Second memoir on excision of the knee-joint : to which is appended a remarkable example of the power of operative surgery in saving the same articulation / by Richard G.H. Butcher.

Presented by Dr. Heath.

SECOND MEMOIR

ON

EXCISION OF THE KNEE-JOINT:

TO WHICH IS APPENDED,

A REMARKABLE EXAMPLE

OF

THE POWER OF OPERATIVE SURGERY IN SAVING THE SAME ARTICULATION.

BY

RICHARD G. H. BUTCHER, ESQ., M.R.I.A.,

SURGEON TO MERCER'S HOSPITAL,

AND LECTURER ON CLINICAL SURGERY;

EXAMINER ON SURGERY IN THE ROYAL COLLEGE OF SURGEONS IN IRELAND, LATE MEMBER OF THE COUNCIL, AND FELLOW AND LICENTIATE OF THAT BODY;

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN ENGLAND; MEMBER OF THE COUNCIL OF THE SURGICAL SOCIETY OF IRELAND;

ETC. ETC.

With Illustrations.

DUBLIN:

McGLASHAN AND GILL, 50, UPPER SACKVILLE-ST.

1857.

[From the Dublin Quarterly Journal of Medical Science, February, 1857.]

Dublin: Printed at the University Press, by M. H. Gill.

TO

WILLIAM FERGUSSON, ESQ., F.R.S.,

PROFESSOR OF SURGERY IN KING'S COLLEGE, LONDON,

As a Tribute of Admiration

FOR HIS PRE-EMINENT PROFESSIONAL ABILITY, ESPECIALLY IN THE DEPARTMENT OF CONSERVATIVE SURGERY, OF WHICH HE HAS BEEN THE CHIEF PROMOTER IN THIS EMPIRE,

THIS SECOND MEMOIR

ON EXCISION OF THE KNEE-JOINT

IS DEDICATED,

BY

THE AUTHOR.

SECOND MEMOIR

ON

EXCISION OF THE KNEE-JOINT.

In February, 1855, I published my first memoir on Excision of the Knee-Joint, and it was favourably received by the profession in all countries. On the Continent it has been noticed: in France it has been referred to, almost reprinted, by M. Costes at Bordeaux, and reproduced by Malgaigne in the "Revue Médico-Chirurgicale de Paris;" while in England it has been appealed to and quoted by many able surgeons: and why this flattering reception? Because therein recorded was the living testimony of powerful advocates, the unbiassed sentiments of thinking men brought to bear on a great, a difficult, a disputed problem; all their energies concentrated, with no other object than the advancement of science, and the benefit of man. In the paper referred to, the operation was traced from its first performance by Park, in July, 1781, to its "abandonment after Syme's failure in 1830;" and again, from its introduction and revival by Fergusson, in 1850, up to October, 1854. Tabular statistics were given of all the cases operated on within these two epochs, answering every particular:—the surgeon who operated; the hospital in which the patient was lodged; the sex and age of the person; the date of the operation; the result as to life; and the condition of the limb at the time that the report closed. Of the six cases mentioned at the

end of the "Table within the second epoch," and reported at the time as recovering, one was subjected to amputation, and recovered; and the remaining five were restored, with perfect use of the limb in every instance.

I shall dwell upon these cases for a few minutes, and bring up their report to the present time. In the important question under consideration, it is most essential to prove all that may have been advanced, so that not even a semblance of doubt should rest upon that which I have written. The first of the six cases to which I have adverted as "recovering rapidly," at the time the report had been made (placed at the end of the second Table), was under the care of Mr. Jones, of Jersey, and, after contending with great difficulties and serious complication, in the form of an immense abscess in the lumbar region and sinuses, he had his patient so far benefited as to perceive she was "improving rapidly in health, and to flatter himself she would recover, and have a useful limb." Now, in an admirable paper on Excision of the Knee-Joint, by Mr. Henry Smith, of London, published in the Medical Times and Gazette[a], he alludes to this case, and as having seen it in October, the month before Mr. Jones wrote to me; and he there says:—"I myself saw this girl (in October); the operation had been done some months; the limb was in good position, and, although there was a great discharge from the wound, and the patient had suffered materially from the existence of a large abscess in the back, the result of a fall a month before the operation, which she had kept secret, she seemed to be doing well." Mr. Smith continues:—"Mr. Jones, however, lately wrote to me, 'You know the state you left her in, and I had every hope the excised limb would prove a useful one, but acute necrosis came on, and was evidently fast gaining ground along the shaft of the femur, so I immediately determined to amputate the limb as high as I could. The girl has now left the hospital with an admirable stump: on examination there was strong ligamentous union at the knee.'"

I have been informed, relative to the second of these cases—a child operated on by Mr. Fergusson—that he is able to run about, with but little halt, and is in excellent health.

The third of the six cases was a little boy, aged 8, operated on by Mr. Holt, of Westminster Hospital, and marked by me as rapidly recovering. The report, at the time referred to, October 31, 1854, was in a private letter, and to this effect:—

[a] Vol. x. p. 519.

"At the expiration of six weeks the bones were anchylosed, and I have no doubt his case will be perfectly successful." How truly we find this prediction verified by the report given of the case in the Lancet, September 13, 1856, wherein it is stated:—"He now walks and runs without the slightest difficulty;" and I have received from Mr. Holt, on October 1, 1856, the following reply in answer to my inquiry:—"The little boy to whom you refer has continued to walk and run without difficulty since I last wrote to you; he is fat, and in excellent health."

The fourth case—that operated on by Mr. Statham—has been very tedious, and slow in recovery. I frequently solicited information relative to it, but to no purpose. However, I have been referred by Mr. Smith to the last account of it in a public record, a small work—Gunshot Fractures and Resections—wherein it is stated, p. 117:—"March 14, 1856: Is found lying in bed, but gets up six hours a day, and gets about with the aid of a chair; joint is quite healed, not tender, but stiff; no matter escapes, and there is no pain."

The fifth case was under the care of Mr. Henry Smith—a boy aged six years—and operated on October 18, 1854, and tabulated as "rapidly recovering." Mr. Smith gives the full details of this case in an able paper[a], already referred to, and from which I make the following extract:—

"April 15th. For the last month the patient has been walking about the streets every day, after having been furnished with a boot having a sole two inches higher than the other; and by means of a crutch and stick his powers of progression are very free. He plants the limb, which is very firm, well down upon the ground; and, with the assistance of a stick alone, he can walk with the utmost facility; but when he goes out for any distance, I have desired that he should use a crutch as well, as a mere precautionary measure, especially as the boy, being proud of his leg, is very fond of showing his agility, by the performance of the most eccentric movements, which are more calculated to amuse others than to enhance the utility of his limb. On very careful admeasurement of the two limbs, I find that the limb operated on is two inches and one quarter shorter than the other. It is straight, and not bowed out. On using some force above and below the site of operation, a little amount of movement, before backwards, can be produced; but in the lateral direction this is hardly detectible. In all probability the junction between the bones is partly fibrous, partly

[a] Medical Times and Gazette, May 26, 1855.

osseous. Whatever be its nature, the limb is a remarkably useful one to the boy."

Having written to Mr. Smith as to the condition of this boy at present, he politely answered my inquiry on the 1st of October, 1856:—"You ask for information as to the case operated on by me two years since. I have seen the boy this morning; he walked to my house from a considerable distance, without a stick; he can walk and run about very well; takes a great deal of active exercise, and walks long distances, without the assistance of a stick even; of course, he has a high-heeled shoe, which is one inch and a half thicker than the other at the toe, and a little less than two inches at the heel. The limb is very well developed; and, what is most satisfactory, is, that the union between the bones, at the knee, is almost quite firm; whereas, for many months after the cure was complete, and the boy was enabled to use the limb well, there was considerable mobility at the part operated on. You will, I am sure, agree with me, that this consolidation of the bones, gradually becoming more decided, as time elapses, is an important and encouraging feature, and one worthy of notice—for those who oppose this operation have made, as one of their most prominent objections, the tardy and deficient union which undoubtedly occurs in some cases, when the powers of the system are at a low ebb."

The last of the six cases noticed in my former Table is that operated on by Mr. Erichsen. When it was reported that the patient "was rapidly recovering, there was a good anchylosis, and the parts nearly quite firm." Shortly after this time he was dismissed from the hospital, with perfect use of the limb; and, in answer to my inquiry a few days since, I received from Mr. Erichsen the following reply, dated October 5, 1856:—"I have not seen the case to which you refer for a considerable time, nor do I know exactly where to find the child; but I should suppose that he is going on well, or I should most certainly have seen him again."

The case upon which I operated in January, 1854, was eminently successful; the man has continued up to the present time in admirable health. On the 8th of December, 1854, I described his condition as follows:—"He stands erect, without the slightest droop. From being an emaciated, worn creature, he has become large and fat, with the entire muscular system well developed; the sickly hue and haggard expression have left his face; and he now looks cheerful and happy. He feels in admirable health. On closely examining the limbs, the affected one has nearly recovered its dimensions and muscular

tone; the thigh perfectly so; it preserves an accurate axis with the trunk, but is slightly shorter than the sound limb. The adapted surfaces of the tibia and femur are bound together by a rigid permanent union; grown into each other, they are immovable and fixed. The motions of the limb effected by the muscles of the hip are very perfect. When in the horizontal posture, the patient can elevate, depress, rotate inwards or outwards, the limb with the greatest precision and accuracy; he possesses a like power in executing those movements either rapidly or slowly. Unsupported, he can sustain the entire weight of his body upon the limb, unassisted by stick or cane. He can walk steadily, with scarcely any perceptible halt, the limb being one solid piece. The amount of shortening is not very conspicuous, being two inches; it is not much greater than is absolutely necessary for the perfection of progression, under the circumstances. A layer of cork beneath the heel, inside of his shoe, fully compensates for the loss, and conceals all deformity. The motions of the ankle-joint are perfectly preserved. It is true that, upon first making the attempt to walk, even for a short distance, he complained of uneasiness, and feeling tired; first in this joint, but never referred pain to the knee. This enfeebled condition of the ankle may be fairly ascribed to the maintenance of the limb in a constrained and straight position for such a length of time; it has been, however, only a temporary uneasiness, which gradual exercise and time have removed. The patient can now walk without any support; he plants the limb firmly upon the ground, without being sensible of the slightest concussion, and feels confident and satisfied in its strength. On the day before yesterday he walked to the Park, and about the grounds, a distance of over four miles, assisted by a walking-stick; and he assured me he was not in the least degree fatigued, or the worse for it. Though the bones are grown into each other, yet I never permit the man to go out without an artificial support to the joint: a short splint placed behind, and steadied with a few turns of a roller, answers every purpose. It should be borne in mind, that only eleven months have elapsed since the operation; and I consider half that number more, at least, necessary to pass over, before immunity from bowing of the limb can be secured, Ever since the man left the hospital, now nearly three months ago, he has followed his trade as a shoemaker, and in this business the limb is of great service, for it is necessary to grasp the shoe between the thighs, at their lower part, so as to steady it for stitching; this he is perfectly enabled to accomplish by

supporting the limb upon a form. Had the thigh been amputated, he says he could not have worked at his employment. Preserved in this jar are the portions of bone taken away: the condyles of the femur, the articulating surface of the tibia, and the patella. The entire amount of bone, when placed in apposition, measures two inches. This drawing represents the parts, and is faithful as to size; and this picture of the man, drawn by Connolly, was taken when the report which you have just heard read was drawn up."

Two years have just passed by, and I am happy to say that the limb has stood the best test of all, that of trial, hardship and fatigue. I brought the young man to the meeting of the Surgical Society at which I read a short abstract of this paper, and presented him before a large assembly of the profession and of students. His appearance, his movements, the symmetry and condition of his limb, in the strictest sense, far surpassed the description which I have read:—1. As to his appearance, he absolutely looks younger than when the drawing was made; this may be ascribed fairly to all anxiety and apprehension being removed, and his improved worldly circumstances, derived from an active, industrious prosecution of his trade; 2. As to his movements, there is nothing straitened about them, and some of them are even graceful in various attitudes; no awkwardness perceptible; 3. As to the symmetry and condition of his limb, the thigh is larger, the muscles of the calf are more developed, and its correct axis maintains; he stepped from the chair upon which he was standing firmly on the ground, alighting on the limb operated upon, a sufficient guarantee for its solidity and strength. Finally, the man himself says, that he can walk any distance, twelve, fifteen miles, or more, at a time, and without fatigue, and by its instrumentality he can work at his trade and earn a comfortable maintenance, and that without interruption.

It is a pleasing thing to dwell upon facts like these, but I must go on. The construction of this, my second memoir, on Excision of the Knee-Joint, will be strictly in accordance with the first: I shall briefly detail each case operated on since the former report closed, and I shall likewise introduce a few cases that occurred prior to that period, and which then had not come to my knowledge. For many of those cases which I shall recite I am indebted to the pages of the Lancet, Medical Times and Gazette, and Association Medical Journal; but for many more, which have not yet appeared in print, I am deeply indebted to the kindness of the operating surgeons in

England and Scotland, who have most courteously answered all my inquiries. From this source likewise I have derived, probably, the most valuable information of all, without compromise, namely, the condition of the several patients up to the present time, December, 1856.

CASE I.—Professor Pirrie, Surgeon to the Royal Infirmary, Aberdeen, excised the knee-joint of a little boy, aged ten years, May 17, 1854, for incurable disease. In this instance the portions of bone removed measured one inch and three-quarters. Measles were very prevalent at the time, and the child was attacked. Hectic fever intervened, and amputation was performed, at the upper part of the lower third of the thigh, on the 10th of June. The boy was dismissed cured on the 18th of August, 1854.

CASE II.—Mr. Peter Brotherston, of Alloa, excised the knee-joint of a boy, aged ten years, on the 19th of May, 1854, for disease of the part. The boy being put under the influence of chloroform, a free incision was made across the front of the knee-joint, below the patella; the lateral and crucial ligaments were divided; and the connexions round the condyles of the femur being separated, about three-quarters of an inch of the condyles were sawn off; a slice of about one-third of an inch in thickness was then taken from the head of the tibia, and the cartilage was removed from the inner surface of the patella by means of a gouge; the ends of the bones were secured, and the wound closed with sutures; a splint covered with lint was applied to the knee; and the whole secured with a bandage. In seven months complete anchylosis of the bones had taken place, and the boy could walk with freedom[a].

CASE III.—Mr. Fergusson excised the knee-joint of a boy, aged ten years, August 19, 1854. The child had extensive disease of the joint, incurable, protracted, and enfeebling all the powers of life. Mr. Henry Smith, in an interesting letter to me, states the great feature in the case was a very anemic and bloodless condition of the body, which led one to predict unfavourably of any severe operation. The child died on the fifth day.

CASE IV.—Mr. Landsdown excised the left knee-joint of a girl, aged 12, in the Bristol Infirmary, September 26, 1854. The particulars of this case I find thus reported by Mr. H. Smith, of London, in a paper published in the Medical Times and Gazette (May 26, 1855), and which I have adverted to in

[a] Edinburgh Medical Journal, April, 1856.

another place as being most valuable and instructive. In reference to the case this able surgeon writes:—"One case was under the care of Mr. Landsdown, at the British Infirmary. The patient was an irritable and highly nervous girl." He continues:—"Mr. Landsdown wrote to me some time ago to say, that since the operation there have been no untoward constitutional symptoms; but from the day of the operation she would turn on the left (the operated side), thus throwing the femur out, the leg being straight and resting upon the back part. At first it made but little perceptible difference. All attempts to change the position of the body brought on tears, and consequently excitement. The femur was very soon pushed through the wound to the outer side, the tibia going up straight, and, instead of remaining on a line with the femur, has gone up inside and behind it, and has thus shortened the limb, I think, at least six inches. What the ultimate result will be, I cannot tell, but I fear amputation." Mr. Smith writes:—"I am happy to say, since this was written, Mr. Landsdown has kindly informed me that the protruded bone has exfoliated; that the patient was in improved health, and that she was gaining strength in the limb, so that it is hoped she will ultimately do well." Mr. Smith, to whom I am indebted likewise for the following information, transfers Mr. Landsdown's report, dated December 3, 1856:—"About four months since, having been able to walk with one crutch, she fell; the consequence was, two ulcers formed upon the knee, which have now healed up. She now walks about the house without any assistance, but out of doors she uses one crutch. The limb has become quite straight, and she is well satisfied with it as it is; it certainly is not strong, but I expect will be a very good leg."

Case V.—Mr. Humphrey, Surgeon to Addenbrooke's Hospital, Cambridge, excised the left knee-joint from a woman, aged 20, on the 27th October, 1854. Mr. Humphrey made a transverse incision over the patella, more than half round the joint, and short cuts upwards and downwards, at right angles to it, at either end; reflected the flaps thus made, and cut into the knee-joint, dividing the lateral ligaments. The patella had acquired close connexions with the outer condyle; and in the endeavour to separate it, and press it on the outside of the joint, with a view of saving it, the ligamentum patellæ was torn up from the head of the tibia, and then the bone was removed; the joint was then bent, the adhesions between the bones, which were of fibrous nature, and the crucial ligaments, being, at the same time, divided with the scalpel. The ends of the

bones being sufficiently uncovered, three-quarters of an inch were sawn off from the condyles of the femur, and a thinner slice from the tibia. On placing the cut surfaces of the bones together, the leg was found to incline a little outwards; this was rectified by sawing off another thin, oblique slice from the inner part of the cut surfaces of the bones. The limb was bandaged, and placed in a straight splint, with a pad under the head of the tibia to raise it, and proper apposition was secured by the pressure of broad lateral splints. No unfavourable symptom followed; not the slightest fever, and scarcely any inflammation at the knee. The discharge forced its way through the bandages, which were seldom disturbed, not more than once in a fortnight or three weeks. In January, the wound being healed, all but one small orifice, and the union of the bones being tolerably firm, the limb was encased in a gum-chalk bandage, and the patient went home. In September she returned, the part having been painful and inflamed; there was a sinus extending three or four inches up the forepart of the thigh; on this being laid open, the bone was not discovered diseased or exposed. The wound healed up, and she again went home; there was pretty firm osseous union between the bones, and every probability of her being able to walk upon the limb[a].

CASE VI.—Professor Pirrie, Surgeon to the Royal Infirmary, Aberdeen, excised the knee-joint from a boy, aged 14, for incurable disease, on November 4, 1854, removing altogether about two inches of bone. There were many bad cases of erysipelas at the time, and the patient was attacked; it commenced in the under part of the leg; purulent collections formed beneath the skin and between the muscles; gangrenous masses of areolar tissue were discharged along with the matter, and sero-purulent infiltration took place into the whole of the areolar tissue of the leg. Amputation was performed at the upper part of the lower third of the thigh, November 13, 1854, and the patient made an admirable recovery, being dismissed cured, December 19, 1854.

CASE VII.—Mr. Hughes, Surgeon to the Staffordshire General Infirmary, excised the knee-joint of a young woman, aged 27, November 16, 1854, for incurable disease. The H-shaped incision was adopted; the patella was so diseased as to require removal. Mr. Hughes then proceeded to clear the articulating extremities of the femur and tibia from the condensed and hardened tissues. He then sawed through the ex-

[a] Association Medical Journal, February, 1856.

tremities of the bones in each, making the line of section to slope slightly from the joint, so that the shape of the whole mass of bone removed was that of a truncated pyramid, of which the apex was at the anterior surface of the joint; by this means, when the sawn extremities were placed in apposition, the femur and tibia formed a very obtuse angle, and, according to Mr. Hughes' views, rendered the limb much more useful in progression. In the course of the operation it was discovered that a long, burrowing abscess, opening into the joint, was situated immediately behind the femur, extending up the thigh. The flaps having been brought together by sutures, the whole limb was placed on a splint made for the purpose, with the knee very slightly flexed. After the operation, the patient suffered alarmingly from the shock, but Mr. Hughes' opinion was, that if the chloroform had been continued until the patient was placed in bed, and the limb finally arranged, this state might have been avoided. Electro-magnetism was had recourse to, and apparently with the best effect. In February, the abscess which was found at the operation to extend up the thigh, close to the femur, re-opened about a hand's-breadth above the joint, discharged freely, and then healed. In October, 1855, her condition is thus described:—"She was in robust health, plump and active, walked to visit her neighbours, and could ascend stairs without aid, wearing a thick, solid boot on the short limb. The appearance of the limb in the situation of the joint is not unsightly[a]."

