Efficacy of Serial Mechanical Membrane Stripping for Labour Induction in Parous Women

Abd El-Naser Abd El Gaber Ali[a], Hazem Hashem Ahmed[a], Saad Mahmoud Saad Mostafa[a]*, Mostafa Mohamed Khodry Mostafa[a]

[a]Obstetrics and Gynecology Department, Faculty of Medicine, South Valley University, Qena, Egypt

Abstract

Background: The artificial initiation of labor prior to its spontaneous beginning is referred to as induction of labour. The frequency of induction differs depending on region and institution.

Objectives: The purpose of this study was to determine the effectiveness of repeated mechanical membrane stripping in labor induction in parous women.

Patients and methods: The Obstetrics & Gynaecology Department, Qena University Hospital, South Valley University, conducted the randomized controlled experiment. The patients were split into two groups: A group of 100 women received serial mechanical membrane stripping every three days. Group (B): 100 women who received no intervention.

Results: There was a statistically significant greater rate of spontaneous labour in group A than in group B, but there was no statistically significant difference in induction of labour between the two groups. The duration of labour was longer in group B than group A. There is no evidence that sweeping membranes increases the likelihood of unfavourable maternal and newborn outcomes.

Conclusion: Sweeping of membranes appears to be an efficient and safe method of shortening the duration of a term pregnancy.

Keywords: Serial Mechanical Membrane Stripping; Labour; Induction; Parous.

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***Correspondence**: dr.saad122@gmail.com

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Introduction

Induction of labour is the stimulation of uterine contractions to induce the commencement of labour artificially. **(Banner and D'Souza, 2021).** Induction of labour is the artificial start of labour before its natural commencement in order to deliver the feto-placental unit. The frequency of induction differs depending on region and institution. The objective of induction is to produce as natural a vaginal birth as feasible. **(Middleton et al., 2020).**

To induce labour, many pharmacological, surgical, and mechanical procedures are utilised. This generates hormones that promote effacement and dilatation, potentially leading to labour. **(Middleton et al., 2018).**

To induce labor, a variety of pharmacological, surgical, and mechanical procedures are utilized. This causes hormones to be released, which increase effacement and dilatation, potentially leading to labour. **(Avdiyovski et al., 2019).**

Whether administered alone or in conjunction with vaginal prostaglandins, antenatal outpatient sweeping (or stripping) of lower segment membranes in pregnant women at term minimises the requirement for labour induction for post-term birth (PG) **(Finucane et al., 2020).** Membrane Sweeping has been employed since the nineteenth century, and while the specific process is unknown, it is thought to induce the commencement of spontaneous labour by boosting endogenous prostaglandins (PG) **(Avdiyovski et al., 2019).**

The purpose of this study was to determine the efficacy of successive mechanical membrane stripping in labor induction in parous women.

Patients and methods

Arandomized controlled experiment was conducted at Obstetrics and Gynaecology Departement, Qena University Hospital, South Valley University.

All participants women were divided into two groups:Group (A): 100 women were subjected to serial mechanical membrane stripping every 3 days. Group (B): 100 women without any intervention

Inclusion criteria: Parous women, less than 40 years old, cephalic presentation, gestational age: 38-41 weeks, and singlet on pregnancy.

Exclusion criteria: Any of the following at the initial assessment: All levels of placenta praevia, macrosomic baby, abnormal fetal presentation, fetal congenital disease, abnormal or scarred uterus, severe oligohydramnios, decreased fetal movements, and abnormal fetal Doppler were assessed.

