

Risk Indicators for Cesarean Section due to Cephalopelvic Disproportion in Lamphun Hospital

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Objective: To investigate risk indicators for cesarean section due to cephalopelvic disproportion.

Setting: Department of Obstetrics & Gynecology, Lamphun Hospital.

Design: Case-control study.

Material and Method: Cases were 87 pregnant women delivered by cesarean section due to cephalopelvic disproportion at Lamphun Hospital between October 1st, 2003 and June 30th, 2004. Controls were 113 pregnant women delivered by normal labour during the same period. Maternal age, gravidity, parity, maternal height, pre-pregnancy weight, gestational age, weight before delivery, weight gain, symphysis-fundal height, birthweight and newborn gender were mainly focused. Information were obtained from medical records. Groups were compared by t-test and exact probability test as appropriate. Risk indicators were analyzed by odds ratio from univariable and multivariable logistic regression.

Results: Risk indicators significantly associated with cesarean section due to cephalopelvic disproportion included symphysis-fundal height greater than 35 cm. (OR = 9.38, 95%CI = 3.42-25.73); nulliparity (OR = 5.36, 95%CI = 2.24-12.82); maternal height less than 152 cm. (OR = 3.65, 95%CI = 1.63-8.17) and weight gain more than 15 kg. (OR = 2.67, 95%CI = 1.32-5.39).

Conclusion: Risk factors for cesarean section due to cephalopelvic disproportion included symphysis-fundal height greater than 35 cm, nulliparity, maternal height less than 152 cm. and weight gain more than 15 kg. Early detection of these risk indicators before delivery helps obstetricians and nurses to recognize potential obstructed labor and prepare for safe delivery in advance.

Keywords: Cephalopelvic Disproportion, Cesarean Section, Risk Indicators

J Med Assoc Thai 2005; 88 (Suppl 2): S63-8

Full text. e-Journal: <http://www.medassothai.org/journal>

Birth, a normal human physiological process, was once a high mortality event causing both serious maternal and newborn losses. Medical technology and public health measures were introduced to prevent childbirth complications, one of which included cesarean section (CS). CS was at first a major operation for high-risk pregnancy, at which time there were still major operative complications from CS. When surgical, anesthetic techniques and blood transfusion are well developed, CS safety has been increasing, and as a consequence, led to a rapid increase in cesarean section rate⁽¹⁻³⁾.

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The worldwide cesarean section rate is increasing in the past two decades. Reports from the United States and around the world have marked a steadily rising cesarean section rate⁽⁴⁻⁷⁾. The cesarean section rate in Thailand has increased steadily in university hospitals, provincial hospitals and private hospitals^(3,6). The national cesarean section rate in Thailand increased from 15.2% in 1990 to 22.4% in 1996. Governmental provincial hospitals under the Ministry of Public Health (MOPH) had a somewhat higher rate (22.9%) than private hospitals and accounted for 32% of the total national deliveries in 1996. Studies worldwide indicated dystocia, fetal distress, breech presentation, and repeated cesarean section were four main indications^(1,4-6).

In Lamphun Hospital, the cesarean section rate increased from 14.1 in 1994 to 21.9 in 2002. Major reasons of cesarean section were, in order of frequency, dystocia (cephalopelvic disproportion; CPD), previous CS, breech presentation and fetal distress⁽⁸⁾. Unnecessary cesarean section were also reported in 8.8% of CS.

The study of risk indicators for cesarean section due to cephalopelvic disproportion (CPD) diagnosed by means of WHO partograph⁽⁹⁾, the criteria of which were guided by the Royal Thai College of Obstetricians and Gynaecologists⁽¹⁰⁾ is needed for early detection of these risk indicators before delivery, so that safe delivery can be planned in advance.

