The catheter comprises a normally straight tube of resilient material adapted to be inserted into an opening of the bladder or other organ being drained of fluid. The tube has a main drainage passageway that communicates with at least one drainage opening formed in the wall of the tube, and an auxiliary inflator fluid passageway that communicates with the interior of a normally deflated inflatable balloon mounted on the exterior of the tube adjacent the forward end thereof. The balloon is disposed on one side only of the tube so that when the balloon is inflated the opposite side of the tube is unobstructed by the balloon and the normally straight tube is bowed in the vicinity of the balloon with the ends of the tube pointing away from the balloon. One of the drain openings formed in the tube wall is disposed on the side of the tube opposite the balloon in straddling relation to the level of the rearward or lower boundary of the balloon.

2 Claims, 7 Drawing Figures
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URINARY DRAINAGE CATHETER

BACKGROUND OF THE INVENTION

1. Field of the Invention
   This invention relates to drainage catheters provided with an inflated balloon structure adjacent the forward end therefor retaining the catheter in the organ being drained.

2. Prior Art
   A catheter is a long tube-like device that is inserted into the body of a person in order to withdraw fluids therefrom. The most common form of catheter is a flexible rubber tube having a rounded forward end that is inserted by way of the urethra into the bladder of a person in order to withdraw fluid therefrom. A drainage opening is formed in the wall of the catheter tube near the forward end thereof to admit fluid from the bladder into the interior fluid drainage passageway of the catheter. Ordinary catheters are not intended to remain in place for protracted periods of time, the catheter being withdrawn from the body of the patient when the bladder or other body cavity has been drained of fluid.

If the catheter is to remain in place for a protracted period of time a modified form of the device must be employed, such, for example, as the so-called “balloon” catheter. In general, a balloon catheter consists of a catheter tube having a main drainage passageway that communicates with at least one fluid drainage opening formed in the tube wall near the forward end of the tube, the tube also having an auxiliary inflator fluid passageway that communicates with the interior of a normally deflated inflatable balloon mounted on and surrounding the exterior of the tube slightly to the rear of the fluid drainage openings formed in the tube wall. The catheter, with the balloon deflated, is inserted into the body cavity to be drained in the usual way, the balloon being disposed inside the body cavity. The balloon is then inflated with a fluid, usually sterile water, to form a large spherical protrusion surrounding the catheter tube and preventing withdrawal of the catheter from the body cavity.

A properly fitted balloon catheter is disposed in the bladder with the spherical surface of the inflated balloon contacting or in close proximity to the portion of the bladder wall surrounding the urethral opening at the bottom or floor of the bladder. Fluid is drained from the bladder through the fluid drainage openings that communicate with the main drainage passageway of the catheter tube. However, as the drainage openings are formed in the tube wall forwardly of the inflated balloon, the drainage openings are located an appreciable distance above the bottom or floor of the bladder so that fluid is never completely drained therefrom. That is to say, a conventional balloon catheter always leaves a residue of fluid in the bladder, and this residue contains sediments which eventually form bladder calculi. The formation of large bladder calculi causes great discomfort and is a source of irritation and infection.

After an intensive investigation of the problems associated with balloon catheters of conventional construction, I have now devised an improved urinary drainage catheter that permits substantially complete drainage of fluids from the bladder and thereby avoids the formation of bladder calculi due to incomplete drainage of the bladder.

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SUMMARY OF THE INVENTION

The urinary drainage catheter of my invention is a normally straight tube of resilient material the closed forward end of which is adapted to be inserted in an opening of the bladder. The tube has a main drainage passageway that extends from the closed forward end to the open rearward end of the tube and an auxiliary inflator fluid passageway that is disposed parallel to the main drainage passageway. A normally deflated inflatable balloon of distensible elastic material is mounted on the exterior of the tube adjacent the forward end thereof with the interior of the balloon in communication with the inflator fluid passageway of the tube. The balloon is disposed on one side only of the tube so that when the balloon is inflated the opposite side of the tube is unobstructed by the balloon and the normally straight tube assumes a bowed configuration in the vicinity of the inflated balloon with the forward end of the tube pointing away from the balloon. The tube wall is formed with a drain opening that communicates with the main drainage passageway, the drain opening being disposed on the side of the tube opposite the balloon in straddling relation to the level of the rearward boundary of the balloon. That is, the drain opening extends an appreciable distance both forwardly and rearwardly with respect to the level of the boundary of the balloon most remote from the closed forward end of the tube. Moreover, the tube wall is advantageously formed with at least one drain opening communicating with the main drainage passageway and disposed between the closed forward end thereof and the forward boundary of the inflatable balloon mounted thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

The improved catheter of the invention will be better understood from the following description thereof in conjunction with the accompanying drawings of which:

FIG. 1 is a side view, partly broken away, of my new catheter showing the balloon in its normally deflated condition;

FIG. 2 is a view of the forward end of the catheter showing the balloon in its inflated condition;

FIG. 3 is an enlarged sectional view along line 3—3 of FIG. 1;

FIG. 4 is an enlarged sectional view along line 4—4 of FIG. 2;

FIG. 5 is an enlarged sectional view along line 5—5 of FIG. 2;

FIG. 6 is a sectional view of a human bladder showing a conventional balloon catheter in position therein; and

FIG. 7 is a sectional view similar to FIG. 6 showing my new catheter in position in a human bladder.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown best in FIG. 1, the catheter of the invention comprises an elongated, normally straight tube 10 of a resilient and flexible material such as latex rubber, polyethylene, polyvinylchloride and the like. The closed forward end 11 of the tube 10 is in the form of a rounded or blunt point that is adapted to be inserted in an opening of the body cavity to be drained, and in particular to be inserted in the urethra of the bladder.
The tube 10 has a main fluid drainage passageway 12 that extends from the closed forward end 11 to the open rearward end 13 of the tube, the main drainage passageway 12 communicating with one or more drain openings formed in the tube wall adjacent the forward end thereof as hereinafter explained. The tube 10 is also provided with an auxiliary inflator fluid passageway 14 that is disposed parallel to the main drainage passageway 12 of the tube, the inflator fluid passageway 14 communicating at its forward end with the interior of a normally deflated balloon 15 and at its rearward end with an inflator connector tube section 16.

