simple fracture. The left lower femoral epiphysis was separated and the end of the diaphysis projected through the skin on the outer side of the popliteal space. The house surgeon carefully cleaned the wound which was some three inches long and found the vessels and nerves intact. He then reduced the epiphysis by a bimanual method. He inserted his thumb into the wound and forced the lower end of the diaphysis forward whilst he flexed the epiphysis by direct manipulation with the other hand and drew it into position. He then put the limb up on a straight splint with a foot-piece. A skiagram (Fig. 5) shows that whilst in this straight splint the fracture gaped behind. A week later, for purposes of drainage, a Hodgen's anterior wire splint was applied and a new skiagram (Fig. 6) showed that the flexed position had reduced this gaping entirely. The boy was seen by us in January, 1899, five and a half months after the accident, and the position and function of the knee were perfect. He could walk and run and there was no limitation of movement. The only thing he complained of was pain in the scar when it was pressed.

Conclusions.—1. That separation of the lower epiphysis of the femur is a very serious injury and is attended when compound by a high mortality. 2. That in the extended position of the knee even with an anæsthetic reduction of the fragment is very difficult if not impossible. 3. That when the epiphysis is not reduced the patient is laid up for about three months and is lame for about six months, whilst the end of the diaphysis frequently requires removal by operation. Shortening of the limb and secondary curves in the spine always follow. 4. Nevertheless, the ultimate result in most cases that recover at all is good. The articular surface of the femur gradually grows into a useful position. 5. That with the method of full flexion reduction is always easy, the treatment is short, and it is the rule to obtain perfect movement in the knee without shortening or deformity of the leg.

DEATHS AFTER ABDOMINAL CÆLIOTOMY.¹

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AFTER a few introductory remarks Dr. Smyly said :

Amongst the causes of death after cœliotomy more or less due to abdominal conditions are : (1) shock ; (2) hæmorrhage ; (3) ileus ; (4) uræmia ; (5) inanition ; (6) tetanus ; (7) embolism ; and (8) sepsis.

SHOCK.

Though we are familiar with the symptoms it is difficult to define the nature of this condition. To say that it is "a profound impression made on the nerve centres and indicating extreme depression of the patient's vital forces" is rather vague, whilst the statement that "it is due to exhaustion of the medulla oblongata and spinal cord leading to a great reduction in the vital activity generally and resulting from severe irritation of the peripheral ends of the sensory and sympathetic nerves" is in the present state of our knowledge too precise ; nor does it include all the cases which present a common group of symptoms, but in some of which there has been no marked or prolonged nerve irritation, as, for example, those resulting from anæsthesia, hæmorrhage, or one recorded by Fritsch where an ovary was removed in five minutes and yet for hours afterwards the patient remained in an alarming condition of the profoundest shock. It appears, then, that the term "shock" applies to a group of symptoms which may be due to a variety of causes but is generally in direct proportion to the magnitude and duration of the operation, especially when associated with long exposure and manipulation of the intestines, to the amount of blood lost and the cooling of the body generally. Patients already debilitated by disease, such as cancer, bleeding myomata, and granular kidneys, bear operations badly, as do also those with "weak hearts." Failure of the heart is one of the most prominent features in shock, and not only may this cardiac insufficiency prove directly fatal, but it may, as pointed out by Fritsch, do so

indirectly, for not the circulation of the blood only but also the movement of all the fluids in the body depends upon the heart's action. If the heart be strong or if it soon recovers after operation the circulation of the blood and the flow of lymph continue normal, as also the currents in the peritoneal cavity where absorption takes place with extraordinary rapidity, lymph, blood, and micro-organisms are carried away through the lymphatics into the circulation, where the latter are rapidly destroyed or rendered harmless by the blood, nature's great antiseptic. But for this to occur three things are necessary : first, there must not be too many cocci ; secondly, there must be a sound heart and an undisturbed circulation ; and, thirdly, the functions of the peritoneum must be normal. Where the heart is weak and continues so the flow of lymph is impeded, peritoneal absorption is diminished or ceases altogether, and a fluid collects in its cavity forming a stagnant culture medium eminently suitable for the development of germs which are seldom altogether absent even after the most aseptically conducted operation. There exist, then, a number of peripheral dangers which a strong heart could overcome but which with a weak heart may prove fatal. Not only do the causes already mentioned cause depression of the heart's action, sluggish circulation, diminished absorption, and suppression of urine, but exposure and manipulation of the intestines is followed by derangement of the physiological functions of the peritoneum. These injurious effects are observable in the congested and disordered circulation, the dilated blood-vessels, and the reddened and lustreless peritoneum. The muscular and mucous coats participating, peristalsis becomes weak or ceases altogether, the mucous membrane swells and ceases to absorb, much flatus forms and is not expelled, and there is excessive tension in the intestines, and under such circumstances a passage of their contents into the peritoneal cavity is possible. We know that white blood-cells can escape and in them, with them, and apart from them, doubtless intestinal bacteria also.

