

**On the proper selection and scientific application of trusses / by Carsten Holthouse.**

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Holthouse, Carsten, 1810-1890.  
Royal College of Surgeons of England

**Publication/Creation**

Westminster : F.B. West, 1871.

**Persistent URL**

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ON THE

PROPER SELECTION

AND

SCIENTIFIC APPLICATION

OF

TRUSSES.

BY

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WESTMINSTER :

F B. WEST, 35, KING STREET.

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1871.

*BY THE SAME AUTHOR.*

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ON HERNIAL AND OTHER TUMOURS OF  
THE GROIN AND ITS NEIGHBOURHOOD ;

With Practical Remarks on the Radical Cure of  
Ruptures.

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ON SQUINTING, PARALYTIC AFFECTIONS  
OF THE EYE,

AND

CERTAIN FORMS OF IMPAIRED VISION.

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J. & A. CHURCHILL,  
NEW BURLINGTON STREET, LONDON.



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“THE treatment of ruptures,” observes Lawrence, “demands as great a combination of anatomical skill, with experience and judgment, as that of any disorders in surgery.”

In spite of this undeniable truth, the public seem to imagine that they have only to purchase a truss, as they would do a hat, in order to be at once relieved of their malady.

“The injurious results of this practice,” says Birkett, “are being continually forced on the attention of surgeons. Among the poor we constantly observe the lamentable effects of this proceeding. Ill-shaped trusses are applied; the springs, being too feeble, allow the hernia to descend behind the pad, where it becomes compressed; or they are too strong, and their pressure induces absorption of the abdominal parietes, on which the pad presses. Frequently a truss suit-



able for supporting a femoral hernia is applied to one of the inguinal kind, and *vice versá*."

It has been said that hernia being a mere mechanical complaint needs only a mechanician to remedy it; but if the reader will refer to my work, "On Hernial and other Tumours, &c.," he will see that it is oftentimes exceedingly difficult to distinguish a hernial tumour from others of a different nature: thus, I have seen a truss applied to a tumour in the groin which proved to be an undescended testis. In another case the tumour to which it was applied was a chronic abscess; in another it was an enlarged gland; in another an unreduced rupture. Repeatedly have I seen the pad of the truss exerting all its pressure on the external abdominal ring, and none on the internal, through which a hernia had escaped, and was lodged in the inguinal canal; or a large triangular pad covering the external ring and front of the pubes, for a small incipient rupture that could have been kept up by the end of the thumb.

It must be obvious from the above facts, that the determination of the nature of the swelling and of the kind of hernia is of the first importance, and that this can only be done by those who are conversant with the anatomy of the hernial regions, both in their healthy and morbid conditions.

One is frequently asked by hernial patients,



Whose truss do you recommend? the only proper reply that can be made to this question is, Nobody's; almost every rupture has something special, and requires some special modification of the pad for its retention. Some herniæ can be kept up by almost any truss, while there are others which scarcely any truss will keep up. It is this difference in the variety and condition of herniæ which has given rise to so many inventions; and mechanics without number have constructed and patented each his own truss, which is vaunted as superior to all others, and applied indiscriminately to every kind of rupture. There are no truss-makers who cannot boast of success after others have failed, and none who have not failed where others have succeeded. Instrument-makers who have not patents eschew the latter, and declare the ordinary truss to be the most efficient instrument; thus most truss vendors are partisans in favour of some particular kind of truss, which will keep up all ruptures, as certain pills will cure all diseases.

How, then, is the public to judge? Is it from the advertisements of truss-makers, or from testimonials of those who have worn their instruments, or from eminent medical men who have examined them, or medical journals, or reports of learned societies? There are few patentees who cannot produce evidence of this kind, and



the only conclusion at which the public can arrive is, that none of these instruments are without merit, and, therefore, it can matter little which they purchase ; yet such a conclusion is far from the truth, for the simple reason that an instrument which may be admirably adapted to A may be utterly unsuitable to B. How, then, let me repeat, is the public to judge ? I answer unhesitatingly it cannot judge ; it has no data whereon to found a judgment ; a ruptured person requires the knowledge of an expert to tell him what kind of hernia he is suffering from, and what sort of truss is best suited to his particular case. In the present state of things, as the public are now supplied with trusses, the proportion of those who continue uncured of their malady to those who are cured is very great ; under an improved system, *i.e.*, with properly constructed and skilfully applied trusses, the proportion of cures to failures might, I believe, be greatly increased. It must be clear from the foregoing remarks that the proper selection of a truss is of the greatest importance, and that it cannot be safely entrusted to those who are interested in the sale of a particular instrument.

Turning now to the more practical part of my subject, first among the many problems to be determined in selecting a truss, is, whether it should be single or double ; in other words, is it necessary or expedient that a person affected



with a single rupture should be supplied with a double truss as if he were ruptured on both sides? If I were required to give a general answer to this question, it would be in the negative: the exceptions are to be found in those subjects in whom a rupture has come on spontaneously, or without any obvious exciting cause; in those in whom there is a strong hereditary predisposition to rupture; in those in whom the abdominal wall or the unruptured side is weak and bulging, though there may be no actual protrusion: if in addition the external abdominal ring of this side should be large, and its pillars lax, there can be no doubt of the expediency of having a double truss in order to anticipate and prevent a double rupture. Under the reverse conditions, especially if the subject be young, a single truss will be sufficient.

