

ON
ACUTE ULCERATION
OF
THE DUODENUM,
IN CASES OF BURN.

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IN no part of the alimentary canal are the diseases to which it is liable, so obscure, both in their origin and diagnosis, as in the duodenum; and as the following cases of ulceration of this portion of the small intestines in connection with burns, may be interesting, as tending to throw some light on its pathology, and to awaken attention to a source of danger in these accidents not generally suspected, I have much pleasure in complying with the wishes of the President in submitting them to the consideration of this Society.

CASE I.

Extensive burn.—Ulceration of the Duodenum.—Fatal hæmatemesis.

M. A. Fox, a girl aged 11, was brought to the London Hospital May 9th, 1841, on account of a

severe burn on the chest and both arms, the skin of which was extensively destroyed. She had apparently been going on tolerably well until the 27th instant, when I was summoned to the case in consequence of the occurrence of profuse hæmatemesis. She afterwards repeatedly ejected blood from the mouth, and also passed some by stool, and notwithstanding the remedies employed, expired in fifteen hours after first vomiting blood.

The body was examined on the following day. The surface was pale and exsanguineous. The heart and lungs were healthy, but nearly devoid of blood. The stomach was sound, and contained a quantity of dark grumous blood. In the duodenum, at the distance of an inch from the pylorus, there was a circular ulcer about half an inch in diameter, and its edges slightly elevated, which had extended through all the coats of the intestine, the bottom of the ulcer being formed by the glandular substance of the pancreas, which was closely united to the duodenum at that part. The open mouth of a considerable-sized vessel could be distinctly seen at the base of the ulcer, apparently on the surface of the pancreas. There was no further disease of the intestinal canal, but it contained a good deal of dark-coloured blood mixed with the fæces. On subsequently making inquiry of the parents, I could find no reason to suspect the existence of disease in the duodenum previously to the occurrence of the burn.

CASE II.

Extensive burn.—Perforating ulcer of the Duodenum.—Death from hæmorrhage.

A fine male child, aged 4 years, was admitted into the London Hospital, Sept. 11th, 1840, under the care of Mr. Luke, having sustained an extensive burn on the neck, chest, and both arms. The case was treated in the usual way, but on the 24th, about 11 A.M., after complaining of heat and pain in the abdomen, he vomited about half a pint of blood, and afterwards continued to pass blood by stool at different periods till his death, which occurred on the following day, in the evening, after a convulsive fit. The bowels were not relaxed previously to the hæmorrhage.

I examined the body the day after death. The surface and internal organs were unusually pale. The heart and lungs were healthy. The stomach was sound, and filled with undigested food mixed with dark-coloured blood. The intestines contained a quantity of black blood, like pitch, mixed with feculent matter and mucus. A large solitary ulcer was found at the posterior part of the duodenum where it passes in front of the head of the pancreas. This ulcer was of an irregular form, and three quarters of an inch in diameter at its broadest part. It had destroyed the whole of the coats of the gut, so that its base was formed by the pancreas. So slight was the connection of the margin of the ulcer to this gland, that in disturbing the parts in their

removal, the border of the ulcer gave way, and allowed the escape of a portion of the contents of the duodenum into the cavity of the abdomen. The edges of the ulcer were smooth and elevated. A large blood-vessel was distinctly seen running across the base of the ulcer in a transverse direction. The anterior part of the parietes of this vessel was destroyed, so that the remains presented merely a groove or channel, which terminated near the edges of the ulcer, at the opposite sides, in open mouths, into which bristles are introduced in the preparation. The rest of the intestinal canal was carefully examined, but without any further disease being detected. The follicles however throughout were well developed.

CASE III.

Burn.—Fatal.—Perforating ulcer in the Duodenum.

A girl, aged 8 years, was admitted into the London Hospital, under the care of Mr. Scott, April 14th, 1842, having met with a severe burn on the face, chest, abdomen and both arms, the cutis being destroyed. She died on the 24th, having passed blood by stool shortly before death. The nurse stated that she had not vomited whilst in the hospital, and that she sank somewhat rapidly at last.

