resented, and the respiration be entirely thoracic, while abdominal distension increases, and may become extreme with vomiting and constipation, and the temperature is raised, *acute peritonitis* is to be diagnosed.

Should the patient recover so far as the general results of the wound are concerned, but the wound through the belly wall remain open as a fistulous track, and through this the contents of any one of the abdominal viscera continue to escape, there is a *fistula*. If the discharge be unstained with bile, acid in reaction, and contain food unaltered, or but partly digested, it is a *gastric fistula*, or possibly a fistula in the upper part of the duodenum, above the entrance of the bile duct. Should the discharge consist of the contents of the intestine, it is a *fæcal or intestinal fistula*. When the matter escaping is soft, pultaceous, odourless, or nearly so, and of a light colour, the communication is with the small intestine; and when the discharge is distinctly fæculent, dark in colour, with a strong fæcal odour, and mixed with much gas, the communication is with the large intestine. Should the discharge be bile unmixed with chyme, or a watery fluid containing urea, it would be respectively a *biliary or urinary fistula*. If, as the result of an operation, or of the natural separation of a slough of prolapsed intestine, the mucous membrane of the gut is immediately continuous with the skin, the intestine opening directly on the surface, it is an *artificial anus*. Should there be from such an aperture a soft, bright-red, corrugated projection, moistened with mucus, it is a *prolapse* of the mucous membrane of the artificial anus. But should there be from the aperture a smooth, rounded projection, covered by the same red mucous membrane, but emptying on gentle compression, leaving the mucous covering collapsed, it is a *hernia* of the artificial anus.

If a cicatrix in the belly wall be found to yield before the pressure of the abdominal contents, and a projection be formed at the spot, smooth, rounded, soft, with an expansile impulse on coughing, and tympanitic on percussion, it is a *hernia*. It may be reducible or irreducible; the coils of intestine are often visible through the thinned cicatrix, or these and masses of omentum may be plainly felt through. There is no distinct neck to the sac of such a hernia.

CHAPTER XII.

THE DIAGNOSIS OF INJURIES OF THE PELVIS.

Contusions of the pelvis are generally the result of heavy blows or kicks, falls from a height, or severe crushing violence. They naturally group themselves into three categories: injuries of the soft parts covering the bones, injuries of the bones, and injuries of the contained viscera. The examination should be conducted with a view to determine under which of these categories the injury falls; the visceral injuries are, of course, very much the most fatal, and occasion the most severe symptoms.

Bruising of the soft parts will be at once recognised by the characteristic discoloration, the dull aching pain, and the swelling, which varies in amount within very wide limits. If the blood be effused from vessels at some depth, the staining of the skin may not appear for a day or two. Sometimes the ecchymotic discoloration extends over a very wide area, and then it is important to learn where it was first noted, as that fact will throw some light upon the seat of the lesion. Whenever the bruising implicates the perineum, scrotum, or penis, careful inquiry should

be made whether there has been, or is, any hæmorrhage from the urethra. If a more or less clearly-defined fluctuating swelling appear in the soft parts quickly after an injury, it is a *hæmatoma;* there may be no bruising of the skin around it; the blood may long remain fluid, or be quickly absorbed. Such swellings are most frequently found on the buttock.

Fracture.—The surgeon, having examined the soft coverings of the pelvis, should then place one hand on each side of the symphysis pubis (the patient lying flat on his back) and run them along the bones from before back, and then down along the pubic arch, and observe if there be any irregularity in the outline of the bones. He next should seize the iliac crest, or the anterior iliac spine, and try to move it on the rest of the bone; then he should press the bone on each side of the symphisis pubis backwards (at first gently, and gradually more and more forcibly), and then placing a hand on each side of the pelvis, should press inwards. Lastly, he may try whether pressure on the pubic spine is painful, and also whether the great trochanter of the femur of the one side is flattened or raised above the other (*see* page 203); and whether movement of the hip joint is painful.

