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Research Article

Pre and post conception risk factors in PROM

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ABSTRACT

Background: The objective of the study was to evaluate the pre conception and post conception risk factors in cases of premature rupture of membranes (PROM).
Methods: Two hundred pregnant women that were hospitalized at Mahatma Gandhi Medical College and Hospital from 1st January 2013 to 31st December 2013 with PROM (>28 Weeks) were evaluated for various risk factors of PROM.
Results: Low socio-economic status, cervical manipulation, urogenital infections, malpresentation, coitus, hydraminos, multifetal gestation and smoking significantly increase the risk of PROM.
Conclusions: Pre and post conception identification of various factors causing PROM can prevent premature deliveries and it's complications to some extent.

Keywords: Pregnancy, Premature rupture of membranes, Risk factors

INTRODUCTION

Premature rupture of membranes (PROM) is the rupture of the foetal membranes before the onset of labour. It is called preterm premature rupture of membranes (PPROM) if occurs before 37th week of gestation.[1] PROM is perhaps the single most common precipitating factor in premature delivery and its neonatal complications requiring admission to a neonatal intensive care unit. Preterm PROM precedes 40 to 60% of singleton preterm births[2] and is responsible, directly or indirectly, for 10% of perinatal deaths.[3] In addition maternal infections, adverse influence on foetal development, increased caesarean section rates with concomitant increased morbidity and mortality are significant complications of PROM.

The incidence of PROM varies for different countries and populations because it is related with multiple risk factors. Gunn et al[4] and Shubert et al[5] reported ranges of 2-18% & 5-15%, respectively. Many conditions such as bleeding in pregnancy, genitourinary infections, smoking, maternal weight, mechanical injury, coitus frequency, low socioeconomic status, nutrition, amniocentesis, foetal anomalies, uterine distension, history of PROM etc. are associated with the occurrence of PROM.[4] The final unifying mechanism for premature rupture of membranes is weakness in the chorioamnionmembrane (relative or absolute, local or generalized).[1,5] This may be due to reduced size of the membrane at the rupture site;[6] reduced collagen content,[7] deficiency of Type 3 collagen[8] or reduced elasticity.[9] Proteolytic enzymes from cervico-vaginal flora or intra-amniotic infection may be the cause.[6]

The devastating consequences of PROM/PPROM make it necessary to develop health strategies to improve the outcome by predicting, preventing and treating this situation. To contribute to the management of PROM, this study was conducted with the purpose of assessing the Pre and Post conception Risk factors causing PROM.

METHODS

The present study is a prospective case control study conducted in Mahatma Gandhi Medical College and Hospital, Sitapura, Jaipur (from 1st January 2013 to 31stDecember 2013) to evaluate the pre and post conception risk factors in PROM.

A total of 200 pregnant women were included in the study. Women with PROM beyond 28 gestational weeks and no labour pains before rupture of membranes were considered eligible for study group. Women without PROM but in labour beyond 28 weeks were included in control group. Controls were matched fro age range and parity with the cases. Apart from routine questionnaire regarding gestational age, leaking and labour pains, stress was given on history of genitourinary infections in pregnancy and in past, recent coitus, history of abortions and instrumentation (D & C), encirclage operation during pregnancy, history of PROM in previous pregnancies etc. PROM was confirmed by noting the presence of liquor on per speculum examination. Where the history or clinical examination was inconclusive, ultrasonographic demonstration of oligohydramnios was taken as evidence of PROM. High vaginal swabs were taken for culture and sensitivity test .All the cases had antibiotics at the time of admission & i.v. steroids for lung maturity if gestational age is<34weeks.Patients not included in the study were ones with overt evidence of systemic infection or outside handled cases. The BMI of each participant was calculated by her pre-pregnancy weight & height. Validity was assessed by using Chi-square with a P-value of less than 0.05 considered significant.

RESULTS

During the 12 months of study from 1st January 2013 to 31stDecember 2013, there were 2028 deliveries of which 200 cases of spontaneous PROM were seen, giving an incidence of 9.8% in our study. Maximum cases belonged to age group 21 to 25 years (45%).67.5% of these patients were multigravida / multipara & 66.5% of cases were >34 weeks. Cervical incompetence, PROM in previous pregnancy, genitourinary infections, multiparity and obesity were observed as significant preconception risk factors, while 1st trimester abortion, history of preterm labour, IUCD insertion and previous difficult vaginal deliveries were not significant risk factors according to our study. [Table 1] History of >2 D&C / D&E, cervical circlage/ incompetence and chronic cervical infections were observed as significant risk factors for PROM [Table 2].

Table 1: Risk factors related to past medical & obstetric history.

