

# **MATERNAL AND FOETAL STRESS IN LABOUR. ITS EVALUATION THROUGH THE OBSERVATION OF SOME NEONATAL PARAMETERS**

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## **SUMMARY**

It is well known that the neurologic and psychologic prognosis of each individual is highly dependent on good prenatal care, on how the delivery has been conducted and how it has taken place and finally on the very first acts of the mother-child relationship.

During pregnancy, delivery and the first days of life, many changes may take place. The delivery itself is probably the paramount critical happening, both for the mother and the foetus.

Many are the factors which may influence this moment and condition its course, i.e. the mother's personality, the amount of anxiety, the quality of the professional assistance available, etc. When one or more of these factors come into play negatively, there is an increase of stress not only in the mother, but in the foetus too. While it may be relatively easy to evaluate the influence of one or more of these factors on the mother or on the foetus, it is quite difficult to evaluate their combined action on the amount of stress generated in each and both.

In the evaluation of this maternal-foetal stress we have found that the behavioural changes in the mother, the examination of reflexes in the newborn and the Apgar's score parameters have proven to be unsatisfactory. It is clear that a proper evaluation of this stress would be of importance not only as a check on the different methods of preparation to labour, but also on the choice of the best way to avoid the pathology of labour and delivery, particularly in regards to possible negative effects on the foetus.

We have ended up by taking in consideration some neonatal parameters during the hours

immediately following delivery, as the simplest and most reliable method of stress evaluation.

As a second step we have made comparison of the same parameters observed in complex pathological conditions of labour, delivery and behaviour.

The results have been very interesting and promise to be of great value for future developments in this field. They also emphasize the great help given by psychoprophylaxis in reducing foetal-maternal stress.

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Let us consider as ideal the delivery which bears no negative consequence for the foetus, in which oxygenation is optimal and in which the mother partakes actively of the development of labour, in total calm and relaxation. Under such conditions the mother and particularly the foetus should undergo only a minimal stress, within physiological limits, whose consequences may be compared to those following any form of mild phy-

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sical strain and consequently recede in a very short time.

The foetus evidently undergoes the stress connected with the dynamics of labour and is consequently affected by all those negative factors inherent the internal and external environment and of which the mother is the connecting link. Therefore the evaluation of the foetal-neonatal stress should give us a clear and complete picture of what happened during labour, and it should also allow us to pinpoint all those variables often so hard to detect which are related to the mother's behaviour and on which most methods of evaluation have been so far construed.

Maternal behaviour — which in most cases gives a passably good criterium of evaluation — is in our view much too dependent on cultural, educational and environmental factors, and it often doesn't take into consideration those subjects who are unable to express their anxiety, fear and pain and who withhold their feelings, thus undergoing a far more severe stress, with parallel negative influences on the foetus.

It is evident that the possibility of evaluating the stress of labour on the newborn — who after all, is the one who most suffers the consequences, being unable to defend himself — would be of the utmost importance not only as a check on the different existing methods of preparation to delivery and on their respective merits, but also as a guide in choosing the best way to avoid or to minimize the pathology of labour and delivery.

Following these considerations we try to solve two problems: how and in what stage of the newborn's life evaluate the foetal-neonatal stress.

The examination of the newborn's reflexes and the Apgar's score offer a method of evaluation which we consider unsatisfactory, as they roughly differentiate only those highly pathological conditions that modern obstetrical practice

should not tolerate. Neither it is our intention here to evaluate such gross pathology, but rather to quantify the stress of labour. This can be done only before the newborn deals with all those conditioning factors arising from the contact with the mother, his family environment, his socio-economic conditions, etc.

We do consider valid the method used by Spitz who, from a continuous observation of the newborn-mother relationship, has drawn those well-known considerations which have had a so great influence on the evolution of child psychology.

However, to evaluate the stress's entity the observation of the newborn should be limited to the period prior to the contact with the mother, that is before stimuli both positive and negative have had time to act. An homogeneous time span, the same for all, seem to be the 8 hours following delivery, inasmuch as during this lapse of time the direct consequences of the stress of labour and their physiological remission may be observed.

We have started from a main assumption: the delivery represents a physical stress for the foetus.

Therefore, in a broad sense, what is the reaction to this stress and, more specifically, which are the reaction parameters when this stress exceeds definite levels?

