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PART I.
ORIGINAL COMMUNICATIONS.

ART. VII.—*Observations on the Application of the Seton, in ununited Fractures,—with Cases; also a Case of Resection of Portions of the Tibia and Fibula to remove Deformity,—with Illustrations.* By FRANCIS RYND, A. M., F. R. C. S., Surgeon to the Meath Hospital.

AMONGST the embarrassments occasionally experienced by the practical surgeon, ununited fractures hold a very prominent position. After the patient has submitted to confinement perhaps for weeks, and during that time been subjected to restraint, which, under the most favourable circumstances, must have been irksome and unpleasant, there can be nothing more disheartening to him and more distressing to his surgeon than the discovery that little or no progress has been made in the cure, and that the injured limb remains as powerless and as incapable of affording support or motion as it had been immediately after the accident. It forms no part of my present purpose to enter on an inquiry as to the causes that may occa-

sion this very untoward occurrence; they are enumerated in every systematic work, and so numerous that one might well be surprised at its comparative infrequency,—such as indiscretion or impatience on the part of the sufferer; carelessness or incompetency in the surgeon; age, habit, and temperament of the patient; or the presence in his constitution of some vice or taint, such as scrofula, venereal, scurvy, or cancer. Still less am I disposed to consider the discrepancies of opinion that prevail as to the pathology of the affection, and the condition in which the ends of the fragments may exist, although it is obvious that if a variety of causes can contribute to the non-union of fracture, and if the faces of the fragments are found in such different conditions as stated by Larrey, Boyer, and others, any one mode of treatment can scarcely be applicable to every case. Accordingly, such has practically been found to be the case; and the different plans that, from time to time, have been recommended, besides the great objections of pain and danger, are open to the greater one of having proved generally unsuccessful. I shall briefly notice two or three of these.

Friction of the ends of the fragments on each other has at least the merit of antiquity on its side, having been recommended by Celsus, but in modern days it derives its chief support from the authority of John Hunter: it is, however, based on imperfect or erroneous notions of pathology. If it be assumed that the faces of the fragments are coated with a substance resembling cartilage, and have in other respects approached the structure of an articulation, then friction can only be of service when carried to the extent of rubbing away this new material, breaking up all adventitious formations, and reducing the ends of the bones to a state as nearly as possible resembling that of a recent fracture; thus supposing the infliction of a degree of violence scarcely practicable, and which could not be endured if it was so. Again, if with Boyer we believe that the fragments are actually bound together by a ligamentous substance in every case, and that the diseased con-

dition consists in the formation of a soft and yielding, instead of a firm and bony union, it is manifest that no friction short of that which would be sufficient to break the ligament could be likely to prove beneficial. If these remarks are correct, friction is generally inapplicable in old and advanced cases, and, according to my experience, has always proved so ; but in recent cases, when the process of union is delayed rather than stopped, when there is a sluggishness and inactivity rather than a cessation of the restorative functions, then the stimulus of a little additional violence may possibly prove advantageous, although in such circumstances the same result might, in most instances, be more safely attained by rest and confinement, if the patient could be induced to submit.

As to the proposal of White, to cut down on the fracture, and saw away the ends of the fragments, I suppose no surgeon of the present day could seriously entertain it. It would be the conversion of the case into a compound fracture of the worst form, and that too in the teeth of some undiscovered cause that had been sufficient to prevent the union of a simple one. It would also be most difficult of performance, and, if successful, must place the bones in a condition in which many surgeons believe nothing but a ligamentous union could occur, namely, with a considerable interval of space between the fragments: and when the necessary consequences of the operation are taken into account,—the inflammation, the fever, the tedious and wasting suppuration, the protracted suffering of the unhappy patient,—very little argument will suffice for nearly erasing this one from the list of surgical operations. I once had occasion to cut down on a fracture that had been greatly mismanaged, and remove portions of the crooked bones, which occasioned an intolerable deformity, and the results of that case, although ultimately successful, were such as to prove the extreme danger attendant on the operation, and establish the opinion of Boyer, that it ought not to be performed unless “*lors qu'elle est le seul moyen de guerison et que le malade veut à tout prix re-*

couvrir l'usage d'un membre inutile." I have added this case to those successfully treated by the seton.

