Research Article

Fetal outcome in pathological cardiotocography (CTG), omdurman maternity hospital

Abstract

Objective: To determine the role of pathological cardiotocography in evaluating the fetal well-being.

Methods: This is cross sectional hospital-based study.

Results Our study included 100 with abnormal CTG, 72 (72%) of them were intrapartum and classified as pathological CTG, and 28 patients had their CTG during antenatal periods (Non-stress test), all of these 28 patients, were delivered by C/S (100%), with 25 (89.2%) babies cried immediately and 3(10.7%) cried after resuscitation, their Apgar scores at 1minute was >8 in 25(89.2%) babies. Out of 72 intrapartum pathological CTG, 59(81.9) were delivered by C/S, 8 (11.1%) by Instrumental delivery and 5 (6.9%) through NVD, 21 (29.1%) of babies cried immediately, 46(63.8%) cried after resuscitation and 5(6.9%) their outcome was early neonatal deaths.

Conclusion: CTG found to be important in evaluating the fetal well-being. Adjunctive methods are required to improve the sensitivity and specificity of fetal monitoring.

Keywords: cardiotocography, cerebral palsy, fetal monitoring, uterine

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Abbreviations: APH, antepartum hemorrhage, C/S, caesarean section, CP, cerebral palsy, CTG, cardiotocograph, D-D, decision to delivery, EFM, electronic fetal monitoring, FHBs, fetal heart beats, FHR, fetal heart rate, FIGO, International federation of gynecology and obstetrics, HIE, hypoxic-ischemic encephalopathy, IOL, induction of labor, IUGR, intrauterine growth restriction, LSCS, lower-segment cesarean section, NICHD, National institute of child health and human development, PROM, prolonged rupture of membrane, SPSS, statistical packages for social sciences , UC, uterine contractions, USG, ultrasonography, UT, uterine , VBAC, vaginal birth after caesarean section, VD, vaginal delivery

Introduction & background

The purpose of CTG recordings is to identify when there is concern about fetal well-being to allow interventions to be carried out before the fetus is harmed. The focus is on identifying fetal heart rate (FHR) patterns associated with inadequate oxygen supply to the fetus. In general, FHR patterns classified as normal are a reliable indication of fetal well-being.[1] Up to 50 % of FHR patterns classified as pathological reflect physiological changes and can therefore be classified as false positives (false pathological). This can lead antepartum to increased numbers of induced births and higher numbers of operative deliveries. The most common causes of false positives are when certain disturbances and influencing variables are disregarded (e.g., fetal behavioral states, age of gestation), failure to use additional complementary evaluation methods, uncertainty of interpretation, and inconsistent threshold values and assessment modalities.[2,3]

The primary goal of antenatal evaluation is to identify fetuses at risk for intrauterine injury and death so that intervention and timely delivery can prevent progression to stillbirth. Ideally, antenatal tests would decrease fetal death without putting large numbers of healthy fetuses at risk for premature delivery and the associated morbidity and mortality. Despite widespread use of many tests, limited evidence exists to demonstrate effectiveness at improving perinatal outcomes with application of these tests.[4]

Introduction of electronic fetal monitoring (EFM) overcame these disadvantages and offered continuous fetal surveillance during pregnancy and, more importantly, during delivery. (CTG) is a measurement of FHR and uterine contractions (UC). Since its introduction the CTG has served as the main information channel providing obstetricians with insight into fetal well-being. The introduction of CTG in late 1960's was accompanied by great expectations. Initially, the CTG was intended for high risk pregnancies but it has become commonly used even for normal pregnancies.[5,6]

Antenatal cardotocograph (CTG): Pregnancy may be complicated by conditions that need additional ways of assessment of fetal well-being. These conditions include medical problems in the mother, which may impact on the fetus, pregnancy-specific problems and diseases of the fetus in which fetal health may be affected. Medical problems in the mother that are associated with increased risk to the fetus include essential hypertension, pre-eclampsia, renal and autoimmune disease, maternal diabetes and thyroid disease.[7,8] Other situations in pregnancy that pose an increased risk to fetal health are prolonged pregnancy, vaginal bleeding, reduced fetal movements and prolonged ruptured membranes.[6] Fetal conditions include intrauterine growth restriction and fetal infection; multiple pregnancies also increase the risks to the fetuses (Table 1).[9]

