months), and several ready prepared cotton-wool-armed match-sticks for the application of the solution.

The "match-sticks" should be made up in the manner of the throat swabs in ordinary use, plugged into test tubes and sterilized before storage.

(2) Train "Special Treatment Orderlies" and others employed in venereal wards in the exact method of the efficient application of silver nitrate solution to eyes likely to have been infected by discharge containing gonococci.

Echoes of the Past.

TWENTY YEARS AFTER.

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(*Continued from p.* 112.)

III.—Gunshot Wounds of Abdomen (*Continued*).

Case 48.—Retroperitoneal Hæmatoma with Gas Infection.

Clinical History.—Nature of wound: Gunshot wound, right loin. (Shrapnel.)

Signs and symptoms: Wound in the right loin just to one side of the mid-line; wound of exit near the right costal margin in front. Pulse 80, temperature normal. Operated on shortly after admission. Next day condition fairly good, but pale. In the evening, temperature 102° F., pulse 140, respirations rapid. Next day temperature 100° F., pulse 160, respirations very rapid. Is pale; mentally, perfectly clear. Abdomen lax. No distension. Wounds look healthy. Died that afternoon.

Operation: Anterior and posterior wounds excised; track through the right psoas, which was quite healthy, horizontal incision made along the costal margin; large retroperitoneal hæmatoma seen; also a puncture of the hepatic flexure of the colon, and a wound of the edge of the right lobe of the liver. There was a slight escape of bowel contents on manipulation, but this was mopped up carefully. The wounds of the liver and bowel were sutured. There was also a small wound of the diaphragm into the lowest part of the pleural cavity; this was sutured. A small tube was put just into the loin wound.

Survival: About forty-eight hours.

Post-mortem Result.—Chest: Except for hypostatic congestion the lungs were normal.

Abdomen: The skin in the loin and down to the groin was bronze; the superficial fascia was darker than normal; the underlying muscles were

normal. The liver and bowel wounds were in good order. The retroperitoneal hæmatoma had undergone liquefaction into a brownish foul fluid, extending medially to mid-line and downwards to the brim of the pelvis. The track of the missile was seen through the right psoas, which was quite healthy except for the small amount of necrosis usual around the track of a missile.

Comments: Death evidently due to gas infection of the retroperitoneal hæmorrhage. (Gas infection may spread in blood-clot as in muscle.) It had spread along the loin wound, and round the abdominal superficial fascia towards the front. Probably the infection in this case came from the bowel contents, rather than introduced from the clothing or skin, as is usual. A free opening of the loin wound and removal of blood-clot, with the insertion of a large drainage tube might have averted death; the tube used was too small and was not inserted far enough; also the loin muscle had more or less prevented proper access to the hæmorrhage.

The rapid breathing was due to toxæmia.

CASE 49.—Hæmothorax, Pulmonary Hæmorrhage, and Retroperitoneal Hæmorrhage. Shock.

Clinical History.—Nature of wound: Gunshot wound, right flank.

Signs and symptoms: A small wound in the right flank about two inches to the right of the spine. Much abdominal distension but no rigidity. Survival: Twenty-one hours after wounding.

Post-mortem Result.—Chest: Heart normal. Left lung normal except for some bronchitis. About seven ounces of dark fluid blood in the right pleural cavity. The lower edge of the lower lobe of the right lung is full of blood; no wound seen. No wound found in the pleura, either parietal, visceral, or diaphragmatic.

Abdomen: Extensive right perinephritic hæmorrhage with a clean-cut laceration of the upper pole of the right kidney. The wound in the back was small, and could not be definitely traced to the damaged area, but no doubt did so; the probe so easily gets into the wrong plane. Hæmorrhage extended just beyond the mid-line but the left kidney was normal. No peritonitis. Large intestine very much distended from cæcum to splenic flexure; there it ended abruptly.

Comments: Presumably died of shock due to extensive retroperitoneal hæmorrhage; possibly this hæmorrhage through its effect on the sympathetic plexuses was the cause of the distension of the large bowel. The pleural and pulmonary hæmorrhage was evidently due to concussion (both surfaces of the diaphragm were searched and no lesion could be found).

CASE 52.—Wound of Ileum, Colon, and Bladder, with Peritonitis.

Clinical History.—Nature of wound: Gunshot wound, abdomen. (Machine-gun bullet.)

Signs and symptoms: Shot in no-man's-land; walked into the trenches was put on a stretcher, then in ambulance, reaching here six hours after

wounding. Has a wound in the left iliac region. Frequent desire to micturate; the urine he passed did not contain blood; the first ten ounces drawn off was likewise free of blood, but the last few ounces contained some. Was cold and collapsed. Liver dullness absent. Much abdominal rigidity. Later on in the day, after operation, he was still conscious, but face was pinched and pulse very feeble. Died some hours later.

