THE AFTER-CARE OF CONGENITAL PYLORIC STENOSIS*

BY

DONALD PATERSON, M.D., F.R.C.P.

PHYSICIAN TO OUT-PATIENTS, THE HOSPITAL FOR SICK CHILDREN,
GREAT ORMOND STREET; PHYSICIAN IN CHARGE OF DISEASES
OF CHILDREN, WESTMINSTER HOSPITAL

As a preface to the discussion of this problem, based on the statistics of 653 cases, I may quote two interesting and unusual cases.

1. A premature male child, which weighed 2 lb. at birth and 3 lb. at the age of 7 weeks, had vomited from the time he was born. He was at least one month premature, and died ten days after admission to hospital, with well-marked pyloric stenosis.

2. A female child, seven weeks premature, vomited from the age of 2 weeks. Periods of remission occurred up to the age of 5 months, when the symptoms became marked. Constipation was always present, but the weight slowly increased. The child was admitted to hospital at the age of 7 months, but no operation was performed in view of her poor general condition. She died at the eighth month, when marked hypertrophy of the pylorus was found at the post-mortem examination.

The first case demonstrates, I think, that hypertrophy of the pylorus is present before birth, and shows itself by the eighth month of intrauterine life. This suggests that the name "congenital pyloric stenosis" is appropriate. The second case illustrates the prolonged duration of symptoms which may occur in medically treated cases. It is a common experience that at about the sixteenth week the symptoms of pyloric stenosis pass off automatically if the case is medically treated.

MORTALITY STATISTICS

In the following table is shown the mortality in 581 cases of congenital pyloric stenosis which were admitted to the Hospital for Sick Children, Great Ormond Street,

SERIES I.—Cases Admitted to the Hospital for Sick Children

Year	Number of Cases	Average Age on Admission (weeks)	Place in Family		Sex		Average Age of Onset of Vomiting (weeks)	Result		Mortality per cent.
			First Child	First Child (male)	M.	F.		Cured	Died	
1917	10	9.5	8	6	7	3	3.7	2	8	80
1918	10	7.2	4	4	10	0	3.7	5	5	50
1919	16	6.8	7	7	14	2	2.5	1	15	93
1920	29	7.8	18	13	22	7	3.5	11	18	62
1921	35	7.4	26	17	25	10	3.0	16	19	54
1922	31	7.3	15	12	27	4	3.1	20	11	35
1923	47	7.5	26	22	40	7	3.2	33	14	30
1924	38	7.0	20	17	32	6	3.1	29	9	23
1925	55	6.6	31	22	40	15	3.3	42	13	23
1926	62	6.3	34	28	51	11	3.0	42	20	32
1927	47	6.4	23	21	45	2	3.2	37	10	21
1928	71	6.5	32	28	61	10	2.7	51	20	26
1929	57	6.9	33	29	45	12	3.4	43	14	24
1930	73	6.6	34	26	57	16	3.5	54	19	26
Total	581	7.1	311	252	476	105	3.2	386	195	30

during the period 1917 to 1930 inclusive. It may be noted that from 1923 onwards the mortality has remained almost stationary. The average age of the children on admission is also stationary, and it cannot be said that

* The substance of a communication to the Section of Diseases of Children at the Annual Meeting of the British Medical Association, Eastbourne, 1931.

cases are being operated upon earlier on the whole. The fact remains that in this large series of hospital patients one patient in four of pyloric stenosis dies, either from the operation or, more generally, from various causes during the convalescent stage.

During the last five years 36 patients were seen by me privately. Of these, one-third—namely, twelve—were the

SERIES II.—Private Cases

	Number of Cases	Average Age on Admission (in weeks)	Sex		Result		Mortality per cent.
			M.	F.	Cured	Died	
Sent to hospital	12	8.5	10	2	9	3	25
Treated privately	24	7.0	14	10	24	0	0

children of parents whose means would not allow them to have the operation performed privately, and were therefore sent to hospital; there was a resultant 25 per cent. mortality.

