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Comparative Study Between Artificial Rupture of Membrane (ARM) Versus Spontaneous Rupture of Membrane in Progression of Labor at Term

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ABSTRACT

Artificial rupture of amniotic membranes (ARM) is a typical procedure carried out in obstetric practice during labour. The decision whether and when to rupture the membranes in uncomplicated labour is a long-standing obstetric controversy. The present study was aimed to find out whether labour management is beneficial with early amniotomy or without amniotomy. The comparative study was conducted among 75 women into ARM group and 75 women into Spontaneous rupture group. Comparison between the two groups is done in terms of duration of labor, rate of caesarean delivery and its effect on maternal and neonatal outcome. Majority of the patients age ranged from 25-30 years. Amniotomy results in shortening the duration of I stage labor by 46 minutes. In the present study 77.3% of ARM group had vaginal delivery and 82.6% of SRM group had vaginal delivery. In this study 22.7% in the ARM group delivered by caesarean section and 17.3% of SRM group delivered by LSCS. This shows a slightly higher risk of LSCS in amniotomy group which is statistically not significant. Amniotomy has various benefits, including shortening duration of labor and the ability to decide the mode of delivery based on the colour of liquor which gives an idea about the fetal well being. As a result, the practise of amniotomy appears to be justified in a growing nation like ours.

INTRODUCTION

Artificial rupture of amniotic membranes (ARM) is a typical procedure carried out in obstetric practice during labour. In order to promote an increase in the development and release of endogenous uterotonic agents such as prostaglandin and oxytocin, rupture of the membranes has been suggested, resulting in stronger uterine contractions and speeding up cervical dilatation. This reduces the length of the first stage of labour^[1]. Artificial membrane rupture is a time-honored procedure for term labour induction. Labour begins within 4 to 6 hours in properly selected patients and results in normal vaginal delivery within 24 hours, although labour does not start until 24-48 hours after the procedure in some women. It is not known the mechanism by which amniotomy causes uterine contractions. The mean active phase duration in the amniotomy group among nulliparous patients was 165 minutes as opposed to 216 minutes in the control group^[2]. <20% of contractions in patients with amniotomy were observed to cause early decelerations, as opposed to 3% of contractions in patients who laboured with intact membranes^[3,4]. In all groups, late decelerations were equally common^[2]. The decision whether and when to rupture the membranes in uncomplicated labour is a long-standing obstetric controversy. The present study was aimed to find out whether labour management is beneficial with early amniotomy or without amniotomy.

MATERIALS AND METHODS

Present study was comparative observational prospective study, conducted in department of Obstetrics and Gynaecology, Yenepoya Medical College, Mangalore, India. Study duration was of 2 years (January 2021 to December 2022). Study was approved by institutional ethical committee.

Inclusion Criteria:

- Pregnant woman, Term gestation either multi/primiparous, Singleton pregnancy, Cephalic presentation, Live fetus, in active phase of labour >4cm cervical dilatation with intact membranes, willing to participate in present study.

Exclusion Criteria:

- PROM (Premature Rupture of Membrane)
- Fetal macrosomia
- Fetal malpresentation
- Multifetal gestation
- Contracted pelvis
- Eclampsia
- Abruptio placenta
- Preterm labour (<37 weeks)

Written informed consent was taken from all patients enrolled in the study. The demographic details were noted and a structured past obstetric history and

relevant histories followed by general physical, systemic and obstetric examination. Patients were selected according to the inclusion criteria and allocated to different groups based on the simple random sampling. Patients with term singleton pregnancy at our hospital were enrolled. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value >0.5 was considered as statistically significant.

RESULTS AND DISCUSSIONS

In the present study the women who were allocated to have ARM are referred to as ARM group (n=75) and those for whom membranes were left intact and were allowed to rupture spontaneously are called the spontaneous rupture of membrane group (n=75). Majority of the cases are between 25-30 years age group. Among 75 participants in amniotomy group 31 were Primigravida and the rest 44 were multigravida. Spontaneous rupture of membrane group includes 33 Primigravida and 42 Multigravida.