Fritsch, who has drawn especial attention to this subject, attributes these changes to air contact and pressure changes rather than to cooling and mechanical injury, though he says they are doubtless aggravated by rough treatment of the peritoneum. Walthard of Berne, however, from a series of experiments on animals came to the conclusion that the injury was due to the drying qualities of the atmosphere though he did not deny that it might in some measure be due to its coldness causing contraction of the blood-vessels and imperfect nourishment of the serosa. He therefore warned operators against drying the peritoneum and recommended the use of moist compresses wrung out of sterilised salt solution. Sängner of Leipsic adopted these views and Schiffer, his assistant, reported much better results, especially the earlier return of peristaltic action and expulsion of flatus, since the introduction of moist asepsis. Uhlmann, however, assistant to Zweifel in the same city, states in a recent publication that no apparent benefit has resulted from moist asepsis which is inferior to the dry in other matters, especially as a hæmostatic. With these latter views I am inclined to agree and prefer the dry compresses taken directly from the can in which they have been sterilised, excepting only those which directly cover the intestines, since the latter are liable to adhere to the dry cloths.

These cases present, according to Fritsch, peculiar clinical and post-mortem appearances. The patient awakes from the anæsthetic with a peculiar anxious feeling, embarrassed respiration, and a feeble heart. She complains that the binder is too tight. The intestine is paralysed, tympanitis occurs without fever, the tongue is dry, and the pulse is fast and grows faster and faster. The sensorium remains clear but the weakness and anxiety increase. On the evening of the second day, or later, fever sets in, the tympany increases, the pulse grows thready, and the patient dies. This, he contends, differs from sepsis, because an acute septic condition could not develop within an hour of the operation. Fever sets in early in sepsis, late in these cases, and the fact that one patient may die in this way whilst others operated upon on the same day make good recoveries proves that no serious error in asepsis has been made. There are peritoneal symptoms no doubt, but not peritonitis, since there is neither fever nor tenderness, and these patients often recover, whereas the acutely septic invariably die. Such patients become septic towards the end, but cardiac weakness is the prominent symptom.

¹ Abstract of a paper read before the British Gynæcological Society on April 13th, 1899.

throughout and they die, not because they are septic, but they become septic because they are dying. The better results obtained by vaginal methods he believes to be due to the peritoneum retaining its physiological functions which are not altered by contact with the air, cooling, or pressure changes, and he holds that the excellent results obtained by Lawson Tait, Bantock, Koeberle, and others are due to rapid and careful operating, whereby central and peripheral injuries are so slight that the functions of the heart and peritoneum are little interfered with.

It may, perhaps, be wrong to consider hæmorrhage in connexion with shock, but there can be no doubt that a large number, if not the larger number, of cases reported as deaths from shock have been due to loss of blood during or subsequent to operation. Hæmorrhage after operation may be due to the slipping of a ligature which has been improperly applied, from denuded surfaces or torn adhesions, omental vessels, or from puncture of an epigastric artery when inserting the abdominal sutures. The spouting of a large vessel soon gives rise to symptoms easily recognised, but a small oozing is more easily overlooked. It occasionally happens that owing to heart failure the bleeding ceases altogether or appears so insignificant that the abdomen is closed; but after the patient has been put to bed and warmth and stimulants employed with the recovery of the circulation the hæmorrhage returns and its symptoms may be confounded with those of shock.

