A PROSPECTIVE STUDY OF CERVICAL LENGTH MEASUREMENT IN PREDICTING PRETERM DELIVERY

By

DR. NORLIDAR BINTI MOHAMED

Dissertation Submitted In Partial Fulfilment Of The Requirement For The Degree Of Master Of Medicine (Obstetrics & Gynaecology)

UNIVERSITI SAINS MALAYSIA
MAY 2008

ACKNOWLEDGEMENTS

I would like to convey my deepest gratitude to my supervisors Dr. Mohd Pazudin Ismail and Associate Professor Dr. Nik Mohamad Zaki Nik Mahmood, the Head of Department of Obstetric and Gynaecology, Hospital University Sains Malaysia of their inspiration, invaluable guidance, contribution and constructive criticism. Without them certainly this study would not have been completed successful.

I would also like to thank all the lecturers in Obstetric and Gynaecology Department for their encouragement and my appreciation to my fellow colleagues for their support in this study.

My grateful thanks to all patients who willingly participated in this study. Without them this study would not be possible. Special thanks to all staffs of Obstetric and Gynaecology for their assistance and cooperation in carried out this study.

Last but not least, I would like to thank my beloved husband Dr Khairul Azhar M. Rajet, my daughter Nur Fatin Shahira and my family for their endless prayers, love and support throughout the course of my training and preparation of this book.

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LIST OF ABBREVIATIONS

ASS.BREECH	assisted breech
BV	Bacterial Vaginosis
BW	birth weight
CI	confidence interval
CRH	corticotrophin releasing hormon
CRL	crown rump length
C&S	culture and sensitivity
CX	cervix
DEXA	dexamethasone
GBS	group B streptococcus
HUKM	Hospital Universiti Kebangsaan Malaysia
HUSM	Hospital Universiti Sains Malaysia
HVS	high vaginal swab
IVH	intraventricular haemorrhage
LMP	last menstrual period
LSCS	lower segment caesarion section
MOD	mode of delivery
NICU	neonatal intensive care unit
NPV	negative predictive value

OR	odds ratio
PPROM	preterm prelabour rupture of membrane
PPV	positive predictive value
PTL	preterm labour
RDS	respiratory distress syndrome
SD	standard deviation
SVD	spontaneous vaginal delivery
SIG.	significant
TAS	transabdominal ultrasound
TVS	transvaginal ultrasound
WHO	world health organization

ABSTRAK (versi Bahasa Malaysia)

Objektif

Untuk mendapatkan hubungkait di antara panjang pangkal rahim dengan kelahiran pramatang.

Metodologi

Pesakit-pesakit yang datang ke klinik ibu mengandung HUSM akan dinilai dan sekiranya memenuhi kriteria-kriteria seperti yang dinyatakan di atas, mereka akan menjalani ujian ultrabunyi biasa dan ujian ultrabunyi melalui pangkal rahim ketika kandungan berusia 16-20 minggu, 24 minggu, 28 dan 32 minggu. Ujian cecair pada pangkal rahim pula akan diambil ketika usia kandungan 28 minggu. Seterusnya pesakit-pesakit berkenaan akan menjalani lawatan antenatal berjadual seperti pesakit-pesakit yang lain sehingga kelahiran bayi mereka.

Keputusan

Sebanyak 183 orang wanita mengandung telah dikaji dalam kajian ini, di mana 61 orang daripada mereka mengalami kelahiran pramatang. Di dalam kajian ini didapati kejadian kelahiran pramatang adalah sebanyak 33.3%. Pesakit yang pernah mengalami kelahiran pramatang, keguguran dan panjang pangkal rahim yang pendek adalah berisiko untuk mengalami kelahiran tidak cukup bulan.

