

TREATMENT
OF
COMPOUND FRACTURES
OF THE
THIGH

FROM GUNSHOT WOUNDS,

AS OBSERVED IN SOME OF THE AMERICAN MILITARY
HOSPITALS.

BY

REDFERN DAVIES, M.R.C.S.



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IN this paper I purposely exclude all consideration of the advisability, or otherwise, of amputation for a compound fracture of the thigh from a gunshot wound, and confine myself solely to its treatment.

The cylindro-conical ball—so much used both in the Crimean and present American war—produces effects said by Appia to have “no parallel in former surgical annals.” These effects are due to the shape, rotatory motion, and velocity of the missile; and consist in the great number of splinters, cracks extending the whole length of the long bones, and increase in the bruising of the soft parts. The whirl or twirl of a Minie ball entangles in its thread both muscular fibre and cellular tissue, separating them from their attachments for a long distance from the track of the ball. Not only does there require to be removed all those fragments of bone entirely detached, but also those that are as yet retained by slight connexions, and whose continued vitality is doubtful. Macleod, in his “Notes on the Surgery of the Crimean War,” says, “I had many times the opportunity of seeing that these partially detached fragments seldom lie in the axis of the limb; so that if they did come to enter into the new bone, they would be more a hindrance than an assistance to its assuming its functions, not only from their position, but also from their interposing between the principal sections of the fractured shaft, and thereby preventing their contact and union.”

The wounded limb, cleared as completely as possible both of

foreign bodies and disorganized structures—many portions of which, although not admitting of removal at first, will be ultimately cast out—has to reunite by the formation of new tissues (bony and soft), attended by a prolonged and weakening process of suppuration and confinement in bed. Hence, when the patient *has* recovered, the condition of his limb will be far different from what it probably would have been had the traumatic injury been effected by one of the usual causes in civil life.

Two methods for the treatment of compound fractures were adopted in the General Hospital, Frederick City, Maryland, after the battles of South Mountain and Antietam (United States), and where for four months I had the opportunity of being professionally engaged. These methods were—

1. Dr. Gordon Buck's "Extension Apparatus."
2. Dr. Nathan Smith's "Anterior Splint."

The *theory* upon which fracture of a long bone is treated by the extension plan may be thus briefly summarized. The sharp and jagged ends of the fractured bones, by hurting and irritating the adjacent parts, afford to the muscles &c. surrounding them such a stimulus as induces them to contract and to spasmodically twitch; the extremities of the bone ride, and thus general deformity is induced, and a permanent shortening of the limb.

But if these extremities be adapted to each other *perfectly*, and an amount of extension be applied equivalent to the *natural* contractility of the muscles, the surrounding tissues, being un-irritated, would serve as natural splints, and the continuity of the bone will be complete.

This may be demonstrated by the accompanying model, consisting of a thick bar of wood, some eighteen inches long, attached at each end to a board; closely surrounding the cylinder of wood (which is obliquely cut through) are cords. By exerting a sufficient amount of extension, and, of course, an equivalent of counter-extension, in a straight line with the attachments of the strings, the surfaces of the divided bone will be brought into complete apposition with one another.

The application of Dr. Gordon Buck's extension apparatus can be readily understood from the diagram (Fig. 1). A roller