Case VIII.—Mr. Fergusson resected the knee-joint of a boy, aged four years, December 16, 1854,—a wretched, strumous child, with a very diseased joint,—yet the health was pretty good. On excising the parts, it was found that the chief mischief lay in the head of the tibia, which was much diseased, and it was necessary to scoop away a considerable portion of morbid structure; an inch and a half of bone were removed. Matters, however, went on well notwithstanding, and the wound nearly healed, but nothing like union took place until he was removed to the sea-side, when he rapidly improved, and came back with a very fair leg.

Case IX.—Mr. Brotherston, of Alloa Hospital, excised the knee-joint of a boy, aged eleven years, January 12, 1855. In this case there was an urgent necessity for excision or amputation being immediately performed. The extreme paroxysms of pain which came on whenever the boy attempted to sleep,

[a] Medical Times and Gazette, March 15, 1856.

caused by the ulceration of the cartilage, and his state of nervous debility, showed that he could not have borne up longer under the source of irritation. There was a sinuous opening in the ham, which discharged a quantity of matter. The operation was performed on the above date. There was a considerable quantity of pus in the joint, and distinct ulceration of the cartilage on the condyles of the femur and head of the tibia. The incision nearly all healed by the first intention, and everything went on well till about the beginning of March, when an abscess began to form on the outside of the thigh, a little above the seat of the operation. This was opened on the 28th of March, and afterwards the abscess gradually closed, and finally closed altogether. The limb after some months became firmly anchylosed[a].

Case X.—The following is a very important case, replete with interest, and communicated to me by that most admirable surgeon, Dr. Keith, of Aberdeen. I shall give his own graphic description:—"John Thompson, aged 33, seaman, long affected with abscesses in the thigh, communicating with the knee-joint, admitted to the hospital, 13th of February, 1855. Excision of the knee-joint was accomplished on the 10th of March most satisfactorily; for a time all went on well, but recurring abscesses down the leg, and up the thigh, with persistent diarrhœa and extreme curvature of the limb, from retraction of the muscles of the inner hamstring, induced me, after a bold struggle, extending over 224 days, on the 20th of October to amputate at the middle of the thigh. He made most rapid recovery after, and was dismissed, in robust health, on the 30th day of November, 1855. He continues well, and is now (11th March, 1856, the time when I received the report) being fitted with an artificial limb. So this is one failure in my hands out of three, but the patient lives, and is in health, and had a chance for his own limb."

Case XI.—Mr. Tatum excised the knee-joint of a young man, aged 18, in St. George's Hospital, May 1, 1855. The patient had been under treatment for some time, on account of strumous disease of the knee-joint, which had existed for some years; he had been treated by various modes; the pain, however, remained, and an abscess formed, which was opened on the 13th of the previous February. Matters not improving, on the above date, it was decided, as there seemed only a small part of the bones involved, to excise their articular extremities,

[a] Edinburgh Medical Journal.

which was done by an H-shaped incision. The patella was thrown up in the upper flap, and was not removed; about half an inch in thickness of the ends of the femur and tibia was sawn off (rather more of the tibia); the joint was found disorganized by suppuration in its cavity, but the bones were only secondarily affected, and were partly healthy when cut through. The synovial membrane investing the parts removed was found much thickened, the bones partially denuded of their cartilages, and unnaturally vascular (especially the tibia), but otherwise healthy. The leg was put upon a ham splint. On the 15th he was much exhausted by the profuse discharge: the face pale, and eyes sunken; some union had been going on in the wound, so that its transverse part was closed; the rest gaped widely; he had rigor, and complained of pain in the right ankle, which was tender on pressure; and he had slight cough. The same symptoms persisted up to the 18th, with the addition of rusty-coloured expectoration; and he died this day.

At the autopsy the patella was found perforated by a rather large ulcerated opening, and there was an abscess between it and the anterior surface of the femur. The cut end of the femur was coated with a grayish layer of lymph, and its cancellous texture, as far as the line marking the junction with the epiphysis, was filled with a similar deposit; the shaft was perfectly healthy; the cut end of the tibia was excavated by caries, and its shaft, for three or four inches, was extremely carious and infiltrated with pus; the popliteal vein was filled with clotted blood and pus, and its lining membrane inflamed and coated with lymph. The femoral and iliac veins also contained pus; the lungs were extremely infiltrated with purulent deposits, otherwise, all the viscera were natural[a].

Case XII.—Mr. Humphrey, of Addenbrooke's Hospital, Cambridge, excised the knee-joint of a sailor, aged 47, May 4, 1855. The history of the case is as follows:—He broke his right patella transversely by a fall upon the deck six months before, the knee coming in contact with an iron ring; the fragments of the patella were four inches apart; there appeared to be no connecting medium at all, the articular surface of the femur lying immediately under the skin. He could bend the leg, but had no power whatever to extend it; consequently, walked with a crutch and stick, scarcely using the right leg. On examination of the left patella it was also found to have

[a] Lancet, vol. ii. p. 281.

been broken across, the fragments being movable on one another, though in close contact. This had happened several years before; apparatus was constructed to try and steady the bones, but the upper fragments of the patella, and the adjacent part of the thigh, were so tender, that no pressure could be used, and the man became impatient for some more decided treatment. The usual incisions having been made, and the bones exposed, three-quarters of an inch of the femur, and a thin slice of the upper ends of the tibia, were sawn off, and before this, the fragments of the patella were dissected away; the bones were secured in good position by splints behind, and on either side well padded; no unfavourable symptom followed suppuration; and, after a time, the discharge gradually diminished. On June 19th the wound was nearly healed, and there was pretty firm union between the bones, though he could not raise the limb from the bed. On the 21st the wound had long been soundly healed and the bones firmly united. He could raise the limb from the bed and bear some weight upon it, and could move about very well with crutches[a].

Case XIII.—Mr. Birkett, of Guy's Hospital, excised the knee-joint of a man, aged 34, who was the subject of incurable disease of the knee-joint, 29th of May, 1855. The patient was put under the influence of chloroform, and a single flap was made in front of the joint, which, after division of the ligamentum patellæ, was reflected upwards with that bone; the lateral ligaments were next divided, and then the crucial; forcible flexion of the joint was then made, and the inferior articular extremity was sawn off; next, the inferior articular extremity of the tibia, and then the articular surface of the patella. The arteries now secured, the ends of the tibia and femur came together in very good apposition, and the cut surface of the patella rested on them in front; the remaining portion of the bone appearing to be superfluous and projecting, it was removed from the flap; sutures were employed to adjust the flap, and water-dressing was placed over the wound. The limb rested on a back splint, and sand-bags were placed at the sides to keep it steady.

On the third day he vomited, occasionally had great pain in the part, apparently from muscular contractions. The dressings used had been changed, and a pillow and sand-bags substituted for the splint, which was thought to hurt him; *but he could not do without the splint,* which was again applied. At

[a] Association Medical Journal.

thisdressing three ligatures came away. A short time afterwards hemorrhage occurred, but was soon controlled by cold applications. The entire wound was, however, filled with coagulum. On the sixteenth day after the operation, the wound began to slough; the pain became very severe, with subsultus tendinum; increased restlessness; occasional delirium at night, and complete prostration. The terchloride of carbon was used as a lotion; the strong nitric acid applied; all the support and stimuli that he could take were given; and in about fourteen days from the commencement of this attack the wound had assumed a healthy aspect, and the powers of the patient were much improved. "During this time, however, it was extremely difficult to retain the ends of the bones in proper relation to each other, and the end of the tibia was drawn backwards behind that of the femur. The flap had almost entirely sloughed away, and it appeared that the powers of the patient were scarcely sufficient to carry him through the repair of the part. In addition to this, it did not appear probable, even if the part was healed, that the limb could ever be a useful one." On the thirty-eighth day after the first operation, Mr. Birkett amputated through the femur in the usual manner. "For several days his progress was so favourable, that he was carried out of the ward into the air, and this improved his condition materially." After repeated hemorrhages, it was determined to search for the vessel, and it was found to be the femoral, and, after following it up about an inch and a half, a ligature was applied about it. The sheath of the artery about its divided end was converted into an osseous structure; the vessel itself was firmly united to this, and around both was a loosely developed aneurismal sac, formed of layers of fibrine. The patient seemed now reduced to the last extremity, and the stump of the femur projected between the flaps; the ligature came away seven days after its application; and cicatrization advanced favourably. On the 30th August, a small round portion of bone was cut off. The next day the man left the hospital[a].

Case XIV.—Mr. Jones excised the knee-joint of a girl aged 9, August 20, 1855. The case is peculiarly interesting, owing to the varied amount of the disease of the leg, yet by the wise judgment of this distinguished surgeon, the recovery was perfect, and an admirable limb preserved. It would appear that for two years the child had been unable to walk without crutches, and in despair returned to Jersey to have

[a] Lancet, 1856.

the limb removed. The child's appearance indicated a strumous diathesis: there was considerable emaciation; her appetite was very indifferent; pulse 106; nights sleepless, &c. The affected leg and knee presented an extraordinary appearance,—the tibia was dislocated backwards, its head being thrust completely into the ham; the popliteal vessels were thus rendered easily perceptible; the patella, which rested in the interspace between the condyles of the femur and the head of the tibia, was so atrophied as to be scarcely distinguishable; the head of the tibia was much expanded, also the whole shaft of the bone generally, and the integuments were in a state of *gonflement;* an open suppurating surface existed along its entire length, the bone being exposed in many parts, and distinguishable by the probe everywhere; several fistulous apertures existed laterally and posteriorly, three also along the fibula on its outer aspect; the probe detected bone in all of them. There existed an immense amount of lateral motion in the dislocated joint; the muscles of the thigh were much atrophied; the motions of the ankle-joint were natural. The patient was put under the influence of chloroform, and the following operation performed:—An incision beginning just below the patella was carried downwards along the almost entire length of the tibia. It was made in rather a zigzag manner, in order to include as many of the fistulous openings as possible; the integuments were then dissected on either side of the bones, so as to expose the diseased parts thoroughly. In many places the tibia was found divested of its periosteum; in others it was thickened and rough; while at its upper and lower thirds, it was so softened as to necessitate scooping out to a considerable depth before healthy cancellous structure was met with; the gouge and chisel had, therefore, to be freely employed throughout. After removing as much diseased bone as could be seen, the next step was excision of the knee-joint. This was performed, first by making a horse-shoe flap, and then proceeding in the manner generally followed, though the extremely disorganized state of the joint rendered the removal of those parts which compose it much more difficult than is ordinarily the case. A large portion of the joint-ends had to be removed; likewise the head of the fibula, and a large sequestrum from the upper third of this bone; the patella, after gouging its under part, was left. After the operation, the leg was placed in a suitable box, and kept steady by means of pads, &c. &c. At the expiration of ten days there was an evident amelioration in the little patient's health; five weeks after the operation she was

able to raise the whole limb; and three weeks after this went about the wards on crutches; scarcely three months elapsed when she moved about without any appliances to the knee[a].

Case XV.—On the 24th of August, 1855, Mr. Holt excised the knee-joint of a charwoman, aged 47, for persistent disease, of seven months' duration. At the time of the operation the patient was greatly emaciated, and the leg flexed upon the thigh; the hamstring tendons having been previously divided, the semilunar incision was employed, and the extremities of the bones were removed in the usual way; an opening was afterwards made in the popliteal space to afford a ready outlet for the discharge; the limb was afterwards brought into the straight position, and placed upon a splint. On the consecutive days of the following week she appeared to be progressing most favourably; there was a total absence of pain or starting; the wound wore a healthy aspect, and there was healthy purulent secretion. From her previously exhausted condition a generous diet was allowed, of which she partook freely. The constitutional symptoms were comparatively trifling, and very much less than those usually following amputation. On the eighth day she complained of soreness over the sacrum, and although immediately placed upon the water-bed, the sore continued to extend, and she died on the eighteenth day.

The post-mortem examination showed the extremities of the bones covered with lymph, with a degree of vascularity which augured well for recovery[b].

Case XVI.—The following excision was performed by Mr. Statham in University College Hospital, September, 1855. Patient, a little girl, aged five years, with the ends of the tibia and femur enlarged, tender, and probable suppuration up the thigh and in the joint. An exploratory puncture was made, pus escaped; lateral flaps exposed the joint; about two inches of the end of the femur were removed; it was enlarged, softened, and the cartilage absorbed in various distinct spots through its entire thickness between the two condyles; the deeper soft parts were in gelatinous-gray degeneration. Although the head of the tibia was in a primary strumous condition, it was merely gouged to a slight extent, on purpose to see if it could be possible to save it, in our present state of knowledge, without removing it from the body. Mr. Statham continues:—"The patient went out some months ago. Her health good, a fistula

[a] Medical Times and Gazette, June, 1856. [b] Lancet, 1856.

leading to the joint, the head of the tibia and soft parts over it in a strumous condition"[a].

Case XVII.—A young man, aged 15, was admitted into King's College Hospital, under the care of Mr. Fergusson, for the second time, in December, 1855, with intractable disease of the knee-joint. From this period until the 2nd of February, matters were progressively getting worse. The joint became more swollen and very tender; pressure on any of the bones of the articulation, or any attempt to move the knee, gave intense pain, and the startings of the leg were frequent. The knee had become bent at an angle, pointing inwards, and the limb was two inches shorter than its healthy fellow. A wound which had been made on the outer side of the joint discharged purulent matter; and the patient's health seemed suffering only from the irritation of the joint. Under these circumstances Mr. Fergusson excised the joint by an H-shaped incision, the transverse cut of which divided the ligamentum patellæ, which bone, being reflected, exposed the interior of the joint; the ligaments were divided to about half an inch of the tibia, and an inch of the femur was sawn off; the inside of the patella was scraped and found healthy; the wound was then stitched up and covered by water-dressing; the limb was placed in a M'Intyre's splint, to which was attached a long thigh splint, which, being fastened on by a perineal band, served to keep the leg steady; the whole was then slung in Salter's swing. The pieces of bone removed were found in a hopeless condition, the synovial membranes being in the last stage of pulpy degeneration, the joint filled with gelatinous matter, and the cartilage absorbed in great measure, so that the bone was exposed at parts, eroded and roughened. On the 8th suppuration was fully established, and the patient's health much improved. On the 5th of March the splint was removed for the first time to readjust the parts, and replaced as before. The bones were pretty firmly united, aud the wound beginning to skin over, on the 4th of April the iron splint was removed, and a gutta percha one, supporting the knee from behind, put on. The patient was then allowed to get up and walk on crutches, with his leg in a sling. On the 2nd of May he was discharged cured; the sinuses nearly healed, the knee stiff and straight; and the patient able to bear his weight upon it when walking; and on the 31st the patient returned to the hospital to show himself. He was able to walk without crutches, having the

[a] Gunshot Fractures and Resections, by S. F. Statham.

sole of his boot a little thickened; and he was in a most satisfactory state of health[a].

Case XVIII.—Mr. Erichsen resected the knee-joint of a man aged 22, who had been admitted into University College Hospital, January 18, 1856. He had been suffering with disease of his right knee-joint for six years, but it had been especially bad for the last three, from a chronic inflammatory condition. On the 6th of February chloroform was given, and Mr. Erichsen operated, making a semilunar incision around the lower border of the patella, cutting through the ligamentum patellæ and lateral ligaments into the joint; the patella was then raised, and, after careful dissection, an inch and a half of the femur were sawn off, and three-quarters of an inch of the tibia; the under surface of the patella, where the cartilage was ulcerated, was scraped; the articular cartilages were for the most part destroyed, and yet there had been no grating; the articular end of the tibia was very soft, and contained a small abscess, from which was let out some thick pus. The limb was now straightened, placed upon a splint; the ends of the bones were brought almost into contact with one another, the anterior flaps laid down and sutured. On the 18th of April his health was much improved; the wound almost entirely healed, and a tolerably firm anchylosis was supposed to have taken place. On the 4th of June he had been going on favourably; the ulcers were healed; there was a little sinus at the inner side of the joint, and scarcely any discharge from it. He had been walking about the wards on crutches; and his general health was very much better; and the report further states, he looked cheerful and contented, and performed his functions well. On the 10th he was discharged, to go into the country[b].

Case XIX.—On the the 9th of February, 1856, Mr. R. W. Coe, Surgeon to the Bristol General Hospital, excised the knee-joint from a little boy aged six years. "In performing the operation," writes Mr. Coe, "I departed in some degree from the ordinary plan. I made a semilunar incision, beginning at the outer side of the joint, and carried it round above the patella to the inside; there was thus a semilunar flap formed, which fell down over the head of the tibia. The joint was acutely inflamed, the loose synovial membrane much thickened, and a considerable quantity of coagulated lymph lay in the various recesses, as it were, of the joint. On passing a probe

[a] Lancet, vol. ii. 1856.

[c] Lancet, vol. ii. p. 253. 1856.

now through the sinus, it made its appearance in the joint, underneath the back part of the external semilunar cartilage." Mr. Coe continues:—"I then removed half an inch, or a little more, of the femur, and a quarter of an inch of the tibia, when there was exposed the track of the sinus and a small cavity filled with soft gelatiniform granulations. Instead of taking off so much of the tibia so as to include all this in the resection, I gouged out the diseased part, leaving, as far as I could judge, nothing but healthy tissue behind. After paring away the synovial membrane from the back part of the patella, the trochlea, and back part of the condyles of the femur, the parts were brought together by sutures, and the limb placed on a splint made purposely for it. On February 10 the splint was found not to answer, and he was moved into an ordinary swinging splint; three weeks after the operation a collection of healthy pus, which had formed in the neighbourhood of the ligamentum patellæ, was let out; the walls of the abscess united almost immediately after all the pus had escaped, and from February 9 to May 8 he has had but one dose of physic. By the end of the eighth week he was able to move freely about in bed; by the end of the ninth week he could get about the ward on his crutches; before the end of the tenth week he could bear his weight on the affected leg, and use it in going about the ward."

Case XX.—Mr. Fergusson excised the knee-joint of a young woman aged 20, who was admitted into King's College Hospital, January 16, 1856. She suffered for more than two years, and the local affection originated from having violently struck the knee against a stone; gradually the disease seized upon the part, and there was a constant aching pain in the joint, not limited to one spot, but extending across the condyles of the femur; all the bones about the joint were very tender, and she complained of much pain if the patella was moved on the femur, or the leg pressed in the thigh, or the fibula against the tibia. Various modes of treatment, blistering, &c., were had recourse to, with little change, up to the 1st of March, and as Mr. Fergusson was of opinion none could be looked for, for some months, and the result was quite uncertain, the patient earnestly requested some operation might be performed. Mr. Fergusson decided to excise the joint on this date, and it was performed by an H-incision; after which about three-quarters of an inch of the femur were removed, and the same quantity from the tibia, but that bone was then discovered to be in an unsound state, having an abscess in the centre filled with scrofulous pus; another half-inch was, therefore, removed, and some further portions with the gouge. The patella, which was only superficially affected,

was scraped and replaced, vessels were secured, and the limb placed upon an iron splint with a foot-piece; the sides of the splint opposite the joint being cut away for the convenience of dressing; a long thigh splint, with a corresponding piece cut away opposite the knee, was also fitted on and fastened by a perineal band in the usual manner, so as to keep up extension, and prevent rubbing of the ends of the bones. On examination the disease was found to have proceeded much farther than had been anticipated; all the synovial membrane was rough and thickened from chronic inflammation, but in the tibia the disease was found to be far more extensive; the deep surface of the articular cartilage was found separated from the bone, which was ulcerated; a small abscess had formed, which extended to some depth in the centre of the bone, and the cartilage had not been ulcerated through. On the 17th her pulse was 100, and she looked much better than she had done; in fact, her appearance would not lead any one to suppose she had recently undergone a severe operation. On the 22nd, the report states, the wound was healed, with the exception of one or two spots on the lateral incisions; the long splint had been discontinued for a week past, and union getting slowly firmer. General health excellent. On the 15th of July she was put upon cod-liver oil, under which the wounds rapidly healed up, and she left hospital in the beginning of August[a].

