

Displacement of the bladder and peritoneum in the male by distention of the rectum / investigated by J.G. Garson.

Contributors

Garson, J. G.
Royal College of Surgeons of England

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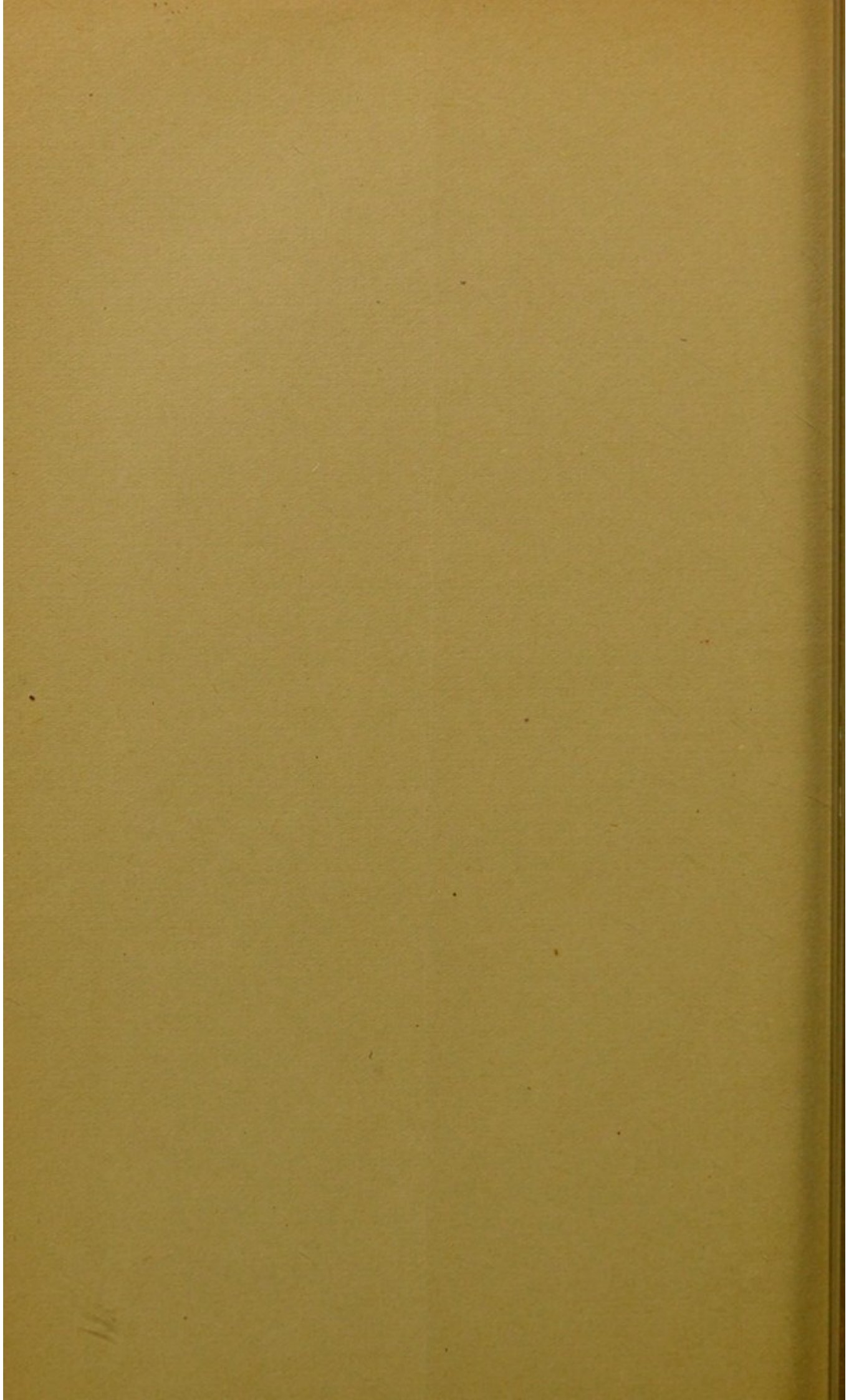
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Displacement of the Bladder
& Peritonium in the Male by
Distention of the Rectum
By

J. G. Garrison



Edinburgh Med. Journ. 1878



With the Authors' Consent.

