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RECTAL BALLOON CATHETER

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5 Claims

ABSTRACT OF THE DISCLOSURE

A catheter, particularly an inflatable rectal catheter, with inflatable stop or limit means limiting the depth of insertion of the catheter into a body cavity to a predetermined maximal depth. The stop means are soft when deflated and may be stiffened to a functionally desirable hardness by inflation simultaneously with the inflating of the bag of the catheter.

The present invention relates to inflatable catheters as are used in various body drainage and fluid administration procedures, and more particularly, to inflatable rectal catheters.

It is of great and often critical importance that such rectal catheters are inserted through the sphincter muscle into the rectum at not more or less than the medically correct depth. A too shallow insertion may cause serious tissue damage to the sphincter muscle, and a too deep insertion may cause even more serious damage such as bowel wall damage or bowel wall perforation. Piercing of the colonic wall by a too deeply inserted catheter results in a massive flow of the treatment fluid contained in the catheter, such as barium fluid, into the abdominal cavity. Obviously, such outflow is most dangerous and may cause a possibly fatal peritonitis.

It is a broad object of the invention to provide a novel and improved catheter of the general kind above referred to which permits an accurate control and visual observation of the depth of the rectal insertion of the catheter.

A more specific object of the invention is to provide a novel and improved catheter of the general kind above referred to which precludes a rectal insertion of the catheter beyond a safe depth limit and also visually indicates the actual depth of insertion.

Another more specific object of the invention is to provide a novel and improved catheter of the general kind above referred to, the means of which for controlling the maximal depth of insertion are automatically readied for positive blocking action when and while the bag of the catheter is being inflated.

Still another more specific object of the invention is to provide a novel and improved catheter of the general kind above referred to which is equipped with the insertion depth limiting means of a nature such that they cannot cause injury or even major discomfort to the patient.

A further and more specific object of the invention is to provide a novel and improved catheter of the general kind above referred to which is equipped with the insertion depth limiting means which do not appreciably increase the total manufacturing costs of the catheter, do not require special manipulation when the catheter is used, and eliminates the need for separately inflating the bag and limiting means.

Other and further objects, features and advantages of the invention will be pointed out hereinafter and set forth in the appended claims constituting part of the application.

In the accompanying drawing, a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a view of a catheter according to the invention;

FIG. 2 is a sectional view of the catheter according to FIG. 1 on an enlarged scale; and

FIG. 3 is a fragmentary view, partly in section, showing the catheter in its inflated condition.

Referring now to the figures more in detail, the exemplified catheter comprises a tubular member 1 which is surrounded near one end by an inflatable bag or balloon 2. The bag may be of any shape suitable for inflation of the bag from a comparatively small volume to a comparatively large volume. A fluted type bag as indicated at 3 is known as Weber's bag. The peripheral cross-sectional outline of the bag when fully inflated becomes substantially circular by flattening the flutes or folds thereof. The bag is conically tapered toward the adjacent end of tube 1. This end constitutes the discharge end of the catheter and is preferably reinforced at 4 to prevent a collapse at this end. As can best be seen in FIG. 2, tube 1 extends through the bag without communication therewith. The wall of the bag is molded to the outer wall of the tube or air-tight sealed thereto by any suitable technique known for the purpose.

Tube 1 includes a first passage duct or channel 6 and a second passage duct or channel 7. Duct 6 extends throughout the entire length of the tube, that is, from an inlet end 8 to discharge end 4 while duct 7 which is parallel to duct 6 within tube 1 except for a branched-off tube portion 9, opens into bag 2 through an aperture 10. The inlet end portion 12 of the tube is preferably enlarged to facilitate the feeding of treatment fluid into tube 1. The branched-off tube portion 9 serves to inflate bag 2 via duct 7 and aperture 10. Air may be forced into bag 2 to a desired extent by any suitable means such as a syringe, and may be released from the bag after completion of a treatment by opening tube portion 9.

As is evident, the passage for the flow of air into and out of the bag to inflate and deflate the same respectively, can be entirely separate from the passage for the treatment fluid, but the combination of both passages in one tube is generally preferable.

As is also evident, tube end 4 may be used as drainage influx end and the other end of the tube as drainage discharge end.