If, by this examination, any marked irregularity in the outline of the pelvis, or mobility of any part of it, or crepitus, be detected, *fracture of the pelvis* is at once to be diagnosed; by noticing the position of the irregularity and of the crepitus, and the part that is movable, the seat of the fracture may be made out. No distinction need be drawn between these fractures and separations of the pelvic synchondroses. Inability to stand, pain on all movements of the hip joint, with great pain on pressing on the pubic spine, are said to indicate a *fissure across the acetabulum.* But if, with great pain on moving the hip joint, there be distinct crepitus, there is *fracture of the acetabulum* with

detachment of the fragments; while if, with these signs, the trochanter be found approximated to the middle line, it points to displacement of the head of the femur into the pelvis. (*See also* page 216.) For the diagnosis of fracture of the sacrum and coccyx, *see* page 108.

Injuries of the pelvic viscera.—The condition of the viscera must be next ascertained. Be careful to learn their condition before the injury, especially whether the bladder was full and when it was last emptied; if a female, whether she was menstruating at the time, or pregnant, or whether she had been the subject of an abdominal tumour. Then ask what the patient's sensations at the time of the accident were, and note particularly any feeling of something "bursting," or "giving way;" inquire as to pain, its position, character, and time of onset, and whether there is desire to pass water or any tenesmus; particularly learn whether the patient has made any attempt to pass water, and if so, with what result, and whether any blood was passed, and notice whether any blood has flowed from the urethra independently of the act of micturition, from the rectum, or from the vagina. And then observe the patient's general condition, whether it indicates shock or not. The surgeon must not be misled by the entire absence of bruising of the skin to think that the viscera have escaped unhurt; extensive rupture of the bladder or of the uterus may occur without any external sign of so severe an injury.

As the urinary organs are those that suffer most frequently, the surgeon should consider them first.

If blood be found escaping, or be known to have escaped, from the urethra, and if there be bruising of the anterior part of perineum, perhaps entering into the scrotum, there is a *rupture of the urethra.* If the patient have tried to micturate, he may have been

unable to do so, or the attempt may have been attended with a sudden increase of the swelling in the perineum and scrotum (extravasation of urine), or the act of micturition may have caused pain as the urine flowed over the rent in the mucous membrane. A catheter should now be carefully passed, and if it reach the bladder clear urine will flow off; if this can be done, it shows that the urethra is not torn completely across; but if the surgeon fail to pass the instrument, and especially if its end be found close under the skin, it is evidence that the urethra is torn quite through, and that it is not simply a superficial laceration. This injury is usually the result of a fall across a beam, or some similar accident.

If, as a result of a sudden strain, a patient experience severe pain in one or other groin, and at the same time, or quickly after, bright blood flow from the urethra, but micturition be performed normally, and if the testicle on the same side become painful, tender, and somewhat swelled, and subsequently waste, the accident is *rupture of the vas deferens*. The escape of the blood from the urethra will at first suggest an injury of the urethra; but the nature of the accident (a strain, not a blow), the absence of bruising in the perineum and scrotum, as well as the normal performance of micturition, will exclude that lesion, while these signs, and the irritation and subsequent wasting of the testicle, will establish the diagnosis.

If there be no evidence of rupture of the urethra, and the patient evince a great desire to pass water, and quite fail to do so, or pass but a few drops, a *rupture of the bladder* must be suspected. If, now, it be made out that the bladder was full at the time of the accident, and the patient felt something "burst," or "give way inside," and this was followed by acute pain in the hypogastrium and by shock, and that soon after a great desire to pass water was felt, with

