

Hamilton (F. H.)

POSTURE

As a Means of Relief

IN

Strangulated and Incarcerated

HERNIA,

With a General Consideration of the Mechan-
ism of Reduction,

BY

FRANK H. HAMILTON, A. M., M. D.,

Surgeon to Bellevue Hospital, Etc.

REPRINT FROM

THE HOSPITAL GAZETTE,

June 7th,

1879.





POSTURE, AS A MEANS OF RELIEF IN STRANGULATED
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CONSIDERATION OF THE MECHANISM OF RE-
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A paper read before the New York Academy of Medicine.

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FRANK H. HAMILTON, A.M., M.D.

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GENTLEMEN OF THE ACADEMY—The following paper was written as prefatory to the consideration of spasmodic colic and ileus. But the space occupied in the consideration of hernia has rendered it necessary to omit on this occasion, the consideration of the latter. Spasmodic colic and ileus will, therefore, be considered at another time, should the opportunity be afforded.

In a late number of THE HOSPITAL GAZETTE I find, copied from the *British Medical Journal*, an account of a case of intussusception cured by copious injections of thin gruel, reported by Dr. Blaker, of England. In the concluding paragraph Dr. Blaker has summarized the causes of his success as follows: "*First*, the complete anæsthesia produced by chloroform: *Second*, the early resort to the injections of gruel, before the invagination had become extensive, and before the intestines had become swollen; and, *Third*, the position of the child, lying on her back with the nates raised" (by a pillow), which Dr. B. says "favored, by gravitation, the introduction of the fluid."

While I am disposed to accept in the main the correctness of the explanation given by Dr. Blaker, I am inclined to attribute more to the posture and to the effect of gravitation than he seems to have done. Not, however, altogether, because the position favored the introduction of the fluid, but because the position, by gravitation, aided the withdrawal of the invaginated gut.

The object of this paper is to invite your attention to this point, and to illustrate and enforce my views by a reference to the effect of posture in the treatment of strangulated and incarcerated hernia, and in the treatment of certain forms of intestinal colic and ileus.

Examples showing the effect of posture in the treatment of strangulated and incarcerated hernia.

CASE 1. In August, 1834, I was called to see an infant male child having a strangulated, congenital, inguinal hernia, the strangulation having taken place the day previous. The child was much prostrated and was vomiting. After a prolonged and ineffectual attempt at reduction, I directed the mother, while the child was lying upon his back, upon a pillow, *with his feet and nates elevated*, to apply a bladder filled with cold water. No farther taxis was employed, and in about four hours the hernia retired.

CASE 2. March 10, 1854, I was called to see Samuel Tollhurst, æt. 2, having an indirect, inguinal, congenital hernia, which had been

strangulated about twelve hours, during which time the mother had made ineffectual efforts to reduce it.

While the child was lying upon his back, upon a pillow, the mother, by my direction, seized both feet and *raised the hips until nothing but the shoulders rested upon the pillow*. I continued to employ moderate taxis, and almost immediately the hernia disappeared.

CASE 3. A male convict in Blackwell's Island Penitentiary, during the summer of 1865, while I was on duty at the Charity Hospital, had an indirect inguinal hernia which had become strangulated. When visited by me in the morning, the strangulation had existed several hours, and one of the house surgeons of Charity Hospital had been with him all night, making ineffectual attempts at reduction by taxis. The hernia was large and tender, and the condition of the patient was alarming. The patient himself wished to take an emetic, by which means, he said, it had once been reduced when strangulated. I did not think it wise to adopt his suggestion; but directed that while the house surgeon was making preparations for the operation, an attempt should be made to reduce the hernia by posture.

Accordingly *the foot of the bed was lifted, and its legs placed on the top of a dining table*; and, while the patient was lying supine, upon this very steep inclined plane, with his head down, moderate pressure was made upon the hernia. It began to diminish in size almost immediately, and in about ten minutes it disappeared altogether.

CASE 4. Some years ago, and prior to the date of the case last recorded, a German, of middle age, living a few miles from Buffalo, N. Y., had a strangulated inguinal hernia. My former pupil, Dr. Ernest Pupikofer, was in charge, and had tried ordinary taxis for some hours before I arrived. I repeated the attempt and failed also. I then adopted the method described in case 3, and in a few minutes the hernia retired.

CASE 5. Aug. 2, 1873, I was requested to see Mr. ———, of this city, Drs. B. and F. in attendance. Three days before—July 31—he had been suddenly seized with pain in the region of the gall bladder which seemed to indicate the passage of a gall stone. Thirty-four hours before I saw him, while vomiting, a hernia descended through the inguinal ring. He never had a hernia before.

After prolonged taxis, the application of ice, and the employment of other judicious measures without success, Dr. W——, one of our most experienced surgeons, was added to the consultation and the efforts at reduction were renewed. Subsequently, it becoming apparent that an operation could not be delayed much longer, Dr. B—— made the necessary preparations, and I was called.

At my suggestion Mr. ——— *was laid upon a blanket upon the floor, and two men lifted his feet and legs upon their shoulders, while I made taxis*. This attempt failed. We then put him under the influence of ether, and a repetition of the same manœuvre was followed by almost immediate success.

CASE 6. A German, aged about 40 years, had suffered from a reducible, indirect, inguinal hernia about ten years, which was some-

times reduced with difficulty. April 13, 1871, it came down and he was unable to reduce it, and on the following day he was sent to Bellevue Hospital. My house surgeon, Dr. Mitchell, gave him gr. $\frac{1}{4}$ of morphine, applied ice bags, employed taxis and raised the foot of the bed two feet.

April 15.—About forty-eight hours after the incarceration took place, he was not suffering from symptoms of strangulation; but the hernia which now occupied the scrotum, and appeared to be intestinal wholly, could not be reduced by taxis.

I then brought him before the class of medical students, put him under the influence of chloroform, elevated the hips upon pillows, and in about five minutes, under moderate taxis, the hernia retired.

CASE 7. Louis Keztell, æt. 55, admitted to Bellevue Hospital April 16 (probably 1872), with a very large, direct, inguinal hernia, on the right side, which had been irreducible for eight days. A police surgeon had attempted reduction, and also Dr. Badeau, one of the house surgeons, but both had failed. My house surgeon, Dr. Mitchell, reduced it in about five minutes by taxis, aided by elevating the hips.