Zweifel has laid particular emphasis upon the importance of absolutely checking all oozing before closing the abdomen, especially where much loss has occurred during an operation. After severe hæmorrhage he says the heart works with half-filled vessels, the demands upon it are increased, and it works with great rapidity. If the bleeding point has been secured and the circulation enclosed within itself it gradually refills, all the organs and tissues pouring serum into it. The functions are gradually restored and the patient comes round by degrees and climbs step by step back to life. But if, on the other hand, even a small hæmorrhage goes on it works against the heart's action both dynamically and reflexly. When the latter improves the hæmorrhage increases; as more serum flows into the circulation the blood becomes more watery, less coagulable, and thus less adapted to the spontaneous closure of the bleeding vessels. The heart working with a half-filled circulation aggravated by even a small continued loss he likens to a steam-engine working a ship's propeller which lifts out of the water or to a locomotive when the wheels slip upon the rails. The mechanism is imperfect, having lost its accustomed grip; it resembles a pump insufficiently supplied with water. It is, in fact, an empty pumping heart which writers term "shock."

Late or secondary shock has been described, but I have never met with an example and am inclined to attribute the fatal issue in cases which I have seen recorded to secondary hæmorrhage, sepsis, or the giving way of sutured viscera, especially intestine.

Preventive treatment of shock.—In weak and debilitated patients with weak hearts and rapid pulse operation should be, if possible, postponed or abandoned. The operation room should be heated to 75° or 80° F.; prolonged exposure of the surface of the body, but especially of the intestines, should be carefully guarded against. The loss of blood should be reduced to a minimum and the first symptoms of depression should be carefully watched for and actively treated.

Treatment of shock.—I think we are pretty well agreed as to the main lines of treatment in these cases. Hæmorrhage should at once be controlled and where the loss has been considerable sterilised salt solution should be infused either into the subcutaneous connective tissue or directly into a vein. In my practice in the Rotunda Hospital I formed an unfavourable opinion of the former and abandoned it in favour of intravenous infusion, but the apparatus of Münchmeyer which I employed was imperfect compared with that used by Howard Kelly in the Johns Hopkins Hospital, by which a large quantity of solution can be more rapidly infused with a fall of six feet, and it is so strongly recommended by him that I am inclined to have recourse to it should the occasion occur. In all cases of shock, whether due to loss of blood or other causes, the patient should be placed in a warm bed between blankets with her head low, heat should be applied by means of hot-water bottles, and enemata of hot saline solution and stimulants should be administered. The best enema in such a case is, according to Howard Kelly, one containing two

ounces of brandy, 20 grains of carbonate of ammonia, and hot water or beef-tea to eight ounces. At the same time brandy, ether, and strychnine are administered hypodermically. Opinions differ with regard to morphia, but I think its use should be restricted to cases in which pain is an important factor in the nervous depression. Excepting in cases where loss of blood has been considerable saline infusion is of little value, though in some cases of protracted shock it might, as Watson Cheyne has pointed out, prevent coagulation of blood in the pulmonary vessels, a recognised cause of death under such circumstances.

ILEUS.

