Observations

ON

THE TREATMENT OF GUNSHOT WOUNDS OF THE ABDOMEN.

WITH A SUMMARY OF 500 CASES SEEN IN AN ADVANCED CASUALTY CLEARING STATION.

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Most articles published on wounds of the abdomen begin with a treatise on the effect produced by various projectiles, at various distances, on various organs, and evolving theories therefor. Ignoring this interesting study, we are going to describe "gunshot wounds of the abdomen" as seen in some 500 cases admitted to an advanced casualty clearing station while active fighting was in progress, referring particularly to their condition on arrival in hospital, indications for operative or palliative treatment, anti operative and post-operative measures carried out, and the results and conclusions arrived at.

GENERAL CONDITIONS UNDER WHICH PATIENTS WERE RECEIVED AND TREATED.

Our unit was the most advanced casualty clearing station in the area during the time when these cases were admitted. In quieter times our cases usually arrived within five hours after being wounded, but these 500 cases were admitted while active fighting was in progress—the time when most cases of such a nature occur—and because of the difficulties of evacuating wounded and the rush of other cases in an advanced casualty clearing station during such pressure the treatment of wounded and the results should be studied entirely separate from wounds seen during ordinary trench warfare. During the time which this article embraces our cases never arrived earlier than nine to ten hours after being wounded, usually it was twelve to fifteen hours and often thirty-six to forty hours.

Cases of "gunshot wounds of the abdomen" came in rushes with a large number of other cases—in one night, between 9 and 12 p.m., 36 cases of abdominal wounds were admitted, besides 60 other cases requiring operation; this was at the end of four days' continual rush of wounded. Two tables were devoted to these 36 abdominal cases, and 32 of them were operated on—the remaining four were moribund and died some hours after admission; all were intra-abdominal conditions.

Obviously cases treated under such conditions must be studied quite apart from cases treated in areas where active fighting is not continually being carried on. Working under this pressure, 710 cases diagnosed as "gunshot wounds of the abdomen" were admitted, of which 500 were considered here as intra-abdominal lesions; 356 were operated upon and 144 left; of the 144 left, 6 were not operated on because, in spite of the fact that they were apparently through-and-through wounds, they did not present sufficient intra-abdominal disturbance to make operation necessary; the remaining 138 were moribund and all died within a short time after being admitted, except 12 cases which developed faecal fistula—8 of these were evacuated and 4 died.

RESUSCITATION ON ADMISSION.

Every case admitted complaining of abdominal pain, with a wound anywhere near the abdomen, was at once seen by a surgeon; if examination suggested operation and the man's condition would permit, he was prepared for immediate operation; if not, he was sent to a ward, where resuscitatory measures were at once carried out—salines (subcutaneous or intravenous), warmth, elevation; if restless, omnopon (Roche) (1 ampoule) or camphor in oil. (C. M. K. did not use camphor in oil.) As soon as the patient's condition would allow he was taken to the theatre.

We were impressed by the marvellous effect of resuscitatory measures in apparently hopeless cases, but we early recognized that one must not delay too long, for in many cases the golden opportunity is lost, and the patient sinks again in spite of the most heroic efforts. A very high percentage of cases required resuscitation, but we found that those requiring resuscitatory measures before going to operation must be very carefully differentiated from those requiring immediate operation.

DIAGNOSIS BEFORE OPERATION.

Each individual case must be carefully examined, but we soon learnt to recognize certain conditions:

Pain.

Pain may vary from a dull ache—general or local—to a sharp stabbing type. It is not diagnostic of any particular organ, but in certain areas of the abdomen it suggests certain conclusions.

Wounds involving the diaphragm (perhaps also the pericardium or lower chest) give a very acute pain in the epigastrium; wounds involving the stomach also give acute epigastric pain, especially if large or allowing escape of the acid contents.

Wounds of the large bowel seem to give more pain than those of the small bowel, but neither are characteristic.

Wounds of the liver do not cause characteristic pain, but are often associated with wounds of the diaphragm, when the patient has severe pain, more right-sided.

Wounds of the kidney often induce severe pain, elicited especially on deep palpation over the kidney area.

Pain, especially of a dull aching nature, is often present in the lower abdomen, due to retention of urine, and may be relieved by micturition or catheterization.

Pain varies with the interval since being wounded, and with the individual, and is frequently masked by morphine, previously given to enable the patient the better to stand the journey to hospital.

Site of the Wound.