S.No	Parameters	Cases	Control	CI	P	Sig
1.	Abortion (1^{st} Trimester)	45 (22.5%)	32 (16%)	0.012-0.142	0.128	NS
2.	Cervical incompetence (2^{nd}trimester abortion)	15 (7.5%)	3 (1.5%)	0.019-0.100	0.008	S
3.	Preterm labour	16 (8%)	12 (6%)	0.030-0.070	0.557	NS
4.	PROM in previous pregnancy	58 (29%)	14 (7%)	0.144-0.295	0.000	S
5.	Genitourinary infections	42 (21%)	15 (7.5%)	0.066-0.203	0.000	S
6.	Multi para / multigravida	135 (67.5%)	78 (39%)	0.082-0.277	0.000	S
7.	Obese / overweight before conception (BMI > 24)	65 (32.5%)	38 (19%)	0.049-0.220	0.003	S
8.	Previous difficult vaginal delivery	9 (4.5%)	4 (2%)	0.099-0.059	0.259	NS
9.	IUCD insertion	8 (4%)	6 (3%)	0.026-0.046	0.786	S

Table 2: Significance of cervical manipulation / infection.

S.No	Parameters	Cases	Control	CI	P	Sig
1.	D&C / D&E 1-2	16 (8%)	12 (6%)	0.030-0.70	0.557	NS
	>2	42 (21%)	20 (10%)	0.039-0.180	0.004	S
2.	H/o operation on cervix	11 (5.5%)	5 (2.5%)	0.008-0.680	0.202	NS
3.	Cervical circlage in past pregnancy	9 (4.5%)	2 (1%)	0.006-0.073	0.040	S
4.	Cervical circlage in index pregnancy	12 (6%)	3 (1.5%)	0.007-0.082	0.035	S
5.	H/o Chronic cervicitis / erosion / cervical tear	22 (11%)	10 (5%)	0.006-0.113	0.043	S

Table 3: Risk factors related to index pregnancy.

S.No	Parameters	Cases	Control	CI	P	Sig
1.	Genitourinary infections	36 (18%)	13 (6.5%)	0.051-0.180	0.000	S
2.	Non-treatment of infections	22 (11%)	10 (5%)	0.006-0.113	0.043	S
3.	Poor socioeconomic status & ANC <2	76 (38%)	41 (20.5%)	0.085-0.264	0.000	S
4.	Anaemia	32 (16%)	18 (9%)	0.005-0.134	0.044	S
5.	Malpresentation	28 (14%)	10 (5%)	0.032-0.147	0.004	S
6.	Multiple gestation	15 (7.5%)	5 (2.5%)	0.007-0.092	0.039	S
7.	Polyhydramnios	12 (6%)	3 (1.5%)	0.007-0.082	0.035	S
8.	Cervical circlage	12 (6%)	3 (1.5%)	0.007-0.082	0.035	S
9.	Increase frequency of coitus (once / Twice a week)	22 (11%)	10 (5%)	0.006-0.113	0.043	S
10.	Smoking	38 (19%)	13 (6.5%)	0.059-0.190	0.000	S
11.	Haemorrhage in 2nd / 3rd trimester	18 (9%)	7 (3.5%)	0.087-0.102	0.039	S
12.	H/o fall or trauma	9 (4.5%)	2 (1.0%)	0.006-0.073	0.040	S
13.	PIH	26 (13%)	20 (10%)	0.032-0.092	0.433	NS

Genitourinary infections & their non-treatment were observed as a major risk factor especially in low socio-economic group with poor nutrition, hygiene and antenatal care. Smoking in low socioeconomic group further increased the risk. Increased frequency of coitus especially in third trimester increased the risk of PROM. An increased intrauterine pressure due to multiple gestation or polyhydramnios is also a significant risk factor. Malpresentation or haemorrhages in 2nd / 3rd trimester were also significant factors in terms of PROM. [Table 3].

DISCUSSION

The cause of PROM is multifactorial. The incidence of PROM in our study was 9.8%.In our study genitourinary infection in index pregnancy was most important cause of PROM (18% VS 6.5%. P-0.000). This infection results in ascending infection to membranes and decidua. Bacterial Proteolytic enzymes (proteases, collagenases or trypsin) from the cervico-vaginal flora cause membrane damage, weakness and subsequent rupture. Simultaneously intra amniotic infection may increase intra-uterine activity, leading to increased intra-uterine pressure and so greater stress on the membranes. The common micro-organisms include *chlamydia trachomatis*, *T. vaginalis*, *candida* species, *mycoplasma* species, *E. coli* and bacterial vaginosis. These findings correlate with Lindsey[7] and Desai[8] who observed genitourinary infections in 25% and 26% cases of PROM respectively. Pre-pregnant urogenital infections also increase the risk of PROM probably by asymptomatic bacterial colonization of uterine cavity. During pregnancy these organisms proliferate and invade the amniotic fluid, placenta and membranes and lead to PROM. Non- treatment of genitourinary infections is also significant in PROM group (11% vs 5%, p-0.043).