Of the other 24 patients whom I saw privately, and whose parents were able to afford the operation and nursing in private, all recovered. The same surgeons were responsible for the operation in both series, and the same methods were used; the difference must be attributed entirely to the environment in which the child was nursed, and to the nursing itself.

In a third series of 36 cases of pyloric stenosis admitted to a Bentinck Street Children's Nursing Home, not one

SERIES III.—Cases Treated at a Children's Nursing Home

Number of Cases	Average Age on Admission (in weeks)	Sex		Result		Mortality per cent.
		M.	F.	Cured	Died	
36	6.5	29	7	36	0	0

of these 36 infants has died. A variety of surgeons, some less expert than others, performed the operation, but with concentrated nursing attention these most excellent results have been obtained. Dr. G. F. Still informs me that he has not had a single death in private practice from pyloric stenosis where Rammstedt's operation has been employed.

AGE OF THE INFANT AT OPERATION

It has been argued that the crucial point in lowering the mortality was the duration of the condition before diagnosis and operation. I do not combat the fact for a moment that the earlier the operation is done the better is the prognosis; but in the series of private cases, as contrasted with the hospital cases, the average age at which the operation took place was identical.

THE OPERATION

Again, it has been contended that the type of surgical treatment seriously influenced the mortality. Dr. Still published a series of 47 consecutive private cases, with only one death, the operation being that of Loretta in all cases. This has been given up, and with the new procedure of Rammstedt the operative risks have been considerably lowered. Undoubtedly the introduction of gas anaesthesia was a great step forward. Lately, local anaesthesia has been given an extensive trial in a series of 50 hospital cases, and the mortality has been lowered a further 5 per cent. The advantages of a local anaesthetic are, briefly, that the baby can be fed directly it returns to the ward, and is not flabby and unwilling to take food; shock is reduced to a minimum, and the cough reflex is still present, thus avoiding aspiration into the lungs from regurgitation of the gastric contents during operation. The anaesthetic used is 0.5 per cent. novocain,

without adrenaline; the baby is bandaged to Denis Browne's cross, and a dummy dipped in glycerin is used to soothe it. There is greater responsibility for the surgeon, since, with straining, sewing may be difficult.

ALKALOSIS IN PYLORIC STENOSIS

The work of Maizels, McArthur, and Payne² is of the greatest importance, and has passed almost unnoticed by many. They point out that, with repeated vomiting and loss of hydrochloric acid over a prolonged period, there is a marked tendency for the chloride content of the plasma to be lowered. The almost universal habit of washing out the stomach with a solution of sodium bicarbonate, usually directly before the operation, tends to induce a state of alkalosis. The very familiar picture after operation of slow, gasping respirations, pallor, and collapse, was the direct result of this procedure. With this knowledge, the avoidance of bicarbonate lavage, and the extensive use of saline solution and glucose subcutaneously, such a clinical picture has disappeared.

POST-OPERATIVE FEEDING

Improvements in post-operative feeding in the past few years have probably assisted to lower the mortality, to prevent diarrhoea, and to hasten convalescence of pyloric cases. Breast milk should be used unquestionably in preference to any other food when it is available, but in other cases some artificial food must be employed. My usual feeding regime is as follows:

Four hours after the operation there is given, at hourly intervals, 1 drachm of one of the following: breast milk; or half-cream Cow and Gate dried milk mixture (or Dryco or Klim skimmed), made up one measure to each ounce of water; or unsweetened condensed evaporated milk mixture; or lactic acid milk-and-water mixture. Twelve hours after the operation there is given, at hourly intervals, 1½ drachms of the food selected. Eighteen hours after operation, at intervals of one and a half hours, 2 drachms of the food chosen are administered, gradually increasing, until twenty-four hours after the operation 1½ ounce of the food is being given at two-hourly intervals. If the infant is breast-fed, it should be suckled at three-hourly intervals from this time onwards. If it is not breast-fed, 2 ounces of the food chosen are given thirty-six hours after the operation, at three-hourly intervals, while at forty-eight hours after the operation almost the full amount for the infant's weight can be administered.

