

[54] **SIMPLIFIED CATHETER**

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[58] Field of Search **128/2 R, 2 M, 2 W, 262, 128/348, 349 R, 350 R**

[56] **References Cited**

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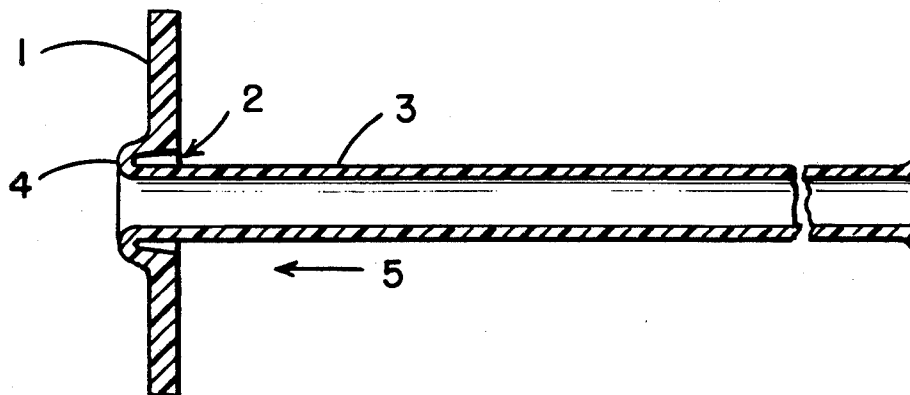
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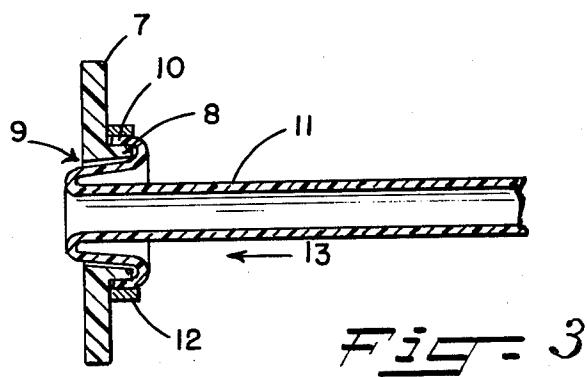
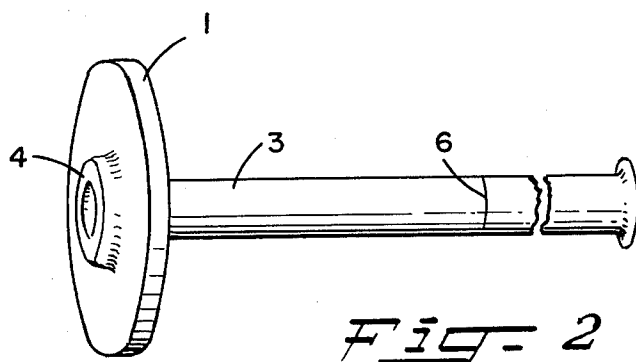
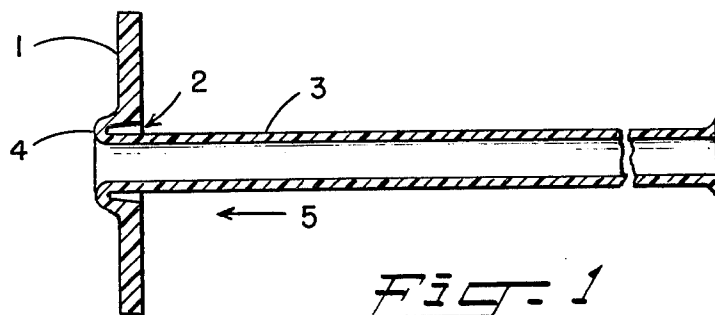
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[57] **ABSTRACT**

A simplified catheter structure including a disc adapted to be positioned in contact with the urethra meatus. The disc is provided with an aperture and a flexible tube is secured to the disc at the aperture. The flexible tube is adapted to be pushed through the aperture by grasping the tube between the fingers and moving it toward the disc whereby the tube becomes everted in the urethra.

6 Claims, 3 Drawing Figures





SIMPLIFIED CATHETER

This invention relates to medical or surgical instruments and more specifically to a simplified catheter.

