

**Clinical lecture on the application of trusses to herniae : delivered at King's College Hospital / by John Wood.**

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*The Application of Trusses*

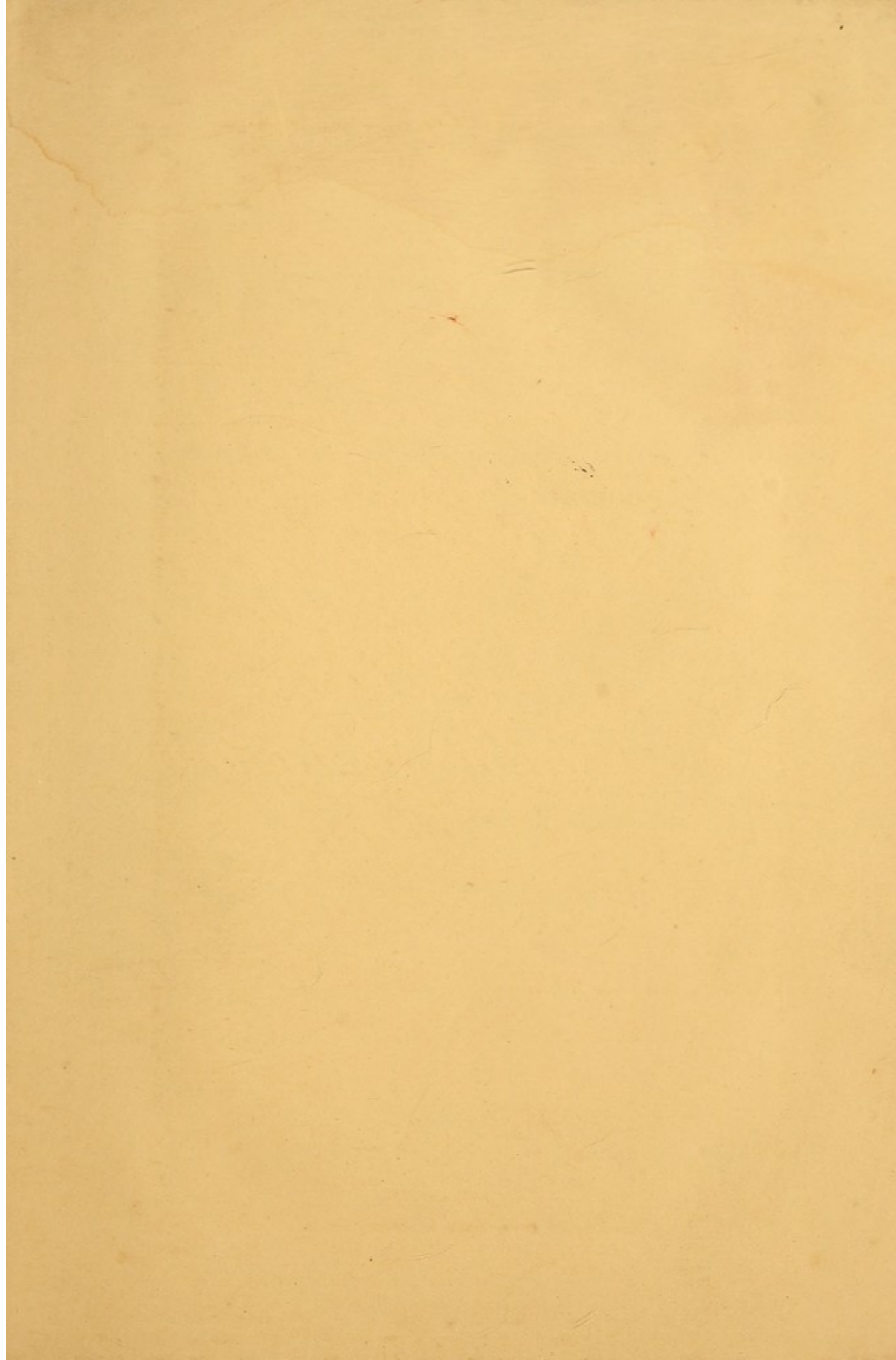
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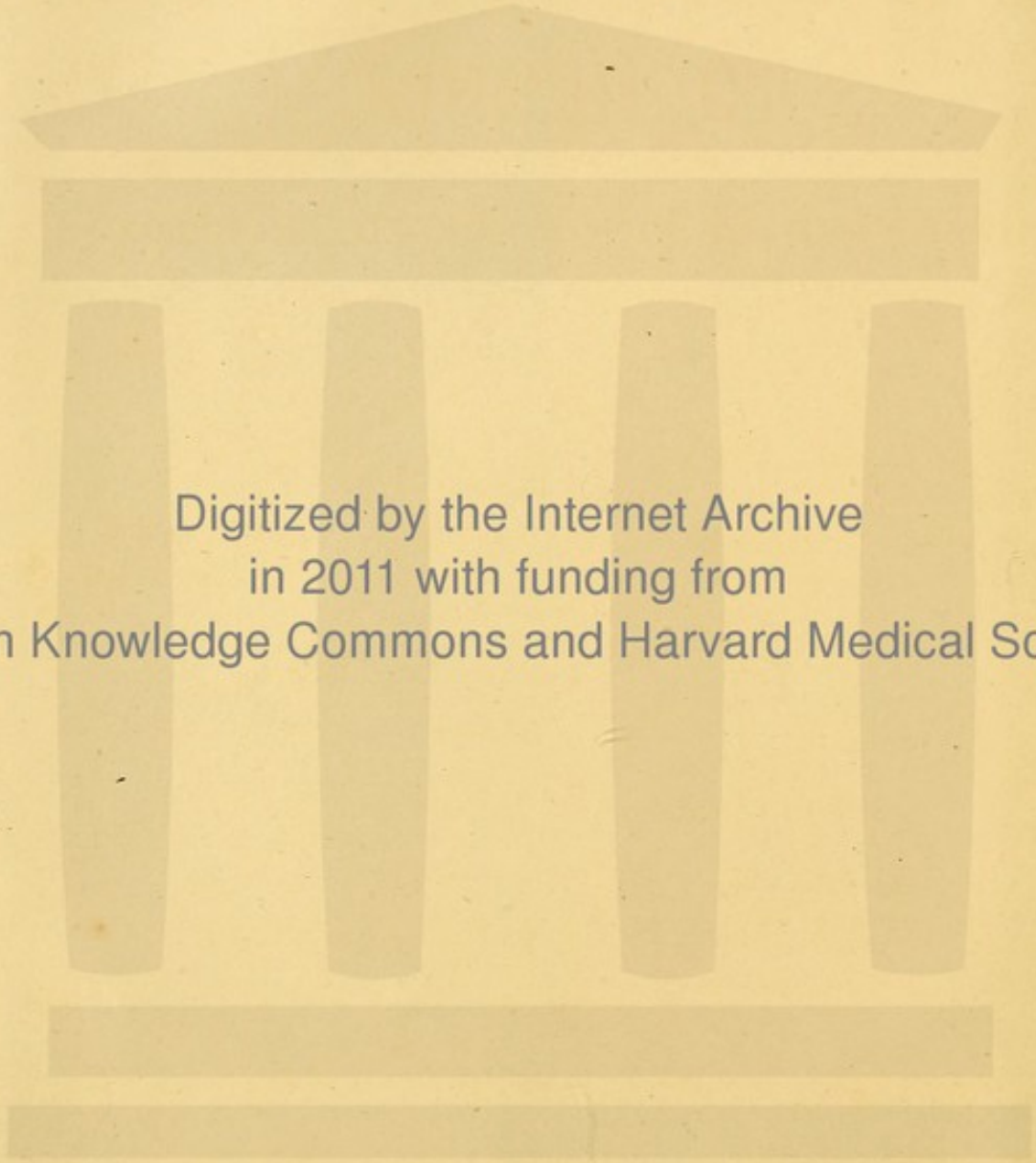
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CLINICAL LECTURE  
ON THE  
APPLICATION OF TRUSSES  
TO HERNIÆ

DELIVERED AT KING'S COLLEGE HOSPITAL

BY  
JOHN WOOD, F.R.S., F.R.C.S.

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TO KING'S COLLEGE HOSPITAL, EXAMINER TO THE ROYAL COLLEGE OF SURGEONS,  
AND OF PHYSICIANS, LONDON

*REPRINTED AND ILLUSTRATED*

BY

MATTHEWS BROTHERS

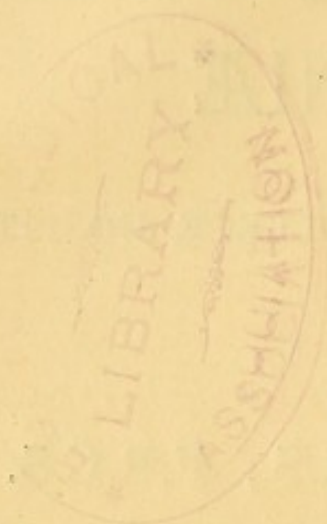
SURGICAL INSTRUMENT MAKERS

27, CAREY STREET, W.C.

LONDON  
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CLINICAL LECTURE  
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APPLICATION OF TRUSSES TO HERNIÆ.

DELIVERED AT KING'S COLLEGE HOSPITAL,

By JOHN WOOD, F.R.S., F.R.C.S.,

Professor of Clinical Surgery at King's College, and Senior Surgeon  
to King's College Hospital.

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GENTLEMEN,

We have lately had in the wards a good number of cases of children with hernia—a very common complaint, and one which may be treated with a great amount of success by proper care and mechanical restraint. I propose to speak to-day, therefore, of the application of trusses to hernia. It is one of great practical importance to you, both in the immediate future and in your career as practitioners. I shall commence with inguinal hernia, which is by far the most common ; and we will consider what you may expect to accomplish by trusses in the way of cure, the kind of truss to be applied, and the sort of apparatus which is either of no use or positively injurious, and is therefore to be avoided. Femoral hernia comes next in point of frequency in the



adult; and lastly we will consider briefly the truss treatment of umbilical hernia.