The unsweetened condensed evaporated milk mixture is made by adding one part of this to four parts of water, one heaped teaspoonful of Demerara sugar being introduced into each 4 ounces of the mixture. For the preparation of the lactic acid milk-and-water mixture, thirty-five drops of lactic acid (B.P.) are added, drop by drop, to one pint of skimmed cow's milk, which has been boiled and allowed to cool; during the addition of the lactic acid the milk is well stirred and sugar is added. The mixture should be given diluted at first with an equal quantity of water.

As regards the feeding in medically treated cases, breast milk should be continued if plenty is available; failing this, the milk mixture, thickened with one of the starchy patent foods (for example, Savory and Moore's or Benger's food added to a mixture of cow's milk and water in equal parts, the whole having the consistency of cream), will be found the most successful. Small, concentrated feeds are desirable, since they are of high caloric value; even if only a small quantity is retained the infant tends to thrive. Lactic acid can be added to the cow's milk if thought advisable.

CONCLUSION

The obvious conclusion to be drawn from this very large and unique series of cases is the value of nursing and good environment to the child after operation. What are the advantages to the child who is treated privately?

First, it cannot be too strongly pointed out that the risk an infant runs in an ordinary hospital ward of contracting infections from other children is very great.

Respiratory and gastro-intestinal infections in other inmates of the ward are readily contracted by the debilitated congenital pyloric stenosis case. With private treatment the infant is in a room by itself, and the possibility of such an infection is carefully guarded against.

Secondly, and of even greater importance, is the nursing care which a very ill infant requires. No hospital ward in this country can provide more than one nurse to four or six infants and children during the twenty-four hours. This means that the infant is sharing the attentions of a nurse with several others, which must necessitate the work being done imperfectly. In addition, those nurses are young, and in process of learning their profession. During the night period, in a ward of from 12 to 26 beds, there are, as a rule, two nurses, and for twelve hours the infant can only have a fraction of their attention.

In private practice, for twenty-four or forty-eight hours at least, the infant receives the entire attention of a skilled day nurse, and also a night nurse, such nurses, with a repetition of cases, becoming most experienced, and, in fact, being able to cope almost unaided with any situation which may arise. It would appear to me that the lowering of the mortality must be attained by the separation of pyloric stenosis cases from all others, the nursing of these cases by themselves, and the realization by the public and the profession that the intensive nursing required in such a case for a short period must be provided.

REFERENCES

- ¹ Still, G. F.: *British Medical Journal*, 1923, i, 579.
- ² Maizels, M., McArthur, C. B., and Payne, W. W.: Alkalosis in the Pyloric Stenosis of Infants, *Lancet*, 1930, i, 286.

THE USE OF AN ANTISEPTIC (QUINANIL) WITH PREPARATIONS OF GONADOTROPIC SUBSTANCES

BY

J. M. ROBSON, M.D., B.Sc.

(From the Macaulay Laboratory, Institute of Animal Genetics,
University of Edinburgh)

In the course of work done on the pregnancy changes in the uterus, a number of experiments were performed in which the effects of various pituitary preparations were investigated in rabbits; when bovine pituitaries, in a finely divided form, were used for injection it was found that the site of injection almost invariably became septic, whatever the precautions taken. As it was impossible to sterilize the pituitaries by the ordinary methods available without destroying the activity of the gonadotropic factors, it became necessary to use some type of antiseptic, and an attempt was made to obtain a suitable substance. It was realized that the substance used should have a high antiseptic power, its toxicity should be low, and, most important qualification, it should not destroy or interfere with the action of the gonadotropic factors of the pituitary. Putnam, Teel, and Benedict (1928) have investigated the action of a number of antiseptics on gonadotropic factors obtained from anterior pituitary lobes (alkaline extracts). They found that alcohol, phenol, acriflavine, mercurochrome, and hexyl-resorcinol either destroyed or precipitated the active principles, and had ultimately to resort to filtration through a Sieck filter in order to obtain a sterile preparation.

It was of course impossible to use this method when the actual pituitary was being injected, and it was decided to try other antiseptics. Quinanil appeared to be suitable in view of its properties. This antiseptic is a derivative of a substance [2 (*p*-dimethyl-amino-anil) 6-methyl-quinoline metho-chloride] originally described