CASE 8. The late Dr. George T. Elliot, Jr., related to me the following case:—"In 1852 or 1853, when I was Resident Physician of the Lying-in-Asylum of this city, there was in the house a male infant with oblique inguinal hernia. When the child was thirteen days old I could not reduce this hernia as I had done on previous occasions. The late Dr. John C. Cheesman then saw the case in consultation, and failed in the taxis. With the Doctor's consent I administered chloroform, and as soon as anæsthesia was produced, *and the child held up by its legs*, the hernia was reduced with the greatest facility.

CASE 9. William Thomas, æt. 25, came to my office Sept. 14, 1855, with a strangulated indirect inguinal hernia, right side. The strangulation had existed eight hours. I put him under the influence of an anæsthetic but could not reduce it. He was sent home in a carriage and two hours later I called upon him, gave him half a grain of morphine, applied a bladder filled with ice and elevated his hips upon pillows. In about three hours the hernia retired spontaneously.

CASE 10. July 14, 1853, I was requested by Dr. Nott, of Buffalo, to see a man, about fifty years of age, who had an old indirect inguinal hernia upon his left side, and which two days before had become strangulated. He was suffering from considerable pain at the seat of stricture, and had vomited occasionally. Neither Dr. Nott nor myself were able to reduce the hernia by taxis. I directed him to be laid upon his back with his thighs flexed upon his abdomen and his hips elevated by a pillow, and a bladder filled with ice and water was laid upon the hernia. In a few hours the hernia disappeared.

CASE 11. Henry Kicher, æt. 29, admitted to Bellevue Hospital April 27, 1870, with an oblique inguinal hernia which had been strangulated three hours. A surgeon had attempted reduction by taxis before admission.

My house-surgeon, Doctor McMaster, placed him in bed, *and ele-*

vated the bed by placing the lower feet upon a table. Aided by taxis the hernia was reduced in about five minutes.

CASE 12. Henry Fricher, æt. 32, admitted to Bellevue Hospital April 27, 1870. He had an old, oblique, inguinal hernia, which had been strangulated twelve hours. Several attempts at reduction had been made before admission.

Dr. McMaster reduced it in about twenty minutes by the same method as in the preceding case.

On the following day I saw both of these patients, and they were well.

CASE 13. Michael O'Hara, æt. 29, was admitted to the Buffalo Hospital of the Sisters of Charity, Oct. 5, 1850, with an irreducible, oblique, inguinal hernia, incarcerated but not strangulated. The hernia had been in this condition twenty days, during which time repeated efforts had been made to reduce it. It felt solid, tense and was tender and somewhat painful to the touch. His bowels had moved several times since it became incarcerated. It was diagnosticated as an incarcerated omental hernia. After having myself made repeated efforts to reduce the hernia by simple taxis, I directed that he should be laid upon his back, in bed, *with his hips elevated*, and cool water fomentations applied. From this day the attempt at taxis was not renewed, although I saw the patient every day. The hernia receded gradually, and on the tenth day it had disappeared wholly.

CASE 14. Catharine Taylor, æt. 32, was admitted to Bellevue Hospital Aug. 20, 1868. She had had an indirect, inguinal hernia about one year. Aug. 18th or 19th it became strangulated. A surgeon tried to reduce it and failed. When brought to the hospital on the following day she was very feeble. Her bowels had not moved in forty-eight hours. The hernia was small, but very tense and tender. Dr. Vance, one of the house-surgeons, immediately put her under the influence of chloroform, *and raised the foot of the bed*. With the aid of moderate taxis the hernia retired in about half an hour.

I am able to recall a few other cases in which I have attributed the reduction of the hernia chiefly, if not altogether, to the mechanical effect of posture, but as I have no notes of these cases and my recollection of them is imperfect I shall omit to mention them. It is proper to say that some of the above reported cases were published some years ago in the "Reports of Bellevue and Charity Hospitals." (1)

I am aware that they do not all prove conclusively that the reduction was caused by the mechanical effects of posture alone, inasmuch as in most or all of the examples other measures, such as taxis, ice-bags and anæsthetics were employed also, but I think that a careful study of each case will force a conviction that posture was in all of the cases the chief cause of the reduction.

Let us consider briefly some of the leading theories which have been adopted, and which to an extent, more or less, are still enter-

(1) Cases illustrating strangulated abdominal hernia, with other rare cases (including ovarian and obturator)—in all, seventy-three examples. By Frank H. Hamilton, etc. Bellevue and Charity Hospital Reports, 1870, pp. 147-225.

tained, as to the causes of strangulation. Omitting, however, such as have no pertinence to the main point which I propose to discuss, namely, *the actual and relative value of posture.*

Muscular Spasm.

Says Velpeau : " Observing that the apertures through which herniæ escape are entirely fibrous, it has been believed that the spasmodic strangulation suggested by Richter and some others was impossible. Fages, of Montpellier, who, Delmas says, continues to hold this opinion, has endeavored to defend it by referring the spasm to the large muscles of the belly ; but from this point of view it did not gain any more partisans, and I myself have contested it. New and more exact anatomical researches, however, have led me to other conclusions. The connection, near or remote, of the angles of these kind of button-holes, which hernial apertures actually represent, is such that all muscular contractions must increase the strangulation." *Med. Operatoire, Deuxième Ed. Tome Quatrième, 1839, p. 55.*

It will be observed that in the paragraph quoted, M. Velpeau admits not only that the muscles more or less control the apertures, but that the opinion of Richter was correct, who held that muscular " spasm " might be a cause of strangulation.

Says Sir Astley Cooper : " When the strangulation is at the upper ring " (speaking of inguinal hernia), " a portion of intestine protrudes under the edge of the internal oblique and transversalis muscles, compressing them, which, in their turn, being excited to contraction by the irritation of this pressure, react upon the intestine with a force sufficient to produce a strangulation accompanied by spasmodic symptoms." *Abdominal Hernia, Amer. Ed., 1844, p. 77.*

According to Lawrence, Bertrandi had already called attention to the supposed agency of the muscles in causing strangulation.

