a definite odour of putrefaction. For longer periods it is possible that larger amounts of sugar may be needed. These could be provided by increasing the concentration of the solution or by adding crystalline lactose to the dressings. With the use of lactose both the amount of exudate and the tendency to excoriation of the surrounding skin appear to be diminished, probably because bacterial production of proteolytic enzymes is decreased in the presence of utilizable carbohydrate (Kendall, 1923). The usual healing process does not seem to be impaired by the addition of sugar. The dressings do not become adherent to the wound as is sometimes the case with vaselined gauze. Since *B. pyocyaneus* has little or no ability to utilize sugar this method does not affect its odour, which, however, is not nearly so offensive and penetrating as that of true putrefaction.

It is to be hoped that the use of lactose will prove as satisfactory in compound fractures as it has in osteomyelitis.

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ACUTE DILATATION OF THE STOMACH

BY

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It is our intention, as the result of an unusual case of acute dilatation of the stomach, to discuss briefly the current views on this condition. Acute dilatation was described first by Kunderdt in 1871, and was soon recognized and commented upon by other people (Fagge, 1873; Rokitsky, 1861). Rokitsky suggested that it was caused by the dragging of the mesentery of the small intestine, which pressed upon and occluded the transverse portion of the duodenum. This theory has persisted till recently, but it is surprising to find it still in modern textbooks. It is difficult to conceive how the occlusion of the duodenum can bring about acute dilatation of the stomach when the case described below is considered. Most of the reported cases follow operations, but there are many accounts of the disease arising apart from operation—e.g., during a severe wasting disease (Herrick, 1906)—and the condition has been known to occur in healthy individuals as the result of overeating (Gillette, 1930). It has also been reported following childbirth and severe blows to the abdomen.

Dragstedt and others (1931) state that acute dilatation is rare after operations upon the stomach itself, and we have considered it noteworthy to report a case following an operation of partial gastrectomy, as no such case could be found in the literature.

There are many peculiarities in respect of acute dilatation. The first striking feature is the enormous amount of fluid from the stomach: where does it come from? One opinion is that the stomach is able to hold all this fluid because it has become paralysed as the result of reflex sympathetic stimulation. The suggestion has been put forward (Morris, 1882-3) that the enormous amount of fluid was the result of excessive secretion of the stomach mucosa—in other words, a gastrorrhoea. Certain factors discountenance this theory. For instance, in our own case, in which a large part of the stomach had been removed, it

is difficult to understand how the remaining portion could secrete 8½ pints in twenty-four hours. Again, if the fluid aspirated or regurgitated came from the stomach alone it would contain hydrochloric acid, but examinations of the fluid show it to contain little or no free HCl. It always contains bile (Herrick, 1906; Dragstedt and Dragstedt, 1922).

The present-day view considers that the dilatation is neurogenic and is the result of paresis of the muscles of the stomach. We suggest that the enormous amounts of fluid collecting in these cases arise from the alimentary canal below. As the result of the stomach becoming paralysed and dilated a negative pressure is produced in its interior. The intra-alimentary pressure where the muscular tonus is normal is higher than the intragastric pressure, and fluid flows backwards into the stomach—in other words, there is a backwash. The fluid keeps on collecting, and when enough is present it wells up into the oesophagus, rises into the pharynx, and is eventually expelled. This theory is supported by the fact that in these cases there is actually no true vomiting. The fluid which comes away just pours out from the patient's mouth. There is no sign of its being discharged in an expulsive manner. Once the condition has been started it is easy to understand why it should continue and how quickly the patient loses fluid. Not only fluid is lost but also valuable substances which are absorbed naturally lower down in the intestine and which are essential to retain the normal equilibrium of the blood. It is the loss of these valuable substances from the blood stream that is the real cause of death in these cases. There is no doubt that after operations acute dilatation of the stomach is of frequent occurrence in minor degrees, just as paralytic ileus is. It is difficult to understand why some cases should develop acute dilatation and others paralytic ileus. Fortunately these minor cases tend to right themselves. Factors which may make one suspicious that acute dilatation (or paralytic ileus) is developing are that the pulse rate is not lessening as expected after an operation, or that it is rising after having been lower for a short while. Or, again, the patient may complain of being uncomfortable under the bandages or show some uneasiness in his epigastric region. These cases should be met by passing a duodenal tube and leaving it in. This process of "sounding the stomach" is of the greatest assistance.

Case Report

The patient, a thin man aged 64, gave a history of abdominal pain in relation to meals for the last twenty years. He had noticed recently that his stools were often tarry. For the past six to twelve months vomiting had become more frequent and of greater volume; it relieved pain. A barium meal revealed great delay in emptying time. Gastroscopic examination showed chronic gastritis and pyloric stenosis, but no ulcer was seen. Occult blood ++ was found in the stools. A test meal disclosed a very high content of free acid.

The patient has had extensive medical treatment at other places, but without improvement. On January 31, 1941, a partial gastrectomy under spinal anaesthesia and gas-and-oxygen was carried out. A large-sized duodenal ulcer was seen. At the end of the operation the patient's condition was satisfactory: the pulse had fallen from 120 to 96. Twenty hours after the operation the pulse rate began to rise slowly, though the patient was comfortable and did not complain of symptoms. Thirty hours after operation the pulse rate had risen to 120 and he had a feeling of distension in the epigastrium. At this time he spat out 2 oz. of dark brown fluid which he said "just came up into my mouth." Acute dilatation was suspected, and the stomach was sounded by means of a Ryle tube. 30 oz. of fluid was aspirated. A continuous gastric drainage apparatus was set up and an intravenous drip was started. Morphine grain 1/4 four-hourly was administered, and the bed was raised two feet at the bottom. Within twenty-four hours from beginning the aspiration 8½ pints of fluid were withdrawn and the pulse came down to 86.

