WAR WOUNDS AND AIR RAID CASUALTIES

The following is one of a series of lectures on the Treatment of War Wounds and Air Raid Casualties recently delivered at the British Postgraduate Medical School

WAR INJURIES TO THE GENITO-URINARY TRACT

BY

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Looking back on the experience of the last war, during which I was for two and a half years in a clearing station performing abdominal surgery, the thing that strikes me was the comparative rarity of wounds of the kidney or the urinary tract. When we consider the hundreds of abdominal cases on which we had to operate, the infrequency of kidney wounds appears remarkable. The reason for it I do not know, except that injury of the kidneys, relatively small organs, might be missed among the more extensive and obvious abdominal injuries which reached the clearing station. The injuries were those caused by machine-gun bullets, shrapnel bullets, and high-explosive shells. In the next war, regarding the matter from the point of view of civilian injuries, the damage caused by the high-explosive bomb and the crushing injuries due to falling masonry will also have to be considered.

One thing which we discovered in the last war was, in general, the uselessness of operating on patients immediately they were brought into the station. Many men shot in the abdomen were received in a terribly collapsed condition, and at first were operated on immediately, and of course they died. The better way was to take some measures of resuscitation, warming them, and relieving their pain, and then, when they reached the optimum period of improvement, to carry out the operation. The habit of detecting such a period was acquired, for it was usually found to be a couple of hours after the case was brought in. If one waited longer than this the patient began to go downhill again.

Injuries to the Kidney

We may take first the case of the man who has been hit by a missile from a machine-gun. There may be a small entrance wound in the loin, and an exit, indicating the line the bullet has taken in passing through the kidney region. All that the patient complains of may be some haematuria, and no sign of any intra-abdominal injury may be found. Such a patient will be left alone, but watched carefully for any further development. On the other hand, if there is a wound, from a bullet, high explosive, or shrapnel ball, with an entrance but no exit, and the patient's symptoms are still entirely local, with haematuria, the treatment is excision of the wound. High-explosive shells in particular produce rather jagged foul wounds. If, in excising, we come across the piece of shell or shrapnel lodged in the kidney, there is no need to do anything further beyond removing it, cleaning out the tract, and draining, after which we wait to see what happens.

In the case of an exit wound through the loin with any of these forms of missile, we may know that the intra-abdominal damage is limited to the particular sector of the abdomen, and in that case the wound will be excised

and the kidney explored from the loin. The ordinary loin incision will enable us to ascertain what the kidney looks like, and the incision can be continued forward and the peritoneum opened, so that the colon, spleen, or other organ which may have been damaged may be reached. There is no need in these cases for a large laparotomy, because the actual limits of the passage of the piece of shell are known.

If there is a wound in the loin with an exit somewhere else in the abdomen, or no exit at all, and the patient is suffering from haematuria, signs of intra-abdominal haemorrhage, abdominal pain, and rigidity, the surgeon must open the abdomen extensively in order to have plenty of room to carry out his exploration. In the kidney itself the damage may be slight—just a local haematoma, which may be left alone while the other trouble inside the abdomen is dealt with. I emphasize particularly the need for a large incision, especially if the place of exit is not known, so that it may be possible to explore the whole abdomen from the stomach down to the rectum.

Sometimes it is found that no injury has been done to the intestines themselves, although the patient when examined showed all the signs of an intraperitoneal injury. There may be extensive retroperitoneal haemorrhage. These patients always suffer a great deal of shock, pain, and distension. In such cases the kidney is dealt with in the best way possible, with drainage lest there be an infection of the retroperitoneal tissues. If the kidney itself is badly damaged, with extensive haemorrhage around it, it will be necessary to carry out a nephrectomy. No time is available in these cases to risk doing what may be called "fancy operations." With these abdominal wounds the chief factor is speed, partly from the patient's point of view and partly because of the pressure under which the work has usually to be done.

In the majority of cases, therefore, where the kidney is severely damaged a nephrectomy has to be performed. Occasionally the surgeon may have the fortune to come across a case in which the damage was done only to the periphery of the kidney, in which event he is justified in suturing, and may hope to save it. Injuries to the pelvis of the kidney are treated as in civil life. If it is possible the pelvis is sutured, but if it is completely torn away, then again a nephrectomy is necessary.