The normally deflated balloon 15 is formed of a distensible elastic material such as latex rubber and is mounted on the exterior of the tube 10 adjacent the forward end 11 thereof. As noted, the interior of the balloon 15 communicates with the inflator fluid passageway 14 by means of an opening 17 formed in the side wall of the tube 10 as shown best in FIGS. 2 and 5, the balloon 15 being inflated by injecting an inflator fluid (usually, sterile water) into the passageway 14, advantageously by means of a syringe 18. In accordance with the invention, the balloon 15 is disposed on one side only of the tube 10 so that, when the tube is inflated as shown in FIGS. 2, 4 and 5, the opposite side of the tube 10 is unobstructed by the balloon. Moreover, when the balloon 15 is inflated the normally straight tube 10 assumes a bowed configuration in the vicinity of the inflated balloon with the forward end 11 of the tube pointing away from the balloon as shown best in FIGS. 2 and 7.

As noted, the main drainage passageway 12 of the tube 10 communicates with one or more drain openings formed in the tube wall. In accordance with the invention, a drain opening 20 is formed in the tube wall on the side of the tube opposite the balloon 15, the drain opening 20 being disposed in straddling relation to the level of the rearward boundary 21 of the balloon 15. That is to say, the drain opening 20 is located so that the opening extends an appreciable distance forwardly and rearwardly with respect to the plane perpendicular to the axis of the tube that coincides with the boundary 21 of the balloon most remote from the closed forward end 11 of the tube 10. The tube 10 is also advantageously formed with additional drain holes 22 formed in the tube wall between the forward boundary of the balloon 15 and the closed forward end 11 of the tube.

The provision of an inflatable balloon 15 located on one side only of the catheter tube 10, the provision of a drain opening 20 located on the side of the tube 10 opposite the balloon 15 in straddling relation to the level of the rearward boundary 21 of the balloon, and the bowed configuration assumed by the normally straight tube 10 when the balloon 15 is inflated are essential features of the catheter of the invention. That is to say, when a balloon catheter 30 of conventional construction is inserted into the bladder 31 of a patient and the balloon 32 is inflated as shown in FIG. 6 the balloon forms an approximately spherical protrusion surrounding the catheter tube 30 that prevents withdrawal of the tube through the urethral opening 33 located at the bottom or floor 34 of the bladder 31. However, because the drain openings 35 are formed in the tube wall forwardly of the inflated balloon 33, the drain openings 35 are located an appreciable distance above the bottom or floor of the bladder so that fluid is never completely drained therefrom. In contrast with the aforementioned conventional balloon catheter, when the catheter tube 10 of the invention is inserted into the bladder 31 and the balloon 15 is inflated as shown in FIG. 7, the inflated balloon 15 forms an approximately semi-spherical protrusion disposed on one side only of the tube 10 that prevents withdrawal of the tube 10 through the urethral opening 33 of the bladder. When properly fitted, the rearward boundary of the balloon 15 contacts the portion of the bladder wall (i.e., the floor of the bladder) surrounding the urethral opening 33 so that the drain opening 20 extends an appreciable distance forwardly and rearwardly with respect to the urethral opening 33 in the floor 34 of the bladder. Moreover, the bowed configuration of the tube 10 in the vicinity of the inflated balloon 15 causes the forward end 11 of the tube to be positioned lower in the bladder 31 than in the case of a conventional balloon catheter. As a result, substantially all of the fluid in the bladder 31 is drained therefrom as shown in FIG. 6 with a consequent avoidance of the formation of bladder calculi.

I claim:

1. A fluid drainage catheter comprising a normally straight tube of resilient material the closed forward end of which is adapted to be inserted in an opening of the body cavity to be drained, the tube having a main drainage passageway that extends from the closed forward end to the open rearward end of said tube and an auxiliary inflator fluid passageway that is disposed parallel to the main drainage passageway, and a normally deflated inflatable balloon of distensible elastic material mounted on the exterior of the tube adjacent the forward end thereof with the interior of the balloon in communication with the inflator fluid passageway of the tube, said balloon being disposed on one side only of the tube so that when the balloon is inflated the side of the tube opposite said balloon is unobstructed by the balloon and the normally straight tube assumes a bowed configuration in the vicinity of the inflated balloon with the forward end of the tube pointing away from the balloon, the tube wall being formed with a drain opening that communicates with the main drainage passageway, said drain opening being disposed on the side of the tube opposite the balloon in straddling relation to the level of the rearward boundary of the balloon.

2. The catheter according to claim 1 in which the tube wall is formed with at least one other drainage opening communicating with the main drainage passageway and disposed between the closed forward end thereof and the forward boundary of the inflatable balloon mounted thereon.

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