The site of the wound is not the most important factor in answering the question whether there is abdominal involvement. A foreign body may enter almost any part of a man's anatomy and in its course traverse or lodge in the abdomen. We were impressed by the great percentage of shell wounds of the buttocks and back that enter the abdomen. A very high percentage of wounds involving the kidneys, colon (ascending or descending), liver, and spleen, enter behind a line drawn from the mid-axilla to the anterior superior spinous process of the ilium. A very high percentage of wounds of the caecum and pelvic colon were produced by foreign bodies which entered through the buttock.

Particular attention should be directed to the entrance and exit wounds where both exist, the plane of abdominal involvement, and the possible structures traversed.

The Pulse.

Usually a man wounded in the abdomen with a pulse over 120 was not fit to stand prolonged anaesthesia; such a case required rest, elevation, warmth, salines, and camphor in oil; but haemorrhage must be suspected, and, if such is the case, immediate operation is the only course left. Whether to operate at once or not depends on the pulse—it is the factor in determining when to operate.

Rigidity of the Abdomen.

This was of most important diagnostic value, and varied from a general rigidity of the entire abdominal wall to a small localized area; this latter is often seen in late cases with lateral wounds involving the colon only, where a faecal fistula or nicely walled-off faecal abscess had already formed. Most cases of abdominal involvement had some degree of rigidity, but we early recognized what we termed the "flaccid abdomen," which was usually associated with extensive laceration of the small intestine, sometimes large intestine, and rarely in cases with much intra-abdominal haemorrhage seen generally not later than ten to twelve hours after being wounded, and before general peritonitis had become established. The "flaccid abdomen" soon became recognized as a very bad prognostic condition.

The degree of movement of the abdomen on respiration was an important sign. A freely moving abdomen had no

marked intraperitoneal injury, but the limitations of movement, like the rigidity, varied from the entire abdomen being wholly or partially immobilized to immobilization of one side or the lower abdomen only. Wounds of the pleura and lung occasionally evinced some abdominal rigidity—usually incomplete—and greatly complicated the diagnosis of a purely abdominal condition.

On inspecting the abdomen the contour was of diagnostic value, but it was necessary to determine whether the roundness and bulging was that of marked haemorrhage or of late cases with a paralytic condition and gaseous distension of the intestine, or due to general peritonitis.

The Facial Aspect.

This is important to note; one needs to see a few cases only to recognize the anxious, drawn expression of a patient suffering from intraperitoneal injury, especially when profuse haemorrhage has occurred.

Vomiting.

Vomiting had usually occurred if the stomach or intestine had been perforated, or if there had been much intraperitoneal haemorrhage from any source.

The Urine.

The condition of the urine should be noted, whether blood-stained or not.

The Typical Picture.

The typical picture of a case of "gunshot wound of the abdomen" requiring operation was this: A history of a wound usually somewhere about the abdomen and received some hours before; pain in the abdomen; rigidity of the abdominal wall, general or local; limited abdominal movement on respiration; vomiting, and a pulse varying from 90 to 120.

OPERATION.

Preparation.

At once, or as soon as the patient's condition would allow, he was taken to the operating theatre; preferably he had had omnipon and scopolamine (1 ampoule) one hour before, and had been washed; the abdomen had been shaved, and he had been dressed in clean pyjamas.

The anaesthetic used was combined hot ether and oxygen, administered through a modified Shipway apparatus. Saline was given subcutaneously throughout the operation. The skin was prepared with picric acid, 1 per cent. in spirit.

Long-sleeved gowns (changed between operations), gloves, mask, and cap were worn by operator and assistant, but one was usually obliged to operate alone.

Diagnosis of Site and Extent of Injury at Operation.

The wound was usually excised first, and the exact track of the missile explored. If the excised incision could not be carried on to a paramedial one, or was not in itself sufficient, the peritoneum was at once closed, or the track carefully packed; used instruments, towels, gloves, etc., discarded; the skin again cleaned up, fresh towels used, and in nearly every case a paramedial incision made, high or low as required.

Occasionally the costal incision was used, but only when the spleen, hepatic flexure, or splenic flexure was involved; it is seldom necessary even in such cases, but may be preferable in very thick-walled individuals, or in through-and-through wounds well out to the flank.