The passage of a seton between the ends of the ununited fragments, as suggested and successfully practised by Dr. Physick, of New York, although less objectionable than the preceding, is nevertheless attended with danger, and, like all others, uncertain in its result, having failed in the hands of very eminent practitioners. This, however, is only to be expected; for, if the process of union has been arrested by some constitutional defect, it will be vain to hope for benefit from any local treatment until such defect is discovered and removed. It appears to be, in many instances, difficult of performance, particularly when the limb is large and fleshy, and the fracture deeply-seated; and dangerous, especially in hospital, from the risk of erysipelas or other unhealthy inflammation attacking such a deep and narrow wound; and that if it could be superseded by some more simple, yet equally efficacious expedient, a valuable improvement would be effected in this department of surgery. Influenced by these considerations, I venture to publish the following cases; and although fully aware that the successful issue of three or four, or even a greater number of cases, must be inadequate to the establishment of a general principle, yet it will effect something if it attracts attention, and leads to other and more extensive trials; and if the comparatively mild practice I have pursued shall appear worthy of adoption by others, and prove even as effectual as the more painful and perilous measures, in relieving a serious and formidable class of injuries, I shall hope for its admission as an improvement in practical surgery.

I. Ununited Fracture of the Tibia and Fibula; Employment of the Seton; Recovery.

Eliza Kavanagh, aged twenty-four years, had both bones of the right leg fractured about five inches above the ankle-joint, from a fall she received on the 7th of May, 1839. She

was otherwise in excellent health, and had always been free from any diseased taint. On the day of the accident she was admitted into the Meath Hospital, splints were applied to the limb, and she was treated with the usual care and precautions, notwithstanding which it was found impossible to procure bony union. Among other means, friction of the broken extremities on each other was tried without any success.

On Thursday, the 25th of July, eleven weeks after the accident occurred, I introduced a seton, made of silk, over the fractured extremities, in the following manner: A curved seton-needle was passed into the inside of the leg, exactly opposite to the fracture, through the integuments, so deeply as nearly to touch the posterior internal edge of the tibia; it was then directed in a semicircular course anteriorly, over and close to the prominent extremities of the fractured bones, and was brought out on the outside of the limb, so that the fracture lay between the points of its entrance and exit. It did not either touch or pass between the fractured extremities of the bones. The ends of the seton were secured, and the patient was enjoined to preserve perfect rest.

August 1st. There is considerable inflammation over the leg, but chiefly along the course of the seton. Ordered a saline aperient, with tartrate of antimony.

8th. Inflammation abated considerably; the openings made by the seton are discharging; no pain in the seat of fracture; the limb has been kept at perfect rest. Ordered a linseed-meal poultice over the openings.

18th. The limb was very cautiously examined to-day: there appeared to be perfect union, but the fear of disturbing the process prevented such an examination being made as would authorize a decided opinion being given. The seton does not cause much discharge, nor give pain; there is not any ulceration, except immediately round the openings. The patient was enjoined to remain in a state of perfect rest.

22nd. The union appears perfect; there is not the slightest

motion in the fractured part; says she walked in the ward this morning with the assistance of a crutch.

24th. She walked very steadily to-day, and felt no inconvenience except from pain and stiffness in her ankle-joints, which are caused by want of use. Ordered to have a stream of tepid water poured from a kettle on the joints for a quarter of an hour, and then to have them well rubbed with chamois leather. Seton removed.

September 1st. Has used and still uses the douche and shampooing. The union is perfectly firm; she wears a bandage on the leg; walks steadily and with ease; uneasiness has nearly gone from the joints, and she is considered sufficiently well to be dismissed.

This woman has come to the hospital frequently since for inspection, and has never had the least uncomfortable sensation from the injury, nor is there any difference in the length of the limbs: the fractured leg performs its functions perfectly.

The next case possesses an equal, perhaps a greater degree of interest; for, having been to a certain extent unsuccessful in hospital, it teaches the absolute necessity of attending to the accessorial measures of perfect rest and the exact maintenance of the fragments in their position: it may also afford a practical hint not to be over-curious or incautious in examining prematurely into the process of the case.

II. *Fracture of the Humerus ununited at the end of ten Months; Employment of the Seton; unossified Union; final Recovery.*

John Reilly, aged thirty years, was admitted into hospital on the 7th September, 1839, with ununited fracture of the left humerus. The bone appears to have been fractured obliquely in its lower third, immediately above the condyles; the fragments are quite moveable in the situation of the fracture; and when he attempts to raise the fore-arm, its weight dislocates the fragments at the point of fracture, and the pressure of the lower one against the brachial nerves and vessels gives him so much

pain that he is obliged to desist; besides this, he cannot raise it or direct its motions except by taking hold of the hand with the other; in short, the limb is useless. The fore-arm, with the adjoining articulated portion of humerus, can be rotated on the upper portion; there is not any sensation of crepitus, and the surfaces appear to be smooth. He states that the arm was broken fourteen months ago, by a fall from a wall; it was put up in splints, and the usual treatment prescribed. At the end of two months it was examined, and found to be ununited; the fragments were well rubbed together, and the splints were re-applied; at the expiration of two months more it was examined again, but no union existed; a long interval elapsed without anything being done, and finally he has come here for relief.

10th. I introduced the seton, by passing in the needle posterior to the brachial vessels, and pushing it round the back of the arm, over and close to the fractured extremities, until it came out at the external edge of the biceps muscle; the arm was bandaged and put in splints.

