DOI: 10.7860/JCDR/2014/8259.5093

Original Article

Obstetrics and Gynaecology Section

Alpha-Foetoprotein in the Diagnosis of Prelabour Rupture of Membranes

CHHAVI RANA SINGH[1], RAJESHWARI GURUMOORTHY BHAT[2]

ABSTRACT

Content: Prelabour rupture of membranes (PROM) complicates overall 10% of gestations which include 7% at term and 3 % preterm gestations. Making an early and accurate diagnosis of PROM is important, to allow gestational age specific obstetric interventions and to optimize perinatal outcome.

Objective: To study the efficacy of alpha-foeto protein in cervicovaginal secretions, to diagnose prelabour rupture of membranes.

Setting: A tertiary care centre.

Materials and Methods: We performed a prospective study on 130 patients who were at ≥ 24 weeks of gestation, who had complaint of leaking per vagina, between September 2011 and August 2013. Alpha-foetoprotein test was perfomed on cervicovaginal secretions which were collected during per-speculum examinations. A diagnosis of prelabour rupture of membranes was made, based on combined clinical diagnosis which was made during hospital stay of the patients prospectively. The efficacy of Alpha-foetoprotein was studied.

Stastical Analysis: Chi-square test, Kappa analysis.

Results: The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of Alpha-foetoprotein were 88.9%, 98.5%, 98.3%, 90.1% and 93.8% respectively. Degree of agreement of Alpha-foetoprotein with combined clinical diagnosis was 0.875.

Conclusion: Assessment of alpha-foetoprotein levels in cervicovaginal secretions can be used as a reliable test to diagnose prelabour rupture of membranes when faced with a diagnostic dilemma.

Keywords: Alpha-foetoprotein, Prelabour rupture of membranes, Combined clinical diagnosis

INTRODUCTION

Prelabour rupture of membranes (PROM) is amniorrhexis in the absence of labour, irrespective of gestational age. PROM which occurs before 37 weeks of gestation is referred to as preterm prelabour rupture of membranes. Overall, 10% of gestations, 7% at term and 3 % preterm are complicated by PROM [1]. There exists an increase in maternal and neonatal morbidities which are related to PROM. Therefore, making an early and accurate diagnosis of PROM is important, to allow gestational age specific obstetric interventions and to optimize perinatal outcome. A false positive diagnosis can lead to unnecessary obstetric interventions like hospitalization, antibiotic administration, corticosteroid administration and induction of labour. Estimation of AFP as a marker for prelabour rupture of membranes can be done by using several techniques, like radio-immunological assay, latex agglutination, immuno-enzymatic assays and using monoclonal / polyclonal antibodies to AFP, but these methods are expensive. We used electroluminescence method for estimation of Alpha-foetoprotein, which is a simple and cheap test which can be used for AFP estimation and which has similar efficacy as those of the above mentioned tests.

MATERIALS AND METHODS

We performed a prospective study on 130 patients who were at ≥ 24 weeks of gestation, who had complaint of leaking per vagina, between September 2011 and August 2013, at a tertiary care centre. The study included all women who had complaint of leaking per vagina. Women with antepartum haemorrhage and intra-uterine death were excluded. A detailed history was taken and obstetric examinations were done. Speculum examination was performed for all the patients to note the presence of pooling of liquor. Sample for Alpha-foetoprotein (AFP) estimation was collected by instilling 5 ml of distilled water into vagina, irrespective of pooling of amniotic fluid and then it was sent for analysis to biochemistry laboratory, for estimation by using electroluminescence method. AFP level of more than 30 ng/ml was taken as positive for prelabour rupture of membranes [2]. Diagnosis of prelabour rupture of membranes was made, based on combined clinical diagnosis which was made during hospital stay prospectively and then, patients were divided into cases and controls based on combined clinical diagnosis.

Diagnosis of PROM was made if two clinical and one laboratory criteria were present. Clinical criteria were a frank leak on per speculum examination or subsequent leaks after admission, as was demonstrated by pad soakage, fever which could not be attributed to any other cause except chorioamnionitis or going of patient into spontaneous labour. The laboratory criteria included rise in total WBC count, differential count showing neutophilia with rise in C-reactive protein and ultrasound examination showing a drop of less than 8 in AFI or AFI levels.