Material and Method

A case-control study was conducted at Lamphun Hospital. Cases were all pregnant women delivered by cesarean section due to cephalopelvic disproportion between October 1st, 2003 and June 30th, 2004 (n = 87). Cesarean sections due to cephalopelvic disproportion were diagnosed following the guideline by the Royal Thai College of Obstetricians and Gynaecologists⁽¹⁰⁾. The criteria included all of: 1.) cervical dilatation of at least 4 cm. and 80% effacement, 2.) regular uterine contractions at least 2 hours before decision making, and 3.) abnormal partograph, such as detected by protraction disorders, arrest disorders or second stage disorders.

Controls were randomly and systematically selected from pregnant women similar to cases in reference to maternal age, pre-pregnancy weight, gestational age and newborn gender, but delivered by normal labor during the same period (n = 113). Maternal age, gravidity, parity, maternal height, pre-pregnancy weight, gestational age, weight before delivery, weight gain, symphysis-fundal height, birthweight and newborn gender were mainly focused.

The information relevant to the interesting factors were obtained from medical records. Cases and controls were compared by t-test and exact probability test as appropriate. Risk indicators or predictors were analyzed by odds ratio from the backward stepwise logistic regression. Continuous predictors such as height and weight were categorized into dichotomous indicators. The cut-points were defined from the value that best discriminated cases from controls, signified by the size of odds ratios.

This study was approved by the ethical committee of the hospital.

Results

The age of cases and controls were similar (means = 26.9 ± 5.7 years vs 25.9 ± 5.8 years. Gravidity and parity of cases were significantly less than controls ($p = 0.012$ and $p = 0.007$). Cases were significantly shorter than controls (means = 153.1 ± 5.3 cm. vs 157.0 ± 5.6 cm.) ($p < 0.001$). Pre-pregnancy weight of the cases was similar to controls (51.1 ± 9.3 kg. vs 50.8 ± 8.7 kg.) ($p = 0.784$) (Table 1).

The gestational age of cases was similar to the controls (39.1 ± 1.2 weeks vs 38.8 ± 1.2 weeks) ($p = 0.111$), but the weight before delivery of cases was more (67.8 ± 11.0 kg. vs 64.3 ± 10.1 kg.) ($p = 0.020$). The weight gain of cases was also more than the controls (16.5 ± 4.3 kg. vs 13.6 ± 4.8 kg.) ($p < 0.001$) (Table 2).

The symphysis-fundal height of cases was higher than the controls (35.3 ± 2.5 cm. vs 33.0 ± 1.9 cm.) ($p < 0.001$), reflecting larger birth weight of the cases ($3,357.36 \pm 467.52$ grams vs $2,935.0 \pm 303.3$ grams) ($p < 0.001$). The fetal sex was not different between the two groups.

Predictors were pre-selected from characteristics that were significantly different between the cases and controls. Only the characteristics that were known before delivery were focused. By the backward stepwise logistic regression analysis, we identified 4 risk indicators significantly associated with cephalopelvic disproportion. These included symphysis-fundal height greater than 35 cm. (OR = 9.38, 95%CI = 3.42, 25.73); nulliparity (OR = 5.36, 95%CI = 2.24, 12.82); maternal height less than 152 cm. (OR = 3.65, 95%CI = 1.63, 8.17) and weight gain more than 15 kg. (OR = 2.67, 95%CI = 1.32, 5.39) (table 3).

Discussion

The risk indicators that were significantly associated with cesarean section due to cephalopelvic disproportion included symphysis-fundal height greater than 35 cm. (OR = 9.38, 95%CI = 3.42, 25.73); nulliparity (OR = 5.36, 95%CI = 2.24, 12.82); maternal height less than 152 cm. (OR = 3.65, 95%CI = 1.63, 8.17) and weight gain more than 15 kg. (OR = 2.67, 95%CI = 1.32, 5.39).

