Original Article

Effectiveness of Membrane Sweeping on Successful Initiation of Labor and Subsequent Vaginal Birth in Patients with Previous One Cesarean Section

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Abstract

Objective: To assess the impact of membrane sweeping on labour initiation, the success of vaginal delivery and neonatal outcomes in patients who have had a prior caesarean section.

Methodology: This randomized controlled trial study registration no NCT06103071 was conducted at HIT Hospital, Taxila, in collaboration with POF Hospital, Wah Cantt, from 15th Jan 2023 to 15th July 2024. Three hundred and eight four pregnant females with previous cesarean section for non-recurrent cause were enrolled. Two groups were made. In Group A, membrane sweeping was done. In Group B, no membrane sweeping was done. The primary outcome measures the onset of labour. Secondary outcome measures of successful vaginal delivery and fetal outcome, i.e. admission to NICU, were recorded.

Results: Females in membrane sweeping had a mean age of 29.24 ± 7.99 years, while in the control group, the mean age of females was 30.54 ± 6.72 years. The onset of labour occurred in 119 (62%) cases with membrane sweeping versus 90 (46.9%) cases in the control group (p-value 0.003). In the membrane-sweeping group, 71 (37.0%) had normal vaginal delivery. In the control group, 60 (31.3%) had a normal vaginal delivery. There was no significant difference in NICU admission in both groups. In the control group, NICU admission was [22 (11.5%)], and in the membrane sweeping group was [20 (10.4%), p-value = 0.744].

Conclusion: Thus, membrane sweeping is found to be an effective and safe method to improve the spontaneous onset of labour in patients with previous cesarean section.

Keywords: Membrane Sweeping, Previous one cesarean section, NICU admission, Apgar score, Onset of labour, Vaginal delivery.

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Introduction

The rate of cesarean section is increasing day by day worldwide. World Health Organization (WHO) suggests that cesarean section rate should be between 10% to 15%.[1] However, the cesarean section rate is 21% at present and can rise to 29% by 2030, according to the WHO.[2] In Southern Asia, America, Europe, and Australia, the childbirth rate through cesarean section is 19%, 39.3%, 25.7%, and 21.4%, respectively.[3] In Pakistan, the cesarean section rate has increased from 14% in 2013 to 22% in 2018.[4] Previous scar is a common indication of repeat cesarean section.[5] Due to increasing rates of cesarean section and associated morbidity, we should focus on reducing the rate of repeat cesarean section in patients with cephalic presentation and singleton pregnancy after previous cesarean section. [6]. Therefore, all women who have one cesarean section due to a non-recurrent cause should consider vaginal delivery.[7,8] Spontaneous labour is an important key factor for vaginal delivery after cesarean section. Other factors are good bishop Score, gestation under 40 weeks and good labour progress. [7] To reduce the overall cesarean section rate and risks of post maturity, we should promote vaginal birth after cesarean section,

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which is more likely if the patient go into spontaneous labour before 40 weeks of gestation.

Studies demonstrate that membrane sweeping promotes the spontaneous onset of labour and avoids formal labour induction for prolonged pregnancy. However, its effects on women with a previous cesarean birth are uncertain till now.[9,10] Drug-induced labour in individuals with a prior cesarean section increases the risk of scar dehiscence and should be avoided[6,8]. The process of membrane sweeping induces the release of endogenous prostaglandins, which lead to the softening of the cervix and the production of oxytocin, which facilitates uterine contractions.[11,12] Existing evidence indicates that membrane sweeping does not provide a substantial danger to the outcome of both the mother and the newborn.[10] To minimize cesarean section rates, our trial compared membrane sweeping to no sweeping in the successful commencement of labour in individuals with one prior cesarean section.

The objective of the study is to assess the impact of membrane sweeping on labour initiation, subsequent vaginal birth and neonatal outcomes in patients who have had a prior caesarean section.

Methodology

This Randomized controlled trial was conducted at HIT Hospital, Taxila, in collaboration with POF Hospital, Wah Cantt, from 15th Jan 2023 to 15th July 2024. The determined sample size overall amounts to 384 patients. The sample size was determined using the WHO calculator by calculating a 95% confidence interval, 80% statistical power, and a % expected success rate of 50% using membrane sweeping.

Women at gestational age of 37 weeks to 40 weeks who were willing for vaginal birth and who had a history of one prior caesarean procedure for non-recurrent reasons were included in the research. Females with multiple gestation or non-cephalic presentations, previous uterine rupture, major degree placenta previa, medical disorders like pregnancy-induced hypertension, gestational or chronic diabetes or having bad obstetrics history were excluded from the study.