Antenatal CTG is a commonly used form of fetal assessment in pregnancy and uses the fetal heart rate as an indicator of fetal well-being.[9] It may be used in isolation, sometimes referred to as the 'non-stress test' or with the stimulation of uterine activity to see how the fetal heart responds, sometimes known as the 'contraction stress test.[10]

Intrapartum cardiotocograph: Once established in labour, a full clinical assessment of the woman and her pregnancy should be undertaken. Where the pregnancy is assessed as normal risk Intermittent Auscultation (IA) is sufficient. Where there are identified

antenatal or intrapartum risk factors, continuous EFM should be commenced.[11] Nice classification of CTG 2014 graded it normal reassuring and pathological, the latter considered when 2 non reassuring features or 1 abnormal feature identified (Table 2).[6]

Table 1 Shows distribution of the women according to personal data and indication for cardiotocograph

Item	N	%
Age		
< 20 years	13	13
20-29 years	46	46
30-39 years	34	34
40 years and above	7	7
Parity		
Primagravida	35	35
Multipara	65	65
Gestational age		
36-40 weeks	77	77
41-42 weeks	21	21
> 42 weeks	2	2

Table 2 distribution of CTG indication and antenatal care indication

Item	N	%
Indication for cardiograph		
Antenatal follow up	28	28
Intra-partum monitoring	72	72
antenatal care indications for cardiograph		
Post date	17	60.7
Hypertensive disorders	11	32.9
Intrapartum indications		
VBAC	31	43.05
APH	12	16.6
Meconium stained liquor	12	16.6
PROM	6	8.3
Hypertensive disorders	4	5.5
Fetal distress	3	4.1

Objectives

1- To determine the mode of delivery after pathological cardiotocograph (CTG).

2- To determine neonatal outcome after pathological cardiotocography (CTG).

Study design: Cross sectional study

Study period: This study was conduct in Maternity Hospital between the periods of January 2017 to June 2017.

Study areas: The area from which the sample selected was Omdurman Maternity Hospital. Omdurman Maternity

Study population: The study targeted all ladies with pathological cardiotocograph after 37 weeks whether booked patients with known gestational age or un-booked patient with also known gestational age. CTG was interpreted by 2 practitioner and classified according to NICE guideline Intrapartum care 2014.

Sample size: The study sample was determined from other studies, all cases that founded in the maternity hospital and met the inclusion criteria (100) cases.

Data collection: Data collected using structured questionnaire containing personal information and indication for CTG along with the outcome for mother and baby.

Any abnormal CTG was interpreted with senior one and discussed to ensure no variation in the diagnosis. Any differences among any of the CTG was a call for exclusion.

Inclusion criteria: Ladies after 37weeks who came for antenatal follow up with known gestational age or intra-partum with pathological pattern in cardiotocograph.

Exclusion criteria: Pregnant Ladies below 36 weeks gestation with pathological cardiotocograph .and those with unknown gestational age.

Ethical aspects

a. written Consent from participants after the purposes and nature of the study were explained).

b. Agreement was taken from Hospital managerial department.

c. Study was not interfering with patient management.

d. confidentiality of data from the patients was assured.

Table 3 Shows distribution of women according to their fetal outcome after ante and intra-partum abnormal CTG

Intrapartum N (%)	Antenatal N (%)	Item
21 (29.1%)	25 (89.2%)	Cried immediately
46 (63.8%)	3 (10.7%)	Cried after resuscitation
5 (6.9%)	0 (0%)	Not cried at all
16 (22.2%)	2 (7.2%)	Apgar score 3-5 at 1min
3 (7 51.3%)	1(6.8%)	Apgar score6-8 at 1 min
19 (26.3%)	25 (89.2%)	Apgar score >8 at 1 min
09 (12.5%)	0 (0%)	Apgar score 3-5 at 5min
17 (23.6%)	03 (10.7%)	Apgar score6-8 at 5 min
46 (63.8%)	25 (89.2%)	Apgar score >8 at 5 min
57 (79.1%)	07 (25%)	NICU admission

