1 Introduction

As far as we know, two publications sketching the history of perinatal medicine have appeared up to now [77, 93]. We should like to start our review regarding milestones in the obstetric branch of perinatal medicine with the following statements:

1. Perinatal medicine began not with singular observations but with a systemic approach to the fetus;
2. Perinatal medicine enormously improved the diagnostic and therapeutic methods;
3. Perinatal medicine with its manifold achievements within such a short space of time is unique in the history of obstetrics.

Supporting statement 1: Viewed from the aspect of medical history, singular observations of the infant in the prenatal and postnatal period, as well as the first attempts at therapy, stretch back over generations, centuries and up to thousands of years.

Until 25 years ago the only possible way of communicating with the “intrauterine” inmate apart from the fetal movements observed by the mother herself, was by auscultation of the fetal heart beats with a simple stethoscope. The following statement made by the two English pediatricians DOBBS and GAIRDNER in 1966 sums up the situation [23].

"Up to now the formidable inaccessibility of the human foetus has meant that foetal medicine (apart perhaps from foetal electrocardiography) has virtually not existed. In an age when man has been able to measure most things from an atom to a galaxy, it is thus paradoxical that to measure his own size during the most critical and precarious period of his life, he still has to depend upon the extreme fallibility of the palpating hand."

Systematic exploration of the intrauterine space during pregnancy did not start until the 1960s. This is why we consider this period as the beginning of perinatal medicine.

Supporting statement 2: The diagnostic and therapeutic progress achieved during the past two or three decades has had a great influence on the expansion of the care of the pregnant woman and the fetus. The knowledge gained has had an incisive effect on everything that happens in our hospitals. In places with modern obstetrical care it helped to lower considerably the rate of perinatal and infant mortality and morbidity. To most of us, however, the manifold diagnostic and therapeutic measures which we use today, already seem to be a matter of course. This demonstrates how quickly we get used to new things.

Supporting statement 3: The concentration of the manifold achievements which happened in such a short space of time is unique in the history of obstetrics. One could be justified in saying that during the previous 2500 years less revolutionary obstetrical progress had been achieved than in the last 25 years. We consider it to be a great privilege for all of us to have been able to experience the stormy development of perinatal medicine in its widespread fields of application.

According to DOBBS and GAIRDNER four innovative techniques brought about the real breakthrough of perinatal medicine [23]. They said:

"With the advent of the techniques of amnioscopy and foetal blood sampling and of amniocentesis and foetal transfusion, we witness the end of the long period of foetal inaccessibility, and we hopefully believe the start of the science of foetal medicine."
In the following contributions about the special fields we will also mention the progress made in the years before, which has been helpful in achieving the real landmarks.

2 Amniocentesis (figure 1)

The first report about amniocentesis appeared in 1881 in "Zentralblatt für Gynäkologie" by LAMBL, as a means of decompressing a hydramnion [58]. In 1930 MENESS performed the first amniography [67]. Not until 70 years after LAMBL's first amniocentesis was this technique used by BEVIS in 1952 for diagnosing Rh erythroblastosis [7]. This was an important prerequisite for both spectrophotometric analysis of amniotic fluid [63] and symptomatic treatment of the severe Rh disease afflicted preterm fetus [64] developed by LILEY in Australia. LILEY is especially renowned for the development of his "LILEY Scheme", which is still used in most hospitals today. LILEY's nomogram for bilirubin limits, providing data as to the severity of the erythroblastosis of the fetus was based on spectrophotometry. Later WHITFIELD supplemented this important scheme by his so-called action line [95]. In this way each clinician was provided with a concrete illustration showing when the fetus should be treated by the intraabdominal blood transfusion developed by LILEY in 1963, or if the pregnancy should be terminated when the fetus is sufficiently mature, in order to perform an exchange transfusion immediately post partum. Today amniocentesis belongs to the modern standard techniques of perinatal medicine, particularly for cytogenetic diagnosis initiated by FUCHS in 1956 [34], for karyotyping initiated by FUCHS and PHILLIP in 1969 [35] and for lung maturity examination recommended by GLUCK et al. [39]. Amniocentesis became safer for the fetus in the 70s as it could be performed under ultrasonographic control.