Table 1: Distribution of Patients According to Age

Age	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
20 and below	3	4.0%	11	14.7%	14	9.3%
21-25	39	52.0%	26	34.7%	65	43.3%
26-30	16	21.3%	25	33.3%	41	27.3%
Above 30	17	22.7%	13	17.3%	30	20.0%
Gravida status						
Primigravida	31		33			
Multigravida	44		42			

Majority of the patients included in this study came in latent phase of labour, progress of labour is monitored and ARM is done in 75 women and other 75 women in comparison group were allowed to rupture the membrane spontaneously.

Table 2: Cervical Dilatation at Admission

Cervical dilatation at admission	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
1-2cm	48	64.0%	52	69.3%	100	66.7%
3-5cm	22	29.3%	20	26.7%	42	28.0%
Os closed	5	6.7%	3	4.0%	8	5.3%

Of 75 women in ARM group in 3 cases ARM was done in view of fetal heart variation of which 2 had Grade 2 Meconium-stained liquor and delivered by emergency LSCS in view fetal distress and one case had blood-stained liquor and is delivered by emergency LSCS in view of abruptio.

Table 3: Cervical Dilatation at ARM

Cervical dilatation at ARM	Count	Column N %
4-5cm	52	69.3%
6-8cm	23	30.7%

Of 75 women who were allowed to rupture spontaneously, majority had spontaneous rupture of membrane after 6cm.

Table 4: Cervical Dilatation at Spontaneous Rupture of Membrane

Cervical dilatation at Spontaneous Rupture of Membrane	Count	%
3-5cm	18	24.0%
6-7cm	39	52.0%
8-10cm	18	24.0%

There is a significant reduction in duration of 1st stage of labour in ARM group when compared to spontaneous rupture group by 45 minutes (p value=0.012). The duration of 2nd stage of Labour is almost same in both ARM and Spontaneous rupture of Membrane group (P=0.490). There is no significant difference in the duration of 3rd stage of labour in ARM and SRM group.

Table 5: Comparison of Duration of I Stage of Labour

Duration of labour	Number	Mean duration	Std. Deviation	t test p	
1st Stage- Minutes					
ARM	75	353.20	110.43	0.012	significant
SRM	75	399.33	110.40		
II Stage of Labour- Minutes					
ARM	60	26.58	11.59	0.490	NS
SRM	62	28.06	12.02		
III Stage of Labour- Minutes					
ARM	60	7.60	2.29	0.200	NS
SRM	62	7.08	2.17		

The frequency of pre vaginal exams can increase the risk of infections, in the ARM group 86.7% of women had <3 per vaginal examination, compared to 65.7% in the SRM group.

Table 6: Number of Per Vaginal Examination

No of P/V	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
2	10	13.3%	24	34.3%	34	23.4%
3	36	48.0%	36	51.4%	72	49.7%
4-5	29	38.7%	10	14.3%	39	26.9%

In the ARM group total 10 cases had meconium-stained liquor. 1 primigravid's and 5 Multigravida had Grade 1 meconium stained, 1 Primi had grade 2 meconium-stained liquor and 1 case among primi and 1 among Multigravida had Grade 3 meconium stained liquor. 1 multigravida among ARM group had blood-stained liquor underwent Emergency LSCS in view of abruption with fetal distress and baby was admitted in NICU was . In the spontaneous rupture of membrane group 4 primigravid's and 6 multigravidas had Grade 1 meconium-stained liquor, 1 Primi had grade 2 meconium-stained liquor and 1 case among primi's had Grade 3 meconium-stained liquor.

Table 7: Colour of Liquor

Colour of Liquor	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
Clear	64	85.3%	63	84.0%	127	84.7%
Blood Stained	1	1.3%	0	0.0%	1	0.7%
G1MSL	6	8.0%	9	12.0%	15	10.0%
G2MSL	2	2.7%	2	2.7%	4	2.7%
G3MSL	2	2.7%	1	1.3%	3	2.0%

14 women in ARM group and 25 women in SRM group had the need for oxytocin administration. There is no significant difference in the need for oxytocin administration in ARM and SRM group.