In accordance with the invention, stop or limit means 15 are interposed between the end of the bag remote from the tube end 4 and the respective other end of tube 1. The overall length of the discharge portion 4, the length of the bag and the spacing between the respective end of the bag and the limit means are selected in accordance with medical requirements. Suitable dimensions are approximately 1/4" for discharge portion 4; about 3" from the discharge end of the tube to the end of the bag adjacent to the limit means, and about 3/4 to 1" between the bag and the limit means. It should be understood that these dimensions are merely given by way of example. The provision of a discharge portion 4 having a length of approximately 1/4" in contrast to the conventional length of 1 1/4" to 2" for the discharge portion, has the advantage that the possibility of bowel damage or perforation is eliminated and that the discharge portion does not jut into the wall of the colon or rectum. A further important advantage of a short discharge portion is that the possibility of kinking of the discharge portion or tip is virtually eliminated. Kinking of the tip, of course, obstructs the free flow of fluid as not infrequently occurs when the tip has the conventional length of 1 1/4" to 2". The use of a short tip or discharge portion has been made practical by the accurate control of the depth of insertion now possible by the limit means of the invention.

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The limit means are shown as one or preferably two oppositely directed branches 16 and 17 laterally extending from tube 1. The two branches are hollow as can best be seen in FIG. 2, and are interconnected by an intermediate portion 18 encircling the respective wall portions of the tube. The two branches are preferably of circular cross-section and rounded at their tips. Moreover, the two branches may be slightly circularly curved so that they will rest against the body of the patient when the catheter is fully inserted. The center of the curvature is preferably located on the lengthwise center axis of the bag. The interior of the two branches communicates with duct 7 through an aperture 20 so that the branches are automatically inflated and deflated simultaneously with bag 2. By making the branches of heavier gauge wall material than the bag, the intercommunication between the two branches can be conveniently provided.

The limit means are preferably molded directly to the outer wall surface of tube 1 as is indicated in FIG. 2, but can also be a separate unit air-tight sealed to the tube by any technique suitable and known for the purpose.

The entire catheter, including the limit means according to the invention, are made of a suitable soft and stretchable material acceptable for medical purposes, for instance, latex, rubber, molded or extruded polyvinyl resin such as a copolymer of vinyl chloride and vinyl acetate, or polyethylene.

In the absence of air pressure bag 2 contracts to its minimum volume by the inherent elasticity of the material and branches 16 and 17 are soft and readily bendable.

After insertion of the deflated catheter into the rectum to the required depth, air is fed into duct 7 thereby simultaneously causing inflation of the bag and stiffening of branches 16 and 17, as is shown in FIG. 3. This figure also shows that branches 16 and 17 more or less match the indicated body contours, and rest against the same, thus not causing unnecessary discomfort to the patient and at the same time effectively indicating and limiting the depth of insertion of the catheter.

Upon completion of the treatment, the air pressure in bag 2 and branches 16 and 17 is released and the catheter can now be conveniently withdrawn.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. An inflatable rectal catheter comprising in combination:

a pliable tube terminating on one end in a substantially rigid hollow tip portion open at its end;

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an inflatable pliable bag encompassing said tube air-tight sealed thereto, said bag being disposed adjacent to said tip portion and tapered at one end into the same;

a limit means including a pair of inflatable substantially cylindrical pliable arms air-tight sealed to the tube at diametrically opposite points thereof and spaced from the other end of the bag by a distance representing the permissible depth of insertion of the catheter, said arms occupying a random position when deflated and extending substantially normal to the tube when rigidified by inflation;

said tube defining therewithin a first passageway for a flow of a treatment fluid through the tube in either direction and a second passageway having intermediate opening leading into said arms and issuing into said bag for directing a flow of air into the bag and the arms to inflate both the bag and the arms simultaneously and for discharging the air simultaneously from the bag and the arms.

2. The inflatable rectal catheter according to claim 1 wherein said arms are joined by intermediate wall portions encircling the tube on opposite sides thereof, said intermediate wall portions in conjunction with the adjacent wall portions of the tube defining passageways between said two diametrically oppositely disposed arms.

3. An inflatable catheter according to claim 1 wherein said arms are concavely curved in reference to the bag.

4. An inflatable catheter according to claim 1 wherein said tube has a widened portion at its other end.

5. An inflatable catheter according to claim 1 wherein a second tube is branched off from said first tube between said bag and said other end of the first tube, said branched-off second tube communicating with said second passageway in the first tube.

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