3 Intrauterine transfusion (figure 2)

Intrauterine transfusion as developed by LILEY in 1963 is still used today in cases of severe Rh erythroblastosis. Its effectiveness is due to the fact that the fetus resorbs through its peritoneum the compatible donor blood that is injected into the peritoneal cavity. Gradually the donor erythrocytes get into the fetal blood circulation via the ductus thoracicus.

In the meantime intrauterine intraumbilical transfusions have been performed since 1981 with the help of fetoscopy [75] or ultrasound [5] and even intracardial transfusions are performed [46].

4 Prevention of Rh erythroblastosis (figure 3)

As far back as 1938 DARROW postulated that in cases of erythroblastosis, the maternal sensitization is linked by an antigen fixed to the fetal
Intrauterine transfusion (Liley 1963)

- Intraperitoneal transfusion (Controlled by x-ray)
- Intraperitoneal transfusion (Controlled by ultrasound)
- Intraumbilical transfusion (Controlled by ultrasound or fetoscopy)
- Intracardial transfusion (Controlled by ultrasound)

Prophylaxis of Rh-sensitization

- Acid elution technique (Kleihauer & Betke 1957)
- Immune globulin prophylaxis (Finn 1960)
- Evidence of feto-maternal transfusion
- First clinical studies (Finn et al. 1961/Freda et al. 1964/Schneider & Preissler 1966)

The pioneer of the sensitization prophylaxis used today was Finn. In 1960 he had the idea of destroying merged fetal Rh positive erythrocytes [30]. Three different research groups — of Finn and Clarke in Liverpool, Freda, Gorman and Pollack in New York and Schneider and Preissler in Freiburg — were able to show by concrete investigations on human subjects, that a sensitization prophylaxis is very effective [31, 33, 91]. This measure was introduced into practice in 1963. Today it belongs to the important and obvious prophylaxis in Rh negative women who are carrying an Rh positive infant or have already given

erythrocytes [19]. In 1940 Landsteiner and Wiener discovered the rhesus factor [59]. Following further investigations by Levine (1941) [60], the hypothesis drawn up by Darrow was recorded in the literature as Levine’s theory. Feto-maternal transfusion was described for the first time as the causal factor in 1948 by Wiener [96]. In 1957 the technique described by Kleihauer and Betke of acid elution from blood smears [54] offered a procedure for proving the existence of Rh positive fetal erythrocytes in the maternal blood. It was quickly shown, that the feto-maternal transfusion occurs mostly during labor.

birth to one. In this way erythroblastosis has become much less frequent.

5 Fetal blood analysis (figure 4)

Fetal blood analysis (FBA) first of all performed by us in 1960 and published in 1961 [79] occurred at a time parallel to the spectrophotometric amniotic fluid investigations. Fetal blood analysis proved to be the first important, direct, diagnostic access to the fetus itself [79, 80]. From the very beginning FBA played a considerable role in greatly improving the safety of the fetus during labor. Although cardiotocography for clinical purposes was not yet available during the first seven years, we were nevertheless successful in significantly reducing mortality during labor using only FBA from 0.6 to 0.3%. When cardiotocography was introduced into clinical routine practice in 1968, there was a further reduction in mortality during labor using a combination of both procedures. Today we have reached a minimum of 0.05%.

The main role of fetal blood analysis today is to confirm or exclude presumed hypoxia when the cardiotocogram is suspicious or pathological. Cardiotocography alone does not allow a reliable diagnosis of intrauterine hypoxia. This is why numerous cesarean sections and difficult vaginal operations due to fetal indications were and still are performed unnecessarily. Cardiotocography has a failure rate of falsely assumed hypoxic risks of over 50% in cases with a suspicious or pathologic cardiotocogram [40].

Continuous pH-measurement of fetal scalp tissue, described by STAMM in 1974 [92] has not become widespread in clinical practice.