Ileus is one of the greatest disappointments which an abdominal surgeon encounters. I have lost two patients from this cause during the past year, one twelve months and the other six years after operation. The former occurred in England and nothing was done; the other came into hospital on the sixth day after obstruction too late to save her life. Excluding cases of paralysis due to peritonitis ileus is generally due to adhesion of intestine to raw surfaces, either the abdominal wound, the stump of the pedicle, the omentum, or the surfaces denuded in enucleating tumours or breaking down adhesions; constriction of bowel by bands or from a coil of intestine slipping through a hole in the omentum; or kinking of intestine, or volvulus. Cauterised surfaces and those deprived of epithelium by abrasion have been blamed for this accident, but this has been denied by others and it is doubtful whether such injuries would cause adhesion unless deeper structures were destroyed. It has also been stated that septic infection is necessary, but experiments have shown that this is not the case and that with the most rigid asepsis adhesions as a rule take place. When intestines are long exposed and much manipulated they undergo changes to which I have already alluded and adhere together. Walthard found that where the peritoneum had been long exposed the superficial epithelium perished and an inflammatory demarcation formed between the dead and living tissues. If two surfaces thus affected remained in quiet contact they adhered. If they were not so left fibrous changes only occurred, nor would a surface so affected adhere to a normal one. Sänger, as I have already mentioned, adopted these views and attributed some cases of fatal ileus to the use of dry asepsis; but Uhlman states that in a number of cases in which the abdomen had to be opened a second time in Zweifel's clinic they always found adhesions to the wound, to the stump, or to places denuded of peritoneum, but never between coils of intestine which had been exposed to the air, and I think that this will be found to coincide with the experience of most operators. The early diagnosis of this complication is of the utmost importance, but unfortunately this is often impossible. Where the symptoms set in suddenly with violent paroxysmal pain in a localised position; where the peristaltic action of the intestine can be seen and felt through the abdominal wall and the patient lies prostrated between the attacks bathed in cold perspiration; where neither flatus nor fæces are expelled after energetic efforts to procure evacuation; where vomiting sets in after the second or third day and the abdomen becomes distended, an error is scarcely possible, but such a stormy onset is exceptional and most of these symptoms are simulated by other conditions. The obstruction may even be incomplete and the bowels may be evacuated at intervals and yet the patient may be lost. In any case active measures should be at once employed to induce the bowels to act: the stomach should be washed out and copious enemata should be administered with a long tube, and where the stomach can tolerate it calomel, Glauber or Epsom salts should be administered. Should these measures fail the abdomen should be reopened without further loss of time. The earlier the gut is freed the better is the prognosis. As to prophylactic measures Trendelenburg's position is one of the most important since the bowels are out of the way and are not disturbed, but especial care must be taken when the patient is restored to the horizontal in arranging the intestines in their normal position and seeing that they preserve their natural relation to the omentum. Coating raw surfaces with collodium has been recommended and Martin of Berlin introduces a sponge soaked in sterilised oil, but most operators attach more importance to drawing down the omentum between the abdominal wound and the intestines and as far as possible covering all raw surfaces with peritoneum.

THROMBOSIS.

Thrombosis occurs from septic infection, or from prolonged pressure of pelvic tumours upon veins, or from sluggish circulation due to the quiet recumbent posture, or from the change in the intra-abdominal pressure due to the removal of the large tumours. As thrombus is a potential embolism and as it may be set free at a late period patients should be cautioned against violent efforts or straining for some time after an abdominal operation. I lost a patient from this accident during the third week after operation; she had been sitting by the fire talking to the other patients and was in the act of pulling off her boots when she suddenly was seized with a feeling of suffocation, præcordial anxiety, gasping respiration, and cyanosis, and she died in a few minutes.

Of tetanus I have had no personal experience.

PERITONITIS.

A question of much importance is, whether peritonitis is always septic? Many would answer this question in the affirmative, but there is much to be said on the other side. There is a condition called traumatic or plastic peritonitis; it is best marked in cases where the intestines have been long exposed and much manipulated and where wide areas of adhesion have been separated. In the worst forms of this affection there are vomiting, severe pain in the lower abdomen, tympanitis, tenderness on pressure, accelerated pulse, and elevation of temperature. Death may result in such cases from pressure of the distended intestines on the diaphragm or from ileus. The treatment of this condition recommended some years ago by Lawson Tait—namely, free purgation—is, I believe, at the present time the recognised method. The non-infective character of many of these inflammations has been proved by Howard Kelly who, when obliged to reopen the abdomen to relieve obstructed bowel, found extensive union between adjacent peritoneal surfaces, but these cases failed to show any kind of micro-organisms in the peritoneal cavity and yet the evidences of the pouring out of a plastic lymph with the subsequent formation of adhesions were abundant.

SEPTIC INFECTION.

I now come to septic infection. The part played by living organisms in the production of disease has been most firmly established by "many infallible proofs" and appears to me as certain as the law of gravitation or the shape of the earth. Some who place their faith in procuring absolutely septic conditions spare no pains in attaining this object, while others regard such extreme precautions as superfluous and laugh at those who practise them as extreme ritualists, some even discarding all precautions excepting cleanliness and attributing their success to perfect technique and skill in operating. For myself I must confess that I am a ritualist.