DISPLACEMENT

OF THE

BLADDER AND PERITONEUM IN THE MALE

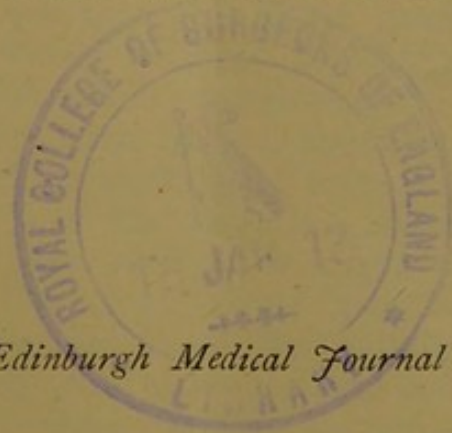
BY

DISTENTION OF THE RECTUM.

INVESTIGATED BY

J. G. GARSON, M.D., L.R.C.S. ED.,

WHEN UNDER PROFESSOR BRAUNE, IN THE ANATOMICAL INSTITUTE, LEIPZIG.



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EDINBURGH: OLIVER AND BOYD, TWEEDDALE COURT.

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DISPLACEMENT OF THE BLADDER AND PERITONEUM IN THE MALE BY DISTENTION OF THE RECTUM.

IN 1865 Simon, of Heidelberg, first introduced his hand into the rectum to complete an operation for fistula. The facility with which he was able to introduce his whole hand, measuring 21 cm. in its greatest circumference, while the patient was under the influence of an anæsthetic, induced him to make some farther experiments on rectal palpation as a means of diagnosis and treatment. Expectations that this mode would yield very important results were freely indulged in, and the advantages to accrue from it were often much exaggerated.

Simon,¹ in his description of the operation, says that there appeared dangers which prevented him from introducing his hand higher up the rectum than the ampulla. Nevertheless, with the body of his hand in that cavity, the upper boundary of which is on a level with the third sacral vertebra, he was able to explore with the extended fingers the umbilical region. More recently, however,² Nussbaum, of Munich, has introduced his whole hand and arm up to the elbow into the rectum, and has succeeded in reaching the ensiform cartilage.

The dangers to be feared are rupture of bloodvessels, injuries to the sphincter, injuries to the peritoneum, etc. The risk from rupture of the bloodvessels is much less than one would have expected, as has been shown from actual results. Injuries of the sphincter are also not of very material importance, and might be entirely avoided by dividing it with a bistoury previously, as we know that after that operation it heals rapidly, and generally with-

¹ Langenbeck's *Arch. für Klinische Chirurgie*, bd. vii. p. 119 ; and *Deutsche Klinik*, No. 46, Sept. 1872.

² *Deutsche Zeitschrift für Chirurgie*, bd. 1, s. 89.

out bad consequences. What is most to be dreaded is injury of the peritoneum, as it is of the gravest importance. The cases on record where that has happened are few in number, but we are inclined to believe that they are more numerous than is generally supposed, because fatal cases are not so frequently published as successful ones, and it is only through private information that one hears of cases which have terminated fatally both after this and many other operations. At all events Simon's rectal palpation has considerably fallen in the reputation of surgeons, and the cause thereof is to be found in the serious consequences which have frequently resulted. However, the object of this paper is not to consider the dangers of that operation, but to direct attention to the displacements of the pelvic organs produced during the operation, and more especially to that of the bladder, urethra, and peritoneum.