The future will show to what extent transcutaneous blood gas measurements as developed by A. and R. HUCH and LÜBBERS [51, 66] provide a landmark in the obstetric branch of perinatal medicine. According to the first experiences gained from considerable material collected in our hospital by SCHMIDT, tcPco2 measurements in particular have produced promising results [90]. In cases with a suspicious or pathologic cardiotocogram, one can use transcutaneous Pco2 measurements instead of fetal blood analysis. In approximately 85% of the fetuses with suspicious or pathologic CTG the tcPco2 remains below the clinical limit level in the non-critical range. Hypoxia or acidosis did not develop in any of these cases. On the other hand when critical Pco2 levels occur, in about half of the cases there is a hypoxic complication present and in the rest of the cases no hypoxia can be found. Seen from the clinical aspect, therefore, fetal blood analysis should only be performed in cases with increased tcPco2 levels. The only handicap when using the tcPco2 measuring method on the fetus in widespread clinical routine practice is the still relatively complicated handling of the equipment.

Due to various reasons, tcPo2 measurements for clinical purposes have not proved to be an adequate method of fetal surveillance.

6 Amnioscopy (figure 5)

Another procedure that was also developed at the beginning of the 1960s and whose usage immediately became widespread, is amnioscopy, first published by us in 1962 [81]. This procedure is based on the fact that hypoxic risks to the fetus in late pregnancy progress very slowly in most
cases. This can be explained by the concept we developed in 1966 — namely, the \( \text{O}_2 \) conserving adaptation of the fetal circulation [84, 86]. The borderline oxygenated fetus reduces its \( \text{O}_2 \) consumption by restricted circulation of those organs that are not of vital importance. Reduction of different areas of circulation has been found by Dawes in many animal experimental studies [20, 21]. According to our concept the intestinal organs are also affected, whereby the intestine reacts with hyperperistalsis. As a result of this there will be with high certainty a passage of meconium during the last 4 to 6 weeks before the date of birth which can easily be detected via amnioscopy.

A further advantage of this method lies in the fact that green amniotic fluid is a finding that lasts for several days and therefore it is not just a momentary diagnosis, as is often the case using cardiotocography. Amnioscopy still continues to enjoy widespread popularity particularly in countries with limited financial resources, because it is simple to use and does not require a lot of equipment and only takes a short time. Furthermore amnioscopy, as already mentioned, is very reliable in its early selection of fetuses at chronically advanced hypoxic risk. The method has failed if a fetus with amnioscopically clear amniotic fluid — that is no passage of meconium — should die. This happened only 8 times in more than 12 000 supervised high-risk cases, that is only 0.6 per thousand [27].

The results of Doppler ultrasound investigations recently achieved by Arabin et al. [3] in our institute provide an interesting new confirmation of the \( \text{O}_2 \) conserving adaptation concept: In severely growth retarded fetuses even when a loss of end diastolic blood flow velocities has already occurred in the umbilical artery and in the fetal aorta; there was an increase in the end diastolic flow in the common carotid artery of these fetuses.

### 7 Assessment of the newborn immediately after delivery (figure 6)

The main task of the diagnostic assessment is to provide retrospective information on the course of intrauterine conditions during labor in order to draw clinical conclusions from it. As far back as 1953 Virginia Apgar published the score, named after her, which is known all over the world [2]. This way of assessing the condition of the newborn by a points system found enormous popularity. Its use in clinical practice however is open to considerable subjective possible errors. Virginia Apgar told me (the first author) personally how upset she was when she was proudly informed that most infants born in a certain clinic had an
Assessment of the newborn immediately after delivery

Clinical state
(Apgar 1953)

Asphyxia and acid base balance
(James 1958)

Acidity state
(Saling 1965)

Figure 6.

Apgar score of 10 at birth. She was fully aware that her score was not being used correctly at that place. Furthermore the reliability of the score for assessing the overall condition of the infant is questioned by various authors.

A much better assessment can be achieved by additional use of biochemical parameters. A number of examiners published articles on blood gas measurements and on the acid-base balance in the umbilical cord blood some time ago. James and coworkers published a fundamental study in 1958 [52]. James was one of the pioneers who reported on the subject of theoretical connections between asphyxia, blood gases and the acid-base balance. However, all those investigations served, as can clearly be seen from the studies, to clarify scientific questions as well as physiologic and pathophysiologic relationships. Nowhere is a recommendation to be found suggesting the use of the acid-base values of the umbilical cord for clinical diagnostic assessment in routine practice — that is in every newborn infant — as was for instance the case with the Apgar score.