## MATERIAL AND METHODS

Being not clinical literature on the subject, in the first phase of our research we kept under observation, during the 8 hrs following delivery, the newborn of normal deliveries, of deliveries lasting longer than normal, of eutocic and dystocic deliveries, of parturients whose behaviour had been calm and controlled and of those who had lost control; especially we observed the combination of all these factors.

First of all from the observation of over a hundred cases we got some parameters which allowed us to single out the conditions leading to foetal-neonatal stress, to evaluate such a stress and lastly to foresee its entity.

The evaluation of the stress is based on the following parameters:

- 1) Apgar's score at the 1st and 5th minute after birth;
- 2) Colour of the skin and its changes (within 60');;
- 3) Time of passage of meconium;
- 4) Rectal temperature taken between 20'-30';
- 5) Behaviour:
  - A) Beginning of sleep;
  - B) Kind of sleep;
  - C) Irritability;
  - D) Kind of crying;
- 6) Response to the maternal heart-beat test (120/min) at the 4th hour.

The values observed were then quantified: we used a maximum positive score of 5 and a minimum negative score of 1 for each parameter, and summed up the results. With this kind of evaluation we find that a normal physiological stress will fall within 30 and 25, a moderate stress between 24 and 20, a severe stress between 19 and 15, and a very severe one below 15.

The ideally reacting newborn has the following characteristics: Apgar's score 10-9, uniformly pink skin, passage of meconium between the 1st and 4th hour, rectal temperature above 36,5°C; he falls asleep within the first hour and his sleep is quiet and deep; there are no negative reactions to stimuli, no tremors nor sudden hiccups or muscular twitching, he cries only when hungry and does not react on hearing a heartbeat with a rate of 120 per minute.

The indicative values of an increasingly severe stress are: Apgar's score between 8 and 6, or below 6; skin colour alterations such as acrocyanosis, generalized cyanosis or pallor; emission of meconium within the 1st hour after the 4th, after the 8th hour or at birth; the rectal temperature is related to increasingly severe stress when it registers below 36,5°C, and points to a particularly severe one when below 35,5°C.

As to behaviour, a moderate stress is revealed by the newborn falling into a light sleep between the 1st and 3rd hour; in severe stress sleep begins between the 3rd and 5th hour and is very light, with hiccups, movements, starts, and a state of continuous unrest interrupted by access of whining; finally, in very severe stress there is lack of sleep, constant and marked irritability, tremor and shaking and persistent whining and whimpering.

The response to hearing a high-frequency heartbeat, which probably reminds the newborn of stressing conditions suffered during pregnancy or labour, and which is absent under physiological conditions, shows evidently an increasing irritability associated to stress all the way up to a severe condition of irritation which manifests itself with unrestrainable crying in case of very severe stress.

The validity of these observations has been corroborated by determinations of serum dopamine  $\beta$  hydroxylase and serum cortisol performed in double blind on the mother, foetus and newborn, during labour and after delivery.

Then, determined the method of research and the method of quantification of each parameter, 200 newborns were studied, born of mothers which form an homogeneous sample group for the following common characteristics:

- 1) Primiparity;
- 2) Ethnic origin: Veneto Region (Italy);
- 3) Cultural and socio-economic condition: middle and lower middle class;
- 4) Age: 20 to 25;
- 5) Uncomplicated pregnancy at term;
- 6) Length of labour: under 8 hours;
- 7) Infusion of oxytocin at 4 cm dilatation, at the dosage commonly used in the Obstetrics and Gynaecology Dept. of the University of Padua, Italy;
- 8) Newborn's weight: 2,800 to 3,500 gms.

In regards to oxytocin the infusion was not administered to a group of 25 subjects constituting a control group.

The sample groups were formed as follows:

A) 100 women who underwent psychoprophylactic preparation to labour (R.A.T. method). Among these, 25 subjects showed negative and uncontrolled behaviour during labour. The others showed positive and controlled behaviour and 25 of the newborns of this sub-group were assisted according to Leboyer's method, while 25 subjects underwent operative delivery (forceps, vacuum extraction, cesarean section);

B) 100 women who did not undergo psychoprophylactic preparation yet showed positive and controlled behaviour except for a group of 25 subjects who underwent operative delivery, and whose behaviour was mostly uncontrolled and negative. In 25 cases the newborn was assisted according to Leboyer's method. So 25 did not receive oxytocin, the last 25 having no particular characteristics.

