

Impact of Amniotomy on Maternal-Fetal Outcome in Early Postpartum: What Should be Understood about this Modern Obstetric Practice in Black Africa?

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Abstract

Introduction: Amniotomy is an artificial rupture of the egg's membranes using a membrane piercer through the cervical opening of the uterus. It is an invasive method of induction and stimulation of labour that may increase the risk of complications during labour and early postpartum. **Objective:** to evaluate the impact of amniotomy on maternal and fetal outcomes during labor, delivery, and early postpartum. **Methods:** This was a case-control study with retrospective data collection over a period of 6 months from March to August 2017 at the maternity ward of the Gynaecological-Obstetric and Paediatric Hospital in Yaoundé. Women who received amniotomy (exposed group) were compared to those who did not receive amniotomy (unexposed group). The data collected were entered and analyzed on Epi-info 3.5.1 and Statistical Package For Social Science SPSS 20.0 software. Comparison of variables was done using Chi-square (X²) and Fisher's exact test. The association between amniotomy and the different variables was measured using the relative risk (RR) and its 95% confidence interval (CI). $P < 5\%$ was considered significant. **Results:** A total of 193 deliveries were recorded and divided into 110 cases of amniotomy and 83 spontaneous rupture of membranes. The frequency of amniotomy was 76.92% in our study. Maternal complications occurred in 38.2% of cases in the amniotomy group and in 32.5% of cases in the second group with a P value of 0.255 (not significant). Fetal and neonatal complications occurred in 13.6% of cases of amniotomy and 21.7% of spontaneous rupture of membranes during labour and 13 cases of amniotomy versus 11 cases of spontaneous rupture of membranes in the early post partum period. The difference was not statistically significant between the two groups for the occurrence of complications ($P=0.410$). **Conclusion and recommendation:** At the end of our study, it appears that amniotomy is very frequent in our environment, but its realization has no proven impact on the fate of the mother and the fetus.

Keywords: Amniotomy, outcome, maternal, fetal.

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INTRODUCTION

Amniotomy or artificial rupture of the membranes is a voluntary rupture of the amniotic sac [1]. It is an invasive method of inducing and stimulating labour but in some cases it allows direct monitoring of the state of the foetus [2]. It is increasingly performed by obstetricians in order to accelerate labour [3]. The frequency of amniotomy is 28.65% in France [4]. The effects of amniotomy are controversial in the literature [5-7]. According to J Peru *et al.* amniotomy is

associated with a high risk of fetal heart rhythm disorder [8]. A systematic review of 15 studies showed that amniotomy alone had no effect on the duration of spontaneous labor or on the incidence of cesarean births [9]. Although commonly performed in our setting, there are few studies on the impact of amniotomy in our setting.

OBJECTIVE

The main objective was to evaluate the impact of amniotomy on maternal and fetal outcome.

MATERIALS AND METHODS

We conducted a case control study from March to August 2017 in the maternity ward of the Gynaecological Obstetric and Paediatric Hospital of Yaoundé (Cameroon). Included in our study were women who had or had not had an amniotomy during labour and who had complete records. Women who delivered outside the term (37-42 weeks of amenorrhea), who were HIV or hepatitis positive and those with incomplete records were excluded from our study.

The data collected was based on a pretested questionnaire structured in 08 sections: identification, personal history, clinical examination, amniotomy during labour and complications, delivery, newborn evaluation, maternal complication at delivery, early maternal-fetal follow-up.

Data analysis was performed using Epi-info 3.5.1 and SPSS 20.0 software. Comparison of variables was done using Chi-square (X²) and Fisher's exact test. The association between amniotomy and the different variables was measured using the relative risk (RR) and its 95% confidence interval (CI). $P < 5\%$ was considered significant.

We have obtained ethical clearance from the Ethics Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I.