Fergusson speaks of the employment of " anti-spasmodics " in the reduction of strangulated hernia. *System of Surgery, 4th Amer. Ed., p. 535.*

Druitt says that spasm was formerly considered a cause of strangulation. *Surgeon's Vade Mecum, 10th Eng. Ed., p. 510.*

Upon reference to M. Velpeau's great work on Regional Anatomy, to which he himself refers his readers for an explanation of his change of opinion, I infer that the change is based upon what he has observed as to the connections of the several abdominal and femoral fasciæ, and especially of the fascia transversalis and fascia lata with the inguinal and femoral apertures. But, admitting the correctness of his anatomical descriptions, I see no necessity of adopting his conclusions, namely, that all abdominal apertures and all abdominal herniæ are more or less under the control of the muscles, and especially that muscular spasm may be a cause of strangulation. Whatever anatomical reasons may be assigned for this latter opinion, there seems to me a sufficient physiological or pathological objection, namely, that muscular spasm is in its nature too intermittent and brief to be the cause of a permanent strangulation.

The same may be said of the opinions of Sir Astley, who recognizes the existence of a spasmodic strangulation, because, in the case of indirect inguinal hernia, the peritoneal sac passes between the margins of the internal oblique and transversalis on the one hand and a portion of the fascia transversalis on the other. It seems highly improbable that these muscular fibres, pressing only against one side of the hernial protrusion, with the more or less yielding fascia beneath, should cause a genuine strangulation. I cannot, therefore, regard either the opinions of M. Velpeau or of Sir Astley upon this subject as entitled to much weight. At any rate, their correctness has never been satisfactorily proven, and they have not been accepted by most surgeons. Skey thus pointedly denies the existence of muscular spasm as a cause of strangulation in ordinary hernia, declaring that while it might occur in a hernia which has penetrated the diaphragm, and in a few other supposed cases, in all ordinary cases it is impossible. "In truth," he says, "this antiquated doctrine, which has too long for the welfare of humanity referred the cause of strangulated hernia to spasm of the muscles, is almost exploded, and with it the numerous class of supposed remedies attendant on its train."—*Operative Surgery, by Frederick C. Skey, F. R. S., Philadelphia Ed., 1851, p. 435.*

Rejecting then the theory, as we think we may be permitted to do, that muscular *spasm* is ever the cause of a strangulated hernia, we shall next inquire to what extent normal muscular action, or normal muscular tension, as influenced by position, &c., may control these apertures, or prevent the return of the hernia.

What effect has the position of the body, or of the limbs, upon these apertures?

Nearly all surgeons up to the present day have believed that in the case of both direct and indirect *inguinal* hernia, flexing the thigh upon the abdomen, and at the same time adducting and rotating the thigh inwards, would so relax the fascia lata, and indirectly Poupart's ligament, as to facilitate the return of the hernia.

The position described does, no doubt, relax the outer or inferior column of the external abdominal ring—as any one may easily satisfy himself by making the experiment either upon the dead or living subject—and thus enlarge this opening; and it must, in some degree, in certain cases facilitate the return of the hernia within the external ring; but this is probably the full extent of its influence. This position, we believe, in no way influences or relaxes the internal ring, at which point, in a majority of cases, the real stricture exists. Moreover, in a large proportion, if not in all cases, of *old* inguinal hernia, whether direct or indirect, the canal formed by the peritoneal and fascial prolongation has become in a great measure, or wholly, independent of the rings or canal through which they have passed. In consequence of the continuous pressure, and perhaps a low grade of inflammatory action, an eccentric and concentric thickening has taken place, and the entire canal, including its two outlets, has assumed the character of a tube or of a channel whose walls are suffi-

ciently firm to resist any ordinary pressure from without. Armand, Scarpa and Lawrence say it may acquire a cartilaginous hardness. It is, therefore, neither capable of being enlarged or diminished by a change of posture. In some cases, as mentioned by Velpeau, this pipe, as it might now be called, actually lies loose in the canal and within the rings, and can be drawn in or out of the rings to a certain extent. Whoever has thrust his finger into the canal after death, in a case of old inguinal hernia, and then flexed or altered in any way the position of the body, must have noticed that these changes of position in no sensible degree affect the diameter of the rings.

Besides, in not an inconsiderable number of cases the seat of stricture is in the sac itself. Some surgeons believe that such is the fact, to a certain extent, in a majority of cases; but certainly, there are very many cases in which this is true.

There remain then only a small number of examples, in which, if the doctrines of Velpeau and Sir Astley were sound, either muscular spasm or normal muscular action, or position, can alter the condition of the stricture.

It will be remembered that a majority of all herniæ are inguinal. How then can it be said, in view of all the facts stated, that ordinarily hernial apertures can be influenced by posture or muscular relaxants?

Umbilical hernia.—I do not think it has ever been claimed that umbilical apertures are subject to these influences. Although it might be supposed, considering the situation of the hernia, in the central tendon of four strong and active muscles, that it would be peculiarly subject to muscular influences. I have never seen an umbilical hernia released by relaxing the abdominal muscles; nor am I aware that any one else has.

Femoral hernia.—The external ring of the femoral canal, formed by the fascia lata, is, no doubt, considerably under the control of posture; and if the stricture were ever at this point, the reduction of the hernia might be facilitated by certain positions of the thigh; but the internal or crural ring is almost always the seat of stricture, being caused here, when it is not in the sac itself, by the internal and free margin of Gimbernat's ligament.

Surgeons have generally admitted that in the case of strangulated femoral hernia, posture does not relieve the stricture; that is to say, when the stricture is situated at the internal ring, or in the crural canal, and it is seldom anywhere else. Velpeau says: "In the crural canal all is solid and unyielding." And for this fact there is probably a better anatomical reason than any assigned by Velpeau; although his explanation might be considered sufficient.

Gimbernat's ligament is in a great measure independent of Poupart's ligament, and of the fascia lata, in consequence of certain tendinous fibres which, I think, were first described by Anderson. These fibres, arising from the anterior inferior spinous process of the ilium, coursing along the inferior margin of Poupart's ligament—forming with the latter only a feeble attachment,—constitute the free concave border of Gimbernat's ligament. I have referred to this anatomical

fact in my Treatise on Surgery, and have often demonstrated it to medical students.

I have thus far conceded what the advocates of muscular contraction, rigidity or spasm have considered undeniable, namely, that in the case of diaphragmatic herniæ and of other herniæ which have suddenly made their way through the abdominal walls, where there are no natural openings, called *ventral* hernia—muscular contraction may prevent the return of the hernia. This would seem at first to be a natural and inevitable conclusion. But let us consider the facts, so far as our own observation extends.