The studies that examined anthropometric measures as predictors of cephalopelvic disproportion provided evidences that the shorter the woman, the more likely is the significant disproportion between the fetus and the maternal pelvis, causing obstructed labor⁽¹¹⁻¹⁸⁾. Although maternal height can predict the risk of obstructed labor, it is also an index of a woman's general health and nutritional status from her child-

Table 1. Demographic characteristics of the study group (N = 200)

Characteristics	Cases (n=87)	Controls (n=113)	p-value
Age (years)			
<19	7 (8.0%)	12 (10.6%)	
20-34	66 (75.9%)	90 (79.7%)	
≥35	14 (16.1%)	11 (9.7%)	
Mean ± SD	26.9 ± 5.7	25.9 ± 5.8	0.237
Gravidity			
1	62 (71.2%)	54 (47.8%)	0.012
2	15 (17.2%)	35 (31.0%)	
3	7 (8.0%)	16 (14.2%)	
4	3 (3.5%)	5 (4.4%)	
5	0 (0.0%)	3 (2.6%)	
Parity			
0	71 (81.6%)	69 (61.1%)	0.007
1	12 (13.8%)	26 (23.0%)	
2	4 (4.6%)	14 (12.4%)	
3	0 (0.0%)	4 (3.5%)	
Maternal height (cm.)			
<145	9 (10.3%)	3 (2.6%)	
145.1-150	22 (25.3%)	14 (12.4%)	
150.1-155	24 (27.6%)	27 (23.9%)	
155.1-160	30 (34.5%)	49 (43.4%)	
160.1-165	2 (2.3%)	13 (11.5%)	
165.1-170	0 (0.0%)	5 (4.4%)	
>170.1	0 (0.0%)	2 (1.8%)	
Mean ± SD	153.1 ± 5.3	157.0 ± 5.6	<0.001
Pre-pregnancy weight (kg.)			
35-50	52 (59.8%)	69 (61.1%)	
51-75	33 (37.9%)	41 (36.3%)	
>76	2 (2.3%)	3 (2.6%)	
Mean ± SD	51.1 ± 9.3	50.8 ± 8.7	0.784

hood, in which genetic factors play a major role. Therefore, the obstetric significance of a particular height needs to be related to the patient's own genetic background. This is exemplified by the various cut-off points that have been identified in different studies as being associated with or predicting an increased risk of obstructed labor. For example, associations have been identified for heights <140 cm. in India⁽¹⁸⁾, < 146 cm. in Tanzania⁽¹⁹⁾, 150 cm. in Kenya⁽²⁰⁾, 150-153 cm. in Ghana^(21,22), < 155 cm. in Burkina Faso⁽¹⁶⁾, and < 156 cm. in Denmark⁽²³⁾; cesarean delivery were predicted by height < 160 cm. in Zimbabwe⁽²⁴⁾, 157 cm. in the United States⁽²⁵⁾, 154 cm. in urban Nigeria and rural Malawi⁽²⁶⁾ and less than 150 cm. in Papua New Guinea⁽²⁷⁾. From our study we detected that maternal height less than 152 cm. increased the risk of operation.

Nulliparity increased the risk of cesarean section due to CPD similarly reported in some studies^(26,27). It is well known that women with successful normal

labor has lower chance of obstructed labor in the subsequent delivery.

Symphysis-fundal height on admission at labor room is associated with an increase risk of Cesarean section due to CPD^(28,29). In this study we found that symphysis-fundal height greater than 35 cm. is the strongest indicator in our study. The study in Thailand reported that symphysis-fundal height measurements 34.8 cm. is associated with Cesarean section due to CPD⁽³⁰⁾, while in Papua New Guinea the corresponding height was more than 38 cm⁽²⁷⁾.

Weight gain more than 15 kg. increased the risk of cesarean section due to CPD. Some studies demonstrated that excessive weight gain during pregnancy is a risk indicator without exact cut-point^(31,32).

