Is it time for routine ultrasound in late pregnancy at Bhumibol Adulyadej Hospital?

Wibool Rueangchainikhom MD*, Sinart Prommas MD*, Saravut Sarapak BSc (MT)*

* Department of Obstetrics and Gynaecology, Bhumibol Adulyadej Hospital, Bangkok, Thailand

Background: At term, about 3-5% of the presentations are breech. Vaginal breech deliveries are associated with increased maternal and fetal morbidity and mortality, but delivery by cesarean section in an emergency does not eliminate all maternal and perinatal morbidity. The use of external cephalic version can produce considerable cost savings in the management of the breech fetus at term. The accuracy in the assessment of fetal presentation and position is essential.

Objective: To study the accuracy of Leopold’s maneuvers in the assessment of fetal presentation and position at Bhumibol Adulyadej Hospital.

Material and Method: Prospective cohort study of 1,528 singletons, pregnant women at gestational age between 34-40 weeks who attended antenatal care unit at Bhumibol Adulyadej Hospital between November 1, 2006 and March 30, 2009. All cases were examined by either residents or staff by using Leopold’s maneuvers. The results of the examinations were recorded as cephalic or non-cephalic presentation. After that, the subjects were re-examined by the staff in the maternal and fetal medicine unit using ultrasound for gold standard. Maternal age, weight, height, gestational age, parity, estimated fetal weight, amniotic fluid index, placental site, and fetal presentation were recorded. The results of the two methods of examination were then analyzed for comparison and calculated in terms of means, standard deviation, sensitivity, specificity, positive predictive value, negative predictive value, and accuracy.

Results: The results of Leopold’s maneuvers with 95% confidence interval revealed sensitivity 63.17 ± 10.84%, specificity 93.35 ± 1.25%, positive predictive value 34.04 ± 7.82%, negative predictive value 97.98 ± 0.74%, and accuracy 92.08 ± 1.35%.

Conclusion: Leopold’s maneuvers are inexpensive, easy to perform, and noninvasive but the accuracy of such assessments vary depending on many factors especially experience of operators. The caregivers can reduce perinatal morbidity and mortality if they can diagnose all of non-vertex presentation in near term pregnancy. Routine use of ultrasound in near term pregnancy to diagnose non-vertex presentation has more benefit than cost.

Keywords: Leopold’s maneuvers, Non-vertex presentation, External cephalic version

The accurate assessment of fetal presentation and position is essential to appropriate management of term pregnancy. Knowledge of the fetal presentation and position facilitates the appropriate choice of the route of delivery, place of delivery and the choice of external cephalic version in cases of breech presentation(1). The incidences of various presentations are approximately 96.8% cephalic presentation, 2.7% breech presentation, 0.3% transverse lie, 0.1% compound presentation, 0.5% face presentation, and 0.01% brow presentation(2). That means the incidence of non-vertex presentation is approximately 4%. Perinatal mortality and morbidity are increased in fetal malpresentation(3). Retrospective studies comparing breech and vertex presentation at term have shown a perinatal mortality rate ratio of 4.3:1 to 2:1 and a perinatal morbidity rate ratio of 5:1 (asphyxia), 4:1 (neurological), and 2.2:1 (traumatic damage)(4). The overall neonatal mortality and morbidity resulting from trauma were increased significantly in the unplanned delivery groups.

Four methods can be used to assess fetal presentation and position, x-rays, ultrasound, pelvic examination, and Leopold’s maneuvers. Pelvic examination and x-rays are inappropriate for current...
practice. Leopold’s maneuvers have become one of the core skills for medical students and residents to acquire during their training. The American College of Obstetricians and Gynecologists (ACOG) recommends Leopold’s maneuvers and the measurement of uterine fundus as the primary method for clinical estimation of fetal weight(5). However, its sensitivity and specificity are variable(6-10). Moreover, its accuracy depends on the examiner’s experience(11). In the present study the authors aimed to determine how accurate Leopold’s maneuvers were in late pregnancy and is it time for routine ultrasound in late pregnancy to reduce perinatal morbidity and mortality in non-vertex fetus. Ultrasound assessments of fetal presentation and position are gold standard, however, the method requires considerable skill(12), but now it is available at Bhumibol Adulyadej Hospital and most hospitals in Thailand.

