due to post-operative infection. Post-operative morbidity has been almost *nil*. Very few patients have remained in the hospital over twenty-one days after the operation. One case was removed to her own home on the tenth day. No cases of ventral hernia or of vaginal prolapse have occurred. There is sometimes some complaint of pain, but this is usually much less than after the performance of vaginal hysterectomy. Indeed, convalescence is very similar to that in normal child-bed, and patients usually sit up on the fourteenth day. The operation is a short one, usually requiring about forty minutes for its completion, and there is practically almost no hemorrhage. These two statements explain the fact that there is usually almost no shock.

The advantages of this method of operating are:

1. Such a shutting off of the vagina as to reduce to a minimum any danger of infection from that source.
2. The ligature placed around the uterine artery is entirely outside of the uterine wound, and being of fine material and buried in the tissues is much less likely to give any trouble.
3. The snug closing of the cervical tissue prevents oozing.
4. The smooth peritoneum in the floor of the pelvis, having no projecting stumps or raw surfaces, reduces to an absolute minimum the danger of intestinal adhesions.
5. The implantation of the round ligaments and puckering in of the stumps of the broad ligaments prevents prolapse of cervical stump and vagina.
6. The use of the clamps on the broad ligaments obviates hemorrhage, leaves the parts in better shape for the subsequent steps of the operation, and saves considerable time.

HOW SHALL WE FEED THE BABY?

Presented to the Section on Diseases of Children, at the Forty-eighth Annual Meeting of the American Medical Association, held at Philadelphia, June 1-4, 1897.

BY A. C. COTTON, A.M., M.D.

CHICAGO.

If at the breast and doing well, leave it alone. If not doing well, let us ascertain the cause. Does it present evidences of innutrition, malnutrition, acute indigestion or chronic indigestion? Is there starvation from insufficient or improper food, or starvation from repletion? In some cases the fault is apparent at a glance; in many it is quite difficult to determine at first wherein the trouble lies. The apparent error as to time, frequency of feeding and quantity having been corrected, the physician may finally have to face this question, "can this mother's milk be made to fill all the requirements of this babe?" and the sooner we ascertain just what and how much this mother is secreting, the sooner we are on the way to a solution of this problem. We must examine the breast milk as to its total amount and as to the relative quantity and quality of its constituents. The old haphazard procedures must be relegated to the past; the time has come when the same exactitude is demanded in this as in other means of diagnosis. We must know *what* the babe is *getting* before we can intelligently consider any changes in food. Analysis, then, of the mother's milk must be the prime desideratum if we would give advice as to the feeding of babies.

There are a number of methods in vogue for determining, with greater or less accuracy, the relative pro-

portion of some of the leading ingredients. For clinical purposes a determination of the total solids may be had from the known specific gravity, temperature and percentage of butter fat by means of Richmond's equation: $T = (G \div 4) + (6 \div 5) F + 0.14$, in which T = total solids, G = specific gravity (the last two figures), and F = fat. Care should be taken to correct specific gravity for temperature if the ordinary hydrometer adjusted at 60 degrees F. be employed. Holland subtracts one from the hydrometer reading for each ten degrees below 60 degrees F., and adds one to the reading for each ten degrees above 60 degrees F., proportionate fractions expressing variations of less than ten degrees.

For determining the percentage of fat we have employed Fessler's lactoscope, also the methods of Holt, Marchand, Leffmann and Beam, and Babcock, with preference for the last-named on account of its simplicity and accuracy. The first mentioned has the disadvantage of inaccuracy from the varying visual power of different observers, also from the fact that the opacity of milk is not due alone to the fat globules but also to the phosphate of calcium present. Holt's method, so easy of employment, requires time, twenty-four hours, and the ratio 5 to 3 does not always express the relation of cream to fat. Marchand's test has never given the results obtained by us from more accurate analysis.

The centrifugal machines adapted to the Babcock test bottles have heretofore been too clumsy, but recently the Chicago Dairy Supply Company, No. 5 West Washington Street, has brought out a small cheap machine. My attention has been called to a bottle manufactured by Wood & Comer, 130 Juvenal Street, Philadelphia, of shape and size to fit the ordinary office centrifuge and adapted by graduation to the Leffmann and Beam method. The capacity of this tube is certainly not more than 20 c.c., so that the quantity of milk required by the Leffmann and Beam test would not exceed 8 or 10 c.c., an item greatly in its favor. If experience proves the utility of this tube its advantages place it far in advance of any previous device for determining the fat in breast milk. The microscope is a necessary adjunct to the examination for the presence in the milk of blood, pus or colostrum corpuscles.

If the child's nutrition does not improve soon, I would remove it from the breast temporarily, keeping up lactation by pumping regularly and testing the milk meanwhile for the improvement sought. Not infrequently the child may be returned to the breast after an interval of from a few days to a few weeks. In my opinion there is no question as to the desirability of maternal nursing in preference to any method of artificial feeding. If, after all, the mother's milk can not be brought to suitable proportions for complete nutrition, or for any reason weaning is necessary, then substitute feeding must be adopted, and the choice of a substitute becomes at once a question of the highest importance. The multitude of infant foods and substitutes for mother's milk suggests the conclusion that none are completely successful, and the startling mortality statistics would be conclusive evidence did any doubt exist. So long as the medical profession relegates its thinking to commercial men, the market will continue to be flooded with "baby foods" and the figures of infant mortality repeat themselves with sickening regularity. What, then, of a substitute for mother's milk? We have no substitute, as the death rate shows, but we have well-

established principles of substitution, by the thoughtful application of which to the especial requirements of each individual case, we may claim to have made some headway in the management of disordered infant nutrition. In the selection of the food we must consider all the requirements of the infant at each stage of its development, and a few cardinal principles kept well in mind may serve as a foundation for specialization. Professor Cheadle, in his post-graduate course of lectures at St. Mary's Hospital, London, emphasizes six essential conditions to be observed in the diet of infants:

