reported by Mr. Mitchell Banks and one by Dr. Hamilton, who both so fully describe the procedure that I need not recapitulate it, but will merely describe a case in which I used it:

G. B., aged 27, a healthy stoker, consulted me on July 7th, 1894; five weeks previously he had been seized with acute colic and sickness whilst at work, without diarrhoea or jaundice. He had always been rather constipated, and was in the habit of taking Epsom salts. Since the first attack he had had several similar ones. The day previous to my visit he had a very severe one, with vomiting and constipation and severe pain in the lower abdomen, aggravated by movement of the legs and by micturition. He was lying on his back with legs extended; the tongue was dry and brown, and there were sordes on the teeth and lips. His expression was anxious; respiration was entirely thoracic, the pulse was 120, and the temperature 101.5°; the skin was dry, the abdomen rigid, generally tympanitic, and excessively tender, more especially below the umbilicus, but not more on the right side than the left. By the rectum a painful swelling could be felt in Douglas's pouch. The bowels had acted slightly at 1 P.M. The urine was scanty and concentrated.

As he was evidently suffering from peritonitis, I sent him to the Norfolk and Norwich Hospital, and, in the absence of the surgeon of the week, he came under my care.

During the evening the abdomen was opened in the linea alba, and some thin sero-pus escaped; a small band connecting the intestine to the bladder was divided. The bowel 3 feet above the cæcum was found adherent deeply in Douglas's pouch. In breaking down the dense adhesions two or three distinct pockets of thick pus were evacuated, and the loop of bowel was drawn up to the wound. It was for 1 inch much thickened and contracted, apparently from dense organised lymph, and the surface was ragged from the broken down adhesions. This, perhaps, might have been left alone; but, with the possibility of its being a malignant stricture and the uncertainty as to the size of the lumen of the bowel, I decided to remove it. Accordingly, about 10 inches of bowel were cut away with a small portion of mesentery, and the ends were quickly and easily joined with a medium-sized Murphy button, the bowel being compressed meanwhile by an assistant's finger. The mesentery was united on each side with a continuous silk suture, which was carried up to the periphery of the bowel so as to support the line of union. The peritoneum was well flushed with hot water and the abdomen closed, a glass tube being inserted.

The after-progress of the case was good (the bowels acting on the fourth day) until August 7th, when some offensive pus escaped through the track of the tube, and on August 19th faecal matter flowed freely. This continued at intervals, and evidently the button was causing partial obstruction. It was dislodged by a dose of castor oil, and passed *per rectum* on September 12th. On the next day a ligature escaped through the wound. No more faecal matter passed, and the sinus contracted though it did not finally heal until January. There has been no obstruction since; the appetite is very good and the bowels act regularly.

The bowel removed was found to be contracted for about half an inch to the size of a No. 10 catheter by dense fibroid material, which could be stripped off the peritoneal coat. The mucous membrane was apparently quite healthy.

This case was communicated to Dr. Murphy privately, and has been entered as No. 65 in his last published list. The point of special interest is the long delay in passing the button—sixty-six days—which is, I believe, the longest on record. Dr. Murphy specifies that cases of existing peritonitis are unfavourable for satisfactory union of the bowel, which one would quite anticipate.

What was the cause of the partial failure in this case? Probably it was the peritonitis. It may have been from the button fitting a little too tightly to pass easily along the remainder of the ileum; it may have been from the supporting suture allowing of infection from within the bowel. Another time I shall certainly trust to the button without additional suture.

One more point of interest. What was the cause of the peritonitis? The vermiform appendix was free from reproach. It is possible that a small gland may have suppurated and

caused local peritonitis, but no history suggestive of it could be obtained; the mucous membrane was intact, and no trace of primary gland abscess can be found in the specimen. Can peritonitis be idiopathic? We know of purulent deposits in other serous membranes—the pleura and pericardium—which are apparently idiopathic. We are not taught that the pelvic peritoneum may behave in a similar way, but I see no reason why it should be exempt from trouble which may befall other serous membranes.

SOME REMARKS ON THE TREATMENT OF FRACTURES.

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IN considering the influence which a fracture may exert on the subsequent life-history of an individual, we must recognise one great difference between the results of fractures of the long bones of the upper and lower extremity.

In the case of the upper, the superjacent weight of the body is not transmitted through the joints as it is in the leg, therefore an alteration of the mechanics of a joint in the arm in consequence of fracture of one or more bones does not determine the development of such extensive changes as take place in the leg. Yet in the arm very considerable alterations may occasionally develop, and are more marked and depreciating to the value of the individual as a machine in proportion as changes have already taken place in the particular joint or joints from the prolonged pursuit of a laborious occupation.

