Clinical Practice Guideline for Cesarean Section Due to Cephalopelvic Disproportion

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Objectives: *To evaluate the effect of the Clinical Practice Guideline (CPG) for cesarean section due to Cephalopelvic Disproportion (CPD) on physician compliance, pregnancy outcomes and cesarean section rate. The study also wants to identify factors associated with physician non-compliance.*

Material and Method: *455 medical records of women undergoing a cesarean section due to CPD from January 1, 2002 to December 31, 2003 were reviewed. The CPG was implemented on January 1, 2003. The pregnant outcomes of women who delivered from January 1, 2002 to December 31, 2002 were used for comparison. The outcome measurements were physician compliance, pregnancy outcomes and cesarean section rates. Multivariate logistic regression analysis was used to identify factors associated with physician non-compliance. Independent variables included private care, parity, maternal height, Bishop score, maternal age and estimated fetal weight.*

Results: *The compliance rate was 83%. Physician compliance in private practice was lower than in non-private practice (76.6% VS 92.4%). Pregnancy outcomes were not different between the two periods. The cesarean section rates before and after implementation of the CPG were 8.4% and 8.5%, respectively. Private practice, poor Bishop score and estimated fetal weight ≥ 3500 g were significant predictors of physician non-compliance.*

Conclusion: *The compliance rate was high, but the cesarean section rate due to CPD did not significantly change within a one year period. There was no adverse outcome. Physician non-compliance was more common in private practice. Poor Bishop score and high estimated fetal weight were significant predictors.*

Keywords: *Audit, Cesarean delivery, Clinical practice guidelines, Compliance*

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The cesarean section rate has been increasing worldwide[1-4]. In Thailand, the cesarean section rate has increased steadily from 15.2% in 1990 to 22.4% in 1996[5]. The cesarean delivery rates have been the highest in private hospitals and lowest in the community hospitals[5]. A cesarean section is not always safe. Many complications may occur[6], and there is usually an increased length of hospital stay and higher expenses.

During the past 10 years, Songklanagarind Hospital, Prince of Songkla University, is amongst the hospitals with a high cesarean section rate. It increased from 27.4% in 1991 to 36.8% in 2000, which is very high. The WHO guideline suggests that the cesarean section rate should be no more than 15%[7]. Concerned with this trend, the authors implemented the first Clinical Practice Guideline (CPG) for cesarean section rate due to Cephalopelvic Disproportion (CPD) on June 1, 1999. The authors were guided by their previous success where the cesarean section rate due to CPD was successfully reduced from 10.7% in 1999 to 8.6% in 2002 by using a CPG derived and adapted from the one of the Royal Thai College of Obstetricians and Gynecologists (RTCOG)[8]. However, as this rate was very high and the authors wanted to reach an optimal rate, they decided to implement a new strategy. They

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revised and made the CPG more stringent and used a compulsory checklist. After 1 year of implementation, the authors evaluated the effect of the new strategy and audited the physician compliance with the revised CPG.

The objective of the present study was to evaluate the effect of the revised CPG on physician compliance and to identify factors associated with physician non-compliance. In addition, the authors also evaluated the effect of the CPG on pregnancy outcomes and cesarean section rate.

Material and Method

The present study was conducted in Songklanagarind Hospital, in southern Thailand. This is a university hospital that also serves as a regional tertiary center. The Department of Obstetrics and Gynecology performs about 2,500 deliveries per year. It is divided into private and non-private services. The private patients have their own obstetrician care from ante-through postpartum. The non-private patients are cared by resident physicians in Obstetrics and Gynecology, supervised by experienced obstetricians.

The CPG guideline was revised and implemented into clinical practice on 1 January 2003 and was similar to the RTCOG guideline. All obstetricians committed to follow the guideline. The new CPG criteria changed the cervical dilatation from 3 cm to 4 cm with 80% of effacement, in line with the RTCOG criteria. The new criteria for diagnosis of CPD are: (i) at least 4 cm of cervical dilatation and 80% of effacement, (ii) good uterine contraction for at least 2 hours, and (iii) protraction or arrest disorder diagnosed. If one of these conditions is not met, the diagnosis of CPD must be confirmed by two obstetricians. Before making a decision to perform a cesarean section due to CPD, its criteria had to be fulfilled. Physician compliance was defined as practice that followed the protocol.

The outcome measurements were physician compliance, pregnancy outcomes and cesarean section rates. Independent variables consisted of type of service, maternal age, maternal height, Bishop score, parity and estimated fetal weight. Multivariate logistic regression was used to identify factors associated with physician non-compliance.

