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Original Research Article

Fetomaternal outcomes in term pregnancies with artificial versus spontaneous rupture of membranes

Divisha Verma*, Rupali Sharma

Department of Obstetrics and Gynecology, G. S. Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India

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***Correspondence:**
Dr. Divisha Verma,
E-mail: divishaverma@gmail.com

ABSTRACT

Background: Artificial rupture of membranes (ARM) is a commonly used intervention in active labor management. Although effective in accelerating labor, its impact on maternal and fetal outcomes remains debated. This study was conducted to compare the feto-maternal outcomes associated with ARM versus spontaneous rupture of membranes (SRM).
Methods: This prospective comparative study was conducted on 160 term pregnant women admitted in labor, divided equally into two groups: Group I underwent ARM, and Group II progressed with SRM. Primary outcomes studied included labor duration, mode of delivery, maternal complications (such as postpartum hemorrhage and fever), and fetal outcomes (Apgar score, NICU admission, meconium-stained liquor.
Results: The mean duration of labor was significantly shorter in the ARM group (5.63±1.63 hours) compared to the SRM group (6.83±1.27 hours) ($p<0.0001$). There was no statistically significant difference in cesarean delivery rate, Apgar scores, NICU admissions, or maternal complications between the two groups.
Conclusions: Artificial rupture of membranes is a safe and effective method to reduce the duration of labor without increasing maternal or neonatal complications. When performed under aseptic conditions, it can be used reliably in active labor management.

Keywords: Artificial rupture of membranes, Amniotomy, Fetomaternal outcomes, Labor duration, Obstetrics, Spontaneous rupture of membranes

INTRODUCTION

Labor is the process by which regular uterine contractions cause progressive cervical dilation and effacement, resulting in the expulsion of the fetus and other products of conception.[1] It is governed by a complex interplay of hormonal, mechanical, and neuromuscular factors.[2] The safe and timely progression of labor is a key objective in obstetric care, as prolonged labor can increase the risk of maternal exhaustion, infections, fetal distress, and operative delivery.

One of the most common interventions in the active management of labor is artificial rupture of membranes (ARM) or amniotomy.[3] It is a procedure wherein the amniotic sac is deliberately ruptured to augment labor. The rationale behind this practice lies in the belief that ARM accelerates labor by enhancing endogenous prostaglandin release and increasing uterine contractility.[4] Additionally, it allows for direct visualization of amniotic fluid, aiding in the early detection of meconium-stained liquor, chorioamnionitis, or other abnormalities.[5]

In contrast, spontaneous rupture of membranes (SRM) is a natural event that typically occurs during the course of

labor, often around the time of full cervical dilatation. In many cases, SRM is associated with a more gradual progression of labor and a lower risk of ascending infections, especially when labor is prolonged.

Despite being widely practiced; the use of ARM remains controversial. Proponents argue that it shortens the duration of labor, decreases the need for oxytocin augmentation, and allows early detection of complications.[6] Opponents raise concerns about increased risks of infection (chorioamnionitis, endometritis), umbilical cord prolapse, fetal heart rate abnormalities, and maternal discomfort.[7]

Numerous studies have evaluated the safety and efficacy of ARM compared to SRM, but the results have been inconsistent. Some studies report reduced labor duration and improved delivery outcomes with ARM, while others find no significant difference in maternal or fetal morbidity and even raise caution against its routine use.

In developing countries like India, where overcrowded labor wards and limited healthcare personnel are common challenges, optimizing labor progression is crucial. Time-effective and safe interventions are needed to ensure favorable maternal and neonatal outcomes. ARM, if proven safe and beneficial, could serve as a low-cost intervention to streamline labor management.

However, very few studies have comprehensively compared fetomaternal outcomes of ARM versus SRM in the Indian population, particularly in the context of tertiary care centers serving semi-urban and rural communities. This makes it important to assess the relevance, safety, and practical benefits of ARM in this demographic setting.

