figured by Huber and Haller; but these anatomists, and all others, as far as I am informed, have overlooked its real structure, in representing it as a common unyielding ligament. Its upper attachment is to the pia mater covering the extremity of the medulla spinalis. It lies in the midst of the nerves which constitute the cauda equina, and inclosed with them in the same sheath of the arachnoid tunic, and proceeds to the end of the fibrous sheath which it perforates. It then goes along the spinal canal within the sacrum, and becomes attached, in a radiated form, to the periosteum on the first bone of the coccyx. A small artery lies so close to the ligament, that they can hardly be distinguished, if the blood be pressed out of the vessel.

Those who have viewed this cord as a common ligament, have called it *ligamentum caudæ equinae medium*. It is endowed, however, with a greater degree of elasticity than any other tissue in the body, excelling even all the elastic ligaments, properly so called, from which again it differs by being devoid of colour, and almost transparent. It is so elastic, that it may be extended more than one-third beyond its proper length, and recover itself; and if removed from the body with a portion of the bone to which it is affixed, and held by the upper end between the finger and thumb, the bone may be made to play up and down, as we see a weight do when appended to a very elastic spiral spring.

The elasticity of this ligament is obviously designed to prevent an undue tension of the spinal marrow, which would otherwise ensue in any considerable flexures of the spine; and in order to permit the ligament to move freely in the hole of the fibrous sheath through which it passes, the arachnoid tunic that lines the sheath proceeds a little way out, and returns on the ligament in the same manner as the serous membrane of the pericardium is reflected upon the great vessels of the heart.

It is not requisite that the lateral or denticulated ligament should possess elasticity. The number and shape of its processes, and the attachment of them by their points only to the inside of the fibrous sheath, would appear to be sufficient to prevent any injurious effects on the medulla, in the lateral movements of the spine.

Sept. 14th, 1840.

MR. GREENHOW'S FRACTURE BED.

TO THE EDITORS OF THE PROVINCIAL MEDICAL AND SURGICAL JOURNAL.

GENTLEMEN,—In the year 1833, I published an account of a sling fracture bed, for the treatment of fractures of the leg and thigh. Though the principles on which it was constructed were good, yet it was somewhat complicated in its mechanism, and not sufficiently simple in its mode of application; and, moreover, was too costly to admit of its being generally introduced into practice.

Since that time I have had many opportunities of testing its value in the management of compound fractures of the leg, of the worst description admitting of cure, and in fractures of the thigh, including some cases where the neck and upper portions of the bone were the seats of the injury; and my experience has confirmed me in the conviction that no plan hitherto in use offers to the surgeon so great facilities in the treatment of these accidents, nor affords to the patient so good a chance of ease and comfort in the progress, or of final success in the completion of the cure.

So great has been the relief from anxiety to myself, attendant on the use of this fracture bed, and so smooth and uninterrupted has frequently been the progress of recovery in the patient, that I have been induced to bestow much thought and attention in obviating the objections to its general use, which have been referred to above; and, after passing through many stages, I am at length enabled to claim for it the attention of practical surgeons, having

reduced it to a state of simplicity in its construction which will not, I think, be easily surpassed; and which renders it in its application convenient and efficient, while its cost has been reduced within the limits of moderation.

The great principles to be held in view in the treatment of fractured bones, as laid down so clearly by Mr. Pott, viz. muscular relaxation and perfect repose of the injured limb, after replacing the broken extremities of bone in their natural position, are to be attained by means of the sling fracture bed in an eminent degree, and without the hazard of irritating by the injurious presence of splints. In practice it will be found to afford all the advantages of the double inclined plane, as recommended by Sir Charles Bell and other modern surgeons; while the comfort which the patient experiences from the degree of motion of the pulleys which the sling allows without danger of displacement, cannot be obtained by any other contrivance with which I am acquainted. But it is in the more serious descriptions of compound fracture of the leg, and in fractures of the upper third and neck of the thigh bone, that the advantages of the sling fracture bed are most conspicuously viewed. In the latter the length of the limb can be effectually preserved, and the unvarying apposition of the broken bone maintained in a manner which must ensure the most favourable result; while in the former, the facility of cleaning, dressing, and bandaging wounds without the least disturbance, is as great as can be wished for.

The cases which have been entirely under my own charge have been treated on the fracture bed from the beginning. I shall not at present give any detail of these cases, but content myself with giving short sketches of two cases of bad compound fracture of the leg, which the intelligent surgeons under whose care they were placed, found it impracticable to manage with the ordinary means of treatment within their reach.

I beg to offer my warm approbation of the scheme of your new Journal, and best wishes for the entire success of so useful an undertaking.

I have the honour to be your obedient servant,
Eldon, Newcastle-on-Tyne, T. W. GREENHOW.
Sept. 23, 1840.

CASE I.

(Communicated by Mr. J. M'Allum.)

On the 12th of November, 1838, I was called to see James Johnson, aged nine years, at High Walker. This boy, in returning home from school, attempted to follow his brother across a waggon way, was tripped by the rope and fell; when a waggon, weighing with its load about two tons, immediately passed over his left leg. The tibia and fibula were fractured a little above the ankle, and the integuments torn off, leaving the muscles nearly exposed, to the extent of about a third of the limb.

I obtained the assistance of my brother, Mr. M'Allum of Blacket-street. After adjusting the bones, as splints could not be applied on account of the wounds, we resorted to various other means to retain them in a proper position; but after attempts of this kind had been made for a fortnight without success, we determined to apply for the assistance of Mr. Greenhow. This gentleman applied his fracture apparatus, by which the limb was readily brought to its proper form, and steadily maintained. Our patient from this time went on well, and by the middle of January was able to walk about with crutches. I saw him a few days ago, when he appeared to be in excellent health, and as active as ever he was in his life, with scarcely any deformity of the leg perceptible, except on close inspection.