The following was the course pursued in investigating these points:—The rectum of the body of a well-developed middle-aged man was emptied by injecting water; then a collapsed indiarubber bag of oval shape, and with a tube attached to one end, was introduced. This was easily done without injury to the sphincter. The indiarubber bag was then distended by injecting water through the tube till it was the size of the maximum circumference of our hand—25 cm. To make it this size 300 grammes of water were required. The rectum, therefore, was in the same condition as if the hand had been in it. The tube was now closed, so that no water could escape. A very flexible caoutchouc catheter No. 11 was then introduced into the bladder, and 240 grammes of water were injected through it to distend that viscus, and the catheter closed, so that no water could escape. The object of introducing a flexible catheter into the bladder was to get the urethra distended throughout its whole course, and at the same time not to displace it, so that when we came to make a section of the parts we would also have a section of the urethra. The body was then laid upon its back in a dry zinc trough, outside of which was placed a freezing mixture of salt and ice. After it was frozen, which took about sixty hours, it was sawn through as nearly as possible in the middle line. The preparation was then cleaned of the sawdust, etc., by washing it in ice-cold water, and afterwards placed in absolute alcohol while still in a frozen condition. Here it was kept till perfectly hardened without any perceivable displacement of parts taking place during the process. Fig. 1 is an exact representation of the section. If we examine it we find at the lower part of the large distended ampulla the sphincter in an almost normal condition, notwithstanding that it had been previously dilated to allow of the introduction of the indiarubber bag. On the walls may be seen the ramifications of the bloodvessels, which, although not previously injected, are well marked from the stretching and thinning that the walls have undergone. On the right and above

is a narrow opening into the first and upper division of the rectum, which in front is almost on the same level as the pouch of Douglas, and behind on a level with the interarticular cartilage of the first and second sacral vertebræ. The diameter of the distended rectum is about 8 cm., which, estimating roughly, gives a circumference of 24 cm. This corresponds accurately to the size of the circumference to which the indiarubber bag was distended. The displacements of the bladder, urethra, and peritoneum are worthy of observation. The penis and perineum, it will be seen, are not displaced, but the bladder is entirely raised up out of the pelvic cavity, and along with it the peritoneum also both in front and behind, so that the bladder is found to be in the same position as it is in the new-born child. Its shape is irregularly round. The internal orifice of the urethra is situated 15 mm. below the line of the conjugata vera, and 30 mm. behind the symphyses—that is, measuring from the orifice forwards to a vertical line passing through the middle of the symphyses, the point of reflexion of the peritoneum from the abdominal walls on to the bladder is considerably raised, being 40 mm. above the upper border of the symphyses. Douglas's pouch is also considerably raised, being only 22 mm. below the line of the conjugata vera. The length of the membranous and prostatic portions of the urethra together is 75 mm., the length of the membranous portion being 25 mm., and that of the prostatic portion 50 mm. The prostate itself is much larger than in the normal condition, and at the same time much diminished in thickness, its greatest thickness, which is behind the urethra, being 9 mm. It is this stretching of the urethra and prostate which allows the bladder to be raised. The urethra is deficient about the middle of the penis, which is owing to its not being perfectly straight when frozen, consequently the section is not through the whole length of the canal, but to one side at a part of it. Cowper's gland is well marked, as is also the vena dorsalis penis, which, when the section was made, was found to be full of coagulated blood. With the exception of a small calcified abscess, about the size of a cherry-stone, situated in the cavernous portion near the bulb, there is nothing farther to be noted in this preparation.

In a second body, that of a man, the rectum was distended in the same manner by the introduction of an indiarubber bag, only it was not so much distended as in the previous case. A catheter was introduced into the bladder, but this time a metal one was used. The body was then frozen, and afterwards sawn vertically as near as possible to the mesial plane. The section was then treated in the same manner as before. In this preparation the internal orifice of the urethra is 35 mm. below the line of the conjugata vera, and 37 mm. behind the symphyses. The peritoneum is also displaced upwards, being 55 mm. above the symphyses, whilst the pouch of Douglas is 38 mm. below the conjugata vera.

The length of the membranous portion of the urethra is 15 mm., that of the prostatic portion 35 mm., and the diameter of the prostate behind the urethra is about 8 mm. These measurements are less than in the previous preparation, but it must be remembered that the rectum and bladder were not so fully distended. In this case the measurements are not so accurate as in the first, because the section was not so good, the body not being sufficiently frozen when it was cut, and because we did not ascertain what quantity of water was injected into the indiarubber bag, and consequently do not know its exact size. This was the first body we experimented upon. However, in both sections it was evident that the bladder was considerably elevated in its position.