We have no means of knowing what is the fact in a case of diaphragmatic hernia, for it is out of the reach of observation; but I have seen many examples of ventral hernia, caused by stabs of the belly, the wounds having been inflicted by pocket knives, dirks, bayonets and other narrow and sharp-pointed instruments; and I have seen a few such herniæ resulting from gunshot wounds (gunshot wounds of the belly do not often cause herniæ) and they have all been exceedingly difficult to reduce, however small they may have been, until the patients were brought under the influence of an anæsthetic. But in no case, which I can recall, has the return been facilitated by any posture which might relax the abdominal muscles. I will not say such relaxation has never facilitated the return, but I have certainly often tried it and it has failed, and I am convinced that successful results thus obtained are rare.

Nor do I see much difficulty in explaining this want of success, and what I have now to say applies to all hernial protrusions which have become strangulated. When a viscus—the intestine for example—has escaped through these accidental apertures formed in the muscular or tendinous portions of the belly and has become strangulated, the hernial opening is by the pressure of the protruding viscus stretched to its utmost. If it were not the intestine would not be strangulated. Instead of a narrow slit, as it was originally, it is now a circular opening, and the fibres, whether muscular or tendinous, which immediately invest it, are kept in this circular position by the solid mass which they enclose. Suppose for example, that, instead of the intestine, a finger or a piece of omentum were projected through the opening as far as possible without tearing the surrounding structures. Do you imagine that any amount of relaxation of the muscle would unloose the finger? Not at all. The fibres whether muscular or tendinous, which immediately enclose the finger would be already stretched to their limits, and, the finger filling the orifice completely, how could the opening be made larger by muscular relaxation? The same is the fact when an intestine has escaped; the walls of the intestine are in contact with themselves at the point of stricture and it represents a solid cord; not so solid as the finger, perhaps, but nearly so, and the ring or aperture is by it stretched to its utmost, and cannot by relaxation of the other portion of the muscle be made appreciably larger. If the ring contained nothing, or was only partly filled, muscular contraction and muscular re-

laxation might close and open the ring ; but these effects, if produced at all, when the ring is stretched, are certainly very trivial and inadequate, as compared with other means and influences, and we are led to question whether in nearly all cases in which flexing the abdomen or thigh has seemed to facilitate the return of the intestine, the result was not rather due to the removal of the outward pressure caused by the abdominal muscles, than to the relaxation of the apertures.

By what other local or general means can we relax these apertures ?

We will next inquire whether we have any means other than posture, either local or general, capable of relaxing and dilating, or which facilitate the relaxation and dilatation of these openings.

The old surgeons, in order to relax the rings, applied liniments, warm fomentations, relaxing salves, such as the belladonna ointment, and other cataplasms; and they professed to close up the rings after reduction by "emplastra styptica," "agglutinatives" and "vulnerary plants;" a pretence which certain empirics also make in our day.

Even good surgeons practice to-day, and recommend in their written treatises, the use of warm fomentations for this very purpose; and Dr. Gross speaks of "relaxing the stricture" by the application of cold fomentations, *Gross' Surgery*, v. 2, p. 588—*Fifth Ed.* Yet it would be difficult for any of these gentlemen to show in what way either warm or cold applications, could relax hernial apertures, whether situated superficially or deep. I do not consider any argument necessary to persuade you that they produce no such effects. With regard to the suggestion made by Dr. Gross that cold applications may relax these openings, I cannot but think that this distinguished surgeon has spoken inadvertently, or that he attaches to his words some meaning not conveyed or explained in the text.

There is much more speciousness in the opinion generally entertained that a certain class of *internal* remedies do produce this effect—namely, *chloroform and other anæsthetics, bleeding, the warm or hot bath, tobacco injections, &c.*; and this opinion has been confirmed in the minds of most men, not solely on theoretical grounds, but because they have had unquestionable practical evidence that all of these agents are sometimes capable of reducing strangulated hernia. That they relax the openings, therefore, has seemed to them a necessary inference from the success attending their employment. We do not agree with them, because the explanation or inference is not, as we have before intimated when speaking of the effects of posture, founded upon correct anatomical or sound pathological reasons, and because other and more satisfactory explanations of their good effects can be found.

If these agents produce their specific effects by relaxing the openings, then we shall have to admit what in the preceding discussion we have denied, and sought to disprove; namely, that these openings are—save as a rare exception—in any degree under the control of the muscles; for it is the muscular fibres alone and not their tendons which are relaxed by these general or constitutional measures. Certainly general relaxants cannot effect the patulency of such pipes or channels

as we have described, or of the structures of the sac itself which have become contracted and narrowed into a stricture.

What is then the true mechanism of the reduction of strangulated herniæ, whether posture or general agents are employed, in the great majority of cases?

We have been occupied thus far in determining what is not ordinarily the mechanism of the release of a strangulated hernia. That is to say we have sought to show that it did not ordinarily consist in a relaxation and enlargement of the canal or rings.

We shall now attempt to show that nearly all of our successful results are obtained by either pressure from without—called taxis—or by traction from within, or by both combined. The efficiency of either method being always increased by the paralysis of the muscles, and especially of the abdominal muscles; which latter by their contraction are constantly tending to expel the hernia, and with a force so great that, while these muscles retain their usual strength, neither taxis nor inward traction may be able to accomplish the reduction.

Taxis.—Of the value, and precise mechanical effects of taxis, no question can exist.

Inward Traction.—In speaking of *inward traction* let us consider first those measures, admitted sometimes to be useful, in which posture is not an element.

Emetics, which were formerly much used, may cause inward traction by the sudden upheaval of the abdominal viscera toward the upper part of the abdominal cavity. It will be remembered that in case 3, the patient wished to have this method tried before resorting to an operation, as it had once succeeded in reducing this same hernia when it was strangulated. *Cold water* dashed suddenly on the naked body has been known to effect reduction; and probably by the same upward displacement of the viscera as occurs in emesis. But in both cases the displacement is caused by a real spasm of the abdominal muscles, which, if the theory of Sir Astley is correct ought to have closed the apertures—certainly it would not open them.

(Velpeau says that the sudden *contraction of the cremaster muscle* has been known to reduce a strangulated hernia. *Anat. v. 2, p. 176.*)

Emetics probably sometimes accomplish the reduction by inducing a violent anti-peristaltic action. I am aware that Dr. Brinton denied that anti-peristalsis ever occurred under any circumstances, but having myself seen this anti-peristalsis in the intestines of a lamb recently killed, I must deny the correctness of his conclusions.