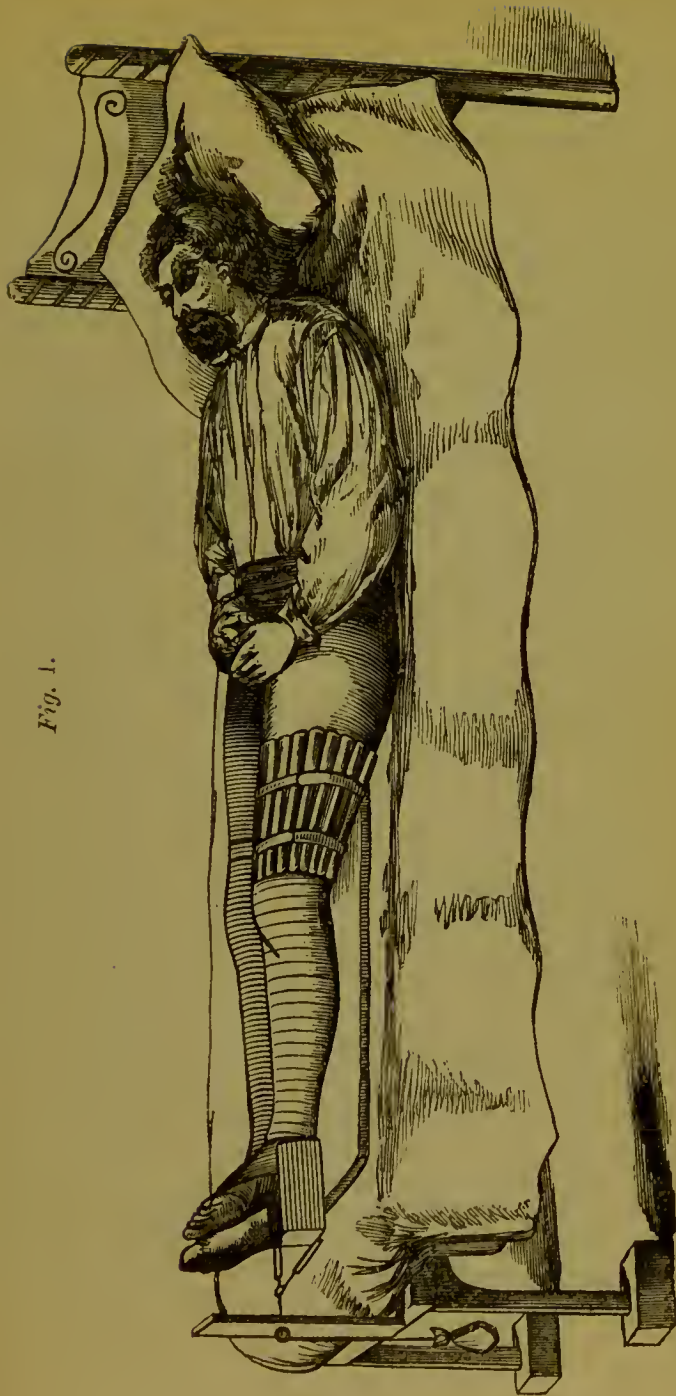
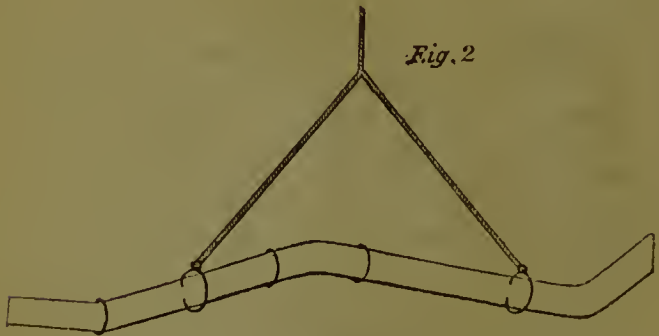


Fig. 1.

is applied in the usual way from the toes to the ankle; here it is temporarily arrested. A band of adhesive plaster—composed of resin ointment spread on Canton flannel, which gives it strength, and does not allow of any stretching—about three inches broad, is then applied along the sides of the leg, having a loop below the sole of the foot; over this plaster the roller now proceeds to the knee; a thin piece of wood, four inches square, is inserted (in the above-mentioned loop) between the sole of the foot and the plaster (to prevent any *pressure* over the ankles), and through a hole in its centre (or over its sides) is fixed a cord. This cord passes over a pulley at the foot of the bed, suspending a weight, the amount of which is determined by the resistance to be overcome and the tolerance of the patient. Extension, continuous and self-sustaining, is thus maintained. Counter-extension is created by simply raising the foot of the bed by bricks; the passive weight of the body thus affording a sufficient counter-resistance to the weight employed. The use of coaptation splints around the soft parts at the seat of fracture, and secured by three elastic bands (in those cases where they are admissible), tends to avert most safely those consequences which might otherwise arise.

