed in 77.9% of cases. The leading indication for surgery was 2 or more previous cesarean section (4.24%), followed by fetal distress (2.76%), breech presentation (2%), failure to progress in labor (1.94%) and severe pre-eclamptic toxemia (PET) (1.04%). Sixty-five percent of patients had booked for their antenatal care and deliveries at the hospital, 25% were self referrals; the remaining 10% were referrals from other hospitals. The list of indications and the corresponding number of patients for the 2 hospitals is presented in **Table 1**. The leading 5 indications for surgery were 2 or more previous cesarean section (6.63% for KAUH and 4.24% for PBTH), followed by fetal distress (5.44% for KAUH and 2.76% for PBTH), breech presentation (3.96% for KAUH and 2% for PBTH), failure to progress in labor (3.46% for KAUH and 1.94% for PBTH) and severe PET (3.46% for KAUH and 1.04% for PBTH). All these indications were statistically significant ($p<0.001$). Cesarean deliveries occur for a variety of indications; thus, some factors are amenable to intervention strategies for reduction of the overall rate. Patient characteristics and indications leading to cesarean delivery are heterogeneous.[5] The

Table 1 - Indications for cesarean section at Princess Badea Teaching Hospital (N=1532 of 8362 deliveries) and King Abdullah University Hospital (N=368 of 1010 deliveries).

Indication	No. of patients (%)				Odds ratio	*P*-value
	PBTH (N = 8362)		KAUH (N = 1010)			
Previous 2 or more CS	355	(4.24)	67	(6.63)	0.62	<0.001
Fetal distress	231	(2.76)	55	(5.44)	0.42	<0.001
Breech presentation	168	(2)	40	(3.96)	0.5	<0.001
Failure to progress	163	(1.94)	35	(3.46)	0.55	<0.001
Severe pre-eclampsia	87	(1.04)	35	(3.46)	0.29	<0.001
Multiple pregnancy	60	(0.71)	22	(2.17)	0.32	<0.001
Unstable or abnormal lie	39	(0.46)	22	(2.17)	0.21	<0.001
Ante-partum hemorrhage	57	(0.68)	19	(1.88)	0.36	<0.001
Previous CS and others	151	(1.8)	15	(1.48)	1.22	0.46
Infertility	58	(0.69)	12	(1.18)	0.58	0.08
Bad obstetrics history	6	(0.07)	6	(0.59)	0.12	<0.001
Failed induction of labor	79	(0.94)	6	(0.59)	1.60	0.26
Intra-uterine growth restriction	6	(0.07)	5	(0.49)	0.14	<0.001
Tubal ligation	8	(0.09)	5	(0.49)	0.19	<0.001
Cephalopelvic disproportion	5	(0.05)	4	(0.39)	0.15	<0.001
Macrosomia	15	(0.17)	3	(0.29)	0.6	0.41
Congenital anomalies	1	(0.01)	2	(0.19)	0.06	<0.001
Cord prolapse	20	(0.23)	2	(0.19)	1.21	0.79
Medical problems	6	(0.07)	2	(0.19)	0.36	0.19
Pelvic floor repair	4	(0.04)	2	(0.19)	0.24	0.07
Cervical fibroid	3	(0.03)	1	(0.09)	0.36	0.35
Others	10	(0.11)	8	(0.79)	0.15	<0.001
Total	1532	(18.32)	368	(36.43)		

PBTH - Princess Badea Teaching Hospital, KAUH - King Abdullah University Hospital, CS - cesarean section

relative contributions of various indications does vary and may be related to the status of the population of a particular hospital, the referral pattern and the inter practitioner variability in practice implementation. Strategies to reduce cesarean delivery rates must address these differences.

Our finding that 39.7% of cesarean deliveries were elective procedures represents a sizable contribution that might be amenable to intervention strategies. If all patients in the elective cesarean section group for indications other than 2 or more previous cesarean sections had been given a trial of labor, this would have decreased the overall cesarean section rate. If the 79 patients in this group had a 75% success rate similar to that reported in other studies,[4,5] 59 cesarean sections would have potentially been eliminated and the cesarean delivery rate would have been decreased to 30.6% from 36.43%, approximately a 16% reduction. The emergency cesarean sections represented 60.3% of cases. A leading indication in this category was fetal distress (5.4%). This has been responsible for most of the increase in cesarean section rate in other hospitals.[4] The finding that one-third of all the cesarean sections carried out for fetal distress were thought to be unnecessary or premature confirms an over diagnosis of this condition.[4] Fetal heart rate monitoring lacks specificity.[6] It has been recommended that fetal pH assessments should be conducted instead of immediate cesarean section.[4] If a third of fetal distress cases have been unnecessary, then the total expected reduction in our cesarean section rate would be almost 5% of the overall cesarean section rate. This rate of reduction would be a worthwhile objective, especially if this reduction could be achieved without an increase in the risk to the fetus. The percentage of our

patients experiencing a trial of labor was not analyzed. A rate of approximately 70 % has been reported with a success rate of approximaely 75% of vaginal birth after cesarean.[7] This is a likely scenario if trials of labor are characterized by less frequent inductions of labor, more use of amniotomy, late epidural placement, and less repeat cesarean for dystocia performed in the latent phase of labor. A reduction in the primary cesarean section rate would lead to a reduction in that of the repeat cesarean section. Analysis of multicenter statistics has found that approximately 35% of cesarean sections were repeat procedures. Thus, reductions in the number of repeat cesarean deliveries would be expected to lower the overall cesarean delivery rate significantly. It has been estimated that if 80% of patients with a previous cesarean delivery attempted a trial of labor, an overall success rate of 75% would lead to a 21% reduction in the national cesarean delivery rate.[8]

In conclusion, the relative rates of indications for cesarean sections are heterogeneous; thus, some are amenable to overall rate reduction strategies. The combination of fewer women undergoing cesarean section for fetal distress and more women experiencing external cephalic version and a trial of labor and the enforcement of more strict criteria for the diagnosis of dystocia would result in more patients achieving a vaginal delivery.

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Loss of zonal organization of articular cartilage after experimental subchondral trauma of the knee joint

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The healthy articular cartilage shows a superficial, a transitional, a deep radial, and a deep calcified zone, which in light microscopic findings can be distinguished, especially by Safranin-O-Staining representing the proteoglycan content. The commonly used histopathological grading systems show a lack of validity especially in the scoring of mild to moderate cartilage damage, and the physiological zonal formation is mainly not a parameter for the quality of the cartilage. Intra- and inter-observer reproducibility in these systems are not satisfying in the grading of osteoarthritis. In several studies, models have been described for the Photoshop-based image analysis for the quantification of proliferative activity and of hormone receptor expression in invasive breast cancer. Meanwhile, Photoshop-based image analysis has been used in different kinds of analysis of cartilage and bone samples, and also to demonstrate the medium term influence of subchondral damage on the articular cartilage, measured by Safranin-O for proteoglycans and by Alcian blue for glycosaminoglycans. Other possible options are PAS for glycoproteins and immunostaining, for example, collagen I and II. It can replace subjective evaluations of color intensities, but it is not meant as another grading system, and it should and cannot contain a classification of arthritis. The benefit of quantifying changes in articular cartilage is well established in animal models, as more attention is paid to the description of biomechanical factors of the subchondral bone leading to cartilage damage. Meanwhile, many studies have shown that MRI can accurately and non invasively evaluate post traumatic changes defined as bone bruises, sub and osteochondral fractures, and even provide information about the