

Adherence to Guidelines on the Management of Dystocia and Cesarean Section Rates

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ABSTRACT

The purpose of this study was to investigate to what extent the Society of Obstetricians and Gynecologists of Canada (SOGC) guidelines on dystocia are being followed, and whether adherence to the guidelines is related to cesarean section rates. Data were extracted from a maternity database for nulliparous women with singleton, cephalic pregnancies at 37 or more completed weeks of gestation for a 4-year period. Patients delivered by elective cesarean section were excluded. Data were examined to determine whether those who had a cesarean section for dystocia in the first stage of labor fulfilled SOGC guidelines. In addition, the obstetricians were divided into two groups (high or low) according to their cesarean section rate for dystocia to determine whether a higher section rate was associated with an increased guideline violation rate. There were 239 nulliparous women who had a cesarean section for dystocia in the first stage of labor. The guidelines were followed in 47.7% of spontaneous labors and 77.5% of inductions. The mean section rate for dystocia in the first stage of labor was 10.8% in the high group and 6.6% in the low group, and the incidence of guideline violations in these groups was 48.0% and 39.6%, respectively ($p=0.07$). The study had a power of 0.88 to detect a 40% difference in guideline violation rates between the two groups. We conclude that many women have cesarean section for dystocia performed without fulfilling SOGC guidelines.

KEYWORDS: Guidelines, cesarean section, dystocia

Recent reports have highlighted the continued concern about increasing cesarean section rates in North America.^{1,2} It has been shown previously that the identity, or practice style, of the individual physician is a major determinant of the mode of delivery.³⁻⁷ The greatest variation between physician's cesarean section rates is seen in nulliparous women with a normal singleton fetus at term and a cephalic presentation.⁸⁻¹¹ In these women, dystocia in the first stage of labor is the leading indication for cesarean section, and so it is in this

group that the greatest opportunity exists for a reduction in the overall cesarean section rate.

Guidelines for the management of dystocia have been suggested by various professional bodies, such as the American College of Obstetricians and Gynecologists (ACOG),⁸ and the Society of Obstetricians and Gynecologists of Canada (SOGC).¹² These best practices are mainly consensus rather than evidence based.

The purpose of this study was to determine the frequency of violation of the SOGC guidelines on

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dystocia among low-risk nulliparous women undergoing cesarean section for dystocia in the first stage of labor. We also tested the hypothesis that the frequency of guideline violation would be greater among physicians with a higher cesarean section rate for dystocia.

MATERIALS AND METHODS

Data were extracted from the Ottawa Hospital (Ottawa, Ontario, Canada) labor and delivery database, for the 4 calendar years 1996 to 1999. This database includes delivery information, demographic, and electronically archived vaginal examination data, entered at the bedside. The patients delivered by the 10 obstetricians who participated in the general call-group during this 4-year period were studied. Singleton, cephalic pregnancies delivered at ≥ 37 weeks gestation were included. Patients delivered by the high-risk service and family practitioners were excluded, as were infants with congenital anomalies. Given that the study was concerned with labor management, elective cesarean sections were also excluded. The outcome of labor was noted with regard to mode of delivery, birthweight, cord pH, 5-minute Apgar score, and neonatal death. Frequencies of labor augmentation with oxytocin and of epidural analgesia were also noted.

The strategies for the management of dystocia, based on the SOGC guidelines published in October 1995, included avoidance of cesarean section for dystocia in the latent phase (< 4 cm dilated); dystocia defined as progress slower than 0.5 cm/h^{-1} during a 4-hour period in the active phase; augmentation should be given for at least 4 hours prior to cesarean section.

Data on cervical dilation were extracted from the database, and were examined to determine the frequency with which these criteria were not fulfilled in the women who underwent cesarean section for the primary indication of dystocia, in the first stage of labor. When we considered the diagnosis of dystocia, we included the following entries from the database: failure to progress, cephalo-pelvic disproportion (CPD), failed induction, failure to descend.

The 10 physicians were then ranked according to their cesarean section rates for dystocia in the first stage of labor, and divided into two groups of five, with high and low cesarean section rates. These two groups were then compared to determine if there were differences in the management of dystocia between the groups. A comparison was also made with deliveries from 1995, to determine whether labor management changed following the publication of the guidelines.

Statistical analysis was performed using Stat View (Windows version 4.57) (SAS Institute, Cary, NC). Data were compared using χ^2 tests or Fisher's exact test for nominal variables, t tests for continuous

variables, and Wilcoxon signed rank test for the overall difference in violation rates. A p value of 0.05 was considered significant.

RESULTS

During the study period, 8497 women were delivered by one of the 10 physicians eligible for inclusion. Of these, 3,061 were singleton, cephalic deliveries at 37 or more weeks of gestation in nulliparous women. The total number of cesarean sections in this group was 527 (17.2%). From these 63 patients (2.1%), elective cesarean sections were excluded. There were 49 infants with a congenital anomaly and 208 deliveries with missing or erroneous data, and these were also excluded. The data from the remaining 2741 women were analyzed.