The present study aims to fill this gap by comparing the duration of labor, mode of delivery, maternal complications (such as postpartum hemorrhage, puerperal fever, and endometritis), and neonatal outcomes (such as Apgar score, NICU admission, and meconium-stained liquor) in patients undergoing ARM versus those with SRM.

METHODS

This was a prospective comparative study conducted in the Department of Obstetrics and Gynaecology at GS Medical College & Hospital, Pilkhuwa, Hapur, a tertiary care teaching hospital in Uttar Pradesh, India. The study duration was from June 2023 to December 2024. The primary objective was to compare maternal and fetal outcomes in term pregnancies undergoing artificial rupture of membranes (ARM) with those having spontaneous rupture of membranes (SRM) during labor. A total of 160 pregnant women in active labor were enrolled and equally divided into two groups: Group I (ARM group): 80 women underwent artificial rupture of membranes under sterile conditions. Group II (SRM group): 80 women were observed for spontaneous rupture without intervention. Participants were selected from labor room admissions based on eligibility criteria and assigned to groups using simple random sampling.

Inclusion criteria

Inclusion criteria included singleton pregnancy with cephalic presentation at term gestation (≥37 to ≤41 weeks) with spontaneous onset of labor, cervical dilatation ≥3 cm, age between 21 and 35 years, willing to provide informed consent.

Exclusion criteria

Exclusion criteria included multiple pregnancy, malpresentation, previous cesarean section or uterine surgery, non-reassuring fetal heart rate at admission, medical disorders complicating pregnancy (e.g., gestational diabetes, pre-eclampsia, thyroid disorders), IUGR or fetal anomalies, meconium-stained liquor at admission, refusal to participate

Statistical analysis

All data were compiled and analyzed using SPSS version 22 (IBM Corp., USA). Categorical variables were compared using the Chi-square test or Fisher's exact test, while continuous variables like labor duration were analyzed using the students t-test. A p-value < 0.05 was considered statistically significant. Results were presented in the form of mean±standard deviation for continuous variables and percentages for categorical data.

RESULTS

A total of 160 pregnant women were enrolled in the study and divided equally into two groups: Group I (ARM group): 80 women and Group II (SRM group): 80 women. Both groups were comparable in terms of baseline demographic and obstetric characteristics such as age, parity, gestational age, and cervical dilatation at admission. There was no statistically significant difference between groups at baseline.

Duration of labor

The mean duration of labor was significantly reduced in the ARM group. Labor was approximately 1.2 hours shorter in the ARM group. The difference was statistically significant.

Table 1: Duration of labor.

Group	Mean labour duration	Standard deviation
ARM	5.63	±1.63
SRM	6.83	±1.27

p value - <0.0001, considered significant

Mode of delivery

No significant difference in cesarean section rates between the two groups.

Table 2: Mode of delivery.

Mode of delivery	ARM Group (n=80) (%)	SRM Group (n=80) (%)
Normal vaginal delivery	72 (90)	73 (91.25)
Cesarean section	8 (10)	7 (8.75)

p value – 0.786

Maternal complications

No statistically significant differences were observed in maternal complications between the two groups.

Table 3: Maternal complications.

Complication	ARM Group (n=80) (%)	SRM Group (n=80) (%)	P value
Postpartum hemorrhage	4 (5)	5 (6.25)	0.726
Postpartum fever	3 (3.75)	4 (5)	0.690
Endometritis	1 (1.25)	2 (2.5)	0.557

Fetal outcomes

No significant difference was found in neonatal morbidity between the two groups.

Table 4: Fetal outcomes.

Parameter	ARM Group (n=80) (%)	SRM Group (n=80) (%)	P value
1-minute Apgar <7	6 (7.5)	5 (6.25)	0.759
5-minute Apgar <7	2 (2.5)	2 (2.5)	1.000
NICU Admission	5 (6.25)	6 (7.5)	0.749
Meconium-stained liquor	9 (11.25)	10 (12.5)	0.803

Table 5: CTG abnormalities.

CTG changes observed	ARM Group (%)	SRM Group (%)
Reassuring	70 (87.5)	69 (86.25)
Non-reassuring/FHR	10 (12.5)	11 (13.75)

p-value-0.805

CTG abnormalities

CTG findings were similar between groups. ARM did not increase fetal distress.

