

# AN UNUSUAL CASE OF INTERMITTENT ATRIAL PARASYSTOLE IN THE FETUS DURING LABOR

A. DI LIETO (\*), M. CHIARIELLO (\*\*\*),  
A. DI MEGLIO (\*), P. MARTINELLI (\*\*)

(\*) Chair of Perinatology

(\*\*) Obstetric and Gynecological  
Pathophysiology

(\*\*\*) Clinical Pathology

II School of Medicine - University of Naples

## INTRODUCTION

The recently introduced techniques for the control of high risk as well as normal pregnancies by cardiac monitoring of the fetus during labor represent an useful means for the continuous assessment of the fetal conditions as well as for the fast recognition of fetal distress; moreover, these techniques allow to identify a number of physiologic and pathologic patterns of the fetus' cardiac tracings previously completely unknown.

As an example, the study of the fetal electrocardiogram allowed to recognize abnormalities in cardiac rhythm during intrauterine life, as for example, congenital sinus bradycardia, atrial, junctional and ventricular premature contractions, tachycardia and other abnormalities, whose nature is difficult to identify.

In this report a case with a double cardiotocographic rhythm is described, in which a fetal intrauterine electrocardiogram simultaneously obtained allowed a careful analysis of the event.

## CASE REPORT AND METHODS

R. A. a 25 year old white woman, gravida I, was admitted to the labor and delivery Unit of the University Hospital of Naples at 40 week gestation. In the history, no previous medical, surgical or obstetrical problems were reported. The cervix was 1 cm dilated and was 30% effaced with a vertex presentation; the fetal heart rate (FHR) was 140 bpm. After two hours of labor, the spontaneous rupture of membranes occurred, the amniotic fluid being clear. A fetal monitoring was performed by a spiral electrode connected to a cardiotocograph (Hewlett Packard 8030) and to an ECG recorder. The contractions were recorded by an external transducer.

Immediately a double rhythm of FHR was observed, represented on the tracing by a double pattern of FHR, i.e. about 140 bpm for the faster rhythm and 130 bpm for the slower one. By fetal ECG it was confirmed that heart rate was alternatively 137 and 127 bpm (Fig. 1 and 2).

The analysis of fetal ECG, made on 5 consecutive complexes for each rhythm, furnished the mean values referred in table 1. An interesting observation is that while the P-Q interval in the high rate rhythm was 84 msec, the same

## SUMMARY

An unusual fetal arrhythmia, detected during labor by continuous monitoring of fetal heart rate, is here described. This event was characterized by a double rhythm, one at high rate (137 bpm) and the other at low rate (127 bpm). An ECG simultaneously recorded, allowed the measurement of the P-P intervals, which were 438 and 424 msec, alternatively. Meanwhile, the P-Q intervals were of 84 and 75 msec, respectively. On the basis of the ECG waves morphology as well as of the different P-Q intervals, the diagnosis of intermittent atrial parasystole was posed. While the high rate rhythm seems to originate from the sinus node, the low rate rhythm seems to be parasystolic and to arise from an ectopic pace-maker, situated in the atrium in an intermediate location between sinus node and the A-V node.

