

# Adherence to Guidelines on the Diagnosis of Cephalo-Pelvic Disproportion at Maharaj Nakorn Chiang Mai Hospital

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**Objective:** To determine the degree of adherence to guidelines on the diagnosis of cephalopelvic disproportion (CPD) in Maharaj Nakorn Chiang Mai Hospital.

**Material and Method:** The database of pregnant women who underwent cesarean delivery due to CPD between 2010 and 2012 was reviewed. The degree of adherence to guidelines on the CPD diagnosis was recorded. The guidelines were from Royal Thai College of Obstetricians and Gynecologists (RTCOG) and the American Congress of Obstetricians and Gynecologists (ACOG) as gold standard criteria for CPD diagnosis.

**Results:** Four hundred sixty four pregnant women diagnosed as CPD were recruited. The adherence to guidelines either RTCOG or ACOG criteria was 80.4%. Of 91 cases that had incomplete criteria to diagnose CPD, 25 cases (27.5%) had been suspected of fetal macrosomia and CPD was diagnosed during latent phase of labor. Unfortunately, 76% of these fetuses had birth weight less than 4000 grams, which were unlikely to be macrosomia.

**Conclusion:** The adherence to guidelines on the diagnosis of CPD was 80.4%. Almost one-third of the cases that had no adherence were false diagnosed of fetal macrosomia. Therefore, the strategy of accurate fetal weight estimation may reduce unnecessary cesarean section from false diagnosis of CPD.

**Keywords:** Cesarean section, Cephalopelvic disproportion, Guideline, Audit

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The rising of cesarean section rate (CSR) is one of the challenging obstetrical problems in many countries including Thailand<sup>(1-4)</sup>, where the rate is going to be much higher than the appropriate CSR, 10-15% in low-risk obstetric population, as suggested by World Health Organization (WHO)<sup>(5)</sup>. For instance, CSR at Maharaj Nakorn Chiang Mai Hospital was significantly increased from 11.3% in 1992 to 23.6% in 2011<sup>(6)</sup>. Moreover, the CSR indicated by cephalopelvic disproportion (CPD) and previous cesarean section are even much higher. The prevalence of CPD in our hospital has been increased from 3.2% in 1992 to 7.9% in 2011<sup>(6)</sup>. According to WHO recommendations, the optimal CSR due to CPD should not be more than 5%<sup>(5)</sup>. Therefore, it is reasonable to hypothesize that such a higher rate was partly associated with the over-diagnosed CPD, as supported by many previous studies<sup>(7-10)</sup>. Hence, the strategy to decrease the rate of over-diagnosed CPD is likely to be effective in

reduction of the unnecessary CSRs. The objective of the present study was to determine the degree of adherence to guidelines on the diagnosis of CPD at Maharaj Nakorn Chiang Mai Hospital.

## Material and Method

A retrospective study was conducted at Maharaj Nakorn Chiang Mai Hospital, with ethical approval by the Institute Review Boards. The database of delivery records between January 1, 2010 and December 31, 2012 were assessed and reviewed. In record selection, inclusion criteria were 1) singleton pregnant women and 2) undergoing primary cesarean section indicated by CPD. Exclusion criterion was obvious fetal anomaly that caused CPD such as fetal hydrocephalus. Medical records of the recruited cases were comprehensively reviewed. Baseline characteristics of the patients and all of the parameters that were essential for diagnosis of CPD were recorded such as rates, duration, and pattern of cervical dilatation/effacement, strength of uterine contraction and labor progression. The guideline for diagnosis of CPD proposed by Royal Thai College of Obstetricians and Gynecologists (RTCOG) and the American Congress of Obstetricians and Gynecologists (ACOG)

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were referred as gold standard criteria for the diagnosis of CPD. The RTCOG criteria for diagnosis of CPD consists of three components, (i) at least 4 cm of cervical dilatation and 80% of effacement, (ii) good uterine contraction for at least two hours, and (iii) abnormal labor curve. If one of these conditions was not met, the diagnosis of CPD must be based on assessment and consensus by two qualified obstetricians<sup>(11)</sup>. According to the ACOG criteria, the diagnosis criteria are similar to RTCOG criteria except for cervical dilatation, which must be at least 3 cm dilatation, and 100% of effacement<sup>(12)</sup>. The descriptive data in the present study was presented as percentage, means and SD for parametric data, median and range for nonparametric data. The statistical package for social science (SPSS, Chicago), version 17.0 was used for data analysis.