*The Pad.*—More important than the singleness or doubleness of the truss, is the determination of the size, shape, and consistency of its pad. How much, as a general rule, ought it to exceed the size of the hernial aperture? According to most authorities it should extend two or three lines beyond its margins; to this, however, there are exceptions, as in certain scrotal hernia, where it is necessary to be prolonged downwards. Again, where general support is wanted, rather than a concentrated pressure, a large flattish pad, considerably exceeding the



size of the internal abdominal ring, is the most advantageous. If the hernia be recent and accidental, and the subject young and strong, a small pad is called for. There can be no doubt that the majority of recent oblique inguinal herniæ might be kept up by much smaller pads than those in general use; and some twenty-five years ago the late Mr. David Tod constructed a truss, the pad of which was "about the size and shape of the point of a man's thumb," so as to make pressure over the internal abdominal ring only. This truss, which required no straps to keep it in position, was much praised by the medical and other periodicals of the day, and was said to have effected many cures. The principal objection to such small pads is the great accuracy of adjustment which is needed, and the difficulty of maintaining it.

The relation of the size of the pad to the strength of the spring is a point which must not be lost sight of: thus, a pad of say 1" in diameter will exert a more concentrated and therefore a greater pressure than one of 2" diameter, though the strength of the spring may be the same. In ordering a truss, therefore, both the size of the pad and the strength of the spring should be given; but the size of the pad includes not only the superficies of its two surfaces, but also its thickness—therefore this must be given, for it must be obvious that the thickening of the



pad is equivalent to the strengthening of the spring.

Not less, if not more, important than the size of the pad is its shape and consistency. And here again one can be guided only by general rules. As a general rule then the outline of the pad should be more or less circular, oval, or inclining to the triangular. The surface which is applied to the skin may be either flat as in Wood's trusses, equally or unequally convex, or of irregular shape, according to the kind of hernia with which one has to deal. A considerable number of failures in the retention of hernia are owing to the too uniform shape of the pad, which may make too much pressure on one part and too little on another, the points of greatest pressure not coinciding with those of the greatest counter-pressure; hence it happens that a pad of wadding (by moulding itself to the part), fixed over the hernial aperture by plaster and bandage, will sometimes keep up a rupture which trusses have failed to command. Hence also the secret of success of air and of water pads. As regards consistency, pads may be hard, unyielding, and inelastic, or the reverse; indeed, they may be made of any degree of consistency or of elasticity. Elastic pads are of two kinds: in one, the elasticity is produced by metallic springs placed between the two plates of the pad, as in the spiral spring truss of Coles; in the other, the elasticity



is due to air or water contained in an air-tight pad of india-rubber. The action of these two kinds of elastic pads differs materially: in the former the inner plate of the pad rises *en masse* under the impulsion of a rupture, just as does the whole pad of an ordinary truss, but it does not alter its form; whilst the latter alters its form in accordance with that of the surface against which it is placed, and yields and resists in correspondence with the counter-pressure from within. If, for example, one of these pads be placed over a direct inguinal hernia, and the patient be desired to cough, what happens? The centre only of the pad yields to the impulsion, and the air driven thence to the circumference forms a ring of circumvallation which offers an effectual barrier against further escape. Pads of this description will retain the most difficult hernia, and are far more comfortable than any others, but the class of cases to which they are applicable is comparatively limited. Speaking generally, firm, unyielding, and convex pads are necessary in very fat or muscular individuals, or when a radical cure is sought for; soft and more or less elastic and flattish pads in the thin, weakly, and aged.

*The Spring.*—To retain the pad in position, either a band or a steel spring is employed; the former was most generally used till the seventeenth century, but it is now almost superseded by the latter, and has fallen into unmerited obloquy.



Among the truss-makers of this metropolis the bandage is eschewed by all but White, the inventor of the moc-main lever truss, and Lindsey ; yet for certain kinds of hernia, as the umbilical, and under certain circumstances, as in bathing, and in cases where it is desirable that a truss should be worn at night as well as by day, it is preferable to the spring. These bandages ought always to be elastic, and, when used during bathing, waterproof. The principal objection to their use arises from the lateral diameter of the pelvis being greater than the antero-part, so that the greatest pressure is made over the haunches, where it is not wanted, and the least over the inguinal canal, where it is most required ; but this is a difficulty which can be got over by placing pads of sufficient thickness in front and behind to make this diameter equal to the lateral.