inability to expel anything more than a few drops; and if on examining the belly the bladder cannot be felt, although there may be dulness reaching up a variable distance above the pubes, and on passing the finger into the rectum no tense rounded fundus is to be made out, a catheter should be introduced, and if it be found to pass the usual distance without difficulty (the finger in the rectum will at once dispel any doubt as to its extremity having reached the bladder), but only a few drops of blood or urine escape along it; and further, if, by manipulation, it can be made to pass in its full length, and its end be very freely movable, or plainly felt under the belly wall, or a large quantity of urinous fluid then flow out, the diagnosis of *rupture of the bladder* is certain. In some cases the history is quite defective; in others, again, the patient retains the power to pass just a small quantity of urine, and the catheter passed into the bladder draws off an ounce or two of bloody urine; the diagnosis is then obscure. Reliance must be placed on the presence of shock, on the frequent desire to empty the bladder, the admixture of blood with the urine, the failure to detect, by any means of examination, a full bladder, and, especially, upon the results of catheterism, particularly the passage of the end of the instrument through the rent into the belly cavity, where it can be moved about and felt, and whence it evacuates sometimes many pints of urine and serum. Should doubt exist, it may be justifiable to inject a warm weak solution of Condy's fluid or warm boracic acid lotion through the catheter, and if more than a pint can be injected without meeting with any resistance, or if a sense of warmth over the belly be produced by it, or dulness appear above the pubes, with or without fluctuation, the fact of a rupture in the viscus becomes certain. If now the symptoms of acute peritonitis come on (general abdominal pain

and tenderness, distension, vomiting, constipation, cessation of abdominal respiration, quickened pulse, pyrexia, etc.), the rupture is *intraperitoneal*. If, however, these symptoms do not quickly ensue, and in place of them there be pain limited to the pelvis, with swelling in front of the rectum, or reaching up above the pubes or along the fold of the groin, with fever, quick pulse, and dry tongue, the rupture is *extraperitoneal*, and has led on to *pelvic cellulitis*; this, if unrelieved, may lead to *peritonitis*. The bladder may be ruptured without fracture of the pelvis, by severe contusions of the hypogastrium, or with fracture of the pelvis (wound of the bladder), by muscular violence, during parturition, by over-distension, or as the result of disease.

If there be an induration in any part of the penis immediately following an injury it is produced by *extravasation of blood into the corpus spongiosum* or *corpus cavernosum*; if this be extensive, and involve the whole organ, it may cause "permanent chordee." The diagnosis of *contusion* and *rupture* of the *pregnant uterus* and *rupture of an ovarian cyst* is discussed on page 153.

Wounds of the pelvic viscera.—If from any wound of the penis or perinæum urine flow during the act of micturition, it shows that there is a *wound of the urethra*. Similarly the escape of urine from a wound over or above the pubes independently of micturition along with the signs of laceration of the bladder (*vide antea*) will indicate *wound of the bladder*. If there be an external wound of anus, or vulva, or vagina, or a history of a weapon of any kind having entered either of these canals, the finger must be passed gently into them, and their walls carefully explored; a rent in either of them may in this way be found. The onset of acute peritonitis will point to a *wound of the peritoneum*; if the bladder be found

empty or containing only a little blood and urine, it will indicate *wound of the bladder*. (*Vide antea.*) The small intestines may be found prolapsed into the vagina. The escape of blood and liquor amnii from the wound, or protrusion of part of the fœtus or of the placenta, and hæmorrhage into the vagina, indicate *wound of the pregnant uterus*.

Foreign bodies in the rectum or vagina will be detected on digital examination; when recently introduced, the history of the case will lead to their detection; when long impacted, the fact of a chronic muco-purulent discharge, with pain, and, in the case of the rectum, tenesmus will suggest the necessity of an examination.

For *foreign bodies in the bladder*, *see* page 551.

Foreign bodies in the urethra.—If in the spongy portion, they may be felt by carefully passing the finger along the outside of the urethra, or they may be felt by a bougie, or seen by the endoscope. When deeper in, the finger in the rectum may detect them; or if not, on passing a full-sized silver catheter or bougie obstruction will be met with near the neck of the bladder, and the foreign body may be pressed back into the bladder, and thus detected.

CHAPTER XIII.

THE DIAGNOSIS OF THE SPECIAL INJURIES OF THE UPPER LIMB.

FULL directions for the diagnosis of wounds, sprains, and contusions are given in chapters ii. and iii. Here, therefore, we have to consider only the diagnosis of dislocations and fractures, and of any injuries liable to