The opening into the abdominal cavity having been plugged with sponges, I cut through normal liver tissue—the cut being oblique—to the depth of two inches and a half. Fifty-six ounces of pus escaped. A drainage-tube with a diameter of one inch was now introduced. It passed upwards and backwards a distance from the skin of ten inches. What was to be done with the abdominal wound? The peritoneal cavity was freely open and the intestines well in view and occasionally protruding. The incision extended to the costal margin and the liver barely projected below that margin. The large drainage-tube was indeed pressed downwards by the ribs. It was impossible to suture the liver to the surface, it was equally impossible to close the peritoneal cavity with sutures. Pus welling up by the side of the drainage-tube would find its way into the abdominal cavity if the parts were left as they were. I therefore, having dusted the liver surface with iodoform, plugged the hole leading into the abdominal cavity with iodoform gauze. The gauze was resting directly upon the omentum and coils of intestine. Four yards of gauze six inches wide were employed. The patient was relieved by the operation. On the third day a smaller drainage-tube was introduced and the gauze plug was removed. As it was withdrawn the omentum came away with it. The omentum was detached and replaced. The abdominal cavity was thus laid open once more. It would have been better if the plug had been left *in situ*. A second plug of gauze was introduced in the same way and was left in contact with the exposed intestines. This column of gauze (which was made up of twelve feet of material four inches wide) was left undisturbed for four days and then as much as would come away readily was removed. This was on the seventh day after the operation. The plug of gauze which still remained behind, and which was known to measure nine feet, was soon entirely covered over with healthy granulation tissue. Fibres of gauze were discharged from time to time, but the main mass was quite undisturbed. The granulating surface was often bristling with loose threads and from ten to twenty could be picked out every day. The drainage-tube was shortened and diminished in size from time to time and was finally removed on the forty-seventh day. Between April 28th and May 3rd the plug of gauze was expelled piecemeal, a little being removed each day. It was introduced in one entire piece, but it was returned from the depths of the abdomen in no less than eleven pieces. The total amount thus recovered from the body represented nine feet five inches. The patient had made an excellent recovery, so far as his general health was concerned, some time before this event. He had been up and out in the garden for many days. He left the hospital on May 10th. When seen on May 30th he was in excellent condition and nothing remained of the great wound but a minute sinus which was almost dry.

I could add to the above several other cases of abdominal section in which iodoform was freely introduced into the peritoneal cavity. These include examples of cholecystotomy, nephrectomy for hydronephrosis and resection of intestine (for both malignant disease and fæcal fistula) with immediate union of the divided ends of the bowel by sutures. These cases, however, do not present any special features. In the nephrectomy for hydronephrosis some diarrhoea commenced on the eleventh day and lasted three days. It may have been caused by iodoform, although the patient had no other symptoms and exhibited throughout the whole of the after-treatment a perfectly normal temperature. As the kidney was of large size and the patient advanced in years I cannot but think that his ready recovery may have in some measure been assisted by the protective influence of the iodoform within the abdomen.

Wimpole-street, W.

BEQUESTS.—Mrs. Harriett Benson has bequeathed £50 to the City of Dublin Hospital, £50 to St. Mark's Ophthalmic Hospital and £25 to the Children's Hospital, Dublin.

ROYAL COLLEGE OF SURGEONS IN IRELAND.—The following office-bearers have been elected for the ensuing year: President: Mr. E. Hamilton. Vice-President: Mr. W. T. Stoker. Secretary: Sir Charles Cameron. Council: Sir G. H. Porter, Bart., Dr. G. H. Kidd, Mr. E. H. Bennett, Mr. H. G. Croly, Sir P. C. Smyly, Mr. R. L. Swan, Mr. H. R. Swanzy, Mr. W. I. Wheeler, Mr. A. Meldon, Mr. W. Carte, Sir C. A. Cameron, Mr. F. A. Nixon, Mr. K. Franks, Mr. C. B. Ball, Mr. J. B. Story, Mr. H. FitzGibbon, Mr. F. T. Heuston, Mr. T. Myles and Mr. H. J. Broomfield.

