APPARATUS AND METHOD FOR CLOSING ABNORMAL OPENINGS
IN WALL LIKE MEMBERS OF THE ANATOMY
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My invention relates to a removable dam or blocking member to control the discharge from the bowels, especially for use by a patient who has been subjected to a colostomy.

More particularly, my invention relates to such a dam which may be applied or removed by the patient so as to provide periodic control of secretions or gases from the intestines, and is characterized by forming a seal between an inflated member within the bowels and the inner wall of the intestine by which the intestine is pressed against the body wall.

Due to many circumstances, as abnormal conditions at birth, cancer and other diseases, many colostomies are necessary, i.e., the colon of the patient is brought out through an opening in the abdomen to provide for the bowels to move through this opening. Such patients of course lose the utility of the intricate and highly complex rectal muscular actions and nervous mechanisms which nature has provided for control of the bowels. While there are a very great number of patients on whom colostomies have been performed, no one heretofore has provided a practical means which may be used by such patients for periodic control, a feature lost because of the nature of the operation performed. At one time it was considered likely that the colon might be brought out through a stoma leading between said abdominal muscles so that such muscles could be used as a control means—the stoma, being understood, being the channel through the body wall through which channel a portion of the intestine is drawn and secured to the outside skin surrounding the exterior opening of the stoma. However, in practice it was found that obstructions of the bowels often resulted, thus bringing about the very condition which was to be eliminated by the colostomy.

Colostomies, as is well known, may be temporary, as for example, when a growth in certain parts of the colon is to be removed, a colostomy may be performed proximal to the growth in order to delay the fecal current until such a time as the growth can be safely resected or removed. After the intestinal anastomosis, where the growth was removed has had sufficient time to heal, the temporary colostomy is closed. Colostomies also, as is well known, may have to be permanent. In a permanent colostomy the growth is so situated that it cannot be removed and the continuity of the bowel reestablished.

Present practices require the use of external devices, as bandage-pad members or colostomy bags, which do not in fact solve the problem incident to the lack of control and in addition often cause irritation and burning of the skin and often personal embarrassment to patients incident to their physical impairments. The inadequacy of prior devices for colostomy control is shown by the fact that even doctors themselves hesitate to subject themselves to permanent colostomies, even though their condition may be such as to urgently require the same.

It is an object of my invention to provide an intestinal dam or device which may be inserted through the stoma formed as a part of the colostomy operation and will operate internally of the intestines as a blocking means for the bowels by causing a pressing by an inflatable member within the bowels of an annular portion of the intestines adjacent the interior opening of the stoma against the body wall.

It is a further object of the invention in cases of colostomies to provide a removable dam or device for controllably closing the intestines against unintended escape of secretions or gases, said device having a tubular member of a length to extend through the body wall, said member having an exterior pad like means formed on one end for pressing against the outside surface or skin of the body surrounding the exterior opening of the stoma and an inflatable member secured upon the other end of the tubular member within the bowels adapted to assume a shape which resiliently presses that portion of the intestine adjacent the interior opening of the stoma against the peritoneal lining. This pressure draws inwardly the pad like member so that the body wall is gently squeezed between said pad and said inflatable member to form a backing against which the inflatable member may urge the wall of the intestines.

A further object of my invention is to provide a device having an inflatable member so that when inflated it will be of a compressed sphere or ellipsoid like shape.

It is a further object of the invention to provide a device of the class described which is light in weight, may be readily and quickly inserted, or removed by the patient, which may be worn without discomfort or irritation and where an increase in pressure due to secretions or gas, will serve to augment the blocking or damming characteristics of the dam, thereby further eliminating any possibility of accidental leakage. Also it is my object to provide such a device that any such increase in pressure of secretions or gases
will be felt by the patient, and, be it particularly noted, will thereby serve as a signal to the patient that the time has come for the removal of the device to permit a movement of the bowels. The importance of the positive security of the closing or blocking of the bowels against accidental release may be further realized when it is remembered that the secretions and gases are characterised by offensive odors. It is a further object to provide a device for closing an opening in a wall-like member of a patient, for example as in the case of an opening resulting from a colostomy or an ileostomy and the case of a fistula, wherein a pad member is placed about the opening and adjacent one side of said wall and an inflatable member is connected with said pad member and is placed about the opening and adjacent the other side of said wall and functions upon inflation to press the pad member against one side of the wall and the inflatable member against the other side of the wall.

