weak tea with light food and half an ounce of brandy every four hours. The pulse was 56 and regular. The face and the conjunctivæ were somewhat jaundiced. There was no headache or vomiting. The examination of the chest proved to be negative, except that rhonchus and sibilus were heard at the left base behind. There was some cough with expectoration. The heart's apex beat was situated at the fifth interval, half an inch inside the nipple line. There was no distension of the abdomen and no perceptible enlargement of the liver; liver dulness appeared to be natural. Stomach resonance was normal. The urine was rather dark, but did not contain bile pigment. The fæces were hard and of a dark colour. At 9.30 P.M. he was given bromidia, dr. i., with water to one ounce, to be taken at once as a draught. On the 24th he had not much sleep. The pulse was 62. He had some cough. The hiccough had been very severe during the previous night, worse than before; he had, however, taken food well. Dr. Walter R. Jordan of Birmingham kindly saw the patient in consultation with me, and the following medicine was tried: ammoniated tincture of valerian, dr. vi.; bromide of potassium, dr. ii.; chloral hydrate, gr. xc.; with water to six ounces; one ounce to be taken every four hours. On the 25th he had five hours' sleep, during which time the hiccough stopped, but recommenced on his waking. He had a good breakfast. At 6.30 P.M. I was sent for because the patient was "not himself," delirious and drowsy, these symptoms apparently coming on suddenly after a copious motion at midday. The patient was now very drowsy and talking nonsense; his face was flushed; he could, however, be roused, and then complained of severe girdle pain at the epigastric level. The pulse was steady, the tension being low. The hiccough was severe. He also complained of a tingling sensation over the chest and arms. The medicine was ordered to be stopped and hot coffee to be given. At 10 P.M. he was much less drowsy. The skin was hot, the temperature being normal. The epigastric pain had gone. On the 26th, about midnight, he tried to get out of bed. Another dose of bromide and chloral was given, although contrary to orders. He slept for six hours without hiccough. In the morning the patient seemed to be much better. The pulse was steady and the bowels were opened. He had a good breakfast. Hiccough was still frequent. The following was prescribed: chloral hydrate, gr. x., bromide of potassium, gr. xv., and water to one ounce, to be taken at 3 P.M. At 9.30 P.M., after the draught, he slept for five hours. He took food well, but the cough was troublesome. The pulse was good. The urine was of sp. gr. 1015 and contained no albumen. On the 27th he had a fair night. For the first time since the onset of the illness, eleven days previously, he was free from hiccough whilst awake. The pulse was rather weak, but regular and not hurried. He woke up suddenly in the night, startled, and coughed much for a short time. Brandy was increased to one ounce every four hours. Expectorant medicine was administered. At 9.30 P.M. the hiccough had returned, being frequent but not very severe; otherwise the patient's condition was satisfactory, though he felt weak. The pulse was stronger. The draught as given on March 26th was repeated. On the 28th the patient took the draught at midnight and slept well. His condition was quite satisfactory. There was no hiccough, but the voice was husky. The pulse was good. At 9.30 P.M. he had been without hiccough all day. The voice was still husky and the throat sore. There was some præcordial pain during the evening, with throbbing of the heart. The pulse-rate was 52. Examination of the fauces gave a negative result. On the 29th he had had a good night's rest without the draught. There was no hiccough for twenty-four hours. He felt very weak, but the pulse was good. On his eyes being examined the fundi were found to be normal, as were also the optic discs, but there was abnormal refraction (both eyes - 6 D). On the 30th there was no hiccough. The patient was convalescent and was allowed to get up for half an hour. On the 31st his condition was satisfactory, though he felt very much shaken. He was dressed and came downstairs. The voice was only slightly husky.