If the wound was in front and could be excised widely and continued into a paramedial incision this was done, but unless we could excise widely we made a paramedial incision. In either case we cleaned up the incision with Dakin's solution, smeared 1 per cent. formalin in vaseline over the edges of the incision, and covered over the exposed edges with American dental tissue or green-protective tissue, extending it from the peritoneum to the towels, not leaving any exposed skin.

If haemorrhage had been profuse we first examined the spleen, liver, and large vessels. If the site of the wound suggested injury of a particular organ this was examined first, then the small intestine, large intestine, and stomach.

We found it wiser to go over the small intestine 10 to 12 in. at a time than to deliver the whole bowel at once, but if the patient's condition was bad and great speed necessary it proved wiser to deliver the entire length of bowel externally, keeping it continually covered with

gauze wrung out of hot 1 per cent. saline, and then go over it carefully with as little manipulation as possible. We found that it was rough manipulation rather than the exposure which affected blood pressure so markedly. Before returning the bowel we carefully wiped it over with gauze wrung out of hot 1 per cent. saline, being careful to avoid any saline entering the abdomen.

Wounds of the ascending and descending colon must be carefully searched for; many wounds of these parts occurred posteriorly and were drained posteriorly, no intraperitoneal extravasation had occurred; too hasty examination may tear the reflected peritoneum, break down the barrier, and allow faecal matter to infect the entire abdomen; these cases demanded the greatest care in examination.

In stomach cases the anterior and posterior walls were carefully examined.

Haemorrhage from mesenteric vessels was the most common source of intra-abdominal bleeding, and the bleeding point required careful searching for and ligation.

Treatment of Injured Organs.

Intestines.—Having located the perforations or lacerations, results proved that resection should always be avoided if possible; double resection should practically never be done. Purse-string suture, reinforced with Lembert suture, was possible in most cases, and gave the best results. We found that resection was only justifiable or necessary in cases with many perforations or lacerations over a short section of gut, where too much constriction would result after purse-stringing; where the bowel was too traumatized to recover; or where there was such extensive destruction of the mesentery that the blood supply to that particular portion of gut was cut off. Shock was undoubtedly greater in resection than in purse-stringing.

Before purse stringing the perforation or laceration, if the edges were frayed we excised them. We inserted a purse-string of No. 0 catgut to control the bleeding from the freshened edges if necessary, then a purse-string of linen, and, if necessary, reinforcing Lembert sutures. This applied to small intestine, large intestine, and stomach equally.

In every case of resection end-to-end anastomosis was done. Although it required a little more care in choosing the site of the resection and in approximating the severed bowel, it was quicker and more satisfactory than the lateral anastomosis.

Stomach.—Only once was resection, or rather partial resection, of the stomach necessary, and that in a case in which a large section of the greater curvature had been completely blown away. A gastro-enterostomy was not found necessary in any case.

Rectum.—Wounds involving the rectum intraperitoneally were always closed by purse-string and Lembert suture, but in these cases, if the perforation or laceration was low down, and especially if it was one that tracked backwards through the posterior wall of the rectum or the floor of the pelvis, we brought up the posterior parietal peritoneum in front of the sutured area so as to occlude the traumatized area entirely from the abdominal cavity.

Splenectomy or nephrectomy was done only when the organ was grossly lacerated or was bleeding at the time. Even when the kidney was bleeding and badly lacerated, if the patient's condition was precarious we found it wiser to check the bleeding with hot saline compresses, and then remove these and quickly pack the bleeding surface with rubber tissue—with gauze in the folds of the tissue if necessary, but not in direct contact with the kidney substance. In many cases nephrectomy was necessary later, but the patient was in a much better condition to stand such interference. A certain percentage of lacerated kidneys entirely recovered. Where the ureter was found to be severed, the kidney lacerated, and urine escaping into already infected tissue, we found the results disastrous unless nephrectomy was done at once.

Liver.—Wounds of the liver were treated expectantly if the liver alone was involved, but if the wound was a nasty jagged one, carrying bits of dirt and cloth with it, or if there was the least question of a hollow viscus being also involved, the abdomen was opened. The wound in the liver was examined, the track if gaping and dirty was thoroughly cleaned out with gauze wrung out of Dakin's solution, then with gauze wrung out of saline, and if widely gaping or if it had been particularly dirty we drained the track

with a soft rubber tissue drain which was brought up to the abdominal wall, and led through a large rubber tube which just traversed the belly wall. Haemorrhage from the liver was controlled by deep catgut sutures in clean lacerations, and by the rubber tissue packing when there was much loss of liver substance or a widely gaping track. We found that gauze should never be packed into the liver substance, nor should a rubber tube be introduced into a track in the liver. We found that the resistance of the liver to infection was very low, and that the "toilet" of the liver wound must be most thorough and careful.