Cathartics, which were also at one time much used, probably act alone by the production of peristaltic or anti-peristaltic action. At least we see no other way of explaining their reputed efficiency; and in fact to these motions their effects have generally been ascribed. "The idea is," says Fergusson, "that the muscular fibres of the intestines may draw the protruded portion within the abdominal cavity again." *Practical Surgery, 4th Amer. Ed., p. 535.* Skey says: "The object, one should presume, was the endeavor to drag up the

bowel from the sac, by the mechanical influence of the medicine on the intestine." *Operative Surgery, 1st Amer. Ed., p. 440.*

Neither emetics nor cathartics are any longer recommended by surgeons, chiefly for the reason that unless they are successful they are pretty certain to do harm, by increasing the inflammatory action.

Surgeons have constantly recommended that previous to the employment of taxis, the *bladder should be emptied*. The sole effect of which must be to diminish the pressure from within outwards, and thus to permit the hernia to be more easily withdrawn.

Mr. O'Beirne has recommended that *the gas be withdrawn from the lower gut* as far as possible, by the introduction of a large tube into the rectum; and the philosophy of this measure must be the same as emptying the bladder. They are both in some sense negative measures, intended only to remove resistance to taxis, or to permit the viscera to return by their own normal action or by gravitation.

Enemata, and especially stimulating enemata, often employed, act in two ways; first, by removing both flatus and fœcal matter; and second, by inducing a violent peristaltic action in the lower gut, which may in some cases, extend to the seat of stricture and draw the gut in. *H. H. Smith, Practical Sur., p. 650; Gross., v. 2, p. 588; Lizars, p. 344.*

But injections of *tobacco-smoke* and of the infusions of tobacco, add to their evacuating and peristaltic effects, intense nausea, and prostration, and have in this way been known to cause death. Those who employed them have generally attributed their efficacy to this prostration alone, by virtue of which the apertures were relaxed. Gibson says it relaxes the abdominal muscles, and Fergusson thinks it acts as an anti-spasmodic.

We have refused to accept of the theory that any agents possess the power of opening these apertures in any material degree, except in the most rare and exceptional cases; and we are disposed to attribute the good effects of tobacco enemata to the same causes which render other purgative enemata successful; and to their additional power in relaxing the abdominal muscles, which were constantly tending to displace the hernia outwards.

Having used tobacco enemata occasionally in the early part of my practice, I was led to observe and study its modes of action; and the conclusion reached was, that whenever it reduced a hernia this result was chiefly or wholly attained by the violent peristaltic action which it induced. (In each instance the rumbling of the bowels—the borborygma—preceded the reduction by a few seconds); and that the production of nausea and general muscular prostration was second in importance to the peristalsis.

I will mention here, merely as a matter of literary curiosity, and as illustrating the loose and unphilosophical manner in which eminent surgeons have discussed the mechanism of the reduction in strangulated hernia, that A. Tavernier advises to "excite the peristaltic motion of the bowels, by means of *tonic and discutient applications*."

Elements of Operative Surgery with Notes and Additions. By S. D. Gross. Amer. Ed., 1829, p. 287.

The manner in which *Chloroform*, and other anaesthetics, bleeding, and the warm bath, encourage or effect the reduction of a strangulated hernia, is not we repeat, by relaxing the apertures. They all have a common mode of action; differing probably only in degree.

Chloroform is admitted to be the most potent. Chloroform paralyzes all the voluntary muscles of the body, including the abdominal muscles, and prevents even the diaphragm from exercising its voluntary power of downward expulsion. This agent removes, therefore, most effectually the resistance usually afforded by these muscles to the return of the hernia, and permits taxis to be successful, when it otherwise could not be. How much resistance these muscles offer, in their normal state, to the return of a hernia, is readily understood when we recall the difficulty which we often encounter in returning a hernia, even after the stricture is cut, unless the patient is under the influence of chloroform; and especially when we recall examples in which the patient, not being under the influence of an anaesthetic, receives a wound of two or three inches in extent in the abdominal walls, as in certain knife or bayonet wounds. In such cases it is almost impossible to prevent large portions of both intestine and omentum from being thrust out. If, however, the wound is much larger, as in certain operations of ovariectomy, and other abdominal sections—so large as to abate or extinguish the expulsive power of the muscles—the tendency to extrusion of the viscera is very much lessened.

Bleeding and the *warm bath*, both of which, in order to be effective, nearly all have agreed, must be carried to the point of producing syncope, produce their effects, so far as the reduction of the hernia is concerned, in the same way as chloroform—by paralyzing the muscles and overcoming their resistance to taxis.

I think the same may be said of *Opium* in full doses, although its effects are a little more obscure, and it is probably less efficient. Fergusson thinks that it acts as an anti-spasmodic.

Mr. Lawrence, who does not think much of venesection as a means of relieving strangulation says—"Venesection cannot enlarge the openings through which the hernial contents have descended;" and he adds that, unlike tobacco enemata, it has not the power of exciting an action of the viscera, but he evidently thinks that tobacco enemata, his favorite remedy, and which he ranks second only to taxis, has the power of enlarging these openings, since he reports a case, in which, as soon as the patient was brought under the influence of the tobacco, "the stricture gave way." Certainly we can attach no other meaning to these words than that the stricture was relaxed and enlarged. Why, if this were so, might not bleeding to syncope produce the same effect?

Probably neither of these agents relaxed the openings, but if one did, the other might; and it serves to illustrate the vague, uncertain and contradictory explanations so often found in the writings of the

best surgical authorities as to the mechanism of reduction in strangulated hernia.

The writer wishes to make at this point a suggestion, namely—that possibly, while under the influence of these last named agents, namely, chloroform, bleeding to syncope, the warm bath to syncope, &c., and during the period of unconsciousness and general paralysis of voluntary muscular power which ensues, the hernia may be actually withdrawn by peristaltic or anti-peristaltic action.

One of the pretty frequent effects of these conditions is violent emesis or retching; and an occasional effect is sudden and expulsive evacuation of the rectum; implying the occurrence of increased anti-peristaltic and peristaltic action.

It is known that death does not immediately suspend these actions, and in some recent observations upon the viscera of calves, I have found these motions, especially peristalsis, to continue quite active for ten or twenty minutes after death, and probably under favorable circumstances as to temperature, &c., it would continue much longer. Whether this motion is more active than before death I have not been able to determine; but Niemeyer says that in animals, after paralysis of the cerebro-spinal nerves, there is for a time increased in-pestinal motion.—*Niemeyer's Text Book of Practical Medicine*, vol. I. p. 564. He also refers to the fact that it is common to find several invaginations in children after death, especially when death has occurred from hydrocephalus; which invaginations have probably taken place in the act of death, or subsequently.