To check those results we deemed it advisable to make some more experiments on a fresh unfrozen body, which was that of a muscular, well-developed, middle-aged man. The intestines were removed as far as the sigmoid flexure of the colon. A string was tightly stretched between, and secured to, the anterior superior spines of the ilii. Measuring from this line, we found the depth of the pouch of Douglas to be 15.5 cm. when the rectum and bladder were empty. The bladder was then filled with 200 grammes of water, and the depth of the pouch was now found to be 13.5 cm. After the indiarubber bag was introduced into the rectum and distended with 300 grammes of water, the depth was only 10 cm. The water injected into the bladder was then drawn off, and the depth of the pouch measured, while the rectum only was distended, and found to be 10 cm., so that the evacuation of the bladder caused no alteration in the depth of the pouch.

To show that distending the rectum alone elevates the bladder even when empty, along with the peritoneum, and that the height of the bladder corresponds to the degree of distention of the rectum, the following observations were made on the same subject: The indiarubber bag was introduced into the rectum, and filled with 120 grammes of water. The depth of the pouch of Douglas was then measured, and found to be 14.2 cm. instead of 15.5 cm., which it was when both bladder and rectum were empty. After 180 grammes more water had been injected into the bag the depth of the pouch was only 10 cm. Therefore, we may say that the depth of the pouch of Douglas depends upon the degree of distention of the rectum, and that by distending the rectum we are able to alter materially the distance of the peritoneum from the anal aperture. In the normal rectum, as may be seen in Fig 2, which is a drawing taken from a preparation made in the same manner as ours by Professor Braune, only under normal conditions, the distance of the peritoneum from the anus is from 7 to 8 cm., but in our two cases the distance is 10 and 12.5 cm. respectively, and Dr Cahen, of New York, has, in a work which will shortly appear, given a long list of measurements which still more

clearly illustrate this displacement. On dried preparations, also, it can be seen very well that the peritoneum becomes displaced according to the extent to which the rectum is distended. Of course, measurements on such preparations are not strictly accurate, and must ~~not~~ be taken approximately. On one of our preparations, in which the rectum was small and contracted, the distance of the peritoneum from the anus was 5 cm., and in another, where the rectum had been distended considerably, it was 8 cm.

On another body—that of a well-developed middle-aged man—we made some further observations on the distance of the peritoneum from the symphyses when the rectum and bladder are distended. Having introduced the indiarubber bag into the rectum, we distended it with 300 grammes of water. We then injected about 200 grammes into the bladder, and made an incision 7 cm. long in the mesial line, and divided the structures down to the bladder, which projected considerably above the pelvic cavity. Upon examining the wound cautiously, we found that the peritoneum was entirely above our incision. However, in order to avoid any displacement of it upwards, we made another incision immediately below the umbilicus into the abdominal cavity, through which we introduced our finger, and examined the position of the peritoneum, which we found to be 6 cm. above the upper border of the symphyses. On emptying the rectum, by allowing the water to escape from the indiarubber bag, the bladder was seen to sink behind the symphyses, and when the rectum was emptied there was only 2.5 cm. of it projecting above the symphyses uncovered by peritoneum.

The ampulla of the rectum is bounded above by a circular band of fibres called the sphincter tertius by Nélaton, which, although not of so much importance as many have imagined, is useful as marking the junction of that cavity with the upper part of the rectum, and as a guide to the spot where the peritoneum leaves the rectum to be reflected on to the bladder. The muscle is arched over by the longitudinal fibres, which, from being shorter on one aspect, generally in front, cause flexure of the gut and a folding of the muscle upon itself, so that a valvular projection into the intestine is formed. This folding of the muscle remains even after the rectum has been removed from the body. The name sphincter tertius is not very appropriate, as there are several other similar bands, varying in number according to the development of the circular fibres of the gut in different subjects, which might equally well be called sphincter quartus, quintus, and sextus.

As a relation of parts similar to those found in our preparations occurs in the living body, although perhaps not to such an extent, from different degrees of filling of the rectum and bladder, we add, in the following table, a series of measurements taken from preparations in this Institute, and from drawings in Pirogoff's Atlas,

to show the position of the peritoneum and internal orifice of the urethra in various conditions of the bladder and rectum.

