question is often asked as to what happens to these cases in after-life, and it is surprisingly difficult to answer. The author has only been able to follow cases for about four years, and certainly up to that time the children appear to be perfectly healthy and to suffer from no digestive troubles. It would be of still greater interest to know what eventually happens to such cases as are not operated upon and recover, for the suggestion made above that no definite case ever recovers without operation is almost certainly an exaggeration. Occasionally cases of hypertrophy of the pyloric sphincter are seen in adults, but unfortunately it is usually impossible to get any accurate history of the patient's infancy. It is, however, possible, even probable, that some of these cases are really congenital in origin, and the author has treated a few by means of the Rammstedt operation with satisfactory results.

The statistics compiled below are from a total of thirty-five cases, but in some instances where the notes are incomplete the averages have been obtained from a proportion only of these.

Average age upon admission—7 weeks, 2 days.

Average age at operation—8 weeks, 3 days.

Males, 26; females, 9.

Average number of days in hospital—28.

Average length of history before admission—29 days.

In three cases the symptoms were stated to have started at birth.

All cases originally breast-fed for an average period where noted of three weeks.

Artificial foods tried include humanized milk, Glaxo, Nestlé's Milk, Allenbury's Food, &c.

Visible peristalsis seen in all but two cases, where the examination was cursory on account of the obvious diagnosis.

Tumour felt in all but three of the earlier cases and one recent case.

Average weight upon admission—6 lb. 14 oz.

Average weight at operation—6 lb. 1 oz.

Average weight upon discharge—7 lbs. 11 oz.

Radiographer's report where noted shows delay in emptying stomach amounting usually to 7 hours.

Test meal report where recorded invariably shows hypochlorhydria or achlorhydria.

Mortality percentage—(five cases), 11.5.

Sequelæ—two cases developed ventral herniæ, one as the result of the onset of whooping-cough immediately after the operation, the other following some infection of the superficial wound.

Average duration of operation—6½ minutes.

Longest time, 12 minutes; shortest time, 4 minutes.

Ultimate result for varying periods up to 6 years quite satisfactory.

HICCUP.

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(The opening paper on a discussion held by the Hunterian Society, March 19, 1928.)

HICCUP consists in a sudden involuntary contraction of the diaphragm, but the inrush of air which should follow is prevented by the fact of the glottis being closed. The abrupt arrest of inspiration produces the characteristic sound. If the spasm occurs during a pause in respiration there is no noise, but the louder the noise the less is the patient distressed. The frequency of the spasms is usually about one quarter or one fifth that of ordinary respiration.

The phrenic is the efferent nerve involved in the process. The afferent nerves concerned are the vagus, sympathetic, and sensory fibres in the phrenic. It was

formerly believed that the nerve centre for the reflex was in the respiratory nucleus, but there is now some reason to suppose that it may really be situated in the cervical cord at the point of origin of the phrenic. Changes are said to have been found in the cord at this site in cases of epidemic hiccup, and in a case of prolonged hiccup occurring in tuberculous meningitis Langeron [1] found lesions at this situation, whilst in a case of cancer of the pylorus with prolonged hiccup, Urechia and Mitulescu [2] found hæmorrhages in the third, fourth and fifth cervical segments. It has also been observed that if hiccup coincides with Cheyne - Stokes respiration, the spasms persist even during the apnoëic periods. If therefore the ordinary respiratory centre is the centre for hiccup, it must be responsive to afferent impulses when the usual chemical stimulus has no effect, which hardly seems likely.

Hiccup may arise from stimulation of any of the afferent fibres already mentioned. Thus, it may be caused by irritation or over-distension of the stomach, especially in young subjects, but even in the adult it may be induced by very hot or highly-spiced food. The hiccup which results from alcoholic excess is another example of the reflex being set in motion by irritation of the gastric mucosa. Curiously enough, however, hiccup is not a common symptom in dyspepsia of any type.