12th. Complains of pain and heat in the arm; says it feels tightly bound; pulse 90; bandage and splints removed; ordered compound infusion of roses, with sulphate of magnesia, to be taken every second hour, to move the bowels; and a linseed-meal poultice to the arm.

14th. No increase of inflammation, but feels the arm tense. Ordered a poultice over the course of the seton, saline mixture, and two grains of James's powder three times a day.

19th. Inflammatory symptoms have nearly subsided, and healthy pus issues from the wounds; there is a good deal of swelling of the arm.

23rd. I made gentle pressure along the course of the seton, and gave exit to about an ounce of matter; he felt quite comfortable after this; the arm was put in splints and bandaged, and he was ordered full diet, and a pint of porter daily.

28th. No uncasiness of any kind; openings discharging moderately, but rather too much for the state of his system.

30th. Appears to be doing well.

October 11th. Arm doing well, but he has got cold: ordered a pectoral mixture, of mucilage, antimonial wine, and camphorated tincture of opium.

14th. Cough nearly well; splints and bandage removed; the union is not solid, but it is so far perfect that, when he attempts to raise the arm, the humerus continues in a straight line, as if there was no solution of continuity in the bone; seton removed; a starch bandage applied; splints continued.

November 4th. Doing well; all appears steady.

12th. Splints and bandages were all removed to-day; the continuity was complete, but ossification had not taken place; to hasten this process an effort to excite inflammation was unfortunately had recourse to, by a manipulation of the arm, similar to that of rubbing the broken extremities together: the result was, that on leaving the hospital some time after, which he was obliged to do on domestic business, the firmness at the fractured part had diminished, and the arm was pliant, but it still retained as much firmness as enabled it to resist the action of the muscles, so that he could raise his hand to his head, and direct the motions of the fore-arm pretty well.

About four months after this, I heard he was perfectly well, and was able to dig in his garden; and that he had substituted a glue bandage for that of the starch, and wore it for three months without intermission.

This case establishes the necessity for maintaining absolute rest, and freedom from motion of every kind, in the injured limb in its advance towards a cure. This may, perhaps, be difficult to accomplish; but by the aid of the starch bandage, splints, and making the patient aware of the injury certain to ensue if he does not comply with the prescribed regulations, it will be found to be quite attainable.

The examination of the limb should be conducted with great caution, and never made until the treatment has been far advanced, and an attentive observation of the case confirmed

its safety; when made, if the smallest improvement can be discovered, and the part has become more firm, even in the least degree, nature must be permitted to advance the new process in her own way; for any attempt to expedite it will have a contrary effect, and in numerous instances (particularly when some diseased taint exists in the constitution) most probably destroy it altogether. I do not propose to explain how or where this process originates, what tissues are engaged in it, or how it is carried on; my impression being, that bone, periosteum, arteries, veins, nerves, muscles, absorbents, in short, that each and every organ constituting the limb contributes its portion towards its reorganization; and it was the hope of exciting a simultaneous action in all, without injuring the vitality of any, that first suggested to me the application of the seton in this particular way.

Amongst the many constitutional causes mentioned as obstructions to the bony union of fractures, none stands more prominently forward than scrofula. The following case proves how true this is, at the same time that it gives ample grounds for attributing much efficacy to the action of the seton.

III. *Fracture of the Femur; ligamentous Union for fifteen Months; Seton; Cure.*

William Archer, aged 13, admitted September 6th, 1840. His left femur presents a prominence on the outer side of its upper third; on examination the prominence is found to be caused by the lower portion of the bone projecting, the result of an oblique fracture that occurred fifteen months ago; the broken fragments do not grate together when they are moved, but motion is perfect between them; when they are rotated on each other, the rotation is restrained beyond a certain extent by a bond of union evidently ligamentous: the boy is thin and of spare habit, which enables this to be easily perceived. Extension elongates the limb three-fourths of an inch, and when

he stands with the thigh exposed, the inferior portion of the fractured bone is seen to jerk upwards on the upper fragment. He is of scrofulous temperament, with light hair, light blue eyes, very clear complexion, and enlarged submental and cervical glands. His history is as follows: about fifteen months ago a boy fell on him, and caused a simple fracture of his thigh; he was immediately brought to hospital, and, in the space of nine months, union having taken place, he was dismissed cured. In about five weeks after this, as he was sitting down on his form at school, he suddenly felt the bone as if quite loose, but not painful, until he attempted to walk, when the pain was slight. After seven or eight days the pain subsided entirely, but the leg felt unsteady, and he got a crutch, by the assistance of which he has walked tolerably ever since, except that for the last six weeks he says he thinks the bones have become more loose. His digestion not being in good order, he was ordered some compound infusion of gentian, with sulphate of magnesia.

