

# Abrupt Fall in the Fetal Heart Rate during Labour

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## SUMMARY

Cardiotocograms of 6 044 patients in labour were examined for evidence of an abrupt fall in the fetal heart rate. The latter was defined as a deceleration of at least 50 beats within 3 minutes, without a demonstration of signs of recovery in the following 2 minutes. Only 9 instances could be found — an incidence of 0,15%. Umbilical cord entanglement possibly played a role in 6 of these instances, and 2 of the infants concerned were stillborn. Intra-uterine growth retardation was associated with deceleration in 3 infants, 1 of whom was stillborn.

*S. Afr. med. J.*, 50, 1960 (1976).

Acute fetal distress during labour is unusual. Saling and Schneider<sup>1</sup> mentioned that acute metabolic disorders had occurred in 0,5% of the fetuses that they studied. Boehm<sup>2</sup> examined approximately 2 000 fetal monitor tracings, of which only 12 demonstrated prolonged end-stage deceleration.

By monitoring the fetal heart rate during labour, impending fetal distress, reflected by patterns such as decelerations, basal tachycardia and/or loss of beat-to-beat variation, may be detected at an early stage. In the case of early or late decelerations, the heart rate slows rather gradually and recovers at or after the end of the contraction. Variable decelerations are characterised by a sudden and occasionally severe decrease in the heart rate, but recovery is usually rapid. However, an abrupt fall in the heart rate occasionally occurred when recovery failed to take place. Prompt delivery, by the most appropriate means, often Caesarean section, is mandatory in these cases. The present study is concerned with these unusual patterns in the heart rate.

## PATIENTS AND METHODS

### Patients

Routine fetal monitoring of all labours is departmental policy at Tygerberg Hospital. Since patients whose labour is uncomplicated are delivered at home or in a mobile labour unit, most of the patients with labour complications who are admitted come from a large surrounding area. During the period July 1972 until June 1975 cardiotocograms of 6 044 patients who were in labour were examined for evidence of an abrupt fall in the fetal heart rate. The latter was defined as a deceleration of at least 50 beats within 3 minutes, without signs of recovery in the following 2 minutes.

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## Method

Hewlett-Packard cardiotocographs (model 8020 A) were used for monitoring. Whenever possible, the double spiral scalp electrode was used for recording the heart rate. Uterine contractions were recorded either externally or internally. Unless stated otherwise, a paper speed of 1 cm/min was used.

Finally, these records were examined specifically for instances of an abrupt fall in the fetal heart rate.

## RESULTS

Of the 6 044 cardiotocograms examined, 9 demonstrated an abrupt, severe and prolonged fall in the fetal heart rate during labour — an incidence of 0,15%.

Nuchal encirclement of the umbilical cord occurred in 6 patients (Table I). Three infants were stillborn, cord involvement having occurred in 2. Birth weights of 2 500 g or less were noted in 4 infants (44%). Only 1 patient was delivered normally, since the fall in the heart rate occurred late in the second stage of labour. Forceps deliveries were performed in 2 instances, and vacuum extraction in 1. Caesarean sections were performed on 5 patients, 2 of whom delivered stillborn babies. Variable decelerations, although occasionally small, preceded the fall in the heart rate in 7 instances.

By application of the growth standards of Jaroszewicz *et al.*,<sup>3</sup> 4 infants were found to have birth weights below the tenth percentile for that specific gestational age. In patient No. 6, however, the second twin was small for dates, although abrupt deceleration in the heart rate was demonstrated in the first.