All participants in the research were subjected to:

- Complete history taking: Personal history: Name, age, number of children.History of medical conditions and drug taking.
- General examination:- Examination of vital signs as heart rate, blood pressure, and temperature.Measuring body weight, temperature and body mass index (BMI). Abdominal and obstetric examination: Abdominal and obstetric examination including fundal level , fundal grip , umbilical grip , first and second pelvic grip , Auscultation of fetal heart sound "F.H.S".
- Investigations: Laboratory: including CBC, Liver and kidney functions, RBS, complete urine Analysis. Obstetric ultrasonography: for assessment of fetal biometrics (Biparietal diameter "BPD¸ Femur length "FL", Abdominal Circumference "AC") ,Fetal Weight, fetal Lie, fetal position, placental grading , Amniotic fluid index and Umbilical artery Doppler.
- Fetal well-being (modified biophysical profile and non-stress test): Amniotic fluid represents fetal urine output throughout the late second or third trimester. Randomisation and allocation concealment: Closed envelope randomisation was performed in an equal ratio of mechanical membrane stripping to no stripping.

Research outcome measures

- Primary (main):We assessed the Rate of vaginal delivery in both groups.
- Secondary (subsidiary): In both groups, it includes maternal, fetal, and neonatal death and morbidity.

Ethical considerations: Before management, all included patients completed an informed permission form that contained a detailed explanation of the surgery, its result, complications, and projected improvement. The study was authorized by the ethics committee of

South Valley University's Faculty of Medicine; code number OBG024/369/1.

Statistical analysis

Data were analysed using Statistical Package for Social Sciences (SPSS) software program (version 20). Qualitative variable was recorded as frequencies and percentages and were compared by chi-square test. Quantitative measure was presented as means ± standard deviation (SD) and was compared by student t- test. correlation and Regression analysis between different variable were performed as indicated. P value < 0·05 was significant.

Results

Demographic Data

In comparison between group A (mechanical membrane stripping every 3 days) and Group B (without any intervention) as regard: age, body mass index (BMI), parity and gestational age (GA)there were no significant differences between both groups (**Table.1**)

Table 1. Comparison between the two studied groups according to demographic data

Variables	Group A (n = 100)	Group B (n = 100)	t	p
Age				
Min. – Max.	25.0 – 38.0	25.0 – 38.0	0.403	0.687
Mean ± SD.	29.01 ± 3.49	29.21 ± 3.53		
Median (IQR)	28.50(26.0 – 32.0)	29.0(26.0 – 32.5)		
BMI				
Min. – Max.	25.0 – 29.0	25.0 – 29.0	1.454	0.148
Mean ± SD.	27.36 ± 1.19	27.61 ± 1.24		
Median (IQR)	27.0(27.0 – 28.0)	28.0(27.0 – 29.0)		
Parity			U= 4460.0	0.141
Min. – Max.	1.0 – 3.0	2.0 – 3.0		
Mean ± SD.	2.22 ± 0.73	2.40 ± 0.49		
Median (IQR)	2.0(2.0 – 3.0)	2.0(2.0 – 3.0)		
GA			t= 0.923	0.357
Min. – Max.	38.0 – 39.0	38.0 – 40.0		
Mean ± SD.	38.40 ± 0.49	38.47 ± 0.58		
Median (IQR)	38.0(38.0 – 39.0)	38.0(38.0 – 39.0)		

IQR: Inter quartile range ; SD: Standard deviation ; t: Student t-test; p: p value for comparing between the studied groups
Group A:mechanical membrane stripping every 3 days; Group B:without any intervention; BMI: Body Mass Index ; GA: Gestational Age

Results of induction and spontaneous labour

Spontaneous labour was reported in 61 cases (61%) among group A and in 30 cases (30%) among group B with statistically significant difference (p <0.001).as regard cases exposed to induction of labour (39 in group A and 70 in Group B), vaginal delivery was higher in cases in group B (23 cases) than group A (8 cases) but with insignificant differences (**Table.2**).

