A C A S E
OF
STRANGULATION OF THE STOMACH
IN
AN UMBILICAL RUPTURE,
AND OF
DEATH DURING ITS REDUCTION UNDER CHLOROFORM.

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A VERY corpulent woman, *æt.* 60, was admitted into the Middlesex Hospital on a Sunday morning. She had been vomiting since the previous Monday, and had had no action of the bowels for three days. She felt, and was, greatly exhausted, her pulse being 120, feeble. She had been operated on ten years previously for a strangulated umbilical rupture by Mr. Wormald.

The lower and greater part of her abdomen was covered with a vast hernial tumour, measuring fourteen inches across and as much vertically. At its upper part it was abruptly prominent, overlapping the umbilicus, where the skin remained fixed to the *linea alba*; on the sides and below, the tumour had spread itself out between the skin and the abdominal muscles, and sloped gradually to the level of the loins

and pubes : in these directions, therefore, its limit could only be distinguished by the touch. Its wall was thin, tense, inelastic, dusky, and marked by many small vessels. It was tympanitic, painless, and but little tender. No diminution of it could be effected by moderate taxis, though it could be so far impressed that the firm hernial ring in the linea alba was just perceptible near the upper part of the tumour. Coughing or vomiting made the sac very tense.

The vomiting was excessive. Though she had drunk little, she was said to have brought up a couple of gallons of fluid in the previous two days. Whilst in the hospital she took but a cup of tea, yet the vomited matters amounted to three and a half pints in less than four hours. The vomiting was forcible as well as copious, and the ejected liquid was thin, black, and at once sour-smelling and aromatic. Before her admission she had taken calomel, with effervescing draughts and prussic acid. Several enemata had been given, and leeches and blisters applied to the abdomen.

Being satisfied that the hernia was strangulated, I had chloroform administered, and made pressure with the whole breadth of both hands on the upper part of the tumour, directing the fingers towards the hernial ring. A coughing effort, coming on at every expiration, made it impossible to continue the taxis, and I placed her on her left side, and waited until the chloroform again acted. Upon renewing the taxis, a gurgling was heard in the tumour, and I felt it begin to go up at the ring. She then vomited copiously a black fluid, as she had before done, and on the sickness ceasing, her pulse was so feeble that no more chloroform was administered. During this state of feebleness, however, the hernia became easily reducible, about one third of its contents passed into the abdomen, and the fingers could be inserted within the umbilical ring. Instead of recovering strength, she became extremely faint, and I ceased manipulating the tumour. Her pulse and respiration were failing proportionally, the one feebly gasping, the other intermitting. Her features lost expression, her lips became livid, her eyes motionless; then pallor and the collapsed look of death

passed over the face, as gradually and together the pulse and respiration ceased; and in about four minutes from the interruption of the taxis and eight or nine from the last inhalation of chloroform she was dead. Cold splashing, galvanism, and artificial respiration, were employed, but they elicited no sign of reaction or of life, and when the surface was cool these measures were abandoned.

Upon afterwards recalling the points of importance relating to this occurrence, it was established that the interval between the commencement of the inhalation and death was twenty minutes; that the chloroform was administered in a towel pinned into the shape of a cone and open at the top; that it was poured into the towel in five measured portions, of which the first was a drachm and the others forty minims each; that the degree of stupor produced was never deep, and was twice interrupted, first by cough and then by vomiting; that there was no muscular spasm and no stertor; that the pulse became feeble, without the usual acceleration, early in the period of inhalation, and that it failed gradually, there being no sign whatever of any sudden collapse. Both it and respiration continued eight or nine minutes after the chloroform was withdrawn. There was no sudden yielding of the rupture. It receded at first under firm, broad, even pressure, directed towards the ring, and it was not until the tumour softened, as it went back, that the hands were used separately for alternate lateral pressure.

Post-mortem examination, twenty-eight hours after death. —The superficial tissues were stained with blood along the back of the trunk, on the legs, in patches on the face and ears, and along the course of some veins on the front of the shoulders. The heart had some pericarditic adhesions on its surface, and was whitened by old lymph in the lining membrane of the left ventricle. Its valves were all efficient. Its muscular substance was somewhat pale in parts, but generally red and firm. There was clotted blood in all its cavities: that on the right side contained fibrinous coagulum, and measured about $\frac{3}{4}$ iv, being nearly thrice the

amount of that in the left side. The lungs were small, and partly emphysematous, but otherwise healthy. The bronchi were congested : they contained no trace of the contents of the stomach. In the heart, and some other parts, the surfaces in contact with blood were stained of a claret colour.

