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RESEARCH ARTICLE

STRIPPING MEMBRANES IN INDUCTION OF LABOUR

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ABSTRACT

Objective: To evaluate the safety and efficacy of membranes stripping in induction of labour in low-risk patients at term pregnancy (38-40 gestational weeks)

Methods: This prospective study included 140 antenatal women who were randomly assigned to one of two groups: a stripping of the membranes group (n=70) and a no stripping control group (n=70). The primary outcome measure was the proportion of women who entered spontaneous labor within 1 week of entry into the study. Secondary outcome measures included mode of delivery and maternal and fetal complications.

Results: There were no statistically significant differences between the two groups regarding maternal age, parity or Bishop score. The proportion of subjects who entered spontaneous labour before 41 weeks of gestation was significantly different between the two groups ($p < 0.0001$). The mode of delivery was significantly different between the groups and there was no statistically significant difference in maternal or fetal complications.

Conclusions: Stripping of membranes is a safe method to reduce the length of term in pregnancy and the incidence of prolonged gestation. There is no evidence that stripping the membranes increases the risk of maternal or neonatal adverse outcomes.

INTRODUCTION

Induction of labour is one of the most common procedures in obstetrics and is carried out in approximately 20% of pregnancies (Allot and Palmaer, 1993). Mechanical and biochemical means have been used to affect cervical ripening and to induce labour. Methods of induction include amniotomy, membranes stripping or sweeping, prostaglandins, laminaria and oxytocin (RCOG, 2008; Mitchell *et al.*, 1977; Keirse *et al.*, 1983). Sweeping (or stripping) of membranes is defined as digital separation of the chorioamniotic membranes from the lower uterine segment. It causes an increase in prostaglandin metabolites in the maternal circulation and in local prostaglandin production (Boulvain *et al.*, 1999; Gupta *et al.*, 1998). A number of randomized controlled trials have been conducted to evaluate stripping of membranes, but the results have been conflicting regarding the efficacy of this method.

A recent meta-analysis of membranes stripping trials concluded that although it reduces the number of women progressing to post-term gestation and the need for normal labour induction, routine use of sweeping of membranes from 38 weeks pregnancy onwards does not seem to produce clinically important benefit (Wiryasirivd *et al.*, 1996). The aim of this randomized controlled study was to evaluate the efficacy and safety of membranes stripping at initiation of labour induction for low-risk patients at term pregnancy (38-40 gestational weeks). The reported side effects of membranes stripping are increased maternal discomfort, mild bleeding, and irregular uterine contractions.

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Multiple studies have established membranes stripping as a safe practice that does not increase maternal or fetal morbidity or mortality; however (El-Torkey and Grant, 1992), no studies have evaluated prelabour rupture of membranes as a primary outcome. Prelabour rupture of membranes is most commonly defined as rupture of membranes before the onset of labour and occurs in 8% of term pregnancies (de Miranda *et al.*, 2006). Since the introduction of membranes stripping as a routine practice at Tripler Army Medical Center, we have noted an apparent increase in prelabour rupture of membranes. It may be that the reduction in post-term pregnancies with membranes stripping is in part due to an increase in prelabour rupture of membranes with subsequent labour induction (Boulvain *et al.*, 1999).

MATERIALS AND METHODS

A randomized study was conducted between July 2011 and July 2012 at Benha Teaching Hospital. The inclusion criteria were the following: a single living fetus in cephalic presentation, gestational age 38-40 weeks as determined by last menstrual period or by a first- or second-trimester ultrasound scan, no previous cesarean section or any uterine surgery, a Bishop score < 4 in the presence of a closed cervix and no contraindication to vaginal birth. Women who had a previous cesarean section and uterine surgery, intrauterine fetal death, twin pregnancies, estimated fetal weight > 4500 g, known gross fetal anomalies or breech presentation were excluded from the study. Stripping of membranes was performed by separation of the lower membranes as much as possible from its cervical attachment.

Stripping was performed by only one of the investigators, and vaginal examination also was performed by the same investigator for the control group. The women were observed for a few hours after membranes stripping and, if they were well, they were discharged. The women were warned to expect a "show" and were allowed to go home. They were instructed to go to the labour ward if they experienced decreased fetal movement, excessive watery discharge or excessive vaginal bleeding or suspected the onset of labour. After the initial intervention, there were no further differences in management the stripping group & control group. All women were given a deadline date for labor to be induced in the absence of spontaneous onset.