The sample size was calculated based on the estimated prevalence of physician compliance with the CPG. Setting a confidence interval of 95% and an estimated prevalence of physician compliance based on a study of the previous practice. This was in accordance with the revised CPG of 60% with an acceptable error of 5%. It indicated that at least 120 cases of cesarean section due to CPD were required to estimate the prevalence of physician compliance reliably.

All 455 medical records of women undergoing a cesarean section due to CPD or failure to progress in Songklanagarind Hospital from 1 January 2002 to 31 December 2003 were reviewed. The study included both before and after the implementation of the new guideline. This included the time before the implementation of the revised CPG from 1 January 2002 to 31 December 2002 and after the implementation of the revised CPG from 1 January 2003 to 31 December 2003.

Maternal characteristics were compared between the two periods using chi-square test and Student's t-test. A p-value of < 0.05 was considered significant. Data were derived from the database of the Statistical Unit of the Department of Obstetrics and Gynecology, Songklanagarind Hospital.

In the analysis for predictors of physician non-compliance, the potential predictor variables consisted of maternal age, parity, maternal height, type of service, Bishop score and estimated fetal weight. Factors with p-value of less than 0.05 in univariate analysis were included in the multivariate logistic regression model. SPSS for Windows version 10.0 was used for data analysis.

Results

Between 1 January 2002 and 31 December 2003, there were 2,685 deliveries before the implementation of the guideline and 2,700 deliveries after the implementation of the guideline. Demographic characteristics were not different between the two periods (Table 1). A total of 455 women had a cesarean section due to CPD. There were 226 and 229 cases in the periods before and after implementation of the guideline, respectively.

Physician compliance, after the implementation of the guideline, evaluated from the 229 medical records was 83%, with 76.6% in private practice and 92.4% in non-private practices. Physician compliance was significantly different between the two groups ($p < 0.05$.) There was only one case that followed the criterion that requires two obstetricians to make the decision. The compliance rate in each criterion of diagnosis of CPD was 84.7% for cervical dilatation ≥ 4 cm, 96.9% for good uterine contraction and 94.7% for abnormal progress of labor. Pregnancy outcomes were compared between the two periods. Postpartum complications, including uterine atony, metritis, postpartum hemorrhage, puerperal morbidity and wound

Table 1. Maternal characteristics

Variable	Period before CPG (n = 226)	Period after CPG (n = 229)
Age (years) (Mean ± SD)	29.5 ± 5.2	28.6 ± 5.2
Height (cm) (Mean ± SD)	155.0 ± 5.7	154.8 ± 5.1
Gestational age at delivery (wks) (Mean ± SD)	39.1 ± 1.2	39.2 ± 1.3
Nulliparity (%)	189 (83.6)	195 (85.2)
Private case (%)	150 (66.4)	137 (59.8)
Estimated fetal weight ≥ 3500 g (%)	49 (25.0)	48 (24.6)

Table 2. Pregnancy outcomes of cesarean section due to cephalopelvic disproportion

	Period before CPG	Period after CPG	p-value
Postpartum complication [a] (%)	6 (2.7)	4 (1.7)	0.54[b]
Fetal outcome			
APG score at 1 min			
< 4 (%)	1 (0.4)	3 (1.3)	0.55[c]
< 7 (%)	11 (4.9)	9 (3.9)	
APG score at 5 min < 7 (%)	0 (0)	1 (0.4)	0.16[b]
Meconium stained AF (%)	21 (9.3)	25 (10.9)	0.57[c]
Admission to NICU (%)	1 (0.4)	4 (1.7)	0.37[b]

(a) Including uterine atony, metritis, postpartum hemorrhage, puerperal morbidity and wound infection
(b) Fisher's Exact test
(c) Chi-square test

infection, were not significantly different between the two periods. Fetal outcomes, including birth weight, Apgar scores, meconium stained in amniotic fluid and admission to the neonatal intensive care unit, were not different (Table 2.) No cases had cesarean hysterectomy. No fetal or maternal death or any serious complications were detected.

It was found by univariate analysis that in private practice, Bishop score < 7, nulliparity and estimated fetal weight ≥ 3500 g were significantly associated with physician non-compliance (Table 3). Maternal height and maternal age were not significant predictors in the univariate logistic regression analysis (Table 3). In the multivariate logistic regression analysis, the factors significantly associated with physician non-compliance were private practice, Bishop score < 7 and estimated fetal weight ≥ 3500 g. Poor Bishop score had the highest likelihood for strong predictor of physician non-compliance. For parity, there was no case of non-compliance in the multiparity group (Table 4).