The trial was registered in the clinical trial registry under registration # NCT06103071 after obtaining approval from the institutional review board of HITEC-IMS and Wah Medical College HITEC-IRB-34-2023. Patients with previous cesarean sections attending the gynaecology department at HIT Hospital and POF Hospital who fulfilled the inclusion criteria were enrolled, and informed consent was obtained. Two groups were made by using the lottery method. Group A was an interventional group in which membrane sweeping was done. Group B was a control group that includes women without membrane sweeping. The lottery method was used to randomly assign patients to either group A or B so every patient has an equal chance of getting selected for intervention. For membrane sweeping, the doctor inserted one finger into the cervix and continuously swept the inferior pole of the membranes from the lower uterine segment. Membrane sweeping was weekly starting at 37 weeks till the initiation of labour or 40 weeks of gestation, whichever happened first. On weekly follow up counselling of the patients alongside thorough evaluation of patients done that included biophysical profile, CTG. Patients in which spontaneous labour did not start till 40 weeks were planned for elective cesarean section in the next operation theatre list according to the protocol of the department. Numerical data, including age and parity, were recorded. The primary outcome measures the number of patients who had onset of labour till 40 weeks. Secondary outcome measures of successful vaginal delivery and fetal outcome, i.e. admission to NICU, were recorded.

All data was entered and analyzed using computer software for statistical package for the social sciences (SPSS) version 28. For quantitative data, mean and percentages were used. Mode of delivery and admission in NICU were compared in both groups using the chi-square test. P value <0.05 was considered as significant.

Results

In this trial, 384 females were enrolled and divided into two groups. One hundred and ninety-two females underwent membrane sweeping with a mean age of 29.24 ± 7.99 years, while 192 females were in control group without membrane sweeping with mean age of 30.54 ± 6.72 years. The mean gestational age at enrolled was 37.76 ± 0.97 weeks in the membrane sweeping group and 37.54 ± 1.08 weeks in the control group. In the membrane sweeping group, there were 100 (52.1%) para 1; in the control group, 106 (55.2%) females were para 1. These details are depicted in Table -I.

The onset of labor was significantly higher in the membrane sweeping group compared to the control group (62% vs. 46.9%, $p = 0.003$). Although the rate of vaginal delivery was higher in the membrane sweeping group (37.0%) compared to the control group (31.3%), this difference was not statistically significant.

Emergency and elective cesarean sections, NICU admissions, Apgar scores, and incidence of uterine rupture were comparable between the two groups, with no statistically significant differences observed. Detailed comparisons are presented in Table II.

Discussion

Spontaneous onset of labour is an important factor in achieving vaginal birth after cesarean section in patients with a previous cesarean section.[13] Membrane sweeping is a simple, easy to perform and safe method for the promotion of spontaneous onset of labour and prevention of postdate pregnancy. In our study, labour onset was substantially higher in the membrane sweeping (62% vs 46.9%) group (p-value 0.003). Normal vaginal delivery rate was higher in the membrane sweeping group, that is, 71 (37.0%) versus 60 (31.3%) in the control group, but statistically, it was not significant.

In a comparable membrane sweeping study in previously scarred uteri, Ramya et al. showed that in the study group labour onset was 61.3% and in the control group 64% with p-value=0.736. The research group had 17.3% VBAC and 82.7% caesarean section, compared to 18.7% and 81.3%, respectively. The research group had a mean gestation age of 40±0.56 weeks at birth, whereas the control group had 39.92±0.55 weeks. Although membrane sweeping is a simple approach to induce labour, this research found no benefit in obstetric outcomes.[14]

Hamdan et al. tested membrane sweeping in scarred uteri. For the membrane sweeping vs control group, the spontaneous labour rate was 78.5% vs 72.1% (P-value = 0.34), and the cesarean delivery rate was 40.2% vs. 44.2% (P-value = 0.58). The gestational age at birth was similar for the membrane sweeping group (39.6±1.0 weeks) and the control group (39.6±0.9 weeks) (P-value = 0.84). Although more patients with membrane sweeping had spontaneous onset of labour, it was not statistically significant, so they concluded that repeated membrane sweeping at term in women who wanted VBAC had no significant effect on the start of labour, pregnancy length, or repeat caesarean birth.[15]

In a meta-analysis, Hamidi et al. reported that membrane sweeping did not affect labour initiation in patients with previous cesarean section (RR 1.05, 95% CI 0.92-1.20). The rates of spontaneous, surgical, and caesarean vaginal deliveries were not significantly different (RR 1.06, 95% CI 0.84-1.34). They determined that membrane sweeping did not initiate labour in

Table I: Distribution of baseline characteristics of females enrolled in the trial.