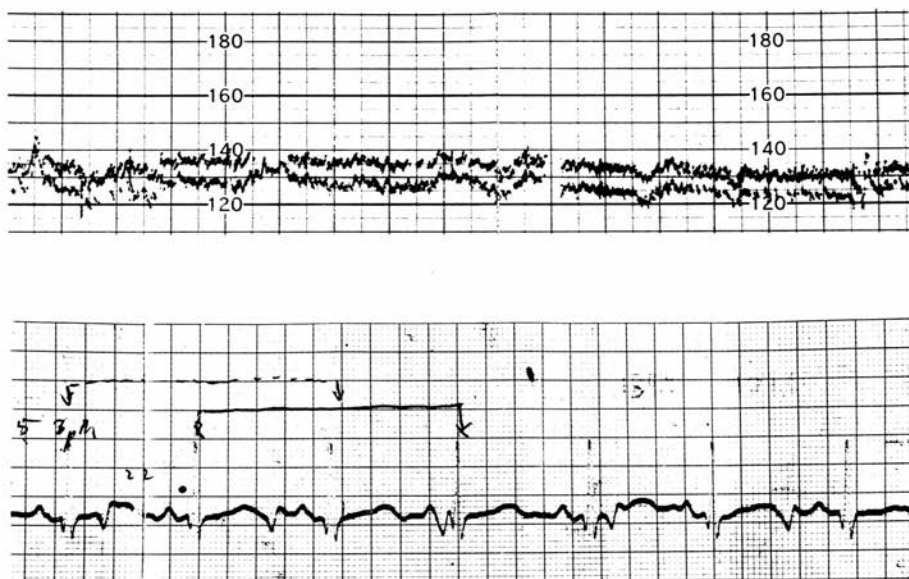


Fig. 1. — Double rhythm of fetal heart rate recorded 220 min before delivery by an internal ECG system. The upper tracing represents the cardiotocographic pattern of fetal heart rate. The bottom tracing shows the ECG recorded while the double pattern was present (paper speed: 50 mm/sec). Note that the interval R-R is alternatively 438 msec and 474 msec, while the P-Q intervals are 84 and 75 msec respectively.

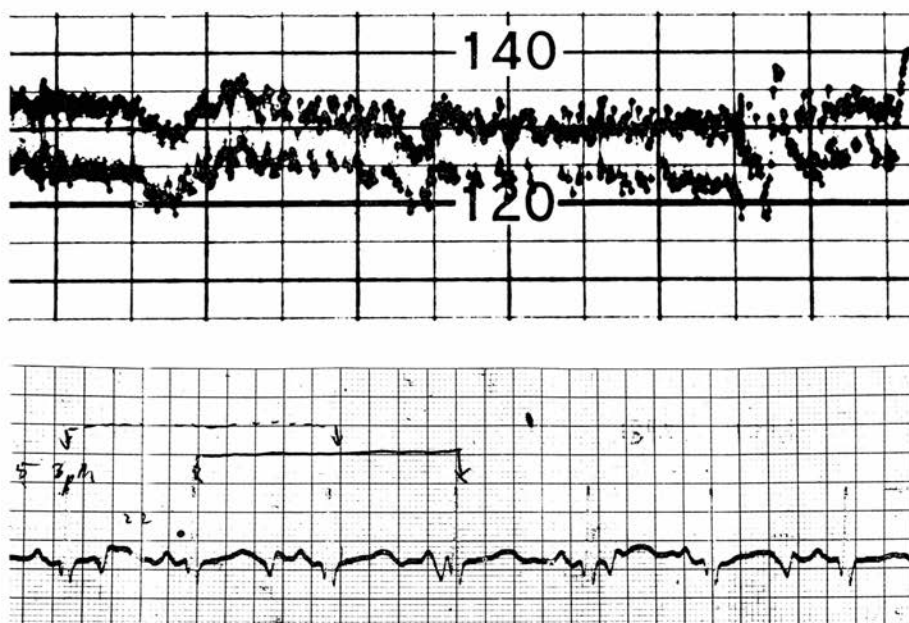


Fig. 2. — Magnification ( $\times 3$ ) of the cardiotocographic tracing of fig. 1.

Table 1. — All the figures represent mean of determinations made on 5 consecutive complexes of each rhythm. Note that in the slow rate rhythm the PQ interval is smaller than in the high rate rhythm.

	Fast FHR	Slow FHR
Heart rate . .	137.0 bpm	126.7 bpm
P wave . . . .	52.0 msec	53.0 msec
PQ interval .	84.0 msec	75.0 msec
QRS . . . . .	58.0 msec	61.0 msec
QT . . . . .	266.0 msec	270.0 msec

FHR: Fetal Heart Rate.

interval in the lower rate rhythm was 75 msec. The maternal heart rate was 100 bpm. On the fetal ECG tracing the maternal ECG was represented by small R waves, since it was almost completely suppressed by the filters of the ECG machine.

The double pattern of fetal rhythm disappeared suddenly after 40 min from the onset of the phenomenon, and a sinus rhythm with constant R-R intervals was observed. At that time, FHR was 130 bpm with an undulatory basal variability and with accelerations of fetal heart rate. The fetal ECG confirmed the presence of regular atrial and ventricular waves with normal rate and morphology (Fig. 3).