It must be conceded, however, that for the majority of ruptures the steel spring is preferable to the elastic band. Truss-springs differ in length, strength, form, and other particulars, according to the kind of hernia or the fancy of the truss-maker ; thus they may embrace only half or nearly the whole circumference of the body. Camper, after many trials, fixed on five-sixths as the most convenient length. In the ordinary circular spring truss of this country the spring is made sufficiently long to pass a little beyond, and to grasp the opposite haunch, and has a strap



attached to its free end which connects it with the pad, and thus completes the circle. In other trusses the spring embraces only half the circumference of the pelvis, a circular, well-padded moveable disc being attached to its posterior end, which rests on the spine, and the circle being here likewise completed by a strap. In other trusses, as Egg's and Salmon's, all straps are dispensed with. There can be no doubt that each of these varieties of truss has its advantages, and that one kind is best suited to one form of hernia and another to another. I shall not here record my opinion on the relative advantages of the German, French, or English springs, nor is it necessary to decide whether fixed or moveable pads are to be preferred. All these points will come under review in another and enlarged edition on which I am now engaged. On one question, however, I must here say a few words : Ought the spring to be strong enough to resist extraordinary or only ordinary muscular efforts—a pressure of—say three pounds being sufficient to keep up a rupture under all ordinary circumstances, but one of six pounds being required on extraordinary occasions—ought the patient to wear constantly the weak or the strong truss ? In other words, which is the lesser evil—the liability of the rupture to escape under certain exceptional conditions, or the being constantly subjected to such an amount of pressure



as is only occasionally needed? There can be no doubt that the *constant* wearing of the strong truss is *not* necessary, but it *is* necessary that those who are obliged at times to make use of violent muscular efforts should be provided either with two trusses of different strength of spring, or that the one they wear should be so constructed as to admit of offering this increased resistance when needed; and I may add that no truss can be considered perfect which does not in itself contain the mechanism necessary for this purpose.

Let us assume now that the tumour for which one is consulted is really a reducible hernia; the selection of the proper truss and its scientific application demand, as a first condition, the recognition of the kind of hernia, and it is quite certain this cannot be done by those who are uninstructed in the anatomy of the hernial regions. I do not mean to affirm that they cannot recognise the more obvious ruptures, such as the umbilical or the scrotal, but I have reason to know that some forms of oblique inguinal hernia are not infrequently mistaken for direct, others for femoral, and both wrongly treated; were it not for this, a large proportion of incipient herniæ, especially of the oblique variety, and in young subjects, might be radically cured by a truss only.

My mode of proceeding in the selection and



adaptation of a truss is as follows:—Having diagnosed the kind of hernia, and ascertained the size of the opening through which it protrudes, I place upon it a pad of such a size and shape as will retain the hernia under digital pressure when the patient coughs. I next ascertain the exact amount of that pressure by means of the dynamometer, and select a spring of equivalent strength; this, of course, necessitates a measurement of the antero-posterior diameter of the abdomen at the site of the rupture. The next step consists in measuring and taking a mould of the circumference of the body at from 1" to 2" below the highest point of the haunch bones; and lastly, the angle which the wall of the abdomen, at the seat of the rupture, makes with a vertical line is noted. This is a most important point to determine, for want of attention to which so many trusses fail. The majority of these are constructed on the erroneous principle that the pressure of the pad should be in a direction upwards, outwards, and backwards; for this being the direction in which the pressure is applied to reduce an oblique inguinal hernia (the most common variety), it is assumed that the direction of the force to retain it, after reduction, should be the same, *i.e.* an upward lifting force, as it has been termed. Now, nothing is more illogical than such an assumption, or more practically hurtful. True,



in perhaps the majority of ruptures in adults, this direction which is given to the pad happens to be the right one; not, however, for the reason alleged, but because a pad, so facing, really corresponds with the surface outline of the part to which it has to be applied. In the flat-bellied, as in most children and young persons, those in fact who constitute the best subjects for a radical cure, the effect of this inclination of the pad is, that it presses only or chiefly by its lower border instead of equally by its whole surface, as it ought to do; thus the inferior part of the inguinal canal and the external abdominal ring receive the pressure, while the upper part of the canal and the internal abdominal ring, where it is really required, are left without any. This is no fanciful representation of what happens, but the direct result of observation and inspection of the fitting on of trusses by some of the most experienced instrument makers of this metropolis.

A truss constructed on the principles which I have laid down, and properly applied, ought not only to prevent the descent of the rupture, but in a large proportion of young persons radically to cure it. To ensure this, however, attention must be given to the following points:—

1. Accuracy of adjustment of the pad, the centre of which should be placed over the internal abdominal ring in an oblique



inguinal hernia, and over the external abdominal ring in a direct.

2. Maintenance of this adjustment in the various movements of the body.
3. Avoidance of injurious pressure on contiguous structures—as the spermatic cord, or the femoral vein.
4. Concentration of the whole force of the spring on the pad.
5. A provision for increasing the pressure of the pad under extraordinary circumstances.

Thus it will be seen that the efficiency of a truss does not depend solely on the pad or solely on the spring ; a spring of four pounds will keep up a hernia which one of six pounds will not, though the pad may be the same, proving therefore that it is not the absolute force but its application through a correct anatomical knowledge to the peculiarities of each individual case.