Care of the Premature Infant

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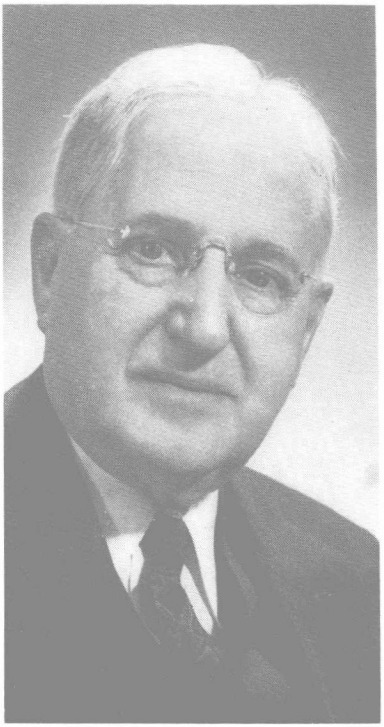

JULIUS H. HESS, M.D.

January 26, 1875–November 2, 1955

With the passing of Dr. Julius H. Hess on November 2, 1955, the medical profession and the public lost a great humanitarian—a man whose life was devoted to the care and the welfare of children in all walks of life. His interest and work were not confined to hospital, clinic and private practice, but he also served his community, state and country for many years in varied activities concerned with medical health and welfare, for which he received many honors. Dr. Hess's greatest efforts were in the care of the prematurely born infant, and it was in this field that he received world-wide recognition.

This book is dedicated to the memory of the "Father of Premature Infant Care," an advocate of *moderation* in both medical and nursing care.

Preface

This book, *Care of the Premature Infant,* was written because of the many requests I have had from nurses for the methods and the technics used at the Hortense Schoen Joseph Premature Infant Station at Michael Reese Hospital. Many of these technics and procedures have been in effect in our station for at least 25 years, so I feel safe in advocating their use. My first thought was to write a book dealing only with the nursing care of the premature infant, but I soon realized that it was difficult, if not impossible, to separate many of the nursing procedures from the medical technics. Knowing that much of the medical data written by Dr. Hess in our previous publications had not changed basically but needed to be brought up to date, I asked Dr. Ralph Hess Kunstadter (who had worked with Dr. Hess for many years and was responsible for gathering much of the earlier data) to be co-author of this volume. I am most grateful that he consented. We felt that preparation and publication of this material would not only be of service to other nurses and pediatricians, but also that in this way we could best commemorate the memory of Dr. Julius H. Hess.

The first significant decrease in morbidity and mortality in our premature station occurred when (1) we decreased the caloric intake of feedings to the premature infant by one third to one half, (2) we improved our technic and prevented cross infections, and (3) oxygen therapy was introduced. We feel that our statistics show that until future research develops new methods for the prevention and the treatment of pulmonary and cerebral pathology and fluid and electrolyte imbalance, further reduction of present-day mortality is doubtful.

E. C. L.

Acknowledgments

Our sincerest gratitude is extended to Mrs. Julius H. Hess who graciously granted permission for use of any of the material in Hess and Lundeen's *The Premature Infant.* This was of inestimable value to us.

We are indebted to Dr. Reuben I. Klein for his contribution on pulmonary pathology; to Dr. Arthur H. Rosenblum who has discussed antibiotic therapy; to Dr. Lawrence D. Elegant for the procedures for management of erythroblastosis fetalis adopted by the Department of Pediatrics; and to Dr. Theodore M. Shapira for the material on eye pathology.

It will be obvious to all that without the valuable assistance of many, our premature infant station could not have been established and the pioneer work would not have been successful. Naturally, many of our early conclusions were arrived at through the trial-and-error method, but many were adopted through the helpful observations and suggestions of co-workers.

To all the graduate nurses, to the many infants' nurses, practical nurses, nurses aides and ward helpers, we express our sincere thanks and appreciation. Since it is impossible to mention everyone, only those who have been with us over a long period of time will be acknowledged here.