The hernia was as large as before the taxis was employed, but it was not so tense, and the outlines of the contained bowels could be distinguished in the shape of its surface. Its wall was almost entirely devoid of fat, and was strikingly contrasted in this respect with the subcutaneous tissues of the chest and abdomen, which were in some parts two and a quarter inches thick. The interior of the sac was everywhere smooth, shining, and composed of a very coarse serous membrane.

As the peritoneum was opened by incisions through the lower costal cartilages and diaphragm, and when the linea alba was incised, a vast quantity of blackish liquid welled out, similar to that which had been vomited. A little air first escaped when the sac was opened, but when the incision was enlarged the same kind of black liquid, with its strong sour odour, mixed with that of carminatives, flowed freely forth. The entire quantity which escaped, added to that which remained in the peritoneum, could not have been less than a gallon and a half. The hernia contained the greater part of the small intestines, with their mesentery. The cæcum also and the appendix lay loose in it ; and the whole ascending and transverse, with part of the descending, colon arched in the sac around the coils of the lesser bowel. All these parts were naturally distended with air, but not with fæces, and some were tinged with healthy bile. All were also free from inflammation and ecchymosis. The great omentum, short and containing very little fat (in which last respect it contrasted remarkably with the mesentery), was adherent to the front of the sac, and detained within the rupture a flexure, including the entire calibre, of the stomach itself. This extruded portion measured about six inches along its greater curvature ; it was constricted at its two extremities by the hernial ring, and was devoid of

air. The pyloric end of the stomach was within the abdomen, and healthy ; the cardiac portion lay flat and flaccid at the back of the abdomen.¹ It was dull and lustreless in

appearance, and flabby in texture, as if it had been over-stretched ; in some parts it was livid or black. When spread out, it was found to be of very large dimensions, to be lacerated in several parts, and in one spot to be perforated through its posterior wall by an aperture of the size of a sixpence. By this aperture the enormous outflow of black liquid had taken place, as well as of some pultaceous black food which lay behind the lesser omentum. The disposition of the lacerations of the stomach was remarkable. Several were limited to the outer coat, were irregular in shape, and were situated near the spleen : the largest of them extended over nearly the whole top of the cardiac portion from the left of the œsophagus to the spleen. There

¹ Below the œsophagus, in the diagram, is represented the flaccid cardiac portion of the stomach. The lower dotted line suggests the extent of the pouch before its laceration.

were six rents of the inner membrane of the stomach, most of which passed in straight lines to the right of the œsophagus, whilst all of them, looked at together, appeared to radiate from the œsophageal opening as from a centre. Only one of them corresponded with a rent of the peritoneal coat, viz., that by which the back of the stomach was perforated. It was four inches in length, was the longest of all the lacerations, and the only internal one which extended beyond the mucous membrane. The mucous coat forming its margin was soft and black; at the end near the œsophagus, it was reddened and inflamed. The tissues outside it were infiltrated with the black contents of the stomach. The corresponding tear of the peritoneal coat was partly ecchymosed.

The mucous membrane in some other parts of the great gastric pouch was black. These black spots were irregular in form; some were small, no larger in area than a pea or a cherry; one was four inches long and one inch broad. All were surrounded by an ulcerating margin, and were clearly sloughs in process of separation. They were chiefly on the posterior surface of the stomach. The pyloric end of the stomach and the adjoining part within the hernia were healthy, having neither laceration, ecchymosis, discoloration, nor slough. *Sarcinæ ventriculi*, but no blood-corpuscles, were found with the microscope in the black fluid. The gall-bladder contained a gall-stone of the size of a nutmeg, with a small quantity of bile.

Remarks.—Some of the circumstances of this case require a careful comment.

I. *The strangulation of the stomach.*—The case was clearly one of strangulated hernia. This was indicated by the symptoms at the time of her admission into the hospital, and was proved after death by the state of the intestinal canal. For the contents of the stomach had been black and fluid; the small intestine, on the contrary, was naturally distended with air, and was either of its usual pale appearance or stained light-yellow with bile. None of the bile had re-

gurgitated into the stomach: none of the black fluid had passed onward and discoloured the intestine.