After 100 min a double pattern of FHR again was observed with a HR of 130 and 120 bpm alternatively. During this period the ECG confirmed the presence of the arrhythmia with fetal ECG patterns similar to those reported in table 1. The double rhythm disappeared from time to time and a higher or lower FHR was observed. Both, accelerations and decelerations FHR started from the high rate pattern (Fig. 4).

The double rhythm lasted until the birth of a male newborn weighing 2,700 g, 220 min after the beginning of the fetal monitoring by spontaneous delivery. The newborn had an Apgar score of 7 at 1 min and of 10 at 5 min, and presented the umbilical cord around the neck.

A 12 leads standard ECG immediately recorded did not show any of the rhythm abnormalities previously present in the uterus (Table 2).

The neonatal outcome was normal and the newborn was discharged from the Hospital 6 days later.

## DISCUSSION

The correct definition of the cardiac arrhythmia described in this report presents remarkable difficulties. Similar atypical

changes in fetal heart rate observed by Fischer (6) by cardiotocography, were considered to be related to fetal arrhythmias. The fetal arrhythmia responsible for the changes in heart rate observed in this case is probably parasystole (1, 2, 4, 8, 10), i.e. a heart activity due to the simultaneous presence of two independent pace-makers, each one protected from the other, though both competitive in the activation of the atria and the ventricles. In this type of arrhythmia, one of the pace-makers is usually the normal sinus pace-maker; the other can be located in any area of the heart, although the most frequent place in the adults is one of the ventricles (4). Less frequent localization of parasystolic pace-makers are the A-V node and the atria. Atrial parasystole is very unusual in the adults (I every I, 200 ECG in Sherf's series) (9, 10, 11, 12) and is usually found in old men with heart disease.

The diagnosis of parasystole is made by showing the independence of the rhythms, the ectopic and the normal sinus rhythm, and by examining the matching and inter-ectopic intervals (4).

In atrial parasystole, the change in matching intervals can be small, due to the premature activation of the sinus node by an atrial impulse (2).

In the case here reported the ectopic pace-maker seemed to be placed in the atrium, very close to the sinus. Actually, only this condition could justify the normal pattern of the fetal ECG, and in particular the normal P wave pattern. Nevertheless, it is difficult to assess whether the

Table 2. — Neonatal ECG recorded 60 min after delivery.

Neonatal heart rate	P	PQ	QRS	QT
133.9 bpm	50 msec	84 msec	60 msec	472 msec

Each figure represents mean of measurements made on 5 consecutive complexes.

sinus rhythm was the faster or the slower one. However, the slower rate rhythm disappeared during physiologic accelerations as well as during decelerations of FHR related to fetal distress. Actually, this faster or slower rhythms always began after a beat with the high rate pattern. This

the low rate rhythm were almost identical; however, the P-Q interval of the high rate rhythm is longer as compared to the same interval of the low rate rhythm (84 vs. 75 msec). This is in accord with the presence of an ectopic pace-maker, situated in the atria not very much apart from