Foreign Bodies.—We early recognized that no foreign body should ever be left in the substance of the liver, spleen, or kidney; regardless of the immediate consequences, it must be removed at once.

Mesentery.—Tears of the mesentery and omentum should always be carefully repaired with catgut.

Diaphragm.—Perforations and lacerations of the diaphragm were very common in these "gunshot wounds of the abdomen." They were particularly fatal if not closed, but if closed the immediate effect was remarkable, and the mortality-rate from such conditions greatly lowered.

Immediately on opening an abdomen, if the diaphragm was found to be torn, it was repaired—at once the breathing became easier, the patient took on a better colour, and the pulse improved. A certain percentage of cases were seen with an extensive wound along the costal margin of the abdomen, with the diaphragm torn away from its attachment and flapping freely. In most cases it was possible to repair the tear, even if an antero-posterior tear also existed, repairing the latter first and then bringing out the free edge and anchoring it with heavy catgut to the fascia under the ribs. The immediate effect was marvellous, and the prognosis was good regarding the diaphragmatic condition. Death certainly ensued if something was not done to repair the diaphragm.

Intestinal Paralysis.—In many cases of small bowel injury, if seen later than ten to twelve hours after being wounded, we found gaseous distension, particularly of the proximal part of the gut. In such cases especially, post-operative paralysis occurred; this dangerous and troublesome complication practically never occurred after we adopted the practice of gently milking the gut from just above the distended area to just below the sutured area before closing the abdomen.

Extravasation.—In cases with considerable extravasation of bowel or stomach contents abdominal lavage with hot saline was tried with disastrous results. The patient's condition at first improved, breathing was deeper, colour was better, pulse fuller, and for a few minutes the hot saline seemed to have done good, but, often even before the patient left the table, his blood pressure fell, breathing became shorter, the pulse became quicker and more thready, and he left the table, in the majority of instances, in a badly shocked condition. Escaping faecal matter, stomach contents, or blood clot was carefully wiped out with gauze wrung dry out of hot saline. We found it unwise to allow any free saline whatever to enter the abdomen or to be left there; it has no value and necessitates drainage.

Some one has said that no surgeon has started to do abdominal surgery till he quits draining the abdomen; this is particularly true in "gunshot wounds of the abdomen." Following repair of the small intestine, the only drainage used was a large split tube into the pelvis, which was aspirated every six hours for thirty-six hours and then removed.

After repair of the stomach or colon, if there had been considerable extravasation, or if the tissue about the sutured area had been badly contused or was exceptionally dirty, we draped soft rubber tissue about it to entirely exclude it from the rest of the abdomen; a split or well perforated tube was passed down the centre of the tissue, just to, but not touching, the repaired surface, and this tube was aspirated every four or six hours and removed as early as possible, usually not later than seventy-two hours. The pelvic drain was not used in these cases unless there was considerable free blood in the belly, or in late cases, where we often found a free serous effusion collected in the abdomen. After repair of the pelvic colon, the rubber tissue drape with central split tube was used for the first forty-eight hours. Faecal abscesses, seen usually in late cases, and most commonly about the ascending or descending colon, were carefully mopped up and the rubber

tissue drape with central split tube used and aspirated every six hours. Unprotected gauze was never left in the abdomen.

Closure of Abdomen.

The abdominal incision was closed in layers, but if the tissues were particularly oedematous or suggestive of gas gangrene, the peritoneum only was closed, silkworm gut sutures being introduced through the skin and rectus sheath, but not tied for twenty-four to forty-eight hours, till the danger of gas gangrene was probably over. If the incision was completely closed a wide mastisol dressing was applied to seal off the incision from soiling from without, and to relieve tension on the sutures (except in C. M. K.'s cases). A binder was applied, care being taken not to roll the patient from side to side, but to raise his buttocks carefully; the slightest turning or moving of the patient often caused an immediate fall of blood pressure.

The patient was sent back to a warm bed, and, if his condition would permit, the head of the bed was at once elevated.

POST-OPERATIVE TREATMENT.

In post-operative treatment we were guided by the following principles:

Position.—Exaggerated Fowler's position as soon as the patient had recovered from the anaesthetic and his general condition would permit.