The relative positions of the apertures which are concerned in inguinal hernia are to be carefully recognized. Under the term oblique inguinal herniæ are included congenital and infantile, because children's herniæ descend along the course of the spermatic cord. In the infantile variety the tunica vaginalis is imperfectly closed, and extends high up the canal, and the rupture-sac comes down within it, so that you have reduplication of the serous sac of the rupture by the addition of the front layer of this serous tissue. Now let us study the hernial apertures. First of all, placed a little inside the midway point between the anterior superior iliac spine and the spine of the pubis, you have an internal or deep ring which transmits the constituents of the cord. This is not a direct opening, which you can see on the superficial as well as on the deep surface, but it is like the opening of the sleeve of your coat in relation to the body, which is seen inside and not outside. If you look at it from the outside you will see the infundibular process of fascia passing from the transversalis, covering the opening by being prolonged over the cord, and forming its intimate investment. In the opening of the coat-sleeve the edge is most prominent on the inner part, where the armpit of the wearer is often galled by it. Now, it is just so in hernia. That is the point also where the internal abdominal ring galls the protruded bowel, and sometimes strangulates it. We will leave out of consideration altogether the relation of the epigastric and other vessels, which scarcely bear upon the treatment by truss-pressure. The inguinal canal slopes downward and inward under the lower borders of the internal oblique and transversalis muscles; and when the hernia has dilated this canal and arrived at the external ring, it forms an opening



placed above and outside the cord. Then the hernia, if permitted to go on, slips under the coverings of the cord, and becomes scrotal hernia. Generally speaking, there is a little constriction in the upper part of a scrotal hernia, indicating the commencement of the unstriped muscle, or dartos, of the scrotum, and the termination of the fat of the tegumentary tissues. This sometimes gives a complete hour-glass appearance to the sac, such as is not uncommonly also seen in hydrocele.

There are various degrees of oblique inguinal hernia. First of all when the bowel begins to pass through the internal ring, it does not usually come through suddenly. In very few cases does oblique inguinal hernia occur suddenly at this point of its progress. It is prepared slowly, till at length, on the patient making an effort, it advances a little further, so as to give him pain, and draw attention to it. It occurs in this wise:—There you will see is a ring, and behind the ring is the peritoneum. The peritoneum there is loose, because it has to provide for the superior false ligament of the bladder, and to allow of the distension of that organ. If the subperitoneal fascia and the fascia transversalis are feeble and their support to the peritoneum insufficient, the latter gets so thinned and weakened as to yield before a cough or any lifting effort. Even the slightest causes constantly repeated will slowly and often unobservedly produce a protrusion. At length the hernia gets into the upper part of the inguinal canal, when it is called a *bubonocoele*, i.e., a hernial tumour which is still within the inguinal canal, or just emerging from the superficial ring. Even in this condition it may get strangulated at the neck of the sac as it passes the internal ring, the inguinal canal having become dilated, sometimes to very much greater extent than the internal ring itself, which may still remain at little more than its normal



size. You frequently find in these cases a large cavity which the hernia has made for itself in the canal between the layers of the abdominal aponeuroses, with no external evidence except a fulness in the groin, and a pain or sense of weakness, increased on coughing or other exertion. At length the pillars of the external ring give way, sometimes by a quick, sometimes by a very slow, process; their edges are first bulged outward; the external pillar carrying with it the cord, and the internal pillar being relaxed and curved inwards. This process is effected by the yielding of the arciform bands of the external spermatic or inter-columnar fascia, which gradually allows the pillars to become bulged forwards, and then everted and curvilinear instead of nearly straight in direction.

Now let us consider how we should best restrain or prevent this process. It must be done by judicious truss pressure, by which even a radical cure may be obtained in some cases. To accomplish this, however, requires so accurate a fit, so appropriate an instrument, and such care on the part of the patient or, in the case of children, on the part of the nurse, that it is not often successful. About 15 to 20 per cent. of hernia patients may be cured by judicious and persistent truss pressure, perhaps more in the case of children and young persons, and certainly less in adults. The reason why in the herniæ of children we are more likely to get a cure by truss pressure in this:—In children, the condition is the result, both in the case of inguinal and umbilical hernia, of an imperfection in evolution shown in the final closing up of the abdominal wall. The former is generally caused by a late descent of the testicle, accompanied, probably, by an imperfect development of the cremaster and gubernaculum testis. The whole of the parts concerned in the descent of the testis are weakened and backward in



development ; the consequences do not always show themselves immediately after birth, but may become apparent at some later period of life. Not uncommonly a portion of the peritoneum is drawn down, preceding the testicle itself in its descent into the scrotum. Sometimes the testicle is held in the abdomen by adhesions, while the epididymis is stretched out and unravelled, reaching from the testicle, which remains below the kidney where it is developed, as far as the external ring.

This fact of the peritoneum preceding testicle gives rise to a peculiar form of rupture, which you sometimes see in children, viz., the testicle is retained in the abdomen, while a hydrocele or serous effusion forms in the tunica vaginalis, producing a tumour which simulates a bubonocoele ; a portion of bowel or omentum may now slip beyond the testicle and pass into the sac. The bowel may come down with the fluid in the tunica vaginalis, leaving the testicle behind. These are sometimes called "windy ruptures," and the fluid contained therein may be pressed back into the abdominal cavity. The descent of the testis takes place about the end of the seventh month of intra-uterine life, and ought to be completed before the end of the eighth ; but it varies very much according to the forwardness of the development of the child. The gland ought to be in the scrotum at the time of birth, and it is the duty of the doctor to ascertain whether it is so or not at the birth of a male child. It is generally some weeks afterwards before the canal is closed up. The closure begins at the upper part, and makes its way downward until it seals up the tunica vaginalis about half an inch from the testicle. A similar process, producing a protrusion of the peritoneum into the groin, may occur in a female child, the ovary passing into the labium instead of the pelvis, and sinking further into it as the pelvis develops. Sometimes, by an error in



development, a process of peritoneum is drawn down into the labium, and this should close up in the male ; but sometimes it remains patulous, and gives rise to a congenital inguinal hernia in the female. In such a case as that you should apply pressure early, directly backward at the site of the deep or internal ring.

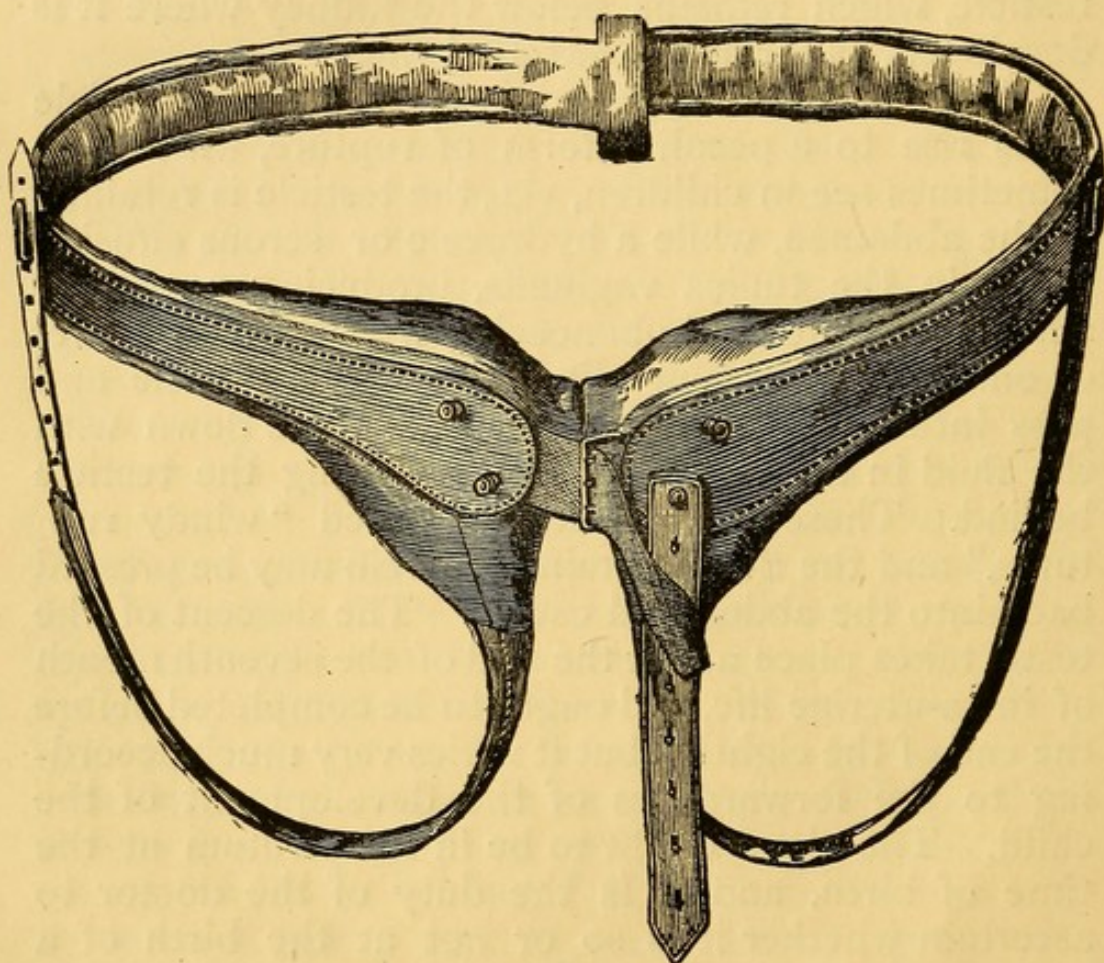


FIG. 1.

