Relationship between Abnormal Cardiotocography and Fetal Outcome

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Aims: This study aimed to determine the frequency of abnormal cardiotocography during labour and to evaluate the significance of these patterns in determining fetal well-being.

Methods: This was cross-sectional study undertaken at Sir Ganga Ram Hospital, Lahore from September 2009-September 2010. Hundred admitted pregnant women were enrolled for the study. Admission cardiotocography was done for 30 minutes in left lateral position and labeled as normal, suspicious or pathological. Suspicious pattern cardiotocography was repeated after hydration with 1000ml intavenous fluid and oxygen inhalation, if remained suspicious then action for delivery was taken. Mode of delivery was dependent on stage of labour.

Results: Twenty three women had suspicious CTG traces and 77 had pathological.It was noticed that the percentage of various mode of dellivery were not much different among suspicious and pathological CTG groups with p value 0.668.The Apgar score observed as per mode delivery reveal that there was no significant association between Apgar score at 1 min and mode of delivery with pvalue 0.889. The association of poor Apgar in pathological CTG group was significant with p value 0.006. Fifteen (15.6%) neonates needed resuscitation and 81 (84.4%)did not require resuscitation.

Conclusions: Abnormal CTG influence the fetal outcome, ie poor Apgar score at 1 min and 5 minutes, increased rate of caesarean section and neonatal resuscitation.

Keywords: Apgar score; cardiotocography; labour; mode of delivery; neonatal resuscitation.

INTRODUCTION

In the past intermittent auscultation of fetal heart sounds and nature of amniotic fluid were used as means of monitoring the fetus during labour. Now electronic fetal monitoring (cardiotocography) record shows the changes in the fetal heart rate and their temporal relationship to uterine contractions.[1] Cardiotocography has been able to detect fetal distress with more reliability.[2] Reactive cardiotocography trace reassures both the mother and health care provider of good fetal health.[3] Widespread use of electronic fetal monitoring is associated with substantial falls in perinatal mortality being 0.7/1000 compared with 1.8/1000 in auscultation group.[4] Abnormal cardiotocography is more common in meconium aspiration syndrome.[5] Incidence of abnormal fetal heart rate pattern were 2.3 times as common in babies who developed cerebral palsy and 6.7 times as common in perinatal death.[6] Moreover, there is interobserver variation in interpretation of abnormal cardiotocography readings and recommendations for interventions.[7] The study done in 2000 at Lady Dufferin Hospital Karachi, showed that the Apgar score less than 7 at 1 minute in 64.15% cases, and it was more than 7 at 1 minute in 35.84%. It remained less than 7 at 5 minute in 18.86% only, while in 81.13% it improved or stayed constant in pathological CTG group.[3] This study will help to detect fetal distress in the early stage and can avoid adverse fetal outcome. However despite its association with increased caesarean section rate cardiotocography remains a major method of monitoring high-risk pregnancy.[8]

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METHODS

This was a cross sectional study undertaken at Sir Ganga Ram Hospital, Lahore from September 2009-September 2010. Ethical approval was obtained from the hospital and informed consent was taken from the patients. The inclusion criteria were pregnancy at 37-42 weeks of gestation in labour (latent /active)

with abnormal cardiotocography. The exclusion criteria were known fetal congenital malformation, malpresentations multiple gestation, ruptured membrane more than 24 hours, intrauterine growth restriction, patients with medical disorders like (HTN & diabetes), decrease fetal movement and bad obstetric history. One hundred pregnant women fulfilling the inclusion criteria were monitored by partogram. For fetal monitoring admission CTG was done for 30 mintues in left lateral position. In case of suspicious pattern CTG was repeated after hydration with 1000 ml iv fluid and oxygen at 10 L/minute over 20-30 minute. If it remained suspicious then action for delivery was taken. Mode of delivery was dependent on stage of labour. Lower segment caesarean section was perfomed unless the vaginal delivery was imminent. In case of pathological pattern lower segment caesarean section was performed, when vaginal delivery was not imminent. The newborns were evaluated in terms of Apgar Score at 1 minute and at 5 minute i.e, good Apgar score >7, poor Apgar score 5-7 and bad Apgar score <5. Note was also kept whether or not the neonate needed resuscitation. Babies were observed for 24 hours to look for signs of hypoxic ischemic encephalopathy.