Omnopon (Roche), one ampoule, if restless.

Warmth.

Aspiration of pelvic tubes (except in C. M. K.'s cases).

Heart Failure.—Nothing was found to be of any use to whip up the failing heart except camphor in oil.

Pituitrin given intramuscularly in half-ampoule doses, repeated as indicated, was valuable to induce peristalsis, but was a most dangerous drug if given to patients suffering from shock or collapse with the blood pressure already much lowered.

Eserine was found useful to induce peristalsis.

Saline (7 oz.), with or without brandy (1 oz.), per rectum three-hourly, was given as routine in all cases for two or three days.

Food.—If the lesion was a stomach one nothing was given by the mouth except one teaspoonful of tepid barley water, or raisin tea, for the first two or three days. In lesions of the large intestine, or ileum, small repeated sips of barley water or raisin tea were given for the first twenty-four to thirty-six hours, and gradually increased in quantity.

Vomiting or hiccup was usually quickly relieved by small sips of brandy or champagne, or 8 minims of tincture of iodine in 1 drachm of water. The stomach tube was occasionally necessary. These were very serious prognostic conditions and could not be ignored.

Thirst.—As has been found with the dirty dry tongue of typhoid, chewing-gum was most valuable to sweeten the mouth, clean the tongue, and allay thirst.

Rectal feeding was not found necessary or advisable, and milk by the mouth was avoided.

Post-operative paralysis was never seen where the intestine had been thoroughly milked at operation, but, in occasional cases seen late, where thorough milking of the bowel had not been possible, pituitrin or eserine, the rectal tube passed high up, and gentle abdominal massage relieved most cases.

RESULTS.

The earlier the patient could be operated on the better were the results. As late as twenty hours after being wounded operation was considered the best course, and our results justified us. Judgement in cases seen after twenty to thirty hours presented much greater difficulties; there was always the danger of increasing the damage by manipulation during the operation.

If general plastic peritonitis had developed, interference was not only valueless but dangerous; we were content to insert a pelvic drain, or, if a faecal fistula was found, to mop it out carefully and drain.

A few cases were operated on by us after thirty hours, but usually to drain a faecal collection. One case, done forty-six hours after being wounded, was found to have two perforations of the small intestine; there had been very little faecal extravasation, and the loop of bowel was found partially adherent to the anterior abdominal wall; the perforations were carefully purse-stringed, the foreign body removed from the greater omentum, and, without further exploration of the abdominal contents, the

abdomen was closed without drainage. The patient made an uninterrupted recovery; he had lain out in a shell hole for forty hours, and also had a compound fracture of the right leg at the ankle.

Cases that had already developed faecal fistulae, walled off and draining freely, were not interfered with otherwise than to clean up the wound, and that without an anaesthetic if possible, lest vomiting or restlessness after operation should break down the early adhesions. We recognized that faecal fistulae should not be closed too early, and they often close spontaneously, and too early interference too often ended disastrously.

Autopsy was performed in some 80 per cent. of the cases which ended fatally without operation having been attempted; haemorrhage was found as the commonest cause of death.

Shock accounted for most of the deaths within the first twenty-four hours after operation. General peritonitis was rare in cases operated on not later than twelve hours after being wounded, but later than that was present in about 50 per cent. of deaths.

Gas gangrene, especially of the posterior abdominal wall, was the cause of death in at least 30 per cent. of cases.

After nephrectomy and splenectomy death from embolism and infarct occurred in a small percentage of cases.

In about 8 per cent. of cases operated on wounds of other parts of the body caused death.

CONCLUSIONS.

Our conclusions from observation of these 356 operated cases and the 144 non-operated cases are these:

1. Wounds of the large vessels to the liver, kidney, and spleen are fatal before they can come to operation. Wounds involving the pancreas are seldom seen on the operating table, by reason, perhaps, of the contiguity of the organ to large vessels; only one case was seen here. In that a foreign body was lodged in the tail of the pancreas.

2. Antero-posterior wounds, especially in the epigastrium, are least dangerous, and wounds from side to side, especially low down, are dangerous.

3. Wounds of solid viscera are not so dangerous as those of hollow viscera.

4. Cases that come to operation with a herniated loop of bowel exposed do badly, especially if much bowel is lying exposed; the same is true when the stomach is partially herniated.

5. Wounds of the stomach, colon, and especially the small intestine, require exploration, but in posterior wounds involving the colon the greatest care should be taken not to convert a retroperitoneal condition into an intraperitoneal one.