We will now consider the mechanical action of *the truss*. There are two parts of the truss for separate consideration. The chief and most important part is the pad. All trusses for reducible hernia are provided with some sort of pad, whatever may be their principle of mechanical action. The object of this



pad is to press upon the opening through which the rupture passes, to keep the bowel or omentum from getting into the canal, and, if possible, to prevent it from slipping down into the scrotum, even if it passes the internal or deep abdominal ring. There are various shapes of pads, some of which are very objectionable in principle. I take one here for example. This is a very conical pad, so conical as to be almost bluntly pointed. Put this on a weak place, and what ensues? There is a hole beneath the integuments, which are spread over that hole, covering it in. The conical or acute truss-pad presses these superficial tissues into the hole, in much the same way as when you put a cork into a bottle with a piece of leather over it. It thus spreads the tissues out, stretches and weakens them, and, at the same time, dilates the tendinous aperture of the superficial ring. The injurious effect of wearing continuously trusses of this kind, or their various modifications, all of which have the same radical vice, is increased in some by a powerful spiral spring placed inside the conical pad, so that they press the tissues still more powerfully into the hernial opening. The movements of a patient who wears such a truss cause a constant working of this spring, and a boring motion into the aperture is produced, like the twisting of a cork into the neck of a bottle. Moreover, in a case of rupture you have, not a resisting bottle-neck, but an elastic and valvular opening which yields to the pressure. You are continually obliged, therefore, to increase the size of your cork-like pad, so as to fully occupy the hole and sustain the rupture. The aperture regularly increases, and the rupture, when it does come down, constantly becomes larger and more liable to become scrotal, until at length it gets so large and unmanageable that no truss will keep it up. This is a common result of wearing a truss-pad of this kind.

It has been asserted that, as a fact, the projecting



conical pad only buries itself in the subcutaneous tissues, and does not project between the pillars of the ring. But this seems a purely arbitrary assumption, and one certainly contrary to the results of observation in cases which have been subject to such pressure for a length of time. If there be no pressure exerted by the point of the cone, what effect can it have in restraining the rupture at all? If it has any effect at all upon the inguinal canal, that effect must be in accordance with the shape of the impinging surface. A conical wedge-like pressure cannot be transformed into a flat pressure by

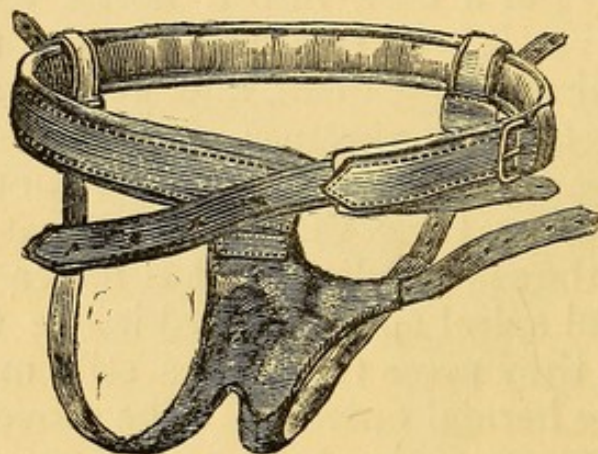


FIG. 2.

skin and fat, which are almost as yielding as water. And what occurs in the numerous cases in which the skin is thin and delicate, and the fat almost entirely absent? A rounded surface must press on all sides in a direction perpendicular to the surface which presses. It must tend, therefore, to thrust outwards the pillars of the ring, and to stretch and weaken the inter-columnar fascia in the same way as the introduction of a Wutzer's plug into the canal. And that it does so I have verified by post-mortem examination in numerous cases where a truss had been worn. In fact, a conical surface fitting into a slippery and



elastic opening, rather favours the escape of the hernia between its sloping sides and the edges of the aperture, as soon as the rupture acquires sufficient power to lift up the truss-pad a little; and if it becomes displaced laterally, the hernia immediately slips down the inclined plane. Sometimes in such a case the instrument-maker, finding the rupture to slip down into the canal, and wishing to stop it in its descent, prolongs his truss-pad downwards into a sort of tail (figs. 1 and 2), and makes it bigger and bigger, until at length he pushes aside the scrotum, and may bring the pad down into the perineum. Such arrangements hardly ever do any good at all; they are simply excuses for "fiddle-faddling." They are exceedingly uncomfortable to the patient, and you may be sure, if a rupture gets down the canal so far as to need such a secondary pad, it is certain to pass on into the scrotum; you cannot stop it. The most important indication, therefore, is to prevent the rupture from entering the canal at all; to shut up the internal ring altogether.

The pads are fastened on to the retaining apparatus in a variety of ways. Some are made so as to be adjusting, with the idea of following the rupture in the various twistings of its course and emergence. After long experience, I have come to the conclusion that nothing useful can be done by such pads as these, unless the patient is constantly on the watch to adapt the pad to the shiftings of the rupture. This, I need not remark, can scarcely be done in society, or in the streets, or in various situations where the stress of a rupture may come. The best way is to have your pad so fixed that it prevents the rupture from getting into the canal at all. The kind of pad I myself recommend—what I chiefly insist upon—is, first, that the bearing of the surface of the pad shall be *flat*, that it shall not press in the tissues or invaginate them into the canal between the pillars of the external abdomi-



nal ring, and thus stretch, fray, and weaken the inter-columnar fascia which ought to restrain the rupture from coming down. The edge, of course, must be rounded off to prevent it cutting. We get, therefore, to this kind of flat-bottomed-boat shape according in outline with that of the inguinal canal in its diseased condition; that shape is an oblique oval. In oblique inguinal hernia in the female a flat oval pad, without any break in its outline, answers very well indeed. In the male, however, there is a peculiarity in the anatomical arrangement of the parts. The spermatic cord passes out of the superficial abdominal opening external to the spine of the pubis, crossing or lying over the outer pillar of the ring. If the truss-pad produces a pressure upon the cord, it not only makes the patient uncomfortable and the pad more liable to shift and slip about, but also may cause swelling of the testicle, hydrocele, varicocele, and ultimately atrophy; while the chafing of the pad against the pubis leads to the formation of excoriations, sores, and even abscesses. In order to avoid this, we have in the truss now before us a chink or slit in the pad (see figs. 3 and 4). This gives the pad a sort of oblique horseshoe shape. If properly put on, the shorter end lies upon Poupart's ligament immediately outside and above the spine of the pubis; the longer end lies on the inner pillar, and the round end covers the deep hernial opening of the external ring. The cord, being very movable, will adjust itself to the pad and slip into the part where there is the least pressure, *i.e.*, into the chink left between the two points of the pad.

If you hope to get the inguinal canal closed up, and the sac obliterated by a radical cure, it is better to have the pressure hard and firm; and the best material for the pad is a substance called "vulcanite," of which a specimen is before you. This does not absorb the perspiration, is perfectly smooth and hard,



and, if proper care is taken to keep the surface clean and dry, will not chafe or give rise to sores. The next best substances are boxwood and ivory, which,

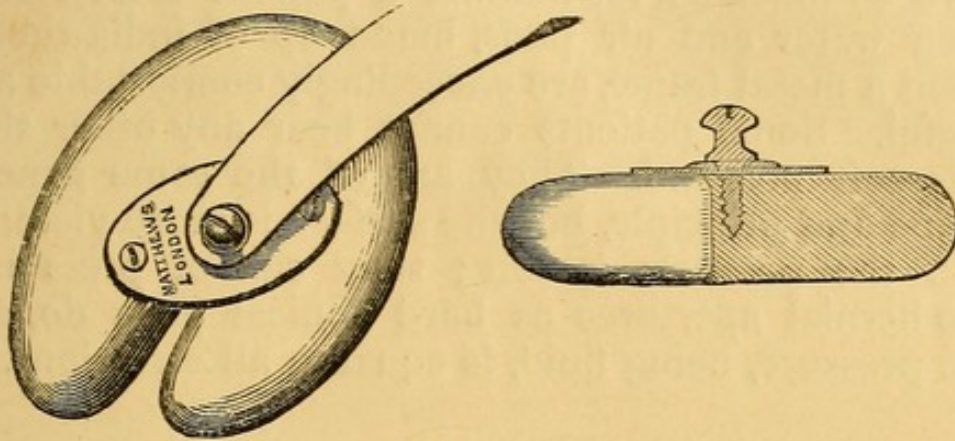


FIG. 3.

however, absorb the perspiration to a somewhat greater extent. Experience of these trusses in hot

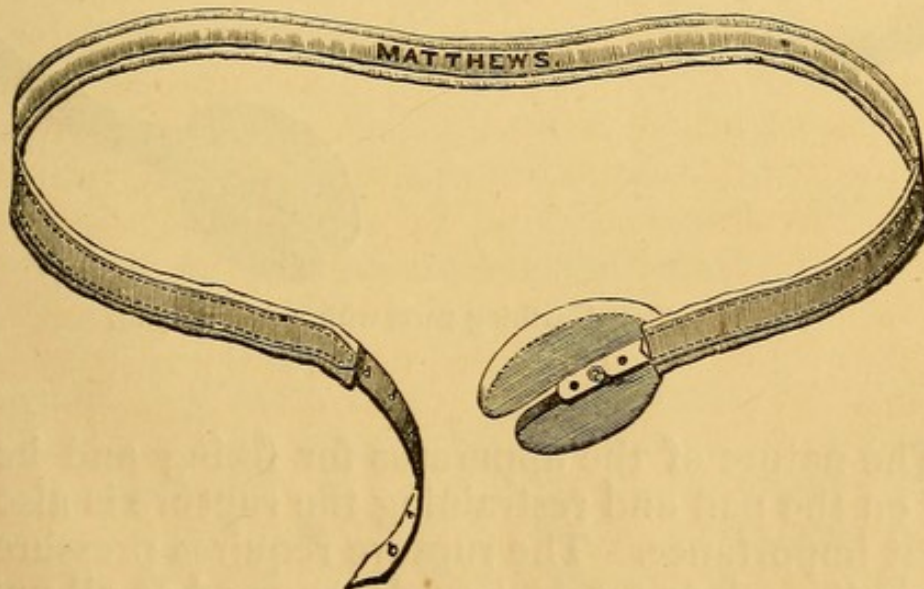


FIG. 4.

climates has been unanimously in favour of the hard vulcanite over any other substance for truss pads. Leathern or parchment coverings become putrid, foul,



and hard, under the effect of constant absorption of the cutaneous excretions, and get so nasty that sensitive and cleanly patients cannot bear to wear them. In other cases, where you do not go in for a radical cure so much as for making a patient comfortable, then water and air pads, made up of india-rubber upon a metal frame, are exceedingly comfortable and useful. Some patients cannot bear any other than this soft pressure. They are of the same general shape and principle, but the surface is more yielding, and the pressure is soft; they cannot press into the hernial apertures as hard conical pads do, and the pressure, being fluid, is equal in all directions.

