MEANS FOR SURGICAL RESECTION

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My present invention relates generally to surgery and has particular reference to a new and improved type of instrument of unique characteristics and capabilities to be used for alleviating obstructing protrusions of body cavities.

Although my invention is directed primarily towards the alleviation of ailments due to protrusions, nevertheless it will be understood that from its broadest aspects my invention is useful generally for a variety of types of resection or coagulation of tissue by means of suitably generated high frequency electric current. Thus, my invention is useful for the alleviation or treatment of tumors masses or the like and of neoplasms and constrictions in general. A typical example of the uses to which my present method and instrument are particularly adapted lies in the alleviation of protrusions in the deep urethra or bladder neck, caused for example by enlargement or ailments of the prostate gland.

A general object of my invention is to provide a novel method and instrument for permitting disorders of the character mentioned to be alleviated or treated by means of a comparatively simple operation, capable of performance under only local anesthesia, practically hemostatic in character, and of short duration.

My invention is of the type which seeks to alleviate protrusions and the like by electrically resecting a sort of channel or groove through the protrusion or constriction; and it is a particular feature of my invention to accomplish this object in a simplified manner which involves the mere provision of a slit through the cavity wall portion which is under treatment.

In general, it is an object of my invention to provide a method of treatment and a particular type of surgical instrument which is not only simple and reliable but which is highly efficacious in fulfilling its contemplated functions, and which is suitably provided with means for accomplishing suitable irrigation and permitting complete illumination of the site of operation; and wherein the instrument is a compact and workmanlike mechanism capable of manufacture in a practical and commercial manner adapted to be expeditiously constructed, assembled, adjusted, and manipulated.

One of the characterizing features of a preferred embodiment of my invention lies in the provision of a fenestrated endoscopic tube and a wire electrode normally in a retracted position within the confines of the tube, together with a means for protruding the electrode laterally out of the fenestra and substantially parallel to itself so as to cause it to engage broadside against the exposed cavity wall portion.

I achieve the foregoing objects and advantages, and such other objects and advantages as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawing, wherein:

Figure 1 is a side view of the rear portion of an instrument of the present general character.

Figure 2 is an enlarged longitudinal cross section through the forward portion of an instrument embodying the features of my present invention.

Figure 3 is a view taken from the bottom of Figure 2.

Figure 4 is an end view taken from the left of Figure 2.

In Figure 1 I have shown a rear portion of a suitable endoscopic tube which is provided at its forward end with a substantially lateral fenestra 11. The tube 10 terminates in sleeve 12 and flange 13, the sleeve 12 being adapted to facilitate the removable association with the tube 10 of an interior operative member presently to be described. The sleeve 12 is also preferably provided with the pet cock 14 forming a part of the irrigation system.

The interior member may consist of any suitable arrangement of supporting parts, and I have illustratively shown a bundle of three tubes, 15, 16, and 17 held in unitary relationship by means of the forward sleeve 18, the latter having a forward extension 19 which fits snugly against the walls of the tube 10 adjacent to the fenestra 11. When the interior member is in position, the extension 19 forms virtually a part of the endoscopic tube 10.

The tube 18 is adapted to accommodate a suitable telescope 20 which is preferably of the character described and illustrated in U. S. Patent No. 1,680,981, an illuminating lamp 21 being mounted at the extreme forward tip of the telescope, and the objective lens 22 arranged slightly to the rear of the lamp 21 and commanding an obliquely forward field of vision. At the rear, the telescope 20 is provided with the usual eye-piece 23, the electric terminal rings 24, and such other mechanism, such as pin 25 for facilitating the manner in which the telescope is held in proper position.

The tube 16 connects at its rear end with the pet cock 26 and forms part of the irrigating system.

The tube 17 is adapted to accommodate the longitudinal control rod 27 forming part of the control mechanism for the electrode itself. At
its rear end, the rod 27 may be provided with a rack 28 adapted to be engaged by a pinion 29 operated by means of a control wheel 30 or the like. This mechanism is merely typical of a variety of possible arrangements for enabling the operator to move the rod 27 longitudinally in accordance with the desired operation or functioning of the operative electrode. The rod 27 is also preferably caused to convey the electric current to the electrode at its forward end, and I have therefore illustratively shown the electric terminal or binding post 31 as the rear end of the rod 27.

In accordance with my present invention an electrode wire 32 is arranged at the forward end of the endoscopic tube adjacent to the fenestra II. This wire is normally in the position designated by the dotted line 33, whereby it lies normally in a retracted position within the confines of the tube 10. The wire 32, is, in the illustrated embodiment, arranged longitudinally with respect to the instrument as a whole.

My present invention contemplates a bodily movement of the electrode wire 32 out of and back into the fenestra II as indicated most clearly in Figure 2, the extreme outer position being approximately designated by the dotted line 34. To accomplish this contemplated movement of the electrode, I articulate it with a suitable parallel mechanism which is controlled by longitudinal reciprocations of the rod 27. I prefer to provide the construction herein illustrated, whereby the opposite ends 35 and 36 of the wire 32 are pivoted to the two links 37 and 33 respectively, these links being substantially parallel to each other, and having their rear ends pivoted to extension 19 forming virtually a part of the endoscopic tube 10. The forward end of the rod 27 is pivoted as at 39 to the rear link 33 so that axial movements of the rod 27 will rock the link 33 with the range approximately indicated by the dotted positions 33 and 34. Obviously the rod 27 is resiliently flexible, especially at its forward end, so as to permit it to function in the manner described.

Upon referring to Figures 3 and 4, it will be observed that each of the links 37 and 33 is bifurcated at its rear end by the pivotal mountings 40 and 41 are arranged along opposite sides of the endoscopic tube. This construction not only enhances the visibility afforded by the telescope 20 but it permits the instrument to be constructed in a compact and workmanlike manner whereby the links 37 and 33 are caused to straddle or extend around the telescope 20 as indicated most clearly in Figure 4.

