ABSTRACT: A catheter with a flexible catheter tube having an eyepot or ring at the distal end thereof. An obturator in the form of an electrode is removably disposed within the catheter tube and has a tip thereof projecting out of the catheter tube. The ring of the catheter tube limits the extent of the projection of the obturator tip from the catheter tube. A conventional electrosurgical apparatus is connected to the obturator-electrode for producing electrical energy to divide or cut tissue of a body so as to form a passageway through which the catheter tube advances.
CATHETER WITH ELECTRICAL CUTTING MEANS

BACKGROUND OF THE INVENTION

The present invention relates in general to catheters, and more particularly to a catheter in which an obturator-electrode performs the function of producing a path for electrical energy to divide or cut tissue of a body for forming a passageway through which a catheter tube advances.

Catheters of the suprapubic type have, heretofore, been placed through the abdominal wall into the urinary bladder by several procedures. One commonly employed procedure is open surgery, in which the abdominal wall is actually opened surgically. In this procedure, an opening is also cut into the urinary bladder and the catheter is sewn in place into the bladder. This procedure is considered to be major surgery.

Another method involves the pushing of a catheter through the abdominal wall into the urinary bladder in a manner similar to inserting a needle in a vein. This method employs a large trocar which is sufficiently large for a catheter tube to pass through its lumen and into the urinary bladder.

The first procedure is not desirable, since it requires an open operation and is considered to be major surgery. The second procedure requires the insertion of a trocar into the tissue of a body with the application of substantial force. This action may cause a disruption of the urinary bladder or surrounding structure. It may be difficult at times to pass a catheter through the abdominal wall by this procedure when earlier surgery has been performed and there is a firm scar tissue in the area intended to receive the catheter.

The trocar which is urged into the bladder through this procedure is always larger than the catheter advancing through its lumen. This action results in a relatively large opening in the bladder defining a relatively large space around the catheter when the trocar is removed. As a consequence thereof, there is commonly present a leakage of urine from the bladder through the space around the catheter, which may cause an abscess or an infection, and, also, may produce a tendency for excessive bleedings.

SUMMARY OF THE INVENTION

The catheter of the present invention employs a removable obturator-electrode to define an electrical path for electrical energy to divide or cut tissue of a body for forming a passageway through which a catheter tube advances. Through this arrangement, the size of the passageway receiving the catheter tube is accurately controlled and the catheter tube can be advanced into the cut or divided tissue with a reduced application of force.

By virtue of this procedure, the passageway for the catheter tube is formed at the smallest possible size to minimize injury to the body and to reduce leakage of fluid around the catheter tube. As a consequence thereof, abscesses and infections are reduced. Also, the catheter tube can be advanced into the passageway with reduced applied force. Thus, the catheter tube advances into the passageway without disruptive force and the catheter tube can now be advanced into a cavity in the tissue of a body, although a dense scar tissue is present in the area receiving the catheter tube.

With the size of the passageway accurately controlled for receiving the catheter tube, the tissue of the body fits snugly or tightly around the catheter tube. As a result thereof, there is a compression of blood vessels and a lessening of excessive bleedings.

While electrical energy performs a dividing or cutting of the body tissue operation, it also performs a coagulating function to seal off bleeding vessels and to prevent excessive hemorrhaging. Thus, there is a coagulation of bleeding vessels to reduce subsequent hemorrhage from the advancement of the catheter tube.

Other and further objects and features of the present invention will appear upon further perusal of the detailed description taken in conjunction with the accompanying drawings.
an inch to three-eighths of an inch beyond the distal end of the catheter tube, when the shoulder 24 engages the ring 17 of the catheter tube 15. The shoulder 24 is brazed or welded to the body 21 or may be integrally formed therewith. The example dimension for the shoulder 24 is three thirty-seconds of an inch in diameter. The sleeve 25 is preferably of 1 inch to 2 inches in length and has a thickness of one sixty-fourth of an inch.

One side of the electrical output of the electrosurgical apparatus 40 is connected to the obturator 20 through the connector 35. The other side of the electrical output for the electrosurgical apparatus 40 is connected to a conductor plate electrode 41 upon which rests the body P of the patient. The electrode 41 is in spaced relation with the tip 22 of the obturator 20.

The obturator 20 is an electrode and serves as a conductor for high frequency currents. High frequency electrical energy between the electrode 41 and the tip 22 of the obturator 20 cuts or divides tissue of the body at the tip 22. This action results in the formation of a passageway in the body tissue for the advancement of the catheter tube 15. The catheter tube 15 is capable of advancing in the passageway with a reduced application of force. The catheter tube 15 follows behind the tip 22 of the obturator in advancing into the passageway. Further, the high frequency energy at the tip 22 of the obturator 20 has a coagulating effect, as well as a cutting effect, which seals off bleeding vessels and reduces hemorrhaging.

While the present invention shows a balloon-type catheter tube, the inventive concept hereof is equally applicable to catheter tubes of many types and shapes, such as straight simple catheter tubes, mushroom-type catheter tubes, and Mellocott catheter tubes.

I claim:

1. A catheter comprising a catheter tube of electrical insulating material with a distal end, and an electrical conductor member disposed in said catheter tube with a tip at one end thereof located at the distal end of said catheter tube and with means spaced from said tip for establishing an electrical connection, said electrical conductor member being a rod disposed axially in said catheter tube and being removable therefrom, said tip projects out of the distal end of said catheter tube.

2. A catheter as claimed in claim 1 wherein said catheter tube includes an annular member disposed at the distal end of said catheter tube for receiving said tip of said rod.

3. A catheter comprising a catheter tube of electrical insulating material with a distal end, and an electrical conductor member disposed in said catheter tube with a tip at one end thereof located at the distal end of said catheter tube and with means spaced from said tip for establishing an electrical connection, said electrical conductor being a rod disposed axially in said catheter tube and being removable therefrom, said tip projecting out of the distal end of said catheter tube, said catheter tube including an annular member disposed at the distal end of said catheter tube for receiving said tip of said rod, said rod being formed with a shoulder adjacent said tip for engaging said annular member to limit the extend at which said tip projects out of the distal end of said catheter tube.

4. A catheter as claimed in claim 3 wherein an insulating sleeve is disposed on said rod adjacent to said shoulder and rearward thereof.

5. A catheter as claimed in claim 4 in which said catheter tube is formed with drainage openings at the distal end thereof.

6. A catheter as claimed in claim 5 in which said rod is an obturator.

7. A catheter as claimed in claim 6 in which said catheter tube is made of plastic material.

8. A catheter as claimed in claim 7 in which said tip is made of noncorrosive, electrical-conducting material.

9. A catheter as claimed in claim 8 in which said obturator has a body made of stainless steel wire.

10. A catheter as claimed in claim 9 in which said obturator includes another insulating sleeve disposed adjacent said electrical connection means and extending into said catheter tube.