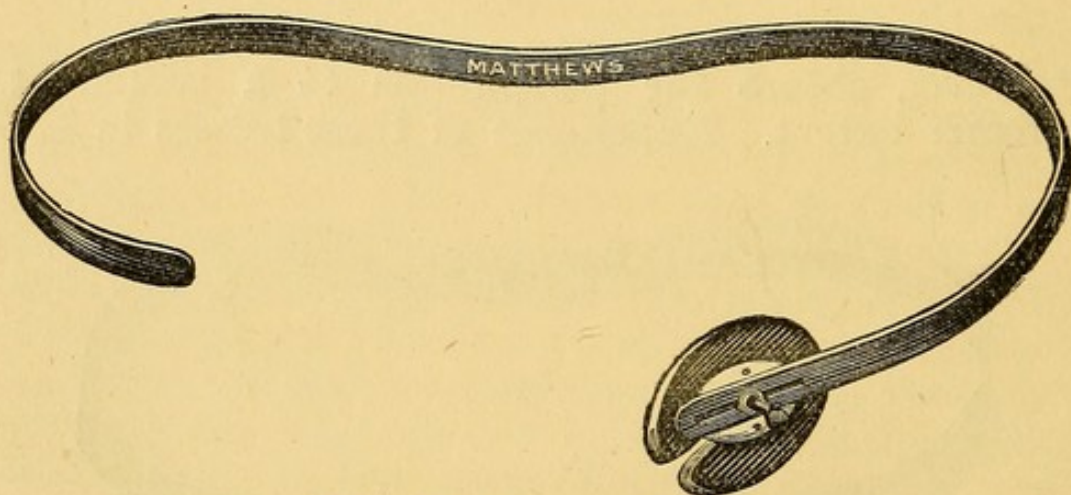


FIG. 5.—Plated bathing truss with vulcanite pad.

The nature of the apparatus for fixing and keeping on the pad and restraining the rupture is also of great importance. The rupture requires pressure to retain it, and, as a rule, you do no good at all unless there is a side-spring. There have been various ways devised of applying this retaining apparatus. One way which the patients sometimes choose, and which seems to recommend itself to them by its simplicity, is having a strap round the body, and an



understrap across the perineum. Now it is exceedingly difficult to wear a band round the waist so tight as not to give way to pressure at one point, and so to yield before the rupture. Even if you could make it tight enough the patient could not wear it, the tightness would be so great. You may take it, as a rule, that these straps round the pelvis, when a patient is exerting himself and contracting his abdominal muscles, are of no use in keeping in a

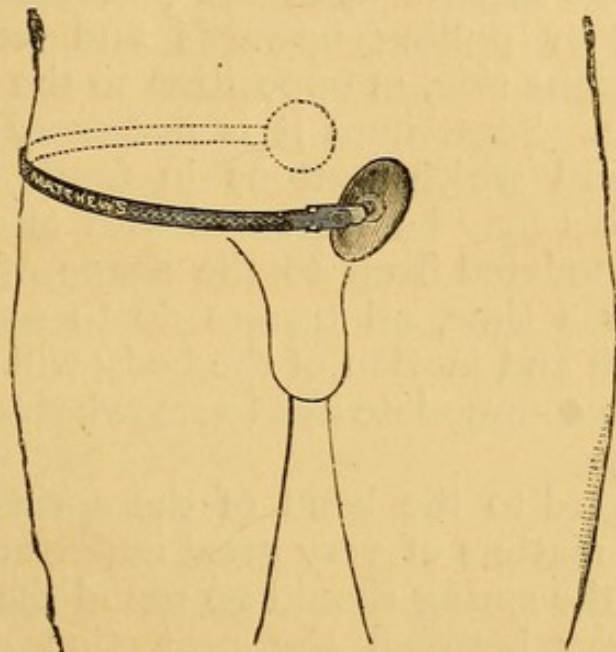


FIG. 6.—Salmon and Ody's truss.

rupture. Where there is real need for pressure, nearly all truss-makers have recourse to some form of the side-spring. Some have the spring passing only round one-half of the body, with a pad behind, on the sacrum. This pad is always flat or oval, and slightly concave, and is larger and thinner than that placed on the rupture. It is held in its place by a strap that goes round the opposite side of the body, and frequently by an understrap across the perineum. Some have the spring put on the same side as the



rupture ; but in Salmon and Ody's truss (fig. 6) the spring is put on the opposite side, so that it reaches across the front of the abdomen, and is longer than those which are put on the same side as the rupture. The rupture pad projects more than the posterior one, and works upon a ball-and-socket joint. The spring is longer than is necessary to go only half round the body ; it reaches over to the opposite side, and the support it gives depends upon the fact of its pushing upwards and towards the ruptured side. Other half-round springs depend upon the power they possess of pressing or pulling upwards and outwards towards the same side, in opposition to the descent of the rupture. Sometimes it is necessary to wear a perineal band which buttons in front. Generally speaking, this may be dispensed with after the truss has accommodated itself to the shape of the body, which, after a time, all trusses do to some extent. The warmth and motion of the body will make even the spring accommodate itself somewhat to the shape of the body.

With regard to the bend of the spring, there are one or two matters of very great importance. In the first place, the spring should go round the body at a level midway between the projection of the trochanter and the anterior superior iliac spine. There it lies on the tensor vaginæ femoris and gluteal muscles, and does not work over bony surfaces. That is the level at which the measurement for a strap should be taken when you have to send for a truss to a maker. But I may here remark that it is never satisfactory to send measurements without the maker seeing the patient. It is as if you were to send measurements to a tailor or a shoemaker to make your trousers and shoes from. You would scarcely be likely to have a good fit. The maker wants, in addition, to comprehend the shape of the back and set on of the pelvis as well as the mere



dimensions. So that, if possible, you ought to bring the maker and patient together. Other plans do not usually succeed. The spring should point down far enough to get to the opening, and the pad should be placed upon the opening. You will see that the spring requires to be bent down a good deal more for crural than for inguinal hernia. For crural hernia the side-spring should be made like the handle of an old-fashioned pistol. That end of the spring which bears the pad should project well, so as to give a proper degree of backward pressure; and if you look at the surface of the spring you will see that it is somewhat twisted on its own axis, so as to give an outward and upward pressure as well as a backward pressure. This gives the right direction in which to keep the hernia in the abdomen when it tends to pass into the canal. The round part of the horse-shoe pad presses upon the internal ring, and the ends press upon the pillar of the external ring. The chink is to lodge the cord, which is thus held as if embraced by the fingers employed in reducing and keeping in the rupture. Thus the rupture is prevented from coming through the internal ring, while the pillars of the superficial opening are prevented from separating, and so allowing the rupture to pass out. The length of the spring from the point where it comes round the hips should be duly proportioned to the patient's formation. In these horseshoe pads there are holes and screws by which the pad can be shifted a little to adjust this properly. If the spring be too long at this part the pad presses against the outer edge of the rectus muscle. The inner border of the pad should be parallel to the outer border of this muscle, and the outer border should lie upon Poupart's ligament. If the spring be too long it pushes the pad further on to the muscle, which bears off the pressure from the hernial cause during the contraction of the muscle, permitting the rupture to



escape below and outside the pad. If, on the other hand, you have the spring too short, the rupture will escape between the rectus and the pad.

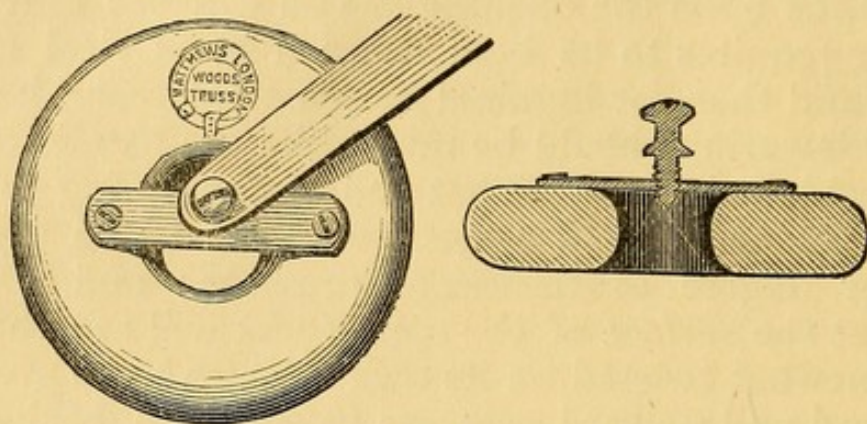


FIG. 7.