Dr. Nathan Smith, of Baltimore, observes that one of the most fruitful sources of shortening and deformity from fracture of the femur arises from the trunk of the patient sliding towards the foot of the bed—as indeed it does in all cases, where great debility is induced, or where the patient cannot exert his own muscular strength; this causes the upper fragment of the bone to be jammed against the lower one, to overlap it, or to assume any other angular position in relation to it. Also, that the surface of support afforded by any apparatus should be accurately and permanently adjusted to the surface and form of the limb which reposes on it. In this method, Smith's anterior splint (Fig. 2) is adjusted to the limb and pelvic portion of the body by adhesive plaster and a roller (care being taken that the splint does not touch the cutaneous surface of the limb or body), and it is suspended by a cord passing over a pulley which is screwed into the ceiling at a point perpendicularly over the middle of the shin; the hooks selecting their

points of attachment to the splint so that the centre of gravity of the limb may be well adjusted. The amount of extension is regulated by the obliquity of the cord; and counter-extension



Composed of one piece of wire the size of a No. 10 catheter, bent at right angles at each extremity, and of sufficient length to reach from a little above the anterior spinous process of the ilium to an inch beyond the toes.

s created (as in Dr. Buck's method) by raising the foot of the bed. (Fig. 3.)

In these methods of treatment the forces of extension and counter-extension are applied only to such a degree as is determined by the tolerance of each patient, increasing or diminishing them according to his feelings, and not being troubled with any diminution in the *length* of the limb, but only when there may be an undue increase in the *thickness* of the bone, and leaving the muscles (unirritated by the presence of bony spiculæ) to their own natural contractility. This seems to me to be in exact accordance with the precepts of Appia and Macleod. Shortening *must*, deformity and twisting of the bone *may* occur, chiefly depending upon the amount of structure that has perished and upon the skill and vigilance of the surgeon.

In the dressing of the wounds attending these fractures there



Fig. 3

was only one thing that I observed as different from what I had seen and done in England, and this was in the substitution of *picked oakum* for lint—first, I believe, both suggested and used by Dr. Lewis Sayre (surgeon to the Bellevue Hospital, New York) in gunshot and other suppurating wounds, who kindly instructed me in its uses.

One of the objects in applying lint to a suppurating wound is that it may absorb the discharges. Lint is composed of cotton. If a bale of cotton is immersed in a river for a month, the cotton in the centre of the bale will be found to be, upon examination, perfectly dry. If the same quantity of picked oakum be similarly treated, it will be found in a few hours to be completely saturated. So when a pad of lint over a suppurating wound is removed, after having been upon it for many hours, it will be found to be—save at its points of immediate contact—quite dry, and the pus beneath will gush out. Thus the pad of lint acts as a tampon, *preventing* the free escape of pus, which necessarily burrows in different directions, giving rise to extensive and dangerous abscesses.

Now, when *picked oakum* is placed over such a wound, upon its removal the wound will be found dry and clean, the oakum saturated with pus. The picked oakum acts like a syphon, discharging the pus as it is secreted by capillary attraction; and, partly from its fibres being tarred, is a very excellent antiseptic, and removes all unpleasant odour.

There appeared to me to be some difficulty in the application of “Smith’s splint,” from the position of the limb—to be a tendency to the burrowing of pus; and that the extending and counter-extending forces were not easily regulated, and very liable to be disarranged.

In “Buck’s apparatus” there was an undue liability for the limb to become twisted—for the prevention of such an accident a sand cushion was usually placed on each side of the limb—and for the fragments of the fractured bone to become disturbed. The wound was more accessible and more conveniently attended to when directly posterior, in “Smith’s splint,” and if directly anterior, in “Buck’s.”

My experience having, of course, been very limited, I am

able to express no opinion as to the *comparative* merit and efficiency of these two modes of treatment, which, however, will be fully detailed in the "Surgical History of the American War," materials for the compilation of which are being duly prepared in the city of Washington.

BIRMINGHAM, May, 1863.