The above mentioned general objects of my invention, together with others inherent in the same, are attained by the device illustrated in the accompanying drawings, the same being preferred exemplary forms of embodiment of my invention, throughout which drawing like reference numerals indicate like parts:

Figure 1 is a view in side elevation wherein a plurality of layers of tissues are disposed between the internal dam and the external pad member and showing somewhat schematically the intestine being dammed thereby;

Figure 2 is a longitudinal sectional view of the device with the internal blocking member expanded;

Figure 3 is a view similar to Figure 2 with the internal blocking member deflated;

Figure 4 is a view similar to Figure 3 of a modified form of the invention;

Figure 5 is a longitudinal sectional view of a further modified form of my invention;

Figure 6 is a view in longitudinal section illustrating the application to a wall of the intestine of a device of small dimensions embodying my invention to temporarily close a fistula; and

Figure 7 is a perspective view of a syringe which may be used in this invention.

Referencing to Figure 1 of the drawing, the outside skin or epithelium of a patient is represented by the layer 10, the fat tissues by 11, the muscle tissue by 12 and the peritoneal membrane by 13. It is to be understood that the thickness of the various layers 10 to 13 forming the body wall will vary with individual patients. Upon performing the colostomy the intestine 14 has been severed from its normal outlet and has been passed through the stoma 15, i.e., the channel through the various layers 10 to 13 forming the abdominal or body wall, and brought to the outer surface as at 9 where it is secured or permitted to adhere.

Referencing to Figure 3, a rubber inflatable member 16 is secured to the tubular member 17 by binders 18 and 19. The length of the tubular member 17 varies for individual patients, depending upon the thickness of the various layers 10 to 13, inclusive, of the abdominal wall, so that the rubber internal dam or blocking member 16 will provide gentle pressure directed longitudinally of the tubular member 17, thus permitting the inflatable or blocking member 16 to urge the annular portion of the intestine or colon 14 surrounding the interior opening of the stoma gently, but not too firmly so as to cause discomfort but with sufficient pressure to control discharge from the intestine, against the interior of the peritoneum 13 and at the same time to press or draw inwardly the external pad member 20 against the outside skin or tissue 10. The tubular member 17 is provided with a passageway 21 and a valve member 22. When the internal blocking member 16 is deflated, as shown in Figure 3, it may be lubricated and inserted through the stoma 15 so that the extent of insertion is that substantially as shown in Figure 1. The valve member 22 is of usual construction and provides for selective open and closed positions. First the valve 22 is opened and then by any suitable air syringe 31, such as that shown in Figure 5, the internal inflatable blocking member 16 is inflated to the necessary extent to provide for blocking of the colon or intestine 14, with a pressure comfortable to the patient and insufficient to cause irritation. Then the valve 22 is closed to maintain the member 16 inflated. The syringe 31 is preferably provided with a threaded connector 32 to permit the patient to use the syringe as a handle to pull longitudinally the tubular member 17 by way of testing to ascertain the proper length of the tubular member 17 and proper inflation of the internal dam 16, a positive resilient seal is provided between the inflated member 16 and the inside wall of the intestine, the outer wall of said intestine being pressed against the peritoneal lining 13 of the body wall, which in turn is held as a backing by the pad member 20. In this wise counterpressures are developed. At the same time the device is such that it may be worn with comfort by the patient. Also any secretions or gases in the colon 14 will provide additional pressure against the internal dam 16 and augment the blocking or damming characteristics of the device.