In 1960 parallel to the first fetal blood analysis during labor, we started including pH values from the umbilical artery and vein blood at the same time for the routine diagnostic assessment of the newborn immediately after delivery. The first publication about the combined diagnosis of the newborn condition by a modified Apgar score and our acid-base score appeared in 1965 [82] and 1966 [83].

The combination of the Apgar score as an overall clinical status with the objectively measurable umbilical artery acidity as concrete expression of the previous $O_2$ supply situation first enabled the clinician to draw conclusions, particularly on the cause of depression and on the duration of hypoxia, that were definitely better than had been previously possible.

8 Cardiotocography (figure 7)

Cardiography is one of the very important landmarks in perinatal medicine. Historic steps go back to Pestalozzi who in 1891 recorded the heart beats of a twin in breech presentation with a sphygmograph [71] and further to Hofbauer and Weiss who recorded the first phonocardiogram in the year 1908 [49]. Cremer was successful in designing the first electrocardiogram in 1906 [17]. The first continuous cardiotachogram conducted from an anencephalic fetus, was described by Caldeyro-Barcia and coworkers in 1958 [12]. The electrode was inserted into the rump of the fetus through the abdominal wall of the mother using the harpoon principle. The same principle was successfully used by Rech in 1931 in animal experiments [73].

In 1966, with his “one-poled” silver-silver chloride electrode (CLIP-electrode), that could be inserted vaginally, E. Hon introduced direct fetal electrocardiotocography during labor [50]. An electrode is fixed on the fetal head, a second counterelectrode lies in the vagina where it is in contact with the mother. The spiral electrodes most widely used now, stem from Junge, 1967 [53] and Rüttgers and Kubi, 1971 [78]. All these registrations of
the fetal heart rate, combined with the recording of the intrauterine contractions, pioneered by the above mentioned CALDEYRO-BARCIA and HON, required the usage of very complicated equipment and could therefore only serve scientific considerations.

The real breakthrough leading to the practical clinical usage came in the mid 1960s when HAMMACHER, in cooperation with HEWLETT and PACKARD was successful in developing the cardiotocograph which has retained the same name today. The equipment is based on the phonocardiographic principle and enables the elimination of all disturbing noises by electronically controlled comparisons of the time interval between two successive first heart beats and two successive second heart beats [45]. In this way it is possible to achieve reliable, specific registrations of the fetal heart rate.

The first prototype of the equipment for routine use was tested by HAMMACHER in Düsseldorf in 1966. Widespread clinical usage started in 1968. The first systematic comparisons between pathological cardiotocograms and the acid-base balance of the fetus were published by us in 1968 [85] and by KUBLI and coworkers in 1969 [57].

Doppler-ultrasound-cardiotocography found widespread popularity in the 1970s due to the simplicity of applying the wide-angled transducer operating on the abdominal wall of the mother. However, due to the considerable deviations from the real beat-to-beat variability that sometimes occurred, it was heavily criticized. It was not until the beginning of the 1980s that ultrasound cardiotocography was accepted by expert circles; this happened after the industry — namely the TOITU company in Japan — employed the so-called “auto-correlation principle” in 1977, which made a recording available that was much more in accordance with the beat-to-beat variability.

The registration of the contractions, particularly during labor is an essential part of cardiotocography. As far back as 1872, SCHATZ developed the external recording principle in our country [89]. But the first regular routine usage did not come about until the advent of cardiotocography.
Quantitative tocography was primarily developed by Alvarez and Caldeyro-Barcia in Montevideo, Uruguay in 1950 by measuring intrauterine pressure and the corresponding recordings [1]. Caldeyro-Barcia, because of his numerous studies should be regarded as the real father of modern continuous tocography.

9 Ultrasonic diagnostics (figure 8)

Without doubt one of the most important landmarks is ultrasonic diagnostics. It does not only serve to supplement the typical attribute of the obstetrician’s acknowledged palpatory skill, but in many respects competes with it as an instrument of equal or superior capability.