## Results

Four hundred sixty five pregnant women who underwent cesarean delivery due to CPD were recruited into the study. One case of CPD associated with fetal hydrocephalus was excluded from analysis. The remaining 464 cases were available for data analysis. The mean  $\pm$  SD maternal age was  $28.92 \pm 5.8$  years (range 16-45). Of them, 85 pregnant women (18%) had advanced maternal age and 19 (4%) were of adolescent pregnancy. The mean of pre-pregnancy body mass index (BMI)  $\pm$  SD was  $22 \pm 4.73$  kg/m<sup>2</sup> (range 14.86-34.29). More than 2/3 of the cases (298 cases, 64%) were primigravida. The mean  $\pm$  SD gestational age at delivery was  $39 \pm 1.49$  weeks (range 27-42) with the mean  $\pm$  SD birth weight of  $3,323.62 \pm 465.5$  grams (range 780-4,950).

Of all 464 cases diagnosed for CPD, 91 cases (19.61%) failed to meet the minimal criteria recommended by RTCOG or ACOG. Of these 91 cases, three cases had discordant diagnoses between the two guidelines, including two cases that met the ACOG

criteria but did not meet the RTCOG criteria and one case vice versa. The two formers did not meet the RTCOG criteria because of 3 cm cervical dilatation at the time of diagnosis, whereas the latter one with adherence to RTCOG criteria did not meet the ACOG criteria due to 5 cm cervical dilatation and 80% effacement.

Of 91 cases that were not adhered to the diagnostic criteria, almost 70% were primigravida, 35.16% were private cases, and 17.58% were referral cases. Of them, 27.47% (25 of 91 cases) had cesarean delivery due to indication of fetal macrosomia. However, most of these newborns (76%, 19 of 25 cases) did not have macrosomia because their birth weights were less than 4,000 grams. Maternal obesity accounted for 42.86% (39 of 91 cases). Moreover, 43 cases (42.25%) had medical complications, almost half of which were diabetes mellitus. Notably, seven cases were diagnosed for CPD in the second stage of labor, in which six cases had failure of vacuum extraction procedure. Interestingly, only 13.2% (12 of 91 cases) of these cases had cervical dilatation  $\geq 6$  cm at the time that CPD was diagnosed.

According to the difference in CPD diagnostic criteria between RTCOG and ACOG about cervical dilatation and effacement, 90 and 89 cases were not adhered to RTCOG and ACOG guidelines respectively. The number of cases that were not adhered to diagnostic criteria either RTCOG or ACOG criteria were shown in Table 1.

## Discussion

In the last two decades, the rising cesarean section rate at Maharaj Nakorn Chiang Mai Hospital was under critical review. One of the main reasons of this escalation was cesarean section indicated by CPD. According to this study, nearly 20% of the cases diagnosed for CPD were not adhered to the guidelines, reflexive of unnecessary cesarean section in these

**Table 1.** Number of the cases that were not adhered to CPD diagnostic criteria (n, %)

| CPD diagnostic criteria                               | RTCOG (90 cases) | ACOG (89 cases) |
|---|------------------|-----------------|
| Cervical dilatation & effacement                      |                  |                 |
| RTCOG: $>4$ cm, 80%                                   | 69 (76.67%)      | NA              |
| ACOG: $>3$ cm, 100%                                   | NA               | 62 (69.66%)     |
| Good contraction $>2$ hours                           | 37 (41.11%)      | 36 (40.44%)     |
| Abnormal labor curve                                  | 83 (92.22%)      | 83 (93.25%)     |
| If 1, 2, 3 not met, needed 2 obstetricians evaluation | 90 (100%)        | 89 (100%)       |

CPD = cephalopelvic disproportion; RTCOG = Royal Thai College of Obstetricians and Gynecologists; ACOG = American Congress of Obstetricians and Gynecologists; NA = not applicable

patients, which was consistent with the result from previous study in Thailand<sup>(13)</sup>.

