

Chips from a surgeon's workshop : five consecutive cases of gunshot wounds of the abdominal viscera treated by abdominal section : two deaths, three recoveries / by A.C. Bernays.

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COMPLIMENTS OF THE AUTHOR.

Recd Augt 8' 1890

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Chips from a Surgeon's Workshop.

FIVE CONSECUTIVE CASES

— OF —

Gunshot Wounds of the Abdominal Viscera

TREATED BY

ABDOMINAL SECTION.

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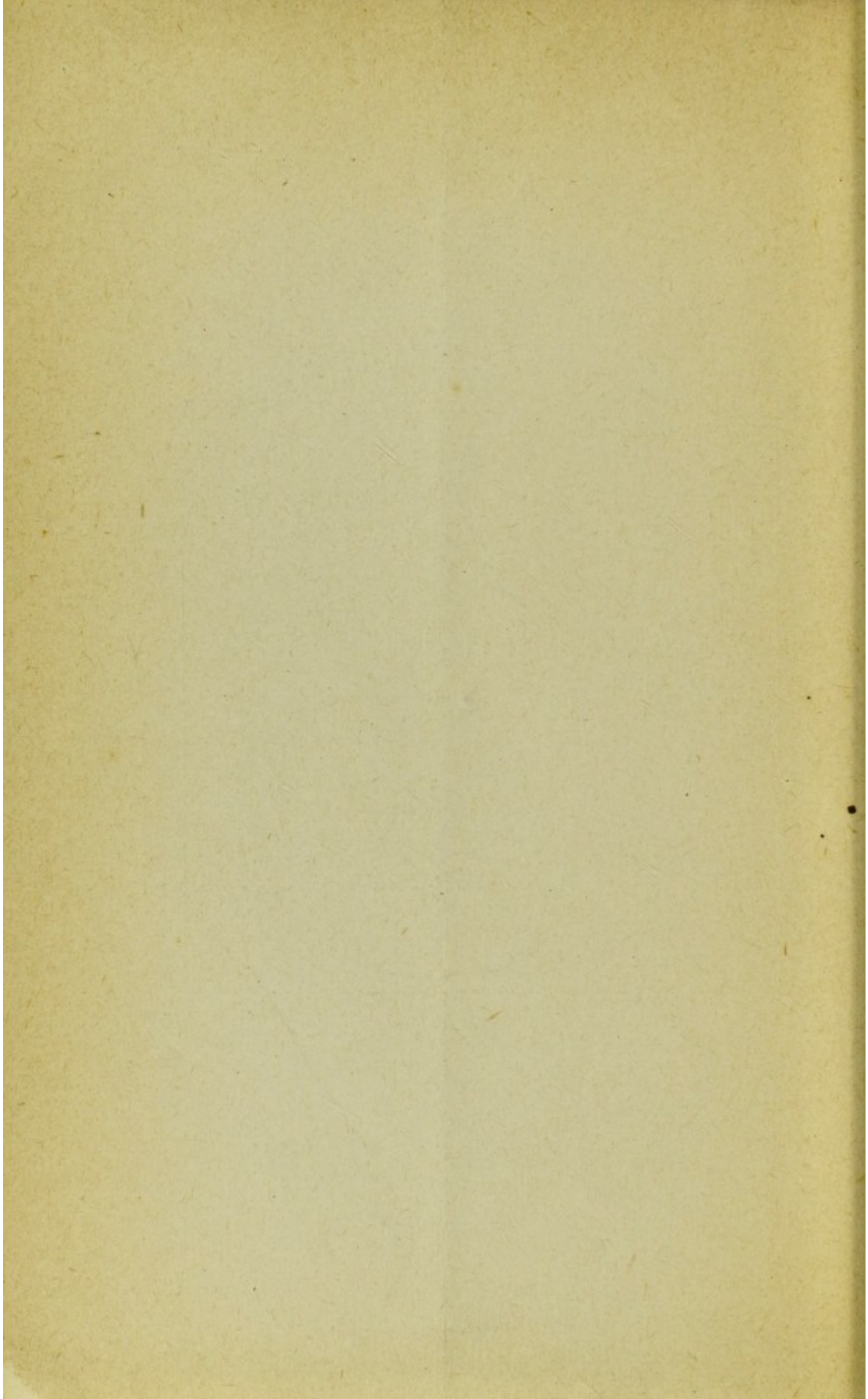
BY A. C. BERNAYS,

OF ST. LOUIS, MO., U. S. A.

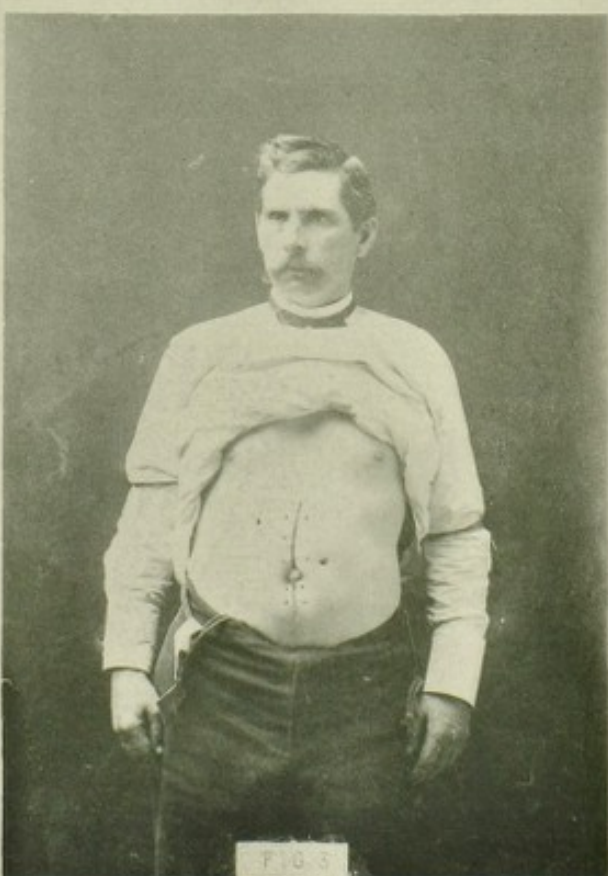
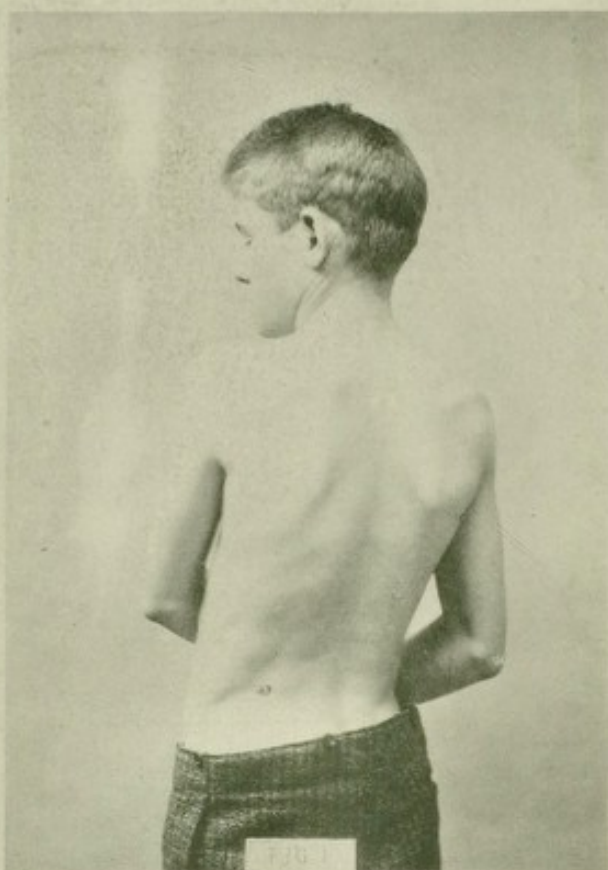
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ARTOTYPE BRIMMER & KALB.