Data was entered in the computer software SPSS version 15 and analyzed accordingly .The quantitative variable like age was presented as mean and standard deviation. The qualitative variables like mode of delivery, CTG pattern, Apgar score at 1 minute, Apgar score at 5 minutes and neonatal resuscitation were presented as frequency and percentages. Relation of abnormal CTG pattern with Apgar score, mode of delivery neonatal resuscitation, was done by using chi square test. P value of < 0.05 was considered as significant.

RESULTS

Among 100 abnormal CTG, 23 had suspicious fetal heart rate and 77 pathological. However percentage of various mode of delivery in both group did not show significant difference with p value 0.663 as shown in Table 1.

Table 1. Mode of delivery as per CTG status of paients.

Apgar	Groups					
	Suspicious		Pathological		Total	
	N	%	N	%	N	%
Spontaneous	2	8.7	6	7.8	8	8.0
Vacuum	4	17.4	8	10.4	12	12.0
Caesarean Section	17	73.9	63	81.8	80	80.0
Total	23	100	77	100	100	100

p-value=0.663

Fifteen (20.5%) neonate with Apgar score <5 at 1 minute belonged to pathological CTG group no such findings were noted in suspicious group with p value 0.006 as shown in Table 2.

Table 2. One minutes Apgar score as per CTG status.

Apgar Score	Groups					
	Suspicious		Pathological		Total	
	N	%	N	%	N	%
<5	0	0.0	15	20.5	15	15.6
5-7	13	56.5	40	54.8	53	55.2
>7	10	43.5	18	24.7	28	29.2
Total	23	100	73	100	96	100

p-value=0.006

There were 19 (82.6%) neonate with suspicious CTG with Apgar score>7, while in pathological group there were 33 (45.2%). There were no neonates with Apgar score <5 in suspicious group with p value 0.003 as shown in Table 3.

Table 3. Five minutes Apgar score as per CTG status.

Apgar Score	Groups					
	Suspicious		Pathological		Total	
	N	%	N	%	N	%
<5	0	0.0	6	8.2	6	6.3
5-7	4	17.4	34	46.6	38	39.6
>7	19	82.6	33	45.2	52	54.2
Total	23	100	73	100	96	100

p-value=0.003

Only 15 (20.5%) neonates with pathological CTG needed resuscitation as shown in Table 4.

Table 4. Neonatal resuscitation as per CTG status.

Resuscitation	Groups					
	Suspicious		Pathological		Total	
	N	%	N	%	N	%
Yes	0	0.0	15	20.5	15	15.6
No	23	100	58	79.5	81	84.4
Total	23	100	73	100	96	100

Out of 77 babies with a pathological CTG trace, neonatal death occured in 10, while 4 were still born. There were no neonatal death and stillborn in suspicious CTG group.

DISCUSSION

Until the second half of the 20th century assessment of the fetal condition depended on very limited means.[9] Sudden absence of fetal movements in the second half of pregnancy was at that time, not only a very emotional but also a serious diagnostic problem.[10] This recurrent dilemma, whether or not the fetus had died in utero, formed the major impulse for the development of cardiotocography.[11] Cardiotocography (CTG) is worldwide the method for fetal surveillance during labour. Although it is applied on a large scale ,this technique is still subject to debate.[12-14] Cardiotocography provides direct information of fetal condition in contrast to other technique. Inspite of lack of specificity it remains the mainstay of intrapartum fetal assessment.