The “father” of obstetrical and gynecological ultrasonic diagnostics is Ian Donald. In his constitutive study with his coworkers in 1958 the first scans of fetuses aged 14 gestational weeks and more were demonstrated. Donald and Brown published pictures of a hydatid mole, a hydrocephalus and the first prenatal measurements of the biparietal diameter with the help of the A-mode procedure in 1961 [25]. This was the beginning of fetal biometry and of the diagnosis of gestational age later improved by measuring the crown-rump-length. Sonographic placental diagnostics began when Gottesfeld demonstrated cross-section pictures of the placenta [41, 42a]. Important steps forward were made in the diagnosing of malformations through the progress achieved in ultrasonic techniques and by the detailed presentation of fetal organs, particularly with the grey scale technique developed by Kossoff et al. [55].

Sonographic vitality diagnostics started with the first registration of fetal movements in the 7th week of gestation by Ian Donald [24], and also with the first registration of fetal heart movements with the help of the Doppler procedure performed by Callaghan and coworkers in 1964 [14]. In 1967 Kratochwil and Eisenhut reported on evidence of fetal heart actions in the 6th week of gestation with the help of the A-mode procedure [56]. In 1974 Reinhold reported on qualitatively different movement patterns of the fetus and their prognostic evidential value [74]. In 1971 before real-time ultrasound had been developed, Boddy and Robinson gave proof of fetal thorax movements with the help of an A-scan [9].

Stimulated by studies resulting from animal experiments by Dawes [22], numerous systematic investigations of fetal breathing movements – among others Gensser, 1980 [37], were undertaken with the help of real-time procedure. Studies on the complex behavioral pattern of the fetus in early pregnancy were published by de Vries et al. [94] and on behavioral states in the advanced pregnancy by Nuhuis et al. [70].

Blood flow measurements using the ultrasound Doppler technique are a new landmark in prenatal supervision. With the help of this technique it was possible to make non-invasive measurements of
the uterine and fetal blood flow, which allow conclusions to be drawn concerning the placental hemodynamics. The first report on the use of the Doppler technique for examining fetal blood flow in the umbilical artery was published in 1977 by FITZGERALD and DRUM [32], studies followed on the first measurements in the umbilical vein by GILL [38] and on measurements of blood flow in the fetal aorta by Eik-Nes et al. [28]. CAMPBELL et al. presented a new important contribution in 1983 enabling us to measure the utero-placental flow [15].

10 Tocolysis (figure 9)

When we concentrate on the first clinically important application of betamimetics, we differentiate between antepartum and intrapartum application.

First systematic descriptions of the antepartum tocolytic effect of betamimetics were published in 1961 by BISHOP and WOUTERSZ [8] and by HENDRICKS and coworkers from the ESkses unit in the same year [47]. Both studies were based on the substance isoxsuprane. Cardiovascular side effects have for the present delayed its wider application in obstetrics. In the mid 1960s other sympathomimetic substances were tried therapeutically to inhibit contractions. In our country, it was buphenin (Dilatol®), that was first tested by MOSLER and SCHWALM in 1965 [69] and by CRETIUS and coworkers in 1967 [18]. MOSLER introduced the now classical expression “tocolysis” in 1964 [68]. The first studies in Latin America were made with orcapepralin by POSEIRO and coworkers in 1968 [72]. The pharmacological substances which are in widespread use today have a predominant beta-specific effect on smooth muscles, among these are fenoterol, ritodrine and hexoprenaline.

Seen from the epidemiologic aspect, there is still controversy on the prophylactic and therapeutic effect as regards a reduction in the prematurity rate, although in principle the tocolytic effect is assured.

There is no controversy as to the advantage of using betamimetics during labor for intrauterine resuscitation. The first clinical applications were undertaken by the CALDEYRO-BARCIA group [13] and shortly afterwards by GAMISSANS et al. [36] and by ESTEBAN et al. [29]. It has been confirmed, that acute hypoxic complications in the fetus can be relieved by the administration of a relatively high dose of bolus injection or an infusion to the mother. The use of tocolysis during labor has also proved to be of clinical value in cases with hypertonic or hyperactive uterine dysfunction.

Tocolysis has also led to considerable improvements in the external version of the fetus from breech to vertex presentation. Unnecessary cesarean sections can be avoided using this method and a number of infants are spared the risk of vaginal breech delivery.

Figure 9.
We performed an external version near term under tocolysis for the first time in 1974 and published our findings in 1975 [87]. The method, when properly applied, does not provide any serious risk to the fetus. Up to now no infant has died as a result of using this method in nearly 1000 versions in our department.