Table 2. Comparison between the two studied groups according to induction and spontaneous labour

Variables	Group A (n = 100)		Group B (n = 100)		χ^2	p
	No.	%	No.	%		
Induction (at 41weeks)						
No	31	80.0	47	68.0	3.742	0.053
Yes	8	20.0	23	32.0		
Spontaneous labor (< 41 weeks)						
No	39	39.0	70	70.0	19.377*	<0.001*
Yes	61	61.0	30	30.0		

χ^2: Chi square test; p: p value for comparing between the studied groups; *: Statistically significant at p ≤ 0.05; Group A: mechanical membrane stripping every 3 days; Group B:without any intervention

Duration of labour in both groups

The duration of labour was longer in group B than group A (4.11 ± 2.75 Vs. 3.39 ± 2.12) and that was statistically significant (P 0.01) (**Table.3**)

Table 3. Comparison between the two studied groups according to duration of labor

Duration of labor (hr)	Group A (n = 100)	Group B (n = 100)	U	P
Min. – Max.	0.50 – 6.0	0.45 – 7.0	3954.0*	0.010*
Mean ± SD.	3.39 ± 2.12	4.11 ± 2.75		
Median (IQR)	4.0(1.1 – 6.0)	5.50(0.85 – 7.0)		

IQR: Inter quartile range ; SD: Standard deviation ; U: Mann Whitney test; p: p value for comparing between the studied groups; *: Statistically significant at p ≤ 0.05 ; Group A: mechanical membrane stripping every 3 days; Group B: without any intervention

Postpartum haemorrhage (PPH), neonatal intensive care unit admission (NICU)

Postpartum haemorrhage was not occurred in both groups. As regard NICU admission was significantly higher among group B than group A (22% vs. 10% with P value 0.021) with statistically significant differences (**Table.4**)

Table 4. Comparison between the two studied groups according to NICU admission and PPH

Variables	Group A (n = 100)		Group B (n = 100)		χ^2	P
	No.	%	No.	%		
NICU admission						
No	90	90.0	78	78.0	5.357*	0.021*
Yes	10	10.0	22	22.0		
PPH						
No	100	100.0	100	100.0	-	-
Yes	0	0.0	0	0.0		

χ^2: Chi square test; p: p value for comparing between the studied groups; *: Statistically significant at p ≤ 0.05; Group A:mechanical membrane stripping every 3 days; Group B:without any intervention.

Fetal distress and Apgar score and hospital stay in both groups

There were insignificant differences between two groups as regard apgar score. As regard fetal distress was higher among cases in group B than group A. There were insignificant differences between two groups as regard hospital stay (**Figs. 1,2,3**).

