Original Research

Study of Women in Labor with Artificial Rupture of Membranes and its Effect on the Duration of Labor

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In a venture to reduce maternal mortality, especially by post-partum hemorrhage and prolonged and protracted labor many labor room procedures are in practice. This study aims to compare laborers with and without amniotomy concerning the duration of admission to delivery interval, mode of delivery (vaginal or cesarean), and fetal compromise in the form of Apgar score. In the background of augmentation of labor by routine amniotomy in normally progressing labor, this study was carried out on 156 parous women in the Department of Obstetrics and Gynaecology at C. R. Gardi Hospital, Ujjain, Central India from January 2017 to January 2018. The main procedure was doing artificial rupture of membranes at 3–4 cm dilatation. Results showed a definite reduction in admission to a delivery interval in primigravida and multipara (p=0.00). There was no effect on mode of delivery, the requirement of addition of oxytocin, and poor Apgar score (< 7); p-value being more than 0.05. Concluding our result findings, amniotomy as a routine procedure in the labor room helps reduce labor length.

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Introduction

This study addresses the effect of artificial rupture of membrane (ARM) on uterine action and reduction in duration of the first stage of labor. Prolonged labor is an important cause of maternal mortality and morbidity.[1] It may cause fetal hypoxia, intrauterine infection, intracranial hemorrhage, increased operative delivery, chorioamnionitis, postpartum hemorrhage, trauma, puerperal sepsis, and subinvolution of the uterus.[2] ARM is a simple, cost-effective, and non-pharmacologic method of labor augmentation. Augmentation of labor stimulates inadequate uterine contractions in frequency, intensity, and duration after the onset of normal labor.

The role of amniotomy as a non-pharmacologic method of augmentation of labor has always been controversial. Apart from reducing the duration of labor, it gives information about the color of liquor and the opportunity to monitor labor.[3] In 2007, a Cochrane Review did not recommend including amniotomy routinely as part of standard labor management protocol.[4] It is recommended that evidence be made available to women who will be a foundation for discussion between women and obstetricians. From the last decade of the 20th century, women preferred short labor and accepted labor augmentation methods suggested by treating Obstetricians. ACOG guideline (2019) recommends that amniotomy is not to be done in all normally progressing labor.[5] The present study evaluated the efficacy of ARM vs. spontaneous rupture of membranes in full-term singleton pregnancy on the duration of labor, mode of delivery, and neonatal outcome. It is indicated for the treatment of prolonged latent phase and secondary arrest of labor. Labor augmentation can be performed by intravenous oxytocin, prostaglandins, and artificial rupture of membranes, i.e., amniotomy to shorten the duration to prevent dysfunctional labor and unnecessary cesarean section. Guideline Development Goal (GDG) in a recommendation of WHO (2014) also advocates complementing amniotomy with oxytocin in uncomplicated full-term cephalic presentation.[6] In the background of the debate on routine ARM or Non ARM in the 21st century, this study has its relevance.

Material and Methods

A prospective observational study was conducted in the Department of Obstetrics and Gynecology at C.R. Gardi Hospital, Ujjain from January 2017 to January 2018. 156

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parous women admitted to the labor room were enrolled after taking informed consent. Patients with obstetric risk factors like antepartum hemorrhage, pregnancy-induced hypertension, premature rupture of membranes, hemoglobin less than 8 gm%, hypothyroidism, diabetes mellitus, a case for elective cesarean section or previous cesarean section, and known HIV positive women were excluded. All patients with a full-term singleton pregnancy, cephalic presentation, adequate pelvis, and in labor were selected. A patient in labor was defined as having regular uterine contractions and progressive dilatation of the cervix for at least two hours. One hundred primigravidas and multipara at dilatation of 3–4 cm undergoing ARM as per the decision of in charge consultant were study participants. Progress of labor in terms of progressive dilatation, progressive increase in the duration of labor pains, and time of the expulsion of a baby were noted. At the same time, 78 women with the same parameters were observed in whom ARM was not done and was selected for comparison in another unit of the Department of Obstetrics and Gynecology. Before doing an ARM, an abdominal examination was done to know fetal lie and presentation, fetal heart sound was auscultated and vaginal examination was done to assess Bishop score and integrity of fore waters. As per the standard guidelines, ARM was done. With aseptic precautions and sterile conditions, one hand's index and middle fingers were placed onto membranes, while with the other hand, Kocher's forceps were introduced between the two fingers, and membranes were ruptured. Before removing fingers cord prolapse was excluded, fetal heart sound was rechecked, and the liquor's color was assessed. The procedure was observed and findings were recorded as per the study objectives. The same parameters were observed in 56 women who did not undergo ARM. Study variables observed were demographic data depicting age, parity; mode of delivery, oxytocin requirement, Apgar score, and ARM to the delivery interval (Table 1). ARM to the delivery interval was observed separately for primigravida, multipara, and grand multipara. Outcomes in the form of mode of delivery, i.e., vaginal, cesarean, and instrumental, were observed; and the addition of oxytocin required or not required was analyzed separately. APGAR score a single parameter was compared in ARM and Non ARM groups as a single sensitive outcome of neonatal wellbeing.