*A direct inguinal hernia* passes through the triangle of Hesselbach, enclosed between the epigastric artery, the edge of the rectus, and Poupart's ligament. That is the area you have to protect; and it can best be

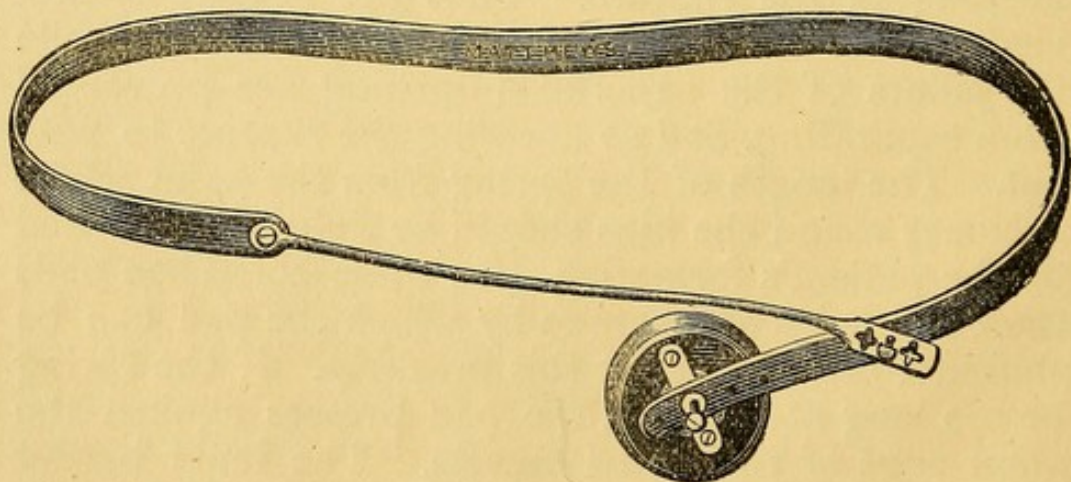


FIG. 8.

done by a flat-rounded or oblately-oval pad (figs. 7 and 8) fitting close between the edges of the rectus and Poupart's ligament, reaching well down to the



crest of the pubis, and provided with a slight notch below for the passage of the cord. To keep the pad from shifting upwards and from pressing unduly upon the pubis, care is required in adjusting the action of the side-spring. It is as well to wear at first an under or perineal strap, until the pad and spring have adjusted themselves to the shape of the abdomen. In corpulent persons a considerable upward slope may be also given to the surface of the pad to make it lie parallel with the slope of the abdomen, and to prevent the upper edge from pressing unduly into the flesh. In thin persons, with lean flanks, the tendency is always for the pad to slide upwards into the hollow formed by the abdomen. This can be met sometimes by keeping the surface of the pad quite flat, so as to lie perfectly level upon the surface of the groin. You may, however, in the course of time, in the same patient find a marked alteration in the slope of the abdomen from an increase in the abdominal volume, as well as in the thickness of the superficial fat, altering entirely the conditions of the rupture and the requirements of the pad and spring. In some instances this may occur in a very short time. On the other hand, a patient, from illness or active work, may get rapidly thin, and require a readjustment from this cause. To meet and manage these conditions is one of the niceties of truss-making. It is sometimes difficult to get the exact twist, and even when you have got it right the condition of the patient may change, and you may have to alter the spring accordingly.

The problem to solve may be put geometrically: it is requisite to obtain the angle of inclination of the abdomen to a transverse vertical plane, taken at the most prominent part of the inguinal region, and containing the side of a right-angled triangle of which the posterior wall of the inguinal canal is the hypotenuse, and the horizontal level of the upper



margin of the pubis is the base. If you do not have the pad-surface inclined enough the rupture comes down under its lower border, and if you twist it too much you get the same edge pressing in so as to inconvenience the patient, and allow the rupture to enter the upper part of the canal. It is this slipping over and under on one side or the other that constitutes the troublesome part of the treatment of ruptures by trusses. You do not often find patients who have sufficient mechanical knowledge, or who take sufficient pains, to aid the efforts of the instrument-maker by skilful adjustment of the pad after a careful return of the rupture. This is one cause why so few cures are effected in this way. I recommend, as a rule, the all-round spring covering over both hips instead of the one-sided spring ; but in certain cases I believe the principle followed in Salmon and Ody's plan, a half-round spring, fitted to the opposite side of the hips, and pushing towards the ruptured part, may be advantageous ; the horseshoe form of pad, however, may be used quite as well with this form of spring (fig. 6).

In old cases of irreducible hernia you meet with another difficulty—you cannot reduce the hernia entirely, and all you can do is to prevent more of the intestines from coming down. In such cases the bowel may be exposed to all sorts of injury, besides constituting a deformity of a somewhat conspicuous character. To remedy this you must have a suspensory or bag truss made of stout jean, or some unyielding material, which will keep a constant pressure upon the contents. If the irreducible portion consist of omentum only, you must also have some pressure over the inguinal canal to prevent the bowel from following the omentum. Such combinations are sometimes exceedingly difficult to carry out. Messrs. Matthews have tried, in some of my cases of this kind, with much success, a truss-pad shaped to



the form of the rupture, composed of a frame of stout wire, well padded, and stretching between the wire framework a bag of stout jean, or of some slightly-elastic material, sufficiently resisting, into

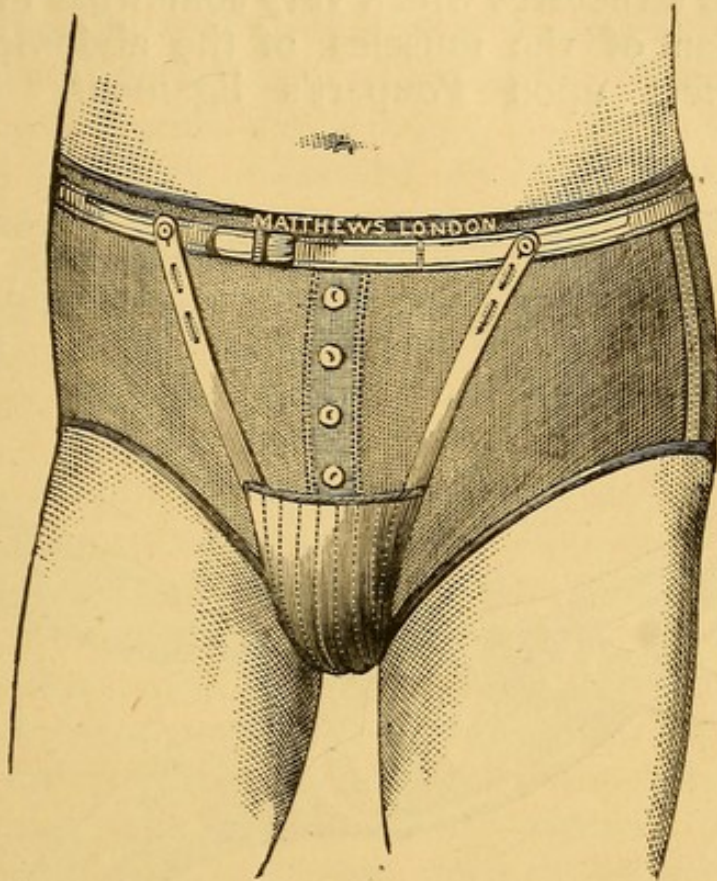


FIG. 9.

*(An elastic silk belt, the fibres of which stretch vertically only, to give a supporting pressure to the hernia, supplemented when required by an elastic strap to give additional support to the scrotum. It is usually worn over the shirt, and is recommended for old people and cases of long standing.)*

which the hernia is received (fig. 10). The wire framework, pressing all round the irreducible rupture, keeps it well in hand and under control. All you can do in such cases is simply to make your patient as comfortable as circumstances will allow, and to prevent injury to the irreducible rupture.

In *crural hernia* we have conditions entirely dif-



ferent. The inner opening is constituted by the crural ring, a horizontal aperture with a slight inclination forward. In front it is bounded by Poupart's ligament, on the inner side by Gimbernat's ligament, and on the outer side by the femoral vein and artery. These are structures which vary somewhat in tension. Relaxation of the muscles of the abdomen has a great effect upon Poupart's ligament. But the

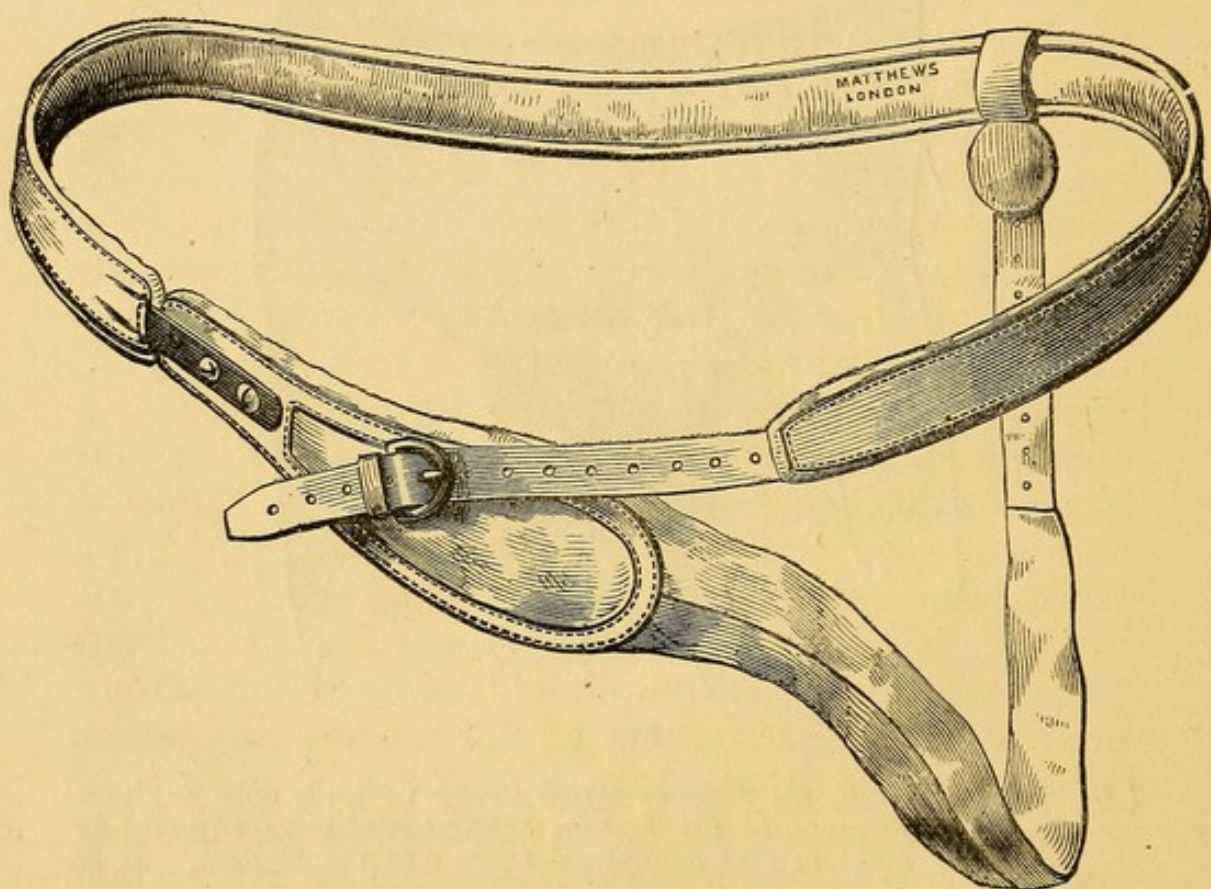


FIG. 10.

greater part of the surrounding structures are composed of unyielding ligamentous tissue, so that there is not that contraction and relaxation that is present in inguinal hernia. A little below there is another opening, called the saphenous opening, directed forwards, and a little inwards, and almost vertically, but with a slight inclination downward.