RESULTS

A total of 193 deliveries were recorded and divided into two groups: Amniotomy 110 (57%) and spontaneous rupture of membranes 83 (43%), i.e. 50 before arrival at the hospital. The frequency of amniotomy in women in labour was 76.92%.

Socio-demographic characteristics of the population

The age group most represented in both groups was 26-30 years. Single people dominated in both groups. The majority of patients had a higher education

level (59.1% vs 45.8%; RR: 1.26 (0.97-1.62)). The majority of patients were from the public sector (23.6% vs. 13.3%; RR: 1.30 (1.10-1.68)); most of whom were from the Western region (55.5% vs. 36.1%; RR: 1.39(1.08-1.78); $p = 0.005$) (Table 1).

Obstetrical variables associated with amniotomy

In our study population, the majority of deliveries were multiparous in the exposed group and nulliparous in the spontaneous rupture of membranes group. Artificial rupture of the membranes was always present with cephalic presentation. Artificial rupture of the membranes was performed in the context of poor quality uterine contractions (74.5%, 82/110). The fetal motive was engaged in 26.4% of amniotomies (29/110). The heart rate was normal in the majority of cases at the time of artificial rupture (94.5%, 104/110). Delivery was by vaginal delivery in 91.7% of cases (Table 2).

Maternal complications associated with amniotomy

Complications at delivery occurred in the amniotomy-exposed and unexposed groups, respectively (38.2% vs. 32.5%; RR: 1.11(0.86-1.42); $p=0.255$). During delivery, women who underwent amniotomy during labour had more complications compared to spontaneous ruptures (38.2% versus 32.5%; RR: 1.11(0.86-1.42); $p = 0.255$). In the early postpartum period, one baby in each group had a complication (0.9% vs. 1.2%; RR: 0.75 (0.02-29.68); $p = 0.680$) (Table 3).

Fetal complications associated with amniotomy

We found fewer fetal complications during labour in the artificial rupture group (13.6% versus 21.7%). During delivery, acute fetal distress was more frequent in the amniotomy group (71.4% versus 33.3%; RR: 1.10(0.63-1.91); $p = 0.523$). There was one case of neonatal asphyxia at 5th in each group. In early postpartum, we had fewer fetal complications in the case of artificial rupture of the membranes (10% versus 12%; RR: 0.91(0.59-1.39); $p = 0.410$) (Table 4).

Table-1: Sociodemographic profile of the study population

	Artificial rupture of membranes n =110(%)	Spontaneous rupture of membranes n=83 (%)	Total n=193(%)	RR (95% CI)	P-value
Age					
<20	6 (5,5)	3 (3,6)	9 (4,7)	1,17(0,73-1,90)	0,405
[20-25[	17 (15,5)	23 (27,7)	40 (20,7)	0,69(0,47-1,02)	0,029
[25-30[	41 (37,3)	24 (28,9)	65 (33,7)	1,17(0,91-1,49)	0,143
[30-35[	34 (30,9)	19 (22,9)	53 (27,5)	1,18(0,91-1,52)	0,141
≥35	12 (10,9)	14 (16,9)	26 (13,5)	0,78(0,50-1,21)	0,161
Marital status					
Single	52 (47,3)	37 (44,6)	89 (46,1)	1,04(0,82-1,33)	0,410
Married	43 (39,1)	32 (38,6)	75 (38,9)	1,00(0,78-1,29)	0,529
Divorced	1 (0,9)	1 (1,2)	2 (1)	0,87(0,21-3,52)	0,676
Widow	2 (1,8)	2 (2,4)	4 (2,1)	0,87(0,32-2,34)	0,577
Common-law union	12 (10,9)	11 (13,3)	23 (11,9)	0,90(0,59-1,35)	0,389