Summary and Conclusions

A case of acute dilatation of the stomach following a partial gastrectomy is described. In view of this condition following a partial gastrectomy the previous theory of compression of the third part of the duodenum by the mesentery is proved to be wrong.

The present theory that acute dilatation is neurogenic in origin is one which is now accepted. We have come to consider that this condition and paralytic ileus are very closely related, the only difference being that one is a pathological state of the stomach and the other a pathological state of the alimentary canal lower down. A theory as to the origin of the large amount of fluid expelled is given.

The value of "sounding the stomach" in the early stages of the condition is stressed.

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Clinical Memoranda

Capillary Fragility and Vitamin C in
40 Children of Different Classes

By dietary experiments on a man and a woman whose capillary resistance to rupture was initially normal Göthlin (1937) was able to show that subsistence on a diet poor in vitamin C gradually gives rise to capillary fragility. The change proved to be reversible, for with increasing doses of fresh orange juice the strength of the cutaneous capillaries returned to normal. In 1931 Göthlin found that 5.9 to 21.5% of his children gave a positive capillary resistance reaction. In all cases their diets were deficient in vitamin C. He gave these children 60 to 120 c.cm. of orange juice a day, and yet only 50% of them showed any definite rise of capillary resistance. From this he concluded that although lack of vitamin C was a definite factor in lowering the capillary resistance there were other factors to be considered. In 1935 Dalldorf and Russell investigated a series of 24 persons with subclinical scurvy. They injected 100 mg. of ascorbic acid in 21 cases and 50 mg. in 3 cases. All showed an immediate rise of capillary resistance between 10 and 20 mm. Hg, using Dalldorf's technique. Since then St. Rusznyák and Szent-Györgyi (1936), and Scarborough and Stewart (1936) have suggested that vitamin P (hesperidin) was responsible for increased capillary fragility; but that has been disputed by Zilva (1937).

THE INVESTIGATION

To discover the relation of capillary resistance to vitamin C and to investigate this difference in various social groups we studied the capillary fragility of 40 unselected healthy children. The method adopted was a modification of Bell, Lazarus, and Munro's (1940) adaptation of Göthlin's test. This modification was necessitated by the small size of the children's arms. A circle 6 cm. in diameter was made on the anterior cubital fossa; the skin on the area was examined, and any blemish resembling petechiae was marked on the skin. The subject was seated in a chair with the arms resting on a table at the level of the heart. The longitudinally folded band of a sphygmomanometer was wrapped round the upper arm, the lower edge of the bag being kept at least half an inch above the circle. Pressure of 50 mm. Hg was maintained for fifteen minutes. After the skin had returned to its normal colour petechiae in the circle were counted by each of us independently, and the average taken. A 300-watt lamp, two feet from the arm, was used for the inspection of the cubital fossa, and the room was kept at a comfortable temperature. Several of the normal children were tested on

two separate occasions, but the results at both times were practically identical.

As Göthlin (1931) and Bell *et al.* (1940) have shown, over eight petechiae in the circle represent a definite increase in capillary fragility.

Results.—A total of 40 unselected healthy children between the ages of 1½ and 6 years were examined. Class A were 10 children from a private school; Class B were 20 children from the poor quarters of Newcastle-upon-Tyne; and Class C 10 children from a day nursery. Therefore the nutrition of Class A could be considered as excellent, of Class B poor, and of Class C intermediate, as the children of this class obtained better food than Class B whenever they attended the day nursery.

TABLE I.—Distribution of Children according to Number of Petechiae in the Circle shown at the First Test

		No. of Petechiae												
		2	3	4	5	6	7	8	9	10	11	12	13	14
Class	A (10)	—	2	1	4	1	1	1	—	—	—	—	—	—
..	B (20)	1	1	2	2	2	3	3	2	—	—	2	1	1
..	C (10)	1	3	1	1	2	—	—	—	2	—	—	—	—
Total (40)		2	6	4	7	5	4	4	2	2	—	2	1	1

TABLE II.—Result of Administration of Ascorbic Acid in the 8 Children with Initial Increased Capillary Fragility

Initial Petechial Count	Petechial Count After Treatment for 1 Week	Petechial Count After Treatment for 2 Weeks
13	4	—
14	11	7
9	6	—
12	4	—
12	5	—
9	4	—
10	5	—
10	4	—

Table I shows that 8 of the 40 healthy children had a definite increase in fragility of the capillaries. These 8 children were re-examined for capillary fragility after the administration of 100 mg. of ascorbic acid (redoxon) daily for a period of one week. Table II shows that after the administration of ascorbic acid all the 8 children were definitely improved, the capillary resistance being normal to 7 out of 8. To the one child who still had abnormal fragility, ascorbic acid 100 mg. daily was given for a second week, after which she showed normal capillary resistance. All children of Class A had normal capillary resistance; while in 33% of Class B and 25% of Class C it was definitely increased.

DISCUSSION

This series shows that capillary resistance to pressure is greatly affected by vitamin C, and that the abnormal fragility of the capillaries can be improved by the administration of ascorbic acid in sufficient doses. The capillary resistance is normal in healthy children of the better classes, and it decreases as the diet deteriorates. This fact may suggest that nutrition, and probably vitamin C, play an important part in capillary fragility.

If the capillary resistance test can be considered to be an index of the amount of vitamin C sufficiency or deficiency in the healthy children, then our results compare favourably with the findings of Prof. Harris (1940) in Cambridge children, as determined by his methods of urine analysis. The capillary resistance test may therefore have great scope in the assessment of adequacy in routine school medical examinations.

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