ST. LOUIS MO.



Chips from a Surgeon's Workshop.

FIVE CONSECUTIVE CASES OF GUNSHOT WOUNDS OF THE ABDOMINAL VISCERA TREATED BY LAPAROTOMY. TWO DEATHS, THREE RECOVERIES. SUGGESTIONS ON THE TECHNIQUE AND AFTER TREATMENT. By AUGUSTUS C. BERNAYS, A. M., M. D., M. R. C. S., Eng. Prof. of Anatomy and Clinical Surgery St. Louis College of Physicians and Surgeons; Surgeon to the Lutheran Hospital; Consulting Surgeon to the City Hospital, etc.*

In October, 1888, Dr. W. B. Coley published an article in the *Boston Medical and Surgical Journal*, which gave an admirable table of all the cases he could compile up to that time, of laparotomy in penetrating shotwounds of the abdomen. A very accurate historical resumé of the subject was given by the author¹.

In October 1889, Dr. Lewis A. Stimson in the *New York Medical Journal*, besides recording three new cases with one recovery, again gives a historical introduction and approaches the important question of the indication for operative interference in these cases of visceral injury by bullets entering the abdomen. In many respects this paper is the most scholarly and logical (I emphasize logical, because a sad weakness

1. In a private communication from Dr. Coley dated Nov. 18th, '89, he states that he now possesses data of 125 cases with 38 recoveries, figures which materially change his former mortality statistics, in which he reckoned only with 74 cases and 29 recoveries. We may soon expect the publication of this table, which will be the most valuable basis for conclusions yet recorded.

* Reprint from ST. LOUIS MEDICAL AND SURGICAL JOURNAL, June, 1890.

in this more academical than practical branch of science is often noticeable in the writings of medical men) that has appeared touching our subject. The following sentence is found in the paper:

"In the present state of our knowledge it cannot be said that either interference or non-interference should be the rule of practice and the surgeon may be guided by his own conviction and feelings, whether they lead him to seek to do as much good or only as little harm as possible." Both authors feel the necessity of more extensive statistics in two directions. We need most of all a complete table of cases treated by the expectant or "do-nothing" plan, and we need a more complete table of those cases that have been treated by aggressive operators. The untrustworthiness of statistics in surgery is based on the fact that successes are more frequently reported than failures, and this may never become otherwise, because the opinion that more can be learned and taught by the reports of successful cases than by failures is deeply rooted in the minds of the younger men of the profession and unfortunately also finds support in a common failing of "human nature." We sometimes notice singular defects of memory when unsuccessful surgical operations are to be reported and the keeping of a case-book, at times, is really so laborious that even the best of us become negligent or have "careless" assistants. I am far from insinuating that great surgeons often have "convenient" memories but I merely desire to show that the impressions made on the memory by successful events in our lives are clearly deeper and consequently less likely to be forgotten than disagreeable occurrences which "good breeding" if nothing else makes more or less unmentionable.

After this somewhat questionable digression I will give the report of my entire experience in the premises. It comprises six cases, one of which must be eliminated from statistics because the patient, being thwarted by my efforts in her first suicidal attempt made a second and successful attack upon herself seven hours after my laparotomy. This limits my experience to five cases, which I believe has been exceeded by that of only one surgeon heretofore.

I may be permitted to state that I arrived at the determination to perform an explorative operation on every wound of the abdominal cavity, if called within a reasonable time after

the injury, as long ago as the year 1885. For me this rule of practice has become a principle from which only insurmountable obstacles could make me deviate at the present time. The decision was made easy for me. I saw a dear friend lose his life on account of non-interference and I had opportunities of seeing three other coroners' post-mortems where the injuries were such as seemed to me clearly amenable to the reparative art of the surgeon. I am of the opinion that if the records of all the coroners' offices in the United States, covering the period of the past ten years, could be compiled, at least one thousand cases of death following non-interference in perforating gunshot wounds of the abdomen could be collected².

Only one-half of them might prove to be cases in which our art could have won laurels under favorable circumstances, but even that number would open a grand field of usefulness for laparotomy. I am aware that these subjective convictions do not bear as much weight as the statistical records of work done and I must admit the logical correctness of Stimson's conclusion quoted above. Let the subjoined cases bear witness and perhaps it will then be admitted by all that my convictions have proven useful in my practice.

CASE I.—Annie Gorman, between nine and ten years of age, was shot by her brother on July 3d, 1887, while playing with a toy pistol, the mouth of which was almost touching her dress when discharged. The boy had loaded the pistol with three shot, caliber 18 (Turkey shot). There was but a single hole in the skin. It was situated three inches below the umbilicus and about three and one-half inches to the right of the median line, just over the cæcum. The probe could not be passed into the abdominal cavity because of the contractions of the muscles and the changed position of the patient, she having been shot while walking. After she was fully anæsthetized the probe passed through the parietes and considerable blood escaped through the bullet hole. Laparotomy was performed by enlarging the wound upwards and downwards. In the fascia of the external oblique two perforations were found side by side and there were two holes, one oblong the other round in the parietal peritoneum.

2. This opinion is based on a calculation of probabilities, arrived at by keeping a lookout in the criminal items of the daily press for two years.

The three shot had evidently separated from one another in their course and three perforations were found in the beginning of the ascending colon on its anterior aspect about one and one-half inches above the ileo-cæcal valve, two of them stopped in some rather hard fæcal matter, one passed through and perforated the posterior wall where it lodged between the layers of the mesocolon. This shot must have cut or torn a small artery and had given rise to the formation of a hæmatoma as large as a small egg. The hæmatoma did not increase in size during the operation and since it was confined between the layers of the mesocolon I left it undisturbed. This, I think was a mistake, because I should have reasoned that the shot in passing through the scybalum probably carried with it some of the fæcal matter which, together with the bullet, would give rise to some form of inflammation. The noxious substance clearly was extraperitoneal but in such close proximity to the peritoneal lymph sac, that peritonitis might be set up by contiguity. This form of peritonitis is similar to a form which has been described under the name of *intestino-peritoneal septicæmia*, which leads to death in a manner quite different from the ordinary tempestuous acute peritonitis. The infection of the peritoneum seems to be a more gradual one, the spreading of the process over the membrane goes on more slowly, involving only limited areas. Death usually takes place before the whole of the peritoneum is affected. I have seen this pathological process in case of typhlitis, also in one case of tuberculosis of the intestines where a perforation had not taken place. The symptoms of this form of peritonitis were well marked in my case and will be described below.

The three holes in the anterior wall of the colon bled freely and some fæcal particles had escaped. The colon was tightly contracted around the scybala and the torn edges of the mucosa were projecting through the muscular and serous coats. The three holes were almost in a straight line along the colon and were within the space of one inch and a quarter. They were closed by ten interrupted Lembert sutures. The finest iron-dyed silk was used. The blood was carefully sponged away and the external wound closed by eight deep and twelve superficial sutures. An antiseptic dressing was applied.