Except in cases of diaphragmatic hernia, it is very rare to find any portion of the stomach in a rupture. It has been partially protruded in the umbilical, and even in the inguinal region. The present case is rare, not only as one of displacement, but also of strangulation of the stomach in its entire calibre, and it appears, indeed, to be unique. The displacement is accounted for by the shortness of the portion of great omentum which was adherent to the anterior wall of the sac. As the sac enlarged, it dragged forward the omentum, and with it the corresponding part of the stomach. Strangulation was occasioned by the great protrusion of the other bowels through the hernial ring.

II. *The dilatation of the stomach.*—Of dilated stomachs, the largest in medical records is probably that of a lady whose case is described in the fourth volume of the 'Transactions of the Pathological Society' (page 137). It occupied the whole front of the abdomen to the left of a line drawn from the anterior superior spine of the right ilium to the ensiform cartilage, and its capacity was ten and a half pints. Proportionally, however, this was smaller than the stomach described in the present paper, of which a part only must have contained no less a quantity of fluid, supposing that all the fluid found in the peritoneum had been at one time in the gastric pouch. In some of the cases there is a difficulty in understanding how the stomach becomes so inordinately dilated, and in the absence of any obstruction to the escape of its contents it can only be supposed that the muscular coat has been paralysed. In the case described in this paper, however, the muscular fibres were distinct and strong; there was manifestly no paralysis, but rather some hypertrophy of them, and the enlargement was a gradual consequence of a partial but permanent obstruction of the portion of stomach incarcerated in the hernia. The result of an excessive enlargement of the stomach appears to be general exhaustion. In this case, one of overfilling, from obstruction and at last complete

occlusion, there occurred not only general exhaustion, which might of itself prove fatal, but also sloughing of the tightly stretched mucous membrane of the organ.

III. *The rupture of the stomach.*—Although by the complete strangulation of the hernia the stomach was deprived of its natural outlet, and became more and more enlarged, it does not appear that the stretching of the organ would of itself have ensured its bursting. Mere distension may account for ruptures of the peritoneal coat. Mr. Curling found that membrane rent as a result of the overfilling of the colon above a stricture. But I am not aware of an instance of complete perforation of either the large or small intestine by the mere accumulation of feculent matters in it, or by however vigorous a peristaltic action, unless violence or gangrene have concurred to produce it. The stomach, however, in the act of vomiting, is compressed with sudden and sometimes great violence, and is thus liable to injury, from which the other bowels are exempt. Of ruptures of the stomach from that cause many instances are on record, and none more clearly attributable to vomiting than those detailed by Mr. Weekes in the fourteenth volume of our own 'Transactions.' Now, in the present case, vast as was its enlargement, the stomach yet retained sufficient sensitiveness to give rise to prolonged and forcible vomiting. To that act, therefore, the lacerations may reasonably be ascribed; and their peculiar relation to the œsophageal opening of the stomach, as well as the pathological change in the tissue which was most rent, appears to make that mode of their occurrence a certainty. Had the stomach in its dimensions only equalled instead of far exceeding those which are recorded as having spontaneously burst during vomiting, it would be perfectly satisfactory to attribute to the act of vomiting the production of the single perforation also, as well as the partial lacerations. There would be no hesitation in doing so, were it not for the two circumstances, that vomiting continued, and that the taxis was in use at the time of the approaching death of the patient. As to the former fact, it is clear from the recorded cases

that an unnatural aperture in the stomach does not preclude the possibility of vomiting. In some instances the patients made efforts to vomit, but they were ineffectual. In others the vomiting was even violent. Hence it is not impossible, though it is unlikely, that the stomach in the present case may even have been burst, as it was certainly partially lacerated, by the vomiting. And with regard to the taxis, it is, of course, not improbable that the pressure necessary to reduce so large a hernia might have contributed to complete a rupture of the stomach already partially made; but it is inconceivable that the taxis, which was employed about the hernia, not the abdomen, should burst the back of the gastric pouch, should occasion many scattered rents of its outer coat near the spleen, should produce numerous radiated cutlike tears of the mucous membrane near the œsophagus, and yet should leave no mark of violence on the anterior part of the stomach or on that extruded portion of it which was under direct pressure in the hernia. The appearances found after death show rather that the stomach was rent in those violent heaving efforts of vomiting by which so vast a mass of fluid was raised towards the œsophagus, and pressed against the adjoining upper parts of the stomach.

IV. *The cause of death.*—This may be found either in the exhaustion of the patient, the rupture of the stomach, or the chloroform. It is probably the united effect of them all.