DISCUSSION

The present study aimed to compare the fetomaternal outcomes of artificial rupture of membranes (ARM) versus spontaneous rupture of membranes (SRM) in term pregnancies during labor. The findings of our study demonstrate that ARM, when performed under aseptic conditions and with appropriate patient selection, is an effective tool to reduce the duration of labor without increasing the risk of maternal or neonatal complications.

A statistically significant reduction in labor duration was observed in the ARM group (mean: 5.63 hours) compared to the SRM group (mean: 6.83 hours), with a mean difference of approximately 1.2 hours ($p < 0.0001$). This observation aligns with findings from several earlier studies. Chauhan et al (2020) and Shafqat et al (2022) both reported shorter labor durations among women who underwent amniotomy, supporting the conclusion that ARM can enhance labor progress efficiency by stimulating the release of prostaglandins and increasing uterine contractility.[8,9]

Despite the shorter labor, our study did not show any statistically significant differences in the mode of delivery between the two groups. The rate of cesarean section in the ARM group (10%) was similar to that in the SRM group (8.75%). This supports the findings of the Cochrane meta-analysis by Smyth et al (2013), which concluded that routine amniotomy had no significant impact on cesarean section or instrumental delivery rates.[10] Our results further validate that while ARM can reduce the duration of labor, it does not alter the overall delivery outcomes in terms of operative intervention.

Maternal complications such as postpartum hemorrhage (PPH), postpartum fever, and endometritis were low in both groups and statistically non-significant. This reflects the safety of ARM when performed at an appropriate stage of labor and with strict adherence to aseptic protocols.[11] A study by Begum et al (2023) in a similar low-resource setting also reported no increased risk of maternal infection or hemorrhage following ARM. On the contrary, Halouani et al (2023) reported a higher incidence of endometritis with early amniotomy (before 3 cm dilatation).[12] This discrepancy may be due to differences in case selection and timing of the procedure. In our study, ARM was only performed when cervical dilatation was ≥3 cm with a well-applied presenting part, likely reducing infection risk and supporting the practice of selective ARM.

Regarding fetal outcomes, no statistically significant differences were observed between the two groups in terms of Apgar scores at 1 and 5 minutes, NICU admissions, or incidence of meconium-stained liquor. These results are consistent with those of Battarbee et al (2021), who demonstrated that ARM had no adverse effect on neonatal outcomes when used appropriately. The concern regarding potential fetal distress, often cited as a

drawback of ARM, was not supported by our findings. CTG abnormalities were also comparable across both groups.

The absence of cord prolapse in our study further emphasizes the importance of performing ARM only when the presenting part is well engaged. The technique and timing of ARM play a critical role in ensuring safety. It must not be used indiscriminately or before proper assessment of the fetal station and cervical conditions.

From a practical standpoint, reducing labor duration by even an hour can have significant implications in high-volume labor wards, particularly in resource-limited settings.[13] A shorter labor may reduce maternal fatigue, allow better allocation of nursing staff, and minimize the risk of prolonged labor-related complications.[13] ARM, as a non-pharmacologic intervention, offers a simple and cost-effective option for managing active labor progression when used judiciously.

While our findings reinforce the utility of ARM, it must be emphasized that it should not be a routine intervention in all laboring women. Selective use, individualized to each clinical scenario, is key. ARM should only be performed under sterile conditions, with continuous fetal monitoring available and when staff are prepared to handle any complications.[14]

This study has several limitations. Firstly, the sample size was relatively small, which may not be representative of the larger population. Secondly, the study was conducted at a single center, which may limit the generalizability of the results. Additionally, the study did not account for potential confounding variables that may have influenced the outcomes. Furthermore, the study's follow-up period was limited, and long-term outcomes were not assessed.