ON THE PREVENTION OF SHORTENING AND OTHER FORMS OF MAL-UNION AFTER FRACTURE,

BY THE USE OF METAL PINS PASSED INTO THE FRAGMENTS SUBCUTANEOUSLY.¹

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THE object of this paper is to demonstrate a method of preventing or of removing shortening after fracture of the long bones by the use, combined with simple external appliances, of rigid metallic pins, inserted subcutaneously, or, at least, without a cutting operation. Oblique fractures of the femur are those which most commonly unite with shortening. I have had no opportunity of applying to any other bone the method about to be described, and the femur is an excellent type of all long bones; it will be convenient, therefore, until the final paragraphs of this paper to consider the femur only.

It is well known that surgeons of great eminence and high character have claimed uniform success in treating fractures of the femur without resultant shortening; but I think the trenchant criticism of these claims given in "Hamilton's Treatise on Fractures" proves conclusively that they have not been made out and are not to be trusted. Hamilton devotes ten pages to this criticism, which shows the great importance he attaches to the question. The latest important article on fractures—namely, that in the second volume of Duplay and Reclus' great "Traité de Chirurgie"—quotes Hamilton with approval on this point and adds nothing of importance. I will venture to take it for granted that serious shortening occasionally follows fracture of the femur treated, however carefully, by all methods hitherto described. On the question of amount of shortening, Hamilton sums up as follows: "When, in consequence of displacement, an overlapping occurs, the average shortening of simple fractures in adults, where the best appliances and the utmost skill have been employed, is from one-half to three-quarters of an inch"; but he does not deny that measurement of museum specimens gave a less favourable result. Of nineteen specimens in Mütter's cabinet not one seemed to him to be shortened less than an inch; indeed, one showed a shortening of two inches and a quarter and one of no less than three inches and a half or four inches. Both these were fractures of the middle third. Surgeons who have gone on obtaining nothing but reasonably satisfactory results for years should give some of the credit to fortune as well as to their own skill. Even their less successful or more severely self-criticising brethren do not meet with extreme cases every day. Next, with regard to the effect of shortening. Though it be true that patients with an inch of shortening may get on very well and with little or no limp, let anyone disposed to make light of such a misfortune spend some morning walking about with one boot on and the other off and then say how he would like to be condemned to do so for life. As a matter of fact, all except careless or vain people, with even no more than three-quarters of an inch of shortening, wear a surgical boot raised by cork, and this means a serious and ceaseless expense to persons of small incomes. Moreover, no raised boot really corrects the deformity; it compensates for a short thigh by making a long leg and raises the knee-joint and ankle-joint to an abnormal situation.

The following conclusions are to be deduced. A not inconsiderable proportion of cases of one of the commonest varieties of fracture known have united with serious shortening in spite of the careful use of the various appliances hitherto described. In 1893 the case stands very much as it did in 1801, when Benjamin Bell wrote: "An effectual method of securing oblique fractures in the bones of the extremities, and especially of the thigh bone, is perhaps one of the greatest desiderata of modern surgery. In all ages the difficulty of this has been confessedly great; and frequent lameness produced by shortened limbs arising from this cause evidently shows that we are still deficient in this branch of practice."² But the general position in which

¹ A paper read at the Medical Society of London on Feb 13th, 1893.

² B. Bell's System of Surgery, vol. vii., p. 21, quoted by Hamilton.