14th. His general health being much improved, a seton, consisting of a skein of silk, was this day introduced, by pushing a curved seton-needle into the posterior part of the thigh, down to the fractured bone, then turning it outwards round the fractured extremities, so as to compass about two-thirds of their circumference, and to rest as closely as possible in contact with them; it was brought out in front of the thigh. The limb was enveloped in a starch bandage, and placed in the straight position; Dessault's apparatus for fractured thigh was applied; and perfect rest was enjoined. Small holes were left in the bandage, opposite the entrance and exit of the seton.

17th. Complaints of pain in the course of the seton; pulse 100; skin hot, and bowels confined. Ordered a saline aperient daily, with calomel and James's Powder at night.

20th. Healthy matter oozes through the openings; the inflammation has nearly disappeared; skin is moist; pulse 70. All his medicines omitted.

28th. The discharge of matter has increased for the last

two days, and he had slight perspiration last night; pulse 90, soft; did not sleep well. The seton was removed, and a scored splint was bound on the front of the thigh, the more effectually to secure absolute rest to the limb.

October 5th. Pulse 60; heat of skin natural; tongue clean; discharge has nearly ceased; appetite good; sleeps well.

20th. Complains very much that the bandage irritates his leg, and prevents him sleeping; the wounds caused by the seton-needle are quite healed; he says he moved his limb in the bed last night, and it felt strong. The bandages and splints were removed to-day, and he was enjoined to keep the limb without motion of any kind.

28th. Sat up in his bed to-day, and says his leg is well; a very cautious examination was made, and the fractured portion appeared to be firm; enjoined perfect rest still.

November 2nd. A strict examination was made to-day, and the union was found to be quite consolidated; he walked for five minutes leaning on the arm of an assistant. Ordered crutches, and to get up daily.

7th. Walked this day for a short time without a crutch; says he is quite well, and wishes to go home. Dismissed.

He has been at the hospital frequently since, and within this month (January, 1846) I have seen him: he has never suffered the slightest inconvenience from the fractured bone since dismissal from hospital in the year 1840; he has perfect use of the limb, and its length is not diminished.

IV. *Fracture of the Patella; ligamentous Union; Seton; Cure.* *Reported by Mr. R. Gregory.*

Patrick Mac Donnell, aged 24, a healthy-looking man, of spare habit, came to me on the 2nd of November, 1844, unable to walk except with the assistance of a crutch, owing to a kick from a horse he received a fortnight previously on the knee of his right leg. The patella was fractured transversely in its centre, and the fragments were about an inch separate. There was some swelling and inflammation of the joint, with a good deal of

pain extending up the thigh; the inflammation was very acute, but subsided a few days back, and he thought he was getting well, but on attempting to walk he could not, he says, prevent the knee from falling forwards, and he thought it would fall out of the socket, it had become so loose from the injury. He has remained quiet since the accident, but has not had any surgical assistance. I put him into hospital, brought the fragments together, and retained them so; his leg and thigh were laid in a splint that fitted along the back of the limb, and grasped it tightly round the calf of the leg and centre of the thigh; the heel and leg were raised on a plane higher than the thigh: he lay on his back in a state of perfect rest. He remained in this state, closely watched and cared, until the 24th of December, when the bone was examined, and there was found to exist a ligamentous union between the fragments; there was no inflammation present, and the man complained much of the long confinement. On this day I introduced the seton, by pushing a narrow seton-needle through the integuments at the outer margin of the patella, and passing it on in front of that bone immediately over the newly-formed bond of union, and bringing it out on the inner edge of the bone; the seton was left in the course of the needle: the limb had been previously put up in a splint, and the broken bone secured with a bandage, so that it could not be moved. The patient was so tractable, and so anxious to get well, that every suggestion we made to him to keep the joint in a state of perfect rest was anxiously adopted.

January 6th, 1845. Complains of pain in the course of the seton; the integuments of the patella and lateral parts of the joint are inflamed and swelled, but not so much as to oblige me to remove the bandages; his tongue is clean; bowels in good order; pulse 80, and rest not much disturbed. Ordered three grains of James's Powder at night.

10th. Had an uncomfortable feel in the joint; says that pain shoots through it occasionally, from before backwards; there is a good deal of inflammation all over the front of the

joint, and considerable tenderness on slight pressure, particularly in the situation of the bursa of the patella; there is a slight oozing of matter from the openings; pulse 90; skin hotter than natural; bowels confined; some thirst; and did not sleep so well last night. Seton removed, and to have a saline aperient.

11th. Feels easier to-day; the shooting pain is not so frequent; pulse 90; thirst not urgent; skin moist; some matter discharging; bowels were moved three times. Ordered a draught of camphor mixture and antimonial wine at night.