Material and Method

The present study was designed as a prospective descriptive study and was performed in the antenatal care unit, Department of Obstetrics and Gynecology, Bhumibol Adulyadej Hospital between November 1, 2006 and March 30, 2009. One thousand five hundred and twenty eight singleton, pregnant women who had a gestational age between 34-40 weeks, confirmed by ultrasound, and were enrolled in the present study. The identification data of the patients would be recorded as follows: maternal age, gestational age, weight, height, parity, AFI (amniotic fluid index), placental site, BMI, and experience of physicians. All subjects were examined by physicians using Leopold’s maneuvers. The results of the examinations were recorded. After that, the subjects would be reexamined by the staff in the maternal and fetal medicine unit using ultrasound for gold standard without knowledge of the results from previous abdominal examination. The results of the two methods of examination were then analyzed for comparison. The identification data were reported in terms of mean, standard deviation, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy with 95% confidence interval (95% CI). The present study was approved by Bhumibol Adulyadej Hospital Ethics Committee.

Results

One thousand five hundred twenty eight singletons, pregnant women attended antenatal care unit of Bhumibol Adulyadej Hospital between November 1, 2006 and March 30, 2009 at a gestational age between 34-40 weeks. The incidence of non-vertex presentation was 4.97%. Mean of maternal age standard deviation (SD), maternal weight, BMI, and fetal weight were 26.11 ± 6.05 years, 65.07 ± 8.58 kg, 26.15 ± 3.24 kg/m², and 3,220.30 ± 210.58 grams, respectively (Table 1). Sensitivity ± 95% CI for diagnosis of non-vertex presentation was 63.17 ± 10.84% and specificity was 93.35 ± 1.25%. Positive predictive value to diagnosis non-vertex presentation by Leopold’s maneuvers quite low but Negative predictive value was high as shown in Table 2. Many confounding factors such as gestational age, parity, BMI, AFI, placental site, fetal weight, and experience of operators were studied (Table 2).

Discussion

The prevalence of non-vertex presentation at Bhumibol Adulyadej Hospital was 4.97%. It was higher than Parkland Hospital(2). To decrease perinatal morbidity and mortality in near-term breech presentation, many factors are involved. Several authors have reported success rates and low complications for external cephalic version at term in routine clinical practice(13-17). Well planned delivery was the other important factor. In cases of abnormal presentation, team approach including, obstetricians, pediatricians, anesthesiologists, and nurses are necessary.

The present study was conducted with the main objective to determine the accuracy of Leopold’s maneuvers in terms of sensitivity, specificity, positive predictive value, negative predictive value,
and accuracy. The present study found sensitivity
(63.17 ± 10.84%) was higher than Nassar N et al (55%) and
Thorp J M et al (28%) and was lower than
Lydon-Rochelle M et al (88%) and McFarlin BL et al
(85.3%). Leopold’s maneuvers are still common in
daily obstetric practice in the United Arab Emirates
and most developed and developing countries. These
maneuvers have become one of the core skills for medical students and residents to acquire during
their training because it is inexpensive, easy to
perform, and noninvasive. However, the accuracy of
such assessments vary depending on many factors especially experience of operators. External cephalic
version is apparently safe and highly successful
when it is attempted in proper conditions. It is effective
in reducing perinatal morbidity and mortality rates of
vaginal breech delivery and cesarean section.

Although non-vertex presentation in near term
pregnancy is quite low, if the caregivers can diagnose all of them exactly, they can reduce perinatal morbidity and mortality. Nowadays ultrasound equipment and skill-operators to diagnose fetal presentation are available in most hospitals in Thailand. It is safe, easy to use, and highly accurate in predicting fetal presentation. The authors believed that routine use of ultrasound in near-term pregnancy to diagnose non-vertex presentation has more benefit than cost.

### Conclusion
Leopold’s maneuvers are still common in daily obstetrics practice at Bhumibol Adulyadej Hospital. Sensitivity for diagnosis of non-vertex presentation by Leopold’s maneuvers was 63.17 ± 10.84% and specificity was 93.35 ± 1.25%. External cephalic version is effective in reducing perinatal morbidity and mortality rates of vaginal breech delivery and cesarean section. Nowadays ultrasound equipment and skilled-operators to diagnose fetal presentation are available at Bhumibol Adulyadej Hospital. The authors believe that routine use of ultrasound in near-term pregnancy to diagnose non-vertex presentation has more benefit than cost.