11 Prostaglandins for cervical ripening (figure 10)

Further progress in modern obstetrics was achieved by the introduction of cervical ripening into routine practice by Calder in 1975 [11], after Lippert had developed the prostaglandin gel principle in 1973 in this country for use in artificial abortions [65]. By means of general local administration (extra-amnially, intracervically, intravaginally), of prostaglandin E₂, numerous operative deliveries can be avoided in cases with unripe cervix, and in this way difficult vaginal operative terminations can be spared. In the group just mentioned, the risk to the infant can be expected to be considerably less due to this procedure.

12 Lung maturation diagnostics (figure 11)

The clinical picture of “Respiratory distress syndrome” was first described by Hochheim in 1903 [48]. In 1947 Gruenwald suggested there was linkage with the surface tension in the lungs [43]. Clements called the postulated components reducing the surface tension “pulmonary surfactant” and already discussed its central importance as an antiatelectasis factor in 1956 [16]. In 1959 for the first time Avery and Mead suggested a relation between low surface activity and the occurrence of RDS [4].

**Figure 10.**

**Prostaglandins for cervical ripening**

- Introduction of the gel principle in artificial abortions (Lippert & Moldy 1973)
- Routine practice for cervical ripening in obstetrics (Calder et al. 1975)

**Figure 11.**

**Prospective diagnosis of respiratory distress syndrome**

- First description of RDS (Hochheim 1903)
  - First definition of “surfactant” (Wilhelmy Balance, Clements 1956)
  - Low surface tension and membrane disease (Avery & Mead 1959)
  - Phospholipids and lung maturity (Gluck 1971)

- Value of phosphatidylglycerol (Hallman et al. 1976)
GRAVEN reported already in 1968 on the determination of phospholipids in human and monkey amniotic fluid and assumed an association between a low concentration of phospholipids and the probability of RDS developing [42 b]. GLUCK and coworkers could definitely prove a close relation between the phospholipid content of the amniotic fluid and fetal lung maturity. They started their work in 1968 and in 1971 published the most often cited study on this particular subject [39].

Thus, at the same time the exchange between alveolar liquid and amniotic fluid was proved. The various methods for phospholipid determination achieved over the years have a high specificity for RDS, but a low sensitivity. Levels which suggest lung immaturity must always be interpreted very carefully concerning obstetric management and have only a restricted prediction whether and how severe an RDS will occur.

13 Lung maturation therapy (figure 12)

The neonatal morbidity and mortality have been decreasing during the past few years. The reasons for this are:

1. The improvement in neonatal intensive care, particularly in artificial respiration techniques;
2. The widespread use of tocolytic substances has enabled us to delay a premature delivery until
3. Lung maturation can be improved with the aid of various drugs. The glucocorticoids hold the leading position in this group.

In 1968 BUCKINGHAM et al. first came up with the hypothesis that glucocorticoids promote fetal lung maturation — on account of the stimulation of the alkaline phosphatase proved in experiments on animals [10]. LIGGINS supported this hypothesis in 1969 with his observations during artificial induction of labor; the lungs of prematurely induced lambs that had been given glucocorticoids were clearly more mature than the lungs of lambs of the same gestational age that had not been treated in this way. He postulated after this chance observation, that glucocorticoids bring about an acceleration in the formation of surface-active substances in the lung via enzyme induction [61].

In 1972 LIGGINS and HOWIE, in their epochal prospective study, were able to transfer the experience achieved in animal experiments to human beings [62]. The occurrence of RDS after antepartum administration of betamethasone to the mother could be reduced from 24% to 4.3% compared to the control group without therapy. According to LIGGINS and HOWIE, the preventive effect of betamethasone is all the more efficient, the lower the gestational age (26 — 32 weeks).

In a collaborative randomised double-blind study (Bethesda Study 1981), [6] it was also established, that dexamethasone is basically able to reduce the incidence of RDS: Success was however concentrated on particular groups of subjects. A clear reduction could be achieved between the 30th and 34th weeks of pregnancy. Girls had a higher incidence of RDS but showed exclusively a clear reduction against the boys after being given corticoids. Further, the authors of the Bethesda Study agreed that the L/S ratio must be determined before corticoids are given, because there is lung maturity prior to the 32nd week of gestation in up to 25% of the cases.