## DISCUSSION

Several causes of severe deceleration of the fetal heart rate have been mentioned in the literature. Beard *et al.*<sup>4</sup> and Hadjev<sup>5</sup> found the supine hypotension syndrome to be a potential cause. Epidural and paracervical blocks could also cause severe decelerations.<sup>6-8</sup> Another aetiological factor is oxytocin overstimulation.<sup>9,10</sup>

Tejani *et al.*<sup>11</sup> described 16 cases of prolonged fetal bradycardia, which was defined as a decrease in the fetal heart rate of more than 30 beats per minute, lasting longer than 2½ minutes. The onset of the bradycardia was found to be associated with tetanic uterine contractions and scalp blood sampling in most of the fetuses. In only one of them did the bradycardia last longer than 10 minutes and an acute fall in the heart rate was not mentioned. Cord compression also plays a role in sudden deceleration, probably through vagal stimulation.<sup>12-14</sup> Boehm<sup>2</sup> described 12 instances of prolonged end-stage fetal heart rate deceleration which occurred suddenly in 4 fetuses, and almost precipitously in 2. Umbilical cord entanglement was noted in only 2 of Boehm's 12 patients;

TABLE I. CLINICAL DATA

Patient No.	Age (yrs)	Parity	Gestational age	Maternal complication	FHR preceding deceleration	Amplitude of deceleration (beats/min)	Duration of initial deceleration (min)	Method of delivery	Deceleration delivery interval (min)	Birth weight (g)	Apgar score at 1 and 5 min	Cord around neck
1	19	0	36	Nil	Occasional early decelerations	125 - 60	>10	Wrigley's forceps	17	2 239	Stillborn	Yes
2	16	0	36	Severe pre-eclampsia	Variable decelerations	150 - 50	5	Episiotomy	9	2 300	9,10	Yes
3	24	0	38	Nil	Variable decelerations	145 - 55	6	Caesarean section	42	2 950	10,10	Yes
4	22	1	39	Nil	Variable decelerations	130 - 50	9½	Wrigley's forceps	35	2 640	10,10	No
5	24	1	42	Post-term	Variable decelerations	130 - 50	>10	Caesarean section	20	Growth retarded 2 430	9,10	Yes
6	19	0	38	Twin pregnancy	Basal tachycardia	170 - 70	>10	Caesarean section	15	1. 3 075 2. 2 380	1. 10,10 2. 4,7	No
7	17	0	42	Post-term. Abruptio placentae noted at operation	Variable decelerations	140 - 60	Returned to normal after 11 minutes	Caesarean section	225	2 700	Stillborn	No
8	30	6	35	Grand multiparity	Small variable decelerations	140 - 60	>14	Caesarean section	36	2 864	Stillborn	Yes
9	33	6	41	Poor weight gain	Loss of beat-to-beat variation	145 - 50	> 9	Vacuum extraction	39	2 500	1,3	Yes

however, this complication occurred in 6 of the 9 patients described in the present series. The very sudden fall in the heart rate which occurred in the majority of our patients strongly suggests vagal stimulation caused by cord compression, and it was probably the cause of the intra-uterine death of 2 infants. Growth retardation was found in an additional 3 infants. This complication probably also played a role in the aetiology of the abrupt fall in the heart rate, since small-for-dates infants do not usually tolerate hypoxia.

During management of these cases valuable time was wasted (Table I) in waiting for the heart to improve after conservative measures, such as turning the patient on her side, had been taken. The suppression of uterine contractions by beta-stimulants is advised as a temporary measure to reduce cord compression, as well as to improve chorio-decidual blood flow by means of uterine muscle relaxation (Figs 1 and 2). Appropriate measures for immediate delivery should therefore be instituted when the bradycardia fails to improve within 2 or 3 minutes after an abrupt fall (Figs 3 and 4). Even if the heart rate increases, a subse-

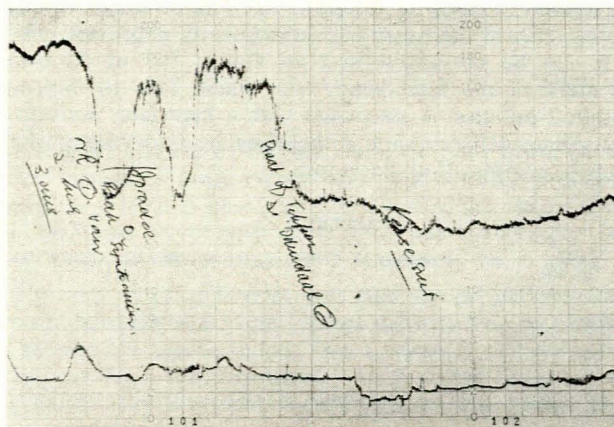


Fig. 1. Severe variable decelerations followed by abrupt prolonged deceleration (patient 6).