Thereafter, all patients were followed weekly until delivery or scheduled induction, and stripping was not repeated. Patients were admitted to the labour ward when they were in labour. For other patients, pregnancies were followed until 41 weeks; when there was lack of labour, induction was started to terminate pregnancy. The primary outcome of the study was the proportion of women who entered spontaneous labor within 7 days of entry into the study. Major secondary outcome included the proportion of women who entered spontaneous labor before 41 weeks gestation, mode of delivery, incidence of premature rupture of membranes, maternal infection and neonatal morbidity (Apgar score at 5 min & admission of intensive care unit).

RESULTS

The study population consisted of a total of 140 women including 82 nulliparous (44 stripping and 38 no stripping) and 58 multiparous women (26 stripping and 32 no stripping).

The median age of the patients in the stripping and no stripping groups was 24 (range: 22 – 28 years) and 26 years (range: 22 – 30 years), respectively. There was no significant difference between the stripping and no stripping groups regarding maternal characteristics (Table 1). Comparison of the study groups regarding pregnancy outcomes are shown in Table 2. The median delivery interval was 3 days (range: 1 – 5 days) in the stripping group, whereas it was 7 days (range: 4 – 12 days) in the no stripping group ($P < 0.0001$). The number of patients who entered spontaneous onset of labor before 40 weeks was significantly higher in the stripping group than the no stripping group $P < 0.0001$, there was significant difference between the two groups regarding the mode of delivery.

There were no statistically significant differences between the groups regarding maternal and fetal complications including PROM, meconium – stained amniotic fluid, maternal discomfort, pathologic fetal heart rate (FHR) pattern or neonatal mortality, except for uterine contractions which were noted more frequently in the stripping group ($P = 0.015$). We performed a subgroup analysis of the effect of membranes stripping on the onset of spontaneous labor before 40 weeks based upon cervical status and cervical status at the time of examination. When only women with open cervixes were included in the analysis, there was a significant difference between the stripping and control groups with regard to the primary outcome ($P < 0.0001$).

DISCUSSION

We performed a randomised controlled trial to evaluate the effects of membrane stripping in low-risk pregnant women between 38-40 weeks of gestation who were routinely monitored.

Table 1. Comparison of the characteristics of the study groups (n = 140)

Characteristics	Stripping (n = 70)	No stripping (n=70)	P
Maternal age (year, median, IR)*	24(22-28)	26(22-30)	0.114
Gravidity (median, IR)*	1 (1-3)	2(1-3)	0.485
Parity (median, IR)*	0(0-1)	0(0-1)	0.079
Multiparous (n, %)	26(37.1%)	32 (45.7%)	0.102
Nulliparous (n, %)	44(62.8%)	38(54.3%)	
Gestational age at recruitment (week, median, IR)*	39(38.2-39.8)	39(38.2-39.5)	0.148
Cervical status:-			
Cervix opened (n, %)	58(82.8%)	60(85.7%)	0.637
Cervix closed (n, %)	12(17.1%)	10(14.3%)	
Bishop score (median, IR)*	1(1-2)	1(1-2)	0.936

IR, interquartile range.

* Mann–Whitney U-test.

**Unpaired Student's t-test.

Table 2. Comparison of the study groups regarding pregnancy outcomes

Outcomes	Stripping (n = 70)	No stripping (n=70)	P
Primary outcomes:-			
Spontaneous onset of labor within 7 days (n, %)*	52.(74.3%)	32 (45.7%)	<0.0001
Secondary outcomes:-			
Delivery interval (days, median, IR)**	3(1-5)	7 (4-12)	<0.0001
Spontaneous onset of labour < 40 weeks (n, %)*	64(91.4%)	49(70%)	< 0.0001
Spontaneous onset of labour (n, %)*	68(97.1%)	60(85.7%)	< 0.010
Mode of delivery:-			
Vaginal delivery (n, %)	67(95.7%)	59(84.3%)	<0.0001
Cesarean section (n, %)	3(4.3%)	11(15.7%)	< 0.0001
Premature rupture of membranes (n, %)*	5(7.1%)	4(5.7%)	0.266
Meconium-stained amniotic fluid (n, %)*	4 (5.7%)	7(10%)	0.111
Maternal discomfort	14(20%)	8(11.4%)	0.134
Pathologic FHR pattern	2 (2.9%)	3(4.3%)	0.286
Uterine contractions	21(30%)	11(15.7%)	0.015
Apgar score (median, IR)**	9 (9-9)	9(9-9)	0.59
Neonatal mortality (n, %)*		1 (1.4 %)	0.300

IR, interquartile range; FHR, fetal heart rate.