In order to facilitate insertion of the device and to better control the inflated shape thereof, I provide for securing the inflatable member 16 at two spaced apart locations on an end portion of the tubular member 17, as by the binders 18 and 19 as shown in Figures 1, 2 and 3 with openings or outlets 25 in the tubular member 17 as preferably the inflatable member is provided with thickened portion 23 in Figure 4 and thickened portion 33 in Figure 5, so that the same, upon inflation, will readily assume the preferred ellipsoid or compressed sphere like shape shown.

In Figure 4 of the drawing I have shown an alternative form of construction where an internal inflatable dam member with thickened portion 23 is shown with one wrapping or binding member 24 to secure the inflatable member 34 to the tubular member 17. As the parts connected with the stem or tubular member 17 duplicate those shown in the previous figures, the stem or tubular member is shown broken away and numbered 17. In this form of the invention the inflatable member 34 is provided with thickened and thinned portions as illustrated in order to assume that will, assuming the member 16 is inflated, the pressed sphere, i.e., flattened shape shown in Figure 4. However, I prefer that the internal inflatable dam member will be secured as shown in Figures 1, 2 and 3, as this will directly operate to eliminate tendency of the member 16 or 23 from in-
flating longitudinally of the intestine as distinguished from sidewise or laterally thereof. The fullest advantages of the invention are realized when the inflatable member is of the preferred ellipsoid or flattened sphere shape, as this will insure greater contact between the intestinal wall and the peritoneal wall, however the advantages of this invention will be proportionately realized if the inflatable member is spherical in shape when inflated.

In Fig. 5 a modified form is shown wherein the features of the device shown in Figs. 2 and 4 are combined. That is, the inflatable member 25 is shown with thick wall portions 33 and thin wall portions 27 and also secured to the tubular member 17 by two spaced apart binders 28 and 29 to doubly insure the ellipsoid like shape.

In Fig. 6 the device is shown applied as a fistula. In case of a fistula in the intestine it may be desirable to temporarily close the fistula in a manner to permit the fecal current to be free to flow distal to the fistula in order to learn whether the bowel is obstructed distal to the fistula. The device is of small dimensions to permit insertion through the fistula and the inflatable member 25 being of relatively small size does not unduly obstruct the fecal current. In this wise, it may be determined whether all that is necessary is simple repaly of the fistula or whether there is in fact an obstruction distal to the fistula which also must be corrected in order to insure a successful closure of the fistula.

It has been found that patients having colostomies may be fitted with a device embodying my invention and thereafter they can readily insert and remove the device and thus provide for periodic control of the bowels, thus permitting patients who have heretofore become (or patients who might become) to a more or less degree a recluse, to take their place as normal members of society. The patient will become aware of any increased pressure because of the presence of secretions or gas in the intestine 14 and the patient may thus arrange for removal and the device under proper conditions to drain the secretions and thereafter the device to thereby provide for periodic control of the bowels.

In producing a seal against secretions and gas in the intestines, the pressure of the inflatable member against the walls of the intestine, and thereby the anullar portion of the intestines against the peritoneum adjacent the inferior opening of the stoma, must be of such magnitude as to insure a tight seal and at the same time develop an irritation. Mere pressure of the inflatable member against the interior walls of the intestine is not sufficient to insure positively and definitely a seal against the accidental escape of secretions or gases. I have discovered that it requires something as a support or backing against which the inflatable member may press the intestine to secure the proper functioning of the pressure to bring about a tight seal. At the same time such pressure must involve a certain resiliency in order not to develop injury to the tissues involved. I have discovered that I can obtain the required degree of backing, as it were, and at the same time the required degree of resiliency by utilizing the body wall as the means against which the inflatable member bears or presses through the medium of the intestines. The pad like member on the outer end of the tubular member functions as a means for holding the body wall so that it may serve as such backing up means.