Results

Among the 100 patients who was classified as pathological CTG, of which 72 (72%) were in the intrapartum and 28 (28%) in the antepartum period. The women under study according to their age, parity, Gestational age, antenatal and intrapartum indication for CTG. (46%) of them aged between 20-29 years, (34%) of them between 30-39 years, (13%) less than 20 years and 7(7%) their ages 40 years and above. Women according to parity about (35%) of them were primagravida and (65%) of them were multipara. The gestational age of participants showed (77%) of them at the gestational age 36-40 weeks, followed by (21%) between 41-42 weeks, and (2%) more than 42 weeks. The indication for cardiograph (72%) was intrapartum monitoring and for (28%) antenatal follow up.

The distribution of the women according to their indications for antenatal cardiograph (CTG), these include postdate pregnancy 17(60.7%) and hypertensive disorder 11(39.2%). The distribution of women according to their indications for intrapartum cardiograph, these indications include VBAC 31(43.05%), postdate 2 (2.77%), hypertensive disorder 4(5.55%), meconium stained liquor 12(16.66%), APH 12(16.66%), PROM 6(8.33%), fetal distress 3(4.16%), breech in labour 1(1.38%) and UT hyper stimulation 1(1.38%).

In term of mode of delivery after antenatal and intrapartum pathological CTG, antenatally all of them 28 (100%) delivered through caesarean section. While the mode of delivery after intrapartum pathological CTG about 59(81.9%) delivered through

caesarean section, 8(11.1%) by instrumental delivery and 5(6.9%) through normal vaginal delivery.

Regarding to the babies after antenatal and intrapartum pathological CTG with relation to admission to the NICU, Out of 28 babies 25 (89.2%) cried immediately, 3(10.7%) cried after resuscitation, their Apgar scores at 1minute was >8 in 25(89.2%) babies ,followed by 6-8 in 1 baby (6.8%) and was 3-5 in 2 babies(7.1%),at 5 minutes it was > than 8 in 25(89.2%), 6-8 in 3(10.7%)babies, 7 (25%) of babies were admitted ,2(28.5%) of them were admitted for more than 24 hours and 5(71.4%) for less than 24 hours. Out of 72 intrapartum pathological CTG, 59(81.9) were delivered by C/S, 8 (11.1%) by Instrumental delivery and 5 (6.9%) through NVD, 21 (29.1%) of babies cried immediately, 46(63.8%) cried after resuscitation and 5(6.9%) their outcome was early neonatal deaths. Their Apgar score was > 8 in 19(26.3%), followed by 6-8 in 37(51.3%) and was 3-5 in16(22.2%) babies ,at 5 minutes Apgar score was > 8 in 46(63.8%), followed by 6-8 in 17(23.6%) and was 3-5 in 9(12.5 %) of the babies, 57 (79.1%) babies were admitted to NICU of 50 (87.7) of them admitted for more than 24.

Discussion

Cardiotocography is one of the reliable methods of monitoring of fetuses in pregnancy and during childbirth. Pathological CTG record with high probability indicates possibility of existence of perinatal asphyxia. Unfortunately, cardiotocography has also large number of false positive findings. In this study, 100 women were enrolled to determine the role of pathological cardiotocography in evaluating the fetal well-being 72 of them done in intra-partum periods and 28 done in antenatal periods. Cesarean section rate in babies with antenatal pathological cardiotocography showed high rate, where all of them 28(100%) delivered through caesarean section. Non stress test when it became abnormal especially If the lady is not in labour carry high rate of aggressive intervention from the health care providers it should be accompanied with other tests such as biophysical profile and Doppler ultrasound,[12,13] but most babies delivered after antenatal CTG showed out good outcome in term of Apgar scores at 1 and 5 minutes and neonatal duration of the admission so there must be protocol in every hospital regarding abnormal non-stress test of the CTG, in cases of sever pre-eclampsia it seems the intervention is justifiable as termination is seems the end anyway anyhow.[14] In cases of postdate pregnancies other tests should be done adjunct to GTG such as ultrasound for amount of liquor, and biophysical profile, but if its accompanied with decrease fetal movement especially if it was recurrent may indicates some sorts of fetal compromise especially if there was abnormal CTG, and the intervention is justifiable, so the clinical situation in every individual case may vary and clinical judgment must not be an overreaction or under-reaction.[15]

