

Stillborn Fetuses : Estimation of Time of Death From External Examination

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Summary

In this prospective study, assessment of gross changes occurring in still born fetuses after intrauterine death were made in order to estimate the death-delivery interval.

One hundred still born fetuses were examined for gross features as proposed by Genest and Singer (1992). Four of these maintained good predictive value in our study (Cord discolouration (≥ 6 Hrs.), desquamation > 1 cm (≥ 6 hrs.), desquamation $> 5\%$ (≥ 18 hrs.) and desquamation ≥ 2 zones of body (≥ 18 hrs.). Apart from these, bluish discolouration of cord and skin were two additional features that emerged as the earliest good predictors for timing IUD of ≥ 3 hrs.

Estimation of time of fetal death in - utero can thus help in planning necessary preventive measures in subsequent pregnancies.

Introduction

Stillbirth is an event which has always challenged the obstetrician. Determination of time of fetal death in utero can help in adopting appropriate preventive measures in the future pregnancies. Various techniques used to find the time of intrauterine death (IUD) are autopsy of the stillborn, histological evaluation of the placenta and external examination of the dead fetus (Genest et al 1992). Autopsy and placental histology are time consuming and expensive procedures. In most of the cases, parents do not even give consent for autopsy. How accurate can the external examination of the fetus be?

There are very few studies which have described various sequential changes occurring after IUD (Langley 1971, Potter and Craig 1975, Becker 1989). It was only Genest and Singer (1992) who developed gross criteria for timing the fetal death from external examination. The objective of the present prospective study was to assess the gross changes occurring in the stillborn fetuses after

IUD and to evaluate the criteria proposed by Genest and Singer (1992).

Material and Methods

One hundred stillborn fetuses with well timed deaths, born in labour ward of Post Graduate Institute of Medical Sciences, Rohtak were studied to analyse the gross changes associated with stillbirths. These fetuses were examined and the features proposed by Genest and Singer (1992) were studied in them. These were:

i) Skin colour	Normal/ red/ brown
ii) Cord colour	Normal/ brown/ brown red
iii) Mouth	Closed/ Partially open/ widely open
iv) Lip colour	Normal/ abnormal (red/ brown)
v) Eyelid colour	Normal/ Abnormal (dark red)
vi) Cranium	Not collapsed/ partially collapsed/ Severely collapsed
vii) Desquamation	
a) extent	None/ Slight/ moderate/ severe degree
b) Surface area involved	
c) Regions of body affected	
viii) Mummification	None/ regional/ diffuse

Each feature was assessed in terms of sensitivity, specificity and positive predictive value in predicting death-delivery interval. The findings in each fetus were then collectively assessed to determine whether gross characteristics could accurately determine the time of fetal death. Gross features with specificity, sensitivity and positive predictive value of > 0.800 were taken as good predictors.

Observations

Most of the stillbirths occurred at 34 weeks of pregnancy (range 28-41 weeks, mean 34.96 ± 3.03 weeks). Intrauterine retention time ranged from 2 hours to 2 weeks. Half of the patients delivered within 6 hours of IUD. In the rest, the time of delivery was as follows: 6-18 hrs. (20%), 18-36 hrs (5%), 36-48 hrs. (6%), 48-72 hrs. (11%), 72 hrs. - 1 week (6%) and 1-2 weeks (2%).

The two earliest features observed were bluish discoloration of the skin and of the umbilical cord. These were seen in the fetuses with death-to-delivery interval of 3 or more hrs. However in this period, desquamation < 1 cm did not prove to be a good predictor. Desquamation measuring > 1 cm in diameter and cord discoloration (brown/red) were observed in fetuses who delivered > 6 hrs. after the IUD. In deliveries occurring after 18 hrs.

desquamation involved > 50% of the body surface. All these features proved to be good predictors. The specificity, sensitivity and positive predictive value of other gross features is shown in table - I.

Fig. 1 shows gross features of a fetus who died 72 hrs. - 1 week before delivery. Using these criteria collectively, the death-delivery interval was correctly estimated in 79% cases.