Patient rallied well from the operation and the effects of the anæsthesia. Chloroform was used, the operation lasting about thirty-five minutes. The operation was performed about one hour after the accident. Dr. H. F. Hendricks, who had sent for me, conducted the narcosis and the after treatment. Dr. W. V. Kingsbury was my assistant, the operation being performed in the parlor of an ordinary dwelling. One quarter grain morphine was given hypodermically immediately after the operation. At that time this was my custom after every laparotomy; I have since given up this practice and only give morphine to relieve severe pain and then only per rectum in doses of from one-third to one-half of a grain.

Temperature on the evening of the operation was $100\frac{1}{2}^{\circ}$ F., pulse 104; no vomiting.

July 4th T. $100\frac{1}{2}^{\circ}$ F., pulse 110 in the morning, 101 and 114 in the evening; no vomiting. Abdomen slightly tympanitic, but painless.

July 5th T. 99° , pulse 114 in the morning; T. $99\frac{1}{2}^{\circ}$, pulse 120 in the evening. Meteorism continues, no flatus passed the anus, slight nausea, thirst, seems weaker and is restless. Icebags over abdomen ordered.

July 6th T. $98\frac{1}{2}^{\circ}$, pulse 110 morning; T. 99° , pulse 124 evening. The administration of a teaspoonful of Epsom Salts and of Seidlitz powder is followed by vomiting. Abdomen though meteoristic is painless, no movement of bowels or flatus. On this morning I was led to believe that the patient was better, but the reduction of the temperature and pulse was evidently only due to the ice applications and the pulse rose higher than ever in the evening.

July 7th T. $100\frac{1}{2}^{\circ}$, pulse 126 and weak in the morning. Stimulants were given freely all day, icebags continued. T. $102\frac{1}{2}^{\circ}$, pulse 130 in the evening.

July 8th T. $102\frac{1}{2}^{\circ}$, pulse 140, died about noon. No autopsy permitted.

The cause of death undoubtedly was peritonitis. It was a septic peritonitis, I believe, but not the ordinary peritoneal septicæmia which is the most frequent cause of death in cases of gunshot wounds of the abdomen, and which usually causes death within four days after the injury. The infection of the peritoneum was not a rapid one, it most probably proceeded

from an extraperitoneal source as above described, and the materies peccans, whatever that may have been, was filtered through the subperitoneal connective tissue before infecting the vast lymph sac known as the peritoneal cavity. The peritonitis was probably not due to one of the forms of staphylococcus pyogenes or to the streptococcus, but perhaps to some of the ptomaines, which are known to exist in the faecal contents of the large intestine³.

I feel sure that this case might have been saved and I regret the necessity of recording it because it will count against the operation in all statistical tables hereafter. It was my first case of intestinal shot-wound and at that time I had performed scarcely more than one hundred cases of laparotomy of all kinds, and the death should be charged to my want of experience in handling injured intestines.

CASE II.—Bertie Cash, a twelve year old boy, was shot by a comrade on the evening of Nov. 5th, 1887, with a revolver, caliber 22. The bullet entered his back two inches and one-half to the left of the spinous process of the second lumbar vertebra (Fig. 1). The boy was about one mile away from home but walked this distance assisted by his playmates, after being shot. He complained of severe pain in the abdomen locating it around the umbilicus. I was called to see the youngster as soon as he reached his home, but fully two hours had elapsed since the shooting when I saw him. He had vomited once, pulse 80, no fever. It was then seven o'clock P. M. and very dark. I decided to postpone any active interference until morning because no good light could be obtained and no instruments or assistants were at hand. Besides there was no certainty that the bullet had entered the abdomen and there were no urgent symptoms. His urine was normal containing no blood. I ordered that ten gallons of water be boiled and filtered and directed other preparations,

3. Stimson finds that there is nothing to warrant the current opinion that gunshot wounds of the large intestine are so much less fatal than those of the small intestine. In connection with this case, I may say that in my judgment next to wounds of the duodenum those of the caecum and colon *ceteris paribus* will prove to be the most fatal of all injuries involving the hollow intestines of the abdominal cavity. One reason for this opinion is that the large intestine is not as well suited to the application of sutures as the small, on account of the disparity in the thickness and arrangement of its muscularis, and because it is more frequently and unevenly distended by solid and gaseous contents than the other portions of the tract.

such as become necessary when a laparotomy is to be performed in the bedroom of a family living in affluent circumstances. All food and drink was withheld from the patient during the night and a compress of carbolized water was applied around the entire body from the sternum to the hips.

On arriving at the house next morning, accompanied by Drs. W. V. Kingsbury, R. Hanser and H. Wichmann, we found that the boy had rested well during the first part of the night, had grown worse towards daybreak, complaining of pain and nausea, but had not vomited. His pulse was 110 and his temperature 102° F., his abdomen swollen though not very tense, but very painful to the touch everywhere below the umbilicus. The instruments had been put in readiness for laparotomy, and after chloroform was administered, I made an incision in the linea alba from the umbilicus to the symphysis pubis. (Fig. 2). The abdomen was just opened, when with a sudden burst the omentum and nearly all the small intestines popped out of the cavity, some of the loops being bloody as if they had been dipped in blood. I allowed them all to escape and covered them with moist carbolized gauze and turned them over towards the right side of the patient. The cavity was now examined and the lower part contained about one and a half pints of dark blood, which was dipped and sponged out of Douglas' cul-de-sac and the left lumbar region. The source of this blood proved to be one of the lumbar veins accompanying the second lumbar artery. The point at which the bullet had entered the cavity was just below the inferior edge of the left kidney and at the lateral edge of the psoas muscle some fibres of which were torn. The descending colon escaped injury but it seemed to me that a slight greyish discoloration was due to the grazing of the serosa, and an appendix epiploicus attached to the medial wall of this bowel was torn half off.

Having completed the toilet of the peritoneum by pouring three or four pitchers of water into the cavity and again dipping and sponging it out, I proceeded to replace the intestines loop by loop. Each loop and its mesentery was carefully examined before being replaced. The first injury to the intestines found, was two perforations on opposite sides of the ileum. These were closed each by four Lembert sutures. Next two perforations were found close together which were

so nicely sealed, by lymph thrown out over them, that I determined not to stitch them. Next Dr. Kingsbury spied a small foreign substance lying in a perforation of the mesentery which proved to be a shred of the boys woolen pants, and a few seconds later the same assistant found the bullet lying between two layers of the omentum. It was easily removed as was also the piece of brown cassimere. Finally two perforations were found very close to one another which required suturing because a portion of the mucosa was held between the torn edges of the outer coats, the hole being covered by a beautiful film of natural glue, which did not impress me as being secure enough to be left alone. Four or five Lembert stitches were used after the mucosa was pushed back from between the edges where it had been firmly agglutinated by the coagulated plastic material.

Very considerable difficulty was experienced in finally replacing all the intestines and I was compelled to resort to the trocar in order to evacuate gases which distended some of the loops. Although I used a fine canula about the size of a No. 1 catheter, one of the punctures in the jejunum permitted the escape of several drops of yellow chyle. I was compelled to insert one Lembert stitch over this puncture in order to stop the leakage⁴.