6. Wounds of the liver and kidney should be carefully determined as such only, and then treated expectantly, doing no more than exploring and cleaning up the track, and not that if probably a through-and-through wound produced by an undistorted rifle bullet or shrapnel ball.

7. Avoid resection.

8. End-to-end anastomosis is preferable to lateral when resection is essential.

9. Wounds of the diaphragm are not necessarily fatal, nor even to be greatly feared. Careful repair gives excellent results.

10. Multiple drainage tubes are rarely necessary, and always to be avoided if possible.

11. Abdominal lavage is a dangerous practice.

12. Never leave free, unprotected gauze in the abdomen.

13. Paul's tube should be relegated to the museum, except in very rare cases.

14. Speed in operating is essential, not only for the benefit of the patient, but because of the demands of scores of less vitally wounded men requiring attention during an active offensive.

15. Resection for faecal fistula is better done late when the patient is in England.

During a heavy rush of work the question inevitably arises, "Is it possible to give every case of penetrating wound of the abdomen the chance of operative interference, without prejudicing the chances of others who are wounded less vitally?" The answer is obvious—that granted an adequate and sufficient personnel, surgeons, nursing sisters, trained orderlies, etc., it should be feasible to deal with every case as its urgency demands, and that no class of case should be relegated to expectant treatment when

surgical interference is indicated and capable of giving a wounded man even a remote chance of life.

The results which have been quoted in this article are, we submit, proof that abdominal surgery is at least as profitable—in a military sense—as the surgery of compound fractures of the femur, skull, etc.; the patients who recover make a rapid and complete recovery and become a satisfactory military asset sooner than the men who have been disabled by compound fractures of the skull, etc.

It was our aim at this casualty clearing station to operate on every case whose need of surgical interference did not warrant the delay his move to the base by ambulance train would involve.

Table of 356 Cases of Penetrating Abdominal Wounds.

Class, and Organ Involved.	No.	Per Cent.	Recoveries.	
			No.	Per Cent.
HOLLOW VISCUS (42.40 per cent.):				
Small intestine	57	16.01	33	57.89
Large intestine	38	10.67	20	52.63
Small intestine and large intestine	24	6.74	5	20.80
Stomach	4	1.12	3	75.00
Stomach and small intestine	1	0.27	0	
Stomach and large intestine	1	0.27	1	100.00
Bladder	13	3.65	5	38.46
Bladder and small intestine	8	2.24	4	50.00
Bladder and large intestine	4	1.12	1	25.00
SOLID VISCUS (17.13 per cent.):				
Liver	29	8.14	20	68.96
Kidney	13	3.65	9	69.23
Spleen	4	1.12	3	75.00
Kidney and spleen	4	1.12	3	75.00
Kidney and liver	3	0.84	2	66.66
Omentum	8	2.24	8	100.00
Pancreas	1	0.27	1	100.00
HOLLOW AND SOLID VISCERA (3.65 per cent.):				
Liver and small intestine	4	1.12	1	25.00
Liver and large intestine	5	1.40	3	60.00
Kidney and large intestine	4	1.12	3	75.00
Stomach, liver, and spleen	1	0.27	0	
DIAPHRAGM (14.04 per cent.):				
Uncomplicated by abdominal injury	10	2.80	5	50.00
Complicated by wound of—				
Liver	10	2.80	7	70.00
Spleen	8	2.24	3	37.50
Spleen and kidney	4	1.12	1	25.00
Stomach	4	1.12	0	
Kidney	1	0.27	0	
Stomach and liver	5	1.40	1	20.00
Liver and kidney	3	0.84	0	
Spleen and stomach	3	0.84	0	
Kidney, stomach, and liver	1	0.27	0	
Spleen and spine	1	0.27	0	
GENERAL (22.44 per cent.):				
Haemorrhage, non-visceral	9	2.52	1	11.11
Intraperitoneal, non-visceral	23	6.46	23	100.00
General peritonitis	21	5.87	1	4.76
Gas gangrene	24	6.74	4	16.66
Abdominal and spinal	3	0.84	0	
Total abdominal operations performed	356		171	48.03

NOTE.—Wounds of the bladder are included in these figures only when intraperitoneal. The treatment will be described in a later paper on "Gunshot Wounds of the Bladder and Rectum." Suture of the laceration without drainage of the bladder itself was the treatment adopted.