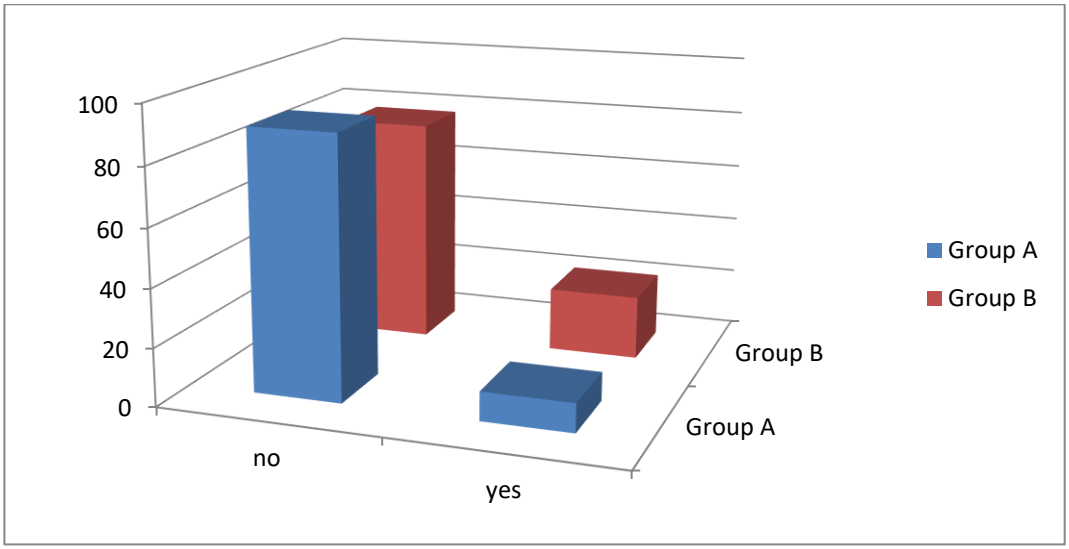

Fig.1. Comparison between the two studied groups according to fetal distress

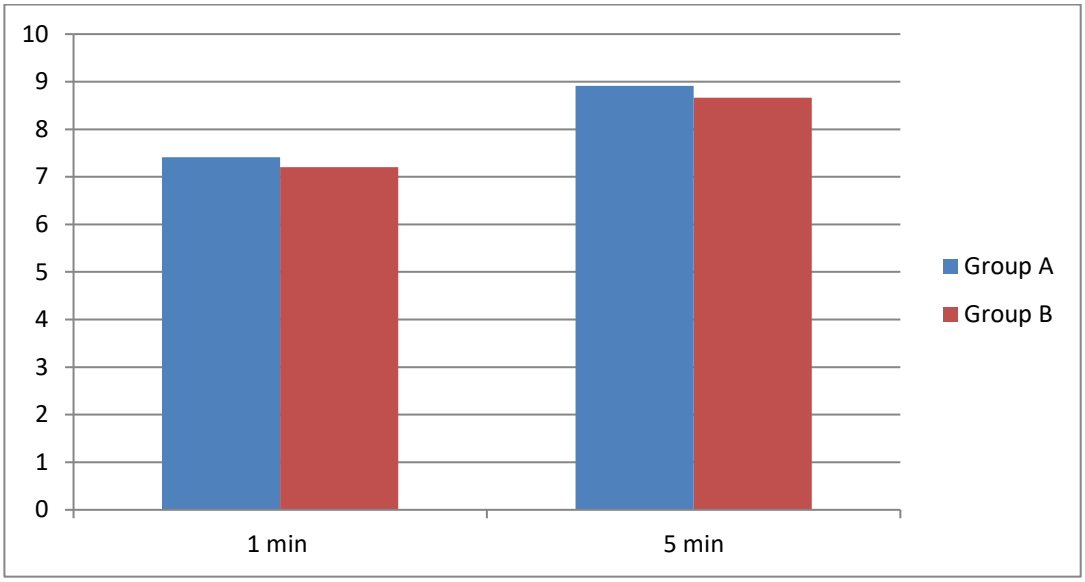

Fig.2. Comparison between the two studied groups according to Apgar score

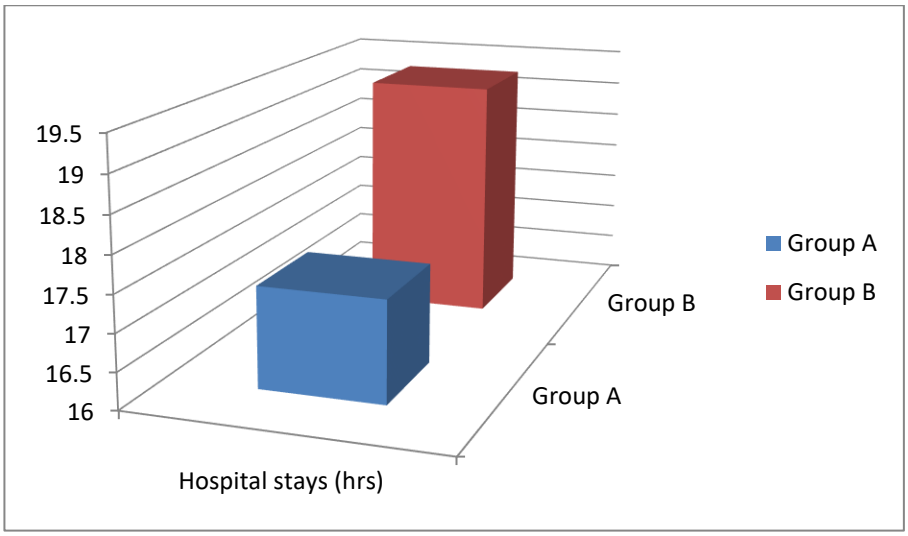

Fig. 3. Comparison between the two studied groups according to hospital stays

Discussion

Membrane stripping or sweeping is the digital removal of the chorioamniotic membranes from the lower uterine section. It increases prostaglandin metabolites in maternal circulation as well as local prostaglandin synthesis. Mild bleeding, increased maternal pain, and irregular uterine contractions have been described as side effects of membrane stripping. **(De Miranda et al., 2006).**

In terms of demographic statistics, there were no statistically significant differences between the two groups.

Our findings agreed with those of **(Nyamzi et al., 2019),** who reported that a total of 194 women were randomly assigned to one of two groups: treatment or control. Ninety-seven women were randomly assigned to one of two groups: those who had membrane sweeping at 40-41 weeks and 0 days gestation, and those who had a vaginal examination to determine Bishop score solely. The demographic features of the two groups were comparable.

Similarly, in the research of (**Saichandran et al., 2015**). On the day of the estimated date of delivery, that is, 40 completed weeks, 100 women who met the inclusion requirements were admitted. These 100 women were assigned to study and control groups. The research group had membrane sweeping, while the control group did not.

The current study found significant differences between two groups in terms of gestational age at birth (weeks), but not in terms

of parity, gestational age, or mode of delivery. The investigation of corroborated our findings **(Zamzami and Al Senani, 2014)**. They claimed that 240 women were qualified to participate in the trial. Eighty women declined to participate, leaving 160 women to be randomly assigned to either membrane sweeping (study group, n = 80) or no membrane sweeping (control group, n = 80).