CONCLUSION

Artificial rupture of membranes (ARM), when performed in appropriately selected cases under strict aseptic conditions, is an effective and safe intervention for the management of labor. In this prospective comparative study, ARM was shown to significantly reduce the duration of labor without increasing maternal morbidity or adverse neonatal outcomes. The reduction in labor time is clinically relevant, especially in resource-constrained or high-volume obstetric settings where optimizing time and patient flow is essential.

Importantly, the study found no statistically significant difference between the ARM and spontaneous rupture of membranes (SRM) groups in terms of cesarean section rates, postpartum hemorrhage, fever, or infection. Similarly, fetal well-being, assessed by Apgar scores, NICU admissions, and CTG findings, remained comparable between the groups, reinforcing the safety profile of ARM when used judiciously.

Given its simplicity, low cost, and clinical utility, ARM can be considered a valuable component of individualized labor management protocols. However, routine or indiscriminate use should be avoided. The decision to perform ARM must be based on careful assessment of maternal and fetal conditions, cervical status, and the availability of facilities for continuous monitoring and timely intervention if required.

In conclusion, ARM remains a useful tool in the armamentarium of obstetric interventions. When used thoughtfully and in the right clinical context, it can improve the efficiency of labor without compromising safety for the mother or the newborn.

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REFERENCES

1. Hutchison J, Mahdy H, Jenkins SM, Hutchison J. Normal Labor: Physiology, Evaluation, and Management. [Updated 2025 Feb 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-.
2. Thornton JM, Browne B, Ramphul M. Mechanisms and management of normal labour. Obstetr Gynaecol Reproduct Medi. 2020;30(3):84-90.
3. Mahdy H, Eruo FU. Amniotomy. [Updated 2023 Apr 10]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025 Jan-.
4. Rattanakanokchai S, Gallos ID, Kietpeerakool C, Eamudomkarn N, Alfirevic Z, Oladapo OT, et al. Methods of induction of labour: a network meta-analysis. Cochrane Database Syst Rev. 2023;2023(1):CD015234.
5. Samiyappa DP, Ghose S, John LB, Samal R. Maternal and perinatal outcome in meconium stained amniotic fluid at term: a case control study. Int J Reprod Contracept Obstet Gynecol. 2016;5(10):3404-10.
6. Upawi SN, Ahmad MF, Abu MA, Ahmad S. Amniotomy and early oxytocin infusion vs amniotomy and delayed oxytocin infusion for labour augmentation amongst nulliparous women at term: A randomised controlled trial. Midwifery. 2022;105:103238.
7. Fowler JR, Simon LV. Chorioamnionitis. [Updated 2023 Sep 4]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025 Jan-.
8. Shafqat T, Zeb L, Yasmin S. Comparing effects of amniotomy and spontaneous rupture of membrane on

duration of labor in primigravida at term pregnancy. Obstet Gynecol Res. 2022;5:181-6.
9. Chauhan A, Sarkar B, Tanwar K. Comparative evaluation of artificial rupture of membranes and spontaneous rupture of membranes on course of labour and feto-maternal outcomes. Int J Reproduct Contracep Obstetr Gynecol. 2020;9(10):4160-4.
10. Smyth RM, Markham C, Dowswell T. Amniotomy for shortening spontaneous labour. Cochrane Database Syst Rev. 2013;2013(6):CD006167.
11. World Health Organization. WHO recommendations: Intrapartum care for a positive childbirth experience Evidence and recommendations, 2018. Available at: https://www.ncbi.nlm.nih.gov/books/NBK513805/. Accessed 01 June 2025.
12. Halouani A, Masmoudi Y, Hamdaoui R, Hammami A, Triki A, Ben Amor A. Early versus late amniotomy during induction of labor using oxytocin: A randomized controlled trial. PLoS One. 2023;18(5):e0286037.
13. Lemos A, Amorim MM, Dornelas de Andrade A, de Souza AI, Cabral Filho JE, Correia JB. Pushing/bearing down methods for the second stage of labour. Cochrane Database Syst Rev. 2017;3(3):CD009124.
14. Umana OD, Vadakekut ES, Siccardi MA. Antenatal Fetal Surveillance. [Updated 2024 Aug 11]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.

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