Case XXI.—Mr. Stanley excised the knee-joint from a girl aged fifteen years, on the 29th of March, 1856. She had been an inmate of another hospital for twelve months, and now was considered a favourable subject for resection. She was given chloroform; and Mr. Stanley made a semicircular incision around the lower border of the patella, dissected the flap off, and reflected it upwards; in doing this he let out a quantity of sero-purulent fluid from the cavity of the joint. The whole of the articulating cartilages were found destroyed on opening the articulation, and the surfaces of the bones in a diseased condition. He sawed off a thin slice of the condyles of the femur, and the same off the head of the tibia; at the same time removing all the diseased cartilages and structures surrounding the joint. "The patient was shifted every few days, and consequently, never being firmly fixed, the flexor muscles gradually drew the leg behind the thigh, although the tendons did not appear tight; of course the original wound gaped, and became very extensive." On the 5th of May her condition was as follows:—"The leg was in a semiflexed position, lying

[a] Lancet, August 30, 1856.

on its outer side, with a large, raw, ulcerating surface over the seat of the wound, discharging a great quantity of matter; the limb, moreover, was very tender, and she could scarcely bear it to be touched, much less moved; her pulse was quick, what might be called an irritable jerking pulse." Her health now began to fail, from the great drain of such a large granulating surface; the vital powers were becoming weakened, the heel sloughed, and debility was increasing. "Her leg, therefore, was amputated above the knee, to save life, on the 10th of May, under chloroform, and after a few days her health began to improve; the stump was nearly healed by the 10th of June, and in the early part of August she left the hospital well"[a].

Case XXII.—Professor Bowman, of King's College, excised the knee-joint, in private practice, of a lady aged about 30, near the end of April, 1856. The disease was a pulpy thickening of the synovial membrane; it was of eighteen months' standing; no abscess had formed. She had been long in a state of great suffering, for which morphia was constantly administered, and she was considerably reduced. Mr. Bowman, on the above date, operated, removing the articular ends of the femur and tibia, taking off about an inch and a half of the former, and half or three-quarters of an inch of the latter. He also cut away all the diseased synovial membrane. Mr. Bowman, writing to me on the 29th September, 1856, says, in reference to the operation:—"The knee went on very fairly for two months, but the system never rallied; for the last two or three months the patient's health has been declining, and I now despair of her life. I do not think she can long survive. There is a want of firm union between the ends of the bones; there are long sinuses extending up the thigh, with very considerable discharge. The dressing has been most assiduously and ably conducted by a medical friend, but it has been very troublesome and tedious. There has been, however, for the three last months such a complete absence of her old pain that she has quite left off her morphia,—and this has been her only gain by the operation."

Case XXIII.—The following case occurred under Mr. Cutler, St. George's Hospital:—Robert D., aged 15, was admitted on account of synovial inflammation of the left knee, in January, 1856. He had been previously a patient of the hospital for about a year. When admitted, he was complaining of great pain in the joint, had rigors, and there seemed reason to apprehend the formation of matter. This point being decided

[a] Lancet, September, 1856.

a few days after his admission by an exploratory puncture, Mr. Cutler opened the joint, at first by a small, but afterwards by a free incision, as that appeared insufficient; no acute symptoms followed the opening of the joint, but the pain was only slightly relieved, and the suppuration continued abundant. Under these circumstances, after the joint had been allowed to remain open for nearly three months, it was determined to excise the knee, or at least to lay its cavity freely open, and remove so much of the bone as should be found diseased. This was accordingly done, on the 17th April, by a curved incision, running parallel to the lower border of the patella, which bone was turned back, and the joint opened; the synovial membrane and the soft parts in the neighbourhood were found very much thickened, but the bones were found only secondarily affected; accordingly, the end of the femur was only removed, which was softened in its whole texture, and carious on the surface. The surfaces of the tibia and patella each presented a small spot of caries, which was gouged out. The relief from the pain in the knee was complete; the cavity of the abscess, however, did not seem inclined to contract, but continued to discharge serous pus. About two months after the operation, during which the boy's strength was gradually declining, it was thought advisable to try country air; he went to Margate, but derived no benefit from the change, and died shortly after a month in London. No post-mortem instituted[a].

Case XXIV. Mr. Marett, of Jersey, assisted by Mr. Jones, excised the knee-joint of a young woman, aged 19, April 17, 1856. The articular surfaces of the femur and tibia were removed, likewise the patella; the limb is stated to have been placed in Liston's splint, and suspended. The semilunar incision was adopted, and it is reported "that at the end of one month the wound was cicatrized, with the exception of about the size of a sixpenny piece." "She then had an attack of erysipelas affecting the knee, extending to the leg and external portion of the thigh;" an abscess formed in the latter situation, which required to be opened; an abundant quantity of matter flowed from it, and still a slight serous discharge oozes from it. On the 29th of November, the report which I have received, through the kindness of Mr. Jones, states, "she is now able to walk with ease, with the help of a person to support her on one side, and the assistance of a stick."

Case XXV.—Mr. P. Price, of the Metropolitan Infirmary, at Margate, excised the knee-joint of a girl aged 15, on the

[a] Lancet, 1856, vol. ii. p. 281.

17th of May, 1856, for incurable disease of the left knee-joint. The patient being placed under chloroform, the usual H-shaped incision was carried through the integuments; the perpendicular incisions, however, were made so as to connect the fistulous openings which existed in the line of the lateral ligaments, while the transverse cut ran over the centre of the patella. The patella was removed. What remained of the synovial membrane was in the last stage of pulpy degeneration. The inter-articular cartilages were entirely destroyed; the condyles being cleared of all soft tissues, their articulating surfaces were removed to about an inch; the cut surfaces, however, not appearing free from strumous deposit, another slice was taken away. The head of the tibia was excavated by a large abscess; a slice was removed, about three-quarters of an inch in thickness; and the remaining cavity of the abscess thoroughly cleansed by means of the gouge and scoop. The limb was placed in M'Intyre's splint, and a fold of bandage rolled round the foot and leg, and another around the thigh; the wound was covered with water-dressing. On July 14, Mr. M'Intyre's splint was removed, and a gutta percha one was substituted. She could put her foot to the ground, and bear some degree of pressure upon it. On August 30 her condition is thus described:—For the last six weeks the patient has been daily gaining strength, and improving in general health; the wounds have almost healed, and the girl spends all her time out of doors, being able to go about, although she has not over-much confidence in the shortened limb. A strong gutta percha splint protects the part. The length of the sound limb, from the tip of the inferior spinous process to the heel, the foot being placed at a right angle to the leg, is 29 inches, while the length of the other is 27 inches. The anchylosis is in most respects of a fibrous character, but the motion is becoming less every week[a].

Case XXVI.—Mr. Moore, Middlesex Hospital, excised the knee-joint from a tall, well-made man, aged 24, by occupation a navvy, for deformity of the leg. Fourteen years before, he was a patient in the Herts Infirmary for four months, after which he had been able to work; but there was great deformity of the leg, mainly at the knee-joint. Four months before, he struck the knee, and since that time it had been very painful, and much swollen; the swelling, however, had considerably diminished, and the pain was less. On admission it was found there was an old dislocation of the head of the tibia outwards,

[a] Lancet, 1856.

with free movement of the joint; with considerable pain and slight effusion. The general health appeared to be good. On the 21st of May, Mr. Moore performed excision, the patient being placed under the influence of chloroform. The joint being laid open, was found healthy; but the head of the tibia was thrown so far outwards as to render the limb almost useless in this state. The cartilage, together with the bone which was covered by it, was sawn off from both the tibia and femur; a cavity was cut into the head of the tibia, which contained no pus, but appeared to be fully developed bone. It being thought proper to leave an exit for the discharge from it, a V-shaped piece of bone was removed from the head of the tibia; the patella was not removed. The denuded extremities of the bones were then adapted to one another, and after the integuments were brought together by sutures, the limb was placed on a straight splint, at the back of the leg. In the evening the parts had to be opened on account of hemorrhage, all sutures removed, and the parts left exposed for the night. At 9 the following morning they were brought together again. On the 24th constant vomiting set in, which continued until the morning of the 25th, when he died. At the autopsy some of the larger bloodvessels were found filled with coagula. All the viscera were healthy, except the kidneys, which were pale and flabby, granular and fatty, mottled on their surface, with their capsules free[a].

Case XXVII.—The following case is one of deep interest:—A young woman, aged 26, was admitted into King's College Hospital, under the care of Mr. Fergusson, March 1, 1856. She had suffered many years with strumous disease of the left knee-joint; but it did not exist internally in proportion to the amount of suffering present. This girl had been in hospital before, and received temporary relief; but now her annoyance was so great, that she became impatient to have excision done. Mr. Fergusson complied with her wishes, as the limb was totally useless to her; and whenever she attempted to walk, the malady came back in an aggravated form. On May 24, after chloroform being given, Mr. Fergusson excised the joint; about an inch of the femur was first sawn off, and then the same quantity of the tibia; the patella was left, but a portion of its incrustating cartilage was destroyed, leaving the bone bare; this was gently scraped. There was not the amount of disease in the joint, when laid open, that might have been expected, as the cartilage of the femur was almost entire; but there was an

[a] Lancet, 1856.

extension of the growing disease in the synovial membrane, such as large pulpy masses at its side; the same were forming on the top of the tibia. On the 1st of June there was a marked change for the worse; she was seized with severe pain in the right side, much increased by a long breath, and felt low and faint, and very sick; and on the 9th she gradually sank, and died at 4½ P.M.

At the autopsy the ends of the bones were found in a necrosed condition; the soft parts around were in a sloughy state, and the periosteum was stripped off the back of the end of the femur for about two or three inches. The femoral vein, for three inches at its upper part, was found completely blocked up by a dense clot, which adhered firmly to its sides; above this was a clot of healthy fibrine. The popliteal and posterior tibial veins were filled with pus, and a firm clot was found along the upper third of both of the posterior tibial veins; the clots extended up to the bifurcation of the iliacs. Fluid was found in both pleuræ, and an abscess, the size of a walnut, in the lower part of the right lung[a].

Case XXVIII.—Mr. Thomas Windsor, Surgeon to the Salford Royal Hospital, excised the knee-joint of a young man, aged 18, on the 29th of May, 1856. History taken from the Medical Times, November 29, 1856:—He was admitted May 24, 1856. Two years since last Good Friday the right knee gradually swelled, with pain in walking; none when quiet; the skin was of its natural colour; he went into the country, and the knee seemed to get nearly well; after a little time it commenced again, and he went into the Manchester Infirmary; the joint becoming worse and worse, he became a home patient of the Salford Hospital in March, 1856, and had then cough, with considerable expectoration and night-sweats; by treatment his general health improved, but the knee became more swelled, and excessively painful.

Present State.—Leg considerably flexed on thigh; flexor tendons contracted; knee rounded in form; patella prominent; skin normal, rather tense; in consistency dense, and rather hard; no fluctuation; motions of flexion and extension very slight; some lateral motion; slight crepitation when the joint is moved; the pain is most severe on the inside of the knee, and is much aggravated by the slightest motion or pressure. No disease of the chest can be detected; there are now no night-sweats, no expectoration, and but little cough; appetite good. Pulse 96, full; no thirst; bowels regular.

[a] Lancet, September 6, 1856.

May 29th. Excised the joint; H-incision; removed about an inch and a half of the femur with the saw, the surfaces of the tibia and patella with a chisel; two small vessels were ligatured; the wounds closed with strips of wet lint, and placed in a frame. The crucial ligaments were almost entirely destroyed; the cartilage separated here and there from the bone; the end of the femur worm-eaten, softened, with enlarged cancelli, and great vascularity; the patella and tibia but slightly affected; the synovial membrane thickened; about three hours after, hemorrhage to so great an extent took place that he became almost pulseless; a small artery was twisted, and lint wetted with spirit of turpentine applied to the ends of the femur, from which blood obstinately oozed; ice to be kept constantly round the knee. After this there was no repetition of the hemorrhage, and on May 31st, two days after the operation, it is stated that he had slept most of the night. The enema which had been given was retained, and the calomel was vomited. Not sick during the night, and has vomited once this morning. Pulse 120; irrigation of cold water to be used to the knee.

On the 1st of June he is reported to have slept well; no vomiting; still has a little nausea; bowels not open since operation. Pulse 114; skin warm; tongue dry and furred; no pain in the leg, which is warm, but not swelled.

17th. Tongue red; bowels regular; knee easy; foot a little puffy; back of sacrum rather painful; to have a water pillow.

28th. Has been going on in all respects well, except that a small sore has formed on the back of the sacrum; calf of the leg is a little painful. Dressed the knee for the first time; wound filled up with granulations, perfectly healthy in appearance; he has a little power over the leg, being able to raise it about half an inch.

July 2nd. Starch bandage applied; back rather painful; in other respects going on well; knee quite easy. Pulse 108.

September 3rd. A piece of bone, apparently part of internal condyle, projects through the granulations, and appears dead. Has been a little troubled with diarrhœa.

October 9th. Since last notice the piece of dead bone appears to have made no change, but he has become thinner, feels weaker, his cough has somewhat increased, and for these reasons amputation was decided on, though delayed, owing to the lad's wish, to October 11, when the ordinary circular operation was performed; only about half an ounce of blood was lost. On examination, the ends of the femur and tibia, and the internal surface of the patella, were found softened, worm-eaten,

vascular, partially covered with fungous granulations. No anchylosis.

On the 16th he is described as almost pulseless; features pale, sunk, &c. On examining stump, edges ununited; its surface covered with a blackish, sanious discharge. Aromatic spirit of ammonia, &c., to be freely used; poultice to stump.

17th. Gradually sank to-day. No examination allowed.

Case XXIX.—Mr. Jones excised the knee-joint of a young woman, aged 23, June 20, 1856, and thus writes to me, November 29, 1856:—"My last case is still in hospital, and under treatment. The patient, an adult female, aged 23, received a blow on the right knee, last June four years. From this date to her admission to the hospital, last May, she consulted several surgeons, and underwent a variety of treatment. None succeeded: so excision was performed the beginning of July. For three weeks not an unfavourable symptom occurred; on the contrary, there seemed every hope that a most rapid recovery must take place. Unfortunately, several cases of erysipelas were at that time in the hospital, and my patient had a most severe attack, which, with infinite trouble, she recovered from. Strange to say, a month after, she had another, quite as severe as the first. One extraordinary feature existed each time—the erysipelas commenced *above* the excised part and *below* it, extended up to the groin and down to the toes, leaving a space of fully four inches perfectly free of even the slightest blush. These attacks caused sinuses to form, and, altogether, my poor patient's health became sadly shattered. I am, however, happy to say, that she is now recovering rapidly, and I have no doubt will get perfectly well, with a *useful limb*."

Case XXX.—Mr. Erichsen excised the knee-joint of a boy aged nine years, affected with pulpy degeneration of the synovial membrane. On admission (May 30, 1856) the affected knee was found to be semiflexed, measuring twelve inches and three-quarters round, whilst the sound one measured only ten inches. The heads of the tibia, the condyles of the femur, and the patella, were not enlarged; the tissues around the joint were thickened and swollen, with an ulcerated patch, the size of a half-crown piece. It was found a probe passed readily within the joint. On the 2nd of July the boy's health appeared delicate, and the ends of the bones constituting the joint moved freely anteriorly as well as laterally, and the articulation was much swollen. Mr. Erichsen, at this date, performed excision of the joint, under chloroform, making a semilunar incision below the patella, reflecting up the flap, and, with Butcher's saw, removed a thin slice of both bones, not

more than three-quarters of an inch altogether, cutting the tibia from behind forwards. The lower part of the femur was found much inflamed, and could be cut away easily with a knife; the synovial membrane was affected with a pulpy thickening and a commencing disorganization. This pulpy matter existed around the joint in large quantity; the edges of the wound were brought together, and the limb placed on a straight under-splint. On the 7th a slight attack of erysipelas seized on the part, but in a few days was arrested. On August 3rd the anchylosis had commenced, and the limb was placed in a strong leather trough, a many-tailed bandage over the limb, and the wound dressed with water-dressing. On the 21st there was scarcely any discharge from the abscess, and the wound was just cicatrized over. The boy had not one bad symptom, and he expressed himself very easy and comfortable. On the 3rd of September he was quite stout and healthy, the joint firmly anchylosed, and the wounds healed. His recovery was perfect[a].

Case XXXI.—For the particulars of this case and the next, I am indebted to the kindness and courtesy of Mr. Humphrey, of Cambridge. Thomas Hodson, aged 29, admitted into Addenbrooke's Hospital, May 21, 1856; a thin, pale, very unhealthy-looking man, with disease of the left knee, of three years' duration. It had commenced apparently in the synovial membrane, and had subsequently involved the cartilages, and extended to the bones; the limb was wasted, and he could not lift it from the bed; the knee was not much swollen, but the joint was evidently destroyed, and disease was progressing. Accordingly, excision was determined on soon after he came into the hospital, but was deferred for a time, in consequence of the very indifferent state of his health. In the meantime an abscess formed above the outside of the knee, and burst, leaving a most foul ulcer communicating with the joint, and confirming suspicion that the bones were involved in the disease. His health continued as bad as ever, though the ulcer assumed a more healthy aspect. He was anxious for some relief, but unwilling to submit to amputation. It not being prudent to delay any longer, in the vain hope of improving his health, while the system was subjected to the irritation of the local disease, Dr. Humphrey performed excision July 18, 1856. A crucial incision was made in front of the joint; the patella was removed, and the articular ends of the bones sawn away; that of the tibia had a large and deep ulcer in it, the saw passed

[a] Lancet, September 6, 1856.

below this, through healthy bone; the synovial membrane was not much thickened; the bones came into good position, and the limb was bandaged upon a straight splint, and supported by a long broad splint on either side. Immediately after the operation his health began to improve, and his tongue to clean; no fever or constitutional disturbance being excited by it, and no swelling of the leg or thigh following for two or three weeks; then suppuration took place in the upper part of the calf and the lower part of the thigh, requiring a free incision in each situation. After this the case went on well, the wounds nearly healed, and the bones became united by firm medium, so that he could throw the leg about, and was able to bear some weight upon the limb when he left the hospital, in the beginning of October.

Case XXXII.—This, the fourth case operated on by Mr. Humphrey, is exceedingly valuable, and I feel deeply indebted for his copious notes of it. John Crawley, aged 20, admitted to Addenbrooke's Hospital, July, 1856; a spare, sallowish, unhealthy-looking lad, with synovial disease of the left knee. There was great swelling, and a good deal of pain at night, with startings which awoke him from his sleep; the thigh and leg wasted, and he was unable to lift the limb from the bed. The disease was of three years' duration, and there was little prospect of its cessation, still less of a useful joint being restored. Although it was probable that the cartilages were involved, yet the disease was chiefly of the synovial membrane, which had become greatly thickened. Mr. Humphrey thought it was a case rather for amputation than excision, but the lad being unwilling to submit to the former, he performed the latter, July 18, 1856. Incision of a crucial form; the patella, the articular ends of the tibia and femur, with as much of the morbid synovial membrane as could be included, were removed: still, some of the latter was left. The cartilages were ulcerated, and easily separable from the bones, which were porous and vascular beneath them. The limb was bandaged upon a splint, and supported by lateral splints, as in the former case. "At first," writes Mr. Humphrey, "the case went on very fairly; there was not much inflammation in the part, or much constitutional disturbance; and there was every prospect that union was taking place between the bones; still, the swelling did not subside; suppuration continued from many points, and the union of the tibia with the femur did not become more firm. Every now and then there was an accession of suppuration, and the man's health began to fail." In the early part of October Mr. Humphrey proposed to amputate, to which the

patient did not assent until November 4, when the limb was removed at the junction of the middle and lower thirds of the thigh. The young man is now rapidly recovering.

Case XXXIII.—Mr. P. Price, in the Metropolitan Infirmary, Margate, excised the right knee-joint of a boy, aged nine years, July 28, 1856, being affected with incurable disease. The H-shaped incision was adopted; on opening the joint a quantity of pus escaped; the synovial membrane was of a dark purplish colour, much increased in substance, and gelatiniform in consistence; the inter-articular cartilages were destroyed, and the cartilages of incrustation partly removed; about three-quarters of an inch of the condyles were cut off, and a good half-inch was removed from the tibia; the patella, which was ulcerated on its under surface, was taken away; difficulty was experienced in overcoming the hamstring muscles, and bringing the bones in apposition; the limb was placed in a splint, and fastened with rollers. On the 3rd of August he became very troublesome, and could with difficulty be kept quiet; he had contrived to loosen the bandages, so that the thigh had been slightly moved from its former position, and it was necessary to put the entire limb up fresh. On the 7th of August he was so irritable that the surgeon was obliged to put a Liston's long splint on the oustide of the limb, extending as high as the armpit, that he might not run any danger of disturbing the bones. On the 30th he was reported as certain of a good recovery[a].