In conclusion, we hope that we have been able to demonstrate the following points:—

1st, That the distance of the internal orifice of the urethra behind the symphyses remains pretty equal whether the displacement of the bladder is great or small, as the extreme distance in our table is 37 mm., and the smallest is 23 mm. The displacement of the bladder produced by distention of the rectum evidently takes place in a plane which is parallel to that of the symphyses.

2d, That the distance of the internal orifice of the urethra from the level of the conjugata vera is very variable. - In Case No. I., where the rectum was very much distended, the bladder was highest, the distance of the internal orifice of the urethra from the level of the conjugata vera being 15 mm. In Case No. VII. it was lowest, being 72 mm. below the conjugata vera, and in this case the rectum was empty.

3d, That the raising of the peritoneum above the symphyses can also be produced by simple distention of the rectum. Usually, when the rectum is empty, the peritoneum is only a few millimetres above the symphyses, as in Cases Nos. IV. and V.; but in Cases Nos. I. and II., it was 40 and 55 mm. where the rectum was distended. In Case No. IX., however, where the rectum was empty and the bladder much distended, the distance was 70 mm. Hence it is evident that in performing the suprapubic operation for lithotomy or puncture of the bladder that viscus can be as easily raised above the symphyses by distending the rectum as by injecting the bladder, and that in cases where it is not advisable to distend the bladder to a large size, distention of the rectum is all that is required to make the parts suitable for the operation.

4th, That the pouch of Douglas is always raised by distention of the rectum. In Case No. V., where the rectum is absolutely empty, it is situated at a distance of 84 mm. below the level of the conjugata vera; but in Case No. I., it is only 22 mm. below that level.

5th, That the displacements of the bladder by distention of the rectum with an indiarubber bag are, as may be seen in Fig. 1, not caused by the raising of the perineum, but by the stretching of the urethra in its so-called fixed parts. The prostate is stretched to nearly double its ordinary length, and is also flattened. The membranous part is not quite so much stretched, but is longer than normal. The urethra, therefore, is apt to vary in its length, and curve according to the state of the distention the rectum is in. Of course, besides this, there are other causes which make its length and curve vary.

6th, That the distance of the peritoneum from the anus varies not only in different individuals, but also in the same individual

| No. of Case. | Condition of the Bladder. | Condition of the Rectum. | Distance of the internal orifice of the urethra from the line of the conjugata vera. | Distance of the internal orifice of the urethra behind the symphyses. | Distance of the peritoneum above the symphyses. | Depth of the pouch of Douglas from the level of the conjugata vera. | Remarks. |
|--|--------------------------------------|--------------------------------------|--|---|---|---|--|
| 1 | Much distended (240 gram. of water). | Much distended filled with 300 gram. | 15 | 30 | 40 | 22 | Cases described. Longitudinal sections. Rectum distended with indiarubber bag. Subject, a middle-aged man. Frozen sections. Pirogoff's Atlas, Fas. III. A., pl. 19, fig. 2. Subject, a muscular man. |
| 2 | Fully distended. | Fully distended. | 35 | 37 | 55 | 38 | |
| 3 | Much distended. | Moderately distended. | 54 | 34 | 50 | 54 | |
| Cases where the Bladder and Rectum were Empty. | | | | | | | |
| 4 | Almost empty. | { Absolutely empty and contracted. } | 54 | 32 | 5 | 65 | { Braune's preparation in the Anat. Institute. Subject, a muscular man. { Young man, aet. 17. Pirogoff's Atlas, Fas. III. A., pl. 16, fig. 2. |
| 5 | Absolutely empty. | { Almost empty. } | 50 | 27 | 0 | 84 | |
| Cases with Empty Rectum and Distended Bladder. | | | | | | | |
| 6 | Much distended. | { Absolutely empty and contracted. } | 60 | 25 | 40 | 84 | { Pirogoff's Atlas, Fas. III. A., pl. 19, fig. 3. Subject, a muscular man. { Pirogoff's Atlas, Fas. III. A., pl. 20, fig. 2. Muscular man. { Pirogoff's Atlas, Fas. III. A., pl. 20, fig. 3. Frozen in the lithotomy position. { Pirogoff's Atlas, Fas. III. A., pl. 20, fig. 1. Muscular man. { Pirogoff's Atlas, Fas. I. A., pl. 12. Muscular man. Frozen in the erect position. |
| 7 | Much distended. | Empty and Contracted. | 72 | 32 | Not marked. | Not marked. | |
| 8 | Distended. | Empty and Contracted. | 55 | 35 | 55 | 53 | |
| 9 | Distended. | Empty and Contracted. | 57 | 26 | 70 | 77 | |
| 10 | Half filled. | Empty. | 57 | 23 | 2 | 71 | |
| 11 | Moderately full. | Moderately full. | 56 | 25 | 8 | 78 | |
| 12 | Half full. | Half full. | 46 | 31 | 20 | 46 | { Braune's preparation in the Anat. Inst. Arteries and veins injected. Middle-aged man. Frozen Section. { Braune's Atlas, pl., fig. 1. Muscular man. { Kohlrausch's Anatomy of the Pelvic Organs, pl., alcoholic preparation. |
| 13 | Moderately full. | Moderately full. | 53 | 30 | 16 | 65 | |