From this study we also found that pre-pregnancy weight more than 69 kg. was somewhat associated with an increase in Cesarean section (OR = 1.82, 95%CI = 0.78 - 4.23, p = 0.161), but without statistically

Table 2. Obstetric characteristics of the study group (N = 200)

Characteristics	Cases (n=87)	Controls (n=113)	p-value
Gestational age (weeks)			
<37	8 (9.2%)	22 (19.5%)	
38-41	79 (90.8%)	90 (79.6%)	
>42	0 (0.0%)	1 (0.9%)	
Mean \pm SD	39.1 \pm 1.2	38.8 \pm 1.2	0.111
Weight before delivery (kg.)			
35-50	1 (1.1%)	7 (6.2%)	
51-75	66 (75.9%)	90 (79.6%)	
>76	20 (23.0%)	16 (14.2%)	
Mean \pm SD	67.8 \pm 11.0	64.3 \pm 10.1	0.020
Weight gain (kg.)			
<5.0 (0.0%)	2 (1.8%)		
5.1-10	5 (5.8%)	32 (28.3%)	
10.1-15	29 (33.3%)	40 (35.4%)	
>15	53 (60.9%)	39 (34.5%)	
Mean \pm SD	16.5 \pm 4.3	13.6 \pm 4.8	<0.001
Symphysis-fundal height (cm.)			
<30	1 (1.2%)	12 (10.6%)	
31-35	53 (60.9%)	93 (82.3%)	
36-40	27 (31.0%)	8 (7.1%)	
>41	6 (6.9%)	0 (0.0%)	
Mean \pm SD	35.3 \pm 2.5	33.0 \pm 1.9	<0.001
Birth weight (grams)			
<2,499	3 (3.5)	8 (7.1)	
2,500-3,000	15 (17.2)	57 (50.4)	
3,001-3,500	43 (49.4)	43 (38.1)	
3,501-4,000	17 (19.5)	5 (4.4)	
4,001-4,500	8 (9.2)	0 (0.0)	
>4,500	1 (1.2)	0 (0.0)	
Mean \pm SD	3,357.36 \pm 467.52	2,935.0 \pm 303.3	<0.001
Newborn sex			
Male	48 (55.1%)	62 (54.9%)	1.000
Female	39 (44.9%)	51 (45.1%)	

Table 3. Risk indicators for cephalopelvic disproportion leading to cesarean section detected by backward stepwise logistic regression

Risk factors	OR	95% CI of OR	p-value
Symphysis-fundal height greater than 35 cm.	9.38	3.42 , 25.73	<0.001
Nulliparity	5.36	2.24 , 12.82	<0.001
Maternal height less than 152 cm.	3.65	1.63 , 8.17	0.002
Weight gain more than 15 kg.	2.67	1.32 , 5.39	0.006

significance, so it was excluded from the set of predictors.

We use a strict criteria of cesarean section due to CPD as guided by the Royal Thai College of Obstetricians and Gynaecologists⁽¹⁰⁾. This increases specificity and should theoretically increase the specificity of risk indicators.

Early detection of these risk indicators before delivery helps obstetricians and nurses recognize potential cases of obstructed labors and be prepared for evaluation of labor progression. Pregnant women who possess many items of such risk factors may be ordered nothing per oral (NPO), meanwhile the operative room and team may be notified for safe delivery in

advance.

These risk indicators for cesarean section may further be used to develop a risk scoring system for staff in a labor room, to predict the likelihood of cesarean section due to cephalopelvic disproportion, and also in decision making for obstetric delivery.

Conclusion

Risk factors for cephalopelvic disproportion included symphysis-fundal height greater than 35 cm., nulliparity, maternal height less than 152 cm. and weight gain more than 15 kg. Early detection of these risk indicators before delivery helps obstetricians and nurses to recognize potential obstructed labors and prepare for safe delivery in advance.

Acknowledgement

The authors wish to thank all of the staffs in the labor ward for their co-operation, and all the subjects recruited in the study.