Table 8: Need for Oxytocin Administration

Oxytocin	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
No	61	81.3%	64	85.3%	125	83.3%
Yes	14	18.7%	11	14.7%	25	16.7%

In ARM group, 37 had Apgar scores between 5-7 at birth. 11 cases were delivered by emergency LSCS and 1 case was delivered by vacuum assisted vaginal delivery. 8 cases required NICU admission and there were no neonatal deaths. In SRM group, 45 had Apgar scores between 5-7 at birth. 6 cases were delivered by emergency LSCS. 5 cases required NICU admission and there were no neonatal deaths and 2 cases with APGAR >8 required NICU admission. There is no significant difference in APGAR at 5 minutes, between ARM and SRM groups.

Table 9: APGAR Score

APGAR score	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
APGAR 1 Min						
5-7	37	49.3%	30	40.0%	67	44.7%
8	38	50.7%	45	60.0%	83	55.3%
APGAR 5 Min						
7-8	13	17.3%	8	10.7%	21	14.0%
9	62	82.7%	67	89.3%	129	86.0%

In this study in ARM group 73.3% of women had full term normal delivery and 4% had instrumental delivery and 22.7% delivered by LSCS. In the SRM group 81.3% of women had full term normal delivery, 1.3% of the cases had vacuum assisted vaginal delivery and 17.3% of the cases delivered by emergency LSCS. The rate of LSCS is slightly more in ARM group when compared with SRM group, but the values are not significant.

Table 10: Mode of Delivery

Mode of Delivery	ARM		SRM		Total	
	Count	N %	Count	N %	Count	N %
FTND	55	73.3%	61	81.3%	116	77.3%
Eme .LSCS	17	22.7%	13	17.3%	30	20.0%
Vacuum assisted vaginal delivery	3	4.0%	1	1.3%	4	2.7%

According to a WHO, prolonged labour can be an important cause of maternal morbidity and contributes to the half a million women who die annually during labour. The major causes of maternal death are infection and hemorrhage, both of which have a strong correlation with protracted labours. The aim of labour management is to ensure a healthy pregnancy, safe delivery, and maternal well being. In the case of nulliparous women, a labour is considered extended if it lasts <12 hour and 8 hours in the case of multiparous women. There is high incidence of fetal hypoxia and need for operative delivery with prolonged labor. Amniotomy is a useful technique for shortening the length of labour, especially the first stage. Amniotomy has insignificant effect on the rate of caesarean section. Although there were differences in how this impact manifested in different studies, it seems to decrease the rate of oxytocin augmentation. There is no evidence that an early amniotomy would have negative effects on the newborn. Studies states that preventing prolonged labour reduces the likelihood of women experiencing severe pain. It is also cost effective as it decreases the incidence of prolonged labor and decrease the usage of oxytocin.

An early amniotomy approach seems to result in a reduction in labour time of between 60 and 120 minutes on average.³ Recently, amniotomy and even routine vaginal examination have been shown to result in a rapid increase in 13, 14-dihydro-15-keto-prostaglandin (PGFM) plasma levels that reached maximum values in 5 minutes and were sustained for at least 30 minutes. This indicates that increased development of prostaglandin (PGFs) could be involved in stimulating post-amniotomy labour. In association with amniotomy, fetal behaviors, uterine function and uterine blood flow were studied. The rupture of the membranes is followed by a temporary decrease in uterine blood flow within 3 minutes. The fetus will often respond within 9-12 minutes by violent and frequent movements or by alteration in the sounds of the fetal heart as in the state of distress. Uterine motility improves dramatically later, at about 25 minutes on average. The flow of uterine blood returns to its initial value no later than 40 minutes after membrane rupture. When management policies are so controversial the outcomes should be compared in a randomized controlled clinical trial. In the present study the duration of first stage of labour is shortened by 46 minutes in ARM group when compared to Spontaneous rupture of membrane group which is statistically significant. A study by Zhonghua Fuchan demonstrated that an early amniotomy can reduce the first stage of labor by 94.90 minutes^[5]. Research by JF