These facts, especially the invaginations, would seem to imply a power of motion and consequently of inward traction under these conditions, which far exceed the normal peristaltic motions. Physiologists have ascribed these increased motions to various causes; and my friend, Dr. W. B. Birdsall, suggests that it may be due to the absence of the inhibitory influence of the spinal and cerebral nerves. Possibly it only represents the last convulsive effort of dying nature; but the facts seem material to our argument, whatever may be their explanation; and they lead us, together with what we have before observed, to suggest that probably the same increased intestinal motion accompanies the temporary suspension of consciousness, when the patient is under the influence of an anæsthetic, or in a condition of syncope from loss of blood or from the warm bath, just as anæsthetics are known not to arrest uterine contractions. It may be, therefore, that by permitting the continuance or causing an increase of peristalsis and anti-peristalsis, these agents favor the reduction. And this may explain in some measure the advantage which these means possess over opium, and their greater efficacy.

What postures are most efficient in the production of inward traction upon the hernia?

With very few exceptions herniæ occur in the lower portions of the abdominal cavity, and it is evident that, in order to be effective, the position of the body should be such as that the traction would be more or less in the direction of the upper portion of the abdominal

cavity: that is to say, if this position is not incompatible with the favorable application of taxis, and with, perhaps, a relaxed condition of the abdominal muscles. Although I do not regard this latter condition as of so much importance as that it should have the preference when it precluded a resort to the posture most advantageous for traction. I think, however, these conditions are never incompatible, and that they may always be combined if required.

Flexing the thigh upon the body, adducting and rotating it inwards, a position recommended by most surgical writers, as facilitating taxis, may be and probably is useful in some cases of inguinal or of femoral herniæ as we have already explained, by relaxing the external apertures, but not as a means of relaxing the internal apertures where generally the stricture is situated. The position would certainly be useful if the stricture were external; and even if it were internal, it might occasionally be in a small degree useful by enabling the surgeon to make his taxis bear more directly upon the internal rings. While therefore it ought to be employed in all such cases, it has no effect in the way of inward traction, and its value in any respect seems to me to have been greatly overestimated, at least when put in comparison with other postural methods, which have in general been less recommended or employed.

Elevating the hips slightly, by a pillow, as practiced by many surgeons, and as practiced by myself in some of the cases reported in this paper, has accomplished a reduction in many cases, and there can be no doubt that the result was effected mainly by the slight displacement or withdrawal of the viscera from the lower part of the abdomen.

Elevation of both hips and shoulders slightly, or what might be termed the supine *incurvated* method, recommended by Sir Astley Cooper and others, possibly possess some advantage over elevation of the hips alone, inasmuch as it relaxes more completely the abdominal muscles. (1)

Gross says 'turning the patient upon the side opposite the affected one sometimes answers the purpose, especially when there is much flatus, the distended bowels drawing the protruded parts backwards and upwards.' *Gross' Surg.*, 5th Ed., vol. 2, p. 590. We have here a distinct recognition of the value of traction as affected by position.

Lawrence suggests the propriety of elevating both the hips and the body slightly in order to "relax the tendon of the external oblique." *Treatise on ruptures*, by Wm. Lawrence, F. R. S., 3d London Ed., 1816, p. 114. A suggestion which is wholly inconsistent with a statement made by himself at p. 26 of the same work, that "those attitudes of the body in which the tendinous apertures at the ring and crural arch are stretched, (as when the trunk is thrown backwards on the thighs and the chest extended on the pelvis), are favorable to the occurrence of ruptures, because the abdominal muscles in this tense state both enlarge the apertures and press out the

(1) *On Hernia*, Amer. Ed., p. 81; *Lawrence, Dorsey's Surg.*, vol. 2, p. 25; *Gross*, Last Ed., vol. 2, p. 586; *Chelius, Surgery*, vol. 2, p. 290; *Ashurst, Surgery*, p. 759.

viscera." That this position of extreme dorsal flexion tends to press out the viscera is no doubt true, but that the exactly opposite conditions of dorsal flexion and dorsal extension enlarge the apertures cannot be true. The statements are inconsistent with each other, as they are also with another statement made by Mr. Lawrence, namely, "that the openings through which hernia generally protrude, being tendinous, cannot contract or diminish in capacity" p. 48; and again, "the tendinous openings through which hernia generally protrude cannot, by their nature, undergo much change" p. 49. This last statement may be accepted as a near approach to the truth.

Mr. Winslow first suggested a posture, which Mr. Skey remarks was much practiced during the last century in cases of inguinal and femoral herniæ, which consisted in *causing the patient to rest on his knees and elbows* while taxis was employed. *Med. Essays and Obs., by Wm. Lewis, London, 1746, p. 413.* Several other writers have alluded to this method favorably, and it is said that the priests sometimes suggested this position of extreme humility in conjunction with prayer.

You will be naturally reminded that this is similar to certain positions recommended by gynæcologists in operations upon the vagina and uterus, in which positions the displacement of the viscera toward the chest causes a marked elongation and expansion of the vagina.

Finally, we shall consider the *position in which the entire body is placed upon a plane more or less inclined, with the head downwards.* This may be called the *inverted inclined*, or the *inverted vertical position*; one or the other of which positions were successfully adopted in several of the cases reported at the beginning of this paper.