Mrs. Frank Co-Tui and Miss Daisy Prentice, now a hospital consultant in Montana, were with us during the first difficult years. Miss Winifred Witz, a very capable assistant for 17 years, has aided in teaching and establishing technics and procedures and in keeping accurate statistics of morbidity and mortality. Mrs. Roberta Stanard Fosse, our first visiting nurse, employed by the hospital to make home visits, has been largely responsible for the low percentage of readmissions and for encouraging the mothers to keep in touch with us so that we could follow the progress of their babies. Miss Irene Johnson is now in Arkansas. Mrs. Kathleen Shafer as present head nurse did an excellent job of supervision of a 2-year research project. Mrs. Helen Lander is now with the Premature Infant Unit at the Chicago Health Department. Mrs.

Joan (Sypnewski) Lerner was formerly a head nurse and later assistant to Dr. Hess in a research project.

For the present-day assistance in teaching and maintaining high standards of technic, we wish to mention Miss Mary Alberta Vaughn, head night nurse; Mrs. Mary Morrison, clinical instructor; Miss Claire Schroeder, graduate in charge during evening shift; Mrs. Edris Clarke, present visiting nurse.

We also wish to acknowledge the assistance of the following: the graduate infants' nurses—Miss Mary Woods, Miss Hilda Anderson, Mrs. Lynore (Freeman) Waldron, Miss Jocelyn Tufts and Mrs. Virginia (Roehrig) Sternbeck; the two aides who have been with us for 7 years—Mrs. Jean Coleman and Mrs. Ruby Tolmaire; and two ward helpers—Mrs. Lucille Johnson and Mrs. Ruby Elmore.

Many premature infants owe their lives to the devotion and the care given to them by the many nurses who worked so diligently and so long in their behalf.

Finally, we wish to thank our medical secretary, Mrs. Louise B. Searing, for her interest in the preparation of this book.

EVELYN C. LUNDEEN, R.N.
RALPH H. KUNSTADTER, M.D.

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chapter 1

The premature infant

DEFINITION

At the annual meeting of the American Academy of Pediatrics in 1935, the following resolution was passed defining prematurity:

> "For statistical purposes and comparison of results of care, a uniform standard for diagnosis of prematurity is important. A premature infant is one who weighs 2500 grams or less at birth (not on admission) regardless of the period of gestation. All liveborn premature infants should be included, evidence of life being heart beating or breathing."

According to this interpretation and for practical clinical purposes, a premature infant is any infant of single or multiple birth, born prematurely or at term or even past term, whose weight at birth is at or below 2,500 Gm. (5½ lbs.). The inference is that such an infant is not completely prepared for full, normal, independent, extra-uterine life. There may be, however, only a relative body weakness in the absence of inherited constitutional debility and malformations. It is well established that the younger and smaller the fetus on leaving the uterus, the greater are the difficulties to be overcome in carrying out required body functions necessary to life. The subsequent lower vitality is obvious.

CLASSIFICATION

Premature infants may be grouped as follows for statistical study and comparison of reports:

1. According to birth weight, living and dead:
   Under 750 Gm.
   751 to 1,000 Gm.
   1,001 to 1,250 Gm.
   1,251 to 1,500 Gm.
   1,501 to 2,000 Gm.
   2,001 to 2,500 Gm.
2. Age at time of death of various weight groups.
3. Age at time of admission of infants received from outside hospitals and homes.
4. According to their physical development:
   A. Premature infants without pathologic changes. Those normal for their fetal age.
   B. Premature infants with pathologic changes due to (1) constitutional disease and chronic infections in the parents; (2) maternal factors influencing the fetal nutrition; (3) local conditions in the mother; (4) multiple pregnancies; (5) constitutional defects and congenital malformations in the fetus; and (6) infants born to parents late in life.
   C. Full-term but immature infants with pathologic changes.

ETIOLOGY

The causes of prematurity are many but, in general, they fall into two main groups: (1) conditions which result in the expulsion of a healthy premature infant and (2) conditions which result in expulsion of a premature infant that has been damaged in some degree.