A total of 279 (10.1%) of these women had a cesarean section for dystocia, of whom 239 (85.6%) were in the first stage of labor. For these women the proportions of labors where the above guidelines were not followed are shown in Table 1, for induced and spontaneous labor. There were 151 (13.5%) cesarean sections for dystocia in the first stage of labor in induced labors and 88 (5.4%) in spontaneous labors. The odds ratio (OR) for cesarean section in induced versus spontaneous labor was 2.7 (95% confidence interval, 2.7 to 3.6). The overall rate of violation of at least one aspect of the guideline was 39.7%, and there were proportionately more violations associated with spontaneous than induced labor.

Demographic and labor data for the high and low groups are shown in Table 2. There was no clinically important difference between the groups, and in particular, no difference in perinatal outcome. There were 148 cesarean sections for dystocia in the first stage of labor (10.8% of women) in the high group and 91 (6.6%) in the low group, and the cesarean section rate for fetal distress/nonreassuring fetal status was 54 (4.0%) and

Table 1 Characteristics of Nulliparous Women Who Underwent Cesarean Section for Dystocia in the First Stage (n = 239), for Whom Labor Patterns Did Not Meet SOGC Guidelines in Spontaneous (n = 1619) and Induced (n = 1122) Labors

Guideline	Spontaneous (n = 88)	Induced (n = 151)	Total (n = 239)
Cervix < 4 cm dilated*	2 (2.3)	24 (15.6)	26 (10.9)
Progress > 0.5 cm/h	13 (14.8)	12 (7.9)	25 (10.5)
Dystocia < 4 h	8 (9.1)	8 (5.3)	16 (6.7)
Augmentation < 4 h*	31 (35.2)	13 (8.6)	44 (18.4)
One or more of above	46 (52.3)	49 (32.5)	95 (39.7)
Mean duration of dystocia (h)	5.9 ± 2.1	6.3 ± 2.8	6.1 ± 2.5

* $p < 0.001$ for spontaneous versus induced labor.

Values are given as No. (%) or mean \pm standard deviation.

SOGC, Society of Obstetricians and Gynecologists of Canada.

Table 2 Comparison of Demographic Data, Labor Characteristics, and Fetal Outcomes for Nulliparous Women in High and Low Groups

Variable	High CS (n = 1367)	Low CS (n = 1374)	p High versus Low
Maternal age (yr)	28.0 ± 5.3	28.2 ± 5.2	0.11
Induction of labor	564 (41.3)	558 (40.6)	0.73
Mean duration labor (h)	12.5 ± 7.3	12.1 ± 6.9	0.08
Physician years in practice	20.4 ± 5.4	19.6 ± 8.9	0.85
Apgar score < 7 at 5 min	34 (2.5)	31 (2.3)	0.69
pH at delivery < 7.1	50 (3.7)	50 (3.6)	0.98
Epidural	1150 (84.1)	1147 (83.5)	0.65

Values are given as mean ± standard deviation or No. (%). CS, cesarean section.

35 (2.6%), respectively. The induction rate was the same in the two groups. There were also no significant differences between the high and the low group in the proportion of cesarean sections performed for induced versus spontaneous labor: high group, 26 versus 16% (OR, 1.7) and low group, 20 versus 12% (OR, 1.6). There was no neonatal death in either group.

The guideline violation rates for the high and low groups are shown in Table 3. The overall violation rate in induced labor was 45.7% for the high group and 33.9% for the low group ($p = 0.15$). The rates for spontaneous labor were 51.8 and 53.1%, respectively.

When the violation rate for 1996 to 1999 is compared with obstetric practice in 1995, a change can be seen. In 1995, there were 54 cesarean sections for dystocia in the first stage of labor, from 763 women meeting the inclusion criteria. Of these, 16 women (29.6%) had labor management that would have been in keeping with the SOGC guidelines and 38 women (70.1%) did not. The difference in the violation rates of the two time periods is statistically significant ($p < 0.0001$). The

Table 3 Characteristics of Nulliparous Women Who Underwent Cesarean Section for Dystocia in the First Stage (n = 239), for Whom Labor Patterns Did Not Meet SOGC Guidelines

Variable	High CS (n = 148)	Low CS (n = 91)	p High versus Low
Cervix < 4 cm dilated	21 (14.2)	11 (12.0)	0.64
Progress > 0.5 cm/h	17 (11.5)	10 (11.0)	0.91
Dystocia < 4 h	13 (8.8)	6 (6.6)	0.54
Augmentation < 4 h	32 (21.6)	14 (15.4)	0.23
One or more of above	71 (48.0)	36 (39.6)	0.07*
Mean duration of dystocia (h)	5.9 ± 2.5	6.5 ± 2.7	0.22

*Wilcoxon signed rank test.