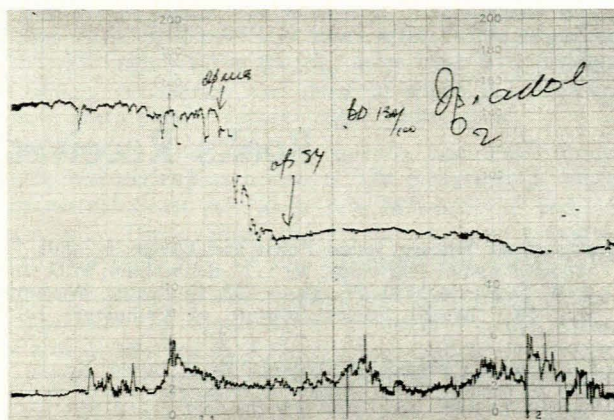


Fig. 2. Fetal heart rate improved after initial severe fall. Subsequent deceleration was followed by intra-uterine death (patient 7).

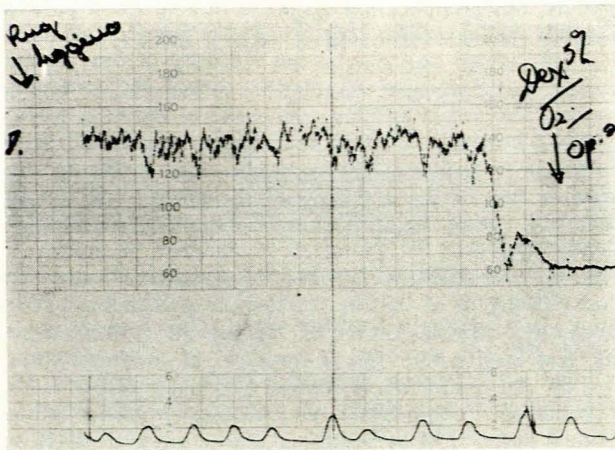


Fig. 3. Acute fall in heart rate is demonstrated (patient 8).

quent fall (as was demonstrated in patient No. 7) could always occur. If necessary, Caesarean section should be performed in cases of abrupt, severe and prolonged bradycardia, even if the heart rate subsequently improves.

It can be concluded that an abrupt fall of 50 beats or more in the fetal heart rate, which fails to improve within 2 minutes, is associated with a high fetal mortality. Immediate delivery should therefore be undertaken when such a complication develops.

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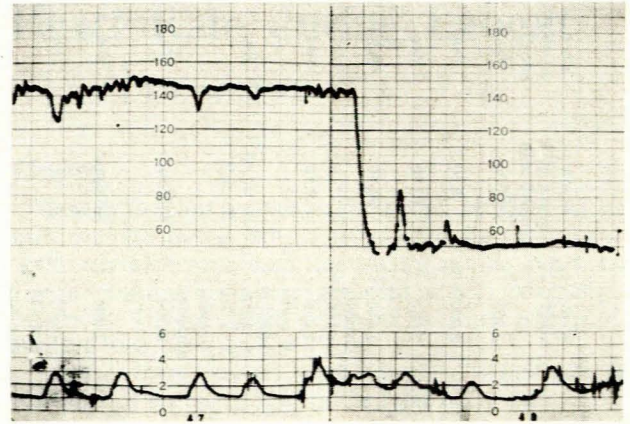


Fig. 4. Severe abrupt fall when patient was sitting upright. Cord entanglement found at delivery (patient 9).

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