Regarding mode of delivery following intra-partum pathological CTG The very high rate of cesarean section (81.9%) due to lack of fetal PH sampling which is not found in the hospital,[16] the test will confirm the pathological pattern of CTG, and then any intervention is justified, hence the low rate of vaginal deliveries, in the absence of fetal blood sampling it's safe to deliver the baby by the fastest route. Low CS rate was observed in study of Bogdanovic et al.[17] Other adjunct to CTG now days widely investigated to reduce the false positives rate of CTG and to increase its sensitivity, those include ST wave analysis (STAN), vibroaocustic stimulation and fetal scalp stimulation.

Our result in agreement with most of studies as with The fact that, delivery by Cesarean Section is usual when CTG becomes abnormal was supported by the study of Farkhunda Khursheed et al.,[18] which showed a high Cesarean Section rate (72.72%) in the presence of pathological pattern of CTG. Similar observation was made by Oladrian et al.,[19] in a study which showed 72% Cesarean Section rate. Also our result didn't agrees with study of Bouiller JP where they count C/S rate of 43.6% and instrumental delivery in 34.6%, the difference might be due to use of scalp sampling for PH after the pathological pattern in CTG. Alvaizer stated in their study that cardiotocography showed no significant improvement in overall perinatal death rate (risk ratio (RR) 0.86, 95% confidence interval (CI) 0.59 to 1.23, n = 33,513, 11 trials), but was associated with a halving of neonatal seizures (RR 0.50, 95% CI 0.31 to 0.80, n = 32,386, nine trials). There was no significant difference in cerebral palsy rates (RR 1.75, 95% CI 0.84 to 3.63, n = 13,252, two trials).[20]

Regarding fetal outcome after diagnosis of pathological CTG, showed out poor outcome according to internationals figures as its estimated that risk of stillbirth is 5.3/1000.[6] This is agrees with the study of Bouiller JP et al, where Thirty-eight newborns (46.3%) were admitted in neonatal intensive care in which they noted 3 deaths (3.65%), 2 multi-organ failures (2.4%) and 17 neonatal encephalopathy (20.7%),[21] but their study has large sample size if we looked over their incidence it agrees with the international figures. Also our results agreed to the study of Sheikh SM et al, where among 60 patient with pathological CTG 53 born alive and 7 was born still birth,[22] this proved that CTG has high false positive rate as concluded from my study.

APGAR score at 1and 5 minute after antenatal CTG showed out high scores with 3 babies their scores less than 6, this related to consequence of sever preeclampsia as it affect in utero-placental perfusion rendering the fetus prone to IUGR and long periods of hypoxemia ,but with advanced neonatal support and care most of those babies get recovered. Regarding Apgar score at 1 and 5 minutes after intra-partum pathological CTG showed out, 53 babies their scores less than 8 ,16 (22.2%) of them less 6 and at 5minutes persistent low Apgar scores only in 9 (12.5%) low Apgar scores is anticipated outcome in those babies with pathological CTG with fetal blood sampling , academia will be the confirming result. In situation where there no access to fetal scalp sampling paired cord sample must be obtained after delivery this agrees with study of SHIEKH SM et al.[22]

In term of Admission of the baby to NICU after ante/intra partum pathological (CTG) it's the hospital policy to admit those babies with pathological CTG after they have been assessed by pediatrician, the decision of the duration of admission is made by the pediatrics staff in hospital, our study in agreement with sheikh et al study[22] where the hospital policy is to admit every baby with pathological CTG and the duration of admission was 15 babies (30%) admitted for less than 24 hours, 26 babies (49%) for 2-4 days and 12 babies (22%) for more than 4 days.

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Conflicts of interest

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