The irritation may also arise in the peritoneum—hence the hiccup of peritonitis, intestinal obstruction, &c., or in the diaphragm itself, as in diaphragmatic pleurisy. Any fever, however, may at times be complicated by hiccup. This seems to have been a commoner occurrence in former days than it is now, and, indeed, the adjective “singultosa” was sometimes used to describe fever in which hiccup was a prominent symptom. It was suggested by the late B. W. Richardson that the febrile hiccup was really due to the patient being semi-intoxicated by too large quantities of alcohol formerly used in the

treatment of fevers; that, in fact, the hiccup was a “drug symptom” and not part of the disease.

Apart from the above reflex modes of origin, hiccup may arise centrally, as in encephalitis. There seems to be no doubt, too, that it is sometimes a sign of hysteria, and it may also be set up by poisons acting on the nerve centres, as in uræmia.

The most severe cases of hiccup met with in practice are the epidemic cases and the post-operative. Post-operative hiccup is specially common after operations on the upper abdomen and on the urinary tract. The patients most apt to be affected are elderly men, and the condition is relatively more frequent in private than in hospital practice. In these respects, if I am not mistaken, post-operative hiccup resembles the epidemic form of the complaint. It has been suggested that women are not so often affected as men, because they use the diaphragm less than men in respiration, but this explanation is not very convincing. The occurrence of hiccup after abdominal operations may be attributed to irritation of some of the afferent nerves already mentioned. Peritonitis need not be present; non-inflammatory irritation suffices. Thus, hiccup has occurred when small pieces of omentum were caught in the wound sutures, and it has been known to cease when a drain was removed from the ileum. On the other hand, Küttner [3] has found that the position of the patient in bed and the nature of the anæsthetic used have no influence on its production.

The urological cases are very interesting. The majority of the patients with severe hiccup to whom I have been called in consultation have been recovering from a prostatectomy, and the comparative frequency of the complication after that particular operation has often been noted. It is not altogether easy to give an explanation of this. There seems no reason why operation on the bladder more than on any other organ should cause hiccup reflexly. It has there-

fore been suggested that the symptom is of toxic origin, and Marion [4] has described a number of cases in which he was able to show that hiccup came and went with a rise or fall in the amount of urea in the blood. But if hiccup in these cases is due to an azotæmia, why is it not met with oftener in ordinary cases of uræmia? Marion sees this difficulty and admits that there must be other factors at work besides mere toxæmia.

The prognosis in hiccup is very variable. It may be a trivial, almost ludicrous, disorder, or, on the other hand, especially in some of the post-operative cases, it may be a most distressing complication which threatens life by the exhaustion it produces. It may last a long time. Knuthsen [5] describes a case of his own in which the spasm continued for a month. He calculates that during this time the patient hiccupped 480,000 times! He also mentions the case of a lady in St. Louis who is said to have hiccupped for twenty years, on the strength of which her husband—not unjustifiably—obtained a divorce.

I believe it to be true, however, that in the majority of cases of hiccup, even of the severe post-operative type, recovery ultimately takes place.

The difficulty of treating hiccup is shown by the immense number of remedies which have been recommended for it. Knuthsen [6] gives a list of more than fifty, for each one of which success has been claimed at one time or another.

In the milder cases anything that will temporarily arrest the action of the diaphragm may bring the spasms to an end. Hence such dodges as simply holding the breath, drinking out of the wrong side of a glass of water, sneezing or tickling the nose,

compressing the abdomen so as to push up and immobilize the diaphragm, &c.

If gastric irritation is the cause, the use of alkalies and carminatives or of gastric lavage may succeed. In the toxic cases, such as those which follow prostatectomy, the proper line of treatment is to stop all food by the mouth and to promote elimination by the administration of large quantities of fluid (if necessary by the rectal route [7]).

In all severe cases it may be necessary to act upon the nerve centres by sedatives, such as morphia, chlorotone, intramuscular ether [8], or even chloroform inhalation. Success has also been claimed for benzyl benzoate, for nitrites and for pilocarpin. The inhalation of carbon dioxide has been recommended and successfully carried out on the principle of stimulating the respiratory centre so vigorously with its normal excitant that it will not respond to the pin-pricks of peripheral irritation.

The reflex arc has also been interrupted by such devices as compression of the phrenics, or paralyzing them, or the lower cervical sympathetic [9] by the injection of novocain. For all these plans success has been claimed, but it is arguable that some of them are worse than the disease.

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