14 Conclusions

The antenatal part of perinatal medicine is to a large extent a product of European clinicians and scientists, although many impulses in numerous fields of medicine since the second World War have come from abroad, particularly from North America.

The great steps forward in perinatal medicine have by no means come to a halt, as many opposers of

Antenatal prevention of RDS with glucocorticosteroids
(BUCKINGHAM et al. 1968, LIGGINS 1969)

First clinical prospective study
(LIGGINS & HOWIE 1972)

Multicenter randomized study
(Bethesda 1981)

Figure 12.
zweizüchtige Früherfahrungen, die über Jahrhunderte hinweg als hinreichend anerkannt wurden und von der Klinik und der chirurgischen Operationssäule der modernen Geburthilfe geprägt wurden.

**Zusammenfassung**

**Historische Meilensteine der Perinatal-Medizin in der Geburtshilfe**


Résumé

Frontières historiques de la médecine périnatale au sein de l'obstétrique

Vues sous l'angle de l'historie de la médecine, les observations surprenantes de l'enfant pendant la grossesse, voire à des milliers d'années. Toutefois, nous considérons que la médecine périnatale a commencé avec l'exploration systématique du contenu utérin dans les années 60 et avec l'utilisation large, en routine, de tous les progrès réalisés. Les progrès diagnostiques et thérapeutiques des 20 ou 30 dernières années ont entraîné une chute de la mortalité et de la morbidity maternelles, prématurées et néonatales dans les pays industrialisés. La concentration de ces progrès multiples, survenus au cours d'une période aussi brève, est unique. Nous considérons que les progrès techniques suivants sont d'une importance particulière:

L'amniocentèse: L'utilisation systématique de l'amniocentèse a commencé avec le diagnostic de la maladie rhésus hémolytique. Le diagramme de Liley a été réalisé à partir de la spectrophotométrie du liquide amniotique. L'amniocentèse est l'étape préliminaire indispensable pour toutes les explorations du liquide amniotique réalisables actuellement, y compris les examens génétiques et le diagnostic de maturité pulmonaire.

Les transfusions in utéro: C'est Liley en 1963 qui a développé la transfusion in utéro intra-abdominale. Puis sa réalisation s'est élargie grâce aux nouvelles techniques de surveillance fetoscopique ou échographique.

La prévention de la maladie rhésus: Consciente que l'immunisation maternelle soit liée à un antigène porté par l'érythrocyte fœtal (Darrow, 1940) et que l'on soit capable de prouver que du sang fœtal peut se trouver dans la circulation maternelle (Kleihauer et Betke, 1957).

De nombreux groupes de travail ont été impliqués dans le développement du concept d'adaptation conservatrice. De nos jours, en liaison avec la cardiotocographie, son objectif principal est d'éviter des interventions inutiles lorsque le C.T.G. est douteux ou pathologique.

L'amniocentèse: L'utilisation systématique d'amniocentèse a commencé avec le diagnostic de la maladie rhésus hémolytique. Le diagramme de Liley a été réalisé à partir de la spectrophotométrie du liquide amniotique. L'amniocentèse est l'étape préliminaire indispensable pour toutes les explorations du liquide amniotique réalisables actuellement, y compris les examens génétiques et le diagnostic de maturité pulmonaire.

Les transfusions in utéro: C'est Liley en 1963 qui a développé la transfusion in utéro intra-abdominale. Puis sa réalisation s'est élargie grâce aux nouvelles techniques de surveillance fetoscopique ou échographique.

La prévention de la maladie rhésus: Consciente que l'immunisation maternelle soit liée à un antigène porté par l'érythrocyte fœtal (Darrow, 1940) et que l'on soit capable de prouver que du sang fœtal peut se trouver dans la circulation maternelle (Kleihauer et Betke, 1957).

chez un fœtus anencephale. Edward Hon fut le premier en 1966 à décrire l’application transvaginale à l’aide d’une électrode uni-polaire.