Operation: About four hours after admission a median infra-umbilical incision was made; urine, blood, and some fæcal material were found in the peritoneal cavity. Iliac colon punctured; it was sutured. Several wounds of the ileum were also sutured transversely. An intraperitoneal wound of the bladder near the fundus was also sutured. Already there was peritonitis. A drainage tube was put in from the left flank down to Douglas' pouch; another one inserted through the perineum up into Douglas' pouch. Catheter tied in the bladder through the urethra.

Survival: About twenty-four hours.

Post-mortem Result.—Abdomen: Peritoneum much engorged; some pus and lymph present. Wounds were apparently all secure.

Comments: He was received too late to save; perhaps if he had not walked in from no-man's-land he might not have extravasated fæces, etc., but the bladder wound, in addition to the bowel injuries, would probably have proved fatal in any case.

CASE 53.—Hæmothorax. Wound of Liver and Perinephric Hæmorrhage.

Clinical History.—Nature of wound: Gunshot wound, arm and chest. (Bullet.)

Signs and symptoms: Hit through the right arm, then the right side of chest, entering in a downward direction through the 8th rib in the mid-axillary line. He had a hæmothorax, which bacteriological examination showed to be infected. Several days later developed jaundice, and the fluid from the chest was bile stained. Abdomen became distended, but not rigid. Temperature and pulse were considerably raised. Vomiting.

X-ray report: Showed shrapnel bullet lying on the 12th dorsal vertebra; a honey-combed appearance throughout the abdomen, and a diffuse dense shadow in the right kidney region. Also a shadow in the right side of the chest (probably hæmothorax).

Operation: On the first day of admission a tube was put in, low down in the chest; not much came away. Later on, under gas and oxygen, he was operated on in a ward; portion of the rib just below the scapula was removed; not much fluid came away, although the exploratory needle had shown it to be present. He died about twenty-four hours later.

Survival: Several days.

Post-mortem Result.—Chest: Both lungs collapsed; some blood-stained fluid in the right pleural cavity; the costo-diaphragmatic sinus was shut off from the rest of the pleura by adhesions, so that the earlier tubes were

not draining the main pleural cavity ; the small cavity they were in was dry ; the tubes had gone through the diaphragm slightly into the liver.

Abdomen : There was a wound of the right dome of the diaphragm, and of the right lobe of the liver, coming out through the inferior surface ; then the bullet had penetrated the posterior parietal peritoneum near the right crest of the diaphragm ; here was a large perinephric hæmorrhage. Much distension of coils of the bowel, which were adherent in many places by flakes of bile-stained lymph ; there was also much bile-stained lymph on the posterior wall of the abdomen ; some free bile in the right kidney pouch just below the inferior surface of the liver—where the wound in the liver was. The bile-stained lymph exudate and the large perinephric hæmorrhage accounted for the appearance in the radiograph. The shadow on the right side of the thorax was partly due to the very high position of the liver (pushed up by distension), and partly to the hæmothorax.

Comments : According to Colonel Rigby, bleeding from a solid viscus generally ceases in about ten hours ; if one were sure that a solid viscus only had been injured, many cases might be left alone, and they would recover, but one is never certain about this.

CASE 54.—Multiple Wounds of Small Bowel and Stomach with Peritonitis.

Clinical History.—Nature of wound : Gunshot wound, abdomen.

Signs and symptoms : The day after operation seemed fairly well, but the following day he was pulseless and cold. Very little vomiting and no abdominal distension or rigidity. Died that night.

Operation : Small bowel sutured in several places ; there was also a hole in the anterior wall of the stomach, about the size of a crown, and another wound just at the greater curvature.

Survival : About sixty hours.

Post-mortem Result.—Abdomen : Peritonitis ; bowels flaked with lymph, and dirty greyish in appearance. Some gas in the peritoneal cavity. The sutured bowel seemed intact ; stomach appeared to be getting gangrenous near the wound. Mesentery torn near the ileum ; lower ileum was collapsed. (? nipped by the torn mesentery.)

Bacteriological examination : Films made from the free blood in the peritoneal cavity showed an organism, probably *Bacillus aerogenes capsulatus*, in addition to other fæcal flora.

CASE 55.—Wound of Cæcum, Ascending Colon, and Splenic Flexure ; Localized Peritonitis.

Clinical History.—Nature of wound : Gunshot wound, abdomen.