Wounds of the Ureter

Wounds of the ureter were also very seldom seen in the rush of war injuries. We may, of course, come across them afterwards on opening up the abdomen, though they had never been diagnosed at the time. In opening an abdomen full of blood and faeces it is essential as quickly as possible to suture the rents in the intestine or to resect as necessary, and in these circumstances the ureter is hardly likely to be seen even if it is damaged. Basil Hughes, who worked at Salonika, had seven or eight cases, I think, which developed urinary fistula as a result of the wound of the ureter. His advice was to leave them alone, as in his experience the fistula practically always healed up.

Turning now to injuries caused by falling masonry, we may get a patient with a crushed wound in his loin, with symptoms limited to haematuria and no signs of any intra-abdominal damage or internal haemorrhage. In such a case the patient would obviously be left alone and the effect of rest in bed be observed. The only circumstance that would make it necessary to interfere in these cases in which the whole condition appeared to be extraperitoneal would be very severe haematuria that refused to stop after treatment and the development of a large lump in the loin, due to perirenal haematoma. In that case it would be necessary to explore the loin and almost certainly carry out a nephrectomy. To decide as to the function of the other kidney, the simplest expedient is the injection of indigo carmine and a rapid cystoscopy before the operation is done.

In some civil injuries of this kind the haematuria ceases and then starts again within a day or two; or even at a later period, after the patient has got up, there may be recurrent attacks of haematuria. Faced with a condition of that kind the kidney must be thoroughly examined, with the aid of either an intravenous or a retrograde pyelogram, to see if any abnormality is keeping up the haemorrhage. I have observed this take place two or three times when the underlying source of trouble proved to be a hydronephrosis that had been injured.

One case of the kind was that of a boy who, while playing rugger, received a kick in the loin. He kept on bleeding and proved to have a large hydronephrosis, though he had had no previous symptom.

Another case I recall was that of a big-game hunter in East Africa, one of the finest-looking men I have ever seen. While going down a narrow glade he was charged by an elephant, and, stepping back behind a tree, he tripped and fell down on the ground. The elephant gave him a jab in the abdomen with the base of its trunk, but by that time one of the bearers, firing his rifle, frightened the elephant away. The hunter was taken on a stretcher made of some branches to the local missionary station thirty-six hours' journey distant, and by the light of the moon that night he discovered that he was suffering from haematuria. The condition settled down; he came back to England, but continued to have several more attacks of haematuria, and on examining him I found perhaps the largest hydronephrosis I have ever seen.

I stress this matter only in order to suggest that in a case of renal injury with persistent bleeding the kidney should be investigated for any underlying cause responsible for keeping up the haematuria.

Obviously with an infected perirenal haematoma we would have to open and drain. That may well be done later in the proceedings, not at the time of the injury. In the case of a person who has had a crush injury of the abdomen and is suffering from haematuria, with all the signs of intra-abdominal damage, with rigidity, pain, or symptoms of intraperitoneal haemorrhage, there would be no alternative but to perform a laparotomy and explore the kidney, and almost certainly a nephrectomy would be necessary. The other intra-abdominal injuries, such as ruptured spleen, liver, or intestines, would also have to be dealt with.

Bladder Injuries

In the case of men shot through the lower abdomen and the bladder by bullets during the war most of the injuries were intraperitoneal rupture of the bladder, although in some cases both intraperitoneal and extraperitoneal injuries were found. Here occurs the added