*Chi-square.

**Mann–Whitney U-test

Membranes stripping resulted in an increase in spontaneous onset of labor within 7 days. Unlike the meta-analysis (Boulvain *et al.*, 2005), we found a statistically significant decrease in prolonged pregnancies and a significant decrease in days to delivery. Moreover, we performed a subgroup analysis to investigate the effect of membranes stripping on spontaneous onset of labor within 7 days based on cervical status at the time of examination and found that there was a significant difference between the stripping and control groups with regard to this primary outcome. However, this study was not designed with power sufficient to analyse subcategories. There are conflicting results with regard to whether stripping of membranes can reduce the need for induction of labour. A meta-analysis of 22 randomised controlled trials (2797 women) evaluated the effect of membrane sweeping (13 studies included women 37–40 weeks' gestation and six studies included women at or beyond 40 weeks' gestation)^[4]. When performed in unselected women, stripping of membranes reduced the risk of post-term pregnancy and the use of other methods of labour induction. However, routine use of stripping of membranes from 38 weeks of pregnancy onwards did not seem to produce clinically important benefits.

Limitations of this systematic review included the relatively small size of the studies and suspicion of publication bias. In these studies, the influence of specific conditions of cervix and/or parity was not addressed. Moreover, there was no consensus on the timing and number of sweepings (once or once a week). In our study, we used stripping of membranes earlier in pregnancy to try to prevent prolonged pregnancies. The Bishop score and cervical status were associated with spontaneous onset of labor within 7 days and spontaneous onset of labour before 40 weeks, with subjects who had unfavourable cervical status being less likely to start spontaneous delivery. Also, gestational age at enrollment was found to be predictive of spontaneous onset of labour within 7 days and spontaneous onset of labour before 40 weeks. Analysis showed that there was a significant difference in the median number of days to delivery between the groups. Stripping reduced the time between randomisation and delivery by 7 days. The difference in time was reflected in the occurrence of spontaneous onset of labour before 40 weeks. These findings are similar to those of previous trials (Canc *et al.*, 1997; de Miranda *et al.*, 2006; Allot and Palmaer, 1993).

Our study shows that membranes stripping seems to be a safe method (Boulvain *et al.*, 2005). There was no significant complication reported in this study. The incidence of premature of ruptured membranes, vaginal bleeding and maternal infection was not increased. Discomfort during the examination and minor side effects including bleeding and uterine irritability were more frequently reported in those women who underwent stripping of the membranes. About 20% of women found that membranes stripping was associated with maternal discomfort. Multiple studies have established membranes stripping as a safe practice that does not increase maternal or fetal morbidity or mortality (Boulvain *et al.*, 2005). In a study conducted by Wong *et al.* (2002) on 120 women, it has been concluded that stripping is not associated with risk of PROM or vaginal bleeding, however, is associated with significant maternal discomfort. An incidence up to 70% has been reported regarding maternal discomfort.

Our study did not have adequate power to detect significant differences in certain outcomes, including PROM and neonatal and maternal morbidity rates. Previous studies when membrane sweeping was performed between the 38th and 40th gestational weeks; stripping was found to be ineffective. Our results, unlike those of previous studies, showed that membranes stripping is an effective procedure to induce labour at term (Kashanian *et al.*, 2006; Canc *et al.*, 1997). As the majority of pregnancies were dated based on the last menstrual period, errors in dating might have resulted in more pregnancies at the borderline of 'late term' (i.e. 40–41 weeks) be classified as post term. Membranes stripping increases birth rate before the 40th gestational week, with no increase in the neonatal morbidity. There is no significant difference between the groups with respect to neonatal outcomes.

Conclusion

In conclusion, stripping of membranes is a safe method for reducing the length of term pregnancy and the incidence of prolonged gestation in a low risk population. There is no evidence that stripping the membranes increases the risk of maternal and neonatal adverse outcomes. As suggested in the meta-analysis (Boulvain *et al.*, 2005), future studies should satisfy the participants according to cervical status and/or parity to determine if stripping of the membranes is more effective for specific subgroups.

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