Secara keseluruhannya didapati purata panjang pangkal rahim mengikut usia kandungan adalah 2.82cm, 2.78cm, 2.73 dan 2.69cm pada 16 minggu, 24 minggu, 28 minggu dan 32 minggu masing-masing. Panjang pangkal rahim yang diukur menggunakan ujian ultrabunyi melalui faraj dan ultrabumyi biasa menunjukkan nilai statistk yang signifikan (nilai $p < 0.001$). Hasil kajian ini juga menunjukkan ukuran panjang pangkal rahim yang dibuat menggunakan ujian ultrabunyi melalui faraj pada usia kandungan 28 minggu memberikan peratusan yang yang tertinggi dari segi nilai prediktifnya dalam menjangkakan kemungkinan berlakunya kelahiran pramatang apabila panjang pangkal rahim ≤ 2.5 cm.

Kesimpulan

Ukuran panjang pangkal rahim menggunakan ujian ultrabunyi melalui faraj adalah merupakan satu teknik yang berguna dalam usaha untuk meramalkan kemungkinan berlakunya kelahiran pramatang di mana risiko kelahiran pramatang adalah berkadar songsang dengan panjang rahim seseorang pesakit. Di samping itu juga didapati ukuran panjang pangkal rahim yang diukur menggunakan ujian ultrabunyi secara ini adalah lebih baik jika dibandingkan dengan ujian ultrabunyi biasa.

ABSTRACT (English version)

Objective

To study the cervical length measurement in relation to the outcome of pregnancy.

Methodology

All patients who attended HUSM antenatal clinic and those who are fulfilled all the criteria listed are recruited in this study. The participants involved will be subjected for transabdominal and transvaginal ultrasound at 16-20, 24, 28 and 32 weeks period of gestation for cervical length measurement. At 28 week of gestation, high vaginal swab will be taken and then subsequently, they will be having a routine antenatal follow up as scheduled like the other patients who are not involved in this study till time of delivery.

Result

A total of 183 pregnant women have been recruited in this study where 61 of them had preterm labour. The incidence of preterm delivery in this study was about 33.3%. Patients with history of previous preterm delivery, miscarriage and short cervix were predisposed to preterm delivery. In general, the average cervical length at 16 weeks, 24 weeks, 28 weeks and 32 weeks are 2.82 cm,

2.78 cm, 2.73 cm and 2.69 cm respectively. Both TVS and TAS in measuring the cervical length showed significant association in predicting preterm delivery. At a cut off point of ≤ 2.5 cm, transvaginal cervical length showed PPV of 100% in all gestation in this study except at 32 weeks to predict preterm delivery and was far by superior compared to TAS. Transvaginal ultrasound at 28 weeks demonstrated the highest predictive value compare to other gestation in predicting preterm delivery.

Conclusion

Cervical length measurement can be used as an important predictor for preterm delivery where the length of the cervix is inversely related with risk of preterm labour. In predicting preterm delivery, the measurement of cervical length by TVS is more superior than TAS .

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

1.0 INTRODUCTION AND LITERATURE REVIEW

1.1 INTRODUCTION

The definition of prematurity as remained a controversial and debatable issue since the earliest recorded incidence of premature birth. In 1907, Simpson referred it to a birth on December 25th, 1642 by widow who delivered a male child who was 'so small that he could have been put into a quart mug' (Keirse, 2003). The infant survived and grew up to be Sir Isaac Newton, who described gravity. At the time Simpson was not concerned as to why Newton was born small. As far as Simpson was concerned it was simply a premature birth.

In 1950, the WHO defined prematurity as a birth weight of 2500 g or less (Keirse, 2003). The definition was derived from an idea by a Finnish paediatrician who was trained in Berlin. His observations showed that babies weighing 2500 g or less did substantially worse than babies weighing more (Keirse, 2003). After 1950, physicians become aware that weight and maturity were not necessarily related. The study by McKeown & Record (1952) illustrated that there was a difference between weight and maturity. In 1961, the WHO revised the definition of prematurity to a gestational age less than 37 weeks.