The cesarean section rates due to CPD were 8.4% before and 8.5% after implementation of the CPG. In 2002, the cesarean section rates due to CPD in private were 12.2% and in non-private cases were 5.2%. After implementation of the CPG, the cesarean section rates were 10.9% for private care and 6.4% for non-private care (Table 5).

Discussion

From the study, it was found that physician compliance with the CPG for cesarean delivery due to CPD was quite high. Compliance in non-private practice was significantly higher than in private practice. However, fetal outcomes were not different between the two groups and there were no maternal or fetal deaths in either study group. Moreover, postpartum complications were not different. It was also shown that pregnancy outcomes of all deliveries between the two periods were not different, indicating that the authors' guideline was not harmful.

Compared with the authors' previous study, the compliance rate was slightly lower (83% vs 89%). This is because the revised CPG was more stringent in terms of cervical dilatation. When each criterion was considered, the criterion of cervical dilatation had the highest non-compliance rate as did the first CPG[8]. It implies that this criterion might be impossible to follow in some cases. However, in such cases the criteria of

Table 3. Univariate analysis of factors associated with physician compliance

Factor	Non compliance rate (%)	p-value
Type of service		
Private	32 (23.4)	0.002[(a)]
Non-private	7 (7.6)	
EFW (g)		
≥ 3500	13 (27.1)	0.002[(a)]
< 3500	14 (9.5)	
Height (cm)		
< 150	4 (14.8)	0.498[(b)]
≥ 150	35 (17.3)	
Parity		
Nulliparity	39 (20)	0.002[(b)]
Multiparity	0 (0)	
Maternal age (years)		
≥ 35	8 (25.8)	0.162[(a)]
< 35	31 (15.7)	
Bishop score		
< 7	22 (23.9)	0.023[(a)]
≥ 7	17 (12.4)	

EFW; estimated fetal weight
(a) Chi-Square test
(b) Fisher's Exact test

Table 4. Factors associated with physician non-compliance using a multivariate logistic regression model

Factors	Odds Ratio	95%CI	p-value
Private care	3.31	1.23-8.91	0.018
EFW ≥ 3500 g	3.30	2.37-17.06	<0.001
Bishop score < 7	6.36	1.27-8.53	0.014

95% CI, 95% confidence interval
EFW; estimated fetal weight

Table 5. Cesarean section rate in cephalopelvic disproportion

Type of service	Cesarean rate before CPG (%)	Cesarean rate after CPG (%)
Private care	150/1232 (12.2)	137/1252 (10.9)
Non private	76/1453 (5.2)	92/1448 (6.4)
Total	226/2685 (8.4)	229/2700 (8.5)

diagnosis of CPD must be confirmed by two obstetricians.

Multivariate logistic regression analysis showed that poor Bishop score was the strongest predictor of non-compliance followed by private practice and estimated fetal weight ≥ 3500 g. Those cases with poor Bishop score have to take a longer time to enter into the active phase of labor. Individual judgment is very important. The doctor might not wait long enough before making a decision. Estimated fetal weight ≥ 3500 g was also a significant predictor of non-compliance. It implies that the doctor might feel that the baby was big and eventually ended up with CPD, so they did not wait until the criteria had been

fulfilled. However, they did not use a second opinion to make the decision.

In a previous study, the authors found that private practice was the strongest predictor of non-compliance (Odds ratio = 15.9)[8]. However, in this study, Bishop score had the highest likelihood of non-compliance. In addition, cesarean section in private care was lower. It reflects that the obstetricians in private practice were aware of the revised CPG and had intention to decrease cesarean section rate.

In the authors' previous study, time series analysis showed that the trend of cesarean section rate was increasing, and the first CPG could successfully reduce the cesarean section rate[8]. However, when the authors implemented the revised CPG with the use of a check list, the cesarean section rate did not change significantly. It might be difficult to further reduce the cesarean section rate below this level.

The authors have to follow these subjects longer to see if caesarean section rate decreased to the optimal point that balances the risk of maternal, fetal and economic factors. The authors' guideline was flexible as there was a criterion requiring two obstetricians to make the decision case if the setting criteria were impossible to be fulfilled. This reflects a transparency of patient care and professional team work to help provide the safest and best patient care.