Of note, more than 40% of the cases that were not adhered to the guidelines had maternal obesity, which often affected the accuracy of fetal weight estimation and adequacy of uterine contraction. Therefore, maternal obesity may be one of the reasons of false diagnosis of macrosomia and CPD as mentioned in other previous studies<sup>(14,15)</sup>. In the present study, almost 30% of the cases was suspected of fetal macrosomia either by clinical or ultrasonography estimation. However, only 25% of these cases had neonatal birth weight more than 4000 grams, indicating the very low accuracy of fetal weight evaluation. Moreover, in our practice, the pelvimetry was subjectively assessed by routine pelvic examination. Therefore, not only inaccuracy of fetal weight estimation but also subjective assessment of pelvic size, false diagnosis of CPD can be simply made by the bias of obstetricians as mentioned in previous study<sup>(16)</sup>. Moreover, in our hospital only one obstetrician can make decision of cesarean delivery in case of suspected fetal macrosomia, different from either the RTCOG or ACOG guideline that needs at least two obstetricians to make a decision. Therefore, if our practice guidelines for fetal weight estimation, clinical pelvimetry, and the number of obstetricians required for decision-making had been adjusted, the unnecessary cesarean delivery in case of suspected fetal macrosomia might have been decreased.

Among the cases that were not adhered to CPD criteria, more than 70% were defined as no adherence due to unsuitable cervical dilatation & effacement. This finding suggested that most of the cases were in latent phase of labor during the time of CPD diagnosis. Additionally, only 13% of the cases had cervical dilatation  $\geq 6$  cm. This result is contradictory to the latest recommendation from ACOG and Society for Maternal-Fetal Medicine (SMFM)<sup>(17)</sup>. Those stated that cesarean delivery for active-phase arrest in the first stage of labor should be reserved for women  $\geq 6$  cm of dilation with ruptured membranes who fail to progress despite four hours of adequate uterine activity, or at least six hours of oxytocin administration with inadequate uterine activity and no cervical change.

In addition, RTCOG guideline uses 4 cm cervical dilatation and 80% effacement as proper cut point for CPD diagnosis, which is differ from ACOG guideline that using 3 cm and 100% effacement. In our opinion, the diagnosis criteria should be universal for

the most convenience of clinicians. ACOG criteria may be more appropriate than RTCOG criteria because it is unlikely that the patients are in latent phase of labor if cervical effacement is 100%, thus using these criteria can reduce the number of cases that were false diagnosed of CPD who were still in the latent phase of labor.

Most of the cases that failed to adhere to the criteria of adequate uterine contraction were those with suspicion of fetal macrosomia. Therefore, such suspicion in early labor might affect the decision making of the obstetricians and tended to perform cesarean section during early stage of labor without completely evaluated of uterine contraction as well as the labor curve pattern. Interestingly, the cases that were not adhered to the criteria of abnormal labor curve accounted for more than 90%, reflexive of the ignorance of clinicians about the labor curve before diagnosis of CPD. This may be an important issue that needs improvement. Regarding the last criteria involving the number of obstetricians needed for evaluation, in our setting only one obstetrician is responsible for making final decision in diagnosis of CPD. Therefore, it is impossible to adhere to this criterion if clinical practice guideline in our hospital has not been changed.

Note that nearly 20% of parturient diagnosed for CPD did not meet the standard diagnostic criteria. Thus, a significant number of cesarean section might have been decreased if audit system had been strictly used. Nevertheless, our results suggest that ACOG or RTCOG guidelines for diagnosis of CPD can result in over diagnoses and the CSR is still relatively high even the guidelines have been perfectly followed. In particular, diagnosis of CPD at 3 to 4 cm cervical dilatation can simply lead to false CPD. New guideline is needed to be sought for. The criteria suggested by Zhang et al<sup>(18,19)</sup>, or new recommendation by ACOG<sup>(17)</sup> may be more attractive and worthwhile being tested. For example, CPD should not be diagnosed before cervical dilatation of less than 6 cm or no evidence of fetal skull molding.