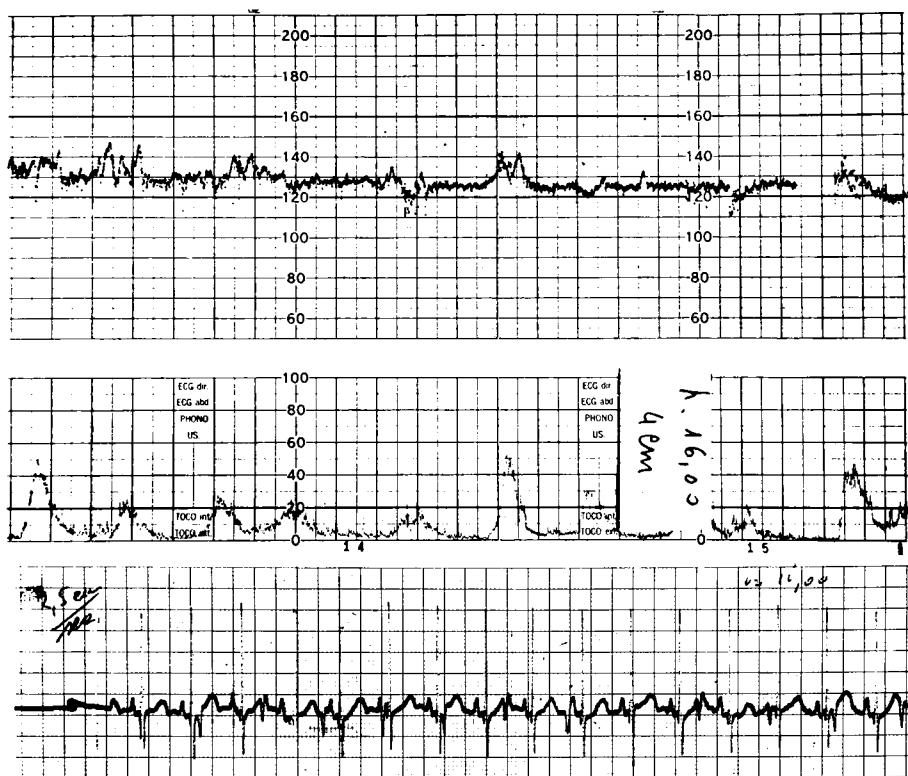


Fig. 3. — Normal FHR pattern recorded 90 min before delivery. The upper tracing shows the cardiotocographic pattern of FHR. The middle panel represents the tocographic tracing. On the bottom the fetal ECG is represented, which shows constant R-R and P-Q intervals.

event was probably related to the predominance of the sinus pace-maker and thereby the disappearance of the parasystole is likely to be caused by sympathetic or vagal stimulations (<sup>5</sup>).

The diagnosis of atrial parasystole was posed on the basis of the ECG pattern. Actually, the P waves preceding the QRS complexes of the high rate as well as of

the sinus node, though close to the atrio-ventricular node. The impulses arising from this ectopic pace-maker would produce an atrial activation through almost normal pathways and, therefore, the P waves will be unmodified. However, since the parasystolic pace-maker will be closer to the A-V node, the P-Q interval in the parasystolic rhythm will be shorter. It is

not likely that the change in FHR were due to variation of the sinus heart rate, since in this case the P-Q interval would litter remain unchanged or decrease with an acceleration of the heart rate. Accordingly, it is conceivable that in this case

this case the ECG usually shows two independent atrial rhythms, one produced by stimuli arising from the sinus node, the other due to an ectopic focus usually situated in the left atrium. Under this condition, however, each sinus impulse is re-