I did not see the child during life, but I made an examination of the abdomen the day after death. The stomach was healthy, and its mucous membrane rather pale. In disturbing the parts to remove the duodenum, a portion of the contents of the bowel

escaped. A large excavated ulcer was found in the duodenum, the coats of the intestine being entirely destroyed, so that the base of the ulcer was formed by the pancreas. It was about an inch in length, and three quarters of an inch broad, and it reached to within a quarter of an inch of the pylorus. The arteria pancreatica duodenalis was distinctly seen crossing the bottom of the ulcer, its cavity being exposed, and a minute black dot at one extremity indicated the existence of a clot in the vessel. About two thirds of the edge of the ulcer were thickened and rounded, the remainder being even and bevelled off, as if undergoing the process of healing. The connection of the margin of the ulcer to the pancreas was extremely slight, and formed only by the peritoneum, in which there was a rent, occasioned in the removal of the parts. The follicles in the lower portion of the duodenum were a little enlarged, but there was no unusual vascularity or trace of disease in any other part of the intestinal canal, which was carefully examined throughout. The contents of the duodenum were natural in appearance, but the intestines beyond, contained a quantity of dark blood, resembling pitch.

CASE IV.

Burn.—Fatal.—Ulceration in the Duodenum.

A boy aged $3\frac{1}{2}$ years was admitted into the London Hospital in September 1840, severely burnt on the face, both thighs, and scrotum, the cutis being destroyed. The accident occurred in consequence of

his clothes catching fire. He lingered till the eleventh day afterwards, when he died. I did not see the boy during life. On inquiry of the nurses in the ward, it was ascertained that the bowels had not been relaxed before death. The friends not having consented to an examination of the body, the stomach and duodenum were the only parts inspected. The former was in every respect healthy. A small solitary ulcer was observed in the mucous membrane of the latter. The ulcer was situated rather further than an inch from the pylorus, at that part of the duodenum where it is in contact with the head of the pancreas. The ulcer was of an oval form, five lines in length and one and a half in breadth at the widest part; its long diameter was in the transverse direction. It was situated between two folds of the mucous membrane, so as at first sight to appear to be merely the depression between them. It was evident, however, on a closer examination, that there was a breach of surface in the mucous membrane. The edges of the ulcer were even. There was no particular vascularity around it, nor any unusual development of the follicles.

I am indebted to Mr. Stanley for the following particulars of a preparation contained in the Pathological collection at St. Bartholomew's Hospital.

CASE V.

Ser. 13th, 55. *Duodenum with part of the stomach.* Two large ulcers, and many of smaller size, have formed in the mucous membrane of the duo-

denum. The two large ulcers have completely penetrated the coats of the intestine. One of these ulcers is closed by the contiguous and adherent surface of the pancreas. The former communicated with the cavity of the abdomen.

From a child about 10 years of age. The child from whom this preparation was taken was brought into the hospital in consequence of a burn, and about a fortnight afterwards, while her case appeared to be proceeding favourably, she was seized with extreme pain in the abdomen, vomiting, and great depression. She was thus attacked in the evening, and expired on the following morning. There had been no symptoms whatever which indicated any previous intestinal affection.

Mr. Henry Lee has favoured me with the following brief particulars of a case which occurred at St. George's Hospital.

CASE VI.

Severe burn.—Ulcer in the Duodenum.

Sarah Twigg, aged 19 years, died on the 19th of April 1842, ten days after a burn, which extended over the nates, thighs, and shoulders.

The duodenum contained a large clot of blood, six inches in length, which had moulded itself to the form of the bowel. In the descending portion of the duodenum was a circular ulcer, the size of a bean, extending through all the coats of the intestine. A portion of peritoneum closed the aperture externally, leaving a valvular opening,

communicating with the cavity of the peritoneum.*

The following cases are related by Mr. Samuel Cooper, in a Clinical Lecture on the Pathology of Burns and Scalds, delivered at University College Hospital.†

CASE VII.

Scald of the Chest, followed by Ulceration of the Duodenum.

Hannah Latter, aged 8 years, was admitted December 18, 1838. About five weeks prior to this date, she met with the accident, for which she was attended by a private practitioner, who covered the injured parts with flour. The case went on promisingly for three weeks, at the end of which she began to void a great deal of blood from the rectum. At the time of her admission she was in a most reduced and emaciated condition, and died on the 20th.

