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CLINICAL ARTICLE

A study of fresh stillbirths weighing 2500 g or more at three academic hospitals in South Africa

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ABSTRACT

Objective: To determine the frequency of fresh stillbirths weighing 2500 g or more, to assess the risk factors and direct obstetric causes, and to describe avoidable factors in terms of substandard intrapartum management. **Methods:** A prospective, cross-sectional, descriptive study was conducted at three obstetric teaching units in Johannesburg, South Africa. Data were consecutively collected for 6 months at each of the hospitals, leading to an 18-month data collection period from May 1, 2011, to October 31, 2012. The study population was hospital-born, singleton fresh stillbirths weighing 2500 g or more. **Results:** Overall, 52 fresh stillbirths were eligible. Intrapartum catastrophic events were recorded in 30 (58%) cases (16 placental abruption, 7 cord prolapse, 4 ruptured uterus, and 3 entrapment of aftercoming head during breech delivery). Intrauterine fetal death was recorded on arrival at hospital in 15 (29%) cases. Twenty-two (42%) women underwent cardiotocography monitoring; 15 (29%) had no fetal monitoring. Among 25 cases in which the emergency was recognized, the median time from recognition of emergency to delivery was 182 minutes (range 13–360). **Conclusion:** There appears to be a failure to detect or respond to evidence of fetal distress even in facilities with skilled staff and available resources.

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1. Introduction

A stillbirth is a devastating experience for a woman and her family, perhaps more so in the case of a fresh stillbirth, when the fetus is usually alive at the initiation of labor and there are expectations of a good and joyful outcome at delivery. At least 2.65 million third-trimester stillbirths were estimated worldwide in 2008 (≥ 1000 g birth weight or ≥ 28 weeks of pregnancy) [1]. A large proportion of fetal deaths in low- and middle-income countries occur in the intrapartum period, usually resulting in fresh stillbirths [2–4].

In South Africa, the incidence of fresh stillbirths weighing 2500 g or more seems to be unacceptably high, even in secondary and tertiary referral institutions [5]. Fresh stillbirths in this birth-weight category should be rare, but 35% of fresh stillbirths in South Africa are in this category, with the leading primary obstetric cause of death being intrapartum asphyxia and birth trauma [5,6]. The root of the problem seems to be a failure to detect evidence of fetal distress, especially in labors that appear uncomplicated [7]. Although the resources needed for adequate intrapartum fetal heart rate monitoring, such as cardiotocography, are available in referral facilities, unborn fetuses do not always benefit from their use [7]. The shortfalls in intrapartum fetal surveillance leading to appropriate fetal monitoring not being performed, or being incorrectly interpreted, need to be determined.

The present study was performed to determine the frequency of fresh stillbirths among fetuses weighing 2500 g or more at three academic hospitals in Johannesburg, identify the risk factors and direct obstetric causes for fresh stillbirths, and describe avoidable factors in terms of substandard intrapartum management, especially with regard to fetal heart rate monitoring.

2. Materials and methods

A prospective, cross-sectional descriptive study was conducted at three obstetric units in Johannesburg: Chris Hani Baragwanath Academic Hospital, Charlotte Maxeke Johannesburg Academic Hospital, and Rahima Moosa Mother and Child Hospital. All three are referral hospitals with academic training status at the University of the Witwatersrand. Obstetric staff included faculty specialists, residents, and medical interns. The users of each of these hospitals are people who do not have, or cannot afford, private medical insurance.

The study population included hospital-born, singleton fresh stillbirths weighing 2500 g or more at birth. The case definition was fresh stillbirth charted in the labor ward register and confirmed as such in the maternity case file. Fresh stillbirths were excluded if there were congenital abnormalities likely to have contributed to the fetal death, including feticides, and if there was doubt in the clinical documents about whether the stillbirth was fresh or macerated. Maternal medical or obstetric conditions were not considered as exclusion criteria. Data were consecutively collected at the three hospitals for a duration of 6 months each, leading to an 18-month data collection

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period from May 1, 2011, to October 31, 2012. Written informed consent was obtained from each mother. Ethical approval was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand.

Relevant information was found in the patient clinical folders. Demographic and obstetric information recorded included maternal age, obstetric history, prenatal care, syphilis serology, HIV status, and maternal hemoglobin level. Gestational age of the fetus was based on early pregnancy ultrasonography (≤ 24 weeks) if available, or on a best estimate on the basis of clinical information or later ultrasonography. A proven history of intrauterine growth restriction was documented if diagnosed using serial ultrasonography.

Intrapartum information obtained included birth weight, induction or augmentation of labor, mode of delivery, and meconium staining (thick or thin as described in the folders) of the amniotic fluid. The progress of labor and delivery was defined as: (1) poor progress in the latent phase (cervix dilated ≤ 3 cm, not fully effaced) when it exceeded 8 hours in hospital; (2) poor progress in the active phase (cervix dilated ≥ 3 cm, fully effaced) if the cervix dilated at a rate of less than 1 cm per hour; and (3) poor progress in the second stage (cervix fully dilated) when there was no bearing down after 1 hour of full dilation or delivery had not occurred after 45 minutes of expulsive effort in a nullipara, or 30 minutes of bearing down in a multipara [8].