Desault says that this method was first suggested by Fabricius Aguapendente, and that it was approved by Corriard, Sharp, Bell and Louis. *Surg. Works of P. J. Desault, Amer. Ed., vol. 1, p. 298.*

Richard Wiseman, Sergeant Chirurgeon to Charles the Second, the first edition of whose book was published in 1676, says, "If after the above mentioned endeavors to reduce the hernia you do not succeed, you ought to consider what the impediment is, and proceed accordingly to let blood, purge or vomit, or put him into a semicupium, keeping on his bag truss the while: after which, he may, if occasion require, be carried to and fro upon the back of a strong man, with his head downward, by which the prolapsed bowels are often reduced. Mr. Smith, the truss-maker, told me that he had made such an engine by which he set them on their heads, and thereby had reduced many, which could not otherwise be relieved."—*Chirurgical Treatises, 6th Ed., p. 248.*

Johannes de Gorter, in his 1519th "Observation," speaks of reducing a hernia by taxis, "dum interim æger supinus jaceat, trunco corporis superiore declivore" (while the patient lying upon his back the upper portion of his body was inclined downwards). *Chirurgica Repurgata, 1742, p. 352.*

Says Percival Pott: "The posture of the body and the disposition

of the lower limbs may be made very assistant in this operation, when the difficulty is considerable; the nearer the posture approaches to what is commonly called standing on the head the better, as it causes the whole packet of small intestines to hang, as it were, by the strangulated portion, and may therefore disengage it. A little time and pains spent in this manner will frequently be attended with success, and obtain a return of the part." *Chirurgical Works, 1st Amer. Ed., vol. 1, p. 435.*

M. Velpeau considers this method, accompanied with a gentle shaking, or succussion, at some length, and speaks of it as having been recommended by M. Ribes, Louis and Hey. While he thinks it probable that the process may not be of very great importance, he contends that Mr. Lawrence is in error when he says that the abdominal viscera are too exactly supported in every part of them for the mere position of the patient to draw them either in one direction or another. Any person he remarks, can satisfy himself to the contrary by the experiment. He does not think therefore that it merits the oblivion into which it has fallen, nor the ridicule which has been cast upon it at the present day.

This author adds that Linacier, with the view of regulating the succussion into a method, and in order to generalize it, contrived in 1819 a kind of vibratory bed or tumbrel, provided with cushions, and upon which the patient was adjusted in such a manner as to enable us to move him more or less violently by successively lowering and elevating the upper part of the apparatus. M. Velpeau would prefer however the ordinary method, by which the belly could be maintained in a flexed or incurvated position.

It is quite probable that in expressing this preference M. Velpeau had in view the relaxation of the rings, to which, as we have seen, he attached considerable importance. *Medicine Operatoire, Deuxieme Ed. Tom. Quatrieme, p. 68, Paris 1839.*

Professor James Miller, of Edinburgh, refers to this method in a note to his Practice of Surg., p. 395, as having been recommended in the *British and Foreign Rev.* for April, 1850, p. 491, as a means of pulling the contents out of the sac.

Druitt says: "In many cases of strangulated hernia, resisting the ordinary application of the taxis, reduction has been effected by raising the pelvis and depressing the shoulders, so as to turn the trunk of the patient topsy-turvy. This is best done by raising the pelvis on a chair placed under the lower part of the mattress of the bed, and letting the patient's head and shoulders rest upon the bed itself. Care must be taken to keep the legs bent up to the body and the trunk itself bent forward, so as to relax completely the aponeurotic structures in the groin. Inversion of the patient acts by the gravitation of the viscera towards the diaphragm, and the dragging of the mesentery and omentum out of the neck of the sac. This aided by a gentle application of the taxis, and by frictions over the belly made in a direction from the strangulated part, will often succeed in overcoming the strangulation when other means fail."—*Surgeons' Vade Mecum, 10th Eng. Ed., 1870, p. 513.*

Mr. John Birkett writes: "Herniæ have been replaced whilst completely reversing the ordinary position of the trunk, by keeping the head nearest the ground and the pelvis upwards. A patient may be placed in this posture by hanging over the back of a man, or over the side of a high bedstead or sofa, whilst the knees are at the same time flexed. Another method consists in encircling the mesogastrium with a folded sheet or round towel, and at the same time drawing the contents of the pelvic region from below upwards, whilst the patient lies in a recumbent posture."—*Holmes' System of Surgery*, 2d Ed.; New York; Vol. 4, p. 700.

Erichsen speaks of this method as having been successfully employed.—*Science and Art of Surgery*, Am. Ed. of 1873, Vol. 2, p. 564.

In this country, Gross and Ashurst have spoken of inversion of the body approvingly.

Mr. Lawrence had never seen this method tried, but he regarded it as utterly useless, inasmuch as it was impossible to change the position of the viscera in the abdominal cavity by posture. To this remarkable statement, M. Velpeau, as we have seen, has made a sufficient reply; but the crowning inconsistency of Mr. Lawrence is found in the fact that, while he denies that any displacement of the abdominal viscera can occur when the body is actually inverted, he advises to raise the hips a little, in order to favor the gravitation of the viscera from the point of protrusion of the hernia. p.p. 114, 117.

Bryant does not think the method worthy of special commendation.—*Practice of Surgery*, Eng. Ed. of 1872, p. 340.

Sir Astley Cooper says in his experience it has always failed whenever taxis, properly employed, had already failed; but he proceeds to say that he has seen "the sudden ascent of the diaphragm in the act of coughing" reduce a strangulated hernia. *On Hernia*, Amer. Ed., p. 82. The principle upon which the reduction was effected was the same as by inversion; yet it is scarcely necessary to speak of its comparative inefficiency. That inversion should have failed in a certain number of cases where taxis had already failed, is not strange. It has often failed in my experience also, but it is enough to say, whatever may have been the experience of others, that it has also often succeeded, when taxis has been fairly tried, and when herniotomy seemed to be the only remaining alternative.

This completes the testimony of authority upon the question of the value of inversion of the body as a means of reducing hernia, so far as I have been able to obtain it. Three or four surgeons of distinction have not thought it of much or of any value. A large number have spoken of it in terms of commendation or approval, while some writers upon hernia, such as Symes, Turner, B. Cooper, Pirrie, Dupuytren, Gibson and others, have made no allusion to it whatever.

I may add, that the objections hinted at by one or two of the writers referred to in the previous pages, and the only serious ground

of objection offered by any writer, namely that inversion might do harm by pulling too hard when the parts are inflamed, applies with equal and much more force to taxis; and this is a matter, which we think, can be left very safely to the discretion of the surgeon. In my experience it has never caused pain at the seat of stricture, while taxis often or always has. The very statement however, of this possible danger, may be taken as one of the proofs of its efficiency.

I have omitted purposely to speak of the value of certain agents in aiding the reduction of strangulated hernia, partly because I did not consider their agency very important, and partly because they were rather outside of the scope of my argument.

In the case of most strangulated intestinal herniæ, the protruding gut contains only air, with perhaps a small amount of thin fluid. The aperture being only large enough to permit the escape of the gut, and the walls of the aperture being unyielding, immediately or in a very short time, the vessels coursing from without inwards become obstructed, and a congestion takes place in the portion of the gut outside the stricture. This increases more or less rapidly, causing at first serous effusions, or œdema, and eventually true inflammatory effusions. The gut is thus button-holed, and cannot easily be pushed back, or drawn in.