Post-mortem appearances.—Abdomen: an ulcer, of about the size of a shilling, in the duodenum, just beyond the pylorus; the deficiency in the parietes of the bowel being supplied by the subjacent portion of the pancreas. Blood was found in various places within the small intestines.

* Mr. Lee has a distinct recollection of another case of ulcer in this part of the duodenum after death, by burn, but he preserved no notes of the case.

† London Medical Gazette, vol. xxiii. p. 837.

CASE VIII.

Burns on the Abdomen, Chest, Arms and Occiput, followed by Ulceration of the Duodenum, and Vomiting of Blood, &c.

Mary Wright, aged 3 years, was admitted into University College Hospital, with several burns of the above-mentioned parts. As she was somewhat collapsed, warm stimulants were given, and the burns dressed with flour. The next day vomiting came on, and for four days the child voided from the stomach considerable quantities of a dark brown fluid, and complained of severe pain in the epigastrium. On the following day she vomited up blood, and, on the next, died convulsed.

Sectio cadaveris.—Traces of peritoneal inflammation on some of the intestines. On raising the stomach, a large clot of blood was observed between it and the mesocolon, circumscribed by adhesion of the adjacent peritoneal surfaces. On breaking the adhesions, and separating the coagulum from the duodenum, the contents of this bowel became effused through an ulcerated aperture, of about the size of a halfpenny, which was situated in the posterior part of the intestine, close to the pyloric orifice of the stomach. A quantity of coagulated blood was found in the latter viscus, and also in the duodenum and ileum; and besides the ulcerated opening, there were three additional ulcers in the duodenum.

The two following cases, which occurred in the Liverpool Infirmary, are recorded by Mr. Long, in an interesting paper on the *post-mortem* appear-

ances found after burns, published in the London Medical Gazette.*

CASE IX.

Ann Jones, aged 28 years, was admitted into the infirmary on the 2nd of April 1834, with an extensive and deep burn of the arms, chest, and nates. She stated that she was in perfect health previously to the accident. She vomited more or less every day, sometimes excessively; had considerable pain on pressure in the epigastric region, with a red glassy tongue, and intense thirst; bowels constipated, but relieved by enemata; the pulse, for some days, was small and weak, then full and strong; died on the eighth day after the accident.

Post-mortem examination.—No peritoneal inflammation, stomach contracted, mucous membrane white, firm; not a vessel to be seen upon it; pylorus healthy; at the superior angle of the duodenum a perforation or ulceration existed, of the size of a shilling; the margins of the perforation were adherent to the gall-bladder, but the slightest traction separated them; the surface of the gall-bladder filling up the area of the perforation, soft, and as it were eroded, the softened surface being easily scraped off; the edges of the perforation and the corresponding surface of the gall-bladder were of a black colour; two or three ulcers of the size of a

* Vol. xxv. p. 743. Mr. Long quotes another similar case, published by Mr. Liston, but this is evidently the same case as the second of the two recorded by Mr. S. Cooper.

pea, and with dark edges, were also found in the duodenum, and the remainder of the intestinal mucous membrane quite healthy, excepting two small red patches in the sigmoid flexure of the colon, which corresponded to two masses of hardened fæces.

CASE X.

Helena Birch, æt. 14, admitted May 24, 1834, with a burn of the second degree, of the nates, posterior part of the neck and both arms; she was in perfect health prior to the accident. She complained of nothing except pain in the burned parts, until the tenth day after the accident. At this period pain in the epigastric region commenced; at the same time the hypogastric region became the seat of pain; the tongue was but slightly altered; she had no vomiting, and the pulse was small and quick. On the 11th the symptoms were more severe; on the morning of the 12th the pain in the epigastric region became intense: very shortly afterwards she was seized with vomiting and profuse diarrhœa, sudden distension of the abdomen, prostration of strength, and in eleven hours she died. There was no doubt but that perforation had taken place in some part of the gastro-intestinal tube. She always lay upon the abdomen.