surgeons stand now is one of great advantage compared with that of the time of Benjamin Bell, for there are now anaesthesia, antisepticism and subcutaneous surgery. Benjamin Bell, keen-sighted as he was, had to survey his field of action from a molehill; the present-day surgeon looks at his from a mountain-top, from a height which, I think, brings into view a path surmounting the difficulties of treating oblique fractures of the femur. I am not going to advocate open incision, with pinning, pegging or wiring the fragments together. Experience and the records of such treatment when applied to ununited fractures make it probable that such a plan, if at all generally adopted, would lead too often to failure of antiseptic precautions and consequent calamities. On the other hand, there are strong reasons for thinking that a carefully purified pin of thickly plated steel, if made to enter through a puncture in the skin, cleansed with equal care, can be passed through muscle and bone and left there for a considerable period with impunity. Assuming two such pins to be used, one perforating the upper and the other the lower fragment of a broken bone, there are also powerful *a priori* reasons for thinking that these two pins could be held at a right and reasonable distance apart also with safety. Moreover, the use of these pins would not prevent the simultaneous employment of splints, cradles, extensions or other external appliances used in the ordinary manner. It is easy to see that these principles could be applied in a great variety of ways. For example (1) the pins could be made to perforate the limb completely or to stop short on one side of the bone; (2) they could be sharp, or screw-pointed, or gimlet-pointed, and could either be made to bore their own way or a passage could be prepared for them by an independent instrument; (3) when *in situ* they could be held apart in different ways, too many even for enumeration; (4) only one pin might be used, the fragment under most control (usually the distal one) being held in place and at proper distance by a wholly external appliance reacting against the solitary pin passed through the other fragment; or the pin might be passed through both fragments like a rivet, as was recommended by Gaillard; (5) the separation force could be rigid or elastic or a weight extension; and (6) as any method of using pins could be combined with almost any kind of external appliance in use, the possible combinations to choose from are enough for nearly every surgeon to have a method of his own. The details of the method I have myself used and now recommend are as follows. The instruments required are: (1) Two L-shaped pins of hardened steel thickly plated with silver; (2) the patella instruments described by me in THE LANCET for Dec. 10th, 1892, or, at least, the long bladed bradawl; (3) a pointed tenotomy knife; and (4) a flat sand pillow. Each L-shaped pin consists, of course, of two arms, one cylindrical (AA'), the other (BB') flattened in a plane at right angle to the rounded arm. The cylindrical arm is of the diameter of a No. 7 (French scale) catheter—i.e., it is 7 millimetres in circumference—and has a rounded blunt point. The length is $3\frac{1}{2}$ in.—i.e., nearly 9 centimetres. The flattened arm of one pin is 3 in. long,

FIG. 1.

that of the other being 5 inches. Both are $\frac{1}{4}$ in. wide, about $\frac{1}{16}$ in. thick and there are notches at the edges at intervals of $\frac{1}{4}$ in. The patella bradawl has, it may be mentioned, a blade $3\frac{1}{2}$ in. long, and both its blade and its handle are of one smooth piece of nickelled steel, the handle being made hollow for lightness.

Operation.—Stringent antiseptic precautions must be used, and they are particularly easy in an operation like this, where the open wound is a puncture and nothing enters it except two or three straight and smooth pieces of plated steel. This easiness is no excuse for carelessness—it only

makes neglect inexcusable. The following are the details of the operation: 1. Reduce the fracture under ether, breaking it down again if union has taken place recently in the bad position. 2. Whilst two assistants make extension and counter-extension, adjust the fractured ends and try to ascertain the precise seat and place of fracture. Select a point in each fragment likely to be clear of the fracture and in such a position that a straight line from it transversely perforating the bone would keep well clear of important vessels and nerves, synovial membranes &c. In both my two cases I have been surprised to find how far it was necessary to go from the fracture in order to find a firm place in the lower fragment. The two points selected should lie as nearly as possible above one another and not in a spiral line circling the limb. 3. Puncture the skin, push the bradawl through the puncture down to the bone, use it very gently as a probe to define the position of the bone and then bore steadily through. Take care not to break the long blade and not to perforate obliquely. 4. Slip the director along the awl. If the handle of the latter is in the way bend the former a little and have the skin pressed down on the bone. 5. Withdraw the awl, twisting and not jerking it out; keep the director carefully in position. 6. Pass in one of the pins through the bone and withdraw the director. Repeat 3, 4, 5 and 6 in the case of the upper fragment. Take care to bore both fragments in the same longitudinal plane. 7. The two pins being now in the bone, turn them into such a position that the flat arm of one lies upon and touches the flat arm of the other. If the pins are to remain less than five inches apart the long-armed pin must lie over the other. The advantage of making the flat arms of different lengths will now be seen. The pins can be thereby fixed at any distance from two to six inches apart. 8. Full extension being made and the limit demonstrated by measurement to be of proper length, lash the flat arms of the pins together with silver wire pulled taut and twisted home at the ends. See that there is full tension on the pins before fixing them, for they have a slight elasticity. If this point is not attended to a quarter of an inch or more may be lost.

FIG. 2.