We may conclude that in fractures of the long bones of the upper extremity it is not of such vital importance to reconstitute the damaged skeleton in its original form as it is in the case of the leg.

In fractures especially of the femur, tibia, or fibula, nothing plays a more important part in the prognosis as regards the presence or absence of subsequent pain and depreciation of the physical capacity than does "age."

In the comparatively young adult, deformity, with the consequent alteration in the physiology of the limb, brings about what may in the absence of a better term be called "adaptive" changes in the anatomy of the joints influenced. By this term I mean an alteration in the form and perhaps in the plane of the articular surfaces, with a variation in the extent of the synovial membrane and in the attachments of the ligaments, and these are usually unassociated with any pain or discomfort at any period subsequent to the receipt of the fracture. After a certain age, which varies within wide limits with the habits, occupation, surroundings, etc., of the individual, which may be roughly averaged as about 40 years, this being probably an excessive estimate for labouring people, a different series of changes takes place. These may for convenience sake be called "passive" changes, and are included under my description of mechanical or traumatic arthritis.¹ They consist in the removal of articular cartilage at the seat of abnormally great pressure, with subsequent eburnation and destruction of opposing bony surfaces, the alteration in the extent of the articular surfaces by the marginal deposit of cartilage and bone, and increase in the thickness and character of the synovial membrane with the secretion of an excessive amount of synovial fluid—in fact, just such changes as used to be regarded by the pathologist as indicative of the presence of a disease which he called by various names, that, perhaps, most commonly used being rheumatoid arthritis.

Clinically this means that in the slightest forms the patient experiences a feeling of insecurity and discomfort in the affected part, and in its marked forms a degree of pain that sooner or later absolutely incapacitates the sufferer from transmitting the weight of the body through the joint or joints of the leg for any useful purposes.

I propose to limit my remarks to fractures of the lower extremities. I would point out that as regards the mechanical treatment of fractures other than those that are transverse, and in which there is no displacement of fragments, or in

¹ Chronic Traumatic Arthritis, *Lancet*, January 30th, 1892.

which there is so little hæmorrhage and swelling that the broken surfaces can be brought by traction and manipulation into accurate apposition, we must be guided by two important principles:

1. The axes of the fragments must be made to correspond as nearly as possible. This is done by placing the patient at rest in the supine posture, and, by observing the foot of the sound limb, the degree of external rotation which is normal to it in that posture can be gauged accurately by the angle included between a vertical and the inner margin of the foot. The foot of the damaged limb is made to form an equal angle with the vertical, and by this means the axis of the lower fragment or fragments will be made to correspond as nearly as possible with that of the upper when the opposition exerted by the shortening of the ties in the length of the limb due to hæmorrhage and inflammatory exudation into them has been removed under the influence of traction. By ties in the length are meant all the soft parts about the bone, namely, muscles, fasciæ, subcutaneous tissue and skin.

2. Traction must be exerted upon the limb beyond the seat of fracture till the blood and inflammatory material referred to are absorbed sufficiently to allow of the fractured surfaces being brought down to corresponding levels and into apposition. It is obvious that the amount of traction with its duration must vary with the amount of hæmorrhage and subsequent inflammatory effusion, since in some cases they are so small in amount as to offer no obstacle to the reconstitution of the bone by moderate traction, aided by the support given by a plaster-of-paris casing, while in others they are so considerable and their absorption so long delayed that union in an unsatisfactory position may result. Though I had some idea that the influence they exerted upon the ties in the length of the bones was very considerable, I did not become alive to the immense resistance they could offer till in 1893 I cut down upon simple fractures of the tibia and fibula with a view of ensuring perfect accuracy of union by fastening the fragments together with steel screws.² In these cases I found that a very moderate amount of hæmorrhage and effusion, even after the skin and soft parts were freely incised in order to expose the fracture, was sufficient to resist any traction that we were able to exert upon the foot and lower fragments, so that it had to be supplemented by the use of elevators and lion forceps before it was possible to fix the broken surfaces accurately together. It is of the truth of this that I have found most difficulty in convincing others; indeed, it would seem that it is necessary for the surgeon to have performed such an operation before he can realise this fact. I do not think that I ever placed any reliance whatever upon the influence supposed to be exerted upon fragments by the prolonged contraction of muscles inserted into them, and which is so fully described both in detail and diagrammatically in surgical and anatomical works. Surgeons mistook this supposed factor in producing deformity, which in my opinion is practically non-existent, for the shortening up of the ties in the length of the limb by hæmorrhage and inflammatory effusion into them, and many lines of treatment and forms of apparatus were invented on this false assumption.