1. If the mode of dying had corresponded to any of those by which death from chloroform is known to occur, the fatal result would naturally be attributed to that agent. The actual failure of life began while the patient was under its influence, and she never regained consciousness. Yet even before the post-mortem examination had revealed the state of the stomach, it had been concluded that the chloroform, though it might have added to her general exhaustion, had exercised no specific toxic effect upon her heart or brain. Neither the pulse nor the respiration specially failed, but their continuance and their failure was uniform

and proportional. Moreover, though the amount inhaled by this patient, 3iij ℥xl, exceeded that which in some of the fatal cases proved a poisonous quantity, yet the continuance of respiration for eight or nine minutes afterwards must have ensured the exhalation of it and the recovery of consciousness, so that death should not have resulted from it alone. The symptoms were those of death by exhaustion, and no share in producing it can be assigned to the chloroform, beyond that of having somewhat augmented the feebleness of the patient.

2. The exhaustion of the general strength was indeed very great, and the employment of chloroform was only determined on as an indispensable means of relieving the stricture and the consequent vomiting. When the age of the patient is considered, the long continuance and severity of the sickness, and the existence of gangrene of several portions of the mucous membrane of the stomach, it will be seen that a great prostration of strength must have resulted from a combination of such depressing influences. Indeed, she was very much more exhausted than appeared by her manner and tone of voice, which were rather calm than feeble. The state of her pulse and her own feelings corresponded much more nearly with her real condition, and showed death to be already imminent.

3. It is not uncommonly believed that a rupture of the stomach is instantly or rapidly fatal, and, without due consideration, the present case might be cited as an instance of that occurrence. In a medico-legal point of view, therefore, it is most important that no misapprehension of the nature of the case should prevail from the possible concurrence of death with rupture of the stomach. It seems likely that, though the numerous lacerations had existed for many hours, the actual perforation of the stomach occurred at or about the time of death. For there was inflammation in the vicinity of some of the rents, but there was little recent ecchymosis at the torn parts, and no peritonitis had followed the effusion of the contents of the stomach. These facts do not, however, prove that death

was the instant result of the perforation. When that accident happens from violence, it does not usually destroy life in less than eight hours; and when it is the result of disease of the coats of the stomach, life is not rarely prolonged to twice or thrice that period. A notable degree of peritonitis is in the latter cases found to have been established. Instances of such long continuance of life after perforation from disease abound in the classical writings of physicians on diseases of the stomach. Excluding the unique case of Alexis St. Martin, the usual duration of life after wounds through the stomach is fairly illustrated by the following three examples. In a case of my own,¹ of a fall from a height, in which intense suffering followed the early administration of brandy, and foreshadowed the nature of the injury, death did not happen until the stomach had been ruptured for eight hours. A soldier, observed by Dr. Davy,² survived for the same period after having shot himself with his rifle through the stomach. On the other hand, my colleague at the Middlesex Hospital, Mr. Shaw,³ has recorded a case in which a man died in an hour and a quarter after a gunshot wound of the stomach. The early death in that case was accounted for by the ball having also opened the abdominal aorta, and occasioned a considerable hæmorrhage. From all this it may be concluded to be possible that the perforation of the stomach contributed to the fatal result. In the exhausted state of the woman, however, there was little need of that additional accident to extinguish her waning life, whilst the anæsthesia either annihilated the shock attending the rupture, if it occurred, or so far masked the symptoms of it that they were indecisive.

One deduction as to the mode of treating the case may be added to this report. It is scarcely questionable that the state of the stomach and the great exhaustion of the strength rendered this patient's recovery hopeless from the time of

¹ Holmes's 'System of Surgery,' vol. ii, p. 411.

² 'Diseases of the Army,' 1862, p. 414.

³ 'Pathological Transactions,' vol. x, p. 168.

her admission to the hospital. But reflection on the case suggests the inquiry, whether she might not have been relieved at an earlier period without the enemata, the leeching, and the medicinal treatment which she received, and at the later period, when I first saw her, without the chloroform and the taxis. For it is plain that the incarceration of the stomach and the distension of its cardiac pouch reciprocally augmented each other. As the pouch enlarged, the other contents of the abdomen were thrust out by it into the hernia, and the accumulation of bowel in the hernia in its turn compressed the incarcerated portion of the stomach, until it was strangulated. Had the stomach been emptied by a less fatal method than vomiting, that is to say, by the stomach-pump, the protruded bowels might have returned into the relaxed abdomen, and the compression of the stomach in the stricture have been relieved.