14th. The shooting pains have subsided, but there is still considerable superficial inflammation; the openings are discharging a little, and the discharge has a reddish tinge; the swelling is less, and he can bear gentle pressure on the joint; pulse 86; skin soft; slept these two last nights comfortably; had some starting in the limb that awoke him in the night. Ordered ten drops of black drop at bed hour to-night.

18th. Is going on well; the fever has subsided; the inflammation of the joint is nearly gone; there is a slight appearance of discharge at the openings; he says he feels comfortable.

21st. No complaint; a little discharge from the external opening, the other is healed; has maintained the most perfect rest, and is enjoined to do so still.

24th. Doing well; openings healed; inflammation entirely subsided.

29th. No change; still maintains perfect rest.

February 3rd. Made a movement of the knee last night incautiously, it gave him no pain, and he says he thinks the bone did not move in its centre as formerly; enjoined rest still.

15th. I examined the bone to-day, and there is not the least motion in the seat of fracture; he says he examined it himself two nights ago, and attempted to move one fragment against the other, but could not. He got permission to sit up a little to-day.

16th. Walked in the ward with the support of a stick.

18th. Has used the leg since, and can stand steady without support; says the knee is very stiff, but it is perfectly firm. Ordered a tepid water douche bath to the knee, and the joint to be rubbed gently after it with the hand.

20th. He left hospital yesterday, with the bone firmly united, and the union perfectly solid.

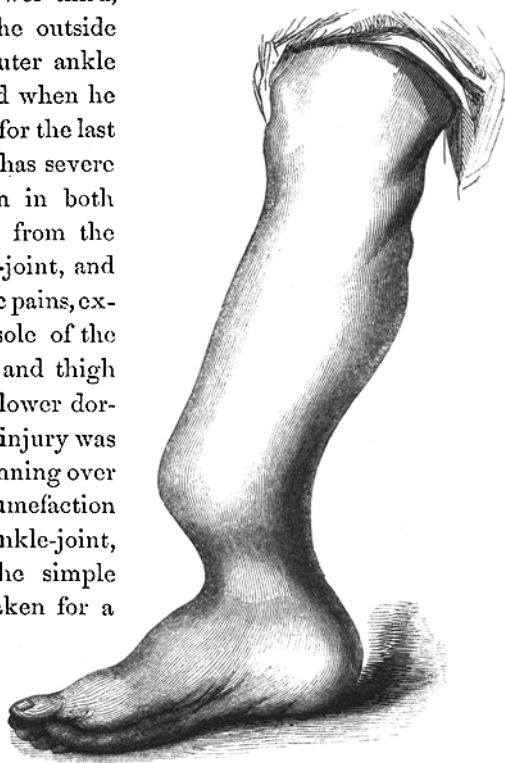
I had an opportunity of seeing this man, and examining the bone, on the 1st of April subsequently: the joint was healthy, and he had very good use of it, and could ride and walk quite well.

If I had to apply the seton in another case I should not allow it to remain for a longer period than perhaps ten days, that time being all that is generally necessary to produce a sufficient degree of inflammatory action in the fractured bone and the parts surrounding it. If the patient complains of pain in the part some days after the introduction of the seton, it is advisable to move it, by drawing it a little from one side to the other, and making gentle pressure along its course, as by this manipulation matter will get free discharge, and the pain be greatly tranquillized. It is most desirable to retain the starch bandage from the time the seton is introduced, and to avoid removing it for as long a period as it may be reasonably supposed the bone will require to become firm and united; this period depending on the bone that is broken, as some bones naturally require a longer time than others,—on the constitution of the patient, whether it be weakly, and tainted by disease, or vigorous and healthy,—on the age,—and on the directions prescribed being strictly adhered to. Circumstances may occur to oblige us to remove the starch bandage; if so, it should be done, if possible, without moving the fractured portions of bone, and it ought to be applied again as soon as may be.

I will not advance anything further in recommendation of the seton, as I consider its results in the foregoing cases sufficiently satisfactory to authorize its application in others of this class of injuries.

Case of badly united Fracture; Resection of Portions of the Bones; perfect Recovery without Deformity.

Andrew Redmond, aged 28, admitted 6th of July, 1841. Is unable to walk without great exertion and the use of a crutch, from an injury received three years ago. His right leg, as exhibited in the accompanying illustration(a), is bowed outwards at its lower third, so much so that the outside of the foot and outer ankle rest on the ground when he attempts to walk; for the last twelve months he has severe and constant pain in both bones of the leg, from the ankle to the knee-joint, and excessive neuralgic pains, extending from the sole of the foot along the leg and thigh to the lumbar and lower dorsal vertebræ. The injury was caused by a car running over the limb. Great tumefaction ensued in the ankle-joint, foot, and leg: the simple fracture was mistaken for a dislocation, treated as such, and both bones united firmly in the position above described. He is most anxious to have the deformity removed, and the use of the limb restored, at any hazard; or, if this can-



(a) There is a preparation in the King's College museum exhibiting the form of false joint exactly in the same position. See Druitt's "Surgeon's Vade Mecum," fourth ed. p. 230.

not be accomplished, he wishes the limb to be amputated, as it is useless to him, and the pain intolerable.