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ตัวชี้วัดความเสี่ยงของการผ่าตัดคลอดทางหน้าท้องจากภาวะการผิดสัดส่วนกันระหว่างศีรษะทารกและเชิงกราน ในโรงพยาบาลลำพูน

สุจิต คุณประดิษฐ์, ชัยนรินทร์ ปทุมานนท์, ชไมพร ทวีศรี

วัตถุประสงค์ : เพื่อศึกษาตัวชี้วัดความเสี่ยงที่บ่งถึงภาวะการผิดสัดส่วนกันระหว่างศีรษะทารกและเชิงกราน

สถานที่ที่ทำการศึกษา : กลุ่มงานสูติรีเวชกรรม โรงพยาบาลลำพูน

รูปแบบการวิจัย : การศึกษาเปรียบเทียบชนิดย้อนหาสาเหตุ (case-control study)

วัสดุและวิธีการ : ศึกษาผู้ที่มาคลอดในโรงพยาบาลลำพูน ระหว่างวันที่ 1 ตุลาคม พ.ศ. 2546 ถึง 30 มิถุนายน พ.ศ. 2547 กลุ่มศึกษาคือ สตรีตั้งครรภ์ที่ผ่าตัดคลอดจากข้อบ่งชี้การผิดสัดส่วนกันระหว่างศีรษะ ทารกและเชิงกราน จำนวน 87 ราย กลุ่มควบคุมคือ สตรีตั้งครรภ์ที่คลอดปกติ ในช่วงเวลาเดียวกัน หรือใกล้เคียงกับกลุ่มศึกษา จำนวน 113 ราย ลักษณะที่นำมาพิจารณาศึกษาได้แก่ อายุ ประวัติการตั้งครรภ์ ประวัติการคลอด ความสูงของมารดา น้ำหนักก่อนตั้งครรภ์ อายุครรภ์ น้ำหนักก่อนคลอด น้ำหนักที่เพิ่มขึ้นขณะตั้งครรภ์ ความสูงของมดลูก น้ำหนักทารกแรกคลอด และเพศของทารก จากทะเบียนคลอดและเวชระเบียนผู้ป่วย บันทึกข้อมูลในแบบบันทึกเปรียบเทียบกลุ่มด้วย t-test และ exact probability test ตามความเหมาะสมของข้อมูล วิเคราะห์ลักษณะเสี่ยงด้วย odds ratio จากการวิเคราะห์ univariable และ multiple logistic regression

ผลการศึกษา : ตัวชี้วัดความเสี่ยงต่อภาวะการผิดสัดส่วนกันระหว่างศีรษะทารกและเชิงกราน คือ ยอดมดลูกที่สูงตั้งแต่ 35 เซนติเมตรขึ้นไป (OR = 9.38, 95%CI = 3.42, 25.73) ไม่เคยผ่านการคลอดบุตรมาก่อน (OR=5.36, 95%CI = 2.24, 12.82) ความสูงของมารดาน้อยกว่า 152 เซนติเมตร (OR = 3.65, 95%CI = 1.63, 8.17) และ น้ำหนักตัวที่เพิ่มขึ้นตั้งแต่ 15 กิโลกรัมขึ้นไป (OR = 2.67, 95%CI = 1.32-5.39)

สรุป : ตัวชี้วัดความเสี่ยงต่อภาวะการผิดสัดส่วนกันระหว่างศีรษะทารกและเชิงกราน คือ ยอดมดลูกที่สูงตั้งแต่ 35 เซนติเมตรขึ้นไป ไม่เคยผ่านการคลอดบุตรมาก่อน ความสูงของมารดาน้อยกว่า 152 เซนติเมตร น้ำหนักตัวที่เพิ่มขึ้นตั้งแต่ 15 กิโลกรัมขึ้นไป การทราบลักษณะเสี่ยงก่อนคลอดล่วงหน้า จะช่วยให้บุคลากรแพทย์และพยาบาลเพิ่มความตระหนักและเตรียมความพร้อมในการวางแผนการคลอดได้อย่างมีประสิทธิภาพดีขึ้น