	Artificial rupture of membranes	Spontaneous rupture of membranes	Total	RR (95% CI)	P-value
Level of study					
No study	7 (6,4)	7 (8,4)	14 (7,3)	0,86(0,50-1,48)	0,390
Primary	13 (11,8)	10 (12)	23 (11,9)	0,99(0,67-1,45)	0,566
Secondary	25 (22,7)	28 (33,7)	53 (27,5)	0,77(0,56-1,06)	0,060
Superior	65 (59,1)	38 (45,8)	103 (53,4)	1,26(0,97-1,62)	0,045
Occupancy					
Private Sector	14 (12,7)	9 (10,8)	23 (11,9)	1,07(0,75-1,53)	0,433
Public Sector	26 (23,6)	11 (13,3)	37 (19,2)	1,30(1,10-1,68)	0,050
Shopkeeper	9 (8,2)	7 (8,4)	16 (8,3)	0,98(0,62-1,55)	0,575
Student	6 (5,5)	7 (8,4)	13 (6,7)	0,79(0,43-1,45)	0,296
Student	26 (23,6)	18 (21,7)	44 (22,8)	1,04(0,78-1,39)	0,443
Housekeeper	17 (15,5)	17 (20,5)	34 (17,6)	0,95(0,59-1,22)	0,236
Small business	12 (10,9)	13 (15,7)	25 (13)	0,82(0,53-1,26)	0,223
Region of origin					
Adamaoua	3 (2,7)	4 (4,8)	7 (3,6)	0,74(0,31-1,76)	0,347
Center	24 (21,8)	25 (30,1)	49 (25,4)	0,82(0,59-1,12)	0,126
East	0 (0)	2 (2,4)	2 (1)	Undefined	0,183
Far North	2 (1,8)	5 (6)	7 (3,6)	0,49(0,15-1,59)	0,123
Coastal	7 (6,4)	5 (6)	12 (6,2)	1,02(0,62-1,66)	0,585
North	2 (1,8)	4 (4,8)	6 (3,1)	0,57(0,18-1,80)	0,119
Northwest	3 (2,7)	0 (0)	3 (1,6)	1,77(1,56-2,01)	0,182
West	61 (55,5)	30 (36,1)	91 (47,2)	1,39(1,08-1,78)	0,005
South	3 (2,7)	4 (4,8)	7 (3,6)	0,74(0,31-1,76)	0,347
Southwest	2 (1,8)	0 (0)	2 (1)	1,76(1,56-2)	0,323

Table-2: Distribution of deliveries according to obstetrical variables

	Artificial rupture of membranes	Spontaneous rupture of membranes	Total	RR (95% CI)	P-value
Parity	n =110(%)	n=83 (%)	n =193(%)		
Nullipare	39 (35,5)	31 (37,3)	70 (36,3)	0,96(0,74-1,24)	0,451
Primipare	25 (22,7)	19 (22,9)	44 (22,8)	0,99(0,74-1,33)	0,556
Multipare	41 (37,3)	28 (33,7)	69 (35,8)	1,06(0,83-1,37)	0,361
Large multiparous	5 (4,5)	5 (6)	10 (5,2)	0,87(0,46-1,63)	0,442
Fetal presentation					
Cephalic	110 (100)	79 (95,2)	189 (97,9)	Undefined	0,030
Headquarters	0 (0)	2 (2,4)	2 (1)	0 (0-2,61)	0,180
Transverse	0 (0)	1 (1,2)	1 (0,5)	0 (0-14,34)	0,430
Member	0 (0)	1 (1,2)	1 (0,5)	0 (0-14,34)	0,430
Uterine contraction					
Poor quality	82(74,5)	61 (73,5)	143(74,1)	0,88(0,55-1,85)	0,516
Good quality	28 (25,5)	22 (26,5)	50 (25,9)	0,97(0,73-1,29)	0,498
Commitment					
Committed	29 (26,4)	26 (31,3)	55 (28,5)	0,78 (0,42-1,48)	0,280
Fetal heart rate					
Bradycarde	2 (1,8)	2 (2,4)	4 (2,1)	0,87(0,32-2,34)	0,577
Normal	104 (94,5)	75 (90,4)	179 (92,7)	1,35(0,73-2,51)	0,202
Tachycardia	4 (3,6)	6 (7,2)	10 (5,2)	0,69(0,32-1,49)	0,214