Remarks—In this case the history of previous attacks of hiccough and also of the "fainting" attacks, which appear to have been of an epileptiform character, is interesting. In the absence of any obvious cause—e.g., uræmia, new growth, &c.—one may look upon the attack as a form of epileptic "nerve storm," though, of course, it is possible that there had been some local pathological condition. The pulse, even at the height of the attack, was never more than 64 per

minute and usually not over 56. The best sign all through the attack was that the patient took his food well. The severity of the hiccough may be understood by stating that frequently the spasms so shook the body that the bed, a heavy one, shook also. No other muscle besides the diaphragm was implicated. The urgent symptoms on the night of March 21st, which made his relatives think that he was dying, were not so very alarming as far as I can make out. Some collection of mucus probably caused the noisy breathing, which seems to have awakened the patient himself, for he woke up suddenly and asked what was the matter. The bad symptoms on March 25th may, I think, be put down to the doses of chloral that he had taken. There is no family history of paroxysmal neuroses.

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THE TREATMENT OF FRACTURES.

By D. M. BEDDOE, F.R.C.S. ENG.

THE recent developments in the knowledge of wound infection, and the resulting increase in the means of preventing such, have led medical men to actively interfere for the relief of patients in regions where, without that means, they dare not trespass. In treating any affection the surgeon, now confident in his aseptic precautions, instead of doubtfully asking himself whether he dare make an incision or not, inquires rather what benefit to his patient will accrue therefrom. This being so, it is curious that, with the exception of one or two isolated cases, attempts have not been made to deal more actively with fractured bones than by placing them in splints. Perchance this is due to a want of knowledge of the after-history of persons who have sustained an injury of this kind. Not long ago, in order to satisfy my mind upon the efficacy of the usual splint treatment of fractures, I made an inquiry into the subsequent history of a number of persons who had sustained such an injury, taking up for this purpose two particular lesions of the lower extremity—viz., simple fracture of the shaft of the femur and Pott's fracture; and I fear that the results will show that we are no whit better off now than when John Bell said many years ago "that 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, and frequent lameness shows that we are still deficient in this branch of practice." In this investigation I have confined myself almost exclusively to those fractures occurring in working men between the ages of thirty and sixty, as it is for them more particularly that the possession of a firm, stable limb is of such vital importance, and I wish it to be distinctly understood that no selection was employed in their collection. The various details concerning these cases, together with the ascertained results, are given in the annexed tables.

Thus, as regards the 16 cases of fractured femur, the following lamentable results occur: 3 are unable to follow any occupation; 1 is able to do but a few light odd jobs; 4 cannot work nearly as well as before, and their wage-earning power has much decreased; 1 can do fairly heavy work, but is unable to climb ladders when carrying weights owing to a stiff knee (he could not do any work for six months); 1 is able to do fairly heavy work, but is out of employment because he could not do any work for seven months; 4 only can do their work as well as before, and of these one was unable to work for five months and another for three. Of the Pott's fractures, 3 have been able to do but very little work since; 5 are able to do their work only at the cost of some pain and considerable inconvenience (one of these was five months before he could do any work at all); 1 cannot walk any distance on account of the pain in his ankle and subastragaloid joints; the remaining 4 are able to do their work satisfactorily, but occasionally suffer from pain in the ankle. When one sees results such as these following treatment, where for broken thigh the patients remained in hospital in no case for less than six weeks, and under all the advantages that skill and appliances can give, it is surely suggestive that there is something radically wrong in our methods of procedure, and a consideration of the conditions of a recent fracture, and the agencies to be overcome in its proper treatment support this contention; thus, in the case of a

TABLE I.—Pott's Fractures.