In practicing my present invention it will be understood that an electric connection is established between one terminal of a suitable source of resecting current and an indifferent electrode contacting with the patient at some suitable point.

Under certain circumstances the endoscopic tube 10 may itself serve as the indifferent electrode. In this way, one terminal of the current source is connected electrically with the cavity wall or protrusion which is to be treated. The other terminal of the high frequency source of current is connected electrically with the active electrode 32, for example by means of the binding post 31. Where the tube 10 is used as the indifferent electrode, the active electrode 32 is suitably insulated from it, as by forming extension 18 of insulating material and properly insulating the control rod 21. Where the relatively remote indifferent electrode is employed, the tube 10 is preferably composed of insulating material, and in such an event, the use of a proper type of alternating current will not necessarily require that the electrode 32 be mounted in insulated relationship to the extension 19, the control device 30, or other portions of the interior member.

It will also be understood that proper connections to the pet cocks will be made, where desired or necessary, so as to submerge the portion to be treated under a suitable liquid such as water. All of the foregoing procedure as well as the subsequent operative procedures may be carried out under well illuminated full vision.

After the protrusion or similar cavity wall portion or constriction has been properly exposed within the illuminated vision of the telescope and in the range of action of the electrode, the control device 30 is manipulated to withdraw the rod 27 rearwardly, thus serving to rock the link 33 and causing the electrode 32 to protrude laterally out of the fenestra in a direction substantially transverse to its own axis. This movement causes the electrode to move substantially parallel to itself whereby an entirely novel and highly efficient result is accomplished by virtue of the fact that the electrode wire 32 encounters the protrusion or cavity wall in a broadside manner. This encounter permits the electrode wire 32 to be advanced bodily against itself into the exposed cavity wall portion, whereby a single operative results in cutting a longitudinal slit through the obstruction or constriction. The type of current employed renders this operation entirely hemostatic and accomplishes this in a rapid and simple manner which requires only local anesthesia. The electrode is immediately withdrawn into its normal retracted position after the desired slit has been cut, whereupon the instrument may be withdrawn and the operation is complete. The formation of the slit results in alleviating the obstruction, inasmuch as a longitudinal channel or groove has thereby been formed in the obstruction. This alleviation is accomplished, as will be understood, without any necessity for actually excising any of the tissue, although obviously the protruding movement of the electrode may be accompanied by some lateral movement or movements (by rotation of the entire instrument) to accomplish such particular objects as may be found necessary under particular circumstances.

I am aware of the fact that the protrusion of an electrode laterally out of the fenestra of an endoscopic tube is not broadly new; and I wish to point out that the characterizing feature of my present construction lies in the fact that the electrode wire is arranged in a plane that may be said to be substantially parallel to the plane of the fenestra. In this way, a lateral movement of the wire, parallel to itself, permits the wire to be applied broadside against the cavity wall which it encounters.

It will be understood that the arrangement of the electrode wire in the longitudinal relationship shown is not necessarily the only arrangement which falls within the purview of my present invention, the essential characteristic lying in the fact that the electrode wire is moved bodily and in a substantially lateral direction out of the fenestra so as to encounter the exposed cavity wall portion in a broadside manner of the controlling the movements of the same, may be modified in a variety of ways.
by those skilled in the art, without departing from the spirit and scope of the invention as expressed in the appended claims.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is

1. In an instrument of the character described, a fenestrated endoscopic tube insertable into a body cavity, a wire electrode substantially parallel to the tube axis and arranged adjacent to said fenestra in normally retracted position within the confines of said tube, and means for moving said electrode laterally out of said fenestra; said means comprising a pair of parallel links pivoted to opposite ends of the electrode respectively, the other ends of said links being pivoted to the tube, and control means extending rearwardly along the tube and adapted to rock at least one of said links.

2. In an instrument of the character described, a fenestrated endoscopic tube insertable into a body cavity, a wire electrode substantially parallel to the tube axis and arranged adjacent to said fenestra in normally retracted position within the confines of said tube, a telescope within said tube behind said electrode and commanding a view of the fenestra, and means for moving said electrode laterally out of said fenestra, said means comprising a pair of parallel links pivoted to opposite ends of the electrode respectively, the other ends of said links being bifurcated to straddle said telescope and being pivoted to the tube, and control means extending rearwardly along the tube and adapted to rock at least one of said links.

3. In an instrument of the character described, a laterally fenestrated endoscopic tube insertable into a body cavity, a wire electrode adjacent to the fenestra and normally in retracted position within the confines of said tube, said wire being arranged in a plane substantially parallel to the plane of the fenestra, an electric binding post at the rear of said tube, means for conducting a high-frequency current to said wire from said binding post, and means for moving said wire, substantially parallel to itself, laterally out of the fenestra and back again.

4. In an instrument of the character described, a laterally fenestrated endoscopic tube insertable into a body cavity, a wire electrode adjacent to the fenestra and normally in retracted position within the confines of said tube, said wire being arranged in a plane substantially parallel to the plane of the fenestra, an electric binding post at the rear of said tube, means for conducting a high-frequency current to said wire from said binding post, and means for moving said wire, substantially parallel to itself, laterally out of the fenestra and back again.

5. In an instrument of the character described, a laterally fenestrated endoscopic tube insertable into a body cavity, a wire electrode adjacent to the fenestra and normally in retracted position within the confines of said tube, said wire being arranged substantially parallel to the tube axis, an electric binding post at the rear of said tube, means for conducting a high-frequency current to said wire from said binding post, and means for moving said wire, substantially parallel to itself, laterally out of the fenestra and back again.

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