Limitations of the present study included 1) some missing data from medical records because of retrospective nature, 2) lack of control group, and 3) other outcomes of pregnancy or fetal outcomes were not evaluated. However, the present study is the first study about auditing system for CPD diagnosis in our hospital. The sample size is adequate for analysis and the result can represent real clinical practice because of retrospective data interpretation. The results may be

useful and lead to strengthening in diagnosis of CPD and reduction of unnecessary cesarean delivery.

### Conclusion

In conclusion, the adherence to guidelines on the diagnosis of CPD by either RCOG or ACOG criteria was 80.39%. Almost one-third of the cases that were not adhered to the criteria were false diagnosis of fetal macrosomia. Therefore, the strategy to increase the accuracy of fetal weight estimation may reduce unnecessary cesarean section from false diagnosis of CPD.

### What is already known on this topic?

Rising of cesarean section rate (CSR) is one of the challenging obstetrical problems in many countries including Thailand. One of the main reasons of rising CSR was cesarean section indicated by CPD, so it is reasonable to hypothesize that such a higher rate was partly associated with the over-diagnosed CPD.

### What this study adds?

The adherence to guidelines on the diagnosis of CPD by either RCOG or ACOG criteria was 80.39%. Almost one-third of the cases that were not adhered to the criteria were false diagnosis of fetal macrosomia. The strategy to increase the accuracy of fetal weight estimation may reduce unnecessary cesarean section from false diagnosis of CPD.

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### Potential conflicts of interest

None.

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## ความถูกต้องของการวินิจฉัยภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาของสตรีตั้งครรภ์ ในโรงพยาบาลมหาราชนครเชียงใหม่

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**วัตถุประสงค์:** ศึกษาความถูกต้องในการวินิจฉัยภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาของสตรีตั้งครรภ์ในโรงพยาบาลมหาราชนครเชียงใหม่

**วัสดุและวิธีการ:** ทบทวนเวชระเบียนของสตรีตั้งครรภ์ที่ได้รับการวินิจฉัยว่ามีภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาจากฐานข้อมูลของโรงพยาบาลมหาราชนครเชียงใหม่ ตั้งแต่ พ.ศ. 2553 ถึง พ.ศ. 2555 และเปรียบเทียบความถูกต้องของการวินิจฉัยโดยใช้เกณฑ์ของราชวิทยาลัยสูตินรีแพทย์แห่งประเทศไทยและวิทยาลัยสูตินรีแพทย์แห่งสหรัฐอเมริกาเป็นมาตรฐาน

**ผลการศึกษา:** จากสตรีตั้งครรภ์จำนวน 464 ราย ที่ได้รับการวินิจฉัยว่ามีภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาพบว่าวินิจฉัยถูกต้องตามเกณฑ์มาตรฐานร้อยละ 80.4 ซึ่งในจำนวน 91 ราย ที่วินิจฉัยได้ไม่ครบตามเกณฑ์นั้น มี 25 ราย (ร้อยละ 27.5) ที่สงสัยว่าทารกตัวโตผิดปกติ จึงวินิจฉัยว่ามีภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดา และการผ่าตัดคลอดเกิดขึ้นในระยะเฉื่อยของการคลอด อย่างไรก็ตาม ร้อยละ 76 ของทารกกลุ่มนี้ มีน้ำหนักแรกคลอดไม่ถึง 4,000 กรัม ซึ่งเป็นไปได้น้อยที่จะเป็นทารกตัวโตผิดปกติจริง

**สรุป:** ความถูกต้องในการวินิจฉัยภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาตามเกณฑ์ของราชวิทยาลัยสูตินรีแพทย์แห่งประเทศไทยและสหรัฐอเมริกา คิดเป็น ร้อยละ 80.4 โดยเกือบหนึ่งในสามของสตรีตั้งครรภ์ที่วินิจฉัยไม่ครบตามเกณฑ์เกิดจากความผิดพลาดในการวินิจฉัยภาวะทารกตัวโตผิดปกติ ดังนั้น แนวทางการคะแนน้ำหนักทารกอย่างแม่นยำอาจช่วยลดอัตราการผ่าตัดคลอดทางหน้าท้องที่ไม่จำเป็นจากการวินิจฉัยภาวะผิดปกติส่วนของศีรษะทารกและอุ้งเชิงกรานมารดาที่ผิดพลาดได้

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