Table 1: Demographic data

Characteristics of study subjects	*Number (N)*	*Percentage (%)*
Age (years)		
</= 20	37	23.7
21–25	86	55.1
26–30	31	19.9
>30	2	1.3
Parity		
Primigravida	59	37.8
Multipara	92	59
Grand multipara	5	3.2

Ethical Considerations

Ethical approval was obtained from the Ethical Committee of R.D. Gardi Medical College. The study's aims and procedure were clearly explained to all participants and confidentiality was assured. A pilot study was carried out on 10 subjects in a pre-tested proforma.

Data Analysis

Descriptive statistics were used for representing the data in the form of frequency, percentage, and diagrammatic representation. $p<0.05$ was considered statistically significant. The statistical analysis was performed by "(SPSS) software version 23.0."

Results

Comparing two groups ARM and Non ARM, the admission to delivery interval is significantly different in primigravida and multipara. In grand multipara the difference is non-significant.

Out of 156 patients enrolled ARM was done in 100 patients and spontaneous rupture of membranes was observed in 56 patients. The overall mean age of the patients was 23.1 years. ARM group has more number of vaginal deliveries that is 93% as compared to Non ARM group, which is 91%. However, the number of cesarean deliveries is more in the ARM group (6%)

Table 2: Comparison of ARM to delivery interval (in minutes) in primigravida, multipara, and grand multipara

Admission to delivery interval (in minutes)			
	Primigravida	*Multi para*	*Grand multi para*
ARM	1 h 19 m (71.91±19.80)	41.39 m (41.39 ± 9.81)	31.33 m (31.33 ± 3.05)
Non ARM	1 h 45 m (87.0±7.69)	56.60 m (56.60 ± 9.43)	51.0 m (15.00 ± 15.55)
t	3.54	7.05	2.31
p	0.000	.000	0.104

Table 3: Comparison of mode of delivery, requirement for oxytocin augmentation, and neonatal outcome in ARM and Non-ARM Group

		ARM	*Non ARM*	*Chi-square*	*p*
Mode of delivery	Vaginal	93(93%)	51(91.1%)	1.274	0.528
	LSCS	6(6%)	3(5.4%)		
	Instrumental	1(1%)	2(3.6%)		
Addition of Oxytocin	Not required	93(93%)	51(91.1%)	0.188	0.664
	Required	7(7%)	5(8.9%)		
Neonatal outcome	Apgar</=7	5(5%)	4(7.1%)	0.303	0.581
	Apgar>7	95(95%)	52(92.9%)		

than the non-ARM group (5.3%) but it is not statistically significant. The number of instrumental deliveries is also less in the ARM group which is 1% as compared to 3.6% in the non-ARM group. Oxytocin was used in 8.9% of patients in the non-ARM group, but it was used in only 7% of patients in the ARM group. This implies that oxytocin augmentation is required more in the non- ARM group than ARM group. Apgar score of more than 7 is seen in 95% patients of ARM group and 92.9% patients of the non-ARM group. Apgar score of less than 7 is seen in only 5% of patients in ARM group as compared to 7.1% of patients in the non-ARM group.

Mean ARM to the delivery interval in primigravida, multipara, and grand multipara was 71.91 minutes (1 hour 19 minutes), 41.39 minutes, and 31.33 minutes while in the non-ARM group admission to the delivery interval was 87 minutes (1-hour 45 minutes), 56.60 minutes, and 51 minutes respectively. The reduction in delivery interval due to ARM is 26 minutes in primigravida, 15.21 minutes in multipara, and 19.67 minutes in grand multipara; which is significant in primigravida and multipara.