In the first group may be included various injuries, falls, heavy lifting, overwork or other physical exhaustion, sudden emotional disturbances and premature rupture of the membranes either accidental or intentional. These conditions do not necessarily affect the nutrition of the ovum yet some may be followed by impaired nutrition of the fetus. Operative procedures, even though they do not involve the uterine cavity, frequently result in premature labor either through shock or trauma.

All disorders of the second category react in varying degrees on the fetus. For instance, milder acute infections in the mother may produce only temporary weakness in the fetus, while other long-continued afflictions in the mother may act on the nutrition

and development of the fetus to cause an impaired physical condition.

The causes of prematurity as seen in our station are multiple pregnancy, chronic nephritis, toxemias of pregnancy, placenta previa and other anomalies and abnormal positions of the placenta, pulmonary tuberculosis and cardiac disorders. The less frequent causes are exophthalmic goiter, syphilis, congenital malformation in the fetus, diabetes and habitual miscarriage.

Finally, in reviewing our cases for etiologic factors, we find a large group of infants whose histories reveal no causative factor for their premature births.

PHYSIOLOGIC DEVELOPMENT

General Characteristics. The appearance and characteristics of the healthy premature child vary with its fetal age at the time of birth (Figs. 1 and 2). With a lengthening of the period of gestation, the distinctive characteristics of the fetus become less and less marked until it becomes impossible to differentiate the slightly premature from the full-term infant. All the distinguishing features of the premature may also be found in the congenitally diseased full-term infant. Just as there are innumerable degrees of prematurity, so also are there all stages of development between the extremes of functional and anatomic inferiority on the one hand and the normal constitution on the other. Both the premature and the debilitated full-term infant may exhibit the following characteristics in varying degrees:

1. The body is usually small and puny. In some instances the infant may be of considerable size and yet have an imperfect development of its internal organs.
2. Weight varies from 600 Gm. (1 lb., 5 oz.) to 2,500 Gm. (5½ lbs.) in the viable.
3. The skin is soft and usually of a pinkish-red color. The epidermis is thin, and the blood vessels are easily seen.
4. Adipose tissue is scant; the features are angular; the face looks old, and the skin frequently hangs in folds.
5. Lanugo is abundant, especially on the extensor surfaces of the extremities, the forehead and the upper back.
6. The skull is round or ovoid. The fontanelles are large, and the sutures are prominent.
7. Many small comedones are visible on the nose and sometimes on the chin.