Barrett and J Savage also revealed a notable reduction in the length of the first stage of labour (mean 8.3 vs mean 9.7)^[6] Fraser and Sokol's study revealed that the active phase's mean duration in the amniotomy group was 165 minutes, compared to 216 minutes in the control group (p 0.001)^[2]. A study by Frederic D. Frigoletto, which showed that active management decreased the average length of labour by 2.7 hours (162 minutes), supports this^[7]. Aisha Abdullah and Sadia Saboohi's study revealed that the average labour time was 7.66 hours (459.60 min) in the selective amniotomy group and 6.66 hours (399.9 min) in the amniotomy group, demonstrating a statistically significant reduction of 1 hour (60 min) in labour time^[8]. According to a study by Nina Naseer and Gulfishan Haq, the active management group labour lasts roughly 100 minutes less than the expectant management group^[9]. A study by Fraser WD and Marcoux revealed that the amniotomy group experienced a median delay of 136 minutes from randomization to complete dilatation^[10]. According to Sara G. Shields and Stephen, amniotomy with early oxytocin augmentation can shorten the first stage of labour by up to two hours (120 min)^[11]. A study by Fraser WD, Turcot, Krauss, *et al.* similarly revealed a statistically significant reduction in the first stage of labour by 39 minutes, with an average labour length reduction between 60 and 120 minutes^[3]. In Cochrane research by Wei S., Wo BL also demonstrated that the early amniotomy group's first stage of labour was shorter than that of the expectant management group (mean difference) (MD-1.43 hours -85.80 min)^[12]. In the present study there was no statistically significant decrease in duration of 2nd stage of labor in ARM and SRM groups. This conclusion is further supported by research by J. F. Barrett and J. Savage, which showed that the duration of the 2nd stage of labour was unaffected^[6]. Fraser WD, Turcot L in a Cochrane study reported similar findings that there was no difference in the length of 2nd stage^[3]. William D. Fraser and Sylvie Marcoux reported similar findings that median duration of 2nd stage of labour was similar in the 2 groups (amniotomy, 68 minutes., conservative management, 70 minutes)^[10]. In this study there is also no significant difference in duration of 3rd stage of labour. In the present study 77.3% of ARM group had vaginal delivery and 82.6% of SRM group had vaginal delivery. In this study 22.7% in the ARM group delivered by caesarean section and 17.3% of SRM group delivered by LSCS. This shows a slightly higher risk of LSCS in amniotomy group which is statistically not significant. This is supported by other studies. Women in the amniotomy group had a higher risk of

delivery by caesarean section compared to women in the control group, however this difference was statistically insignificant, according to research by Smyth RMD and Alldred SK in a Cochrane review^[5]. There is a trend toward an increase in the risk of caesarean section associated with early amniotomy, according to Fraser WD and Turcot L in a Cochrane review, however this did not achieve statistical significance^[3]. This slightly increased risk may be because of earlier knowledge of presence of meconium or earlier use of internal monitoring. This, however, contrasts with a recent Cochrane analysis by Wei S, Wo BL, *et al.* from 2009, which found that active management is linked to a slight decline in the rate of caesarean sections^[12]. According to William Fraser and Francoise Vendittelli, an active policy of augmentation by AROM may lower the risk of cesarean section. Compared to the 4% of individuals in the selective amniotomy group, 8% of cases in the AROM group underwent instrumental delivery. There is a statistically irrelevant small increase in risk^[13]. Fraser WD, Turcot L also stated that there is no effect on the risk of operative vaginal delivery^[3]. According to Smyth RMD and Alldred SK in a Cochrane research, the incidence of assisted vaginal birth was the same in the two groups^[1]. While only about 12% of patients in the AROM group required oxytocin augmentation, almost all of the cases in the selective amniotomy group required oxytocin augmentation. Smyth RMD and Alldred SK's findings in a Cochrane analysis showing there was a statistically significant decrease in the usage of oxytocin augmentation in the amniotomy group confirm this^[1]. In this study, there is no significant difference in requirement of oxytocin for augmentation in both ARM and SRM group. 18.7% required oxytocin augmentation while 14.7% in SRM group required oxytocin augmentation which is not statistically significant.