July 15th. With the hope of remedying those evils, I performed the following operation. Having placed him on a table, with the foot of the affected limb resting on it, and the leg flexed, I made an incision four inches in length, commencing two inches above the deformity, parallel to and behind the posterior edge of the fibula; this incision severed the connexions of the soft parts with the bone in this direction; a similar incision was made along the posterior edge of the tibia. Those incisions were connected inferiorly by a transverse one in front, passing through the skin and integuments; the portion thus incised was dissected up and formed a flap, which, being raised, exposed completely the deformed bones; a chain saw was then passed round the fibula, keeping close to it, in order to avoid the vessels, and the bone was sawed through above the deformed part, then below it in a similar manner; the piece was firmly attached to the angular portion of the tibia, and so not easily removed; the deformed portion of the tibia was removed in a similar manner. The limb was then placed straight, the extremities of the bones in apposition; the flap was drawn down, it covered the whole wound, and was united by a few points of suture; the limb was then placed in a case prepared for it, and the man put to bed: there was not a blood-vessel divided, nor was there an ounce of blood lost. This wood-cut exhibits the appearance of the portions of the removed bone.



Nine o'clock, P. M.—Has been pretty easy, but is much depressed; pulse 55, and small: ordered thirty drops of tincture of opium, and twenty-five of spiritus ammoniæ, in mint water.

July 16th. Nine o'clock, A. M.—Says he is pretty well; slept a little; looks fatigued; pulse 70, stronger, and more full; no complaint of the leg. Ordered tea, and an opiate at night.

17th. Complains of shooting pain in the wound; in other respects he is better: ordered a spirit lotion to the leg. Three of the sutures were removed. Opiate at night continued.

19th. The leg is a little inflamed round the wound; pulse 100; did not sleep well last night; is a little sick in his stomach. All the sutures removed: to have an aperient of compound infusion of roses, and sulphate magnesia; omit his opiate.

21st. Is much better to-day, bowels moved twice; pulse 80; slept without an opiate; to have mutton-broth for dinner.

23rd. Does not look well to-day; face a little flushed; pulse 100; tongue white and dry; is thirsty; has no pain anywhere; wound is suppurating a little, and the matter looks healthy. Ordered one grain of blue pill, and two of James's powder, every three hours; the effervescing mixture *ad libitum*; no broth.

24th. Feels better; skin moist; pulse 80; tongue cleaner; wound suppurating freely; the bowels were moved four times in the night. Omit his medicine, except the effervescing mixture.

26th. Doing well; a light bread and water poultice to be laid over the wound; to have broth, tea, and flummery.

30th. Doing well; part of the wound is healed, the rest is suppurating; food as usual.

August 2nd. Complains of great pain in his heel; the suppuration is very profuse; pulse 100, soft and small; perspired a great deal in the night over his face, neck, and arms; a slight hectic on left cheek; says he is very tired.

Ordered: Compound infusion of roses, with sulphate of magnesia, sulphate of quinine, and dilute sulphuric acid, thrice daily. A pad, hollowed in the centre, was placed under the heel.

5th. Much improved in appearance; pulse 70; perspirations on the face only; appetite good. Ordered a little broiled

meat for dinner, and a small glass of porter; his bowels are a little too free to-day. Omit his medicine.

8th. Felt quite comfortable since last report, until two o'clock this morning, when he became suddenly sick in his stomach and began to shiver; the shivering lasted for half an hour; his skin is now hot; face flushed; pulse 120; has had some startings in the leg; there is an erysipelatous blush round the wound and a little up the leg; discharge is scanty, thin, and glairy: the edges of the wound are puffed and glassy-looking; the flap is engaged in the inflammation. The wound was closely examined; there is not any deposition of matter. Ordered a grain of calomel and two of James's powders every third hour. Omit his meat and porter. Complains of intolerable pain in his heel, to which a piece of lint, kept wet with a solution of oxy muriate of mercury in spirits of wine and laudanum, has been applied.

9th. The erysipelas has extended to the knee, quite round the leg; the flap is of a dusky red colour, swelled and tense; the wound is dry; he complains of pain and starting in the leg; the starting frightens him so much that he fears to sleep; the bones are evidently quite moveable; he is very low; his countenance looks sallow, and has a greasy perspiration on it; his eye is languid; says he is tired; pulse 100, small and intermitting; slight nausea; bowels were moved twice in the night; tongue brown in the centre, but not very dry. Ordered the decoction of bark in a state of effervescence, an ounce every fourth hour. To have porter when he wishes for it; a vapour stupe to the leg, and the sound part adjoining the erysipelatous portion to be pencilled over with nitrate of silver; a person to remain beside the bed with his hand resting on the limb to control the starting; to have ten drops of black drop at night. The calomel and James's Powders were omitted at eleven o'clock last night.