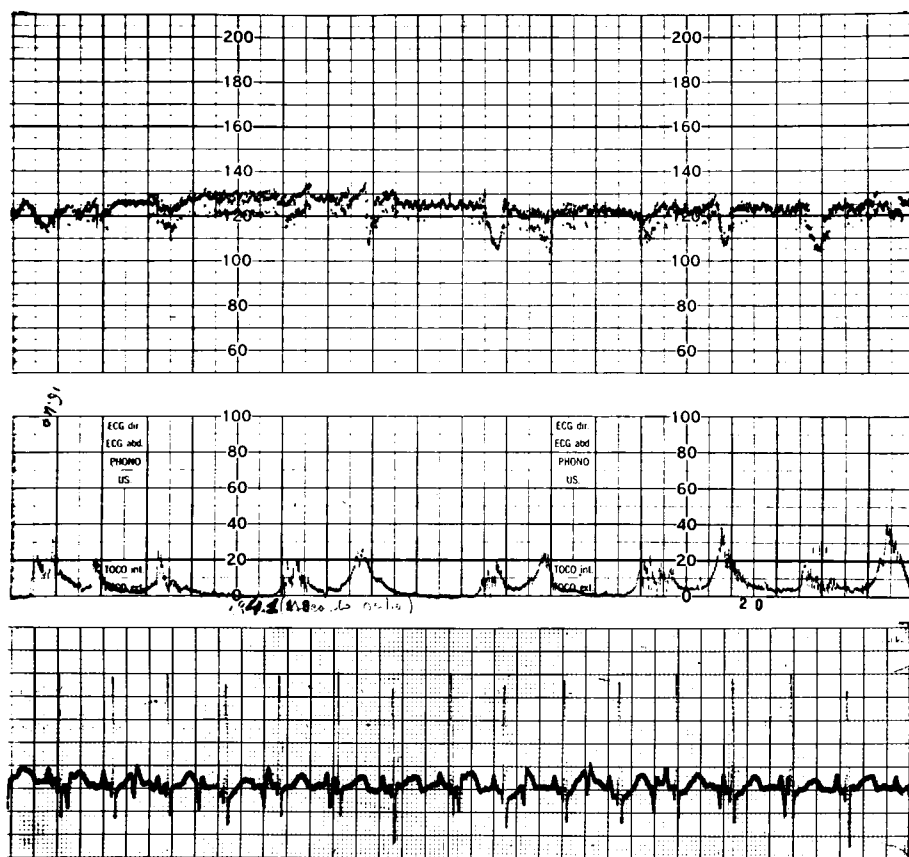


Fig. 4. — A new phase of double rhythm of FHR recorded 15 min before delivery. Upper tracing: cardiotocographic recording of heart rate. Middle tracing: tocographic recording. Bottom tracing: fetal ECG.

the high rate rhythm originated from sinus impulses, while the low rate rhythm was parasystolic and originated from an ectopic pace-maker situated close to the atrio-ventricular node, thus having shorter atrio-ventricular conduction time.

The alternative diagnosis of atrial dissociations was also considered (<sup>3,7</sup>). In

regularly conducted to the ventricles, while the impulses produced in the ectopic atrial pace-maker do not reach the ventricles. Thereby, the P waves produced by the ectopic pace-maker have low voltage, present an abnormal pattern and are not followed by a QRS complex. Since all of the P waves recorded in the case here describ-

ed have normal pattern and are followed by normal QRS complexes, the hypothesis of an atrial dissociation can be ruled out.

The unusual rhythm disturbance observed in this case probably did not influence the haemodynamics of the fetus, as would have been the case for ventricular parasystole, since there were no abnormalities in the cardiac cycle.

The cause of this fetal arrhythmia remains unclear. The only fact that could have produced fetal distress during the labor was the presence of the umbilical cord around the neck at delivery. However, at birth the newborn was in good condition, the Apgar score was satisfactory and no ECG abnormalities were observed.

It is conceivable that a more widespread use of the ECG recording and cardiocography during labor, by the recognition of similar cardiac arrhythmias will lead to a better understanding of the fetal conditions, which produce this phenomenon.

#### BIBLIOGRAPHY

- 1) Chung E. K., Walsh T. J., Massie E.: *Am. J. Cardiol.*, 13, 209, 1964.
- 2) Chung E. K., Walsh T. J., Massie E.: *Am. J. Cardiol.*, 14, 255, 1964.
- 3) Chung E. K., Walsh T. J., Massie E.: *Am. J. Med. Sci.*, 250, 72, 1965.
- 4) Chung E. K.: *Progr. Cardiovasc. Dis.*, 2, 64, 1968.
- 5) Eliakim M.: *Am. J. Cardiol.*, 16, 457, 1965.
- 6) Fischer W. M.: *Kardiotokographie*. Lehrbuch und Atlas. Georg Thieme Verlag, Stuttgart, 1973, p. 360.
- 7) Igarashi M., Katayama F., Hinohara S.: *Am. J. Cardiol.*, 2, 267, 1963.
- 8) Muller P., Baron B.: *Am. Heart J.*, 45, 441, 1963.
- 9) Scherf D., Schott A.: *Extrasystoles and Allied Arrhythmias*. New York, Grune and Stratton, Inc., 1953.
- 10) Scherf D., Yilydiz M., De Armas D.: *Am. Heart J.*, 57, 507, 1959.
- 11) Scherf D.: *New Engl. J. Med.*, 252, 928, 1955.
- 12) Scherf D., Cohen J.: *The atrioventricular Node and Selected Cardiac Arrhythmias*. New York, Grune and Stratton, Inc., 1964.