After the bowels were finally replaced the omentum was carefully pushed over the intestines and the incision closed by numerous deep and superficial sutures in the usual way. I

4. In returning the everted intestines, the most important point is complete relaxation of the abdominal muscles. In order to obtain this the narcosis must be carried to the utmost limit consistent with safety. In this case we found it impossible to reach this, and I think the cause is to be found in the fact that a few doses of morphine had been administered during the night previous to the operation. As will be shown in Case V., where a physician who first saw the case administered a number of doses of morphine the same difficulty was met. The morphine seems to produce a certain moderate tonic contraction of the voluntary as well as of the involuntary muscles (e. g. pupil) which is very hard to overcome by the chloroform or ether narcosis. When relaxation can be achieved there is no difficulty in returning everted bowels. But in all cases where we are compelled to perform laparotomy without being enabled to previously thoroughly evacuate the intestinal tract this great difficulty will often be met with. I have met with it in twenty laparotomies, in cases of ileus the result of some form of obstruction and I have been compelled to resort to the enteropuncture in nearly every instance. In some of these cases I have even resorted to enterotomy with washing out of the bowel and have closed the incision by sutures. In no case could the death of the patient be traced to this procedure as was shown by the post-mortem examinations. In these cases the obstruction would account for the extreme dilatation of the bowels which leads to paralysis of the muscular coats.

applied a dressing of antiseptic gauze and a bandage. The boy stood the operation well and soon came to perfect consciousness.

The course of his recovery was a very peculiar one. He proved to be one of the worst and unruly of boys. After a few days of tolerably good behavior he one night got out of bed and drank at least one pint of cold water at a single draught; at another time he got out of bed unnoticed by the nurse to urinate, walking across the room. During the entire first week his temperature always reached 101° or 102° in the evening and was never lower than $99\frac{1}{2}^{\circ}$ in the morning. During the second week on the tenth day he was suddenly taken with violent belly-ache and vomiting. His pulse ran up to 120, but his temperature never exceeded $100\frac{1}{2}^{\circ}$. The vomiting was incessant during twenty-four hours and the emitted material was a greenish mucus. I became alarmed and although there was no tenderness over the abdomen, it was very tense and I think there was an obstruction perhaps due to agglutination of the loops in a false position. I ordered injections and small doses of calomel, 1 grain per hour, to be followed by Seidlitz powders, until a movement of the bowels or at least the passage of flatus was noticed. I saw the boy about noon of the twelfth day and the fifteenth grain of calomel had been taken an hour previously; he was still vomiting, belly like a drum, pulse 120, temperature 100° . The vomit had a decidedly suspicious smell. I sent for assistants, had the instruments, table, etc., prepared, intending to reopen the belly, which by the way had united most perfectly by first intention. Before operating I determined to try the effects of injections administered while the patient was completely relaxed under deep chloroform narcosis. I succeeded in injecting one-half gallon of warm water into the colon and then by a gentle but determined massage of the abdomen I started the contents of the colon and an astonishing amount of flatus and a little fæcal matter was discharged. The little fellow awoke from the narcosis and expressed himself much relieved. The vomiting ceased, pulse falling to 108 in two hours. He had some diarrhœa for a few days, no doubt the result of the calomel and salines. The patient now seemed to rapidly regain his appetite and health, but on the evening of the sixteenth day he again had a severe attack of obstruction of the

bowels accompanied by vomiting, drum-like abdomen, rapid pulse and impossibility to get a movement of the bowels. I was compelled to chloroform him again the next day and again succeeded in relieving the obstruction by massage and injections.

On the 23rd day the rascal ran away from his home and went sleigh riding. This escapade was again followed by a slight rise of his pulse and a milder attack of obstruction of the bowels which his father relieved by means of massage and large injections, having learned how to employ these agents from seeing me practice them.

After this time he had no more trouble, and now two years after the operation is in the enjoyment of perfect health.

In the above history, I have not related all of the curiosities and eccentricities that varied the interesting course of this boy's remarkable recovery. Some would be proper pranks to be enacted in a farce and even there would be "hard to swallow" and since they have no scientific interest I can omit them. That "Truth is stranger than fiction" is a true saying and finds many illustrations in practical surgery.

This case was the first successful laparotomy for shot-wound of the intestines performed in the State of Missouri.

CASE III.—Murtie O'Sullivan, police officer, aged 38, was shot in the abdomen by a negro whom he was trying to arrest on June 26th '88, just before midnight. The weapon was a 41-caliber English Bulldog pistol and the distance from which the shot was fired about twenty-five feet. The ball entered two and one-half inches above the umbilicus and about two inches to the left of the median line. (Fig. 3.) Patient was first seen by Dr. Yarnall, then driven to the City Dispensary in an ambulance. Having been told that he would most likely die before morning, he refused to be taken to the City Hospital and was driven to his home. I was sent for, but being otherwise engaged could not be found before 2:30 A. M. One of my assistants, Dr. W. W. Graves, however, answered the call and had been in attendance since one o'clock. When I arrived at the house of the patient I found him suffering from shock, pulse 100, face pale, hands cold. He had vomited and there was some blood mixed with the thrown up victuals and a small stream of blood was trickling from the bullet hole.

Some ordinary hydrant water was quickly heated in a boiler, an operating table arranged and three coal oil lamps and a tallow candle put in order. Antiseptic solutions were prepared, by the use of the Bichloride tablets of Parke, Davis & Co., for sponges and instruments. For intra-abdominal work the warm water alone was used.

The abdomen was shaved and cleansed while the chloroform was being given and then an incision in the linea alba was made, reaching from the sternum to one and a half inches below the umbilicus. After opening the abdominal cavity there was a decided smell of intestinal gas, not fæcal in character, but smelling of semi-digested sour food. A large clot of blood was found on the anterior wall of the stomach and when this was removed a ragged large hole in the anterior wall of the stomach equidistant from the curvatures came into view. Hanging out of this hole was a shred of drilling which proved to be a piece of the waistband of the drawers. When this was withdrawn, profuse hæmorrhage from the wall of the stomach followed and some gas and particles of the contents escaped. After trimming the ragged edges and washing away the escaped contents and mucus the hole was closed by six Lembert stitches. I expected to find another perforation on the posterior surface of the stomach but a careful search failed to reveal one. In order to fully satisfy myself of this fact I tore a slit into the omentum minus through which I pulled the lower surface of the stomach so that I satisfied not only the sense of feeling but could plainly inspect the entire stomach wall. The point of exit was found two inches below the pylorus in the duodenum, the ball having passed through the pyloric orifice. This opening was closed by four Lembert sutures. The next perforation was found about eighteen inches below the one last closed and was by far the largest hole in a gut made by a bullet that I have ever met with. It was fully an inch and one-quarter in its largest diameter, very irregular in shape with ragged edges. Some shreds were cut off with scissors and the edges doubled into the lumen and closed by seven Lembert sutures, over which two more were placed because at two points a re-inforcement seemed to be necessary. This large opening was fortunately situated exactly opposite the mesenteric attachment. A search was now made for a wound of exit. There was none

to be found either on the jejunum two feet below or between the perforation and the pylorus or at any other place in the gut. At least twenty minutes were spent in this fruitless search and finally it was given up. After a most thorough irrigation of the bowels and of the exposed parts of the cavity with warm water I closed the abdominal cavity in the usual way by means of thirteen deep sutures. A large rubber drainage tube was inserted through the bullet hole, an anti-septic dressing applied and the patient put to bed. I had no definite idea as to the whereabouts of the bullet but hoped that it might be within the bowel and would then be passed per rectum. The operation lasted about one hour and a half. The patient's pulse was feeble and intermittent and his extremities cold; his condition did not seem favorable at this time, nearly 5:00 A. M.