Catheters available to the medical profession for examination and treatment purposes generally comprise a rigid or semi-rigid catheter tube. The insertion of the catheter causes pain and discomfort to the patient due to the pressure applied and to the friction and scraping of the tube along the walls of the urethra. In diagnostic and treatment techniques it is vital to determine what specific microorganisms are present in the bladder urine. Since other bacteria and microorganisms are present at the exterior and terminal portions of the urethra, ordinary urine specimens are not representative of the organisms in the bladder urine. The first portions of discharged urine may flush out some of these organisms but can not be relied upon to remove all such organisms and later portions of the discharged urine are not necessarily free of these organisms.

Specimens may be obtained from the bladder by introducing a catheter through the urethra, but the conventional catheter will scrape bacteria and microorganisms from the walls of the urethra into the bladder. Discarding the first portion of the specimen will not assure the removal of these undesired organisms. Further, the catheter may actually introduce into the bladder organisms causing infection where such organisms were not previously present in the bladder.

The principle purpose of the present invention is to provide a catheter structure that is relatively simple in construction which eliminates all sliding contact between the catheter tube and the walls of the urethra.

A further purpose of the invention is to provide a catheter structure which prevents transfer of microorganisms along the walls of the urethra from one location to another location and isolates the microorganisms at their initial sites.

Another object of the invention is to provide a catheter structure which permits the taking of a specimen from any desired location along the walls of the urethra.

A further purpose is to provide a catheter structure that prevents introduction of infection causing organisms into the bladder from where it may ascend to the kidneys and cause harm to the patient.

Other objects and advantages of the invention will become apparent from the description taken in conjunction with the drawings wherein:

FIG. 1 is a longitudinal cross sectional view of one embodiment of the structure according to this invention;

FIG. 2 is a perspective view of the structure shown in FIG. 1; and,

FIG. 3 is a longitudinal cross sectional view of a further embodiment of the structure of this invention.

In my copending application Ser. No. 437,835, filed Jan. 30, 1974, I have disclosed a catheter structure wherein a semi-rigid catheter tube is supported within an aperture in a disc that is adapted to be placed in contact with the urethral meatus. The catheter tube is supported within a thin-walled, flexible, tubular envelope secured to the disc. In the use of this instrument, as the catheter tube is moved longitudinally, the envelope unrolls progressively to cover the walls of the urethra and thereby eliminates direct contact between the catheter tube and the walls of the urethra.

Proposals have been advanced, such as shown in U.S. Pat. Nos. 3,525,329 and 3,669,099, to provide catheters utilizing thin-walled, flexible tubing without the use of semi-rigid catheter tubes. In these instruments, for example, the opposite ends of the flexible tubing are secured to opposite ends of a rigid sleeve so as to provide a chamber between the sleeve and tubing. In general, the tubing is of greater length than the sleeve and one end portion of the tubing is everted and brought back upon itself. The extending tubing is packed within the sleeve. The disadvantage of this type of instrument is the requirement of auxiliary equipment necessary to supply under pressure a fluid to be introduced into the chamber so as to evert and advance the flexible tube and subsequently withdraw the fluid so as to invert and withdraw the tubing.

I have now discovered that a satisfactory simplified catheter may be provided without the use of a semi-rigid catheter tube as shown in my copending application and without the necessity of auxiliary equipment as required by the forementioned instruments.

The catheter structure of this invention contemplates a rigid disc or plate having an aperture therein and a thick-walled, cylindrical, flexible tube secured to the disc at the aperture, the axis of the aperture and tube being coextensive. The tube is adapted to be pushed through the aperture and into the urethra and becomes unrolled or everted progressively to cover the walls of the urethra. As the tube becomes everted in the urethra it exerts lateral pressure on the urethra walls and isolates any microorganisms at their sites between the urethra walls and the tube. As the tube is withdrawn, it uncovers progressively the walls and becomes inverted thereby preventing any sliding of the tube along the urethra walls. This structure thus prevents a transfer of microorganisms from the walls into the bladder and reduces to a minimum discomfort or pain to the patient.

As illustrated in FIGS. 1 and 2, the instrument includes a disc or plate 1, circular, oval or other desired shape, having front and rear surfaces, the front surface being adapted to be placed in contact with the body surface surrounding the body opening such as the area surrounding the urethra meatus. The disc is provided with an aperture 2 and a flexible tube 3 is secured, by suitable means, to the disc at the annular surface surrounding the aperture. As shown in the drawings, the disc and tube may be in the form of a molded integral structure and the tube is shown having its forward end portion everted and projecting forwardly of the disc with the major length in inverted position extending rearwardly of disc. Since in use, the tube is pushed longitudinally to force it through aperture 2, the aperture is preferably tapered, as illustrated, with the larger diameter at the rear face of the disc so as to reduce friction between the tube and surfaces of the aperture.