at different times, according to the greater or less distention of the rectum.

In this paper we have only treated of the displacements that take place in the male; but as it is equally important to know what displacements occur in the female under similar conditions, we hope to make that the subject of future investigation.

EXPLANATION OF PLATE.

FIGURE I.—Longitudinal section through a frozen body with the rectum much distended (artificially).

FIGURE II.—Longitudinal section through a frozen body with the rectum filled (naturally), but not distended.

1. Peritoneal fold passing over the bladder from the abdominal walls
2. The bladder.
3. Internal orifice of urethra.
4. The prostate.
5. Dorsal vein of penis.
6. Bulbous portion of urethra.
7. Cowper's glands.
8. The upper end of the membranous portion of the urethra.
9. Peritoneal fold forming Douglas's pouch.
10. Prostate.
11. Abscess in the bulbous portion of urethra.

Fig 1

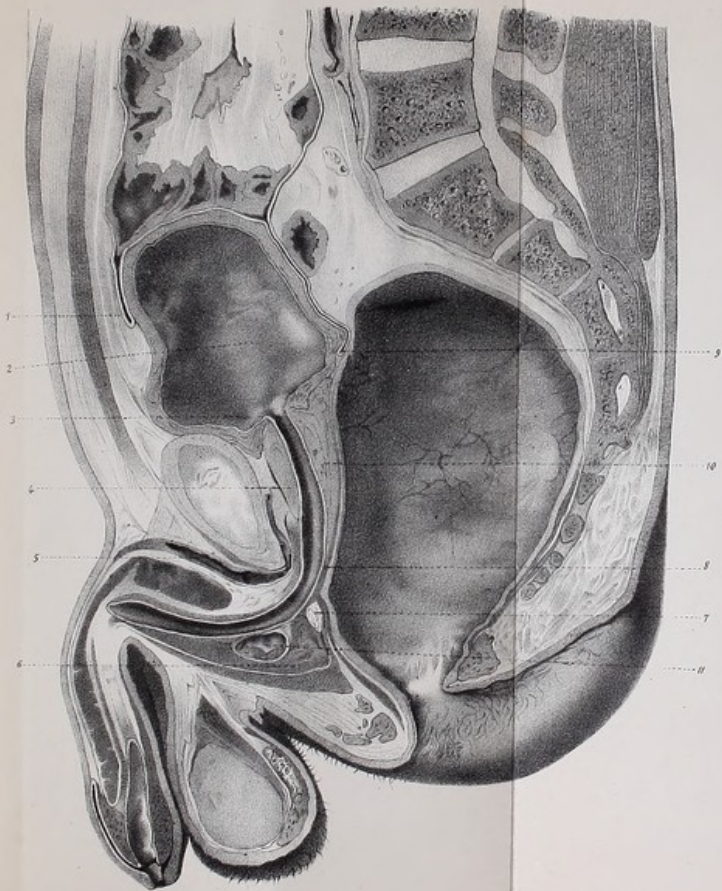


Fig 2