No.	Occupation.	Age.	Date of fracture.	Time in hospital.	Present condition.	Condition as regards work.
1	Carman	30	1893	14 days	Depression at seat of fracture.	Ankle was very weak for some time; still has pain after a hard day's work.
2	Labourer	32	1893	14 days	Distinct depression 1½ in. above external malleolus, the displacement of fragments not having been reduced.	Has continual pain in ankle and subastragaloid joints; impossible to do anything but the lightest work, and that with considerable pain.
3	Bricklayer's labourer	49	1893	A few days	Slight depression at seat of fracture; some eversion still.	Quite unable to do any work for five months; has been able to do but very little since from pain in ankle and subastragaloid joints.
4	Accountant	58	1893	6 days	Depression at seat of fracture.	Unable to walk any distance from pain in ankle and subastragaloid joints.
5	Stickmaker	64	1893	14 days	No displacement, but a little thickening of bone at seat of fracture.	Has pain on standing for some time.
6	Labourer	53	1891	A month	Movement at ankle-joint somewhat limited.	Returned to work in two months; has suffered much pain at intervals; ankle still feels very weak.
7	Leather-dresser	27	1891	3 days	Slight depression at seat of fracture.	Patient does his work, but suffers great inconvenience when standing on it for long.
8	Dock labourer	35	1893	A few days	No displacement.	Pain on change of weather only.
9	Labourer	31	1891	Two days	—	Can work as well as ever; very occasional pain only.
10	Waterside labourer	32	1892	Five days	Slight displacement; no deformity.	Has not been able to do much work since on account of pain in ankle.
11	Constable	29	1893	A few days	—	Can do his work all right; has occasional pain only.
12	Porter	38	March, 1894	Seven days	A slight rim at seat of fracture.	Has a good deal of pain in his foot occasionally, and is able to follow his employment, but with some discomfort.
13	Engine man	48	Feb., 1894	A few days	No displacement.	Can now work as well as before, but he had a good deal of pain for some months after the accident.

TABLE II.—Fractured Shaft of the Femur.

No.	Occupation.	Age*.	Date of fracture.	Seat of fracture.	Time in hospital.	Condition on discharge.	Present condition.	Capacity for work.
1	Labourer	50	June, 1892	Junction of middle and lower thirds	Six weeks	Satisfactory; ½ in. short	Pain and weakness at seat of fracture; pain and stiffness in knee; no obvious deformity.	Is unable to follow his regular employment; can do odd jobs only; earns but very little.
2	Carman	36	June, 1890	Middle third	Eleven weeks	Apparently satisfactory	Lame; pain in knee and hip; kneeswells after walking; bowing of femur.	Cannot work nearly so well as before accident; was nine months before he could do any work at all.
3	Boot welter	43	1892	Middle and upper thirds	Seven weeks	Apparently satisfactory	Lame; pain in thigh.	Cannot do his work so well; was eighteen months before he could work, and then could not stand for any length of time.
4	Labourer	58	1890	Fracture in two places	Four months	2 in. short	Pain and weakness in limb at seat of fracture and in knee-joint.	Has done no work since.
5	Riverside labourer	40	1893	Upper and middle thirds	Six weeks	¾ in. short	Lame; occasional pain in thigh.	Is not able to work nearly as well as before; his wage-earning power has much diminished; was six months before he could work at all.
6	Fitter's labourer	55	1893	Upper third	Seven weeks	Some little deformity	Lame; pain and insecurity in limb; limb occasionally helpless, bowing outwards.	Is not able to work nearly as well as before; was four months before he did anything.
7	Blacksmith	40	1894	Above centre	Nine weeks	—	2½ in. short; increasing pain in knee and hip; can only hobble with a stick.	Unable to follow any employment.
8	Porter	38	1890	Upper third	—	—	1½ in. short; pain in the thigh, discomfort in knee and hip; cannot bear his weight upon his leg.	Unable to follow any occupation.
9	Engine driver	58	1893	Lower third	Six weeks	1 in. short; adhesion in knee broken down in three months	No deformity; slight pain in ankle on exertion; foot rotated inwards slightly.	Can perform heavy work, but is out of employment consequent upon his being incapacitated for seven months.
10	Labourer	32	1892	Lower third	Six weeks	½ in. short	No pain; not lame; foot turns out a little.	Can work well.
11	Carman	39	1892	Middle and upper thirds	Seven weeks	1 in. short	No pain; limps a little.	—
12	Drayman	47	1890	Lower and middle thirds	Eight weeks	1½ in. short	Good firm limb, but cannot flex knee to full extent.	Can work satisfactorily, but cannot carry weight uphill; could not work for six months.
13	Carman	37	1889	Lower and middle thirds	Six weeks	½ in. short	No lameness and no deformity.	Can do his work as well as before.
14	Labourer	29	1891	Middle third	Six weeks	½ in. short	No lameness and no deformity.	Can work well, but could not for nineteen weeks.
15	Watchman	42	1890	Middle third	Seven weeks	—	No lameness, no deformity, and no pain.	Can work well, but was unable to for three months.
16	Drayman	49	1893	Upper and middle thirds	Nine weeks	¾ in. short	No lameness, no deformity, and no pain.	Can work as well as before.