Table-3: Distribution of maternal complications according to type of rupture

	Artificial rupture of membranes	Spontaneous rupture of membranes	Total	RR (95% CI)	P-value
	n =110(%)	n=83 (%)	n =193(%)		
Maternal complication at delivery	42 (38,2)	27 (32,5)	69 (35,8)	1,11(0,86-1,42)	0,255
Route of delivery					
Delivery by vaginal route	103 (93,6)	74 (89,2)	177 (91,7)	1,33(0,75-2,35)	0,196
Delivery by caesarean section	7 (6,4)	9 (10,8)	16 (8,3)	0,75(0,42-1,32)	0,196
Maternal complication of childbirth	42 (38,2)	27 (32,5)	69 (35,8)	1,11(0,86-1,42)	0,255
Placental Retention	0 (0)	1 (3,7)	1 (1,4)	Undefined	0,430
Perineal tear	23 (54,8)	12 (44,4)	35 (50,7)	1,19(0,90-1,57)	0,167
Vaginal tearing	14 (33,3)	5 (18,5)	19 (27,5)	1,33(0,98-1,80)	0,094
Cervical tear	4 (9,5)	3 (11,1)	7 (10,1)	1,00(0,52-1,92)	0,646
Uterine rupture	0 (0)	1 (3,7)	1 (1,4)	0 (0-12,21)	0,390
Uterine atony	1 (2,4)	3 (11,1)	4 (5,8)	Estimate	0,000
Immediate postpartum hemorrhage	2 (4,8)	2 (7,4)	4 (5,8)	0,87(0,32-2,34)	0,577
Retention of placental debris	7 (16,7)	4 (14,8)	11 (15,9)	1,12(0,70-1,78)	0,448
Membrane retention	2 (4,8)	3 (11,1)	5 (7,2)	0,69(0,23-2,05)	0,369
Early maternal complication	1 (0,9)	1 (1,2)	2 (1)	0,75 (0,02-29,68)	0,680

Table-4: Distribution of fetal complications according to the type of rupture

	Artificial rupture of membranes	Spontaneous rupture of membranes	Total	RR (95% CI)	P-value
	n =110(%)	n=83 (%)	n =193(%)		
Complication during labour	15 (13,6)	18 (21,7)	33 (17,1)	0,76(0,51-1,13)	0,101
Umbilical Cord Procidence	0 (0)	1 (5,6)	1 (3)	Undefined	0,430
Member Procedure	0 (0)	1 (5,6)	1 (3)	Undefined	0,430
SFA	7 (46,7)	9 (50)	16 (48,5)	0,75(0,42-1,32)	0,196
Acute fetal distress	5 (71,4)	3 (33,3)	8 (50)	1,10(0,63-1,91)	0,523
Complication during childbirth					
cord procedure	1 (14,3)	1 (11,1)	2 (12,5)	0,87(0,21-3,52)	0,676
Cephalopelvic disproportion	1 (14,3)	4 (44,4)	5 (31,3)	0,34(0,05-1,99)	0,100
Fetal malposition	0 (0)	1 (1,2)	1 (0,5)	Undefined	0,430
Member Procedure	0 (0)	1 (1,2)	1 (0,5)	Undefined	0,430
Adaptation at birth					
Neonatal asphyxia 1st min	7 (6,4)	6 (7,2)	13 (6,7)	0,94(0,56-1,58)	0,516
Neonatal asphyxia 5 ^{ème} min	1 (0,9)	1 (1,2)	2 (1)	0,87(0,21-3,52)	0,676
Fetal complication	11 (10)	10 (12)	21 (10,9)	0,91(0,59-1,39)	0,410
Neonatal asphyxia	6 (5,5)	4 (4,8)	10 (5,2)	1,05(0,62-1,77)	0,557
Trauma	1 (0,9)	0 (0)	1 (0,5)	1,76(1,55-1,99)	0,569
Hypoglycemia	1 (0,9)	0 (0)	1 (0,5)	1,76(1,55-1,99)	0,569