In terms of parity and gestational age, there was no statistically significant difference between the two groups. The current study found statistically significant differences in cases of spontaneous labor between groups A and B, while in cases of induction of labor, spontaneous labor was higher in group B than in group A, albeit with minor differences. The duration of labor was statistically significant longer in group B than in group A.

Our findings were validated by a study of (**Zamzami and Al Senani, 2014**). They reported that the majority of women had 1 membrane sweeping 65 (81.3%) went into spontaneous labor between 39 - 40 weeks, while 15 (18.75%) women had ≥ 2 membrane sweeping 7 (8.75%) of them went into spontaneous labor 41 weeks, and 8 (10%) needed induction of labor at 41 weeks' gestational age. The control patients had a higher labor induction rate (25% vs. 10%) (OR, (95% CI): 3 (1.2 - 7.3); P = 0.01). In the study, shorter pregnancy length and more spontaneous labor commencement were statistically significant.

In The research of **(Saichandran et al., 2015)** found a statistically significant difference between the study and the control groups in spontaneous commencement of labor, pregnancies prolonged beyond 41 weeks, method of delivery, and the use of oxytocin for augmentation.

Moreover, **(Batham and Anjum, 2021)** claimed that the commencement of labor following membrane sweeping was estimated in terms of days. The average length of cases was 6.82 ± 1.967 days, and only 22 women in this group went into spontaneous labor. The mean length from 39 weeks to the commencement of labor in the control group was 7.96 ±3.630 days; in this group, 57 out of 85 women went into spontaneous labor. They discovered no significant difference when comparing cases to controls.

While in the study of **(Ugwu et al., 2014).** the incidence of post-term pregnancy in the membrane stripping group was 16.1% (10/62) versus 39.3% (24/61) in the control group (RR 0.41; 95% CI 0.22-0.78; P = 0.004; NNT = 4). Membrane stripping reduced the duration of pregnancy by 3 days (P < 0.001).