1. "The food must contain the different elements in the proportion which obtain in human milk," viz., according to Harrington: Proteid, 1 to 2 per cent.; fat, 3 to 4 per cent.; sugar, 6 to 7 per cent.; ash 1 to 2 per cent.; water, 87 to 88 per cent.; or, according to Luff, proteid, 2.35 per cent.; fat, 2.41 per cent.; carbohydrate, 6.39 per cent.; salts, .34 per cent.; water, 88.51 per cent.

2. "The total quantity in twenty-four hours must be such as to represent the nutritive value of from one to three pints of human milk, according to age," viz. proteids, 225 to 675 grains; fat, 231 to 693 grains; sugar, 613 to 1,839 grains.

3. "It must be in a form suited to the physiologic condition of the digestive function of the infant."

4. "It must not be purely vegetable, but must contain a large proportion of animal matter."

5. "It must possess the antiscorbutic element," raw.

6. "It must be fresh and free from all taint of decomposition."

These six statements as to essential conditions seem to be almost axiomatic and if faithfully observed will keep the practitioner quite close to the line of safety.

Since the sources from which the essential ingredients of infant food may be obtained are so numerous, and the facilities of different physicians so varied, it is not strange that a variety of methods of assembling the necessary constituents for a perfect substitute food should be advocated. Eminent observers and experimentors along this line have seemed to array themselves by their practices into three general classes, viz.:

1. Those, who by their use of cereals, treat the human infant as if belonging to the *herbivora*.

2. Those who would place him with the *carnivora* and find nothing to meet his physiologic requirements outside of milk, meat juice, animal extracts, etc.

3. Those who by a judicious selection of the essential elements of food from both animal and vegetable sources consider the babe *omnivorous*. Certainly, analogy, and I believe, also experience shows that the young infant finds its most assimilable and nutritious elements in *animal* foods, and no teacher of infant feeding has recently laid the world under greater tribute for his positive stand in this direction than Dr. Rotch, the father of the milk laboratory in this country. Believing that the babe should have exclusively animal diet, and that cow's milk contains all the essentials of mother's milk, but in different proportions, he founded the laboratory for the modification by separating cow's milk into its grosser constituents and reassembling them in exact and definite proportions to meet the requirements of the individual case. I have never heard it claimed that there was anything *new* in the modification of milk. In fact, many practitioners claim to have done this long before Rotch, and wonder why the process should be

deemed worthy of a patent. The putting of the idea into practical form through the laboratory, securing uniformity of manipulation by trained experts, the supervision of the milk supply (perhaps the most important feature) and last but not least, the stimulation of keeping exact records, all mark the advent of the laboratory as the longest stride in the advancement of substitute feeding.

The province of the milk laboratory, however, is broader than many would at first suppose from its name. With all due respect to Dr. Rotch I should prefer to call it a "food laboratory," where prescriptions may be compounded to meet the requirements of prescribers who do not believe that all the ingredients should be derived from cow's milk. Some infants can not digest cow's casein in any form, be the quantity reduced to the minimum limits of laboratory modification, or if only so small an amount can be endured as must of necessity appear in the cream, his nutrition will show faults from lack of proteids. In such cases many of our best men order raw meat juice.

The need of albuminoids when cow casein can not be tolerated (and this condition, I believe, is one of great frequency) must be met by substitution of some soluble, readily absorbed, concentrated albuminoid. No source of albumin in a condition to meet all the requirements of infant digestion, is, in my experience, to be compared with the hen's egg, the white. For many years I have employed it in suitable cases with the most satisfactory results. From the opening of the first laboratory in Chicago, October 1895, I have ordered egg albumin to maintain the necessary percentage of proteids in cases where cow casein was not tolerated. To illustrate by a prescription with ingredients proportioned as follow: Fat, 4.50 per cent.; sugar, 6.50 per cent.; proteids 2 per cent.; which not being well borne, the casein appearing in the stools as curds, is reduced in its percentage of proteids experimentally until the low figure of $\frac{1}{2}$ or $\frac{1}{4}$ of 1 per cent., represents the highest toleration of this constituent of milk.

Since complete nutrition can not long be maintained on such low proteids we must enrich our prescription with albuminoids from some source other than cow's milk. The egg albumin has proved very efficient in my hands for this purpose. To illustrate by prescription: Fat, 4.50 per cent.; milk sugar, 6.50 per cent.; proteids from milk, .50 per cent.; albumin, whites of two eggs; water, q.s. ad 100 per cent.; number of feedings, 6; amount of each feed, 6 oz.; alkalinity (lime water), 6 per cent. Pasteurization is not necessary if due care be exercised in the selection of the ingredients for this emulsion.

SOME PRACTICAL POINTS ON INFANT FEEDING AND INFANT FECES.

Presented to the Section on Diseases of Children, at the Forty-eighth Annual Meeting of the American Medical Association held at Philadelphia, Pa., June 1-4, 1897.

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To properly determine the value of an infant's food