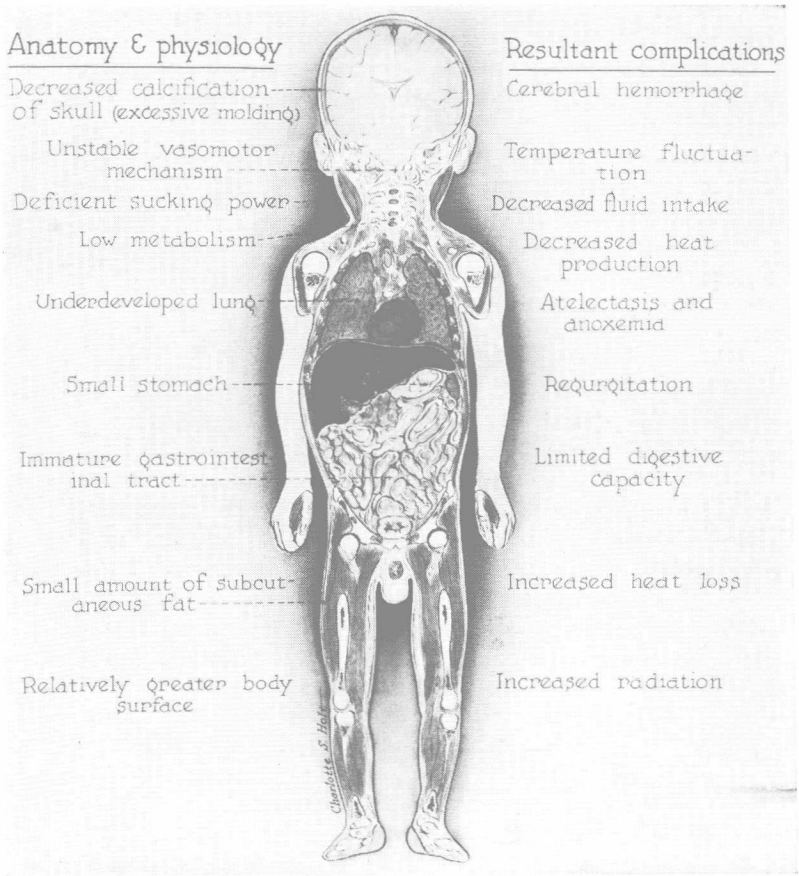

FIG. 1. Anatomic and physiologic development of 7-month fetus.

8. The ears are soft, small and hug the skull.

9. The nails have scarcely reached the ends of the fingers even in the larger infants, while in the smaller ones they may be poorly developed.

10. The cry is feeble, monotonous and whining.

11. The infant lies in a deep sleep and may have to be aroused for feedings. Efforts at suction may be weak or absent. All movements are slow, all functions are sluggish, and the child shows a remarkable degree of muscular inertia.

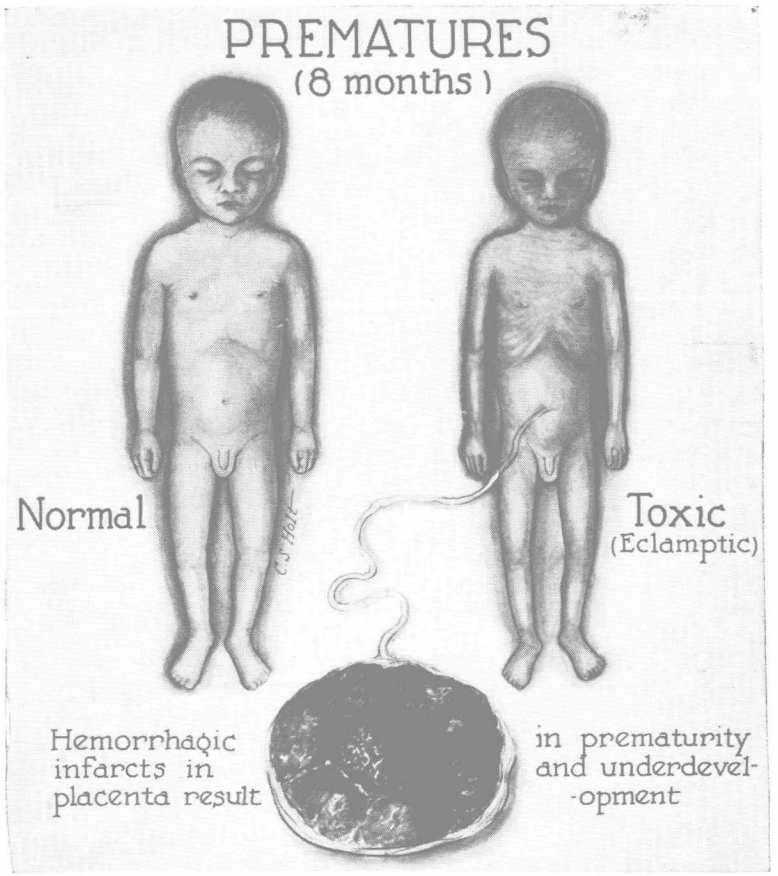

FIG. 2. Comparative development of infants born to a normal mother and a toxic mother.

12. The body temperature has a decided tendency to remain below normal and is inclined to be irregular in character.

13. Urine is scanty.

These principal features which may be observed on superficial examination vary in different individuals of the same age, depending on the cause of prematurity and the state of health of both the mother and the child. With increasing age the characteristics become less conspicuous.