* Age refers to age at time of fracture.

recent fracture of the femur, which in an adult is almost invariably oblique,¹ we may take it that there is almost always some overlapping of the bones, and from the great eversion of the foot, which is almost always constant, there must also be some rotation of the fragments. To take this overlapping first. It is generally said that the cause of this position of the fragments is due, with the exception, perhaps, of the fracturing force, to active muscular contraction; but this overlapping is present, and often almost as difficult to reduce when the muscles are fully relaxed under the influence of an anæsthetic as without, and it seems reasonable to suppose, as Mr. Arbuthnot Lane contends,² that the shortening from a broken bone is due to the blood extravasation and effusion into and beneath the soft tissues around the fracture, which bulging out the skin and tissues causes the limb to undergo in proportion a compensatory shortening and resists reduction. Of the truth of this observation I am perfectly satisfied, for I have seen several cases where this difficulty of reduction could be explained in no other way. To give an example. Not long since I saw two cases of compound fracture of the leg, in one of which there was a large ragged wound through which the effused blood found a ready exit; whilst in the other there was a much smaller hole partly blocked by the fragment. The former was easily reduced, but the latter, even under an anæsthetic, taxed the full powers of the surgeon to satisfactorily reduce it, although the tendo Achillis had also been divided. I have observed also from records of cases that the amount of shortening is often proportionate to the amount of effusion. It is clear, therefore, that to put up an overlapping fracture in an unyielding envelope such as plaster-of-Paris, as is so often done, simply retains the fragments in their abnormal relation, in which undesirable position they become permanently fixed. As regards this, the method of continuous extension is infinitely preferable; but even here it seems, to judge by the invariable shortening, that the bones unite sufficiently firmly to prevent full apposition before the counteracting effusion has ceased to act. As Hamilton³ says: "When the ends have once become completely displaced no means have yet been devised by which an overlapping and consequent shortening of the bone can generally be prevented." Of fifty cases of fractured femur Mr. Holthouse⁴ found that 90 per cent. had shortening varying from $\frac{1}{2}$ in. to $3\frac{1}{2}$ in. The application of the various means of extension also is not without grave inconveniences—chafing of the skin, blisters, intractable ulcers, and stiff joints often resulting. As Velpeau says, most of these contrivances fail to obviate the shortening, and produce eschars, ankylosis, or troublesome arrests of the circulation.

With reference to the second displacement—namely, that of rotation—it is curious what little attention has been paid to it. It seems sufficient to the minds of most surgeons to correct the extreme eversion only without any definite rule for its more accurate position. For instance, if the fractured femur be treated by means of a long Liston or Desault, the foot is at a right angle to the bed, whereas in a Hodgen the foot may lie in any position from a right angle to as much, perhaps, as 65°. Now, as has been pointed out by Mr. Arbuthnot Lane,⁵ the lower extremity in a position of rest has the foot at an angle of about 45°, the limb rotating outwards from the hip-joint; it is clear, therefore, that if the foot be at a right angle the ends of the fragments do not correspond, but the lower one is twisted inwards to the upper, whilst if the foot be rotated out to an extent exceeding about 45° there is a twist outwards of the lower fragment. I have seen instances of these conditions both in living subjects and in museum specimens of old fractures. Concerning the importance to be attached to a certain amount of overlapping and rotation it may be argued by some that so long as the bones are firmly united a slight amount of shortening is a matter of no moment. Thus Erichsen states "that a slight diminution in the length of a limb is of no consequence, the pelvis remedying this"; and Hamilton⁶ says "that in shortening over two-fifths of an inch either they limp, or they have lifted the heel of the shoe, or, in short, the limping is only concealed by a lateral deviation of the spine." What effect in the long run this deviation has one does not exactly know; but I have met with several instances where the patients have complained of pain and weariness in the back after doing work, which they

say they did not experience previously to the occurrence of the fracture. This is suggestive that this compensation on the part of the spine is not altogether to the advantage of the patient. In overlapping of three-fourths of an inch and over, lameness and deformity generally occur, both in some cases being extreme. Out of the sixteen cases nine are lame, eight markedly so.