Today, preterm birth is defined as labour which occurs in between 22 weeks and 37 completed weeks of gestation. Preterm birth is associated with significant perinatal morbidity and mortality rates. Moreover, preterm baby are

at high risk of having premature complications such as visual and hearing impairment, cerebral palsy, developmental delay and chronic lung disease. Pregnancy carries around 5 to 10% risk of preterm delivery (Morrison, 1996). Even with the recent development in neonatal resuscitation and care still is one of the major adverse events to the newborn. The criteria for diagnosis of preterm labour are defined by the onset of increasingly frequent and painful uterine contractions with progressive effacement and dilatation of the cervix before completed 37 weeks. In HUSM the incidence of preterm delivery in 2006 is around 3.17% with the total delivery rate of 6936 as shown in the table below.

The number of delivery in labour ward HUSM in 2006.

Delivery	Number(n)
1) SVD 2) LSCS 3) Breech 4) Vaccum 5) Forcep 6) BBA	5291 (76.3%) 1291 (18.8%) 105 (1.5%) 31 (1.9%) 45 (0.6%) 73 (1.1%)
Total	6936

The number of preterm delivery according to gestation and birth weight with the perinatal mortality rate at HUSM in 2006.

	n (%)	Perinatal Mortality (n)
Weight		
0 – 1000 g	22 (11.7%)	18 (50.0%)
1001 – 1250 g	26 (13.8%)	6 (16.7%)
1251 -1500 g	29 (15.4%)	7 (19.4%)
1501 -2000 g	111 (59.0%)	5 (13.8%)
Total	188	36
Gestation		
< 28 weeks	23 (10.5%)	17 (47.2%)
29 – 31 weeks	44 (20.0%)	11 (30.6%)
32 – 36 weeks	153 (69.5%)	8 (22.2%)
Total	220	36

Ultrasound assessment of the cervix in normal pregnancy shows that effacement starts around 32 weeks. In preterm labour, the process may begin between 16-24 weeks. Effacement begins at internal os and can visualize as cervical shortening and funneling, a process that occur before dilatation of the external os. By using a transvaginal ultrasound, assessment is possibly in virtually all cases (Sonek J et al, 1990). Transvaginal ultrasound assessment of the cervix has been used in a variety of situations to improve the accuracy of a diagnosis of preterm labour and to predict likelihood of a women going into preterm labour.

Cervical length can be accurately and repeatedly measured by ultrasound. The risk of prematurity is inversely related to cervical length. These measurements

should only be made by transvaginal scan as the full bladder necessary for visualization transabdominally leads to false lengthening and can obliterate gross funneling (McParkland et al, 2004).

Survival of preterm infant is mainly dependent on gestational age at delivery and survival increases from less than 5% for those born at 23 weeks to more than 95% by 32 weeks. The risk of severe handicap in survivors decreases from more than 60% for those born at 23 weeks to less than 5% by 32 weeks. Consequently, prediction of the high risk group for preterm delivery, especially at ≤ 32 weeks and useful intervention to prevent this complication of pregnancy constitute major challenges in obstetrics (Heath et al, 1998).

Preterm labour and delivery pose an increasing problem to the obstetrician. Perhaps one of the most disappointing reports of the past year was that describing the lack impact that peripartum therapeutic interventions in preterm labour have had on neonatal outcome over past 20 years. The incidence of preterm delivery has risen, and while survival rates for preterm infants are vastly improved, these improvements have not been through advances in obstetrics. The major contributing factors are higher multiple birth rates, confirmation of dates by early ultrasound in pregnancy and greater obstetric intervention. Whether there has been a real increase in the spontaneous preterm birth rate is not clear.

1.2 LITERATURE REVIEW

Preterm birth is defined as birth as occurring between 20 and 36 weeks of gestation is a major contributor to perinatal mortality and morbidity, and affects approximately six to seven per cent of birth in developed countries (Keirse, 1995). A large multicentre trial have demonstrated that 83% of neonatal death occurred in pregnancies ending before 37 completed weeks of gestation and 66% of neonatal deaths were in infants delivered before 29 weeks gestation (Copper et al, 1993).