I saw the patient again at 9:00 A. M. about four hours after the operation. The attendants said he had fallen into a deep sleep soon after my departure, and had just awoke a few minutes before my return. His condition was entirely changed, there was complete reaction, pulse strong, though slightly intermittent, 85 per minute temperature 99°. He was warm all over, recognized me and said he felt pretty well. He passed his urine at 9:30 A. M. and soon became perfectly quiet and conscious. The following table will give a synopsis of the further progress of the case as it was given me by Dr. W. W. Graves who constantly attended the patient in a most devoted manner for which I take this opportunity of expressing thanks.

DATE.	TIME.	PULSE.	TEMP.	REMARKS.
June 27th,	9 P. M.	100.	100°	No food allowed, a small ice pill every hour, complains of thirst—1 pint water per rectum which was retained.
"	28th, 8 A. M.	84.	99.6°	One pint of water injected per rectum to quench thirst. Complains of hunger.
"	9 P. M.	100.	92°	Passed a great deal of flatus all day—gets enemata of peptonized milk with a few drops of laudanum. Sleeps a great part of the time.
"	29th, 9 A. M.	77.	98.8°	Same treatment as before, is
"	9 P. M.	78.	99°	very hungry.

DATE.	TIME.	PULSE.	TEMP.	REMARKS.
June 30th,	7 A. M.	80.	99.2°	
"	6 P. M.	84.	99.6°	Passed some fæces.
July 1st,	9 A. M.	96.	100°	Seven stitches removed from wound, first intention perfect. The administration of brandy is begun and also of meat juice. Passed a large amount of fæcal matter.
	8 P. M.	108.	102°	
"	2nd, 9 A. M.	86.	100°	Patient was restless during night. Brandy and meat
	9 P. M.	88.	99.6°	juice per os, peptones per rectum.
"	3rd, 7 A. M.	86.	98.4°	Sleeps well, is hungry, no pain; bowels move every day
	6 P. M.	84.	99.4°	slightly.
"	4th, 9 A. M.	84.	98.4°	Same, removed rest of
	9 P. M.	86.	99°	stitches.
"	5th, 9 A. M.	80.	98.4°	Same.
	9 P. M.	86.	99.2°	Same — removed drainage tube, there never having
"	6th, 9 A. M.	86.	99.2°	been more than a few drops of secretion of a serous liquid.
"	7th, 9 A. M.	80.	98.6°	Allowed soups and milk per
	7 P. M.	80.	99°	os.
"	8th, 9 A. M.	76.	98.6°	
	9 P. M.	76.	98.8°	Passed bullet per rectum.
"	9th, 9 A. M.	78.	98.8°	
"	10th, 9 A. M.	78.	98.8°	Normal convalescence.
"	11th, 9 A. M.	73.	98.8°	Allowed to sit up in bed.

After this period there was nothing to interrupt the regular process of convalescence and patient was allowed to leave his bed about one month after the accident and has never had as much as an attack of colic since. Nearly one year and a half have passed since the accident and he has been doing police duty without losing a single day on account of illness, since he resumed his position on the force.

The Municipal Assembly of the City of St. Louis passed a special ordinance awarding me the sum of \$500.00 for the above operation and I am much gratified to record this truly rare recognition accorded to a member of the medical profession by a political body. I hope that it may serve as a precedent and be used as such by many of my colleagues. I was assisted in the above operation by Drs. W. W. Graves and W.

V. Kingsbury. The former gave the chloroform, the latter assisted me, whilst sponge-washing, lamp-holding and other services were rendered by policemen and neighbors. The circumstances under which the operation was done were of the most discouraging character. Anything like proper aids and appliances for performing a perfectly aseptic operation, or the best light were *pia desiderata* and were not to be had by any possibility. The same observation is true of the next case which also ended in a perfect recovery.

CASE IV.—On the night of Nov. 16th, about eleven o'clock, Herman Spackler, age 25, was accidentally shot by the discharge of a 32-caliber revolver, which a few minutes previously he had placed in his left trousers' pocket, the handle towards the feet barrel pointing upwards. As he was walking upstairs to go to bed he slipped and the weapon was discharged in his pocket. Dr. A. Kleinecke, the family physician arrived one half hour after the accident and seeing the serious nature of the case telephoned for me. On examination we found the point of entrance two inches below and about one inch to the left of the umbilicus. (Fig. 4). Dr. Kleinecke had located the position of the missile. It lay immediately under the cuticle in the seventh intercostal space exactly in the right axillary line. From this course it was judged that the ball must have passed through the stomach and entirely through the liver in an oblique direction, thence through the diaphragm and pleural cavity. Laparotomy was decided upon. Dr. C. Barck, and Drs. Hersman and Moore, internes at the City Hospital, were sent for. In the meantime an operating table, coal oil lamps, hot water, and instruments were prepared by myself and the attending physician. Just before the operation the condition of the patient was as follows: pulse weak, 100 per minute, temperature normal, not much shock but great pain in the abdomen. His face was almost white and since his pulse had grown decidedly weaker between the hours of 12 midnight and 2 o'clock A. M., internal hemorrhage was suspected. During the two hours all possible arrangements with a view to insure an aseptic operation were made, but I must confess they could not satisfy even very modest requirements.

The patient was chloroformed and ready about three minutes before two o'clock A. M. I made the incision beginning at the point of entrance of the ball obliquely to the umbilicus

thence upwards in the median line to the ensiform process. This incision was nearly ten inches in length, the patient being a very tall man, over six feet in height. The first injury detected was a perforation of the omentum which was not bleeding and required no treatment. Next the stomach was everted and at the major curvature a large spurting artery was seen which proved to be the gastro-epiploica dextra. It was completely severed and both ends spurted vigorously. They were brought into view by sponging away the blood and were tied. I left the ligatures long and when closing the wound drew them out between the edges of the incision between two of the deep sutures. I did this because as will be presently explained I expected that a reopening of the cavity for the purpose of evacuating peritoneal abscesses would become necessary and the ligatures would then serve as guides, through the agglutinated omentum and intestines, to the anterior margin of the stomach. Every experienced surgeon will admit the great difficulty of finding one's way among the intestines, where they are glued together by inflammatory adhesions. This is especially true, when adhesions have formed after perforations of hollow intestines, where we have reasons for believing that contents had escaped, as for instance of the appendix vermiformis or of the gall bladder. My precaution proved to be unnecessary but was entirely harmless, excepting that I was unable to extract the threads for over a month, every attempt to do so causing a feeling of distress and almost an attack of syncope.