In our study 23 (23%) patients had suspicious CTG traces while 77 (77%) patients had pathological traces. In a study carried out by Mamatha,[15] out of 150 patients with abnormal patterns of CTG 39(26%) patients showed suspicious and 111 (74%) patients showed pathological fetal heart rate pattern which is comparable with our study. Another study carried out by Shiekh,[3] admission traces were pathological in 66% cases and 34 % were in suspicious group. This study showed pathological fetal heart rate pattern were more than suspicious which is comparable with our study. CTG patterns that deviate from the normal, therefore, occur in about half of all deliveries and over reaction to these commonly occuring CTG pattern is frequent leading to unnecessary intervention.

Regarding mode of delivery in our study about 80% patients with suspicious and pathological CTG pattern underwent caesarean section and 20% delivered vaginally. A study done by Amena,[16] 82% patients underwent caesarean section for abnormal CTG, which is comparable with our study. Similarly, another study carried out by Farkhunda et al,[17] observed high caesarean section rate (72.72%) in the presence of abnormal pattern of CTG. A similar observation was made by Oladrian et al,[18] study which showed 72% caesarean section rate. A study by Kulkarni and Shroti[19] also showed the progressive rise in operative deliveries for fetal distress. The high caesarean section for fetal distress could not be brought down, if electronic fetal monitoring without adjunctive test is used thus necessitating the need for additional test (fetal ECG, fetal pulse oxymetry, fetal blood sampling for pH) to reduce the number of false positive cases. In our study the high caesarean section rate may be attributed to this factor that only CTG was taken for assessing fetal condition.

In our study neonates with Apgar score at <5 at 1 minute were 15% in pathological group. There were no neonates with Apgar score <5 in suspicious group .In another study done by Mamatha,[15] 75.2% neonates had Apgar score <7 in pathological group and 20.7% in suspicious group. This difference may be due to the grouping of neonates in 3 groups as bad (<5) Apgar score, poor (5-7) score and good (>7) Apgar score in our study. In study done by Mamatha the neonates were categorized only in 2 groups i.e, poor (<7) Apgar score and good (>7) score, in this study the neonates with pathological CTG has low Apgar score which is comparable with our study. However in above mentioned studies, it is seen that babies with abnormal CTG had poor Apgar score that was als comparable with the study done by Dellinger et al.[20]

In our study 6.3% neonates with abnormal CTG had Apgar score <5 at 5 minutes while 18.86% neonates had Apgar score <7 at 5 minutes in the study done by Sheikh,[3] which is not comparable with our study because of grouping the neonates in two groups in their study and three groups in our study, so, we have another group of neonates with Apgar score 5-7 which is not present in the study done by Sheikh. Another reason that may be considered is that in the above-mentioned study other factor as meconium stained liquor; precious pregnancy and intrauterine growth restriction and their effects on Apgar score were also noted. In our study 15.6% neonates needed resuscitation. This is similar with the study conducted by Tan et al[21] where 12.8% neonates needed resuscitation for low Apgar score at 1 min.

In our study there were 13.7% neonatal, death, 5.2%

still birth with 18.9% overall neonatal mortality in neonates with pathological CTG traces, while in study done by Sheikh[3] the neonatal death were 16%. There were 10% still birth 26 % overall neonatal mortality. The higher percentage of neonatal mortality in the study done by Sheikh is because of delayed action and misinterpretation of CTG, this limitation is acknowledged by the author himself.

On this ground it is recommended to do critical reappraisal of training, assessment, supervision of practice of obstetrician and midwives. There is a need to stress on the importance of a regular training programme in the use and interpretation of CTG for professionals involved antepartum and intrapartum care.

CONCLUSIONS

It is concluded that cardiotocography can be continued as good screening test of fetal surveillance. Abnormal CTG in fluence the fetal outcomes, i.e, poor Apgar score at 1 minute and 5 minutes, increased rate of caesarean section and neonatal resuscitation. Therefore there is a need to develop a uniform and unequivocal definition of FHR tracing to reduce the incidence of false positive findings that may result in increased incidence of unnecessary intervention particularly caesarean section.