In case the patient is one who wears very tight clothing, or a corset, it is manifest that the tubular member may be pressed inwardly and I have provided against such pressing inwardly of the tubular member to operate to release the sealing function. I provide the inflatable member having such ellipsoid like shape or at least having such shape that when inflated it may operate to resiliently hold the annular portion of the intestines about the inferior opening of the stoma against the peritoneal lining with a resiliency that permits moderately pressing inwardly of the pad like member and at the same time with breaking the seal between the inflatable member 16 and the intestine 14 created by pressure against the peritoneal lining 13. In this connection the importance of the length of the tubular member is clear. The length of the tubular member accordingly is adjusted to the thickness of the body wall of the patient. Ordinarily, the device will move with the body wall and there will be no relative movement between the tubular member 17 and the body wall 10-13.

However it should be any such relative movement, the resiliency of the inflatable member will compensate and prevent the breaking of the seal as set forth.

The use of devices embodying my invention will mechanically serve also to prevent the prolapse of the colon which sometimes occurs in colostomies and it will also act in the same manner to prevent prolapse of the small bowel in cases of ileostomies.

Obviously, changes may be made in some of the forms, dimensions and arrangements of the parts of my invention without departing from the principle thereof, the above setting forth only preferred forms of embodiment.

I claim:

1. A device for periodically closing and opening the stoma of a patient who has been subjected to a colostomy, comprising a pad member having an inner annular contacting surface portion, said pad member being positionable external of a patient and with said surface portion in relatively close proximity to the stoma and in continuous supporting relation with the epithelium layer surrounding the stoma; a tubular member insertable in the stoma of a patient and carrying at one end portion thereof the said pad member; and an inflatable and deflatable member secured to the other end portion of the tubular member, and positioned in spaced relation to said pad member when inflated a distance substantially less than the normal thickness of the tissue between the epithelium layer and the peritoneal lining of a patient, whereby said inflatable and deflatable member may be inserted when deflated, and after inflation, to move a portion of the intestine of a patient substantially parallel to the body wall, thereby to compress the said portion of the intestine and the tissue of the patient between the epithelium layer and the peritoneal lining and thereby effectively block fecal discharge of liquids, solids and gases from the intestine leading to the stoma.

2. The method of controlling the periodic closing and opening of the stoma of a patient who has been subjected to a colostomy, comprising enlarging the intestine adjacent the body wall and moving the adjacent intestine portion substantially parallel to the body wall of the patient; blocking the central portion of the said stoma; and in fecal-liquid, solid-and-gas tight
manner, blocking the edge portions of the stoma by resiliently urging the said adjacent intestine wall portion against the body wall of the patient, thereby effectively blocking the fecal discharge of liquids, solids and gases from the intestine leading to the stoma.

3. A device for periodically closing and opening the stoma of a patient who has been subjected to a colostomy, comprising a pad member having an inner annular contacting surface portion, said pad member being positionable external of a patient and with said surface portion in relatively close proximity to the stoma and in continuous supporting relation with the epithelium layer surrounding the stoma; a tubular member insertable in the stoma of a patient and carrying at the outer end portion thereof the said pad member, said tubular member being closed at its inner end portion, having a lateral outlet adjacent said inner end, and having a longitudinal duct communicating with said lateral outlet and the outer tubular end portion; and an inflatable and deflatable member adapted to assume when inflated an ellipsoid like shape and connected to said tubular member at opposite sides of said lateral outlet, said inflatable and deflatable member being positioned in spaced relation to said pad member when inflated a distance substantially less than the normal thickness of the tissue between the epithelium layer and the peritoneal lining of a patient, whereby said inflatable and deflatable member may be inserted when deflated, and adapted, upon inflation, to move a portion of the intestine of a patient substantially parallel to the body wall, thereby to compress the said portion of the intestine and the tissue of the patient between the epithelium layer and the peritoneal lining and thereby effectively block fecal discharge of liquids, solids and gases from the intestine leading to the stoma.

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