Post-mortem examination.—Peritoneal lining of abdominal muscles, and its reflections over the liver, uterus and intestines, coated with custard-like coagulated lymph; the omentum was in a similar

state, and about two pints of whey-like fluid floating in the cavity of the abdomen; the peritoneal coat of the intestines intensely red; the mucous lining of the stomach, jejunum and ileum, quite healthy; a few red patches in the colon; the duodenum, at its superior angle, presented a perforation the size of a shilling. The state of the duodenum and of the perforation in this case, differed from the preceding one only in the following particulars: the perforation was rather nearer to the pylorus, its margins were not black, it did not adhere to the gall-bladder, and there were no ulcerations.

I have here adduced four cases of ulceration of the duodenum occurring in cases of burn, which have come under my own observation, two others furnished me by friends, and four previously recorded, making in all ten, which considering the rarity of ulceration in this part of the tube, and the absence of any previous symptoms of intestinal affection, appear to me sufficient to indicate the existence of a connection between the injury to the skin and the disease in the duodenum.

The circumstance of congestion in the mucous membrane of the alimentary canal in common with a similar condition of the blood-vessels in the brain and lungs, occurring in the early stage of burns, and of the stomach and intestines being subject to inflammation after recovery from the immediate effects of the injury, were first particularly noticed by Dupuytren,* but it does not appear that any

* " Si les sujets, après avoir résisté à la première impression du

suspicion was excited that the duodenum was the part most liable to suffer.

The subjects of the disease were young, the eldest having been 28 years of age, whilst the ages of the other nine varied from 3 years to 19. The ulcerative action was evidently of an acute character, a fatal termination having ensued in from seven to seventeen days after the injury in all the cases except one, in which the patient survived till the end of five weeks. Its highly dangerous nature is evinced by the circumstance that death was occasioned in three cases by the ulceration going on to perforation, and thus causing peritonitis, and in six by hæmorrhage consequent on the lesion of a blood-vessel. The ulceration usually taking place in that particular part of the duodenum where it passes in front of the head of the pancreas, renders these cases very prone to the occurrence of serious hæmorrhage,

feu, succombent du troisième au huitième jour, à la seconde période, à la violence de la réaction inflammatoire, après avoir présenté pendant la vie tous les phénomènes d'une vive irritation des viscères, on trouve à l'ouverture des cadavres, tous les signes de la gastro-entérite la mieux caractérisée, et ordinairement accompagnée d'altérations inflammatoires de l'encéphale et des poumons . . . Enfin si le sujet n'a succombé qu'à une époque beaucoup plus éloignée, pendant le cours de la période de suppuration et d'épuisement, on trouve dans les viscères, et surtout dans le canal digestif, des altérations profondes qui attestent la longue inflammation dont ils ont été affectés ; la muqueuse est parsemée de plaques d'un rouge plus ou moins vif, ou plus ou moins foncé, d'ulcérations plus ou moins profondes ; les ganglions mésentériques sont généralement engorgés, &c."—*Leçons Orales*, t. i. p. 217. Brussels edition.

owing to the arteria pancreatica-duodenalis running so close to the walls of the intestine in its passage between the duodenum and pancreas, as almost necessarily to become exposed, when perforation ensues. In order to trace out the progress of the disease, I examined the alimentary canal in several cases of burn, fatal at various periods after the accident, and it was thus that I met with the ulcer in the early stage described in the fourth case. In the case of a child aged 2 years, who was admitted into the London Hospital December 2nd, severely burnt on the arms and chest, and died on the 28th, I found considerable injection of the mucous membrane of the duodenum, near the pancreas, occupying a space of about an inch in diameter, the parts around being pale. There was also similar injection of the mucous membrane at the termination of the ileum. In the following case there were more unequivocal marks of inflammatory disease.

CASE XI.

Burn.—Fatal.—Inflammation of the Duodenum.

A male child, aged $4\frac{1}{2}$ years, was admitted into the London Hospital December 29th, severely burnt on the face, chest, and left arm, the cutis being destroyed. The accident happened by his clothes catching fire. He survived the injury only three days. The body was examined on the third day after death, the weather at the time being frosty. The vessels of the brain were turgid, but the lungs were not particularly congested. The mucous mem-

brane of the stomach was natural in appearance. On opening the duodenum, I detected in the mucous membrane a spot of deep diffused redness, about three quarters of an inch in diameter, situated just anterior to the head of the pancreas, and its outer margin half an inch distant from the orifice of the pancreatic and biliary ducts. On the outside of the intestine there were several lymphatic glands, much enlarged and highly injected, no doubt the result of the irritation within. There was also an enlarged gland on the gall-bladder. The mucous membrane of the remainder of the intestinal canal was examined, but nothing remarkable was observable. There was no injection of the mucous membrane, and no enlargement of the follicles or disease of the mesenteric glands.