Lying in front of the passage between these two openings is the upper part of the process of Burn's or femoral ligament (Hey's), which extends from half to three-quarters of an inch downwards from Poupart's ligament, with which it is continuous above, to the margin of the saphenous opening.

It is this part to which the pressure of a truss should be applied in crural rupture, when it will protect both crural ring or upper, and the saphenous opening or lower, aperture of the crural canal. Immediately outside the canal are the femoral vein and artery, which must not be pressed on by the truss, and below is the saphena vein, which it is also important not to compress.

When a femoral rupture gets fairly through the saphenous opening, it turns upward and outward round the edge of the falciform process, and lies over the femoral vessels and upon Poupart's ligament. In order effectively to deal with this rupture, you must altogether prevent it coming through the crural ring into the canal before it makes the upward and outward turn, so as to lie upon Poupart's ligament. If you fail in this, then your truss pressing the rupture against the falciform process of Burns thereby injures the bowel, and does harm rather than good, and the patient would be safer and better without a truss at all.

The truss-pad for crural hernia must protect the crural ring by pressure over Poupart's ligament, and it must also press upon and fill the saphenous opening. It must not press downward, so as to obstruct the saphenous vein. The pad will be apt to slip, so as to miss the crural canal altogether, and, by irritating the inguinal glands, may cause trouble. The best form of truss-pad for this hernia is the one I show you (fig. 11). The outline is an egg-shape, with the small end downwards: it is adapted to the saphenous opening, but rather longer, so as to press



upon Poupart's ligament with its broad end above. The side-spring is fixed exactly in the centre. If you look at the section, you will see it slopes off below, so as to avoid pressing upon the saphenous vein, and forms a rounded projection above, so as to fall into the fold of the groin upon Poupart's ligament when the patient sits down. It is thus adapted for keeping in position; for the truss-pad which most adapts itself to the form of the surface will stop in its place the best.

In the truss for femoral hernia, the pad end of the

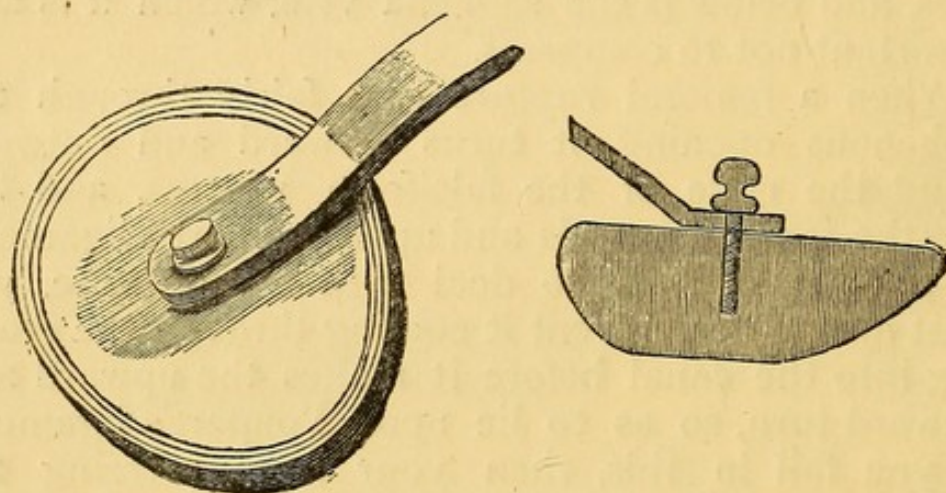


FIG. 11.

spring is bent downwards in a large curve to permit the patient's thigh to bend freely and without obstruction in sitting. You ought not to be content with seeing your patient stand when you fit on a truss; you must make him sit down on a low seat, and then stand, walk about, and jump from a stool, and see if that dislodges the truss. If the truss does not hurt him, but keeps the hernia up, under those conditions, you may conclude it will do for all the ordinary purposes of life. The commencement of a radical cure by truss pressure always dates from the last time the bowel or omentum came into the



sac of a rupture. Hence the importance of the patient preventing the hernia from ever coming down. If it come down even once, he has to begin *de novo* from that point to produce the obliteration of the canal. Hence a patient who wishes to get rid, at the earliest possible period, of a disagreeable and troublesome deformity, must wear his truss on all occasions, night and day; he must never assume the erect posture without it; and if he bathes, he must have a bathing truss, for sometimes in the gymnastic movements which generally attend upon a cold bath the rupture may come down.

see rule  
p 32

One or two words with regard to *umbilical rupture*, and its apparatus. Umbilical rupture is exceedingly common in children, and in them it is usually curable. It comes through a natural opening which is left for the umbilical vessels up to the time of birth, and which it is the tendency of nature to close up sooner or later. That tendency is very strong, and the only thing that prevents it is the bowel constantly coming into the sac. If you can, in a child, manage to prevent this, you cure the hernia; and that is generally the case when the improved apparatus of the present day is carefully attended to. But there are some cases where the child is not tractable, and from pain and fretfulness is often crying and screaming; then you get the rupture distended violently and constantly. Again, if the nurse is not soothing and careful you seldom get the rupture cured. The ordinary rough-and-ready and often very successful fashion of treating umbilical hernia is covering a flat piece of metal, say, one of the bronze coins of the realm, a penny-piece, with plaster, with the sticky side outwards, putting it on the projection, and strapping it across the abdomen with broad straps of adhesive plaster.

In some of the older books on this subject you will find recommended a convex cork plugging up



the aperture, like the neck of a bottle ; but elastic apertures of vital tissue cannot be blocked up in that way, while the cork tends to make matters worse by dilating the aperture, and thus keeping open the rupture. Therefore that is one of the things to be avoided. It does not keep in the rupture, because it will slip out at the side of the cork. A flat surface, rather larger than the aperture, is what you ought to have. A flat penny-piece, or bit of lead of the same shape and size, may be backed up by a thicker piece of wood or cork, and the strapping may be put across. In this way a very good and easy apparatus is made, if the patient cannot afford to have a proper apparatus ; but it involves the necessity of a tedious process of taking off sticking plaster, which is sometimes not done in the gentlest way, and thus sets up a crying bout, and brings the bowel out of the aperture. All this is inconvenient. When you are called upon to do this, you must press the parietes of the abdomen together with your finger and thumb, so as to close the umbilical hole before you take off the pad and strapping, and take care the bowel does not slip out.

A very capital invention is one produced by Messrs. Matthews, a very ingenious adaptation of elastic india-rubber, arranged in two compartments, distended with air, and communicating by a small aperture ; a central one, globular in shape, and an outer ring. The former presses upon the umbilical opening, and the outer upon neighbouring tissues forming its boundaries, and so prevents the umbilical hernia from coming out under a cough or cry impulse (figs. 12 and 13). This central portion acts like the penny-piece, with the additional advantage of becoming tightly distended by the air from the surrounding ring cushion, forced through the small aperture of communication by the impulse of the abdominal muscles. The whole is held on by



an elastic band round the body, and can be distended after fixing by blowing through a little stop-tap. By this means, the moment the bowel has a tendency to escape through the hernial aperture, it is met and forced back again by the dilating globe. By this

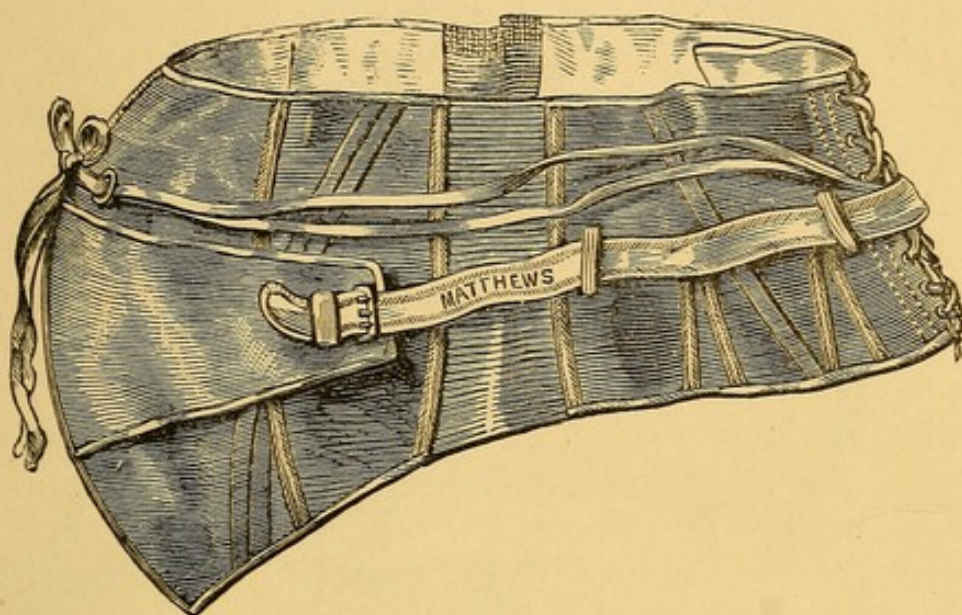


FIG. 12.—Abdominal belt, which may be fitted with reflex or other pad if required.