Signs and symptoms : Hit at 7.30 a.m. ; operated on at 1 p.m. A wound in the right flank perforating the cæcum and ascending colon in several places. Blood in the peritoneal cavity. The wounds were sutured. On admission, temperature 96° F., pulse 120. Next day he was comfortable ;

no vomiting; temperature normal, pulse 110. Next day vomited a little. Bowels open with enema. Several days later bowels open daily; no vomiting. Very little abdominal distension. Asking for morphia; thought to be exaggerating. Next day died suddenly.

Operation: Suture of wound in cæcum and ascending colon.

Survival: Five days.

Post-mortem Result.—Abdomen: Stomach very much dilated; duodenum slightly. Leakage of fæces from a pin-point perforation in the splenic flexure; on the medial side of this, in the peritoneal cavity, but shut off from the general peritoneal cavity, was a little pus. The wounds of the ascending colon and cæcum were intact; the mucosa in this area and in the splenic flexure was dark and septic looking, the intervening area being quite healthy. There was some retrocolic hæmorrhage. There was a track leading from behind the colon out to the wound of entrance, which was two and a half inches above the right great trochanter. Although there was no general peritonitis there were some flakes of lymph causing adhesion and partial kinking of the small bowel here and there. The loops of the small bowel hanging down into the pelvis were very much congested. The bullet could not be found.

Comments: From the nature of the bowel wounds it is probable that they were caused by the scattered fragments of bone from the ileum. The cause of death was evidently the sepsis around the leak in the splenic flexure; the peritonitis (which may have been more general than we thought) arose from this source.

CASE 56.—Wound of Colon and Compound Fracture of Femur, with Wound of Popliteal Artery.

Clinical History.—Nature of wound: Gunshot wound, abdomen and thigh.

Signs and symptoms: Day after operation quite conscious; in no pain; abdomen soft. Pulse not yet palpable. Next day the leg was slightly swollen and numb; slight bluish discoloration.

Operation: Laparotomy performed; a small hole in the colon sutured. Portions of the condyles of the femur removed; the fracture extended into the knee-joint. Carrel's tubes inserted. Intravenous saline given.

Survival: About forty-eight hours.

Post-mortem Result.—Abdomen: A coil of bowel was found under the skin; it had come through the peritoneum and rectus muscle (the stitches having given way). No peritonitis.

Limbs: Leg. The popliteal artery was wounded, there being a small gap out of its wall; it was thrombosed below this. The popliteal vein and all its branches, also the external saphenous vein, were thrombosed.

CASE 63.—Multiple Wounds (Abdomen, Buttock, and Arms). Fractured Humerus. Wounds of Small Bowel and Bladder.

Clinical History.—Nature of wound : Gunshot wound, arm and abdomen. (Rifle grenade.)

Signs and symptoms : Wound near the back of the left shoulder, extending down the arm ; humerus is fractured in its upper third, foreign body presumably there. Wound of right buttock, also wound of the lower abdomen to the left of the mid-line. Catheter passed, urine blood-stained. Temperature 97° F., pulse 90. Shocked, but quite conscious. The day after operation he was very ill ; temperature 97° F., pulse 140, respirations rapid ; no vomiting.

Operation : Operated on four and a half hours after being hit. Flesh wounds excised, tube inserted ; arm splinted. Median laparotomy performed in Trendelenburg position ; some blood in the peritoneal cavity, no urinous smell ; small bowel shot through in two places about two inches apart ; the bowel was excised and end-to-end anastomosis done. A through-and-through wound of the bladder near its base was discovered ; the two wounds were sutured. Operation took about an hour and a half.

Survival : About twenty-four hours.

Post-mortem Result.—Abdomen : The sutured bowel proved to be within a foot of the ileo-cæcal valve and was intact. The bladder suture was also intact. There was free gas in the peritoneal cavity, which came from wounds high up in the jejunum, which had not been discovered during life. Some hyperæmia of some coils of bowel.

Comments : Apparently died of shock with very early peritonitis. It is probable that if the patient had not been put in the Trendelenburg position before he was opened, the wounds of the jejunum would have been discovered at operation. But even so that would have lengthened the time of operation ; this factor probably contributed more to death than the early peritonitis.

(*To be continued.*)

Current Literature.

HARE, R. **Sources of Hæmolytic Streptococcal Infection of Wounds in War.** *Lancet*, January 20, 1940.

The author states that in the Great War, 1914–18, the most important bacteria infecting wounds were the *Clostridium tetani*, the gas gangrene bacilli, and hæmolytic streptococci. Tetanus was controlled by injection of serum and gas gangrene by early excision and debridement of wounds, but infection due to streptococci was not controlled at all. The source of the organisms of tetanus and gas gangrene was undoubtedly the soil over which the armies fought, but that of streptococci remained a mystery.