The mode in which traction is to be exerted must vary with the position of the fracture. If it is placed low down, and not far from the ankle, and there is much swelling, it is obvious that but little force can be brought to bear on it, since the pressure that must be exerted locally by the extension apparatus upon tense and inflamed parts soon becomes unbearable.

In the paper in the Clinical Society's *Transactions* already referred to, I confined myself to the consideration of the treatment of fractures of the tibia and fibula, and chiefly those that were oblique in direction, and I found from a careful examination of a considerable number of cases in which such fractures had been sustained during and after middle life, that the average financial depreciation of many varieties of labourers after such an injury was enormous, and this was especially marked in those who were obliged to depend largely on the security and perfect control of their legs in following their occupation. I refer to such as scaffolders, firemen, sailors, decorators, etc. It seems to me that the surgical

treatment of fractures of the lower extremity especially is far behind that of any other department of surgery. It is the only section in which little or no progress has been made in recent years, except in the case of fracture of the patella, and as the best evidence of this I would call attention to the survival of the vertical footpiece at the present time, in spite of its readily demonstrable capacity for harm.³ Yet the importance to the patient of a good or bad result can hardly be exaggerated. Instead of advancing it seems to me to have retrograded in a very marked manner, and chiefly in consequence of the use of rigid cases made of plaster-of-paris or other similar material, which are applied very soon after the patient's admission.

This method is both cheap and bad. It is cheap since it enables many patients to be sent home very soon after its application, and its cost is very small. It is bad since the presence of hæmorrhage and effusion renders it impossible to replace the fragments in accurate apposition in the majority of cases, and the apparatus perpetuates the bad position. Before this method was generally adopted fractures of the tibia and fibula were treated with splints, and there was more chance of obtaining a better result, since as it was the rule to leave the seat of fracture uncovered, when the hæmorrhage and swelling subsided the surgeon was able to recognise any very marked deformity, and was in a position to attempt to diminish it by manipulation, etc.

While I believe that a proportion of fractures of the tibia and fibula occurring in labourers during or after middle life may be treated satisfactorily by extension, regard being had to the symmetrical rotation of the fragments, I am even more convinced than I was that in oblique fractures of both bones occurring somewhat low down the wisest course is to expose the fractured ends, and, having established continuity of position, to retain them there with screws. A greater reliance on the part of the surgeon on the safety of his surgical procedures will, I feel sure, soon remove this reproach from surgery.⁴

Passing on to the consideration of fractures of the shaft of the femur occurring during the same period of life, I am of opinion that the financial capacity of the individual is depreciated to an extent which is not far, if at all, below that which exists in fractures of the tibia and fibula, and this would appear to be due largely to the imperfect recognition of the two important principles to which I have called attention, namely, the symmetrical rotation of fragments and sufficient traction. Both must be applied in the treatment, either alone being insufficient to obtain a perfect result. The physical conditions in the case of the femur lend themselves much more readily to treatment by apparatus alone than do those existing in fractures of the tibia and fibula. Even in fractures of the femur difficulties may be experienced which may render it advisable to expose the fragments and to ensure accurate continuity.⁴ I have not investigated systematically any long series of fractures of the femur sustained during or after middle life, but I have examined very many who were depreciated mechanically to such an extent that they could only get about with considerable pain or difficulty, and who were quite unable to follow any active employment. It is well to remember that once these conditions have resulted it is practically impossible to remedy them by operative interference. Action must be taken before the fragments have united, or not at all. If it is attempted subsequently, it is impossible to reconstitute the bone in its original form, since a considerable length must be removed to allow of accurate apposition. An improvement may be effected, but probably, after the risks and discomfort of an operation, the patient will find his joints almost as painful and as insecure as before.

Perhaps of all fractures of the lower extremity none would seem to lend themselves more readily and at less risk to operative interference than the conditions which result from excessive forcible abduction of the foot, and which are usually

² A Method of Treating Simple Oblique Fractures of the Tibia and Fibula more Efficient than those in Common Use, *Trans. Clin. Soc.*, Vol. xxvii.

³ An Undescribed Method by which the Superjacent Weight of the Body is Transmitted in United or Ununited Fracture of the Neck of the Femur, and the Bearing of the Principle Involved on the Surgery of the Hip-Joint, *Trans. Med. Chir. Soc.* 1888. Cases Illustrating a New Operation for Dorsal Dislocation of the Head of the Femur, and some Points in the Surgery of the Hip-Joint, *Trans. Clin. Soc.*, 1893. Fallacy of Vertical Foot Piece, *BRITISH MEDICAL JOURNAL*, 1893.