Fig. 1: 39 weeks fetus (2.9 kg) who died between 72 hours-1 week before birth. Note collapsed skull, partially open mouth, cord discoloration and presence of desquamation on face (eye), neck, arms, chest, abdomen, scrotum and legs.

Table 1 Comparison of Gross Changes of Genest and Singer (1992) and the present study

S. No	Gross Findings	Retention Time	Genest & Singer (1992)			Present Study		
			Sensi.	Speci.	PPV	Sensi.	Speci.	PPV
1	Desquamation < 1 cm	≥ 3 hours	0.878	0.667	0.923	0.833	0.792	0.737
2	Desquamation > 1 cm	≥ 6 hours	0.853	0.812	0.921*	1.000	0.964	0.957*
3	Cord Discoloration (Brown/Red)	≥ 6 hours	0.947	0.867	0.947*	0.800	1.000	1.000*
4	Desquamation Face, Back and abdomen	≥ 12 hours	0.864	0.905	0.941*	1.000	0.750	0.882
5	Desquamation > 5% of Body	≥ 18 hours	0.862	0.920	0.926*	0.867	1.000	1.000*
6	Desquamation > 2 of 11 zones	≥ 18 hours	0.931	0.920	0.931*	1.000	0.875	0.917*
7	Skin color (Brown/Red)	≥ 24 hours	0.828	0.928	0.923*	0.769	0.892	0.714
8	Desquamation moderate/severe	≥ 24 hours	0.896	0.857	0.867*	0.714	0.909	0.909
9	Any cranial decompression	≥ 36 hours	0.619	0.935	0.866	1.000	0.857	0.733
10	Desquamation > 10% of body	≥ 48 hours	0.904	0.857	0.791	1.000	0.800	0.700
11	# Desquamation > 75% of body	≥ 72 hours	0.529	0.945	0.818	-	-	-
12	Widely open mouth	≥ 1 weeks	0.700	0.837	0.500	1.000	0.857	0.500
13	# Mumification (any)	≥ 2 weeks	0.888	1.000	1.000*	-	-	-
14	# Skin color Tan	≥ 4 weeks	1.000	0.962	0.714	-	-	-
15	\$ Skin color blue	≥ 3 hours	-	-	-	0.929	0.895	0.867*
16	\$ Cord color blue	≥ 3 hours	-	-	-	0.800	1.000	1.000*

Sensi = Sensitivity

Speci = Specificity

PPV = Positive Predictive Value

* Good Predictor

Features not found in our body

\$ -New features in present study

Discussion

When death occurs before delivery degenerative changes begin immediately and retained fetus undergoes maceration. Maceration is characterized by softening and peeling of skin and discoloration and softening of viscera. These changes are nonputrefactive and progressive (Potter and Graig 1975, Becker and Becker 1989, Genest et al 1992).

Bluish discoloration of the skin and of the cord were the earliest changes that developed after IUD. These proved to be good predictors for IUD of > 3 hrs. Both these changes had not been observed by Genest and Singer (1992). Desquamation < 1 cm, reported to be a good predictor during this period by them, proved to a poor predictor in the present study.

Desquamation was however progressive, its extent and degree being directly related to intrauterine retention time (Table I).

Genest and Singer (1992) had described eight gross features which correlated reasonably well with the death delivery interval (good predictors). However in the present analysis, only four of these features could be described as good predictors. Hence the total of six good predictors that emerged from the present study are:

1. Bluish discoloration of skin (at ≥ 3 hrs)
2. Bluish discoloration of the cord (at \geq hrs.)
3. Desquamation > 1 cm (at ≥ 6 hrs.)
4. Red/brown discoloration of the cord (at ≥ 6 hrs.)
5. Desquamation > 5% body surface (at ≥ 18 hrs.)
6. Desquamation 2 or more zones of the body (at ≥ 18 hrs.)

To conclude, for deliveries occurring within 24 hrs. of IUD, the external examination of stillborn fetuses appears to be a reliable, cost effective, less time consuming and an easy method for determining the death-delivery interval. Further studies are required to develop good predictors for deaths of > 24 hrs. duration.

References:

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