Case XXXIV.—Mr. Coe, Surgeon to the Bristol General Hospital, has sent me the following most interesting particulars relative to a second case in which he excised the knee-joint. Patient, a little boy, aged 4½ years, of well-marked strumous habit. He was admitted to hospital July 28, 1856. Two years ago he complained of severe pain in the vicinity of the left knee, and three months before his admission a large abscess formed below the knee, and burst, discharging a large quantity of green offensive matter. On July 28 a fistulous opening on the anterior and inner aspect of the head of the tibia marked the aperture; the knee-joint itself was likewise swollen and painful; on the introduction of a probe a small piece of dead bone was felt, not far from the surface, and the probe passed without obstacle even far deeper towards the joint; an incision was made upon the dead bone, and a piece removed, and the soft parts were freely incised, so as to allow a free escape of matter from the head of the diseased tibia.

[a] Lancet, 1856.

Mr. Coe writes, it was impossible to gouge any part of the bone away, owing to the close proximity of the diseased part of the joint. Up to 23rd of August the boy improved, the swelling and pain in the knee-joint subsided, and hopes were entertained that the case would do well without further interference. On this date, however, there was a sudden accession of mischief in the joint, accompanied by the most violent constitutional disturbance. Mr. Coe was inclined at once to operate, but he yielded to the suggestions of others, and tried general antiphlogistic means, &c., all of which were exercised without success. On the 28th of August the joint was excised; the usual semilunar incision was adopted in this case; three-quarters of an inch of the end of the femur was sawed off, and the thickened synovial membrane cut away from the back of the patella and trochlea of the femur; the articulating surface of the tibia presented a small opening, the size of a pea, leading from the internal tuberosity into the joint, thus forming a communication externally; a vertical incision was then made through the soft parts, from the centre of the wound, laying open the joint, and carried down to a sufficient extent to expose the carious tibia; the triangular flaps were dissected back; a thin slice of the articulating surface of the tibia, one-third of an inch thick, was sawn off; this brought into view a hollow, the size of a filbert in its internal tuberosity; a wedge-shaped piece, the base above, including all the diseased part, was cut out; thus, Mr. Coe writes, all the diseased bone was cleared away, and a channel established for the escape of secretion; the wounds were brought together by five points of suture, and the limb placed on a swinging splint. The case progressed most favourably up to September 4; but, shortly after, the angles of the wound refused to heal, and in about a month after the operation the tissues covering the lower part of the femur became swollen and painful, and the cicatrix threatened to give way; however, both the local and constitutional disturbances were soon alleviated by a free discharge of pus from beneath the flaps; a free incision also of the fascia lata was made, which arrested the matter in passing upwards; from this period he gradually improved, and hereafter I shall notice his present condition.

Case XXXV.—On the 20th of January, 1856, Frederick F., aged 23, a baker, a pale, strumous-looking man, was admitted into King's College Hospital, under the care of Mr. Partridge, with disease of the knee-joint. Various modes of treatment were adopted, and without any beneficial effect; therefore, on the 30th of July, Mr. Partridge excised the joint

after the following manner:—The patient was put under the influence of chloroform, and an H-shaped incision made (the lateral incision being made well back), the anterior aspect of the joint at the level of the lower edge of the patella was opened, on dividing the infra-patellar ligament, and the bone reflected upwards. The synovial membrane and ligaments about the articulation were then cut though. The joint now being put in a flexed position, the articular ends of the femur and tibia were successively sawn off. The loose portions of degenerated synovial membrane having been clipped away, the cut surfaces of the bones were placed parallel to each other, and the incisions united by sutures. On examining the removed portions, there was found extensive ulceration of the cartilages, especially in the inner condyles of the femur, which was almost bare. On the 14th the splints and bandages were removed for the first time since the operation, and the wounds looked well. On the 23rd the granulations were looking rather profuse; external and internal wounds closing; transverse cicatrizing at either extremity; no pain now. On 29th, discharge very scanty, abscess above the knee quite closed; was able to sit up in bed[a].

Case XXXVI.—Mr. South, on the 9th of August, 1856, excised the knee-joint of a woman, aged 40, for incurable disease of the part. He adopted the semilunar incision right across the joint, and removed about an inch and a half of the lower end of the femur, and an inch of the tibia; the line of this incision entered the sac of a large abscess. The wounds, by the 6th of September, were entirely healed up; two or three little ulcerated spots remained, from which exuded a few drops of pus; there was no pain or uneasiness, and, so far as the operation is concerned, the result is satisfactory; the limb has a tendency to turn inwards, and is a little twisted; the general health is perfect in every respect[b].

Case XXXVII.—Mr. Brace, Surgeon to the Bath Hospital, excised the knee-joint from a man aged 27 years, for disease which had resisted treatment for eighteen months. On the 16th of August, 1856, "one inch from the femur, and half an inch from the tibia, were removed; the synovial membrane was extensively disorganized, and the incrustating cartilage on the head of the tibia widely destroyed, and in one spot the bone bared, the cancellated structure of the bone softened." The man died twenty-four hours after the operation.

Case XXXVIII.—Mr. Humphrey, Addenbrooke's Hospital, Cambridge, cut out the knee-joint from a boy aged 12,

[a] Lancet, vol. ii. p. 279. 1856.

[b] Lancet, September, 1856.

August 31, 1856. The history of this case is, I conceive, peculiarly interesting. The child was admitted with the knee bent to a right angle; indented cicatrices of sinuses, which had evidently extended deeply, told of former serious disease; at this time all acute symptoms had passed away; there was no swelling and no pain, but the joint had been destroyed; no movement could be effected, and the limb was rendered quite useless by the contraction. The patient was placed under chloroform, and extension was made carefully and steadily; the joint yielded without much difficulty, and was straightened and fixed upon a splint bound to its hinder part; it was kept thus for several weeks, and being done up in a gum-chalk bandage, the patient was allowed to turn upon it a little; the progress, however, was not satisfactory: the joint gained no strength; the limb was quite unable to bear the weight of the body; the contraction began to recur; and it was evident the limb would remain a useless one; therefore, on the above date the operation was performed. The patella was firmly anchylosed to the femur, and was accordingly left, the tibia and femur were united by firm fibrous tissue, which was partly divided by the knife, partly torn in flexing the joint. A small portion of each bone was removed, and the limb placed in a straight position, supported by splints. The operation was not followed by any febrile disturbance or bad symptoms; suppuration took place in the usual manner, and subsided as the healing of the wound went on; the latter process was completed in little more than a month, and in about two months there was firm union between the bones[a].

Case XXXIX.—Mr. Square, of Plymouth, excised the knee-joint from a boy aged 11, August 25, 1856. He adopted the H-incision; removed a thin slice from the patella, a quarter of an inch of the articulating surface of the tibia, and two inches of the femur. The boy had a very severe attack of scarlatina six days after the operation. Mr. Square writes thus to me, November 23, 1856:—"The discharge has not been very profuse; no abscesses have been opened, and after the subsidence of the scarlatina he had but little constitutional disturbance. His constitutional health and general condition are now moderately good. The size of the joint is still much enlarged, and the vertical incisions are not healed; flabby granulations keep the edges apart."

Case XL.—Mr. H. Thompson, Assistant Surgeon to University College Hospital, excised the right knee-joint from a

[a] Association Medical Journal.

man, aged 37, October 1, 1856. The history is briefly as follows:—"He dislocated his right knee about three years ago; it was overlooked, and remained unreduced in a very bad position, so that he could not use it in walking. His other foot was the subject of talipes equinus from a burn in childhood," and Mr. Thompson states "it had been operated on four times without benefit; consequently, he was a cripple, and progressing rather than walking, by means of two crutches."

On the 1st October Mr. Thompson "removed the articulating surfaces of the tibia and femur, broke up the adhesions, bringing the limb into good position. Everything went on well for five weeks, at the end of which time there was very considerable consolidation, and nothing could promise better. He was then the subject, together with two other cases in the same ward, of erysipelas, which produced great mischief; abscesses formed around the end of the femur, and broke up all the adhesions. Writing to Mr. Smith, December 3, 1856, and to whom I am indebted for these details, Mr. Thompson says:—"He has struggled through this with care, and is now in no very favourable condition; there is no union, and much suppuration, and he is weak. I would have amputated the thigh last week, but he would not submit; and now it seems a shade better."

Case XLI.—Mr. Fergusson resected the knee-joint from a young woman, aged 27, on the 11th of October, 1856. Her history is as follows:—She had been married, and suffering from disease of the right knee for eleven months, contracted first from the sequelæ of fever attending childbirth. She was admitted into King's College Hospital during the summer, when treatment of various kinds had been tried, but the symptoms got worse, the patient resisting any operative interference until the above date. The usual mode of excision was adopted: the joint was found in a very diseased condition; there was but little shock, notwithstanding the reduced condition of the patient. I am indebted to Mr. H. Smith for the particulars of this case. And in recently writing to me he says:—"I paid her a visit, November 16, five weeks after the operation; I found the limb in excellent position, the wounds almost entirely healed, the patient improved in condition, and in good spirits, although still very thin and pale."

Case XLII.—Mr. Page, of Carlisle, excised the knee-joint of a young girl, aged 12 years, on the 13th of October, 1856. She had long suffered from disease of the articulation, the cartilaginous surface of the femur being almost destroyed, an inch from the femur, and a thin slice from the tibia was

removed, and the limb was restored to the straight position, it having been previously bent at a right angle. The report goes on to state, even after some days, "that the patient so far was in the most satisfactory state."

Case XLIII.—Mr. Price excised the knee-joint of a woman aged 26, in the Metropolitan Institution for Invalid Paupers, at Margate, October 15, 1856. At the time that she came under his notice, in the summer of the present year, she was suffering from symptoms of disease of the cartilages of the left knee-joint, complicated with a large abscess situated in front, and external to the joint. At this time the abscess was opened, and the limb steadied on a splint; after this the disease continued, though the health was improved, and excision was performed on the above date. The condyles of the femur were extensively ulcerated, and bared of their cartilage for some extent; the internal tuberosity of the tibia was excavated by a deep abscess, and bore trace of long-standing disease; the back part of the head of the tibia was likewise necrosed; the posterior portion of the femur between the condyles was likewise necrosed, and a piece of necrosed bone was found separated, and loose in the joint. The extent of bone removed was about two inches and a quarter at the most; the cut surfaces were perfectly healthy; the patella, being healthy, was allowed to remain undisturbed in the upper flap. I am deeply indebted to Mr. Price for the details of this most interesting case.

Case XLIV.—Mr. Page, of Carlisle, excised the knee-joint of a young woman aged 19, October 27, 1856. The disease in the joint commenced twelve years before, after injury, and the limb had been totally useless for sixteen months; it was firmly fixed at an angle of 45°, and much everted. The joint was exposed by means of a horse-shoe-shaped incision, and about half an-inch of each of the bones was removed, together with nearly an inch of the patella, which was firmly anchylosed to the inter-condyloid sulcus, and prevented the bones being placed in close apposition. The disease was found to be limited to the cartilage investing the external condyle, and to the corresponding articular surface of the tibia; the cartilage appeared to be converted into flocculent, fibrous membrane, in which was entangled a small, irregular piece of necrosed bone, not larger than a split pea; and immediately opposite this was a cavity in the head of the tibia capable of containing a pistol-bullet, also filled up by fibrous matter. The cut osseous surfaces looked healthy.

Case XLV.—Mr. Bowman excised the knee-joint from

a girl aged 16, November 1, 1856. The knee was much enlarged, and bent at an acute angle; the head of the tibia was displaced outwards; strong fibrous anchylosis. The articular cartilage had disappeared from the patella, and in part also from the inner condyle of the femur; the cancellated tissue of the bones was soft; one inch and a quarter of bone was removed; the disease began three years before. I am indebted to Mr. Bowman for this description, and also for the present state of the patient.

Case XLVI.—Mr. Jones, of Jersey, excised the knee-joint of a little boy aged 7, December 2, 1856. For the particulars of the case I am indebted to the courtesy of this eminent surgeon. He writes thus:—"I operated, as I told you I intended, last Tuesday. My patient is a little boy aged 7 years. In this case the disease had been progressing three years; there was considerable pulpy degeneration; the cartilaginous heads of the femur and tibia were in progress of ulceration; the tibia was partially dislocated backwards. Although I removed a considerable portion of bone, I found it impossible to bring the leg straight without dividing the hamstrings. It is still too soon to pronounce any kind of sentence on the little invalid. As usual, I had no vessel to secure."

Case XLVII.—Mr. Bowman excised the knee-joint from a girl aged 16, December 6, 1856. The knee was much bent and enlarged; duration of disease, three years. The cartilages had entirely disappeared from all the bones, excepting a few fibrous patches loosely adhering to the trochlear surface of the femur by soft gelatinous tissue; the exposed surfaces of the bones were rough, but not soft; ligaments vascular and softened; synovial membrane pulpy; abscesses around the patella; two inches of bone removed.

Case XLVIII.—Mr. Hey, of Leeds, excised the knee-joint of a delicate young girl aged 11, in May, 1856. She was four years the subject of diseased knee-joint. The joint was stiff at a right angle, and there was a large fistulous opening. Excision of the whole articulation was performed, a horse-shoe flap being made; and about half an inch from the tibia, and an inch and a half from the femur, being sawn away; the patella was left. The synovial membrane was found thick and pulpy, and the cartilages were extensively ulcerated; both bones were much softened. Subsequent to the operation the extremity of the femur got exposed in the wound, and was removed with the bone-forceps. The same report states:—"The child is doing well; the child's health was rapidly improved,

and the wound was healing healthily. It is feared, however, there will be no bony union"[a].

Case XLIX.—Mr. Hey, of Leeds, excised the knee-joint from a married woman, aged 36, July 12, 1856. Three years before, she received a severe kick in the joint, and disease supervened, and gradually increased up to the above date. In this case the synovial membrane had passed into pulpy degeneration; a large quantity of pus was found in the joint, but no disease of bone, beyond extensive ulceration of the cartilages of the contiguous bones and of the patella. About two inches of bone were removed altogether, and the surface of the patella was pared. Mr. Hey, who kindly furnished me with this report, says:—"For more than a month the case was perfectly satisfactory in every respect, the flap being perfectly cicatrized in three-fourths of its extent,—the matter escaping at the two sides." The report goes on to state:—"On the 24th of August an abscess was opened just below the knee on the inner side, and since that time, at intervals, other abscesses have formed, chiefly in the same situation, and one also in the popliteal space." Writing to me, December 30, 1856, he says:—"The appearance of the limb is now very good, the discharge abating, and a good prospect still exists of a satisfactory result. The health of the patient keeps firm. The union of the bones is by no means complete." Mr. Hey described the same condition to maintain, at the present time, in the first case operated on.

Case L.—Mr. Quain excised the knee-joint of a young man, aged 26, in University College Hospital, October 9, 1856. He was for four years afflicted with pain in the joint, attended with considerable swelling; and about a year prior to the above date he had been in the hospital, and relieved from pressing symptoms. On this, his second admission to the hospital, the joint and parts in its neighbourhood were found much enlarged, and a good deal deformed, especially at the outer side, where there was considerable bulging; this swelling was tense and elastic to the touch; at the back part of the limb, near the outer hamstring, was the opening of a sinus; the bones were easily moved from side to side, unrestrained by the softened ligaments, and they grated as they passed, one the other. The patient was worn out by suffering, and demanded an operation. Excision was performed with two lateral incisions, joined by a transverse one across the ligament of the patella; as the flap

[a] Medical Times and Gazette, October 4, 1856.

was raised up, an abscess was discharged; it was near the patella, but had no connexion with that bone; an inch of the femur was sawn off in a curved direction, from behind forwards, and a thin layer of the tibia was removed horizontally, with a view to the easy discharge of pus afterwards; a seton was passed backwards near the outer hamstring; the section of the edges of the bones appeared sound; only a few fragments of cartilage remained on the pieces removed, and they were soft and gray; the exposed bone was highly vascular and rough; the small remnants of synovial membrane were likewise vascular and pulpy. Mr. Quain, who has most politely forwarded to me the above details, states, December 30, 1856:—"From the time of the operation the case went on in all respects well for several days; healthy suppuration was established; but on the 16th an unfavourable change was manifest: the wound was dry, suppuration was stopped, and the patient became excited, at a later period even delirious; and he died thirteen days after the operation." The dissection is most interesting:—"A sinus was formed under the vastus internus muscle, invading the crureus, and reaching nearly half-way up the thigh; the lower end of the adductor magnus was pale, and small deposits of pus were found disseminated among its fibres; there was another short sinus behind the femur, and a third, likewise a short one, at the outer side of the leg; both bones were soft at their truncated ends; about an inch of the thigh-bone was scraped away before the natural resistance of the osseous structure was met with. By microscopic examination some fat, but no pus, was distinguished in the softened bone; among the bloodvessels there was no purulent deposit anywhere. The puncture of the seton, which, it should be said, had been removed in a couple of days after the operation, was seen to be between the popliteal vessels and the outer hamstring; the condensation around it was well defined; in the viscera there was nothing worth noticing."

Case LI.—Mr. William Nichols, Surgeon to the Norwich Hospital, excised the knee-joint from a young woman, aged 19½ years, October 11, 1856. About two years ago she was a sufferer from subacute inflammation of the synovial membrane of the left knee-joint; this was treated, but with little behefit, and about six months ago the joint became more swollen, exquisitely painful from every movement, and her general health began to decline from the local mischief; and, under these circumstances, the joint was removed upon the above date. The semilunar incision was adopted; the condyles of the femur and

the articluating surface, of the tibia were removed, the tibio-fibular articulation being left untouched. The cartilages were found to be absorbed in patches on the tibia and femur; on the patella not so; the synovial membrane was clipped away; sutures were put in, and warm water-dressing applied. On this day, January 5, 1857, Mr. Nichols has kindly informed me:—"The limb has been kept perfectly quiet in an apparatus made for it; and at this time, thirteen weeks after the operation, I am happy to say the case is going on satisfactorily; the wound is nearly healed, and the limb promises to be a useful one."

Arranged in the Table on the following page are all the cases of excision of the knee-joint which I have been able to collect either from public records or private communications: and it would appear that fifty-one operations have been performed since my last report closed.

Now comes the difficult, and by no means enviable, occupation of analyzing thoroughly the results as given. The review demands grave and serious consideration. The cause of death in each instance must be strictly investigated, as well as the reason of failure in others, demanding, as a *dernier ressort*, amputation of the limb. Out of 50 operations, death followed in 9 instances, from which number 1 must be subtracted, Case XXIII., *partial* excision. 7 were subjected to amputation, and only 1 died. One case is said to be in a precarious way, and all the rest are either cured with useful limbs, or progressing rapidly towards the same result.

The first fatal case, No. III., was operated on by Mr. Fergusson, and died on the fifth day. Now, from the history of the case, it will be seen that the child would most probably have died after any severe operation, for Mr. Henry Smith writes:—"The patient was in a very anemic and bloodless condition, which led one to predict unfavourably of any severe operation." Now it is manifest that here the result should not be ascribed to the *peculiar* operation. Excision of the knee-joint, performed by the perfect and rapid hand of Mr. Fergusson, produced no greater shock, to say the least of it, than would have been incurred by amputation, and one or other was demanded to give the creature a chance for life.