Efficacy of Alpha-foetoprotein was studied by using Chi-square test. p-value which was < 0.05 was considered as significant. Degree of agreement with the final diagnosis was calculated by using Kappa analysis and a value of more than 0.80 was considered to suggest a high degree of agreement. The data was analyzed by using Statistical Package for the Social Sciences (SPSS –version 16).

Ethical Committee Clearance: 15th September 2011 – IEC 259/2011.

RESULTS

The mean age of patients who had prelabour rupture of membranes was 26.8 years. 63.5% (40/63) patients were primigravidae. 6.4% (4/63) patients who had prelabour rupture of membranes had diabetes mellitus as compared to 1.5% (1/65 patients) who did not have prelabour rupture of membranes. Incidence of twinning was also more common in patients with PROM i.e. 3.2% (2/63 patients) as compared to none in patients without PROM [Table/Fig-1,2]. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of Alpha-foetoprotein were 88.9%, 98.5%,

98.3%, 90.1% and 93.8% respectively. Degree of agreement of Alpha-foetoprotein with combined clinical diagnosis was 0.875 [Table/Fig-3].

Demographic data	Cases n=63(%)	Controls n=65(%)
Mean age ± Standard deviation (years)	26.86 ± 7.8	26.51 ± 5.4
Parity 1)Primigravida (77) 2)Multigravida(51)	 40(63.5) 23(36.5)	 37(56.9) 28(43.1)
Period of gestation (weeks) 1)24 to 31 weeks 6 days-Early Preterm(33) 2)32 to 36 weeks 6 days-Late Preterm(31) 3)≥37 weeks- Term (64)	 14(22.2) 19(30.2) 30(47.6)	 19(29.2) 12(18.5) 34(52.3)

[Table/Fig-1]: Demographic characteristics n = 128

Demographic data	Cases n= 63(%)	Controls n=65(%)
Hypertensive disorders of pregnancy	2(3.2)	2(3.1)
Twins	2(3.2)	0(0)
Polyhydramnios	1(1.6)	0(0)
GDM and Overt DM	4(6.4)	1(1.5)
Infection (UTI/ Respiratory tract infection)	1(1.6)	1(1.5)
Vaginal discharge/Vaginitis	17(26.9)	34(52.3)
Intercourse	3(4.8)	6(9.2)
Previous LSCS	6(9.5)	9(13.8)

[Table/Fig-2]: Efficacy of Alpha- fetoprotein test (n=128)

Alfafeto Protein	Cases n= 63(%)	Controls n=65(%)	Predictive value of the test
Positive	56(88.9)	1(1.5)	Positive predictive value- 98.3%
Negative	7(11.1)	64(98.5)	Negative predictive value-90.1%
	Sensitivity-88.9%	Specificity- 98.5%	

[Table/Fig-3]: Risk factors in cases and controls (n=128)

DISCUSSION

The objective of the present study was to study the efficacy of alpha-foetoprotein in the diagnosis of prelabour rupture of membranes. In our study, AFP was found to be a reliable test with a sensitivity of 88.9%, a specificity of 98.5%, a positive predictive value of 98.3%, a negative predictive value of 90.1% and accuracy of 93.8%. The degree of agreement with combined clinical diagnosis was as high as 0.875. Levi et al., reported a sensitivity of 99%, a specificity of 91%, a positive predictive value of 95%, a negative predictive value of 99%. Their study results were better than those of the present study, because they used a kit which had a combination of AFP/PP12 monoclonal /polyclonal antibodies, for detection of PROM [3]. The present study's results were comparable to those of study done by Shahin et al., opined that AFP had 94% sensitivity, specificity, positive predictive value, negative predictive value and efficacy [4]. Feng et al., had also reported a similar efficacy of AFP as that which was seen in our study i.e. a sensitivity of 97.7% and a specificity of 100%. Electroluminescence immunoassay for the estimation of AFP was used in the study [5].

In a study done by Chang et al., the sensitivity which was detected was 90%, specificity was 100%, positive predictive value was 100% and negative predictive value was 90.9% and accuracy was 95%. Method which was used was immune-enzymatic assay [6]. Kishida et al., used an improved Alpha-foetoprotein monoclonal antibody kit for diagnosis of PROM and reported an accuracy of 98%, a sensitivity of 100% and a specificity of 97.4% in a period of gestation of less than 37 weeks and an accuracy of 97.1%, a sensitivity of 95.5% and a specificity of 100% at more than 37 weeks of gestation [7].