The evils resulting from the union of fragments rotated upon one another may be less evident at first sight than the lameness resulting from the overlapping, but are on that account none the less real. In this occurrence the dependent joints, which require for the perfect freedom of their action a perfect continuity of the shaft of the bone, suffer undue stress in endeavouring to accommodate themselves to the altered conditions. As Erichsen says: "The rotation outwards of the lower fragment seriously cripples the patient, as the movements of the knee and ankle are rendered almost useless in walking." This undue stress is manifested in two ways: (1) pain and weakness, or limitation of movement in the joint; and (2) organic alterations in the joint or joints. Out of the sixteen cases of fractured femur seven complain of pain in the joints, chiefly that of the knee, but occasionally in the hip and ankle also; and out of the thirteen cases of Pott's fracture four complain of pain in the subastragaloid joint, and seven in the ankle on exertion. Respecting the organic changes in joints, one is unable to draw any deductions from the above cases on account of their not extending back more than five years, whereas for their full development so as to be manifest externally they would probably require a longer time. I have, however, seen in workhouse patients some good examples of organic change in joints resulting from old fractures of the femur, and these alterations seem to be of the nature of the traumatic arthritis described by Mr. Arbuthnot Lane.⁷ After the lapse of time the lipping of the articular margins and the concurrent changes in the joint itself seriously impede the patient in the performance of his work. An examination of the museum specimens of old fractured femora will often show such a condition of traumatic arthritis.

From a consideration of the above facts it is clear that the object we should strive for in the treatment of fractures is to replace and fix the bone in its original position, and it is also plain that the conditions are such as cannot be entirely remedied by means of splints. To go on treating fractures by such means in the face of results such as the above, where in so many cases the result to the patient is so disastrous, could only be justified if there were absolutely no other means of treatment at our disposal; but fortunately there is one method which offers a prospect of perfect cure, and that is to cut down upon the seat of fracture and unite the fragments by screw or wire in the exact relation that they occupied previously. The only possible objection to this will be raised by those who are doubtful of the success of their aseptic precautions. They will probably ask, What if suppuration occurs? Yet nevertheless they open the abdominal cavity to remove ovaries and tumours which do not threaten the life of the individual, and they open knee-joints to remove loose bodies which are a source perhaps of discomfort only. Would not suppuration be as disastrous there? That line of argument is surely a wrong one to advance; the only way to decide the question should be upon grounds such as these: (1) are the present results satisfactory? and, if not, (2) does operation offer a better prospect of fixing the fractured bone in its original position? To the former question there can surely be no other answer after considering the above statistics than that the results are most deplorable, and with reference to the latter I have no hesitation in saying from the cases I have seen done thus that for replacing and fixing the bones in their proper relation, this method is infinitely superior to any means I know.

Guy's Hospital.

⁷ THE LANCET, Jan. 30th, 1892.

NATIONAL SOCIETY FOR EMPLOYMENT OF EPILEPTICS—The first annual meeting of governors was held at 12, Buckingham-street, W.C., on Monday, May 27th, the chair being taken by Mr. E. Montefiore Micholls. In a most encouraging report presented by the honorary medical staff it is stated that the experience of the first half-year from the opening of the colony has been a pleasant surprise even to those who were most sanguine as to the ultimate success of an epileptic colony.

¹ Hamilton: Treatise on Fractures and Dislocations, p. 458.

² Brit. Med. Jour., April, 1895.

³ Treatise on Fracture, p. 468.

⁴ Holmes's System of Surgery, second edition, vol. ii, p. 866.

⁵ Brit. Med. Jour., Nov. 11th, 1893. Fallacy of Vertical Footpiece.

⁶ Treatise on Fracture, seventh American edition, p. 461.