10th. Much as yesterday; raves a good deal; mortification

has set in along the line of the incision, and the united part is separating. To continue his medicines, and have a glass of port wine occasionally; the fermenting poultice to be laid on the wound. As the larvæ of the house-fly appeared under the limb, the sides of the case were painted over with spirits of turpentine to destroy them. A blister to be applied to the region of the stomach for two hours.

11th. Is much sunken in appearance; tongue dry, brown in centre, edges red; pulse 100, very small and intermitting; a cold dampness on his skin; the mortification engages the greater part of the flap, and the lower margin of the wound looks sloughy; the nausea has ceased; has retention of urine. Erysipelas not extending, it has vesicated in a few spots; no starting of the limb. An ounce of the ammoniated tincture of bark every six hours.

Ten o'clock, P. M.—Feels a little better; pulse 110, and more regular; says he is so tired he cannot sleep; 40 drops of tincture of opium were given him in a wine-glass of port wine.

12th. Slept from half-past ten o'clock last night to six this morning; says he feels better; pulse 120, and regular; tongue brown and rough, with a slight appearance of moisture over its centre; the flap is sloughing. To continue his medicines.

Ten o'clock, P. M.—No change; his laudanum in the wine as last ordered.

13th. Slept well for seven hours; pulse 120, full; tongue not so brown, and more moist; bowels not moved since yesterday morning, at four o'clock, A. M. To have ten grains of compound colocynth extract, with one of capsicum immediately, and, as soon as his bowels are moved, to continue his other medicines. Repeat his wine and laudanum.

14th. Is decidedly better; bowels moved twice; has a little headach; omit his wine and bark, and repeat his aperient pills. To have some porter.

15th. Slept well; looks very much better; pulse 100, and regular; tongue cleaning and moist; a portion of the flap has

sloughed off, and exposed the bones beneath it; about the twelfth of an inch of the tibia, at its upper cut extremity, looks dry, and void of periosteum, as if it would exfoliate; there is a profuse foetid discharge, but no pain. I raised the limb from the box, and the back of the leg was dry and clean, but red from the pressure, and the cuticle scaling off from the erysipelas; the heel has not pained him since the use of the oxymuriatic lotion. Ordered a thick fold of lint, steeped in the solution, to be laid all along the bottom of the box, and the limb placed on it. To continue his porter; to have some beef-tea, and his black drop at night; lint, wet with the chloride of lime lotion, to be kept on the leg.

16th. Still improving; to have broiled meat and wine and water to-day; his black drop at night.

19th. Has gone on gradually improving; eats, drinks, and sleeps pretty well; is very weak; the wound is suppurating freely. Ordered one grain and a half of quinine, and ten drops of diluted sulphuric acid; porter and meat daily.

25th. He is now considerably improved in health; the discharge is profuse, and granulations are appearing on the fibula; his pulse is 90, and he is greatly emaciated; he complains of the protracted confinement, and is beginning to despond; longs for his home. Ordered light nutritious diet and tonics.

September 1st. He is not cheery, and these last two days feels very weak, and has had perspirations in the morning over the upper part of his body; the hectic flush is on his cheek, his pulse is 100, and the discharge profuse; the fibula is granulating, and so is the tibia, above the exfoliating part; the lower extremities of the bones are invisible, as the soft parts have granulated over them; he is so restless that it is almost impossible to keep the bones *in situ*. Under all these circumstances I had a consultation this morning, and the result was, to propose amputation as the best chance of preserving his life.

5th. I told him to-day the decision we had come to: he

asked me to "wait a little, if I was not already tired of him." This accorded so well with the feeling of intense interest I had for the poor fellow, that I readily assented to his request, and did not urge the matter. Ordered to continue his diet and tonics, and his body to be sponged over, night and morning, with tepid vinegar and water.

18th. No great change since last report. He objects to take his medicines. Pulse 120. He is greatly emaciated; discharge not so profuse, and wound granulating; extremity of tibia visible, it protrudes up through the granulations. Ordered two drachms of powdered Cinchona bark in a pint of porter twice in the day.

October 1st. Nothing particularly interesting has occurred up to this day. He has been struggling on, living on tonics, wine, porter, and occasionally a little meat. To-day I find a bit of the tibia is moveable. I felt it with a probe at the posterior part of the bone; it is very deep, for the soft parts have formed well and firmly in the situation of the flap. He is a little irritable, and begs me to leave him alone to-day. Ordered a five-grain calomel pill to-night, and a saline aperient in the morning; a linseed-meal poultice to the wound.