Intrauterine fetal death (IUFD) on arrival at hospital, which was confirmed by ultrasonography, was noted. If the fetus was alive on arrival, the time taken from recognition of emergency (if and when it occurred) to delivery was calculated in minutes.

The fetus was classified as being monitored if there was documented intermittent fetal heart auscultation or if there were cardiotocograph (CTG) tracings (intermittent or continuous) in the folder or documentation of the interpretation of such tracings. Fetal distress was classified according to the three-tiered fetal heart rate interpretation system as category I, II, or III, with the latter indicating fetal distress [9,10]. If the CTG tracings on which decisions were made were not classified in the correct category according to this system, these were then labelled as being incorrectly interpreted. The researcher (M.B., a resident at the time of the study) interpreted the tracings and the classification was confirmed by a specialist colleague. Intrauterine resuscitation was defined as one or more of the following: left lateral positioning of the mother, correcting of maternal hypotension, maternal oxygen administration, discontinuation of uterine stimulation (stopping oxytocin administration), or suppression of uterine contractions (by administering salbutamol or nifedipine) [11]. Catastrophic events directly related to the fresh stillbirth were documented, and included placental abruption, cord prolapse, uterine rupture, and birth trauma.

Data were analyzed using Stata 11 software (StataCorp, College Station, TX, USA). Descriptive statistics included statements of frequencies with percentages and confidence intervals, medians with ranges, and means \pm standard deviations. When differences in frequencies between groups were compared, the Fisher exact test was used, with a two-tailed *P* value of less than 0.05 indicating statistical significance.

3. Results

A total of 52 eligible fresh stillbirths were identified. All hospitals had fresh stillbirth rates of between 2.0 and 3.0 per 1000 births for neonates of 2500 g or more (Table 1).

A summary of demographic and obstetric information, intrapartum details, progress of labor, and delivery of the 52 cases is shown in Table 2. Most mothers had attended a prenatal clinic. No cases were complicated by eclampsia. No women presented with diabetes mellitus, cardiac disease, thromboembolic disease, or connective tissue disorders and none was acutely ill; one woman had mild asthma.

Seven (13%) fetuses were delivered at a gestational age of at least 41 weeks. None of the neonates weighed more than 4000 g at birth. There were no cases of proven intrauterine growth restriction. Four

Table 1
Number of births and fresh stillbirths at each hospital.^a

Variable	Chris Hani Baragwanath Academic Hospital	Charlotte Maxeke Johannesburg Academic Hospital	Rahima Moosa Mother and Child Hospital
No. deliveries in 6-mo period	11 952	4692	5974
No. deliveries ≥ 2500 g in 6-mo period	9781	3720	5050
Fresh stillbirths ≥ 2500 g in 6-mo period	25	14	13
Rate of fresh stillbirths ≥ 2500 g, per 1000 deliveries	2.09 (1.35–3.09)	2.98 (1.63–5.00)	2.18 (1.16–3.72)
Rate of fresh stillbirths ≥ 2500 g, per 1000 deliveries of ≥ 2500 g	2.56 (1.65–3.77)	3.76 (2.06–6.31)	2.57 (1.37–4.40)

^a Values are given as number or rate (95% confidence interval).

women had labor induced with oral misoprostol; the indications for induction were prolonged pregnancy ($n = 2$) and hypertensive disorder ($n = 2$). No labors were augmented.

Most births were either normal vaginal deliveries or cesarean deliveries; four were assisted vaginal deliveries. Three women were booked for elective cesarean delivery but experienced complications before the planned date: the first had undergone two previous cesarean deliveries and was not in labor but had placental abruption with an IUFD on arrival; the second had undergone two previous cesarean deliveries, was not in labor, and presented with an IUFD on arrival; and the third had undergone one previous cesarean delivery, had gone into labor, and presented with uterine rupture. There was one case of placenta previa presenting with an IUFD on arrival at hospital. Apart from the first two elective cases mentioned previously, all other women were confirmed to be in labor.

No women had prolonged labor in the latent phase of labor, while three women had a prolonged active phase of the first stage and three had a prolonged second stage of labor. Most women with meconium-stained amniotic fluid had fluid of a thick consistency.

Table 2
Obstetric characteristics of fresh stillbirths ($n = 52$).

Characteristic	Value ^a
Prenatal maternal characteristics	
Age, y	25.6 \pm 5.5
Nulliparous	23 (44)
Previous cesarean delivery	12 (23)
Attended prenatal clinic	42 (81)
HIV seropositive	16 (31)
Combination antiretroviral therapy	6 (38)
Anemia ^b	20 (38)
Hypertensive disorder	10 (19)
Intrapartum details	
Gestational age by best estimate, wk	38.4 \pm 2.3
Birth weight, g	3038 \pm 411
Pre-labor rupture of membranes	1 (2)
Induction of labor	4 (8)
Augmentation of labor	0
Progress of labor and delivery	
Prolonged labor	6 (12)
Prolonged latent phase of labor	0
Prolonged active phase of first stage	3 (6)
Prolonged second stage	3 (6)
Meconium-stained amniotic fluid	23 (44)
Thin meconium	4 (17)
Thick meconium	19 (83)
Mode of delivery	
Normal vaginal delivery	24 (46)
Cesarean delivery	24 (46)
Vacuum	3 (6)
Forceps	1 (2)

^a Values are given as mean \pm SD or number (percentage).

^b Hemoglobin < 110 g/L.

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