The incidence of PROM was high in low socio-economic group (38% Vs 20.5%, p-0.000). It was stated by Ratnam[9] that low socio-economic group with associated factors such as malnutrition, overexertion, poor hygiene ,stress, high parity, recurrent genitourinary infections with non-treatment, anaemia & poor antenatal care considerably increase the risk of PROM. Spinillo et al[10] also found maternal social class to be a strong independent predictor of preterm PROM.

The incidence was high in multipara / multigravida (67.5% vs 39%, p-0.000) consistent with study of Kosus et al[11] and Paumier et al.[12] There was a significant increase in PROM in cases with H/O more than two D&C / D&E (21% vs 10%, p-0.004) and it is probable that cervical trauma predisposes to infection as well as incompetent os (loss of elasticity of internal os).Two or more induced abortions more than double the risk of preterm PROM, this risk is independent of an increased risk of incompetent cervix. This finding was similar to Linn et al.[13] Operations on the cervix other than dilatation and curettage were not a risk factor for PROM in our study.

Both a history suggestive of cervical incompetence (mid trimester abortion) and of cervical circlagein past or index pregnancy increase the risk of PROM by loss of sphincteric action, cervical trauma and ascending infection. Spinillo et al[10] found that cervical incompetence might predispose membranes to trauma

and rupture through effacement and dilatation of the cervix.

There was no significant difference in the number of first trimester abortions between the cases and controls (22.5% vs 16%, p-0.128) but there were more 2nd trimester abortions in cases as compared with controls (7.5% vs 1.5%, p-0.008).

Similarly bleeding in 2nd or 3rd trimester of index pregnancy increases the risk of PROM (9% vs. 3.5%. p-0.039). Chronic abruption of placenta may cause decidual necrosis, which weaken membranes or predisposes to intra-amniotic infection eventually leading to membrane rupture Darby et al[14] and Hossain et al[15] reported that especially second trimester bleeding may cause preterm labour and PROM. Though history of preterm labour does not increases the risk of PROM in subsequent pregnancies but history of PROM in previous pregnancy significantly increases the risk (29% Vs 7%, p-0.000). The repetition rate was 25% in a study in Turkey.[16] The cause may be cervical incompetence or untreated cervio-vagnial infection by bacterial vaginosis or Chlamydia.[17]

Malpresentation was also a common cause of PROM in our study (14% vs 5%, p- 0.004). Of these breech was the commonest (66%). This is consistent with the study of Miller et al[18] who found malpresentation in 13.9% of PROM cases. Delayed or non-engagement of presenting part causes transfer of increase pressure to fore water. This resulted in weakening of dependent part of membranes followed by rupture. Over distention of the uterus by either polyhydramniosor multiple gestations also increases the risk of PROM by increasing the intrauterine tension. Increased frequency of coitus (once / twice a week) in last trimester increases risk of PROM by causing ascending infection (especially in predisposed cases like anaemia, GU infection, cervical circlage or damaged cervix) as well as increases uterine activity through prostaglandins present in semen. Naeye[3] found PROM in 23% of cases, when h/o ¬recent coitus was present.

Smoking also increases the risk of PROM (19% Vs 6.5%, p-0.000) probably by decreasing the collagen and proteins in membranes with resultant weakness. Williams[19] also stated that increased cadmium levels by cigarette smoking decreases the availability of Cu^{+2} for collagen synthesis in amnion mesenchymal cells. Evaldson et al[20] and Harger et al[21] found smoking to be significant as a risk factor for preterm PROM. Nicotine causes arteriolar constriction leading to uterine decidual ischemia[3] so affecting the integrity of the membranes.

H/o fall or trauma was high in PROM cases than controls. (4.5% vs 1% P-0.0040).

The risk is increased in women who are overweight /obese in terms of BMI before conception (32.5% vs 19%, p-0.003). This is consistent with study of Chen et al.[22]

CONCLUSION

In most of the cases PROM happens spontaneously and without apparent cause. Probably the cause is multifactorial. Some of the identifiable high risk factors are genitourinary infections, cervical incompetence, and obesity, low socioeconomic status with malnutrition and poor antenatal care, multiple gestations, smoking and increased frequency of coitus.

The critical analyses of our study has brought forth following recommendations which can contribute to decrease the incidence of PROM.