5th. I removed a very small bit of bone to-day from the front of the tibia; it was loose, and came away in the forceps; and the deep-seated portion came away also; it was from the back of the tibia. About an ounce of florid-coloured blood followed the removal of the latter, but it was checked by pressing the popliteal artery steadily for about ten minutes. He is very faint and irritable. I gave him twenty drops of acetum opii in a glass of porter, and ordered him to be kept perfectly quiet; a fold of lint, wet with the spirit wash, to be kept on the wound.

10 o'clock, P. M. Slept all day, and says he was not so well these two months as he is to-night; no appearance of hæmorrhage in the wound. To continue the spirit wash, and give him some tea.

20th. Going on well; no cavity in the wound; it presents a surface of granulations; discharge diminished; complains of a very sore spot on his back; the soft parts on the sacrum are red, and very painful. Ordered the oxymuriate of mercury solution to be applied to it; he is to be raised up, and to sit supported by a bed-chair.

November 1st. His health is very much improved, his appetite good; wound looks healthy; the limb is becoming more firm; there appears to be a general regeneration of all the parts: it is still kept in the case, and every attention paid to keep it straight, in a state of perfect rest, dry, and clean.

20th. Complains of pain over the fibula, about an inch above where it was sawed; it is slightly inflamed, and the parts a little elevated; in other respects doing well. Ordered a linseed-meal poultice to the painful part.

December 3rd. There is a small abscess over the fibula at the painful part. I opened it to-day, and found a small spicula of bone in it. Ordered to continue the poultice.

20th. Doing well, and if he moves the limb in changing his position in bed, the motion of the foot corresponds with the motion of the knee; his ankle-joint is perfectly stiff.

January 5th. The wound is not healed. The limb appeared so firm to-day that I commenced moving the foot at the ankle-joint; it gave him excessive pain. I placed the limb on the inclined plane, and applied a splint to each side of the leg; the knee is very stiff and painful in motion.

7th. The leg and thigh are firmly bound on the inclined plane, the inclination of which is ordered to be altered several times in the day, so as to give motion to the knee; the foot to be moved frequently on the ankle-joint, but not by a rotatory movement.

February 1st. Every apparatus removed from the limb to-day; the wound is healed; the motions of knee and ankle-joints much improved, and he raised the leg half a foot from the bed

by its own muscular power; the inclined plane, splints, &c., were all replaced, and the leg bandaged from the toes to the knee.

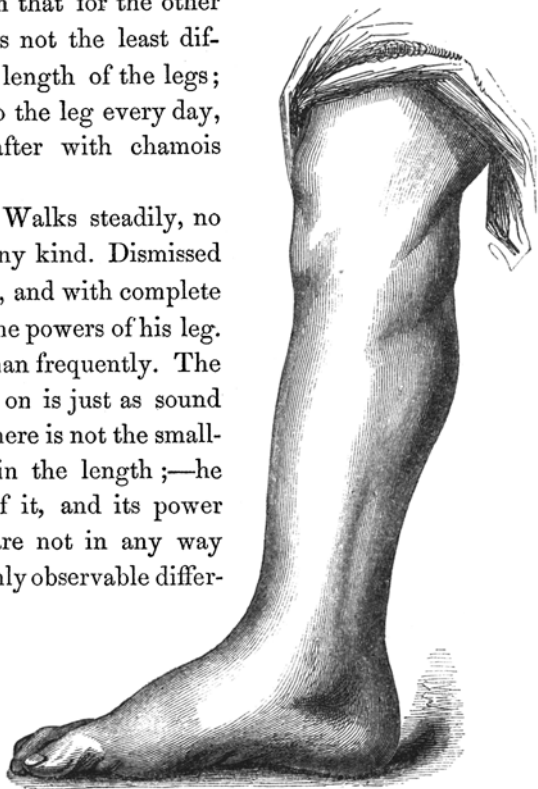
20th. The limb is now quite firm; the apparatus all removed; a bandage continued on, and the foot to be suspended by a broad strap from his neck; to go about with crutches.

March 1st. Walks pretty well with the aid of a crutch and a stick.

20th. Has dismissed his crutch and sling; walks steady and well; the shoe for this foot to be made with a broad heel, but not higher than that for the other foot, as there is not the least difference in the length of the legs; a cold *douche* to the leg every day, and friction after with chamois leather.

April 5th. Walks steadily, no complaint of any kind. Dismissed perfectly cured, and with complete restoration of the powers of his leg.

I see this man frequently. The leg I operated on is just as sound as the other; there is not the smallest difference in the length;—he has full use of it, and its power and strength are not in any way lessened; the only observable difference is, a slight prominence on the tibia from the deposition of the new bony matter.



The accompanying wood-cut faithfully represents the present appearance of Redmond's leg.