difficulty in that there may be rupture not only of the bladder but of the intestines, and also severe splintering damage to the sacrum or the bones of the pelvis. That is more likely to happen with a jagged high explosive than with a bullet, which may go straight through. The entrance and exit wounds may be found, but the patient remains unable to pass urine. If a catheter be inserted only a little blood-stained urine may be obtained. A diagnosis of bladder injury is then made, and the first thing to do is to excise the wound. If there are signs not only of perforated bladder but of intra-abdominal injury as well, then a laparotomy should be performed. The injured peritoneal wound in the bladder is found and sutured, the injuries to the rectum or small intestine are dealt with, and then either a catheter is tied in or the peritoneum is stripped back and a self-retaining catheter inserted suprapubically—the abdomen, of course, being mopped out. If there is severe damage to the bones of the pelvis and sacrum it is absolutely essential to excise these wounds and remove any bony fragments that are lying about. If the wound is found communicating with the bladder the bladder should be opened and an endeavour made to suture it from the inside. A tube is then put down through the excised wound to the bladder, and the rest of the wound sutured as much as possible, after which the bladder is drained suprapubically. These are the cases in which the damage is caused by fragments of shell or pieces of bone that have not entered the peritoneal cavity. Drainage must always take place in these cases, not only suprapubically but from the entrance or exit wound made by the foreign body. The result may be successful and the whole condition be cleared up. On the other hand, some of these cases, while they show healing, are left with various fistulae. I saw one ex-soldier who passed his urine partly through his urethra, partly through two suprapubic fistulae, and partly near the site where his ischial tuberosity used to be. His injury was sustained in the war, and he is living a fairly normal life.

If the wound is extraperitoneal and the patient is tender suprapubically, on passing a catheter through the entrance wound a fair amount of blood-stained fluid will be found. The thing to do is to excise the wound and track down to the bladder; we may then have the fortune to find in the bladder itself the fragment of shell. In that case it is removed, a Malecot tube is put in, and drainage instituted. If the bullet has gone right through it will have damaged the rectum or the bones of the pelvis. In a case of severe damage to the rectum itself the safest thing is to perform a colostomy temporarily while there is a chance for the wounds below to heal up, because there is no chance at all so long as faecal material is passing over the lacerated wounds. It is always safer to drain a bladder suprapubically than to tie in catheters, especially in the conditions under which war casualties have to be attended. The patient may have to undergo a long journey after the operation, and the surgeon never knows whether the catheter may not get blocked or kinked. On the other hand, the suprapubic self-retaining catheter is always safe.

Crushing wounds of the bladder in war are very much the same as those encountered in civil life in road accident cases, and the injury of the bladder is usually produced by a fracture of the pelvis. The fractured ends of the bone may be driven into the bladder. Here again the bladder may be ruptured intraperitoneally or extraperitoneally. In the former case one finds pain, rigidity of the abdomen, and inability of the patient to pass urine. When the catheter is inserted a little urine is obtained. If a small amount of sterile lotion be injected through the catheter

very little of it comes back. In that case a laparotomy is performed, the intraperitoneal rupture is sutured, the abdomen is mopped out and closed. The safest plan is to strip back the peritoneum and insert a self-retaining catheter through the trocar and cannula.

On the other hand, if the damage is extraperitoneal we may find the bladder palpable, and on passing the catheter obtain a good deal of blood-stained urine. I have employed cystoscopy on one or two occasions to confirm the diagnosis, and could see the rent at the top of the bladder. In cases like that a suprapubic procedure is carried out, the hole in the bladder found if it is anywhere in the median line, the self-retaining catheter and Malecot tube inserted, and the wound sutured around it. The Malecot tube can be taken out after a week.

In considering the bladder the further question of a fractured spine arises. In war there are many fractured spines, and there will probably be a great many more in air raids, as a result both of direct wounds from bombing and of falling masonry.

The question how to treat the fractured spine from the bladder point of view was one that obtained a great deal of consideration during the war, and much varied counsel was given, some of it of a kind that was obviously foolish. Indeed, we were always getting new directions from the base as to what we were to do when a man came in with a fractured spine or pelvis and a distended bladder. First of all we were told that such a case was to be catheterized regularly; but in a clearing station one catheter might be passed, and the patient who was not in pain go down to the base with his bladder greatly distended. The procedure could not be carried out regularly, for the people concerned were much too busy. Then we got orders to tie in a catheter. This was much more sensible, because the patient could drain continuously all the time; but again there was trouble on account of occasional blockage or kinking of the catheter.