About one-half inch from this wounded artery and about three inches from the pylorus on the anterior wall of the stomach the ball entered this viscus, tearing a small hole, through which a good deal of gas and some contents bubbled out. The hole was closed by four Lembert stitches. It will be well to state here that the patient's supper had consisted of roast saddle of venison, potatoes, cabbage, bread, butter and coffee. Slices of potatoes and pieces of cabbage leaves were found free in the abdominal cavity. Whenever found, I sponged or washed them away, but I have no idea that every particle was seen and removed. On the anterior surface two perforations larger than the first one were found separated from one another by a narrow bridge of stomach wall. They were nearer to the minor curvature than to the major, the up-

per one large enough to admit the end of my index finger. They were closed by a row of seven Lembert sutures. The next wound was exactly at the attachment of the gastro-hepatic omentum to the minor curvature, and I think was not a complete perforation, the mucosa seeming to be intact. In closing this laceration by Lembert stitches my needle wounded a branch of the pyloric artery, causing a rapidly growing hæmatoma between the layers of the omentum minus. Noticing this, I quickly passed a needle around the pyloric artery and by tying the ligature stopped the subperitoneal hemorrhage.

No other lacerations or perforations of hollow intestines were present and I next proceeded to examine the liver. Passing my hand under the left lobe I found several handfuls of blood, which I removed. The ball had partially torn off the round ligament, then entered near the hilus of the liver, and I found the hole in the liver plugged by a large clot of blood which I studiously left alone. In fact I left a very large quantity of blood in the abdominal cavity under the liver and near the posterior attachment of this organ to the posterior abdominal wall. The operation was now practically finished. During the time occupied as above described (about one hour and a quarter) all the intestines had wormed their way out of the abdominal cavity unnoticed. They were thoroughly washed with warm water and the usual difficulty was experienced in replacing them. Fully a quarter of an hour was spent in accomplishing this object. During their stay outside of the abdomen they had become somewhat cool, but had not gotten beyond the antiseptic towels which had been placed over the patient. Two large three-eighths inch drainage tubes were placed into the abdomen, the one passing above the stomach and under the liver, the other passing from the lower canthus of the incision, at the point of entrance of the bullet, under the omentum and under the stomach. The abdominal incision was closed by eighteen stitches. The upper drainage tube emerged in the line of incision three inches below the gladiolus of the sternum. A simple dressing of antiseptic gauze was applied, held in place by a bandage.

The ball was excised from its bed under the cuticle, because the lead shone through the skin giving it a blue color. The covering was in such condition that it would have become

gangrenous in a few hours and I thought it advisable to incise the integument and remove the bullet from its bed.

The entire duration of the operation was nearly two hours. The patient's condition was good, pulse 100, temperature 99° . He was placed in bed, head low and dry heat applied to the extremities.

Nov. 17th 10 A. M. Pulse 124, temperature $99\ 2.5^{\circ}$. Has rallied nicely and feels comfortable.

Nov. 18th. Pulse 124, temperature $99\frac{1}{2}^{\circ}$. Slight pain in abdomen, one-tenth grain of calomel every hour for eight hours followed by copious stools. The nourishment in this case was exclusively per rectum for one week. Thirst was always alleviated by injecting water with a little whisky. Beef juice and milk were injected in large quantities three times a day. At bedtime one-fourth grain of morphine was given with very good effect.

Nov. 19th, 10 A.M. Pulse 118, temperature $101\ 2.5^{\circ}$, pulse weak. Frequent injections of water and whisky. Abdomen slightly tympanitic. While redressing the wound I gently moved the upper drainage tube, and as I did so quite a blast of gas escaped, making a noise and striking me in the face. The abdomen immediately became softer and the patient expressed relief.

Nov. 20th, 8 A.M. Pulse 106, temperature $99\ 3.5^{\circ}$. Patient evidently better than at any time since operation. Abdomen flat. I slowly removed the drainage tubes, no secretion or gas having accumulated since yesterday.

Nov. 22d. Patient begins to have a troublesome cough accompanied by no expectoration whatever. This proves to be due to a very slight circumscribed irritation of the pleura originating in the perforation of the diaphragm by the bullet. All the stitches were removed at the morning dressing. Pulse 94, temperature $99\frac{1}{2}^{\circ}$. A severe coughing spell occurred during the day and caused a separation of the edges of the incision. The separation extended through all the soft parts down to the peritoneum. This, however, was tightly closed by adhesions and remained so. The separated edges were not reunited by sutures, because from similar former experiences I know that to be worse than useless. The method of drawing the edges together by means of adhesive strips reaching half around the body is also useless. I adopted the method,

which I believe to be the only rational one, and which is original with me. It consists in placing a belt about three inches wide around the body and tightening it firmly. No matter how severe the cough, there can be no further separation, because a distension of the abdomen is impossible at the point covered by the belt. A space of a few inches above and below the belt will also be well protected, hence it need not be more than three or four inches broad. Besides this manifest effect of the belt, it has other advantages which I shall make the subject of a special paper and merely call attention to the subject at this time. The narrow tight belt after any laparotomy tends to give the abdominal organs mechanical rest. It prevents the excursion usually present during normal respiration in a great degree, and enforces thoracic breathing while it diminishes the abdominal and diaphragmatic. Secondly, it prevents the rapid spreading of a peritoneal inflammation tending to localize and circumscribe it. This is a result to be striven after, and since the "opium splint" has been relegated to oblivion, we are compelled to look for another kind of "splint" for the peritoneum. In certain cases I should not hesitate to put a plaster of Paris cast around the belly if I found an indication which seemed to make mechanical rest for the abdominal viscera desirable.⁵

Dec. 1st. Pulse 80, temperature 99°. Food per os is now sparingly administered.

5 The antiseptic method in surgery rests upon certain universally admitted bacteriological facts. The method and its scientific foundation has so radically changed our views on pathology, and our methods of treatment of disease, that a new terminology will become necessary if we wish to have a clear understanding. What was meant by the term inflammation as used ten years ago, and apparently so well described and observed by our best pathologists is almost totally changed. All the best evidence we have, tends to show that inflammation, even when it does not reach suppuration, is dependent on pathogenic germs or their products for its first cause. There is, however, one principle in the treatment of disease which is unshaken and will remain so, and that is the great truth which has guided wise surgeons for centuries, concerning the relation of rest to repair. Applied to diseases of the abdominal viscera whether they be due to traumatism or infection or both, the result will be in exact proportion to our ability to secure rest to the cells and to the organs which they compose. Recent investigations by careful experiments have shown that the tissues are normally endowed with certain powers which result in a rapid removal of pathogenic germs and their products, and these powers no doubt are most active when the tissues or their component cells are in a condition of physiological rest, which is usually coexistent with mechanical rest. The methods which we have for securing mechanical rest should always be present in our minds; the particular method which we choose in a given case will always be more or less conducive to physiological rest, when properly put into practice.

Dec. 5th. Pulse 78, temperature 99°. A dose of sulphate of magnesia is administered and followed by copious evacuations.

Dec. 15th. Pulse 78, temperature 98 3-5°. Usual diet is now allowed and patient sits up.

Dec. 20th. Patient is well, the incision is entirely healed.

At this period in my experience the result of my work in this line shows a remarkable percentage of recoveries. In a letter received from Dr. W. B. Coley, of New York, he says: "Allow me to congratulate you as heading the list of successful operators for pistol shot wounds of the abdomen." The second best record in the world is that of Dr. Lewis A. Stimson who has had two recoveries out of four cases. The largest number of cases recorded by any one surgeon is seven. This operator is Dr. Wm. T. Bull, of New York, who has had two recoveries and five deaths. There are a few operators who have had only one case which recovered, but there are many whose only case has died. In my own experience the statistics of the operation were changed from one hundred per cent. mortality to fifty per cent., then to thirty-three and one-third per cent. and then to twenty-five per cent. where it remained only a few days. For my fifth case to be described below raised the mortality to forty and of course lowered the percentage of recoveries from seventy-five to sixty. The most reliable percentage of mortality can only be based on a complete table of all the published cases, and for reasons given in the introduction, this will necessarily lead to untrustworthy conclusions. Perhaps the individual conclusions of those operators who have seen the largest number of cases will carry more weight than the percentage arrived at by the calculation of the statistician, having little or no experience.