### References

### Table 2. Probability for none-vertex diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity % ± 95% CI</th>
<th>Specificity % ± 95% CI</th>
<th>PPV % ± 95% CI</th>
<th>NPV % ± 95% CI</th>
<th>Accuracy % ± 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All case</strong></td>
<td>63.17 ± 10.84</td>
<td>93.35 ± 1.25</td>
<td>34.04 ± 7.82</td>
<td>97.98 ± 0.74</td>
<td>92.08 ± 1.35</td>
</tr>
<tr>
<td><strong>Age &lt; 35 years</strong></td>
<td>67.18 ± 11.50</td>
<td>97.36 ± 0.90</td>
<td>57.33 ± 11.19</td>
<td>98.25 ± 0.74</td>
<td>95.84 ± 1.09</td>
</tr>
<tr>
<td><strong>Age ≥ 35 years</strong></td>
<td>58.33 ± 27.89</td>
<td>96.93 ± 2.64</td>
<td>58.33 ± 27.89</td>
<td>96.93 ± 2.64</td>
<td>94.28 ± 3.49</td>
</tr>
<tr>
<td><strong>GA 34-36 weeks</strong></td>
<td>38.84 ± 12.15</td>
<td>96.72 ± 1.29</td>
<td>48.83 ± 16.88</td>
<td>94.75 ± 2.33</td>
<td>92.04 ± 6.78</td>
</tr>
<tr>
<td><strong>GA 37-39 weeks</strong></td>
<td>38.46 ± 10.83</td>
<td>97.51 ± 1.11</td>
<td>55.55 ± 15.55</td>
<td>95.15 ± 4.78</td>
<td>93.10 ± 4.66</td>
</tr>
<tr>
<td><strong>GA ≥ 40 weeks</strong></td>
<td>70.00 ± 14.66</td>
<td>94.11 ± 2.56</td>
<td>87.50 ± 8.65</td>
<td>84.20 ± 8.95</td>
<td>85.18 ± 7.34</td>
</tr>
<tr>
<td><strong>Parity 0</strong></td>
<td>62.06 ± 17.66</td>
<td>97.93 ± 1.03</td>
<td>54.54 ± 16.98</td>
<td>98.47 ± 0.89</td>
<td>96.55 ± 1.30</td>
</tr>
<tr>
<td><strong>Parity ≥ 1</strong></td>
<td>63.82 ± 13.73</td>
<td>96.62 ± 1.38</td>
<td>57.69 ± 13.42</td>
<td>97.36 ± 1.23</td>
<td>94.41 ± 1.70</td>
</tr>
<tr>
<td><strong>BMI &lt; 25 kg/m²</strong></td>
<td>59.67 ± 12.21</td>
<td>97.18 ± 0.96</td>
<td>53.62 ± 11.76</td>
<td>97.78 ± 0.85</td>
<td>95.24 ± 1.20</td>
</tr>
<tr>
<td><strong>BMI ≥ 25 kg/m²</strong></td>
<td>78.57 ± 21.49</td>
<td>97.46 ± 1.99</td>
<td>64.70 ± 22.71</td>
<td>98.71 ± 1.44</td>
<td>96.41 ± 2.30</td>
</tr>
<tr>
<td><strong>Resident</strong></td>
<td>50.00 ± 12.65</td>
<td>97.65 ± 0.91</td>
<td>54.54 ± 13.15</td>
<td>97.19 ± 0.99</td>
<td>95.10 ± 1.26</td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td>75.00 ± 21.21</td>
<td>97.43 ± 1.75</td>
<td>60.00 ± 21.47</td>
<td>98.70 ± 1.26</td>
<td>96.34 ± 2.03</td>
</tr>
<tr>
<td><strong>AFI &lt; 25</strong></td>
<td>53.57 ± 13.06</td>
<td>94.88 ± 1.38</td>
<td>37.50 ± 10.60</td>
<td>97.27 ± 1.03</td>
<td>92.64 ± 1.59</td>
</tr>
<tr>
<td><strong>AFI ≥ 25</strong></td>
<td>40.00 ± 21.47</td>
<td>94.51 ± 2.04</td>
<td>23.52 ± 14.25</td>
<td>97.39 ± 1.45</td>
<td>92.30 ± 2.34</td>
</tr>
<tr>
<td><strong>FW &lt; 2,500 grams</strong></td>
<td>37.50 ± 15.00</td>
<td>82.03 ± 6.65</td>
<td>39.47 ± 15.54</td>
<td>80.76 ± 6.77</td>
<td>71.42 ± 6.83</td>
</tr>
<tr>
<td><strong>FW ≥ 2,500 grams</strong></td>
<td>52.77 ± 16.03</td>
<td>97.58 ± 0.83</td>
<td>37.25 ± 13.26</td>
<td>98.70 ± 0.61</td>
<td>96.39 ± 0.99</td>
</tr>
<tr>
<td><strong>Placenta anterior</strong></td>
<td>35.71 ± 17.74</td>
<td>94.81 ± 2.21</td>
<td>33.33 ± 16.86</td>
<td>95.31 ± 2.11</td>
<td>90.82 ± 2.78</td>
</tr>
<tr>
<td><strong>Placenta other site</strong></td>
<td>54.16 ± 14.09</td>
<td>96.76 ± 1.10</td>
<td>44.82 ± 12.79</td>
<td>97.75 ± 0.92</td>
<td>94.79 ± 1.35</td>
</tr>
</tbody>
</table>