Mr. Page, Surgeon of the Carlisle Infirmary, who during eighteen months made the *post-mortem* examinations at the London Hospital, and at my request directed his attention to the subject of these inquiries, met with the following cases:—

A girl aged 13 was admitted, with a severe burn on the back, legs, and arms, the skin being extensively destroyed. She died two days afterwards. The body was examined twenty hours after death. The mucous membrane of the duodenum was much congested, more especially that part which passes in front of the pancreas, where there was an irregularly circular spot of a highly florid colour, but no destruction of substance was observed.

Martha Young, aged 7, admitted February 3rd,

with a severe burn on the head, face and abdomen, and died on the 14th. The posterior portion of the duodenum which passes before the pancreas was rather more vascular than usual. The intestinal canal was otherwise healthy.

In two other cases of burn, one, a young woman, aged eighteen, who expired at the end of eleven days, the other, a girl aged seven, who died from the effects of double pleurisy, after thirty-three days, Mr. Page observed nothing remarkable in the duodenum.

In the preceding observations, the origin of the mischief in the intestine may be traced from the period of the injury to the skin, and referred to acute inflammation, ending in ulceration of a defined portion of the mucous membrane of the duodenum proceeding rapidly to perforation, exposing the pancreas, and sometimes laying open the branches of the hepatic artery passing between this gland and the intestine, and sometimes opening a communication with the serous cavity of the abdomen, producing peritonitis, and thus causing death. It has been noticed by authors, that in cases of extensive burn, patients often appear to be going on well, the constitution seeming to bear up against its destructive effects, when the powers suddenly give way, and the patient rapidly sinks. In many of these cases, if inquiry had been made, it would very probably have been found that the unfavourable change had resulted from the occurrence of hæmorrhage or perforation from an ulcer in the duo-

denum. Indeed, in two cases which have come under my notice, the surgeon in attendance was quite unaware of there being any bleeding from the bowels, the nurse having neglected to inform him of the alteration in the appearance of the stools.

It would be interesting to inquire how it happens that in cases of burn, the first portion of the duodenum is peculiarly the seat of inflammation and ulceration in preference to other parts of the intestinal tube. It cannot be attributed solely to the congestion of the mucous membrane, which commonly occurs after a severe burn, inasmuch as the remainder of the alimentary canal, though equally participating in the vascular disturbance, very rarely indeed becomes affected with ulceration. May it not be an effect of the sudden arrest of the important functions of a large part of the skin, not only of that actually injured or destroyed by the fire, but also of the parts which usually become afterwards inflamed to some extent around the seat of injury? The duodenum is furnished with peculiar glands, the true glands of Brunner, which abound in that particular part of the intestine, the seat of disease, and though their office and the nature and uses of their secretion have not been well ascertained, their size and number indicate that they must be capable of pouring out a large quantity of fluid, and that their functions in the œconomy are by no means unimportant. Now it is seldom that the secretions of any organ can be suddenly stopped without injurious consequences resulting, and con-

sidering the importance of those of the skin, and the continuity of this structure with the mucous surface of the alimentary canal, we can scarcely be surprised that the duodenal glands should sympathise and endeavour, by an increased action, to compensate for the suppression of the exhalation from the skin, and that the irritation consequent thereon should often lead to inflammation and ulceration. The period too at which the disease is set up, commencing as it does so soon after the occurrence of the injury, and, if not fatal, ceasing, as I shall presently show, when the functions of the skin are restored, or a drain is established during the necessary work of repair,—all these circumstances seem to indicate that the origin of the mischief must be referred to some sympathetic cause, such as I have described. And if this supposition should prove correct, the excavated and perforating character of the ulcer* would be explained by the disease commencing in glands seated beneath the mucous membrane. Since I was led to suspect that the glands of the duodenum were the original seat of diseased action, I have not had sufficient opportunities of investigating this interesting point

* I have seen ulcers of this form in the same part of the intestine in other cases besides burns. Some specimens of the kind may be seen in the museum of Guy's Hospital. The peculiar characters of the duodenal ulcer are also well described by Dr. Hodgkin in his published lectures on the Morbid Anatomy of the Mucous Membranes. For the hint that the glands of Brunner are the probable seat of ulceration in these cases, I am indebted to my friend Mr. Bowman, of King's College.

by dissection, in cases where death has ensued within a few days after the injury. In the following case these glands appear to have been the seat of irritation.