1. Patients with history of cervical manipulation, genitourinary infections or PROM in previous pregnancy should be warned about the risk of PROM in this pregnancy. They should be followed vigilantly during the antenatal period so that correction of potentially remedial risk factors can be possible.
2. Nutritious diet, correction of anaemia and improvement in general health of the pregnant women will be a safeguard against infection as well as PROM.
3. Since genitourinary infections play an important role in PROM, these should be treated promptly and vigorously with proper antibiotics not only during pregnancy but also in between the pregnancies.
4. Coitus should be avoided in last month of pregnancy or condoms should be used to reduce inoculation of bacteria and prostaglandins present in semen.

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REFERENCES

1. Cootanco AC, Althaus JE, Preterm birth and premature rupture of membranes, “The Johns Hopkins Manual of gynaecology and obstetrics (third edition), Kimberly BI, Linda MS, Harold EF & Edward EW (Eds) Lippincott Williams & Wilkins, Philadelphia. 2008: 122-136.
2. Keirse MJ, Ohisson A, Treffers P et al, Prelabour rupture of membranes preterm in: Chambers I,

Enkin M, Kense MNJC. Effective care in pregnancy and child birth (EJS) Oxford. 1984: 666-693.
3. Naeye RL. Causes of prenatal mortality in the US. Collaborative prenatal project. J Amer Med Ass. 1977:238;228-31.
4. Gunn GC, Mishell DR, and Morton D.G. Premature rupture of membranes, A review. Amer J Obstet Gynaec. 1970;160:469-83.
5. Shubert PJ, Diss E, Lams JD. Aetiology of preterm premature rupture of membranes. Obstet Gynaec Clin N Amer. 1992;19:251-80.
6. Allen R.S. The epidemiology of premature rupture of the foetal membranes. Clin Obstet Gynaec. 1991:34:685-93.
7. Lindsey P, Marcos Alger LS. ClinObstet & Gynecol. 1986:29:758-61.
8. Desai BR, Shobhana SP, Sharma R. Evaluate the incidence of infection as the cause of PROM, Journal of Obst. & Gynae of India. 2001:51:83-5.
9. Ratnam S. Obstetrics & Gynaecology for post graduates, 2nd edition, 96.
10. Spinillo A, Nicola S, Pia IK, et al; Epidemiological correlates of preterm premature rupture of the membranes. Int J Gynaec Obstet. 1994:47:7-11.
11. Kosus A. Kosus N, Capar M. Perinatal outcome in pregnant women with PROM in our clinic. T Klin J Gynecol Obst. 2007:17:152-5.
12. Paumier A, Gras leguen C, Branger B, Boog G, Roze JC, Philippe HJ, et al. PROM before 32 weeks of gestation ; prenatal prognosis factors. Gynecol Obstet Fertil. 2008:36(7-8):748-56.
13. Linn S, Schoenbaum SC, Monson RR, et al. The relationship between induced abortion and outcome of subsequent pregnancies. Amer J Obstet Gynaec. 1983:146:136-40.
14. Darby MJ, Lantis SN, Shen-Swarz S. Placental abruption in the preterm gestation: An association with chorioamnionitis. ObstetGynaec. 1989:74:88-91.
15. Hossain R, Harris T. Lohsoonthorn & Williams M.A., Risk of preterm delivery in relation to vaginal bleeding in early pregnancy. Eur J Obstet Gynecol Repord Biol. 2007;135(2):158-63.
16. Turan C, Ozcan T, Kaleli B, Danisman N, Sayilgan A, Gokmen O. Risk factors of preterm PROM. Turkish J Perinat. 1995;3(2):30-2.
17. Minkoff H, Grunebaum AN, Sewarz RH, et al. Risk factors for prematurity and premature rupture of membranes. A prospective study of vaginal flora in pregnancy. Amer J Obstet Gynaec. 1984:150:965-7.
18. Miller JM, Pupkin MJ. Premature labour and premature rupture of membranes. Amer J Obstet & Gynaec. 1978:132:1-4.
19. Williams obstetrics, 20th edition, 163.
20. Evaldison G, Lagrelius A, Winiarski J. Premature rupture of membranes. Acta Obstet Gynaec Scand. 1980;59:385-93.
21. Harger JH, Hsing AW, Tuomala RE, et al. Risk factors for preterm premature rupture of the membranes. A multicentre case control study. Amer J Ostet Gynaec. 1990:163:130-3.
22. Chen Z, Du J, Shao L, Zheng L, Wu M, Ai M, et al. Prepregnancy body mass index, gestational weight gain and pregnancy outcomes in China. Int J Gynaecol Obstet. 2010;109(1):41-4.

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