The second fatal case, No. XI., was operated on by Mr. Tatum, and died on the seventeenth day, of pyemia; so he might after amputation. In my opinion, this case was not fitted for excision at all, and amputation should have been performed. In the report it is stated "that the bones were *pretty* healthy

TABLE *of all the Cases operated on from December,* 185

A few Cases that occurred prior to the above date, and no

No.	Surgeons.	Hospitals.	Sex and Age.	Date of Operation.
1	Mr. Pirrie, . . .	Aberdeen Royal Infirmary, ...	Male, 10 years,	May 17, 1854,
2	Mr. Brotherston,	Alloa Hospital, ...	Male, 10 ,,	May 19, 1854,
3	Mr. Fergusson, .	King's College Hospital, London, . .	Male, 10 ,,	Aug. 19, 1854,
4	Mr. Landsdown, .	Bristol Infirmary, ...	Female, 12 ,,	Sept. 26, 1854,
5	Mr. Humphrey, .	Addenbrooke's Hospital, Cambridge, .	Female, 20 ,,	Oct. 27, 1854,
6	Mr. Pirrie, . . .	Aberdeen Royal Infirmary, ...	Male, 14 ,,	Nov. 4, 1854,
7	Mr. Hughes, . .	Staffordshire Infirmary, ...	Female, 27 ,,	Nov. 16, 1854,
8	Mr. Fergusson, .	King's College Hospital, London, . .	Male, 4 ,,	Dec. 16, 1854,
9	Mr. Brotherston, .	Alloa Hospital, ...	Male, 11 ,,	Jan. 12, 1855,
10	Dr. Keith, . . .	Aberdeen Royal Infirmary, ...	Male, 33 ,,	Mar. 10, 1855,
11	Mr. Tatum, . .	St. George's Hospital, ...	Male, 18 ,,	May 1, 1855,
12	Mr. Humphrey, .	Addenbrooke's Hospital, Cambridge, .	Male, 47 ,,	May 4, 1855,
13	Mr. Birkett, . .	Guy's Hospital, London, ...	Male, 34 ,,	May 29, 1855,
14	Mr. Jones, . . .	Jersey Hospital, ...	Female, 9 ,,	Aug. 20, 1855,
15	Mr. Holt, . . .	Westminster Hospital, ...	Female, 47 ,,	Aug. 24, 1855,
16	Mr. Statham, . .	University College Hospital, ...	Female, 5 ,,	Sept. —, 1855,
17	Mr. Fergusson, .	King's College Hospital, London, . .	Male, 18 ,,	Feb. 2, 1856,
18	Mr. Erichsen, . .	University College Hospital, London, .	Male, 22 ,,	Feb. 6, 1856,
19	Mr. Coe, ...	Bristol Hospital, ...	Male, 6 ,,	Feb. 9, 1856.
20	Mr. Fergusson, .	King's College Hospital, London, . .	Female, 20 ,,	Mar. 1, 1856,
21	Mr. Stanley, . .	Bartholomew's Hospital, London, . .	Female, 15 ,,	Mar. 29, 1856,
22	Mr. Bowman, . .	Private, ...	Female, 30 ,,	April —, 1856,
23	Mr. Cutler, . . .	St. George's Hospital, ...	Male, 15 ,,	April 17, 1856,
24	Mr. Marett, . .	Jersey Hospital, ...	Female, 19 ,,	April 17, 1856,
25	Mr. Price, . . .	Metropolitan Hospital, Margate, . . .	Female, 15 ,,	May 17, 1856,
26	Mr. Moore, . . .	Middlesex Hospital, ...	Male, 24 ,,	May 21, 1856,
27	Mr. Fergusson, .	King's College Hospital, London, . .	Female, 26 ,,	May 24, 1856,
28	Mr. Windsor, . .	Salford Royal Hospital, ...	Male, 18 ,,	May 29, 1856,
29	Mr. Jones, . . .	Jersey Hospital, ...	Female, 23 ,,	June 20, 1856,
30	Mr. Erichsen, . .	University College Hospital, London, .	Male, 9 ,,	July 2, 1856,
31	Mr. Humphrey, .	Addenbrooke's Hospital, Cambridge, .	Male, 29 ,,	July 18, 1856,
32	Mr. Humphrey, .	Addenbrooke's Hospital, Cambridge, .	Male, 20 ,,	July 18, 1856,
33	Mr. Price, . . .	Metropolitan Hospital, Margate, . . .	Male, 9 ,,	July 27, 1856,
34	Mr. Coe, ...	Bristol Hospital, ...	Male, 4½ ,,	Aug. 28, 1856,
35	Mr. Partridge, .	King's College Hospital, London, . .	Male, 23 ,,	July 30, 1856,
36	Mr. South, . . .	St. Thomas' Hospital, London, . . .	Female, 40 ,,	Aug. 9, 1856,
37	Mr. Brace, . . .	Bath General Hospital, ...	Male, 27 ,,	Aug. 16, 1856,
38	Mr. Humphrey, .	Addenbrooke's Hospital, Cambridge, . .	Male, 12 ,,	Aug. 31, 1856,
39	Mr. Square, . .	Plymouth Hospital, ...	Male, 11 ,,	Aug. 25, 1856,
40	Mr. Thompson, .	University College Hospital, London, .	Male, 37 ,,	Oct. 1, 1856,
41	Mr. Fergusson, .	King's College Hospital, London, . .	Female, 27 ,,	Oct. 11, 1856.
42	Mr. Page, . . .	Carlisle General Hospital, ...	Female, 12 ,,	Oct. 13, 1856.
43	Mr. Price, . . .	Metropolitan Institution for Paupers, Margate,	Female, 26 ,,	Oct. 15, 1856.
44	Mr. Page, . . .	Carlisle General Hospital, ...	Female, 19 ,,	Oct. 27, 1856
45	Mr. Bowman, . .	King's College Hospital, London, . .	Female, 16 ,,	Nov. 1, 1856
46	Mr. Jones, . . .	Jersey Hospital, ...	Male, 7 ,,	Dec. 2, 1856
47	Mr. Bowman, . .	King's College Hospital, London, . .	Female, 16 ,,	Dec. 6, 1856
48	Mr. Hey, . . .	Leeds General Hospital, ...	Female, 11 ,,	May —, 1856
49	Mr. Hey, . . .	Leeds General Hospital, ...	Female, 36 ,,	July 12, 1856
50	Mr. Quain, . . .	University College Hospital, London, .	Male, 26 ,,	Oct. 9, 1856
51	Mr. Nichols, . .	Norwich Hospital, ...	Female, 19 ,,	Oct. 11, 1856

en my last Report closed, up to December, 1856.

iced in my former Tables, are also introduced here.

Result as to Life.	Condition of the Limb. Observations.
ecovery, . .	Amputation of thigh; complications; measles; hectic.
ured, ...	With perfect use of the limb.
eath, ...	From operation.
ured, ...	With perfect use of the limb.
ured, ...	With perfect use of the limb.
ecovery, . .	Amputation; complication; severe phlegmonoid erysipelas.
ured, ...	With perfect use of the limb.
ured, ...	With perfect use of the limb.
ured, ...	With perfect use of the limb.
covery, . . .	Amputation.
ath, ...	Pyemia.
red, ...	With perfect use of the limb.
covery, . . .	Amputation; complication; hospital gangrene, &c.
red, ...	With perfect use of the limb.
ath, ...	Complication; extensive bed-sores.
lieved, . . .	Operation imperfect; only partial excision.
red, ...	With perfect use of the limb; walking in thirteen weeks.
red, ...	With perfect use of the limb.
red, ...	With perfect use of the limb.
red, ...	With perfect use of the limb.
covery, . . .	Amputation.
ath, ...	Lived for five months after, free from the excruciating pain; died of organic disease.
ath, ...	Imperfect operation; only partial excision.
covering, . .	With a useful limb.
red, ...	With perfect use of the limb.
ath, ...	Excessive hemorrhage; death on fourth day.
ath, ...	Phlebitis; pleuritic inflammation and vomicæ in lungs.
ath, ...	Amputation.
overing, . .	"Rapidly improving, and will have a useful limb."
red, ...	With perfect use of the limb; union perfect in nine weeks.
red, ...	Bones united by solid medium, and able to bear his weight upon limb; a little more time will perfect it.
overy, . .	Amputation: excision was pressed in this case. Dr. Humphrey did not think it suitable
overing, . .	Under treatment; health much improved, and anchylosis far advanced.
overing, . .	"With every hopes of a perfectly straight, useful limb."
overing.	
overing, . .	Under treatment.
th, ...	Completely rallied from the operation, and died suddenly from a slight effort in bed.
ed, ...	With perfect use of the limb.
overing, . .	Under treatment.
. . . . .	Under treatment.
overing, . .	"At end of five weeks wounds almost healed; health greatly improved."
overing, . .	"Limb quite firm and straight."
overing, . .	"In five weeks very considerable union of the bones; every prospect of speedy use of the limb."
overing, . .	"Limb in good position; straight; general health as good as could be desired."
overing, . .	"Union between the bones becoming firm; wounds nearly healed."
arious state,	Appearance of secondary abscess in parotid region.
vering, . .	Union between the bones delayed.
vering, . .	Union between the bones delayed.
h, ...	Thirteen days after the operation, delirious.
vering, . .	"The wound is nearly healed, and the limb promises to be a useful one."

when cut through." Whether this applies with equal force to the two bones is questionable, for it is stated afterwards, that the tibia was "especially vascular." Now my reading of this sentence is, that the tibia was not in a sound state, and hence, "even more of the tibia was removed;" and the post-mortem examination, I think, confirms this view, for it is stated, "that the cut end of the femur was coated with a grayish layer of lymph, and its cancellous texture, as far as the line marking the junction with the epiphysis, was filled with a similar deposit, and the shaft was perfectly healthy." But now observe the changes in the diseased bone: "The cut end of the tibia was excavated by caries, and its shaft for three or four inches was extremely carious and infiltrated with pus." Surely such ravages of disease were not brought about within the few days between the operation and the patient's death. I have no doubt that the excitation produced by the *division* of diseased bone may be looked upon as one of the causes giving rise to capillary phlebitis, purulent infiltration, and blood-poisoning.

The third fatal case, No. xv., was operated on by Mr. Holt. The patient was greatly emaciated; "on the eighth day she complained of soreness over the sacrum, and although immediately placed upon the water-bed, the sore continued to extend, and she died on the eighteenth day." In the treatment of fractures with the long splint, I have frequently found this annoying symptom setting in early, but have never failed in checking it, when the patient was under 60, by the judicious adjustment of perforated pillows (far better than any water-bed), a strong solution of nitrate of silver to the back, &c., and the free administration of stimulants. Had this case occurred with me, and that all else failed in arresting the ulceration, I should not have hesitated in placing the patient in the sitting posture, with the limb steadily fixed in the box which I have recommended on such occasions. The post-mortem revealed this fact:—"The extremities of the bones were covered with lymph, with a degree of vascularity which augured well for recovery." Now it may, I think, be fairly inferred, had the sore upon the sacrum been removed from pressure, a like repair would have been extended to it.

The fourth fatal case, No. xxii., was operated on by Mr. Bowman; but death cannot strictly be ascribed to the special operation. Through the politeness of Mr. Bowman, I obtained the following valuable information, December 10, 1856:—"The lady, whose case I briefly related to you before, died between four and five months after the operation. Tubercular disease in the lungs and kidney, and a large gall-stone which lay in

an abscess in the situation of the gall-bladder, were found. There was no union of the ends of the bones, but large sinuses about the part. The veins of the lower extremities, and even the iliac veins, were impacted with fibrinous clots; but there were no purulent deposits, so called." In the report of the case it is stated that the operation afforded an exemption from pain for three months: as much as possibly could have been expected from any operative interference, when such extensive disease of vital organs prevailed.

The fifth fatal case, No. xxiii., was operated on by Mr. Cutler. In my mind this case does not fairly come within the category of those of excision of the knee at all. An imperfect operation was accomplished; the diseased cartilaginous surface of one bone removed, while the other was permitted to remain. True, it is stated that the small spot of caries on the tibia was gouged out. But this is not enough, according to my views, for the perfection of the operation of excision of the knee-joint. I contend, if the articulating surface of one bone be taken away, that of the other must likewise be removed, whether diseased or healthy. The thinnest slice will suffice, so that the cut osseous surfaces may lie in contact, and ultimately be grown into each other. The polished cartilage will not unite with the cut bone—no strong, permanent union will cement them together, and Nature, if she has sufficient power, will struggle to remove the cartilage, and then bring about union; but during these efforts profuse discharge is kept up; the tendency to capillary phlebitis evoked, sinuses are formed, and ultimately the patient, worn out with a partially developed hectic, sinks and dies.

The sixth fatal case, No. xxvi., was operated on by Mr. Moore. It is not recorded whether the end of the femur was removed or not; but it is stated:—"In the evening it was found necessary to open the parts again, on account of hemorrhage; all the sutures were removed, and the parts left exposed for the night." The irritation created by the disturbance and exposure of the extensive cut parts, no doubt, contributed to the manifestation of the great constitutional excitement which carried off the patient on the fourth day.

The seventh fatal case, No. xxvii., was operated on by Mr. Fergusson, and died, on the fifteenth day, of extensive phlebitis, pleuritis, and vomicæ.

The eighth fatal case, No. xxviii., was operated on by Mr. Windsor. It is stated that about "three hours" after the operation "hemorrhage to so great an extent took place, that he [the patient] became almost pulseless." From this period con-

stitutional disturbance was gradually developed, persistent vomiting, rapid pulse, &c. Again, we find a small sore formed over the sacrum, and a piece of bone, apparently part of the internal condyle, projected through the granulations, and appeared dead. On the 11th of October the limb was amputated, and on the 16th the patient died. I attribute the entire failure of this case to the prostrating effects of the fearful hemorrhage which was permitted to take place immediately after the operation.

The ninth fatal case, No. xxxvii., was operated on by Mr. Brace. I have obtained, through the kindness of this gentleman, the following interesting particulars:—"The man rallied immediately and completely from the effects of the chloroform; he slept well, and made a good breakfast on the following morning; he fainted, and died, after making some slight efforts to pass water, twenty-four hours after the operation." "Post-mortem examination revealed no disease of the heart or lungs; but the pleuræ were closely adherent to the ribs on either side, the cavity being apparently obliterated by *fat;* there were also large depositions of fat in the omentum and abdominal walls; but in no other part of his body." Mr. Brace continues:—"I cannot attribute his death to the special operation; had any other capital operation been performed, I believe he would have died the same way from syncope; could we have suspected his condition, brandy would, I believe, have saved him." I likewise have no doubt that, from the very first, stimulants should have been freely administered here. Mr. Brace concludes:—"This case promised at first so favourably, that to many the result would be discouraging; but I shall have no hesitation in performing the same operation when an opportunity offers."

The tenth fatal case, No. l., was operated on by Mr. Quain:—"From the time of the operation," writes Mr. Quain, "the case went on in all respects well for several days; healthy suppuration was established; but on the 16th of the month an unfavourable change was manifest. Then the wound was dry, suppuration was stopped, and the patient became excited; at a later period, even delirious. He died thirteen days after the operation." I have often seen patients die in a similar way after amputation. The particulars of this case and the post-mortem examination are most interesting, and I feel deeply indebted to Mr. Quain for them. I may here remark, relative to the seton that was used, that it was not necessary; and this was Mr. Quain's opinion afterwards. In his letter he distinctly says:—"The seton was used in consequence of my having

known pus to accumulate between the bones, its escape being prevented by a barrier of muscle on each side. But that expedient turned out to be wholly unnecessary, for, with the same view of allowing a free escape for the purulent secretion, I had made the lateral incisions far back, and the result was, that the pus, which was secreted abundantly, was discharged freely at the sides of the limb."

We next come to consider the cases, after excision, requiring amputation. The first case requiring amputation after excision, No. I., was operated on by Professor Pirrie, May 17, 1854. In reply to my inquiries, he informed me, Sept. 24, 1856, that—"Measles were very prevalent at the time, and the boy was attacked, in a very severe form, on the third day after the operation. Hectic fever quickly supervened, and on the 10th of June, twenty-four days after the operation, amputation of the thigh was performed in its lower third. I think it must be ceded in this case, that the very unusual complication which threatened the boy's life militated powerfully against the success of the operation, and to it must be ascribed, in a great measure, the apparent necessity for the removal of the limb. The boy made a rapid recovery, and was dismissed cured, August 18, 1854."

The second case requiring amputation after excision, No. VI., was operated on by Professor Pirrie; excision was performed on the 4th of November, 1854; four days after, the patient was violently attacked by phlegmonous erysipelas. On the 13th of November, nine days after, the thigh was amputated through the lower third, and the patient was dismissed cured on the the 19th of December. Professor Pirrie, writing on the 2nd of October, 1856, in answer to some questions of mine, says:—"The man never had any form of erysipelas before this attack, but there were many bad cases of erysipelas at the time; it commenced in the under part of the leg; purulent collections formed beneath the skin and between the muscles; gangrenous masses of cellular tissue were discharged along with the matter, and sero-purulent infiltration took place into the whole of the cellular tissue of the leg. Coexisting with this extensive suppuration and disorganization of the limb, the extreme exhaustion, and other sources of danger arising from the great irritability of the stomach and bowels, rendered amputation necessary." I shall only remark, and in Mr. Pirrie's words, "measles in one case, and phlegmonous erysipelas in the other, were very unfavourable circumstances."

The third case requiring amputation after excision, No. x., was operated on by Dr. Keith, March 10, 1855; but recurring abscesses down the leg and up the thigh, with persistent diarrhœa, &c., demanded amputation, which was performed on the 20th of October. He made a most rapid recovery after, and was dismissed in robust health on the 30th of November, 1855. In reference to this case, Dr. Keith, in writing to me, Sept. 30, 1856, says:—"The latest entry in Thompson's case is dated Monday, 30th of June, 1856.:—Presented himself to-day, looking stout and well, walking on an artificial limb most nimbly." Dr. Keith concludes:—"This is one failure in my hands out of three, but the patient lives, and is in health, and had a chance for his own limb."

The fourth case requiring amputation after excision, No. VIII., was operated on by Mr. Birkett. The joint was excised on the 29th of May, and on the sixteenth day after, hospital gangrene attacked the wound; however, by judicious local applications and abundant support and stimuli, in about fourteen days from the commencement of this attack, the wound had assumed a healthy aspect, and the powers of the patient were much improved. On the thirty-eighth day after excision amputation, through the thigh, was performed. On the fifth day after this he had a slight hemorrhage, which was controlled by cold and pressure. For several days after, his condition materially improved. Three weeks after the amputation, he had bleeding again from the stump, which seemed to come from near the bone that was bare; this was controlled, but on the morning of the twentieth day after the amputation, a most profuse bleeding took place; it was found to proceed from the mouth of the femoral artery; the trunk was traced up for about an inch, and ligatured; the patient now seemed reduced to the last extremity, and the stump of the femur projected between the flaps; the ligature came away seven days after its application; the cicatrization advanced favourably. From this time his health improved rapidly; the stump healed, except around the projecting bone, and he was able to walk about on crutches. On the 30th of August the necrosed end of the stump came away, and the next day the man left the hospital.

There are some points in the management of this case to which I cannot assent; from the very first the limb, according to my views, was not put under proper restraint; it was not placed in an apparatus which should protect the divided bones from the slightest motion; it was clear that the "back splint and sandbags" were inefficient, for on the "third day the dress-

ings and bed were changed, and a pillow and sandbags substituted for the splint, which was thought to hurt him, but he could not do without the splint, which was again applied."

The repeated necessity for adjusting these means proves their inefficiency. Again, when the gangrene ceased, the wound had assumed a healthy aspect, and the powers of the patient were much improved; it is stated, "it was extremely difficult to retain the ends of the bones in proper relation to each other, and the end of the tibia was drawn backwards behind that of the femur." Why was all this? Simply because the bones were not restrained from the very first; such hideous deformity should never have occurred; when such an unsightly object presented, I can conceive a surgeon supposing "the powers of the patient scarcely sufficient to carry him through the repair of the part," and also join in the belief "that it did not appear probable, even if the part was healed, that the limb could even be a useful one." But I repeat that the limb, which was so easily restrained immediately after the operation, when "the ends of the femur and tibia came together in very good apposition, and the cut surface of the patella rested on them in front, should never have been suffered to distort itself, as above stated; and if so unfortunate an occurrence had been guarded against, there is no reason why, at this time, the improved state of the patient should not have been continued, and the union of the divided bones accomplished. The soft parts proved an abundant vitality, they liberated themselves, and cast off the sloughs around; and it may be presumed, I think, that the general health, which at this time bore up after a severe amputation; considerable hemorrhage three weeks after; another violent effusion of blood in a few days, requiring a tedious operation to secure the main artery above the stump; finally, the elimination of a large piece of necrosed bone; would have been competent to the full reparation of the part after the first operation.

The fifth case, requiring amputation after excision, No. xxi., was operated on by Mr. Stanley, on the 29th March, 1856. I conscientiously ask any impartial judge whether the after treatment was at all likely to insure success. In the report of the case it is stated:—"The patient was shifted every few days, and, consequently, never being firmly fixed, the flexor muscles gradually drew the leg behind the thigh, although the tendons did not appear tight; of course the original wound gaped, and became very extensive." Here, then, we have hideous deformity created, just as in Mr. Birkett's case. We read that, "on the 5th of May her condition was as follows; it appears that from some peculiar condition of the system, some nervous

irritability, the girl is not going on well. The leg is in a semi-flexed position, laying on its outer side, with a large, raw, ulcerated surface over the seat of the wound, discharging a great quantity of matter. The limb, moreover, is very tender; she can scarcely bear it to be touched, much less moved." It requires no great sagacity to divine upon what cause the "nervous irritability" depended; there need be no fanciful "peculiar condition of the system" looked for. The after part of the paragraph, describing the unrestrained and distorted limb, will account for the constitutional disturbance, aggravated pain, and profuse discharge, requiring the amputation of the limb on the 10th of May. The report says:—"After a few days her health began to improve." After the removal of such a misshapen, irritable mass, the favourable result might be conjectured:—"In the early part of August she left the hospital well."