Gaucherand et al., used an immune-enzymatic assay for AFP estimation. AFP was applied to three groups of patients i.e. those with an extremely low probability of PROM, those with frank leaks and thirdly, those with suspected ruptures of membranes in this study. A sensitivity of 98% and a specificity of 99% for a threshold value of 30ug/l were detected in group with low probability of PROM and in group with frank leaks. In group with suspected ruptures of membranes, with the same threshold value, a sensitivity of 94.5% and a specificity of 95.4% were seen [8].

Guibaud et al., found out overall sensitivity of 88 %, a specificity of 84%, a positive predictive value of 86% and a negative predictive value of 87% for AFP estimation in vaginal secretions [2].

ACKNOWLEDGEMENT

I acknowledge my gratitude to Professor Lavanya Rai, Head of the Department of Obstetrics and Gynaecology, Kasturba Medical College, Manipal, Professor Pratap Kumar and Professor Murlidhar V Pai for their constant support, encouragement and guidance. I also express my sincere gratitude to Professor Parvathi Bhat, Dr T M A Pai Hospital, Udupi, Professor Satish Nayak, Dr. T. M.A.Pai Hospital, Karkala, Dr.Jyothi Shetty, Additional Professor and Dr.Sapna Amin, Associate Professor, and faculty membranes of Department of Obstetrics and Gynaecology, Kasturba Medical College, Manipal, for their cooperation.

CONCLUSION

Alpha-foetoprotein assessment in cervicovaginal secretions can be used as a reliable test, to diagnose prelabour rupture of membranes when faced with a diagnostic dilemma.

REFERENCES

[1] Bhalerao S, Desai A. Premature rupture of membranes. Principles and practice of Obstetrics and Gynaecology 9 2nd edition; FOGSI publication. New Delhi: Jaypee Brothers; 2003;125.
[2] Guibaud, Rudicoz, et al. Diagnosis of PROM by identification of AFP in vaginal secretions. *Acta Obstet Gynecol Scand*.1994; 73:456-59.
[3] Levi, Draper M, et al. Diagnosing rupture of membranes using combination monoclonal/polyclonal immunologic protein detection. *J Reprod Med*. 2013; 58(5-6): 187-94.
[4] Shahin M, Raslan H. Comparative study of three amniotic fluid markers in premature rupture of membranes: Prolactin, beta subunit of human chorionic gonadotropin, and alpha-fetoprotein. *Gynecol Obstet Invest*. 2006; 63:195–99.
[5] Feng, et al, Yu LZ. Practicability of using vaginal fluid markers in detecting premature rupture of membranes. *Ann Clin Biochem*. 2003; 40: 542-5.
[6] Li HY, Chang TS.Vaginal fluid creatinine, human chorionic gonadotropin and alpha-fetoprotein levels for detecting premature rupture of membranes. *Zhonghua Yi Xue Za Zhi(Taipei)*. 2000; 63: 686–90.
[7] Kishida T, Yamada H, Negishi H, et al. Diagnosis of premature rupture of the membranes in preterm patients, using an improved AFP kit: comparison with ROM-check and/or Nitrazine test. *Eur J Obstet Gynecol Reprod Biol*.1996; 69: 77–82.
[8] Anthony R. Gregg. Introduction to premature rupture of membranes. *Obstetrics and Gynecology Clinics of North America*. 1992; 19(2):241-51.

PARTICULARS OF CONTRIBUTORS:
1. Postgrauate, Department of Obstetrics and Gynaecology, Kasturba Medical College, Manipal, India.
2. Associate Professor, Department of Obstetrics and Gynaecology, Kasturba Medical College, Manipal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Rajeshwari Gurumoorthy Bhat,
Mamara, First Left Cross, Balaji Lay Out, Kannarpadi, Kadekar Post Udupi-576103, India.
Phone: 8861928280, E-mail: rajibhat@yahoo.co.in

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Dec 20, 2013**
Date of Peer Review: **Feb 16, 2014**
Date of Acceptance: **Feb 16, 2014**
Date of Publishing: **Nov 20, 2014**