In our study, instances in group B had a greater neonatal outcome and fetal discomfort than those in group A. In terms of Apgar score, there were no notable differences between the two groups. In terms of NICU admission, group B was much more than group A. In terms of hospital stay, there were no significant differences between the two groups. According to our findings, the research of **(Batham and Anjum, 2021)** found no change in Apgar score between the case and control groups. In 5 minutes, the Apgar score for all patients was 9/10. In both the case and control groups, there was no lengthy NICU admission. In both the case and control groups, no antibiotics were given for an extended period of time. Among the research groups, there was no maternal death. Moreover, in the research of (**Zamzami and AlSenani, 2014**). Meconium stained amniotic fluid was more common in the controls (25% vs. 5%; OR (95% CI): 5 (1.8 - 14); P = 0.001). Baby weight, Macrosomia incidence, and labor time were all statistically substantially higher in the control group. There were no differences between the two groups in terms of cesarean delivery or maternal or fetal problems.

Conclusions

According to the findings of this study, sweeping of membranes appears to be a successful and safe method for shortening the duration of a term pregnancy. There is no evidence that sweeping membranes increases the likelihood of unfavorable maternal and newborn outcomes.

References

- **Avdiyovski, H., Haith-Cooper, M., Scally, A. (2019).** Membrane sweeping at term to promote spontaneous labour and reduce the likelihood of a formal induction of labour for postmaturity: a systematic review and meta-analysis. Journal of Obstetrics and Gynaecology, 39(1), 54–62.
- **Banner, H., D'Souza, R. (2021).** Towards an evidence-based approach to optimize the success of labour induction. Best Practice and Research Clinical Obstetrics and Gynaecology, 77, 129–143.
- **Batham, S. K., Anjum, S. (2021).** Repeated Sweeping of Membranes at Term Pregnancy

as Method of Induction. Journal of South Asian Federation of Obstetrics and Gynaecology, 13(4), 265-268.

- **De Miranda, E., Van Der Bom, J. G., Bonsel, G. J., Bleker, O. P., Rosendaal, F. R. (2006)**. Membrane sweeping and prevention of post-term pregnancy in low-risk pregnancies: a randomised controlled trial. BJOG: An International Journal of Obstetrics and Gynaecology, 113(4), 402–408.
- **Finucane EM, Murphy DJ, Biesty LM, Gyte GM, Cotter AM, Ryan EM, Boulvain M, Devane D. Membrane sweeping for induction of labour. Cochrane Database Syst Rev. 2020** Feb 27;2(2):CD000451. doi: 10.1002/14651858.CD000451.
- **Middleton P, Shepherd E, Crowther CA (2018).** Induction of labour for improving birth outcomes for women at or beyond term. Cochrane Database Syst Rev. 9;5(5):CD004945. doi: 10.1002/14651858.CD004945.
- **Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC (2020)**. Induction of labour at or beyond 37 weeks' gestation. Cochrane Database Syst Rev. 15;7(7):CD004945.doi: 10.1002/14651858.CD004945.
- **Nyamzi, M. G., Isah, D. A., Offiong, R. A., Isah, A. Y. (2019).** Effectiveness of sweeping of membranes in reducing the incidence of elective induction of labor for postdate pregnancies. Archives of Medicine and Surgery, 4(1), 15-21.
- **Saichandran, S., Arun, A., Samal, S., Palai, P. (2015).** Efficacy and safety of serial membrane sweeping to prevent post term pregnancy: a randomised study. Int J ReprodContraceptObstet Gynecol.4(6):1882-1886
- **Ugwu, E. O., Obi, S. N., Iferikigwe, E. S., Dim, C. C., Ezugwu, F. O. (2014).** Membrane stripping to prevent post-term pregnancy in Enugu, Nigeria: a randomized controlled trial. Archives of Gynecology and Obstetrics, 289(1), 29–34.
- **Zamzami, T. Y., Al Senani, N. S. (2014).** The efficacy of membrane sweeping at term and effect on the duration of pregnancy: a randomized controlled trial. Journal of Clinical Gynecology and Obstetrics, 3(1), 30–34**.**