DISCUSSION

Frequency of amniotomy

We counted 193 deliveries of which 57% were cases of amniotomy against 43% of spontaneous rupture of the membranes on entry into the maternity hospital. The frequency of amniotomy was 76.92%, higher than the prevalence found by Florine D'Agostin in Grenoble, which was 43.1% [10]. This difference could be explained by the fact that artificial rupture of the membranes is often used as a method of induction of labour [11], but also of stimulation of labour [12]. It should be noted that 74.5% (82) of the babies arrived at the maternity hospital with intact membranes and poor

quality uterine contractions; this could therefore justify artificial rupture of the membranes in 110 parturients.

Socio-demographic characteristics

We found that being from the West was a risk factor for amniotomy. It should also be noted that a large proportion of our study population was from the West (55.5% in the artificial rupture of membranes group versus 36.1% of spontaneous rupture of membranes). This is all the more complex as our study took place in the Central region.

Having a higher level of education could be a risk factor (CI=0.97-1.62, %). . we can say that pregnant women with a higher level of education, having regularly attended prenatal consultations had a better understanding of the warning signs of labor and therefore arrived earlier before the rupture of the water bag.

Obstetrical variables associated with amniotomy

The women in our study gave birth mainly by vaginal delivery (91.7%). There was no statistically significant difference in the mode of delivery between the two groups. This result is comparable to that of Rojansky N. *et al.* [13] who evaluated whether induction of labour in a high risk obstetric population, when medically indicated, presented an increased risk of surgical intervention and maternal and fetal complications. Their work found that no significant increase in the rates of primary Caesarean section (8.6 versus 7.1%) and instrumental delivery (15.7 versus 12.7%) was found in the high-risk induction group compared with their general obstetric population. Intrapartum complications and fetal outcomes were comparable in their two groups. In the literature, some authors such as Mishanina E *et al* have dwelt on the issue and found a low rate of cesarean section in the case of induction of labor post-date and a real benefit for the fetus [14]. It should be noted that their work concerned all methods of induction of labour and not specifically amniotomy.

Association of amniotomy and maternal complications

We found no association between amniotomy and maternal complications either during labour, delivery or early post partum. This result is comparable to that of Cooley LG and Bastek JA [5].

Amniotomy associations and fetal complications

Amniotomy was generally not associated with fetal complications in our study. On the other hand, for Onah LN *et al.* Amniotomy especially early would be advantageous in the occurrence of prolonged labor, maternal and fetal complications [6]. This difference in results can be explained by the fact that their objective was specific to early amniotomy. During labour, in each of the two groups, we found 1 case of umbilical cord proclivity, i.e. 0.9% of cord proclivity in the amniotomy group. This is higher than in the study by Cohain JS who found 0.3% [15]. This can be justified by the fact that in our study only 26.4% of amniotomies were performed on an engaged fetal mobile. Artificial rupture of the membranes on a high head would have a greater risk of proclivity of the cord. This was proven by Smit M *et al.* in the study "Umbilical cord proclivity in primary midwifery care in the Netherlands; a case series"[16]. Usta IM *et al.* concluded that obstetric interventions (primarily amniotomy) contribute to 47% of cases of cord proclivity [17]. We noted 5 cases of acute fetal distress

in the amniotomy group, compared to 3 cases in the unexposed group [18].

CONCLUSION

The frequency of amniotomy in our study was 76.92%. The sociodemographic, clinical and obstetric characteristics were similar in both groups. There was no difference in the occurrence of maternal complications during labor, delivery and early post partum. The fetal outcome was identical in the amniotomy group and the spontaneous rupture of membranes group.

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