I. Femur (lesser fragment). II. Artery. III. External popliteal nerve. IV. Dressings.

Dressings.—Iodoform gauze wrung out in sublimate solution (1 in 2000) should be placed beneath and above the external arms of the pins; the gauze should be flat and not lumpy. Over the gauze a well-rolled wood-wool pad should be placed, and all round the limb at and near the fracture there should be a sheet of absorbent wool. The whole should be bandaged firmly and evenly—firmly enough to prevent any internal extravasation. Lastly, external appliances suitable to the case should be put on. If, as in my first case, the superior fragment tends to ride forward I use a double splint with transverse iron lips or brackets, and in all cases I should use extension.

My two cases were: (1) A boy aged thirteen, operated on in the West London Hospital on March 11th, 1892; and (2) a man aged twenty-four, operated on there on Dec. 20th, 1892. In the former case union of a fracture at the juncture of the upper with the middle third of the femur had already taken place and the bone had to be refractured. In the latter the fracture was ten days old. The amount of shortening, in spite of my house surgeon's efforts to abolish it, was in the case of the boy nearly two inches and a half clear and in the case of the man one inch. The use of the pins absolutely prevented the slightest shortening. In the boy's case they were removed too early—namely, on the twentieth day—and he left the hospital

with half an inch of shortening due to angularity at the point of fracture. Absenting himself for a month he then returned with more angularity still. In this case the pins were not kept in long enough and he ought not to have been allowed to escape from observation. He slept well the night after the operation and never complained of pain nor had he any rise of temperature. The pins caused no irritation. They were merely improvised out of a stout, old white-metal wire retractor (plated). The man lay in a long splint with 7 lb. weight extension and the pins were *in situ* until the forty-third day after operation and the fifty-third after fracture. There was no pain and no sign of irritation, general or local. His temperature remained normal except two days after operation, when it reached 99.4°. Firm union resulted without the slightest shortening. When the dressings were removed the pins, which had been imbedded for forty-two days, were found to be a good deal rusted, exciting superficial supuration at the orifices of the puncture but no pain or rise of temperature. Under boracic dressing the punctures healed in a few days. I am sorry to say that this patient fell down, owing to his crutch slipping, and rebroke the femur, but probably without tearing the periosteum, as there was no deformity, no shortening and no swelling, but only tenderness and weakness.²

It is demonstrated, therefore, that the pins can be left painlessly and apparently without doing harm in the femur, and that, in combination with simple extension and the long splint, they can completely prevent shortening. With regard to the best time for inserting them I should recommend about ten days to a fortnight after the accident. By then effusion should have become either absorbed or organised, leaving only well vitalised tissues to deal with any germ that might accidentally enter. By that time, also, it would be seen whether thorough reduction and ordinary appliances would suffice for the case or not, and at that period, also, the tracks made for the pins need not communicate with the fracture itself.

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TWO CASES OF VAGINAL HYSTERECTOMY FOR CANCER.

By ARTHUR H. N. LEWERS, M.D. LOND.,
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CASE 1.—A woman aged forty-two, who had been married twenty-two years and had had one confinement a year after marriage. It was a difficult labour, instruments having to be used and there was post-partum hæmorrhage. She was in bed for three weeks afterwards and suffered from great pain in the lower abdomen and feverishness. The child only lived half an hour. The patient was quite well until September, 1888, when she had a sudden discharge of blood in large quantity, and from that time till the date of her admission to the London Hospital on Oct. 8th, 1889, she had been almost continuously losing blood. The red discharge had only stopped once as long as five days during all that time. This was about a fortnight before she came into the hospital. She had only had pain when clots were being passed, the pain then being only slight, and something like labour pains. The discharge was not offensive till a week before her admission, when it became slightly so. Her impression was that she had been losing flesh, but she was not very clear on this point. The catamenia appeared when she was twelve years old, and previously to the present illness she had always been regular every four weeks, and had had no pain at her periods. She was admitted from the receiving-room on account of the bleeding, and, as I happened to be in the ward at the time, I saw her at once. She was losing a good deal of blood. On vaginal examination a soft, friable, cauliflower-like mass, the size of a goose's egg, was felt projecting through the os uteri. The os was widely dilated. No part of the growth was attached to the rim of the os, but the attachment seemed to be situated high up in