## RESULTS

The data collected can be summarized as follows: within the group of women who benefited of psychoprophylaxis the best results were obtained from the subjects who showed a controlled behaviour. In 80 % of these the newborn evinced an ideal behaviour and only in 20 % there was a very mild neonatal stress; in no

case we found a severe or very severe stress.

On the contrary, when the subject's behaviour was uncontrolled and negative, the stress was physiological in only 64% of the newborns, moderate in 28%, and severe in 8%. The neonatal condition worsens in case of operative delivery, the stress being severe in 20 % of the newborn, moderate in 60 % and normal in 20 %.

When the newborns are assisted with Leboyer's method the observed stress values are similar to those obtained when psychoprophylaxis only is used.

An interesting result appears among the women who did not follow a preparatory course: if the delivery is eutocic and no oxytocin has been administered, then the neonatal stress is minimal and nearly similar to the optimal one observed in the women who did practice psychoprophylaxis.

Among the subjects who used oxytocin, there is a prevalence of moderate stress (60 %), against an equal 20 % of severe stress and 20 % of physiological stress.

A similar pattern is present in those cases assisted with Leboyer's method, which in this group also did not seem to bring any substantial improvement.

Following operative delivery there was very severe stress in 40 % of the cases, severe stress in another 40 %, and a moderate one in 20 %.

There wasn't a single instance of physiological stress.

We might conclude that psychoprophylaxis, apart from its beneficial effects on the dynamics of labour, on oxygenation and on the mother's behaviour, acts efficiently in bringing neonatal stress down to physiological levels.

This advantage is also evident, even though in a lesser degree, in those subjects who, because of personality, environment or other problems, react to delivery with an uncontrolled and negative behaviour.

## DISCUSSION

It should be noted that, in the Veneto region at least, the personality of the women who follow a preparatory course to labour is more disturbed, so to be clearly pathological in 3 % of the cases and moderately so in another 10 %. Under these conditions, the fact of obtaining a result, which may be even only just satisfactory, but which is however better than the one obtained from a similar sample group of unprepared women, confirms the positive value of psychoprophylaxis also in regards to neonatal stress.

Our efforts are today directed towards the screening of such subjects, their pre-labour psychological treatment and towards providing them with special assistance during delivery.

The advantages of psychoprophylaxis are again evident in case of surgical deliveries, with a 20 % severe neonatal stress, 60 % moderate stress and 20 % physiological stress, while in unprepared women we have a 40 % incidence of very severe stress, 40 % severe, 20 % moderate, and no case of physiological stress.

Leboyer's technique, whose theoretical and conceptual foundation we do consider valid and which we apply extensively, does not seem to bring in any single case any substantial advantage for the newborn.

Its importance on obstetrical customs and in promoting a good mother-child relationship and the father's involvement is evidently projected in the future of the family and consequently is hard to verify. Let it be clear that we expected more from it in regards to neonatal stress.

Unfortunately most obstetricians want and need facts.

Moreover to the women who nowadays in ever increasing numbers demand their child to be born by the « delivery without violence » should be reminded that the foetal and neonatal stress starts long before delivery, during pregnancy

and especially during labour, and were so to avoid preparing themselves accordingly. I would not like for Leboyer's method the same acritical enthusiasm — with its consequent delusions — which years ago, at the beginnings of psychoprophylaxis, was engendered by the so-called « painless childbirth ».

Lastly, psychoprophylaxis counteracts the negative effects of oxytocin: as we have seen, under homogenous and optimal conditions the infusion of oxytocin causes an increase in foetus-neonatal stress. On the other hand the infusion becomes increasingly less necessary in prepared women, and our observations show that the use of this drug, which has be-

come too much customary, should be reappraised and restricted to those special cases in which it is indispensable. Our observations confirm once more the great value of obstetric psychoprophylaxis which in the Respiratory Autogenic Training technique has found so valid a doctrinary setting, so homogeneous an applicability, and has allowed to get such positive results not only for the mother, but for the newborn too.

The observation of the newborn as a method of evaluating foetus-neonatal stress, even though it certainly will need further studies, seems to be highly interesting as a critical tool towards the constant improvement of obstetric practice.