By the end of the war we had definitely settled down to what was the best treatment—namely, a suprapubic operation and the insertion of a self-retaining de Pezzer catheter. The great precaution to observe is not to let the bladder overdistend, because the one thing to be hoped for is that sooner or later the patient may develop an automatic bladder. This may take one month or six months. If the bladder has not been overdistended it has still got its muscles, and after a few weeks one can always try, even while suprapubic drainage is going on, whether urine can be naturally expressed. If this can be done then it is known that the patient is developing an automatic bladder, and the suprapubic catheter can be taken out and a catheter tied in with a view to healing.

Injuries of the Urethra

Injuries of the urethra and penis were moderately common during the war and had to be handled as was thought best at the time. I saw cases of a simple through-and-through bullet wound of the penis, also possibly of the scrotum, in which there was no evidence of rupture of the urethra and no extravasation of blood. These cases were just left alone. On the other hand, if it was suspected that the urethra might be ruptured, then an attempt was made to pass a catheter and tie it in. If the catheter would not pass and there was a complete rupture, a urethrotomy had to be performed. In the anterior portion of the urethra this was fairly simple, the urethra being repaired over the catheter. On the other hand, with a urethra ruptured in the bulbous portion the case was treated exactly the same as when a patient in civil life had fallen astride some hard object

and sustained a ruptured urethra. If there was a complete rupture a suprapubic cystotomy was done, a retrograde bougie was passed so as to indicate the position of the proximal part of the urethra, and urethrotomy was carried out and the urethra sutured over the catheter. In war wounds it might not be always possible to re-suture the urethra, in which case we would have to do the best we could and allow the catheter to act as a splint so as to keep the whole urethra from scarring up.

The other type of ruptured urethra, sometimes seen in civil life too, was the case in which there were injuries to the prostatic or membranous urethra. There is nothing, of course, that a shell or a bullet cannot damage, but the treatment will be much the same. A similar condition is occasionally seen in persons who have been run over in road accidents, the urethra being ruptured between the membranous and prostatic portions and becoming dislocated, so that there is no urethral continuity. In that type of case it is obviously quite impossible for any repairs to the urethra to be carried out in the way of stitching. With a bullet wound the entrance and exit are excised, though in an ordinary case of civil accident there would be no occasion to do that. A suprapubic cystotomy is performed to deal with the two dislocated portions and a large-size bicoudé catheter is inserted down to the penile portion of the ureter. Then, on placing a finger in the prostatic portion of the urethra, it can be moved about until it is opposite the catheter, which is then tied in and acts as a splint.

With regard to the penis everything depends on the extent of the injury. If it is a simple wound straight through no harm may result. On the other hand, it may be a badly lacerated wound, and the only recourse may be to amputation, done in the same way as a partial amputation for carcinoma in civil life, endeavouring to get some skin from what is left of the penis to cover over the raw area and tie in the catheter. There were occasions on which it was possible to excise and repair the wounds and leave the penis, but in the majority of badly wounded cases it had to be amputated.

The same principle applies to wounds in the testicle. Either they were through-and-through wounds which were not bleeding and in which no particular damage had been done, or else they were lacerated wounds of the scrotum out of which one might have a testicle herniating. They were treated exactly as civil injuries, the wound being excised, the testicle removed, and suturing being done.

BEIT MEMORIAL TRUST FOR MEDICAL RESEARCH

A meeting of the trustees of the Beit Memorial Fellowships for Medical Research was held on July 19 for the election of Fellows and other business. The resignations from the Advisory Board of Sir F. Gowland Hopkins and Sir Patrick Laidlaw, F.R.S., were received with regret. These vacancies were filled by the appointment to the board of Dr. R. A. Peters, Whitley Professor of Biochemistry, University of Oxford, and Dr. Paul Fildes, bacteriologist on the scientific staff of the Medical Research Council.

It was in 1910 that the first Beit Fellow, now Sir Thomas Lewis, F.R.S., was elected, and last year's election brought the total of all Fellows elected to exactly 200. Women are eligible and have been elected from 1910 onwards, their total being thirty out of the 200. Of the 170 men, six have been elected to the Fellowship