There was only one obstetrician who followed the criterion that requires two obstetricians to make a decision, indicating that this obstetrician was aware of the CPG and had a strong intention to follow it. On the other hand, some obstetricians were not ready to use this criterion in 39 non-compliance cases. This was a problem as they were either not aware of the CPG or they thought an unfavorable outcome might occur if they strictly followed the CPG.

In summary, the compliance rate was quite high. The criteria proved its maternal and fetal safety on implementation and the cesarean section rate did not decrease, nor increase in the year following implementation of the revised CPG and the use of a checklist. There were high non-compliance caesarean section rates in the private group however, length of evaluation is important. In a previous study[8], the authors found that the cesarean section rate significantly decreased after two years of implementation of the CPG. The authors propose that peer review and intensive individual feedback should be used in all cases.

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ผลของการใช้ clinical practice guideline สำหรับการผ่าตัดคลอดจากภาวะผิดสัดส่วนระหว่างศีรษะทารกกับอุ้งเชิงกรานต่อการปฏิบัติที่สอดคล้องของแพทย์ ผลของการตั้งครรภ์และอัตราการผ่าตัดคลอด

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วัตถุประสงค์: เพื่อศึกษาผลของการใช้ clinical practice guideline (CPG) สำหรับการผ่าตัดคลอดจากภาวะผิดสัดส่วนระหว่างศีรษะทารกกับอุ้งเชิงกรานต่อการปฏิบัติที่สอดคล้องของแพทย์ผู้ดูแล ผลของการตั้งครรภ์ อัตราการผ่าตัดคลอด ปัจจัยที่มีผลต่อการปฏิบัติที่ไม่สอดคล้องกับ CPG

วัสดุและวิธีการ: ศึกษาจากสตรีครรภ์เดี่ยวทั้งหมด 455 ราย ที่ได้รับการผ่าตัดคลอดจากภาวะผิดสัดส่วนระหว่างศีรษะทารกกับอุ้งเชิงกราน ตั้งแต่วันที่ 1 มกราคม พ.ศ. 2545 ถึง 31 ธันวาคม พ.ศ. 2546 โดยประกาศใช้ CPG ตั้งแต่ 1 มกราคม พ.ศ. 2546 ตัวชี้วัดที่สำคัญคือ การปฏิบัติที่สอดคล้องกับ CPG ผลของการตั้งครรภ์ อัตราการผ่าตัดคลอด และปัจจัย ที่มีผลต่อการปฏิบัติที่ไม่สอดคล้องกับ CPG

ผลการศึกษา: อัตราการปฏิบัติที่สอดคล้องกับ CPG คิดเป็น ร้อยละ 83 โดยในกลุ่มที่เจาะจงแพทย์ผู้ดูแล มีอัตราการปฏิบัติที่สอดคล้องกับ CPG ต่ำกว่ากลุ่มที่ไม่เจาะจงแพทย์ผู้ดูแล อย่างมีนัยสำคัญทางสถิติ คิดเป็น ร้อยละ 76.6 และ ร้อยละ 92.4 ตามลำดับ ไม่มีความแตกต่างกันของผลการคลอดในช่วงก่อนและหลังการใช้ CPG อัตราการผ่าตัดคลอดเนื่องจากภาวะผิดสัดส่วนระหว่างศีรษะทารกกับอุ้งเชิงกราน ก่อนและหลังใช้ CPG คิดเป็น ร้อยละ 8.4 และร้อยละ 8.5 ตามลำดับ ซึ่งไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ โดยปัจจัยที่มีผลต่อการปฏิบัติที่ไม่สอดคล้องกับ CPG ซึ่งวิเคราะห์โดยใช้ Multivariate logistic regression ได้แก่ คะแนน Bishop < 7 กลุ่มที่เจาะจงแพทย์ผู้ดูแล คาดคะเนน้ำหนักทารกมากกว่า หรือเท่ากับ 3500 กรัม

สรุป: อัตราการปฏิบัติที่สอดคล้องกับ CPG ค่อนข้างสูง แต่ CPG ไม่สามารถลดอัตราการผ่าตัดคลอดเนื่องจากภาวะผิดสัดส่วนระหว่างศีรษะทารกกับอุ้งเชิงกรานได้ภายในระยะเวลา 1 ปี แต่ผลของการใช้ข้อปฏิบัตินี้ไม่ได้เพิ่มภาวะอันไม่พึงประสงค์แต่อย่างใด การปฏิบัติที่ไม่สอดคล้องพบมากในกลุ่มที่คะแนนBishopต่ำ การเจาะจงแพทย์ผู้ดูแลและการคาดคะเนน้ำหนักทารกมาก