La percée réelle pour une utilisation en clinique a été réalisée par Hammacher au milieu des années 60 à l’aide d’un phonocardiogramme permettant d’enregistrer les comparaisons des intervalles de temps entre des premiers et seconds bruits cardiaques consécutifs. Ce type de cardiotocographie a été le premier disponible en pratique clinique; c’était en 1968. La tocoGRAPHIE ENDO-UTÉRINE avait déjà été mise au point en 1954 par Alvarez et Caldero-BARCIA et elle acquit une nouvelle dimension en combinaison avec l’appréciation du rythme cardiaque fœtal.

L’échographie: Une bonne kilométrique majeure dans l’histoire de la médecine perinatale a été posée lorsque Donald a publié le premier rapport sur l’application des ultrasons en obstétrique et gynécologie. Les éléments importants en sont: la biométrie fœtale pour le diagnostic précoce de l’âge gestationnel, le diagnostic du retard de croissance, les diagnostics concernant le placenta, le diagnostic des malformations, le diagnostic de la vitalité fœtale, le diagnostic des structures fonctionnelles (par exemple, les mouvements respiratoires) et les études sur les états comportementaux du fœtus; plus recemment, avec l’aide du doppler, les mesures des débits utéro-placentaires, feto-placentaires et fœtaux sont devenues possibles.

La tocolyse: Les béta mimétiques occupent une première place parmi les substances présentant un effet tocolytique, d’une part, en ce qui concerne leur utilisation anté-partum pour empêcher ou éviter la prématurité, d’autre part en ce qui concerne leur utilisation per-partum (réanimation in-utéro). Les premières publications sur leur utilisation datent des années 60. Actuellement, les béta mimétiques (β2) prédominants sont très largement utilisés.

Prostaglandines et maturation du col utérin: C’est Calder en 1975 qui le premier a décrit l’efficacité de la consis-tence du col, ensuite son développement a été réalisé par Lippert pour une utilisation en clinique, c’est lui qui a développé les gels de prostaglandines. Depuis, leur importance est devenue grande, tout particulièrement pour les interruptions précoces de grossesse.


Les thérapeutiques de maturation pulmonaire: Ce sont Liggins et Howie qui publient en 1972 les bases du traitement de routine par les corticoïdes permettant la maturation pulmonaire, ce sont eux qui furent capables de prouver que le S. D. R. survient moins fréquemment après administration de corticoïdes. D’autres substances permettant d’améliorer la maturation pulmonaire ne se sont pas encore répandues.

Les grands pas en avant de la médecine perinatale ne se sont aucunement stoppés comme de nombreux oppo-sants à ces nouveaux développements l’ont insinués de- puis des années. Il semble des plus imprétables qu’un espace de pratique nouvellement développées (tel que le contenu intra-utérin depuis le début des années 60) ait pu être entièrement exploré sur le plan médical au cours d’une période de seulement 25 ans.

Tout cela va continuer à aller de l’avant et il est possible que certains de ces progrès modernes dont nous sommes si fiers seront regardés plus tard comme le fruit d’un tâtonnement et d’une époque imparfaite de pionniers.

Mots-clés: Histoire de la médecine, médecine perinatale.

References


[58] LAMBL, D: Ein seltener Fall von Hydramnion. Zentralbl Gynäkol 14 (1881) 14
[71] PESTALOZZI E: Graphische Darstellung des fetalen Herzimpulses. Arch Gynäk 39 (1891) 137
[72] POSEIRO JJ, G GUEVAR-RUBIO, JM MAGAGNA, R CALDEYRO-BARCIA: Accion de la orciprenalin (Alupent®) sobre la contractilidad del utero humano gravido, el sistema cardiovascular materno y la frecuencia cardíaca fetal. Arch Ginecol Obstet 23 (1968) 99
[80] Saling E: Neues Vorgehen zur Untersuchung des Kindes unter der Geburt (Einführung, Technik, Grundlagen) Arch Gynäkol 197 (1962) 108
[83] Saling E: Das Kind im Bereich der Geburtshilfe. Thieme, Stuttgart 1966
[89] Schatz F: Beiträge zur physiologischen Geburtsh.-kunde. Arch Gynäkol 3 (1872) 174

Prof. Dr. Erich Saling
Dr. med. Birgit Arabin
Mariendorfer Weg 28
D-1000 Berlin 44 (Neukölln)
West Germany