The birth of a preterm infant who requires care for its survival is a crisis, not only for the infant, but also for the parents (McCain & Deatrick, 1993). Severe morbidity, especially respiratory distress syndrome, intraventricular haemorrhage and necrotizing enterocolitis are known complications in preterm babies. Its long term impairment includes cerebral palsy, visual impairment and hearing loss (Keirse, 1995).

A retrospective cohort study examined cervical length by means of a two-stage procedure; transabdominal ultrasonography followed by transvaginal ultrasonography where a total of 6877 patients met inclusion criteria with the mean cervical length was 37.5 mm. A short cervix seen on a second trimester sonogram was a powerful predictor of early spontaneous preterm delivery (≤ 32 weeks). Nearly 50% of patients with a cervical length of ≤ 15 mm had an early spontaneous preterm delivery and 3.2% with a cervical length of 30 mm. (Sonia S. Hassan et al, 2000). The test has predictive ability in all groups of women

(low risk or high risk). In asymptomatic women with a short cervix, the risk of very preterm delivery rises only slightly to 4% with lengths of 11-20 mm. At 10 mm, the risk is 15% and it increases dramatically as length decreases (McParland et al 2004).

Recently, several studies in pregnancies considered at high risk, because of a history of previous mid-trimester miscarriage or early preterm delivery, and those presenting with preterm labour have reported that cervical assessment may provide useful prediction of preterm delivery. Furthermore, in a screening study involving measurement of cervical length by transvaginal sonography at 24 weeks of gestation, a cervical length of 20mm or less identified 23% of those delivering before 35 weeks with a false positive predictive rate of 3% and a positive predictive value 26% (Heath et al, 1998).

In HUKM transvaginal ultrasonography was done on 78 women at booking, between 16-18 weeks then subsequently at 24 and 28 weeks. The risk of preterm labour was assessed base on data collected. A cervical length of 3.0 cm had a positive predictive value of 40% and 3.3 cm had a positive predictive value of 21.7%. Out of the sample study 92% delivered at term and 8% had preterm labour. No patient delivered before 34 weeks (Murad AZ et al, 2000).

Ultrasound assessment for cervical length in threatened preterm labour showed 70% presenting with premature contraction do not progress to active labour. Out of these 30% - 42% were treated with tocolytics and 35% managed expectantly. About 0.5% of will end up delivering despite cervical length more

than 1.5 cm as compared to 37% of patients with cervical length less than 1.5 cm delivered within 7 days. (Tsoi et al, 2003).

Sonographic measurement of cervical length in threatened preterm labour in singleton pregnancies with intact membrane showed from 510 cases - 4.1% delivered within 48 hours with cervical length less than 1.5 cm and 8.4% with 7 days and 14.9% before 35 completed weeks of gestation. In women with threatened preterm labour sonographic measurement of cervical length helps to distinguish between true and false labour and to predict preterm delivery (Tsoi et al, 2005).

De Carvalho (2005) found that the incidence of spontaneous preterm delivery at gestational age of ≤ 34weeks was 3.4%. The mean cervical length was 30.1 mm (SD 10.1 mm) in the group with the history of prematurity and 35.8 mm (SD 7.9 mm) in the group without previous history of prematurity. The mean gestational age at delivery was significantly lower in the group with funneling compared with the group without funneling (33.5 weeks versus 38.8 weeks). In conclusion, ultrasound cervical assessment was useful in the prediction of preterm delivery, but it should also be considered in association with the obstetric history of prematurity.

Heath et al (1998) noted that cervical length ≤ 15mm in 2% of population delivered at 23 weeks, 90% delivered at ≤ 28 weeks and 60% delivered at 32 weeks respectively.