The present aseptic treatment consists essentially in perfect cleanliness and whatever others may say I have no hesitation in stating that the doctrine of cleanliness originated with, and has been based upon, the teaching and practice of Lawson Tait and Bantock. Years ago, whilst most of us were practising antiseptic methods, they, in the face of bitter opposition, insisted upon the importance of perfect cleanliness and pointed out the injurious effects of chemical substances in irritating and poisoning the tissues. And at the present time we differ from them only in the meaning of the word *perfect*, for whilst they are satisfied with ordinary cleanliness we strive after and in a great measure obtain not only macroscopic but also microscopic cleanliness.

By perfect asepsis, then, we understand that everything which comes in contact with the field of operation must be absolutely pure. "Everything" includes not only the operator and his assistants, his instruments and dressings, but also the air and water. An operation may be carried out aseptically in any ordinary room, but this is achieved with great difficulty and risk, so that in my opinion so serious a proceeding as coeliotomy should, except under peculiar circumstances of emergency, always be performed in a special apartment so constructed that absolute cleanliness can be insured, with pure air free from draughts, ample supplies of pure water and good light, and heated to about 80° F.

[Dr. Smyly here described the arrangement of the

operating theatre at the Dublin Rotunda Hospital. He continued:]

Where an operation has been carried out with thorough aseptic detail and hæmorrhage has been completely arrested, drainage, one of the most important aids to success in former times, is now but rarely needed, but can never, I fear, be entirely abandoned.

With regard to the after-treatment of septic cases I shall only state that I place most reliance upon alcohol. Of anti-streptococcic serum I have had but little experience and that of a not very favourable kind. The reopening of the abdomen and thorough washing of the cavity I view in a pessimistic manner, though Howard Kelly speaks of it with approbation. The chief difficulty is diagnosis, for when this is clear it is generally too late to interfere. In conclusion, I may epitomise these somewhat fragmentary remarks with the advice of Doyen—"Opérer vite et bien."

Dublin.

HOMICIDAL INJURIES TO THE RECTUM AND VAGINA.

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AT about 4 P.M. on July 22nd, 1898, an unfortunate, aged 36 years, was seen to go into a house with a man. The landlady stated that the couple hired the room for two hours. She noticed only the man, with whom she bargained. At about 5.30 P.M. the man left hurriedly without paying, saying that he would be back in a few minutes, but that his "missus" wanted to rest a little longer. He did not return. The landlady was doing some washing in the room beneath that occupied by the couple all this time and said that the doors of both rooms were open but that she heard no sounds, not even footsteps. At about 6.30 P.M. she went upstairs and found that the woman was asleep; she noticed nothing peculiar about the room and left the woman alone. On this point there is some variation in the different statements made by the landlady. At about 7 P.M. she again went upstairs, roused the woman up, and noticed that she was ill. She had some conversation with her and at her request opened her stays. In doing this she noticed that the underclothing was saturated with blood and that there was a very foul odour in the room which caused her to faint away. On her recovery she procured the assistance of her niece who lived next door and finally had the woman conveyed to the Royal Infirmary at about 9.45 P.M. After getting the woman removed she noticed that the bed was saturated with blood; there was blood on the floor and washstand and blood-stained water in the basin. She said she thought that the woman had had a miscarriage. On the patient's arrival at the Infirmary she was found to have sustained very extensive injuries to the rectum and vagina and she died on the same night without making any statement. The landlady having got rid of the woman at once proceeded to clear up the room and wash the soiled linen. According to the evidence both the man and the woman were drunk.

On July 23rd, 12 hours after death, with the assistance of Mr. C. V. Knight, the assistant house surgeon, I made a post-mortem examination. The only external marks of violence were around the genital organs. There was extreme bruising for about two inches around the posterior part of the vulva and the anus. The anus was dilated and the sphincter was torn; the mucous membrane was lacerated in all directions, as was also the mucous membrane of the rectum as high up as the finger could reach. Per vaginam there was a deep laceration of the mucous membrane on either side from the vulva to the cervix; the vagina was not dilated and the cervix was normal. Before death no injuries other than these could be detected. On examining the interior of the body the peritoneal cavity was full of turbid, blood-stained, foul-smelling fluid evidently due to a perforation of the intestine which was found to be present in the rectum. The rectum on removal showed a longitudinal perforation two and a half inches long, lacerated and contused, in the anterior wall opening into Douglas's pouch; the lower end of the wound was four and a half inches from the anus. The mucous membrane