In use, the instrument is positioned so that the aperture in the disc and forward everted end 4 of the tube is in alignment with the urinal canal or urethra and the disc 1 contacts the urethra meatus. The tube is advanced axially through aperture 2 and into the urethra and everted by grasping the tube 3 between the fingers and moved in the direction of the arrow 5. Because of the flexibility of the tube, the tube 3 is grasped at a short distance from the disc 1 and advanced intermittently through the urethra. If desired, suitable indicia 6 may be applied to insure that the tube is inserted through the length of the urethra and into the bladder.

As is obvious, advancement of the tube may be arrested at any desired position so as to permit obtaining a specimen from the walls of the urethra by means of an instrument inserted through the tube. Upon insertion and as the tube becomes everted, the sole action is the application of lateral pressure to the walls of the urethra and upon removal as the tube is inverted the sole action is a release of the pressure. Hence, no sliding action is effected to cause discomfort or pain to the patient.

In the modification shown in FIG. 3, the instrument includes a shaped disc 7 adapted to be placed in contact with the area surrounding the urethra meatus. The disc is provided with an integral collar 8 on its rearward surface which defines an aperture 9 which may be tapered as described above. The forward end 10 of the catheter tubing 11 is brought over the collar 8. The end may be secured to the collar by any suitable means such as an adhesive or heat sealing and/or by means of a clamping ring 12. Before use, the tube 11 is partially everted into the position as shown in FIG. 3 by the application of force in the direction of the arrow 13. In use, the action is as described in connection with FIGS. 1 and 2.

The instruments are preferably formed of various plastics such as polyethylene, polypropylene, Teflon, nylon, PVC, etc. For example, the instrument as illustrated in FIG. 1 may be of molded, high slip polyethylene; that as illustrated in FIG. 3 may consist of a molded nylon disc 7 and a tube of an elastomer, polyethylene, or Teflon. In order to reduce friction between the external surfaces of the catheter tubing during insertion, a suitable lubricant may be applied to the external surfaces between the disc and the indicia. These surfaces are isolated from contact with the urethra and the internal passage through which urine may pass and such lubricant thus can not interfere with any examination. It is also possible to partially reduce friction by a slight taper of the external wall of the tubing toward its rearward end.

For example, a catheter intended primarily for the purpose of obtaining a specimen of urine from the bladder may have a tube varying in outside diameter along its length (12-15 cm.). The forward $\frac{1}{3}$ of the length may have an outside diameter in everted position of about 6 - 7 mm. with a wall thickness of about 2 mm.

This provides sufficient rigidity to allow advancement of the tube as described hereinbefore. The intermediate $\frac{1}{3}$ of the length may be tapered to an external diameter of about 4 - 5 mm. which will also be the external diameter of the final $\frac{1}{3}$ of the length. The wall thickness of the forward $\frac{2}{3}$ of the length need have only sufficient rigidity to permit advancement and eversion of the tube without buckling.

What is claimed is:

1. A catheter structure consisting of a rigid disc having front and rear surfaces and an aperture therein, said disc being adapted to be placed in contact with the area surrounding the urethra meatus with said aperture in alignment with the urethra, and a thick-walled, flexible, cylindrical tube secured to said disc with the axis of said aperture and of said tube being coextensive, the forward end portion of said tube being everted and projecting through said aperture and forwardly of said disc and being adapted to be positioned in alignment with the urethra and the major portion of said tube being inverted and extending rearwardly through said aperture and said disc, said cylindrical tube having sufficient rigidity so as to permit advancement of said tube through said aperture in said disc and to permit eversion progressively of said tube into the urethra by manually grasping said tube rearwardly of said disc and by manually pushing said tube through said aperture and into the urethra.

2. A catheter as defined in claim 1 wherein said cylindrical tube is integral with said disc.

3. A catheter as defined in claim 1 wherein said aperture in said disc is tapered with its larger diameter at the rear surface of said disc.

4. A catheter as defined in claim 1 wherein said disc is provided with an integral collar at said aperture on its rearward surface and the forward end of said cylindrical tube is secured to said collar.

5. A catheter as defined in claim 4 wherein said aperture and the internal surface of said collar are tapered with the larger diameter at the rear surface of said collar.

6. A catheter as defined in claim 1 wherein said cylindrical tube is tapered toward its rearwardly extending end.

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