FIG. 13.

means we have produced some very capital cures in children. In adults, also, in whom it is much more difficult to produce a radical cure, this apparatus is very useful and comfortable. The chief reason why in adults you do not get a radical cure of umbilical



hernia is because it is generally accompanied by abdominal obesity and laxity, the stomach too becoming at intervals much distended with food and flatulence, and the mesenteries being enlarged by an

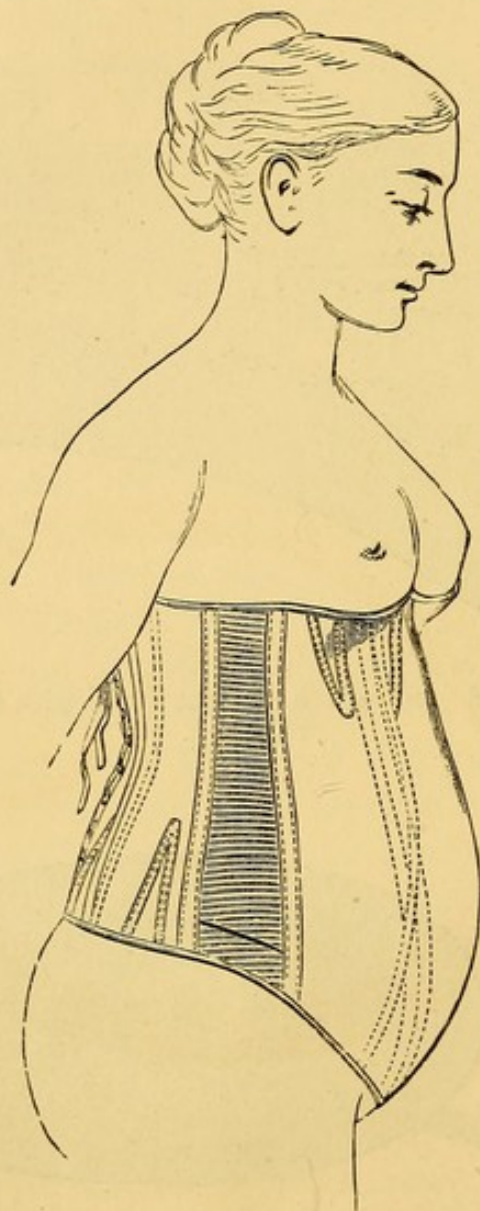


FIG. 14.—Bodice combining abdominal belt and elastic stays, to enable the patient to dispense with ordinary stays.

accumulation of fat. In such persons you must be content, even in any kind of hernia, with amelioration of their condition rather than cure. But in



young persons you may frequently succeed in effecting a cure by the aid of a proper instrument. If, in young persons, a hernia of the inguinal or umbilical variety resists the cure by careful mechanical restraint, then it becomes a question whether you cannot

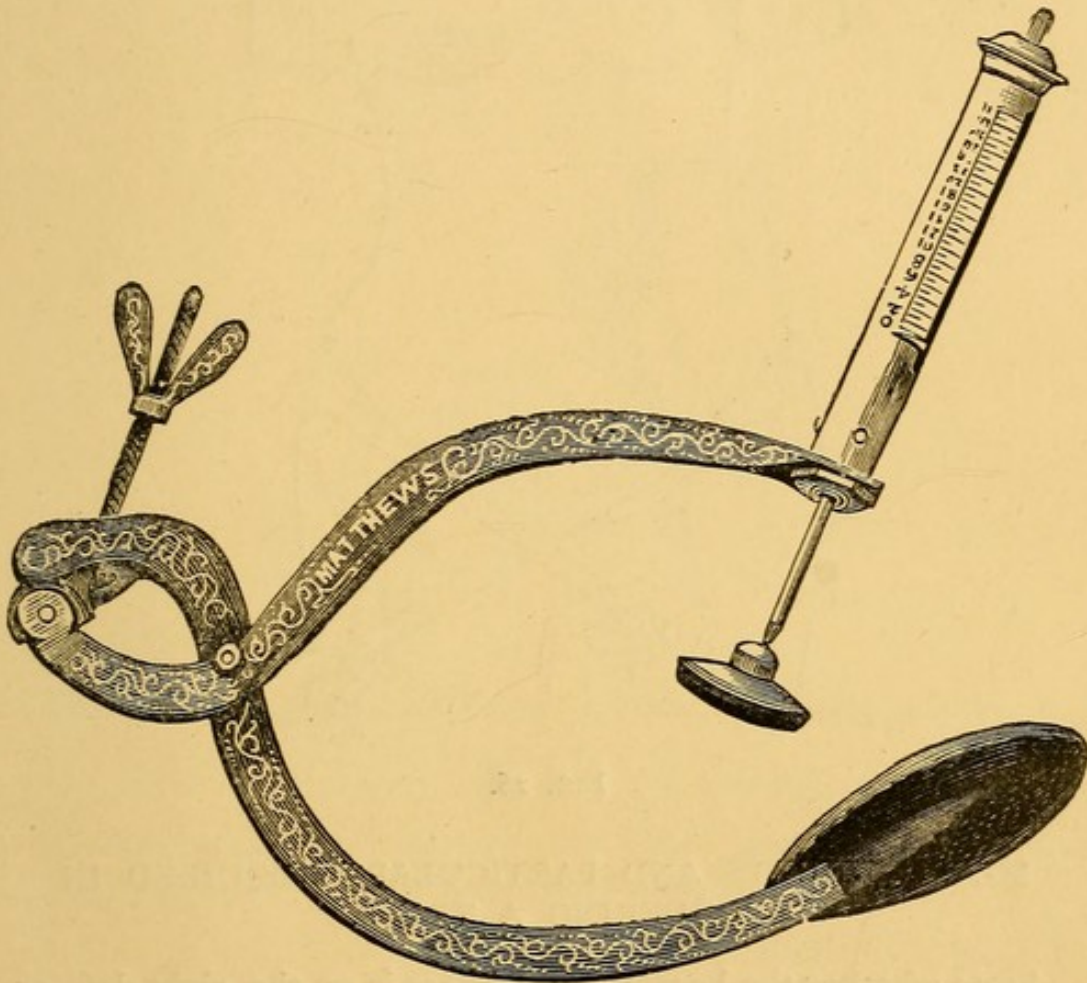


FIG. 15.—WOOD'S Pressure Gauge for ascertaining the amount of hernial Impulse and consequent strength required for Truss Spring—*Vide British Medical Journal*, Oct. 14, 1871.

safely and greatly increase the chance of a cure by an operation, which keeps out the bowel for a sufficient length of time for the opening to contract and close.



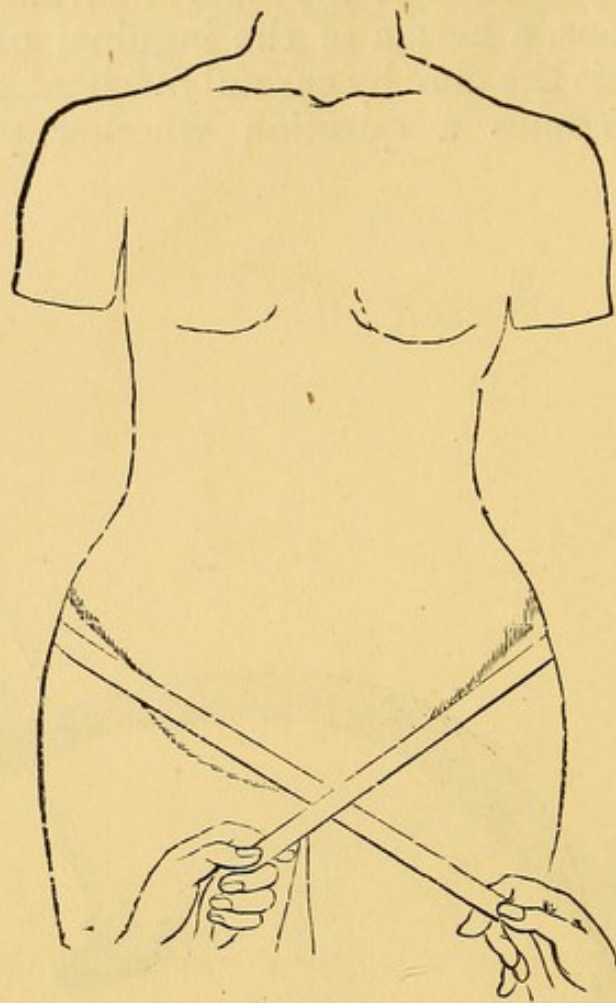


FIG. 16.

#### MEASUREMENTS AND PARTICULARS REQUIRED IN ORDERING A TRUSS.

State whether the hernia or weakness is on the right, left, or on both sides.

Give some idea of the size of the protrusion, such as, large as a walnut, egg, &c.

State whether the opening through which the hernia escapes is large or small.

State description of hernia.

Measurement for inguinal hernia (state whether oblique or direct), the girth of body half-way between the iliac crests and great trochanter,—the tape meeting in front. In extremely bad cases of hernia, it is sometimes necessary to take a plaster of Paris cast of the pelvis.



MEASUREMENTS REQUIRED FOR AN ABDOMINAL BELT.

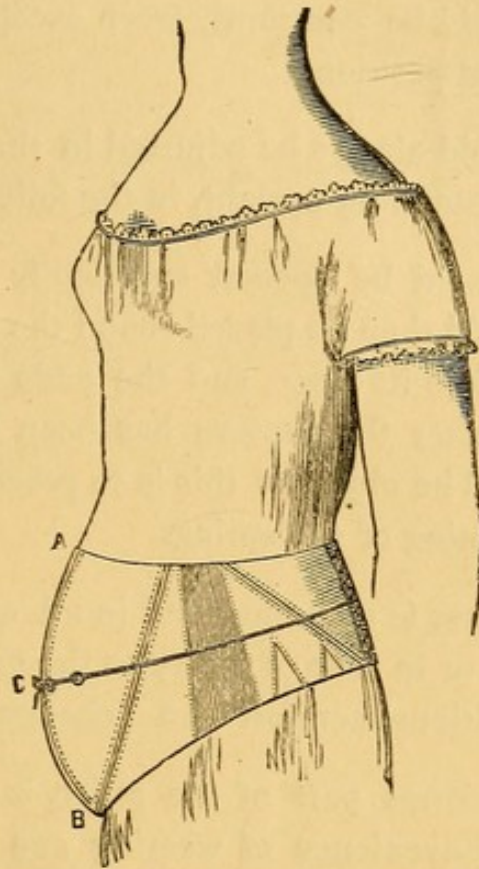


FIG. 17.—Circumference of Body at A, B and C. Length from A to B.