⁴ The chief difficulties are considerable swelling of the soft parts and inability to endure such traction as is requisite.

comprised under the term of Pott's fracture. The broken bone is of small calibre, it is readily exposed, and it is dense in structure, holding securely the wire or other means used to retain the broken surfaces in apposition should any be found necessary after their replacement by the elevator or forceps. The results obtained under the methods at present in use are, in my experience, often most unsatisfactory. If on the dead body one divides the fibula in the seat of fracture and displaces the lower fragment it is often possible by manipulating the foot to bring the fragments into tolerable apposition, and I should imagine that the recognised methods of treatment are based upon such a study as this; but in the living subject a considerable amount of hæmorrhage and effusion very often takes place, and this alters the mechanical conditions so thoroughly that it is probable that in many cases the forcing the foot into a position of adduction not only does not bring the fragments into apposition but by traction on the bruised and inflamed peronei and upon the skin, made tense by the effusion beneath and into its substance, the displacement is exaggerated rather than lessened.

One cannot but feel that the perpetuation of methods of treatment which have been in use up to the present time must depend on the fact that surgeons have not taken such trouble to inquire into the subsequent life-history of these patients as they have done in other departments of surgery.

It is very possible that I may be accused of exaggerating the evil results of the treatment of fractures in the present day and that many may not be inclined to agree with the mechanical principles upon which my statements are based. It is, however, quite open to anyone to prove the former by publishing an account of a series of fractures sustained at the same period of life which show better results, and the latter are obviously capable of absolute demonstration.

A NOTE ON THE TECHNIQUE OF REMOVAL OF THE VERMIFORM APPENDIX.

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THE last six or seven cases in which I have quite recently been called upon to remove a diseased vermiform appendix for various reasons have given me the opportunity of perfecting a method of dealing with the stump which I had put in practice some years ago in a modified form, and which appears likely to simplify the procedure considerably and save much time. It is possible that it has been adopted by others before this, but, if so, I am not aware of its having been published. I note, too, that in an interesting series of cases recently published by Mr. Treves he still adheres to the older practice of stitching the serous coat over the stump of the appendix after removal, and I think that, had he been aware of the advantages of the method I am about to propose for further trial, he would have adopted it, if only to reduce the duration of his operation.

This saving of time appears to me to be a matter of prime importance in this class of cases, as in all abdominal operations, and any surgeon who has done many of them will admit that where time is lost it is in the preparation for and carrying out of stitching, which, to be efficient, has to be neatly done, and often under great difficulties, at some depth in the abdomen in the cases alluded to.

Some years ago I noticed in removing the appendix that the greatly thickened and sclerosed mucous and submucous coats were comparatively loose within the other outer coats of the process close to the cæcum, and that after circular division of the latter could be drawn out of them to the extent of an inch or so in an unbroken tube. Noting this, I at once put in practice in a modified form the measure now to be briefly described.

In any case in which the appendix has been separated from its surroundings its mesentery is first transfixed and tied in one or two parts with fine silk. The little mesentery is then cut with scissors up to the base of the appendix, close to the cæcum. Then at about three-fourths of an inch from the latter the serous and muscular coats are divided by a circular sweep of a sharp knife, leaving the mucous tube intact. The

latter is now gently drawn out, and the two outer coats are stripped back towards the cæcum with a director, and turned over like the sleeve of a coat. In this way the tube of mucous membrane can be reached at its point of exit from the cæcum, and is tied with a fine silk ligature, and so closed. Then it is cut across an eighth of an inch beyond the ligature, and immediately retracts. The outer tube of serous and muscular tissue is now turned down over the stump of the mucous coats, which has retracted towards the cæcum on being divided. This tube formed of the outer coats is then, instead of being stitched, simply surrounded with a fine silk or gut ligature, and closed over the mucous stump. Of course the serous surfaces are not by this means brought together, but this is not necessary, and perhaps not even desirable, as no firmer barrier to the prolapse of the mucous membrane could be made than by bringing the raw, inner, non-serous surfaces of the tube into contact.

The simplicity and rapidity of this little manoeuvre are great, and my colleague Professor Heath, who was looking on at one of my cases lately, was much struck by its superiority to the method of stitching the serous coat over the stump.

As all these six or seven cases in which I have proceeded as above have recovered, I cannot show any specimen to illustrate the state of the stump after operation; but Fig. 1,

Fig. 1

a, Tube of mucous membrane drawn out of stump; b, divided edge of two outer coats; c, swollen end of appendix. Natural size from a photograph.

from a photograph taken from an appendix recently removed in this way, shows to what extent the inner mucous tube can be drawn out and separated, and consequently how much of a tube of the outer coats there is when they are drawn forward again for the circular closing ligature. Fig. 2 is a dia-

LIGATURE ROUND THE TUBE FORMED OF OUTER COATS.

Fig. 2.

gram to illustrate the relation of parts while applying the latter.