The sixth case requiring amputation after excision, No. XXVIII., was operated on by Mr. Windsor, May 29, 1856. About three hours after, a most violent bleeding took place. "The effect of the hemorrhage, which commenced a few hours after the operation, was so severe," writes Mr. Windsor, "as to make me fear for the immediate death of the patient." This case affords another instance of the ill effects of hemorrhage after excision. No doubt, considerable depression followed, manifested by the tendency to bed-sore, &c. I quite agree with Mr. Windsor, "that all cases after operation should be closely watched." If a competent assistant had been placed beside the bed in this case, that hemorrhage which threatened "the immediate death of the patient" would have been prevented, and controlled until effectual efforts for staying it were put in force. I do not think the treatment by irrigation with cold water very applicable to those cases. It is apt to chill; to prolong the shock, which in many instances, after severe operation, continues for several hours—aye, and in some cases requiring quantities of stimulants for days to prevent the prostration due unto it. Again, I think it acts injuriously, by limiting that active inflammation which is essential to the commencement of repair. In most instances, I believe, failure in the union of the parts may be ascribed rather to a want of healthy inflammation, than to an excess of it. The great controlling power to be depended upon, in regulating, as it were, the inflammatory process in cases of this kind, I believe to be the steady maintenance of the limb, accurately and equally supported, in the straight position; if such management be duly enforced, irritation is quickly subdued, the tendency to engorgement and congestion of the parts divided is diminished or checked, and the inflammatory pro-

cess rises no higher than that which the surgeon frequently excites for salutary purposes. On the 9th of October a piece of dead bone, supposed to be the internal condyle which had projected through the granulations a few days before, appeared unchanged in the wound; but the patient became thinner, weaker; his cough increased. For these reasons his limb was amputated October 11, and he died on the 16th. A very marked want of vitality stamped this secondary operation, for it is stated, "on examining the stump, edges ununited, its surface covered with a blackish, sanious discharge. No examination of the body allowed."

The seventh case requiring amputation after excision, No. xxxii., was operated on by Mr. Humphrey, July 18, 1856. Now the history of this case, and the after dissection of the limb, which Mr. Humphrey politely communicated to me in a letter, dated November 12, 1856, are most valuable and interesting. Mr. Humphrey did not think it a good case for excision, owing to the wide-spread disease of the synovial membrane, and would have performed amputation, but the boy resisted, and solicited for the former. At first the case went on very favourably, but in a short time "the lad's health began to fail, profuse suppuration set in; in the early part of October amputation was proposed, to which the boy would not assent until the 4th of November, when the limb was removed at the junction of the middle and lower thirds of the thigh." The following is a history of the dissection, and Mr. Humphrey's remarks on the cause of failure:—"Dissecting the parts, I found still remains of the thickened and diseased synovial membrane around the extremities of the bones. Indeed, the sinuses, in each direction, led to some of this, and I believe its presence to have been, in great measure, the cause of the continuance of the suppuration, and of the unfavourable progress of the case. At one place, close to a portion of this diseased membrane, the edge of the femur was, to a small extent, bare and rough." Had the child's health borne up a little longer, I think success would have crowned Mr. Humphrey's efforts in this case also, for mark the extent to which repair had gone:—"The cut surfaces of the bones were covered by a softish, granulating-like structure, extending between them and uniting them, except near their circumference, where they were, in many places, joined by tougher fibrous structure. At one point only was there any formation of new bone, and this was insufficient to bridge over the interval between the bones." At the time Mr. Humphrey wrote, the boy was rapidly recovering after the amputation.

We turn now from the dark side of the picture, to investigate those cases which have been most successfully cured. By repeated correspondence I have obtained the most faithful statistics in reference to them, even up to the time at which I write.

With regard to the case, No. II., successfully operated on by Mr. Brotherston, May 19, 1854, I received from him the following account:—

"*Alloa, November* 25, 1856.

"I was at Clackmannan to-day, and called for the boy Strong, who I found at school, but had him sent for. I had an opportunity of seeing him running down the hill to the house, without any assistance, and without the use of a crutch or stick. I will, as you wish, give you the exact state of the leg at the present time. The femur and tibia are firmly anchylosed, and the patella is immovable at the juncture of the bones; the leg is not quite straight; there is a little enlargement of the inner condyle of the femur, which makes the leg a little bent at this point; there is a small ulceration on the front of the knee, on the line of incision, and another upon the outside of the thigh. The leg is, however, strong, and most useful; he can walk and run with freedom, and can stand on it alone, and hop. The boy is of a highly scrofulous constitution, and I think it likely that the ulceration will entirely heal as he gets stronger."

Mr. Brotherston had many difficulties to encounter in the management of this case; he thus writes:—

"When you consider the great obstacles I had to overcome in the treatment of this case, you will wonder how I succeeded so well. The boy lived with his father, a collier, with a large family, all occupying one room. In this case the limb was one inch and a half shorter than its fellow."

The next successful case, No. IV., was operated on by Mr. Landsdown, Sept. 26, 1854. A great many untoward circumtances occurred to delay recovery, as already stated; but, by Mr. Landsdown's management, the limb was brought down from its contracted position; so that in answering my inquiry, he writes, on the 13th of December, 1856:—"She walks about in the house without any assistance, but out of doors she uses one crutch. The leg is two and a half inches shorter than the other."

In reference to the first case, No. V., successfully operated on by Mr. Humphrey, October 27, 1854, he writes to me thus:—

"*Cambridge, Nov.* 22, 1856.

"Eliza Hobbs, the young woman who underwent the operation of excision of the knee-joint, came over to Cambridge, and I have seen her to-day. The bones are firmly united, and bear the weight of the body well; so that she is able to walk without either crutch or stick, the only defect being, that the limb is one inch and a half shorter than the other, and stiff from the hip to the ankle. I am very glad to be able to send you so satisfactory an account of the operation. The wound has long been soundly healed."

The next case, No. vii., successfully operated on by Mr. Hughes, November 16, 1854, is described by this gentleman in a letter with which he favoured me, and dated, Stafford, November 15, 1856. "I received your first note of inquiry, and delayed to answer it till I could conveniently visit Anne Turner, the subject of the operation, who resides on the borders of the county. I have this week been to her residence to make the needful inquiries, and am obliged, she being from home, to content myself with the testimony of her mother. I learn that the sinuses did not permanently close until last April. She has, during the last twelve months, had a very useful limb, and has declared her intention to go out to service. She has often walked to church and back, between three and four miles, and once the same distance, without an interval of rest, and without much inconvenience. The shortening of the limb is between an inch and a half and two inches."

Mr. Henry Smith has kindly informed me as to the present condition of the boy successfully operated on by Mr. Fergusson, December 16, 1856—No. viii. "October 1, 1856. I have frequently seen him walk into the theatre of King's College Hospital when Mr. Fergusson wished to show him to his pupils. In this case an inch and a half of bone was removed."

It is with great pleasure I refer to the case, No. ix., successfully operated on by Mr. Brotherston, January 12, 1855. He has favoured me with the following history as to the boy's present state:—

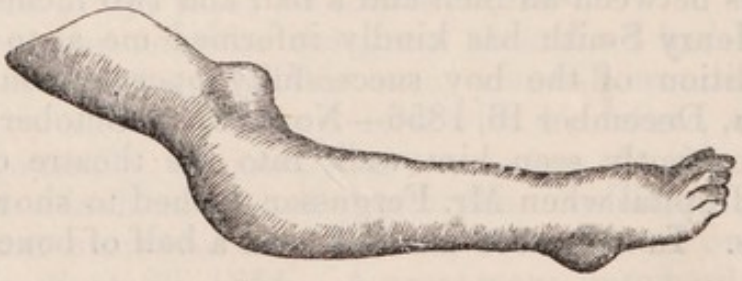
"*Alloa, November* 13, 1856.

"The present condition of the leg, in which I performed excision of the knee-joint on January 12, 1855, is as follows:—The leg continues quite well to this date; the tibia and femur are firmly anchylosed, and the patella movable, but a little drawn up. All ulceration has perfectly healed, and he can walk without the support of a crutch. The leg is an inch

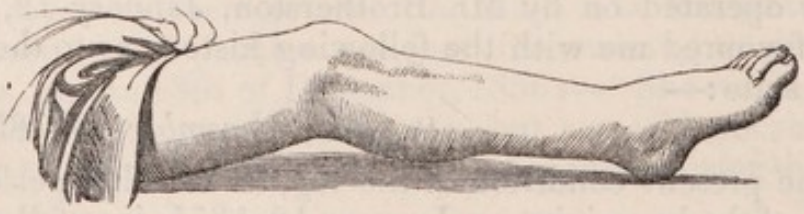
shorter than its fellow, but is evidently keeping pace in growth with it and the rest of the body. The lad has grown much since the operation, and has improved greatly in general health. He is sitting by me at present, while I am writing this note."

Case No. xii., successfully operated on by Mr. Humphrey, May 4, 1856. In a letter which I received from that gentleman, dated November 12, 1856, he states:—"With regard to the man, aged 47, some friends who saw him in the spring of the year told me that he could walk very well with a stick."

I refer, with the greatest pleasure, to the case, No. xiv., successfully operated on by Mr. Jones, August 20, 1855:—"At the expiration of ten days there was an evident amelioration in the little patient's health; five weeks after the operation she was able to raise the whole limb; and three weeks after this went about the wards on crutches; scarcely three months elapsed when she moved about without any appliances to the knee." "For some time past," continues Mr. Jones (writing in June, 1856), "the child has been in perfect health, strong and stout, and can walk quickly about with her little companions." This case affords such an admirable illustration of the powers of conservative surgery, when directed by an able surgeon, that it is a pleasant and instructive thing to contemplate and dwell upon the great change, as represented in the annexed woodcuts of the limb, taken before and after operation.



Before the operation.



After the operation.

In reference to this case I shall just insert the impression made upon Mr. H. Smith, of London, by it. In writing to me

from Jersey, October 3, 1856:—"I was at the hospital here, this morning, and I saw the case where Mr. Jones took out the knee-joint, and at the same time removed almost the entire tibia. It really is a splendid case. The union of the knee is perfect; the tibia has been restored, and the little girl has most excellent use of her limb; runs about famously. It is by far the best case I have seen, considering the amount of disease taken away."

Case xvi., operated on by Mr. Statham, in September, 1855, affords an instructive lesson, too. If all the badly managed cases in surgery were collected together, they would constitute, probably, one of the most valuable books that the surgeon could lay his hand on or consult. In the present instance perfect excision of the joint was not accomplished, and, therefore, the case does not properly belong to this category; but from the history of it at the time of operation, I have no doubt that it should have been so,—in other words, only a part of the diseased bones were taken away. "About two inches of the end of the femur was removed; it was enlarged, softened, and the cartilage absorbed in various distinct spots through its entire thickness, between the two condyles,—the deeper soft parts were in gelatinous gray degeneration. Although the head of the tibia was in primary strumous condition, it was merely gouged to a slight extent, on purpose to see if it could be possible to save it, in our present state of knowledge, without removing it from the body"[a]. The same objections, which I urged in Mr. Cutler's case, apply here with even greater force; for it is admitted that "the head of the tibia was in primary strumous condition." Yet "it was merely gouged to a slight extent," as if to satisfy idle curiosity, "on purpose to see if it could be possible to save it, in our present state of knowledge, without removing it from the body!" It is admitted that the head of the bone was in primary strumous disease: yet it is expected that it shall not resent the gouging and violence offered to it. There can be no second opinion that the articulating surface of the tibia should have been sawn off, diseased or not; but, diseased as it was, even the most sceptical must admit the propriety of the measure. And what is the result of the case? It is said "the patient went out some months ago; her health good; a fistula leading to the joint; *the head of the tibia and soft parts over it in strumous condition.*" And what view *now* does Mr. Statham take of the case? Why, this:—"I believe that the head of the tibia ought still to be excised, and although amputation might

[a] On Gunshot Fractures and Resections, by Statham.

be thought of by some surgeons, I am satisfied that a firm joint might be easily obtained by removal of an inch and a half of the tibia." If *now* requisite, and so likely to be productive of permanent benefit, how much more so, when the part was not so extensively diseased, and when the removal of it would have incurred no additional danger, no new and serious operation, such as opening up the extensive articulation again? But let it likewise be remembered, that some importance must be attached to the quantity of bone removed in reference to usefulness of the limb in progression. It is stated that "about two inches of the end of the femur were removed." A thin slice removed from the articulating end of the tibia, at first, would in all likelihood be enough, while *now*, when the disease has progressed, it is supposed that "an inch and a half" would be required: and yet he expresses even a doubt of this quantity being sufficient, in the words, "although amputation might be thought of by some surgeons."

The case No. xvii., successfully operated on by Mr. Fergusson, February 2, 1856, is most remarkable:—"On May 2, discharged cured; the sinuses are nearly all healed up; the knee is stiff and straight, and the patient is able to bear his weight upon it when walking, thirteen weeks after the operation." "On May 31, the patient came to show himself; he is able to walk without crutches, having the sole of his boot a little thickened." Mr. Jones, of Jersey, in writing to me recently, alludes to this case thus:—"I saw one of Fergusson's cases, a most splendid specimen; the youth walking about almost as if nothing had happened."

Cases No. xviii. and xxx., successfully operated on by Mr. Erichsen, the former on February 6, 1856, and the latter on July 2, 1856, made most rapid recoveries. In the first instance, "the man was walking about the ward on crutches within three months, his general health greatly improved, and contented and cheerful." In the second, "the boy had not one bad symptom, and on September 3, nine weeks after the operation, he was going about the ward on crutches. The joint was firmly anchylosed, and the wounds healed; his recovery is perfect." In reference to both these cases I have been favoured with the following note from Professor Erichsen:—

"*Welbeck-street, December* 1, 1856.

"My dear Sir,—I have much pleasure in giving you the information you require: both patients are now perfectly well; they walk easily with the aid of a high-heeled shoe, and, in fact, have very useful limbs. I have had no case of excision

of the knee since that in July last. That was, perhaps, the most successful of all my cases.

"Believe me to be most sincerely yours,

"John Erichsen."

I have recently heard from Mr. Coe, respecting his two cases of successful excision. The first operated on, February 9, 1856, is thus stated to have progressed:—"By the end of the eighth week he was able to move about freely in bed; by the end of the ninth week he could get about the ward on his crutches; before the end of the tenth week he could bear his weight on the affected leg, and use it in going about the ward." And on the 8th of December Mr. Coe tells me:—"I heard a most favourable account of the boy about two weeks since." In reference to the second case, though much complicated, a happy issue is certain, and must be ascribed to the admirable management of the limb. Mr. Coe, in the letter referred to, concludes thus:—"At this moment I may sum up by saying, he promises to make a good recovery; and, if he do so, he will have a perfectly straight, useful limb. I have paid the lad great personal attention, and have succeeded in keeping the bones in excellent position."

Case No. xx., successfully operated on by Mr. Fergusson, March 1, 1856, was dismissed from hospital, twenty-two weeks after the operation, with the wounds healed up.

Case No. xxiv., successfully operated on by Mr. Marett, April 17, 1856, has turned out most favourably. On the 29th of November, the report which I have received through the kindness of Mr. Jones, of Jersey, states—"She is now able to walk with ease, with the help of a person to support her on one side, and the assistance of a stick."

In reference to the first case, No. xxv., successfully operated on by Mr. Price, May 17, 1856, I have received, by letter, the following intelligence:—

"*November* 19, 1856.

"The girl aged 16, whose left knee-joint I removed on the 17th of May of the present year, at the Metropolitan Infirmary for Scrofulous Children, at Margate, has made an admirable recovery. She now possesses very considerable use of her leg, and, with a high heel to her boot, is enabled to walk about, without the aid of stick or crutch; one or two small sinuses still remain open, but they cause little or no inconvenience. Bony union is not, however, quite complete; but as the general health improves, I have but little doubt of it be-

coming perfect. Surgically speaking, the result has more than realized my most sanguine anticipations."

Case No. xxix., successfully operated on by Mr. Jones, June 20, 1856, promised to make a most rapid recovery; but repeated attacks of erysipelas delayed this event. I have been thus informed by Mr. Jones, Dec. 5, 1856:—"I am, however, happy to say that she is now recovering rapidly; and, I have no doubt, will get perfectly well, with a useful limb." In this case the amount of bones removed was not quite two-thirds of an inch.

In reference to the third case, No. xxxi., successfully operated on by Mr. Humphrey, July 18, 1856, in the beginning of October the patient left the hospital, "the wounds nearly healed, and the bones united by firm medium, so that he could throw the leg about, and was able to bear some weight upon the limb." In the same letter from which I have taken this extract (dated November 12, 1856), Mr. Humphrey says:—"The progress of the case, after the operation, was certainly better than I anticipated, from the very indifferent state of the patient's health, and the foul character of the ulcer consequent on the bursting of the abscess. Indeed, at the time the operation was performed, I should scarcely have ventured on excision, had he been willing to consent to amputation."

Relative to Mr. Price's second case, No. xxxiii., successfully operated on, July 27, 1856, I have been informed, in a letter dated November 19, 1856, by Mr. Price—"That the child suffered for many weeks from a low irritative fever, which favoured the formation of bed-sores. At the time at which I write, there is evidence of some disease in the upper part of the tibia, but I trust that some further interference may enable me to give him a useful limb; his health has very much improved, and anchylosis has proceeded to some extent."

It is a great pleasure to refer again to Mr. Humphrey's successful efforts. His fifth case, No. xxxviii., operated on August 31, 1856, has made an admirable recovery. He favoured me with a letter on the 12th of November, 1856, and thus writes:—"The boy, aged 12, I saw very recently, and he could walk very well without any assistance from stick or crutch; the bones of the leg and thigh being firmly united together, and well able to bear the weight of his body."

In reference to the case No. xli., successfully operated on by Professor Fergusson, October 11, 1856, Mr. Henry Smith has thus written to me, Nov. 18, 1856:—"On paying her a visit, Nov. 16, five weeks after the operation, I found the limb in excellent position, the wounds almost entirely

healed, the patient improved in condition, and in good spirits; although still very thin and pale."

On the 3rd of December, 1856, I received the following gratifying intelligence from Mr. Page, relative to the two cases of excision which he recently performed:—"With regard to the girl whose knee-joint I excised on the 15th of October (Case No. XLII.), I have only to say, that the limb is straight, and apparently quite firm; one large sinus only remains; her health is excellent, and she is getting fat; indeed, after the first operation, she has never had a bad symptom." And, as relates to the second case (No. XLIV.), operated on October 27, 1856, he mentions:—"No untoward circumstance has occurred since the operation; if an extensive abscess which formed on the the outside of the limb be excepted: the wound is healing; the limb is in good position, being straight; and the general health is now as good as could be desired."

Case No. XLIII., successfully operated on by Mr. Price, October 15, 1856, is rapidly recovering. Mr. Price writes to me, Nov. 19:—"Since the operation, the patient has not had a bad symptom; and strange, though but five weeks have elapsed, there is very considerable union of the bones, and a good prospect of a very speedy use of the limb. Relative to the present condition of the cases No. XLV. and XLVII., operated on by Mr. Bowman, he has been polite enough to give me the following statement as to their present condition:—

"*December* 27, 1856.

"The girl operated on in November has gone on without a bad symptom; union between the bones becoming firm; wounds nearly healed; a few small sinuses remaining. The case operated on December 6th has gone on very badly, and the patient is in a most precarious state. A swelling in the parotid region, perhaps secondary abscess, has formed."

In Cases XLVIII. and XLIX., operated on by Mr. Hey, I have every reason to hope, when the limbs are steadily fixed by nicely fitted leather cases, or some other mechanical appliance, and the patients, when in a sufficiently healthy state, permitted to get up and move about, that consolidation of the parts will gradually be effected. It is important to dwell upon this point, as it may prevent too hasty interference by amputation. In my paper on "Excision of the Elbow and Wrist-Joint, and the Preservative Surgery of the Hand," published in the Dublin Quarterly Journal, November, 1855, I have

dwelt, with great stress, upon the certainty of improvement in the condensation of the parts around, and in the vicinity of the excised joint, as time advances. Indeed, this circumstance was strikingly illustrated as regards the knee in many of the foregoing cases, and most remarkably so in Mr. Smith's case, as recorded in the early part of this memoir; but in none so forcibly as in one of Mr. Fergusson's cases, No. xx., the young woman operated on, March 1, 1856. She left the hospital cured; but the limb was not firm. I have received from Mr. Fergusson the gratifying intelligence of its perfect solidity now. In a letter dated January 3, 1857, with which he favoured me, he thus writes:—

"My dear Sir,—This afternoon I learned from one of my dressers who has just been down to Portsmouth, that he had seen one of my cases, a girl on whom I operated ten or twelve months since. She made an excellent recovery; but at the end of four or five months there did not seem the least disposition to the formation of bone. The change of air, however, has been most beneficial; and now the leg is firm, and she walks actively about without any assistance. There is still a small sinus open, but the case is perfect for the length of time.