CASE V.—Louis Bowman, aged 22, was accidentally shot near Hamburg, Mo., on Dec. 15th, 1889, at seven o'clock P. M. at close range by a friend in whose hands was a 32-caliber revolver. Immediately after the accident he was seen by Dr. Martin who correctly diagnosed the case as one of perforating shotwound with visceral injuries. The doctor ordered his immediate removal to this city, giving him a letter of recommendation to me. Patient was taken a distance of two miles in a wagon, then put in a boat and rowed down the river to Port Royal, then put on the railroad and brought to St. Louis

on the morning of Dec. 16th. He was taken in a wagon to the Baptist Sanitarium a distance of four and one-half miles from the R. R. depot. I saw him at this place at 10:45 A. M. about sixteen hours after the accident. From the time the accident occurred the patient was given nothing but hot water and a few doses of morphine. The ball entered the abdomen two inches above the umbilicus and one inch to the right of the median line. There was great tenderness on pressure all over the epigastric region on pressure, but when left alone the patient complained only of pain in right lumbar region. Temperature and pulse normal, condition good, no signs of weakness but there was a certain restlessness which I have several times seen after visceral injuries and operations, and which is the first symptom of peritonitis.

Laparotomy was determined upon and performed after elaborate antiseptic preparations and good light, assistance, etc., had been provided. Dr. W. H. Mayfield administered chloroform and Drs. Geo. A. Krebs and G. W. Cale were my assistants. The abdomen was opened in the median line from the ensiform process to the umbilicus. On the anterior aspect of the stomach two inches from the pylorus a circular perforation was found and immediately closed by five silk Lembert stitches. The wound of exit was found near the minor curvature on the posterior (more properly lower) wall of the stomach and was closed by a double row of Lembert stitches. No other perforation of the intestines was found, the ball passed backwards grazing the head of the pancreas. The entire parietal peritoneum covering the posterior wall of the abdomen, as well as that part of the peritoneum, which forms the so-called root of the mesentery behind which lies the vertebral column and the large vessels was suffused by extravasated blood. In other words there was an enormous *hæmatoma postperitoneale*, which extended from the promontory up and into the posterior mediastinum. The extravasation was coagulated and during the time I watched its borders, it did not increase in size. I determined to leave it alone hoping that it might be due to an injury of some small vessel. I reasoned that to attempt to remove the clots from their position and perhaps to search for the bleeding point would involve a most dangerous and time-consuming procedure during which not only the aorta and vena

cava and their branches but also the thoracic duct, the sympathetic ganglia and nerve fibres would be more or less interfered with. The correctness of this view was afterwards proven by the autopsy. The cavity was cleansed with warm water, and all clots and some liquid which had escaped from the stomach were carefully removed. The abdomen was closed in the usual manner. Considerable difficulty being experienced in replacing the eventrated intestines, as it was impossible to secure complete relaxation of the abdominal muscle by extreme chloroform narcosis. Duration of operation one hour.

Patient did remarkably well for twenty-four hours and then rapidly growing worse died at 7:30 p. m. on Dec. 17th. His temperature reached 100° and his pulse which was 78 twenty-four hours after the operation ran up to 140, during the last six hours of his life. He died in collapse which was due to subperitoneal lesions and to an acute and most likely septic peritonitis. I have noticed that in strong patients peritonitis will often make no impression upon the pulse and but little on the temperature for a period of thirty-six to forty-eight hours.

At the autopsy (Coroners' post-mortem) besides the facts just related, a perforation of the duodenum at its lower connection with the head of the pancreas was found, which had been overlooked at the operation. The wounds of the stomach that had been stitched were nicely and firmly closed. After passing between the duodenum and the head of the pancreas the ball glanced off from the body of the second lumbar vertebra lacerating the right renal vein and some small lumbar arterial branches. The right kidney as well as the vena cava and all the other vessels and nerves along the vertebral column were completely surrounded by extravasated coagulated blood. The bullet passed backwards into the lumbar muscles.

There was general peritonitis, some contents had escaped from the perforation in the duodenum. Had I known of the existence of the laceration of the renal vein I might have ligated the renal artery or perhaps have enucleated the entire organ. Which of the two procedures would have been most likely to be successful, can only be decided by experiments. So far as I am aware the renal artery has never been ligated

to stop hæmorrhage from the vein. The danger of gangrene of the organ would be small I think because collateral circulation via the capsule would be easily established.

The perforation of the duodenum which was not seen at the operation because it was hidden by the head of the pancreas might have been found by Senn's test, providing that it was not closed by some such little thing as a cabbage leaf or some other tough material that might be passing through the bowel.⁶ There was no evidence at the autopsy that the septic peritonitis was due to this overlooked perforation. The most extensive inflammatory changes (deposits of yellowish lymph and adhesions between loops of intestines) were found in the lowest part of the cavity, in the pelvis, far away from the perforations and in my opinion were due to escaped contents that had found their way to the most dependent portion of the peritoneal sac during the rather variegated transportation of the patient to the hospital. I do not wish to be understood to mean that the overlooked duodenal perforation might have healed spontaneously. I am convinced that this lesion alone would have inevitably caused the patient's death and I desire to particularly emphasize the necessity of searching the duodenum carefully. Its perforations in my experience have proven the most difficult to find and to treat because of the deep and hidden position of this bowel. They are more difficult of access even than wounds of the lower surface of the stomach near its minor curvature. Wounds of the duodenum will be found most fatal I believe, because a missile coming from the front and perforating the duodenum can hardly miss all of the many important structures which overlie this bowel. Again, the duodenum will probably never be entirely empty the bile and pancreatic juice being constantly secreted, which will make a leakage from a perforation of this intestine almost unavoidable at any time. The probability of a spontaneous closure of a wound of the duodenum by the unaided efforts of nature without leaving a fistula seems to me much smaller than in any other part of the intestinal tract. That such a closure is possible in the ileum was conclusively proven to me in Case II where I left two complete perforations untouched, the missile having been of small caliber.

6. For a fair estimate of this test see Stimson's article l. c. page 488.

Since the history of the above cases was written I have seen a case of gunshot wound of the abdomen which although it did not lead to a laparotomy is so instructive that I desire to record my observations and reflections in this connection.

On Dec. 25th, 1889, at 8:30 P. M., I received the following telegram: Dated, New Florence, Mo., Dec. 25th, 7:00 P. M. Can you come to operate on a strong, healthy patient suffering from gun shot wound in the abdomen? Answer.

DR. T. H. KALLMEYER.

NAT. C. DRYDEN.