CASE II.

(Communicated by Mr. Potter.)

Matthew Clough, aged 13, received June 8th, 1840, while at work in Cramlington Colliery, a compound fracture of the left leg, about midway between the ankle and knee. The fracture was extremely oblique, and a considerable portion of tibia was forced through the wound. He was

immediately seen by Mr. Davison, and Mr. French, who reduced the fracture, and placed the leg in one of M'Intyre's splints. For some time the case appeared to do well; but we now found that it was impossible to prevent contraction; and, though extension was repeatedly made, we could not keep the ends of the bones in apposition.

A period of about eight weeks was spent in unavailable attempts to promote union, and prevent contraction, though every thing that afforded a chance of producing the desired effect was tried.

It then determined, as a "dernier resort," to give Mr. Greenhow's fracture-bed a trial; and, in order that it might be properly applied, requested him to go out with me, and superintend the application, which he very kindly did.

The leg, at this time, was a great deal swollen and inflamed, the inflammation being evidently of an erysipelatous character. The wound was covered with high flabby granulations, and looked exceedingly unhealthy.

On the third day after the leg had been placed in this "fracture-bed," there was a remarkable change in its whole appearance; the high granulations were much less, and the swelling and inflammation greatly abated.

From this time the leg rapidly improved, the discharge gradually ceased, the inflammation disappeared, and the wound healed. In about five weeks we removed the fracture-bed, as firm union had evidently taken place.

This day, (September 23,) the boy is walking about on his crutches, in excellent health; and, on the most accurate measurement, I am unable to detect the slightest shortening when compared with the other leg.

I cannot conclude this very imperfect sketch of the case, without expressing my firm belief that this patient's limb was saved by the application of Mr. Greenhow's very admirable invention, and, at the same time, earnestly hope that it may be brought into general use.

The following wood-cut will give a pretty clear idea of Mr. Greenhow's apparatus:—

In applying the instrument the thigh-piece is adjusted to the length of the femur by means of the screw on the back part. The thigh is received into a soft pillow, reaching to a little below the knee. The degree of flexure of the knee is regulated by the leather slings. The foot is fixed by a bandage passed through the leather loops of the foot-piece; a small pillow, or cushion, must be interposed to protect the foot from injurious pressure. The leg is supported by portions of bandage passed from one parallel bar to the other, and tied with such tightness as to afford equal support to the limb; a small pillow may be interposed, should the surgeon consider it advisable.

The pelvis is fixed by the groin-strap, passed through the iron loop at the upper part of the thigh-piece, which can be turned so as to be adapted to either leg; and, in cases of fractured femur, a common splint, reaching from the knee to the trochanter, may be secured by a bandage passed round the thigh so as to preclude the hazard of displacement.

The reduction of fractures of the leg is effected by the nicely-adjusted action of the screw. No hazard exists of shortening or displacement when once properly reduced.

In dressing compound fractures, the supports to the back part of the leg are to be carefully removed, as well as the strips of bandage applied round the limb in the manner of a many-tailed bandage, the wound cleansed, the dressings renewed, and the bandages carefully replaced, all which is easily done, and without injury or pain to the patient. The advantages of the sling are very great; it enables the surgeon to regulate with accuracy the relative height of the knee and foot; and the patient may perform certain necessary movements of the pelvis, which greatly contribute to his comfort, without danger, the injured limb being moved in a corresponding direction.

NEWCASTLE-ON-TYNE, NORTHUMBERLAND, AND DURHAM INFIRMARY.

STONE IN THE BLADDER.

JOHN MILLER, aged 26, glass-blower of Gateshead, was admitted August 27th, 1840, under the care of Sir John Fife, with the usual symptoms of stone in the bladder,

which he has laboured under from childhood. At the age of 12 years he was admitted into this infirmary, but his friends would not allow the operation to be performed. He took a considerable quantity of medicine, which greatly relieved him. Since then the symptoms of stone have been constantly present, but have not been very urgent. About a month ago, after bathing, the symptoms became much aggravated—so much so, as to compel him to apply again to the hospital for relief. On admission he was sallow and emaciated; laboured under symptoms of stone of a high degree, with great irritability of bladder, giving rise to a frequent desire to micturate, and occasionally to the involuntary discharge of feces from straining. He passed a large quantity of mucus with his urine;—pulse small, tongue white, slight thirst, and appetite good.

During twelve days, which intervened between his admission and the operation, he was treated with the warm bath, and Dover's Powder at night; from the use of which he derived great relief. He was sounded several times, and a stone distinctly felt.

On Tuesday, September 8th, he was carried into the operating theatre—much improved in health, and in good spirits.

Sir John Fife operated in his usual manner, using Mr. Liston's knife: a free incision was made from the left side of the bulb of the urethra, passing to the right of the tuberosity of the left ischium; the prostate gland was then partly divided by sliding the knife along the groove, and the left fore-finger introduced into the bladder. The staff was now withdrawn, the forceps cautiously introduced, and the calculus immediately grasped; but on making a gentle effort to extract it, the operator experienced an unusual dragging sensation; he then rotated the forceps, and by this, and the introduction of the left forefinger, having satisfied himself that no structure was entangled, at once extracted the calculus. An elastic gum tube was introduced through the wound, and secured there by tapes. Since the operation he has not had any bad symptom; the elastic tube was withdrawn on the 11th—when the urine flowed freely through the wound.

17th. Some urine passed, for the first time, through the orifice of the urethra.

18th. Improving.