	Groups	
	Membrane sweeping (Group A) n=192	**No membrane sweeping (Group B) n=192**
Age of females (in years)	29.24 ± 7.99	30.54 ± 6.72
Gestational age at presentation (in weeks)	37.76 ± 0.97	37.54 ± 1.08
Parity		
Para 1	100 (52.1%)	106 (55.2%)
Para 2 or above	92 (47.9%)	86 (44.8%)

Table II: Comparison of outcome of pregnant ladies with or without membrane sweeping.

	Group		P-value
	Membrane sweeping (Group A)	**No Membrane sweeping (Group B)**	
Onset of labor	119 (62%)	90 (46.9%)	0.003
Gestational age at labor (in weeks)	39.06 ± 1.01	39.36 ± 0.90	0.382
Mode of delivery			
Vaginal delivery after cesarean section	71 (37.0%)	60 (31.3%)	0.483
Emergency cesarean section	54 (28.1%)	57 (29.7%)	
Elective cesarean section	67 (34.9%)	75 (39.1%)	
Indications for emergency cesarean section			
Fetal distress	16 (8.3%)	18(9.4%)	0.253
Meconium stained liquor	14 (7.3%)	14 (7.3%)	
Premature rupture of membranes	12 (6.3%)	8 (4.2%)	
Failure to progress in labour	6 (3.1%)	8 (4.2%)	
Scar tenderness	6 (3.1%)	9 (4.7%)	
Apgar score	8.36 ± 0.84	8.19 ± 0.88	0.059
NICU admission	20 (10.4%)	22 (11.5%)	0.744

patients intending a trial of labour following a caesarean. A comprehensive assessment of membrane sweeping for women who have had a caesarean showed insufficient evidence.[6]

Yasmeen and Malik observed that membrane sweeping resulted in 21 (70%) successful deliveries within 48 hours, compared to 14 (46.67%) in the control group. The researchers found that membrane sweeping initiates the spontaneous onset of labour.[16] In this study, membrane sweeping groups had a mean gestational age of 39.06 ± 1.01 weeks at the beginning of labour, whereas the control group had 39.36 ± 0.90 weeks (p-value = 0.382).

Our study found that the mean Apgar score in the membrane sweeping group was 8.36 ± 0.84 while in the control group it was 8.19 ± 0.88 (p-value = 0.059). NICU admission in the control group was [22 (11.5%)] as compared to the membrane sweeping group [20 (10.4%). There was no significant difference (p-value = 0.744). Cross-sectional research by Hassan indicated that membrane sweeping triggered labour in 127 (86.4%) postdate women. All newborns survived, with 90.5% (130) having an Apgar score greater than or equal to seven. The NICU admitted 7 (4.8%) infants.[17] Nyamzi et al. also examined the effects of sweeping membranes on reducing elective labour induction for postdate pregnancy. They found three babies in the sweeping group and four babies in the control group had an Apgar score of less than seven. These findings imply that membrane sweeping is safe for mothers and babies.[18]

Zamzami et al. found that membrane sweeping resulted in spontaneous labour in 90% of women, with a significant difference in mean gestational age (39.5 ± 0.9 vs. 40.0 ± 1.2, P = 0.004). Like our study, the two groups had no difference in caesarean deliveries and maternal/fetal morbidity.[19] However, Njoku et al. found no differences in membrane sweeping to delivery time (P = 0.85), spontaneous labour, induction, or Caesarian section rate (P = 0.68). [20]

This study's limitation is the small sample size, and further studies with large sample sizes are needed to know the effect of membrane sweeping in patients with previous cesarean sections.

Conclusion

Membrane sweeping is found to be an effective and safe method to improve the spontaneous onset of labour in patients with previous cesarean sections without any harmful effect on the mother and fetus. Thus, we want to perform membrane sweeping in many patients with one previous cesarean section to see its effectiveness in the spontaneous onset of labour.