It would naturally be supposed that under these circumstances the first thing to be done would be to reduce the congestion and swelling of the protruded gut. For this purpose, accordingly, patients have been bled, generally and locally, and ice has been applied externally; and no doubt with a certain amount of good effect, especially when the pathological condition had not passed beyond the stage of mere vascular congestion, without effusions.

But it is easy to see that ordinarily, after a very few hours of constriction, the influence of these or of any other agents in this direction must have ceased. We have no means of forcing or inviting back the blood into the general circulation, from a part whose vessels are all tied by a ligature. It cannot be done in the case of a finger or of a leg which is swollen from constriction. Indeed, the more that ice is applied in this condition, the more certain it is that the limb will die. You must first remove the constriction.

If, however, these agents may be of some use in the first or earliest periods of constriction, and probably they are, then any posture which favors the return of blood by gravitation, would be of equal if not of greater service; and this method of withdrawing the blood would not be attended with such hazards of causing gangrene, as are known to attend the use of ice, even if it were employed at a period when it could be of no use. The principle is often employed in surgery in order to drain off the blood from parts which are bleeding; and it has been even employed to arrest dangerous uterine hæmorrhages.

Having spoken of the "button-holing" of the viscera by the congestion and inflammatory effusions, it is necessary to say that, in the

case of an intestine, this condition is aggravated by the expansion of the intestine outside of the stricture, by gas. Sometimes this gaseous expansion is the chief cause of the button-holing. It may cause incarceration before the occurrence of strangulation, whenever the channel of the intestine is completely closed, so that no air can be pressed back, but the vascular circulation is not interrupted. That this may be alone the cause of incarceration has been demonstrated by the speedy reduction of the hernia in some cases, when the gas has been withdrawn by aspiration; but this expedient fails when there is actual vascular strangulation.

Ice applied locally, in recent or not completely strangulated cases, may reduce the congestion of the vessels, and by its weight may make moderate and continued taxis—and when conjoined with rest in a suitable position, the abdominal muscles being relaxed by a full opiate, relief of the strangulation is occasionally obtained.

CONCLUSIONS.

First, as to our ability to increase the diameter of the hernial apertures, except by resort to herniotomy.

1. The hernial apertures are not, only with few exceptions, and then usually only in a small degree, either directly or indirectly under the control of the muscles. Relaxation of the muscles does not therefore usually relieve hernial strangulation.

Muscular spasm is never a cause of strangulation.

2. Posture, whether intended to relax the muscles, the tendons or the fasciæ, does not relax the apertures when the seat of stricture is in the sac itself—when the hernial aperture is old and has become established, or fixed in its form—or has become a canal in some sense independent of the original aperture. Nor does it relax these openings in cases of inguinal or femoral hernia, when the strictures are at the internal rings; and in both of these herniæ the strictures are, in most cases, at the internal rings.

3. Neither ointments, nor warm, nor cold applications effect in any way these apertures, or the seats of stricture, whether these be superficial or deep-seated.

4. Neither chloroform, nor bleeding, nor the hot bath, nor indeed any other general or constitutional measures affect the hernial apertures, that is, cause them to become relaxed and to dilate, except, perhaps in the case of recent herniæ which have suddenly pushed their way through tendinous or muscular fibres; and even in these cases, their effects are often questionable, and certainly trivial.

5. In short, hernial apertures can seldom be relaxed or opened by any measure except by a surgical operation. The apertures do not, only with rare exceptions, actively compress the protruding viscera; but the viscera become constricted by pressure against the apertures. Relaxation of these apertures is not, therefore, ordinarily a part of the mechanism of the release of a strangulation and of the return of the viscera.

Second; as to the effects of Taxis and Inward Traction.

1. Taxis, or pressure from without in, judiciously applied, is first in point of importance as a means of reducing strangulated herniæ.

2. Inward traction, judiciously employed, is only second in point of importance to taxis. Inward traction is effected indirectly by paralysis of the abdominal muscles, through the agency of posture or of general muscular relaxants, and by emptying the bladder and lower gut. It is effected directly by peristalsis, anti-peristalsis, and gravitation through the agency of posture.

Hitherto, relaxation of the apertures has occupied the second rank, or the position now assigned to inward traction, and the latter has been either entirely disregarded, or it has been assigned only to a subordinate position.

3. Emptying the bladder and rectum and distracting the attention of the patient, are measures which remove certain obstacles to reduction by taxis, and indirectly favor or encourage inward traction.

4. Chloroform, bleeding to syncope, and the hot bath to syncope act indirectly by overcoming the resistance of the abdominal muscles, and possibly they may in some measure effect their results directly by increasing peristaltic and anti-peristaltic motions, or, at least, by permitting the normal actions of the intestines to continue, while the abdominal muscles are in a state of paralysis.

Ice, as a local application, can only relieve the button-holing when it is due to congestion of the vessels, and then only when the circulation in the vessels is not completely arrested. If the patient is at the same time reposing upon his back, it serves also as a continued taxis.

5. Opium operates, probably, only indirectly, by causing a partial paralysis of the abdominal muscles.

6. Emetics probably effect their good results directly, by virtue of the inward traction caused by the upheaval of the abdominal viscera, and by anti-peristalsis.

7. Purgatives, given by the mouth, act directly by inducing anti-peristalsis above the seat of stricture; and in some cases peristalsis below the seat of stricture. They sometimes also cause vomiting. Their mode of action is, therefore, similar to, or identical with emetics. They are both liable to do harm when not successful.

8. Stimulating enemata, cause generally only violent peristalsis, but occasionally anti-peristalsis. Tobacco enemata operate in the same way; and perhaps, sometimes by causing general muscular paralysis, and thus removing the resistance of the abdominal muscles. Their effect upon the hernia are then both direct and indirect.

9. All postures in which the viscera are dragged toward the upper portion of the abdominal cavity aid reduction directly, by causing an inward traction; and that posture is the best, which, whilst it does not interfere with taxis and relaxation of the abdominal muscles, makes the most effective inward traction. Inversion of the body, however, displaces the viscera so far toward the upper part of the body that the abdominal muscles cease to have any power to expel the viscera downwards, and their relaxation is then a matter of no consequence.