Values are given as No. (%) or mean ± standard deviation. SOGC, Society of Obstetricians and Gynecologists of Canada.

cesarean rates for dystocia in the first stage of labor were 7.1% in 1995 and 8.7% for 1996 to 1999 ($p = 0.15$)

DISCUSSION

The total number of cesarean sections, in nulliparous women with a singleton, cephalic pregnancy at term in our study (17.2%), is similar to the North American rate for 1996 (17.9%).⁸ The ACOG suggested goal for this group is 15.5%. Cesarean section for dystocia in the first stage of labor accounted for 45% of cesarean sections, and our study shows that the SOGC management guidelines have not been followed in 40% of these women. There is a trend toward an increased incidence of one or more guideline violations in physicians with higher cesarean section rates, but this did not quite reach statistical significance. The greatest difference between the high and low groups is seen in the frequency of augmentation for less than 4 hours, and this occurs in more than one third of women in spontaneous labor. These results suggest that there may be room for improvement. However, the increased cesarean section rate in the high group is not explained completely by increased guideline violations. We observed a 40% difference in the incidence of cesarean section between the high and low groups, but only a 20% difference in violation rates. This did not appear to be due to a trade-off in indication for cesarean section between dystocia and fetal distress, given that the high group had a similarly higher proportion of cesarean for dystocia and fetal distress. Nor was it due to an increased proportion of cesareans for induction. Given that at least some of the women who underwent cesarean section for dystocia without meeting the guidelines would have needed a cesarean section in due course, we hypothesized that the difference in violation rates should be proportionally as great, or greater, than the difference in cesarean section rates. Given the observed difference in cesarean section rates, the study had a power of 0.88 to detect the same difference in guideline violation rates.

The overall proportion in whom the guidelines were not followed is similar to that in other studies.¹³⁻¹⁵ For example, Grol et al¹⁴ found that recommendations were followed in 61% of decisions, on average. The reasons for poor compliance among physicians are many and complex, and include the possibility that physicians do not agree with the consensus reflected in the guideline.^{15,16}

We were not able to study extensively the period prior to the introduction of the guidelines, given that our database was introduced in 1994. The comparison of obstetric practice is therefore limited, but does show that there seems to have been a significant improvement in how labor was managed following the introduction of the guidelines. This change may or may not be directly attributable to the SOGC guidelines, especially because

many of the recommendations were already in the Canadian literature prior to 1995.¹⁷ However, there was no significant change in the cesarean section rate for dystocia in the first stage of labor. A previous study, performed in the same geographical area in 1984, found a striking variation between hospitals in the rate of cesarean section for dystocia performed in the latent phase (from 13.3 to 58.1%).⁹ The figure for our institution from that study was 20.4%, which has decreased to 10.9% in the present study. However, the cesarean section rate for dystocia in the first stage of labor was the same for the two studies (8.2 versus 8.7%). There have been considerable increases in cesarean section rates since the end of our study period.³ Although there have not been any published updates to the Canadian guidelines on the management of dystocia, it is also possible that adherence rates may have increased with time. These factors should be considered in applying our findings to different practice settings.

The relationship between a physician's personal preferences, or practice style, and his or her cesarean section rate is clearly complex. Guillemette and Fraser¹⁰ also compared obstetricians with high and low cesarean section rates. The authors were not able to explain the differences in cesarean section rates for dystocia by differences in the management of the first stage of labor, although they found that amniotomy was practiced earlier by the high group. Poma¹⁸ found that augmentation of labor was performed more frequently by physicians with a higher cesarean section rate, whereas the opposite was found by the Green Bay¹⁹ cesarean section study. Performance of cesarean section in the latent phase of labor has been identified as an undesirable practice,^{8,9} but our data indicate that this occurs very infrequently in spontaneous labor. The induction rates between high and low physician groups were the same in our study, but the overall rate was more than 40%, and inductions accounted for 63% of cesarean sections for dystocia in the first stage. In keeping with other studies,²⁰ we confirm that induction is an important driver of cesarean section for dystocia. In induced labor, different criteria for management may apply, given that we observed a higher section rate despite better adherence to the guidelines.

In a retrospective study such as this, there is always the possibility of unmeasured confounding variables contributing to the differences in cesarean section rates between the two groups. This is unlikely in this study, given that the 10 physicians shared a group practice, and so laboring patients, in effect, were randomly allocated by the on-call rota, particularly for spontaneous labors. The maternal demographics are very similar between the high and low groups. Homogeneity of the two populations is also contributed to because in our teaching hospital, many of the routine decisions are made by the obstetric residents (e.g., the

use of amniotomy and epidural analgesia). The decision regarding when to perform an operative delivery is always made by the attending obstetric consultant. However, the residents may have exerted some influence in labor management, although our study did not measure this effect.

Guideline violations in the management of labor dystocia were common in this study, and the possibility remains that better adherence to the guideline will indeed be associated with a reduction in cesarean section rates.

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