The latter name is the name of a celebrated criminal lawyer, who as I afterward learned is the attorney for the defendant in the criminal cause arising from the shooting. Evidently the jurist, who had been told that the chances of recovery of the patient were very small intended to use the surgeon in his client's favor, as well as the physician did, in favor of his patient. The Deputy Marshal, Mr. Messenger, about 40 years of age had been shot at very close range with a 38-caliber revolver while attempting to make an arrest. The ball entered the abdomen at a point about midway on a line extending from the umbilicus to the spine of the left ilium. The patient was doing exceedingly well, pulse ranging from 80 to 90, temperature was $99\frac{1}{2}^{\circ}$, never had been above 101° , abdomen somewhat tympanitic but not painful on pressure. Patient had vomited a half dozen times, which one of the attending physicians attributed to the morphine that had been administered. About 40 hours had elapsed since the shooting, the bowels had not moved, the patient had been properly and judiciously treated, he had only taken a few doses of morphine and quinine and but little liquid nourishment. From a superficial examination any one would have supposed that the ball entered the cavity and must have injured the intestines, either the descending colon, the sigmoid flexure or the small intestines or all of these. On account of the long time which had elapsed I did not very urgently press the necessity of performing an explorative laparotomy but after a consultation with Dr. Kallmeyer, Dr. De Vault, Dr. Graves, and Dr. Krebs, we thought an explorative operation should be made, but knowing the bad results following late operations could offer the patient no very encouraging prognosis. The patient

absolutely refused to be operated under any circumstances. There were several hours left before train time and nothing to be seen in the village, so that even after this decision on the part of the patient I determined together with the other physicians to make a second and more leisurely examination of the case, which resulted in some new developments. First of all on turning the patient over a peculiarity was noticed in the motions of the left lower extremity. We found that all the muscles supplied by the crural nerve were paralyzed whilst those supplied by branches of the sacral plexus were intact. I also administered at first tentatively, then copiously large enemata of water and it was clearly demonstrated that no part of the large intestine was injured by the bullet. Besides these facts it was shown that the shot was received while the parties were scuffling or wrestling on an uneven piece of ground and statements of the eye-witnesses made it probable that the body of the patient was bent forwards when the ball struck him. Taking these facts into consideration it seemed quite possible to me that the ball might have passed into the abdominal cavity, along its anterior wall very close to the parietal peritoneum, perhaps not even injuring the omentum, a distance of several inches and then have torn or injured the crural nerve just above Poupart's ligament. If this was the true course of the ball, it must be located somewhere in the direction of the obturator foramen. It is certain that the patient would not have been injured by an explorative laparotomy and we can only regret that it was not made, as we will never be able to positively know whether or not, or to what degree there was visceral injury. As it is, the case is of little value from a surgical standpoint. At some future time if the injury to the nerve should prove to be a permanent one an operation may be consented to by the patient which will throw more light on the case.⁷ Our first rather gloomy prognosis was of course favorably modified by the second more careful examination.

EPICRISIS.

Before me I have a short review of the surgical part of Vol. III, of the report of the sanitary service during the

7. Fifteen days after the accident patient is up and there have been no evidences of intestinal injury. The paralysis of the extensor muscles seems also to be improving. I am informed by Dr. Kallmeyer that patient is regaining the use of his limb.

Franco-Prussian war, compiled under the direction of the officers of the German War Departments. The review is exceedingly unsatisfactory. It was published December 21, 1889, in the *Centralblatt fuer Chirurgie*.

There were 5,743 wounds of the abdomen, of which 4,143 did not involve the peritoneal cavity, while 1600 penetrated into this cavity. Of the non-penetrating wounds only 364—8.8 per cent. were fatal, while of the perforating wounds 1,111—69.4 per cent. ended in death. It is not stated that laparotomy was performed in any of the 1,600 cases, and I am inclined to believe that this operation was not resorted to during this war in cases of gunshot wounds of the abdomen. During nearly five years spent in German Universities as a student, and during a visit of several months last year, I heard no mention of this practice, although in daily association with those surgeons who would have known of these operations. A perusal of the report, which is not at hand in the original, would leave no doubt on this point. The reviewer makes the point that since perforating wounds of the abdomen cause death so very quickly, either on account of shock, hæmorrhage, or peritonitis, the antiseptic method would probably not change the rate of mortality very materially. He calculates that 57.2 per cent. died, during the first three days following the injury. The result of a careful consideration of all the cases leads the author to formulate the rule, that surgical interference should be limited to a careful cleansing of the wound and its surroundings and an antiseptic dressing, *du reste*: opiates, abstention from food per os and rest. The reviewer (Richter) agrees to this rule for the majority of cases occurring in military practice.

Nimier in the *Archives de méd. et de pharmacie militaire*, 1889, No. III, states that in the Tonkin war there were seventy-two penetrating gunshot wounds of the abdomen, with fifty-four deaths. This is a percentage of recoveries of twenty-five. The eighteen cases that recovered were treated by the "expectant opium method." The author admits that in some cases the penetrating character of the wound was not proven beyond doubt. That being the case, we must assume that the mortality was above seventy-five per cent.

A statistical table of 110 cases of gunshot wounds of the abdomen in which laparotomy was done appeared on January

4, 1890, in the *Journal of the American Medical Association*. The author, Dr. Thomas S. K. Morton, finds a mortality of 67.27 per cent.

In a private note from Dr. W. B. Coley, of the New York Hospital, to me, he finds thirty-eight recoveries in 125 cases, a mortality of 69.6 per cent, following operative interference.

The Messenger case above described would undoubtedly have been recorded by any casual observer as a perforating shot wound of the most serious kind. Knowing the close range, the caliber of the weapon and the point of entrance, visceral injuries would appear to be almost inevitable, yet a more careful examination made their existence very doubtful and even improbable. In the German table of 1,600 cases are included 1291 in which data in regard to the degree of injury, and even of the location of the wound are entirely wanting. 902 of these cases died—69.9 per cent., leaving 389 patients who recovered, and about whose wounds nothing is known beyond the fact that their names were entered on the lists as having a perforating wound of the abdomen. We cannot examine into the qualifications or conscientiousness of the persons making the entries, but it is highly probable that a large number of those cases in the bustle and turmoil of the field service could not be carefully examined, and instantaneous diagnoses were entered on the lists, perhaps often by assistants or orderlies. I think then that the percentage of recoveries from penetrating gunshot wounds of the abdomen is given considerably too high, in other words, an unknown number of the 389 patients did not have *perforating* wounds of the abdomen. The author of the report feels the inaccuracy of the records upon which his statistics are based, and where he finds thirty-three cases of wounds recorded, in which there was only a wound of the peritoneum without injury to the organs, he feels constrained to make the remark that in some of these the existence of an injury to the organs cannot be denied with certainty. The remark applies to cases in which there were some positive written hospital records. How much more probable are mistakes in diagnosis in the 1,291 cases, or rather in the 389 who recovered, where there are no data at all? I cannot believe from the evidence before me, that thirty per cent. of penetrating gunshot wounds of the abdomen will recover without laparotomy, more especially if there

is visceral injury, and if the missile be of such calibre as was used by the French army in 1870. My own experience of five operations proves to any candid and honest critic that under the expectant plan of treatment by non-interference, the record would have shown five deaths. Under the aggressive plan followed by me, this mortality of 100 per cent, was lowered to forty per cent.

Every surgeon will also admit that my cases, excepting the first one, were bad cases, and indeed cases Nos. II, III and IV, all of which recovered, were perhaps as grave, and as badly injured as any successful cases that have been recorded.

If the publication of these cases and results will serve to encourage my co-workers in the field of abdominal surgery to renewed efforts in cases of gunshot wounds of the viscera, and if the description of my operations and after treatment will serve to throw a little more light on this most difficult department of surgery, my object in publishing this paper shall have been achieved.

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