References

1. Rai SD, Poobalan A, Jan R, Bogren M, Wood J, Dangal G, et al. Caesarean section rates in South Asian cities: Can midwifery help stem the rise? J Asian Midwives. 2019.
2. Jadoon I, Khattak M, Mughal KS, Mughal US, Khan M, Abdulsamad SA, et al. Rising cesarean section rates in Pakistan: analyzing frequency and key risk factors in a tertiary-care hospital. Cureus. 2024 Oct 24;16(10): e72333. https://doi.org/10.7759/cureus.72333
3. Betran AP, Ye J, Moller A-B, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Health. 2021;6(6):e005671. https://doi.org/10.1136/bmjgh-2021-005671
4. Javed H, Ahmad TI, Adnan B. Cesarean section delivery in the districts of Pakistan: prevalence, extent, and correlates. Rev Appl Health Res. 2023 Dec 31;1(1):28–37.
5. Asghar A, Habib S, Naeem N, Hussain H, Nawaz S, Zafar M. Frequency of cesarean section in patients with previous one scar. Pak J Med Health Sci. 2022 Oct 27;16(09):323. https://doi.org/10.53350/pjmhs22169323
6. Hamidi O, Quist-Nelson J, Xodo S, Berghella V. Membrane sweeping in patients planning a trial of labor after cesarean: a systematic review and meta-analysis of randomized controlled trials. J Matern Fetal Neonatal Med. 2020;33(18):3103–10. https://doi.org/10.1080/14767058.2019.1569612
7. Royal College of Obstetricians and Gynaecologists. Birth after previous caesarean birth. Green-top Guideline No. 45. 2015.
8. Ramya V, Ghose S, Pallavee P. Membrane sweeping for vaginal birth after caesarean section and its outcome: a comparative study. J Clin Diagn Res. 2015;9(8):QC01. https://doi.org/10.7860/JCDR/2015/11161.6306
9. Wallstrom T, Bjorklund J, Frykman J, Jarnbert-Pettersson H, Akerud H, Darj E, et al. Induction of labor after one previous cesarean section in women with an unfavorable cervix: a retrospective cohort study. PLoS One. 2018;13(7):e0200024. https://doi.org/10.1371/journal.pone.0200024
10. Ali A, Iqbal S, Rashid T. The effectiveness of membrane sweeping at term and clinical effects on duration of pregnancy. Ann King Edward Med Univ. 2021;27(2). https://doi.org/10.21649/akemu.v27i2.4550
11. Shams R, Nasreen A. Membrane sweep and stretch at term pregnancy: preventing prolonged pregnancy. Adv Basic Med Sci. 2019;3(1).
12. Finucane EM, Biesty L, Murphy D, Cotter A, Molloy E, O'Donnell M, et al. Feasibility study protocol of a pragmatic, randomized controlled pilot trial: membrane sweeping to prevent post-term pregnancy—the MILO study. Trials. 2021;22:1–15. https://doi.org/10.1186/s13063-021-05043-9
13. Finucane EM, Murphy DJ, Biesty LM, Gyte GM, Cotter AM, Ryan EM, et al. Membrane sweeping for induction of labour. Cochrane Database Syst Rev. 2020;2(2):CD000451. https://doi.org/10.1002/14651858.CD000451.pub3
14. Ramya V, Ghose S, Pallavee P. Membrane sweeping for vaginal birth after caesarean section and its outcome: a comparative study. J Clin Diagn Res. 2015;9(8):QC01–3. https://doi.org/10.7860/JCDR/2015/11161.6306

15. Hamdan M, Sidhu K, Sabir N, Omar SZ, Tan PC. Serial membrane sweeping at term in planned vaginal birth after cesarean: a randomized controlled trial. Obstet Gynecol. 2009;114(4):745–51. https://doi.org/10.1097/AOG.0b013e3181b8fa00
16. Yasmeen A, Malik AM. Outcome of sweeping membrane within 48 hours in the induction of labour in multigravidae. Pak J Med Sci. 2014;8:876–8.
17. Hassan AM. Membrane sweeping to induce labor in post-term pregnant women: success rate and outcomes. Cureus. 2023;15(3):e36942. https://doi.org/10.7759/cureus.36942
18. Nyamzi M, Isah D, Offiong R, Isah A. Effectiveness of sweeping of membranes in reducing the incidence of elective induction of labor for postdate pregnancies. Arch Med Surg. 2019;4:15–21. https://doi.org/10.4103/archms.archms_36_18
19. Zamzami TY, Al Senani NS. The efficacy of membrane sweeping at term and effect on the duration of pregnancy: a randomized controlled trial. J Clin Gynecol Obstet. 2014;3(1):30–4. https://doi.org/10.14740/jcgo225w
20. Njoku C, Omietimi JE, Oriji PC, Aigere EOS, Afolabi SA, Tekenah ES, et al. Effectiveness of multiple versus once-only membrane sweeping at term in preventing prolonged pregnancy: a randomized controlled trial. Sci Afr. 2023;19:e01571. https://doi.org/10.1016/j.sciaf.2023.e01571