"Yours, my dear Sir, with great regard,
"Wm. Fergusson."

In my former essay I gave abundant evidence that *the danger of excision of the knee-joint is considerably less than that attending amputation of the thigh;* and stated ample reasons why it should be so. By the mass of evidence just adduced the fact is confirmed.

In my former essay I demonstrated, by numerous examples, that *the after utility and seemliness of the limb* were vastly superior to any artificial substitute, no matter how beautifully contrived. By the mass of evidence just adduced, the fact is confirmed.

In my former essay I forcibly dwelt upon *the necessity of carefully selecting the cases for excision*, and pointed out the prominent features which should influence the surgeon; but I believe the caution has not been applied in every instance. I fear the panting after *eclat* has charmed away some from the stern dictates of judgment; yet I trust this may never be the case—infinite mischief is done by such rashness. Not only is the life of the patient jeopardized by an operation which cannot secure a useful limb for the purposes of life, but the opera-

tion itself is brought into disrepute, and open to the sarcastic criticism of those who know but little about it. *Apropos*, my attention has been directed to an "Introductory Lecture" by Mr. Syme, recently published in the Lancet (November 15, 1856), wherein he alludes to this operation, and in the following terms:—"Vehement and persevering efforts have lately been made to force into fashion two operations, which, while bloody and formidable, have the advantage of being so easy in execution, that they may be accomplished by the most inexpert of operators,—I mean excision of the knee-joint, and removal of the head of the thigh-bone, for disease of the hip-joint." We shall examine into Mr. Syme's assertions as regards the first of these operations, and see whether they contain more truth than is usually ascribed to his statements. All capital operations are formidable: lithotomy; operations for hernia; excision of part or the entire of the upper or lower jaw; securing the main arteries for aneurism; the removal of large portions of the body by amputation, are all formidable operations, yet surgeons do not reject or shrink from them. Excision of the hip, excision of the elbow, excision of the knee, are likewise formidable operations; but the latter I have proved, by lengthened statistics, and even from Mr. Syme's own showing, not to be so dangerous to life as amputation of the thigh; therefore the term 'formidable' must be taken in a restricted sense as applied to excision of the knee, but in its unlimited meaning in reference to amputation of the thigh. Now, as to excision of the knee being, as Mr. Syme elegantly expresses it, a 'bloody' operation, it really is not so. We have the united testimony of Fergusson, Erichsen, Keith, Jones, Smith, Page, Brotherston, Humphrey, and a host of others, that it is not so. But the man who is doubtful about, or ignorant of the anatomy of this region, may easily learn better by reading a few pages of Harrison or Power on the Arteries; or, if he should not wish for anything Irish, let him turn to Cloquet or Quain; or, if he should prefer a Scotch author, Lizars is the man; and he will be informed that there is no artery of volume or size which need be divided in this operation; if any of the normal vessels be enlarged from long-continued disease of the part, they will not be larger, or more difficult to ligature, than those presenting themselves in every-day practice. Mr. Syme's statement as to the "operation being so easy in execution that it may be accomplished by the most inexpert of operators," must be taken with great limitation. I am sure it may be performed with comparative ease in the young subject; but in the adult, when the leg is

flexed, and great matting of the parts around the joint has taken place from long-continued disease, the difficulties are very great. Mr. Syme's statement, as applied to the case upon which I operated, is untrue, for I both know and felt the difficulties I encountered in disarticulating the bones, and separating the vessels which were matted to them behind. Though the above sentence was written by Mr. Syme, I think he never intended it to be believed,—he wanted merely to make little of what he signally failed in accomplishing himself. Indeed, the whole tenor of his "Lecture" seems to me a piece of facetious bantering, which I think arrives at its climax when he offers to the class of the University of Edinburgh his "Principles of Surgery as a standard of doctrine for reference." There is one more statement of Mr. Syme's relative to excision of the knee-joint which I wish to refute. He states, in a Lecture published in the Lancet (April 21, 1856):—"So long as the smallest sinus remained open, the limb would be no use for support of the body." In many of the foregoing cases will be found abundant proof to the contrary.

In reference to Mr. Syme's views about the hip-joint, the facility with which it may be excised, its being a "bloody operation," or the propriety of the measure, &c., we cannot enter into these questions here; but I have the greatest possible pleasure in referring the learned gentleman to a source from which he will derive information on every point, and that from one of the first surgeons in Europe. I allude to Mr. Fergusson, who has published a most comprehensive and valuable Lecture "On Hip Disease," in the Lancet, April 7, 1849.

In my former essay I proved, by several instances, *that the growth of the limb was not checked by excision of the joint in childhood;* and am happy now again to confirm this most important fact. Mr. Keith, the distinguished surgeon of Aberdeen, informs me, by letter dated September 30, 1856:—"I have no fear of young limbs not growing; what should hinder them? John Hay's limb (operated on, November, 1853), *is plump, and growing in length as fast as his sound limb. So is* John Keith's (operated on May, 1854)." I have confirmation of this fact, likewise, from Mr. Page, the eminent surgeon of Carlisle. In a letter, with which he favoured me, dated November 20, 1856, he states:—"When I last saw the youth, on whom I operated four years ago, he was able to walk perfectly, and *the growth of the stiff limb had quite kept pace with that of its fellow.*" Mr. Brotherston, also, corroborates this truth; in writing to me, November 13, 1856, relative to the little boy

from whom he excised the knee-joint, January 12, 1855, he says:—"The leg is an inch shorter than its fellow, but is evidently *keeping pace in growth with it, and the rest of the body.*

In my former essay I described *the various ways of incising the soft parts*, and the operative methods preferred by different surgeons: exception being taken to that recommended by Mr. Syme, from its perfectly unwarrantable nature.

In my former essay I laid stress upon *the propriety of dividing the bones from behind forwards* by means of a fine saw, which I invented and described. One word in reference to this instrument—it is now used most extensively, and I have been gratified to hear of its efficiency in other hands besides my own, even from some of the first operating surgeons in England.

In my former essay I laid great stress upon *the mode of managing the limb immediately after the operation;* how that it should be placed in the extended position and retained so, in a solid case specially made for the purpose, before the patient was taken from the operating table. The difficulties to be overcome in obtaining this result were likewise considered, and modes prescribed according to the exigency of the case. Even here I have advised the division of the hamstring tendons, and in these words:—"But if this method fails (speaking of the milder mode by traction, &c.), and it will most likely do so in those cases where the leg has been for a length of time flexed upon the thigh, and the muscles have assumed a spastic contraction of a settled character,—here I would most certainly recommend the surgeon to divide the hamstring tendons (in preference to cutting off another piece of the healthy bone); this becomes more imperative when the head of the fibula has not been removed, and the tendon of the biceps interfered with; it is the powerful and spasmodic action of these hamstring muscles, dragging the leg upwards and backwards, that creates, to a great extent, the deformity, by the thrusting of the thigh-bone forwards: *by their division, then*, not only is reduction easily secured, but all tendency to after-displacement checked." This paragraph, I think, anticipates by more than a year *one* of Mr. Hutchinson's Two Suggestions respecting Excision of the Knee-Joint[a]. And I think my directions have likewise forestalled the *second*—"Making an opening in the popliteal space." After enumerating various methods of operation, I continue:—"By incisions planned after either, the joint can be very

[a] Two Suggestions respecting Excision of the Knee-Joint, by Jonathan Hutchinson, Esq., Surgeon to the Metropolitan Free Hospital.—Medical Times and Gazette, March 15, 1856.

readily reached and exposed; I conceive that in the selection of any, *the wound must extend far back to allow of the free discharge of matter;* and the case to be operated on must not altogether be lost sight of, as some peculiarity may require special consideration." Now I consider my directions far more efficient than "an opening made in the popliteal space" could by possibility be, and simply for these reasons—the "opening" could not, with safety, be made in towards the mesial line, owing to the course of the vessels; and even if it was effected to either side of them, owing to the tension of the soft parts behind, from the straightened position of the member, the edges of the opening would be approximated, and, therefore, matter would not drain off. No, I object to the space being opened behind, or anything that could favour the secretions from the cut surfaces in that direction; if the limb be steadily supported behind, and firmly fixed in the box with the anterior splint arranged as I have directed, and the footboard sustaining the leg at a right angle, there will be no pouching posteriorly, and the lateral incision, or the cornua of the semicircular one, placed well behind, will be far more effective in every way; through these, secretions can freely escape, and be readily soaked up with a bit of sponge, so that the pads behind shall not be soiled, or rendered irritant. By attendance to many apparently minor details of this kind alone, can the quietude and repose of the limb be maintained undisturbed for days, a condition which I would insist upon in every instance, and by the observance of which the issue of the case will be most materially influenced.

I do not believe one word of the "impossibility" of placing the limb in the straight position at once, and retaining it so; it can be done if the surgeon is up to his work; and this first adjustment can be made without any pain to the patient, as chloroform annihilates sensibility. I cannot find words to enforce, with the power I desire, the importance of this measure. Amongst the foregoing cases there are lamentable instances where it was not adhered to, and which, I trust, will appeal forcibly to the mind of every thinking man. Independent of the advantages of steadying the cut surfaces—the prevention of the divided bones from irritating the surrounding tender parts, the subjugation of all spasm, the limiting of the inflammation to the bounds only necessary for repair—we have still another great benefit accruing from "*putting up the limb at once*," namely, the mind of the patient is at rest, that protective watchfulness over it is removed, and which probably, prior to the operation, had caused nights of restlessness and want of sleep.

The same apprehensiveness when the bones are divided will remain, aye, be increased, if the limb be not immediately fixed in the straight position; but if the control of the patient over the part be checked, he feels confident in the security; repose quickly follows, and sleep is generally induced; if not, opiates will act more certainly, pain being subdued.

Excision of the knee-joint has been objected to by some, owing to the tediousness of the convalescence. I endeavoured to meet this objection in my former essay, and I adduce in the present paper some instances of very rapid recovery,—cases treated by Fergusson, Erichsen, and others; but while I admit that in some recovery has been retarded, yet I think the ultimate benefit has more than compensated for the delay. On this point I shall just quote a passage from Mr. Erichsen's admirable book on Surgery:—"It has been urged against the excision of the knee-joint, that convalescence is tedious and prolonged, but this argument can, with justice, have but little weight; if a useful limb can be preserved to the patient, it can matter but little if a few additional weeks are devoted to the procedure by which it is maintained"[a]. On this ground, also, I find an objection has been raised to its adoption in military surgery. In the Report of the Crimean Medical and Surgical Society, published in the Medical Times and Gazette for September 13 and 20, 1856, Dr. Macleod makes allusion to excission of the knee-joint, and states:—"The only case of excision of the knee-joint had been performed in the General Hospital in camp. The ball had penetrated the joint, and lodged in the internal condyle; that no symptoms had appeared for ten days; then inflammation had set up, and the operation was performed a week after. When the wound was nearly healed, symptoms of pyemia supervened, and he died six weeks after the operation." "He considered the operation was not adapted for military surgery, from the length of time necessary for recovery." This case, I conceive, affords a very admirable lesson as to how great an amount of repair may be set up and accomplished in the short period of six weeks; for the Report says:—"When the wound was nearly healed, symptoms of pyemia supervened, and he died six weeks after the operation." Now I think it may be presumed, when so much had been accomplished in a few weeks, had not this fatal affection stricken the patient, that perfect recovery would not have been tedious, or restoration prolonged, and, therefore, the observation, "That the opera-

[a] Erichsen's Science and Art of Surgery, p. 516.

tion was not adapted for military surgery from the length of time necessary for recovery," could not be sustained by this case. I am fully alive to all the difficulties which military surgeons frequently have to contend against, and likewise to all the benefits and advantages arising from rapidity of cure in military surgery; but every civil surgeon believes the same to hold good relative to the cases in his hospital; and he looks upon, and estimates the life, and the time, of the industrious artisan, as being in every way as valuable as that of the paid soldier of fortune. No doubt, after gunshot injuries the parts are generally so shattered, that few cases can occur to which the operation of excision would be applicable; but if, as in the case just transcribed, the injury is limited, there can be no reason why the operation should not be successful. Here, as in civil practice, the surgeon must make his choice between amputation and excision, according to the condition of the parts.

Sir George Ballingall, in the "Outlines of Military Surgery," fifth edition, p. 397, writes:—"An amputation above the knee, however, I have long looked upon as a very hazardous operation, from the constitutional disturbance which the removal of so large a portion of the body necessarily involves; and looking to the excision of the knee-joint as likely to involve less of this constitutional disturbance, I could not be thought to discourage it as a primary operation."

Another great question presents itself in reference to this operation, and may be considered under two heads:—

1. *Does an error in diagnosis, as to the suitableness of a case for excision, debar the patient from the likelihood of cure by amputation?* Certainly not. The patient is insensible, and, therefore, suffers no prolonged shock; and if the bones are found extensively diseased, I would say, to the terminations of their expansions, amputation should be performed at once; otherwise, if life be preserved, the limb would only be a useless appendage. Now I shall bring to bear upon this point a very interesting case by Mr. Hutchinson, Surgeon to the Metropolitan Free Hospital[a], and detailed to the Pathological Society of London:—A boy had been subject to chronic disease of the right knee for four years; until within a month of the operation, no abscess had ever broken externally. When placed under Mr. Hutchinson's care, the history was—that for the last

[a] Published in the Lancet, May 10, 1856.

six months the joint had been getting much worse, and that the boy's health was failing. Believing the case a suitable one, Mr. Hutchinson advised an excision of the joint. In the performance of that operation, the following condition of parts was found:—The articular cartilages were everywhere removed, and the opposed surfaces of bone, except where united by adhesions, were in a state of caries. There was a deep ulcer, extending into the patella, the cavity of which would have contained a filbert. In the left side of the head of the tibia was a cavity, into which, for the depth of half an inch, the first joint of the finger entered easily. The condyles of the femur having been sawn away, two patches of yellowish material, infiltrated into its cancellous tissue, were seen; and also the cavity of an ill-circumscribed collection of pus. A second slice of the bone having been removed, a nearly similar condition of things was still found—a small abscess lined by tough lymph, and capable of holding a small nut, having been opened. It was thus made evident, that unless by shortening the limb to an extent which would make it useless, it would be impracticable to cut away all the diseased bone, and amputation was accordingly decided on and performed. Mr. Hutchinson remarked, that the pathological interest of the specimens consisted in their showing several distinct abscesses in the bone, and in the circumstance that the existence of them had not been rendered probable, by the severe pain usual in such cases. With regard to the operations, he believed that, although it had not been deemed wise to persevere with the excision, *his patient had lost nothing whatever by the attempt made to save his limb.* He had been, throughout its performance, in complete insensibility from chloroform, *and within six hours afterwards was in as good a condition as he could possibly have been after amputation only.*"

Now, as to the second part of the question,—*Is amputation likely to be successful when performed some days after excision, owing to some unfortunate circumstances having arisen?*—the cases in the foregoing report answer in the affirmative. In seven instances amputation of the thigh was performed, and all made rapid recovery, save one. How satisfactory this return as contrasted with the result of the wholesale lopping off of limbs practised in one of the largest hospitals in London,—St. George's Hospital. I extract the following particulars from the Table of Operations performed in that institution, and recently published in the Medical Times and Gazette (October 18, 1856). I have placed them for convenience in the following order:—

Amputation of the Thigh, as recorded from St. George's Hospital, London.

No.	Sex and Age.	Limb amputated, circular or flap.	Why amputated.	Result.
1	M. 38.	Thigh, flap.	Degeneration of the synovial membrane of the knee after synovitis; ulceration of the cartilages, and abscess in the joint.	Died.
2	F. 15.	Thigh, circular.	Abscess in the knee-joint.	Recovered.
3	M. 9.	Thigh, circular.	Strumous disease, and abscess of the knee.	Recovered.
4	M. 27.	Thigh, circular.	Gangrene of the foot, after ligature of the femoral artery for aneurism.	Died.
5	M. 31.	Thigh, circular.	Old disease, and partial anchylosis of the knee, with abscess extending up the thigh.	Died.
6	M. 13.	Thigh, flap.	Strumous disease, and abscess of knee.	Died.
7	M. 16.	Thigh, circular.	Strumous disease of the knee, with ulceration of the cartilage.	Convalescent sixty-two days after.
8	M. 40.	Thigh, circular.	Old disease of the knee-joint, with partial anchylosis, and constant pain on motion.	Recovered.
9	F. 18.	Thigh, flap.	Degeneration of the synovial membrane of the knee, after chronic synovitis; ulceration of the cartilages.	Recovered.
10	M. 24.	Thigh, flap.	Caries and necrosis of the tibia, with abscess in the head of the bone, and distortion of the limb.	Recovered.
11	F. 26.	Thigh, circular.	Abscess in the knee-joint, and ulceration of the cartilages.	Died.
12	M. 18.	Thigh, circular.	Abscess in the knee-joint.	Died.

In this Table twelve cases of amputation of the thigh are recorded, and six of them died; while one of the mutilated six is reported only as convalescent on the sixty-second day. Such a result is very calamitous; and it is painful to look upon this Table, and see how many cases, apparently well adapted for excision, were subjected to the more formidable operation,—amputation,—terminating in death. I may well repeat, there is a wholesale lopping-off of limbs for "abscess" and "ulceration of the cartilages" of the knee-joint exemplified here.

In my former essay I dwelt upon the constitutional manage-

ment of the patient after excision, and the necessity for a very abundant supply of stimulants and sedatives, proportioned to the age and habits of the person—nutritive diet being given according to the powers of assimilation. I again advert to the enormous quantities of wine and opium which I prescribed myself, and with the best success. One word more, for the safety of the patient—the operating surgeon must not lose sight of the case; to him is intrusted the life of the individual: he should have the deepest interest in its success.

As a stimulus to others for exertion, and as an evidence of what may be achieved by the operation of excision of the knee-joint, I shall state the impression produced upon an impartial judge, the Irish correspondent of the Medical Times and Gazette, upon seeing the man, whose case I have recorded in the early part of this paper, and whom I exhibited at the first meeting, this session, of the Surgical Society of Ireland.

"Mr. Butcher made an exceedingly instructive and interesting communication on the subject of excision of the knee-joint, and illustrated the efficacy of the operation, not only by a series of very beautiful casts, drawings, and preparations, which were laid upon the table, but by the production of a man on whom he had operated three years previously, and whose appearance of rude health, combined with the trifling amount of the deformity left, and of the impairment of his power of locomotion, was the best proof of the complete success of the proceeding to which he had been subjected. The idea of a stiff joint is almost necessarily associated with that of rigid and awkward powers of motion; but in the present instance, it was remarked by all who were favoured with the opportunity of seeing the man who had been operated on, that he had acquired not only a free, but even a graceful, movement of his legs. He jumped upon a chair and down again, walked across the room, and readily took off the laced boot and stocking which he wore; in short, it was difficult to perceive which was the leg from which the knee-joint had been excised, without a close examination, so as to see the deep cicatrix left"[a].

It is with great satisfaction and pride I have received from Mr. Fergusson, the distinguished surgeon of London, whose name is so intimately identified with this subject, and, indeed, with all the improvements of modern surgery, the following letter:—

[a] Medical Times and Gazette, December 27, 1856, p. 650.

16, *George's-street, Hanover-square,*
December 29, 1856.

"My dear Sir,—I am glad to learn that you are again working at the subject of excision of the knee-joint. It is still full of interest; and if the grave question, as to the propriety of the operation be not already solved, I have every hope that, with your labours, and the exertions of others, we shall have ere long the proper data on which its true character must be finally determined. I shall be anxious to see your statistics, although I think we already have fair evidence, that the operation is probably less fatal than amputation in the thigh. If this is once fully proved, then there can be no doubt that the proceeding must be preferable to amputation, as the natural leg and foot are, with few exceptions, far superior to artificial substitutes.