CONCLUSION

Randomized controlled trials have found no difference in cesarean section rates, rate of operative vaginal delivery and neonatal outcome. This also supports our results with regards to operative delivery and neonatal outcome. Amniotomy has various benefits, including shortening duration of labor and the ability to decide the mode of delivery based on the colour of liquor which gives an idea about the fetal well being. As a result, the practice of amniotomy appears to be justified in a growing nation like ours.

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REFERENCES

1. Johnson, N., R. Lilford, K. Guthrie, J. Thornton, M. Barker and M. Kelly, 1997. Randomised trial comparing a policy of early with selective amniotomy in uncomplicated labour at term. *BJOG: An Int. J. Obstet. And Gynaecology*, 104: 340-346.
2. FRASER, W.D. and R. SOKOL, 1992. Amniotomy and Maternal Position in Labor. *Clin. Obstet. Gynecol.*, 35: 535-545.
3. Fraser, W.D., L. Turcot, I. Krauss, G. Brisson Carrol and R. Smyth, 2000. Amniotomy for shortening spontaneous labour. *Cochrane Database of Systematic Reviews.*, Vol. 2000 .
4. Smith, R.M.D., S.K. Alldred and C. Markham., 2008. Amniotomy for shortening spontaneous labour (Review). *Chocrane Database Syst Rev. Obstet Gynecol.*, 111: 204-205.
5. Li, N., Y. Wang and H. Zhou., 2006. Effects of routine early amniotomy on labor and health status of foetus and neonate: a meta-analysis. *Zhonghuaufuchankezazhi.*, 41: 16-19.
6. Barrett, J.F.R., J. Savage, K. Phillips and R.J. LILFORD, 1992. Randomized trial of amniotomy in labour versus the intention to leave membranes intact until the second stage. *BJOG: An Int. J. Obstet. and Gynaecology*, 99: 5-9.
7. O'Driscoll, K.I., D.E. Meagher and P.A. Boylan., 1996. Clinical trial of active management of labour. *N Engl J Med.*, 334: 798-799.
8. Abdullah, A., S. Saboohi and U. Hashami., 2010. Effects of amniotomy versus spontaneous rupture of membrane on progress of labour and foetal outcome in primigravidae. *JLUMHS.*, Vol. 9.
9. Naseer, N., G. Haq and N. Soomro., 2009. Active Versus expectant management of labour study of 100 cases. *Department of Obstetrics and Gynaecology. Dow University of Health Sciences and Civil Hospital, Karachi.*, 25: 274-278.
10. Fraser, W.D., S. Marcoux, J.M. Moutquin and A. Christen, 1993. Effect of Early Amniotomy on the Risk of Dystocia in Nulliparous Women. *New Engl. J. Med.*, 328: 1145-1149.
11. Shields, S.G., S.D. Ratcliffe, P. Fontaine and L. Leeman., 2007. Dystocia in nulliparous women. *Am Fam Physician.*, 75: 1671-1678.
12. Wei, S., B.L. Wo, H.P. Qi, H. Xu, Z.C. Luo, C. Roy and W.D. Fraser., 2012. Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care. *Cochrane Database of Systematic Reviews.*, Vol. 2012.
13. Fraser, W., F. Vendittelli, I. Krauss and †Gérard Bréart, 1998. Effects of early augmentation of labour with amniotomy and oxytocin in nulliparous women: A meta analysis. *BJOG: An Int. J. Obstet. And Gynaecology*, 105: 189-194.