DISCLOSURE

The authors report no conflicts of interest in this work.

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REFERENCES

1. Alfirevic Z, Devane D, Gyte GML. Continuous cardiotocogaphy as a form of electronic fetal monitoring for fetal assessment during labour. Cochrane Database Syst Rev. 2008;CD0066066.
2. Gardosi J. Monitoring technology and the clinical perspective. Bailliere's Clin Obstet Gynaecol. 1996;10:325-40.
3. Sheikh SM, Kamaruddin A, Senta F, Riaz T. Role of pathological cardiotocography in evaluating fetal well being. J Coll Physicians Surg Pak. 2006;16:404-7.
4. Atanasov B, Ignatov P. Quantitative cardiotocography. Akush Gynaecol. 2008;47:11-5.
5. Ash AK. Managing patients with meconium stained amniotic fluid. Hospmed. 2002;161:325-31.
6. Danielian P, Steer PJ. Fetal distress in labour. High risk pregnancy management option. 3rd ed. New Delhi: Elsevier; 2006.p.450-72.
7. Palomaki O, Iuukkaala T, Luoto R, Tuimala R. Intrapartum cardiotocography. The dilemma of interpretational variation. J Perinat Med. 2006;34:298-302.
8. Bix E, Reiner LM, Klovning A, Oian P. Prognostic value of labour admission test and its effectiveness compared with auscultations only: A systematic review. Brit J Obstet Gynaecol. 2005;112:1595-1604.
9. De Snoo K, Leerboek der verloskundde. Wolters Uitgeversmaatschappjj Groningen. 1946.
10. Herman PG, Kurjak A. Cardiotocography. Textbook of Perinatal Medicine. 1998;2:1424-8.
11. Sureau C. The history of fetal surviellance. In: Van Geijn HP, Copray FJA, editors. A critical appraisal of fetal surviellance. Elsevier; 1994:3-10.
12. Hagberg B, Hagberg G, Beckung E, Uvebrant P. Changing panorama of cerebral palsy in sweden: prevalence and origin in the birth year period 1991-94. Acta Paediatr. 2001;90:271-77.
13. Low JA, Pickersgill H, Killen H, Derrick EJ. The prediction and prevention of intrapartum fetal asphyxia in term pregnancies. Am J Obstet Gynaecol. 2001;184:724-730.
14. Pare JT, King T. Fetal heart rate monitoring: Is it salvageable? Am J Obstet Gynaecol. 2000;182:982-7.
15. Mamatha K. A one year cross-sectional study for evaluation of cardiotocography monitoring for intrapartum fetal surveillance and its correlation with Apgar score and cord blood with PH. [Dissertation] Rajiv Gandhi University of Health Science, Karnataka, Bangalore, India. 2006.
16. Amena K, Nurun NK, Fahmida N. Role of elabourate cardiotocography in pregnancy management. BSMMU J. 2009;2:18-24.
17. Farkhunda K, Chandra MD, Nasreen J. Cardiotocography: obstetric and neonatal out come. J Rawal Med Coll. 2009;13:86-8.
18. Oladrian FA, Raphaeil JP. Abnormal antepartum cardiotocography and major fetal abnormalities. ANZJOG. 2008;28:120-23.
19. Kulkarni AA, Shroti AN. Admission test: a predictive test for (fetal) distress in high risk labour. J Obstet Gynaecol Res. 1998;24:255-59.
20. Dellinger EH, Boehm FH, Crane MM. Electronic fetal rate monitoring: early neonatal outcomes associated with normal rate, fetal stress and fetal distress. Am J Obstet Gynaecol. 2000;182:214-20.
21. Tan KH, Wyldes MP, Settatree R, Mitchell T. Confidential regional enquiry into mature stillbirth and neonatal death-a multidisciplinary peer panel perspective of the perinatal care of 238 deaths. Singapore Med J. 1999;40:251-5.