"The occasional deaths which have occurred after the operation, from the time of the Moreaus to the present day, seem to me no greater objections to this proceeding, than to amputation; and the strongest argument against it seems to be the length of time needful (even in the most satisfactory cases) for perfect recovery. This point requires investigation. Meanwhile, from my experience, I am inclined to think that there will be little force in such an objection. No doubt, the recovery has been very slow in many instances; but the same may be said of amputations. It is well known, that stumps occasionally do not heal for six or twelve months, or even a longer date. Such also is the occasional history of resection of the elbow. Such also seems likely to be the case in certain instances of resection of the knee. I have, however, seen a patient, after this latter operation, stand on his own leg within three months, and within six months walk in a more efficient manner, than I ever saw any one in the same time make use of an artificial limb. The wound is a very difficult one to heal, and, I believe, from what I have heard, that the unfortunate result of some of the cases has arisen from defective after-treatment. When better surgery prevails in this respect; it is probable that we shall have more satisfactory results.

"There are some features in favour of the operation (as I imagine) which have never yet been alluded to, and which I think deserve great attention, viz., the comparatively small amount of hemorrhage; the immunity (comparatively) from secondary hemorrhage, and the comparatively small size of the wound.

"As to hemorrhage, a tourniquet is not required, no main vessel is cut, and the loss of blood from the small vessels around the knee is of little consequence. Certainly, in some instances there has been a formidable oozing within the first six or eight hours (intermediary hemorrhage, as it is often called), but I doubt if any harm has ever arisen from this. In one of my own most successful cases, this happened, but no evil resulted, and the progress of the case was satisfactory in the extreme. The question of secondary hemorrhage I think of great importance; it is an occurrence that could not possibly take place in this operation; the size of the wound I believe to be less than in amputation; possibly the greater extent of osseous surface may modify this view. It does not appear, however, that the end of the tibia is prone to disease after this operation; the end of the femur suffers most frequently, just as is occasionally seen after amputations low down in the thigh.

"If there be any force in the modern dogma regarding amputation, 'the further from the trunk, the safer the operation,' I suppose the rule would hold good as regards resections and wounds generally; if so, a resection of the knee-joint, being farther from the body than an amputation, should with those who hold the above doctrine be a guarantee for the propriety of the proceeding.

"There is one feature in the modern history of this operation which I think deserves special notice, viz., the frequency with which it has been practised within the brief period of a few years. Few of the great operations in surgery have so speedily attracted attention from independent members of the profession; this, doubtless, arises from the feeling of "conservatism" which is abroad, as also from that which first actuated me in reviving it: that it had not been sufficiently tried to afford us the data on which to found an accurate decision as to its advantages or otherwise in comparison with the mutilation of amputation in the thigh.

"With cordial sympathy in the good work in which you are engaged,

"I am, my dear Sir, yours very faithfully,

"Wm. Fergusson."

I shall now conclude my observations upon excision of the knee-joint, and I trust the propriety of the operation in suitable cases has been fully established in all its bearings. Actuated by the same protective principles of conservatism which I have espoused, I shall append a remarkable example of the powers of operative surgery in saving the knee-joint.

It is not my object in the present communication to dwell upon the various modes of dealing with the cicatrices occurring after burns; the judgment of the surgeon must, more or less, determine the operation applicable to the case. I adduce the exposition in the following embarrassing instance as a good example of what may be effected by extirpation of the morbid cicatrix and implantation of natural structure in lieu of it,—the abnormal, dense, elastic, retractile tissue—the nodular tissue of Delpech.

Hugh Brady, aged 29, was admitted into Mercer's Hospital, December, 1855; he applied on the above date, a wretched sufferer, and described his crippled state to have been occasioned in the following way. Being a servant to a wealthy farmer in the country, he was frequently employed in the feeding and superintending of cattle; on several week-days huge boilers of hot mashes were prepared, and it was this man's business to oversee that the proper temperature was employed and kept up during their formation. While thus engaged, he inadvertently stepped upon the lid of one of the boilers, which turned, and he slipped into the cauldron; most fortunately for him, he seized upon the rim of the vessel, and resolutely secured his grip; thus the lower limbs were alone immersed; in his struggles to draw himself out, his left leg was elevated to the rim, and thus only suffered partially, but no further effort could he make: his strength failed; and he must have relaxed his hold and fallen back, had he not been rescued by a fellow-labourer who heard his piercing shrieks.

On being lifted out, and stripped of his trowsers, shoes, and stockings, the fearful injury inflicted on the right thigh, leg, and foot was apparent; the skin in "thick flakes" came off, though the greatest gentleness was used in undressing him. For months the creature suffered most severely; and at about the end of a year the limb was cicatrized, but deformed, and bent considerably; this condition continued to increase, and presented the appearance represented in the drawing.

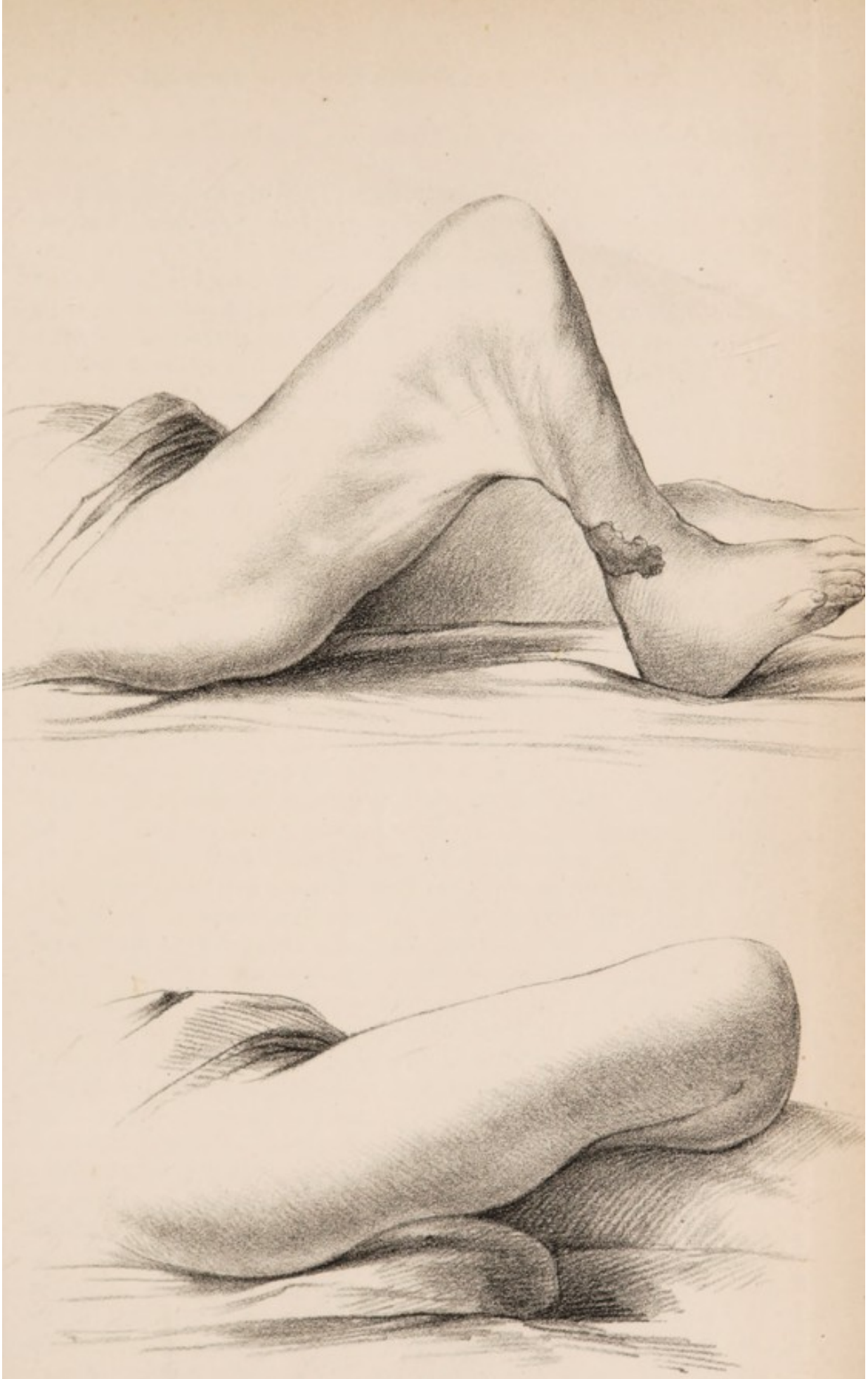
But now, to be a little more minute as to the condition of the parts, when the patient placed himself under my care. The leg was flexed upon the thigh, at somewhat more than a right angle, and belted up by a dense, massive cicatrix, which, while it permitted the angle to be reduced to less than a right angle, effectually resisted even the slightest amount of increase by extension; but an additional deformity was created by the foot being girt up in the extreme of flexion, and rigidly retained so by a similar condensation and matting together of tissues, as that in the greater cicatrix; the leg and foot toge-

ther presented a most misshapen mass. The greater cicatrix extended from the posterior and upper third of the thigh, commencing a little below the fold of the buttock, to the outer and inferior half of the lower third of the leg, where it terminated in the margin of a large, deep, ulcerated patch, about the size of the palm of the hand, and which never healed from the time of its creation, after the casting off of the sloughs; as a discharging sore, it abundantly afforded a thin, watery secretion; its margins were never healthy—they were irregular, they were inflamed, they were irritable. Now the intractable nature of the ulcer was to be attributed to two causes—the dense matting of the superficial and deep fissures surrounding it, altogether preventing contraction; and secondly, the constant dragging of the expanded cicatrix at its upper margin. By measurement, the depth of the posterior, or great cicatrix, corresponding to the angle of flexion at the knee, was seven inches and a half; its thickness exceeded an inch and three-quarters. On closely examining the structure of this powerful band when put upon the stretch, it was firm, unyielding, dense, with many corded lines easily traceable through it, and hard nodules here and there deposited. On relaxing it by extreme flexion of the leg, all the characters of fibro-elastic were communicated to the trunk; without exception, it was the largest mass I ever saw developed, and borrowed from the surrounding parts after burn or scald. I have used the term "borrowed," and it is most applicable, for the integuments in front of the thigh, leg, and knee, were strained backwards, and compelled to contribute to its formation. In numerous instances I have seen remarkable cicatrices after burns and scalds, remarkable for their size, extent, and distorting influence on neighbouring parts; yet in no instance was the disorganized product so great as in the case I am describing, although, in my private collection, I have specimens where, as the result of burns, an expanded web stretched between the ear and the tip of the shoulder, forming as it were, a partition between the front and back of the neck; in another, where the chin was bound down close to the sternum, with all the hideous deformity of countenance characteristic when located in such a site; in another instance, where the cicatrix extended from the axilla to the lower third of the forearm, bending it at a right angle; and in the same specimen the hand powerfully adducted, even to an acute angle from a second and similar cause, along its ulnar edge; while in another there is exemplified dislocation of the wrist forwards, and of the first phalanx of the thumb from its socket, from the same cause: the slow, gradual, yet pro-

gressive contractile power inherent in the product, as reparative after severe burns.

In the case under consideration, the integuments on the forepart of the leg were in a healthy condition, as low down even as the upper margin of the ulcer; while on the corresponding surface behind they were implicated in the massive cicatrix, all save a small portion on the inner side, and corresponding to the upper part of the calf, the outer two-thirds of the calf, its muscular structure, and all seemed to be embedded and fused into the cicatrix. The integuments around the lower third of the leg, or below the confines of the upper margin of the ulcer, were strained over, and matted to the bones; while the foot, distorted, as already noticed, beyond its natural angle of flexion, was fixed so, and spoiled in shape; the arch was filled up, and all the sulci and hollows around, by deposited fibrine, with the integuments greatly thickened and spoiled; in fact, that part of the leg corresponding to the ulcer, and inferior to it, seemed, in its entire circumference, as if it had been tightly strangled. This appearance was very remarkable on looking at the limb in profile, owing to the additional volume created by the cicatrix above, and the thickened, shapeless mass presented by the foot below (see Plate I.)

Before proceeding farther, I may here mention, that the left limb did not escape injury altogether, for though only a short time immersed in the scalding fluid, it too suffered, even deeply, but only in isolated parts, and not to any extent. Small cicatrices were observable upon it; deep, sunken patches on the thigh, calf, front of the leg, &c., varying from the size of a half-crown piece to that of the palm of the hand; yet the tendons above, below, and around the joints were not implicated, and the limb retained its functions. By the assistance of crutches the young man was enabled to move about; but the amount of exertion requisite was followed by great and prostrating fatigue, with constantly recurring, inflamed margins around the cicatrices of the left limb. In this way he struggled on for months, until life became absolutely irksome, and he determined to have the contracted leg removed. When he presented himself to me, such were his feelings. I fully sympathized with him, and gave his case the most earnest consideration. There were many features of great interest in it; there were many points to be weighed and balanced before coming to any hasty conclusion, or executing an operation before a large class of students, that might not be in accordance with the strict rules of preservative surgery; an act which, if consummated, independent of the bad example set forth to



Forster & Co. Lith. Dublin

others, would indeed, upon reflection, prove to me most humiliating.

First, then, I decided on not meddling with the cicatrix, by way of liberating the knee-joint, and for these reasons, the ankle-joint was irremediably distorted and spoiled; its surrounding tendons and ligaments were all matted together; into every interstice lymph seemed to have been poured, and the entire was disorganized and unfitted for its functions. Again, the integument above the ankle was strained around and bound to the bone, together with the tendo Achillis, while on the outside and in front was a part lost, ulcerated, incapable of lessening itself, deprived of the power to cicatrize. For here, even the division of the cicatrix attached to its upper edge could not set it free. Neither could that beautiful operation, recommended by Mr. Gay, liberate its margins, for the reasons assigned.

There could be no second opinion as to the propriety of amputation in this case, but the difficulty which presented was to save the knee-joint, at the same time to plan such an operation that the cicatrix should not exert its traction on the stump, either by retarding its healing or keeping it open altogether, and thus proving a source of perpetual irritation.

Erysipelas several times attacked the sore on this patient's leg, and he suffered severely on more than two occasions. A short time after his coming under my charge, he had a sharp attack, which lasted several days, and it was not until the 8th of February that I dared to remove the limb. Other circumstances, too, conspired towards this delay. The man was wearied and prostrated after a long journey from the country; in a word, his whole system required repose and nourishment.

On the 8th of February I performed the following operation:—The patient being placed recumbent on the operation table, he was quickly brought under the influence of chloroform. When so, the circulation in the limb was controlled by pressure made upon the femoral artery where it passed over the pubis; and here I may state, that it was a difficult matter to command the vessel, owing to the flexed knee, for the foot rested upon the table and was so steadied; thus the thigh was inclined upwards, and the groin sunken. The limb being fixed in this way, and the arterial supply cut off, standing upon the right side of the patient, I commenced an incision over the inner edge of the tibia about two inches below the articulation, and carried it rapidly downwards to the inferior third of the leg, and swept the knife in a semicircular manner outwards and upwards, avoiding the ulce-

rated patch, in a line over the forepart of the fibula, and terminating a little below its head, and opposite to where the knife was first laid on. Thus an extensive flap, of somewhat a triangular form, was marked out, from eight to nine inches in length, and three and a half at its widest part, extending over the entire forepart of the leg; it was quickly dissected up from below, its narrowest part upwards, to the base, and great care was taken to remove with it a considerable portion of muscular fibres from between the bones. This was done with a double object, first to insure the vitality of the flap, and secondly, to fill up the space into which it was to be ingrafted. The knife then was applied at the point where the external incision terminated, and was carried freely upwards along the outer margin of the cicatrix in the thigh, to where it commenced near the buttock: in a similar way the knife was brought back along the inner sides of the cicatrix, finishing opposite the articulation, and in a line mesially about a third from the internal wall of the joint. This long cicatrix, then, being liberated at the sides, was dissected out, together with the fascia, from the back of the thigh. So much being effected, the hand and knife were passed beneath the limb, and the edge of the instrument applied at the beginning of the internal incision for the anterior flap; from this it was carried with a slight degree of obliquity downwards and backwards through the integuments covering the healthy piece of calf; the integuments below the incision were then dissected down a short distance, together with the cicatrix, from the upper part of the leg, and next a catling was thrust from the outside, behind and close to the bones, so as to separate the healthy muscular fibres, and sever them about two inches below the division of the integument. Thus a muscular covering was secured for the ends of the bones, and we shall presently see how well it was adapted to that end. All remaining fibres attached to the tibia and fibula being divided, I rapidly cut through the tibia and fibula, about two inches below the tuberosity of the former; the section, being made with my own saw, was intentionally curved, so that the sharp margins of the bones should not irritate the tender flaps. The only artery that yielded blood was the posterior tibial; it was ligatured, and shortly after the patient was removed to bed, and the limb supported on pillows. Could I have secured the main arteries, I would far have preferred at once dressing the wound, so that the long anterior flap should not be lowered in temperature, and thereby its vitality imperilled. I did, however, the next best thing, and wrapped the entire limb in a sheet of cotton wadding, some linen being interposed, and left

it so, a pupil remaining beside the bed to watch for and arrest any bleeding that might take place. After a lapse of three hours I proceeded to dress the wound; reaction was fully established, and all the cut parts warm. The sensitiveness of the patient was so exalted, that I had recourse to chloroform again; and then had no difficulty in adjusting the parts. On removing a few clots from the flaps, rapid bleeding ensued, and was easily recognised as coming from the anterior tibial artery, and two large muscular branches in the internal flaps; they were, however, quickly secured, and, therefore, with but little loss. The adjustment of the parts now proved very perfect and satisfactory; the internal flap formed an admirable covering for the bones, which were retained in a flexed state, while the anterior long flap, when turned back, lay in a direct line over that portion of the internal flap covering the bones, and without tightness, and also fitted up along the back of the thigh into the extensive space from which the cicatrix was removed; and it was pleasing to see how ample it was for the purpose. Numerous points of the interrupted suture were employed to hold these parts in contact, and, when completed, nothing could possibly look more perfect; adhesive straps and bandage, lightly put on, were also had recourse to, so as to afford a gentle, equable support throughout the entire opposed surfaces, at the same time, with due caution not to interfere with the tardy and struggling circulation, especially in the transferred part behind.

Immediately before the operation, the patient had some wine, and after, he was liberally supplied with it; and when the dressing was completed, he got a full opiate.

9 P.M. Feels comfortable; the opiate to be repeated.

Feb. 9th. Had a fair amount of sleep throughout the night, being only disturbed on two or three occasions by twitchings in the stump. He, however, lies a good deal prostrated. Pulse 112; tongue bluish and flabby, together with some slight nausea; urine passed in abundance; ordered saline effervescing draughts, and small doses of a mixture containing hydrocyanic acid and morphia; an increased quantity of wine.

5 P. M. Has suffered but little pain, and almost free from nausea; to repeat the anodyne draught at bed-time.

10th. Says he feels much better, had a good night and quiet sleep; no startings or headach; pulse 104, soft. Took some toast and tea for breakfast, with appetite; to have small quantities of beef-tea, wine, and bread, frequently during the day; the stump looks well; no more heat or inflammation than requisite for union. The flaps, throughout their entire extent, preserve ample vitality; lint, soaked in spirit lotion, laid over

the entire surface now: to continue the mixture containing hydrocyanic acid and morphia.

12th. Going on most favourably; pulse 100; wound free from all pain; no irritation about it; union has taken place, by first intention, in many parts along its edges, and the posterior flap is grown into the surface above, and consolidated throughout. Some healthy purulent matter can be pressed out from beneath the margins of the internal flap, and in the line of the ligatures. On this day I removed many of the sutures, being no longer required—their office fulfilled—and in a few days later the remainder were taken away. On the 16th, 23rd, 27th, and 29th, the ligatures were cast off; nothing could be more promising than the appearance of the limb. It is unnecessary to continue the report day after day. On the 25th of March the parts were healed, and thoroughly consolidated throughout; and a more perfect or beautiful stump could not be produced (see Plate). I have made a very accurate cast of it, which contrasts remarkably with that of the deformed member, taken before operation. Both are in my private collection, and it will afford me the greatest pleasure to show them to any one interested in such matters.

Shortly after the above date I had a wooden-leg made for this man, properly fitted to the knee, and a more perfectly serviceable limb could not, by the most sanguine, have been expected.

Before I conclude, there is one point that I would specially wish to insist upon, and it is this—that in all cases where a part is to be transplanted, the flap should not be handled much, compressed, or violence offered to it in any way; it should be seized with a spring-forceps, or held gently with the fingers, and elevated as the dissecting-knife frees it from beneath. By this measure alone can its vitality be insured, and a certainty obtained as to its accepting the union necessary to vitalize it in its new position.