*Testimonial from Professor WOOD, F.R.S., Professor of Clinical Surgery and Senior Surgeon to King's College Hospital.*

68, WIMPOLE STREET, CAVENDISH SQUARE.

I am glad to be able to say that Messrs. Matthews have shown much skill and patience in carrying out my designs for truss-pads, in accordance with the principles I have laid down in my work on Rupture. I have had a great number of cases fitted with trusses by Messrs. Matthews, many of these cases of a most aggravated character, which no other truss-maker has been able to do anything with, and with the most successful results.

JOHN WOOD.

To Messrs. MATTHEWS BROTHERS,  
Surgical Instrument Makers,  
27, Carey Street, W.C.



## MANAGEMENT OF TRUSSES.

see p 25 The Truss should be constantly worn except when the body is in the horizontal position.

The Truss should always be adjusted in the recumbent position, never when standing upright, in the following manner :—

The spring should be opened sufficiently to go round the right leg ; it should then be placed round the left leg, and afterwards drawn up into its place, and the pads adjusted in their proper position after the rupture has been perfectly reduced (*i.e.*, put back). The object of this is to prevent the breaking, or gradual weakening of the spring.

A duplicate Truss is recommended in all cases, not only for renewal of cover or in case of injury to the original Truss, but for the great additional comfort of a "change."

As the Truss forms part of the attire, it must be so considered ; the inconvenience of wearing one pair of boots or shoes from the time they are new to the time they become worn out is sufficiently obvious ; a new Truss is as irksome to wear, and should be brought gradually into regular use.

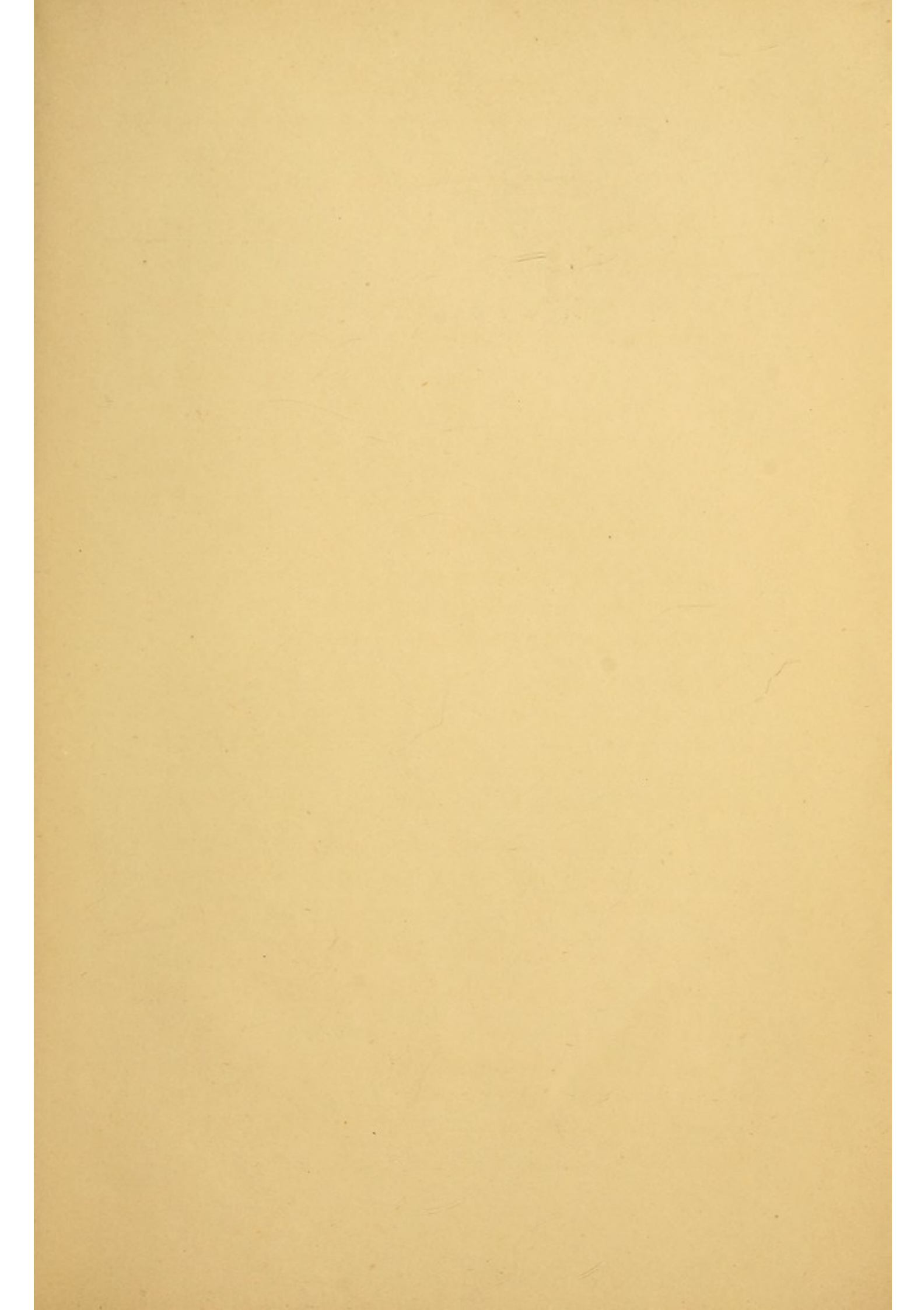
A Bathing Truss is always recommended, it being almost impossible to retain the rupture with the hand during swimming, bathing, or ablution.

A sleeping Truss is sometimes recommended.

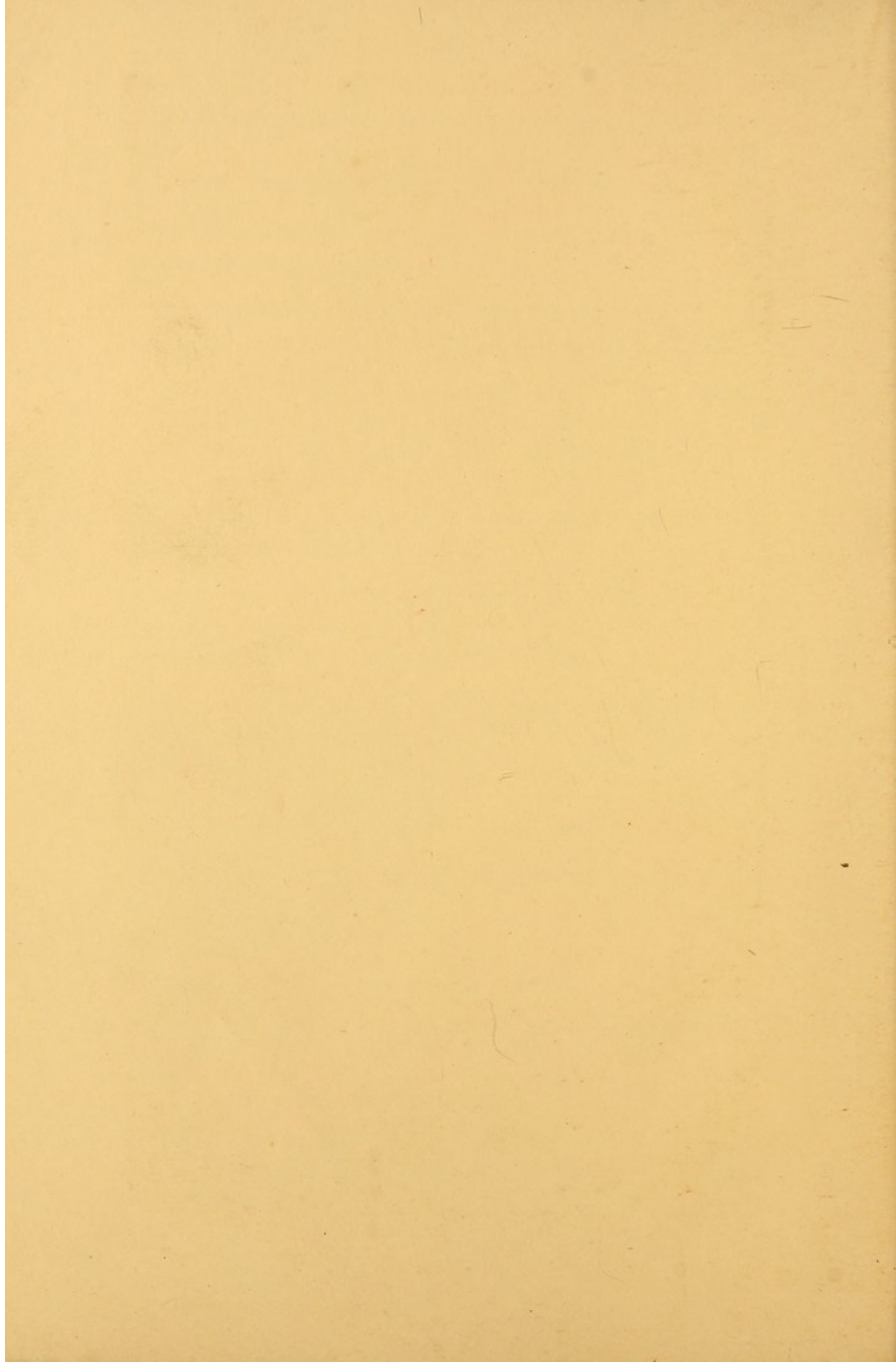
A soft pad attached to a soft band round the body is usually sufficient.

The principle that a rupture should, under all circumstances, be kept up, should always be borne in mind ; and the importance of these simple directions can hardly be too strongly insisted upon.















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