GA = gestational age; BMI = body mass index; AFI = amniotic fluid index; FW = fetal weight
ความแม่นยำของการตรวจครรภ์ทางหน้าท้องด้วยวิธี leopold’s maneuvers ในการตรวจคัดกรองส่วนนำที่ผิดปกติของทารกอายุครรภ์ 34-40 สัปดาห์ในโรงพยาบาลภูมิพลอดุลยเดช

วิบูลย์ เรืองชัยนิคม, สินา พรหมมาศ, สรุป สาวก็ดี

วัตถุประสงค์: เพื่อศึกษาความแม่นยำของการตรวจครรภ์ทางหน้าท้องด้วยวิธี leopold’s maneuvers ในการตรวจคัดกรองส่วนนำที่ผิดปกติของทารกอายุครรภ์ 34-40 สัปดาห์ในโรงพยาบาลภูมิพลอดุลยเดช

วัสดุและวิธีการ: เป็นการวิจัยแบบเชิงพรรณนาโดยเก็บข้อมูลในหญิงตั้งครรภ์เดี่ยวอายุครรภ์ 34-40 สัปดาห์ที่แผนกผู้ป่วยนอกกองสูตินรีเวชกรรมโรงพยาบาลภูมิพลอดุลยเดชตั้งแต่วันที่ 1 พฤศจิกายน พ.ศ. 2549 ถึง 30 มีนาคม พ.ศ. 2552 ได้หญิงตั้งครรภ์รวม 1,528 ราย โดยหญิงตั้งครรภ์ทุกคนจะได้รับการตรวจทางหน้าท้องด้วยวิธี leopold’s maneuvers และได้รับการตรวจยืนยันอีกครั้งโดยเครื่องตรวจคลื่นเสียงความถี่สูง

ผลการศึกษา: พบอุบัติการณ์ของทารกที่ไม่ใช่ท่าศีรษะร้อยละ 4.97 พบความไวในการตรวจทางหน้าท้องเพื่อวินิจฉัยท่าที่ก้นเพียงร้อยละ 63.17 ± 10.84 และความจำเพาะร้อยละ 93.35 ± 1.25

สรุป: การตรวจครรภ์ทางหน้าท้องด้วยวิธี leopold’s maneuvers ในการตรวจคัดกรองส่วนนำที่ผิดปกติของทารกใกล้คลอดมีความไวไม่ดีพอ อาจทำให้การกำหนดผลคลอด และเกิดอันตรายทางคลอดได้ในปัจจุบัน เครื่องตรวจคลื่นเสียงความถี่สูงมีราคาถูก และมีข้อเกี่ยวกับโรคเจาะยามมีภาพ ถ้านำมาใช้ตรวจทางหน้าท้องนั้นจะมีประสิทธิภาพในการตรวจคัดกรองส่วนนำที่ผิดปกติของทารกใกล้คลอด สามารถวางแผนผลการแพทย์ชอบจากการคลอดทารกท่านนั้นได้อย่างมีประสิทธิภาพ.