² In a fortnight the limb was apparently quite firm and strong again, without deformity and without shortening. Such a quick union will seem almost incredible to surgeons familiar only with ordinary fractures, which are, of course, caused by considerable violence and accompanied by great damage to the periosteum; but after refracture from slight causes reunion is usually very quick, probably because the fibrous parts clasping the fragments together are so little disturbed.

the uterus. The growth exactly resembled the ordinary cauliflower-like mass so commonly met with in cases of cancer of the cervix; it broke readily under pressure with the finger, and the pieces that came away had a yellowish colour. I had no doubt that the growth was malignant, and as the patient was losing a good deal of blood I removed the growth at once with the écraseur and scissors, cutting through the attachment as high as possible. No anæsthetic was given. The patient was waxy-looking and extremely anæmic. The growth was so obviously malignant that unfortunately none of it was kept for further examination. It seemed to me that most likely it was a case of polypoid cancer of the body of the uterus, and the removal of the growth as described was only intended as a temporary and preliminary measure. On Nov. 7th, the patient being under the influence of ether, the cervix was rapidly dilated with Hegar's dilators till the finger could be passed into the body of the uterus. There was nothing to indicate any disease of the cervix, but an irregular patch was felt on the posterior wall of the body of the uterus, suggesting that the attachment of the mass removed might have been there. I decided to extirpate the uterus. After freeing the cervix from its attachments as high as the internal os and opening Douglas's pouch, the uterus was retroflexed and the vesico-uterine pouch of the peritoneum opened. The broad ligaments were then tied, and also clamped with large pressure forceps, which were left on, and the uterus was removed. One suture was used to close the aperture in Douglas's pouch, and a small drainage-tube was left just within the peritoneum. The vagina was then filled with carbolic gauze sprinkled with iodoform. The plug was removed the next day, the small drainage-tube coming away with it, and vaginal douches of weak iodine-water were given every four hours. On Nov. 9th, forty-eight hours after the operation, the pressure forceps were removed, a small Keith's tube being left in the vagina, and a pad of salicylic wool was placed over the lower end of it to receive the discharge. The highest temperature after the operation was on the evening of Nov. 9th, when it reached 102.2°, and the highest pulse rate was 120. After Nov. 12th the temperature never rose above normal. On Nov. 21st the suture that had been used for Douglas's pouch was removed, and the ligatures that had been employed for the broad ligaments came away. Several offensive black sloughs were removed from the site of the wound by mopping it with wool. On Nov. 28th, three weeks after the operation, an examination was made, and there was seen at the site of the wound a curious somewhat conical-shaped red body, half the size of a walnut, projecting into the vagina. It looked as if it might have been half of an ovary prolapsed and fixed in the wound. The patient went home on Dec. 7th. I did not see her again for a long while. In January, 1891, Mr. Bishop, who was my clinical clerk at the time, succeeded in tracing the patient. She said she was quite well and had no discharge, and she had promised to come up to the hospital to see me. She came, in August, 1891, and on examination the projection into the vagina at the site of the wound was found to be exactly as I have already described. The patient was quite well.

CASE 2.—A woman aged forty-one was admitted into the London Hospital under my care on Oct. 11th, 1890. She had been twice married, having had three children by her first husband and none by the second, to whom she had been married twelve years. She had never had any miscarriages. It appeared that for some time previously to admission the patient had had a red discharge in the intervals between her menstrual periods, and this had been so for more than twelve months. The metrorrhagia at this time was continuous, so that she did not know when the proper menstrual period occurred. There had been no offensive discharge. She had had an occasional feeling of weight in the pelvis, but had not had any actual pain. She had for some time had a sensation of great discomfort if the bladder was not frequently emptied. She had lost flesh and strength during the last three months, but her appetite was fair. The menstrual history previously to the present illness presented nothing requiring special mention. On admission she was examined under the influence of ether with a view to deciding whether or not an operation was advisable. The cervix was seized with a vulsellum and was drawn down to the outlet of the vulva. A definite cauliflower-like growth was seen on the posterior lip, bleeding freely when it was touched. The uterus was of about the ordinary size, and was freely movable. There was slight "thickening" to be felt in the left lateral fornix, such as might be due either to a former attack of pelvic inflammation, or to extension of the growth from the cervix in that direction. It