CASE XII.

Severe burn.—Inflammation of the Duodenum.

A girl, aged 13, was admitted into the London Hospital, under Mr. Luke, May 13th, 1842, severely burnt on the face, abdomen, arms and knees, and died on the 16th, at 7 p. m. She vomited on the 15th, afterwards refused all nourishment, and was insensible for thirty hours before death.

The abdomen was the only part examined. The stomach was quite sound and rather pale. The mucous membrane of the first part of the duodenum presented an uniform bright red appearance, which terminated abruptly at the pylorus, but was gradually shaded off in the membrane, a little beyond the part where the duct of the liver and pancreas open into the intestine. Brunner's glands were carefully dissected, and found very distinct and large, and numerous vessels were interspersed amongst them. There were some enlarged lymphatic glands in the vicinity of the duodenum externally. The remainder of the intestinal canal was carefully examined, but nothing peculiar was remarked, and the glandulæ solitariæ and agminatæ were not usually developed. The mesenteric glands were slightly enlarged.

Dr. Hodgkin seems to think that vomiting may be a sufficient cause of ulceration in this part of the

duodenum, and expresses his belief that in some instances it has been the cause of ulceration, as much as the ulceration has been the cause of keeping up the vomiting. He refers to a well-marked case of ulceration in the first part of the duodenum, which occurred in a young woman, whose vomiting commenced on her becoming pregnant, and continued uncontrolled till about the fourth month, when she died. He observes that the vomiting in this case was evidently secondary, and not the result of original disease in the alimentary canal; in which the ulceration alluded to was the principal morbid appearance, and even this did not appear to be of long standing.* Vomiting, it is true, often occurs for hours and even days after severe burns, and though in some of the above cases it appears to have been obstinate and distressing, in others the patients suffered very little from it, and as the part of the duodenum affected is nearly fixed, and cannot be much disturbed by the act, I am not inclined to attribute any considerable influence in the production of the disease to this cause.

The disease would commonly be indicated by pain and tenderness on pressure on the right side, midway between the cartilages of the ribs and umbilicus, by uneasy digestion, and sometimes also by vomiting, and, when ulceration ensues, by dark bloody stools. But the morbid action, though acute, is so

* Lectures on Morbid Anatomy, vol. ii. p. 271.

limited in extent and so deeply seated, that we should scarcely expect the symptoms to be well-marked, and they must often be more or less masked by the general derangement consequent on the serious injury inflicted on the skin. The treatment which I should be disposed to adopt in cases of burn, where I had good reason to suspect that inflammation or ulceration was going on in the duodenum, would be the application of leeches to the skin on the corresponding part of the abdomen, if not implicated in the burn ; the exhibition, at intervals, of a few grains of the hydrargyrum cum cretâ combined with opium to allay pain ; and allowing nothing but fluid nutriment of the blandest description.

We have sufficient evidence that the ulcerative process in these cases may be arrested before producing perforation, and the breach of surface admit of being repaired. In Case III. I have mentioned that part of the edge of the ulcer was even and bevelled off as if undergoing the process of healing, and in the pathological collection at the London Hospital, there is an interesting preparation of a cicatrized ulcer in the duodenum, which was found in the body of a young woman who died exhausted from the effects of an extensive burn, eight weeks after the occurrence of the injury. The cicatrix is smooth, rather less in size than a fourpenny piece, and situated near the pylorus, extending a little over that part of the intestine in contact with the duodenum. It is extremely thin, consisting merely

of peritoneum, which exhibits internally a number of radiated lines. The preceding observations justify me in concluding that the cicatrized ulcer in this case originated in the burn, of which the patient ultimately died.