Discussion

ARM is performed as a widely accepted labor room procedure. However, the effectiveness of ARM in reducing the duration of labor and its neonatal and perinatal outcome is a point of concern for obstetricians. Whether to rupture membranes or keep them intact in uncomplicated labor is a long-standing obstetric dilemma. The role of ARM in augmenting labor in uncomplicated pregnancies at term is advocated. However, a review of some studies has shown contrasting results and questioned the widely accepted procedure of ARM. This study was undertaken to find the effect of ARM on the duration of labor and to understand the validity and utility of this simple clinical intervention.

Amniotomy and Reduction in Duration of Labor

It was routine in older obstetrics to do ARM at 4 cm dilatation for the uneventful outcome. We report a significant reduction in admission to the delivery interval in primigravida and multigravida in the ARM group as compared to the non-ARM group (p=0.00) (Table 2). The oldest report in 1997 observed a definite reduction in duration of labor and without any compromise to maternal and fetal health, and mode of delivery.[7] Early literature also agrees with a reduction in labor duration and the frequency of labor dystocia in primigravida having ARM in early labor.[8] The usefulness of amniotomy in primigravida in active labor is also documented in a report in 2010 without significant effect on mode of delivery and neonatal outcome.[9] This is consistent with our findings.

Effect on Neonatal Outcome

Neonatal outcome in form of good or poor Apgar score is not statistically different in ARM and non-ARM groups (p=0.581) (Table 3). Considering fetal heart rate as a key monitoring parameter, authors as early as 1993 concluded that ARM helps only in nullipara and is not much use in multipara. They documented an increased risk of cesarean, which is consistent with our findings.[10] Other reports also support our study outcomes.[11-13] In contrast to this statement, a Cochrane database in 2013 concluded that no amniotomy should be done routinely. The review included 15 studies on 5583 women. No statistically significant difference was found between women in the amniotomy and no ARM group as long as cesarean section, maternal satisfaction, or Apgar score less than seven was concerned.[14] The authors of this review do not recommend amniotomy as part of standard labor management and care. They recommend that the evidence presented in this review be made available to women while doing an amniotomy. It may be useful as a foundation for discussion and any resulting decisions made between women and their caregivers. ACOG guidelines support this directive.[15]

Effect on Cesarean Rate

In the present study rate of vaginal delivery is 93%in the ARM group, while the rate of instrumental delivery

is less in the ARM group than in the non-ARM group. The cesarean rate is slightly more but not statistically significant (p=0.528). This is because cesarean indications will be there as it is and not influenced by ARM or no ARM. A Cochrane review 2013 reports a modest decrease in cesarean rates.[14] Early amniotomy reduces the duration of the first stage of labor significantly without affecting cesarean rate, neonatal outcome, and oxytocin requirement.[16]

Requirement of Oxytocin

While considering the requirement of oxytocin in the ARM and non-ARM group we observed no statistical difference in these two groups (p=0.664). Same are reports of authors in a Cochrane Database Systematic Review 2013.[16] These findings support the fact that ARM does not affect the normal progress of labor (Table 3).

Recent Literature

In 1919 an Iranian study states improvement in labor indices like duration, Apgar score, frequency of prolonged labor, fetal distress, and PPH by doing an early amniotomy.[17]

Implications

The findings of this observational study strongly imply in favor of ARM as a routine labor room practice. In a setting like ours, where women usually report to a facility with regular labor pains, the latent phase of labor is already over. What they need is a gentle push for a successful end result. The advantage of early detection of meconium-stained liquor is also a boon to obstetricians who can act smartly and take an early decision of operative delivery.

Shortcomings are in the form of a small sample size. A study on thousands of vaginal delivery patients may give statistically significant results.

Conclusion

We conclude that ARM is more beneficial in primigravida in the first stage of labor, in which it enhances uterine contractions and dilatation of the cervix and reduces admission to the delivery interval. Though the cesarean rate is a little higher than Non-ARM subjects, it is beneficial for the fetal outcome. The presence of meconium is detected early and intervention is done to treat fetal distress.

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