

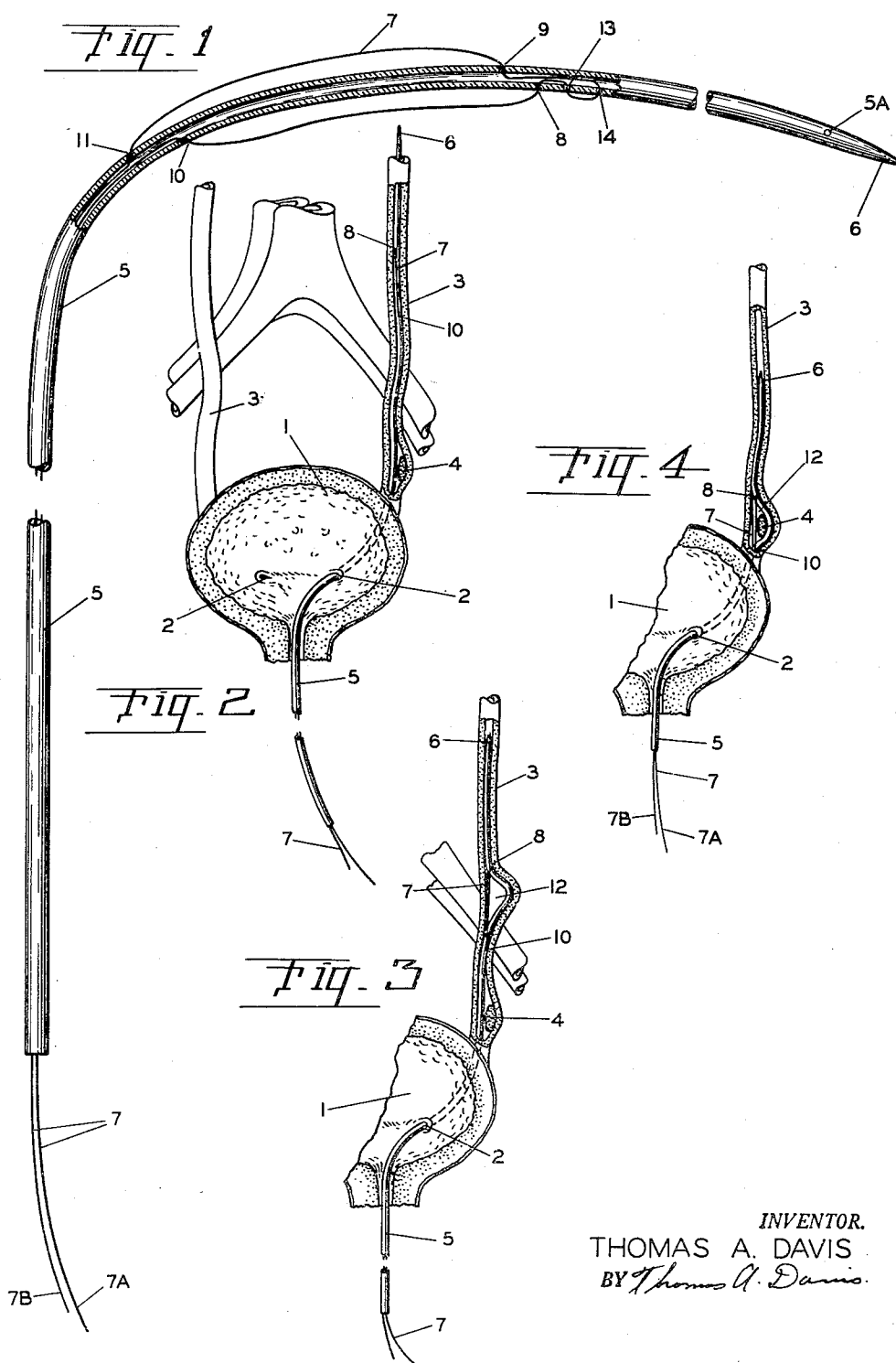
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URETERAL STONE EXTRACTOR

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1

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URETERAL STONE EXTRACTOR

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3 Claims. (Cl. 128—349)

My invention relates to a ureteral stone extractor and is particularly adapted for the removing of stones from a ureter or for dilating the ureter.

There are ureteral stone extractors already on the market of the catheter type, wherein the upper end or tip is looped back into the form of a loop. This requires considerable space to make this loop and in the use of them it normally requires the advancement of it to the renal pelvis in order that there may be sufficient space in which to form the loop.

In my device, the loop can be formed at any location within the ureter and a complete loop does not have to be formed so that considerable control of the loop is had in my construction.

Furthermore, in the device in which the tip is looped back, the cross diameter of the loop on withdrawal into the ureter is depended upon the relationship between the diameter of the ureter and its degree of contraction, and the inherent elastic expansion of the loop. In my device there is complete control of the diameter or depth of the loop.

With the forming of a loop on the end of the extractor, a tendency for the same to hook into the tissue is always possible, causing injury, but with my specially formed loop, this possibility is completely eliminated.

With the present day device, the loop having once been formed and withdrawn into the ureter, the loop cannot be released without danger of damage to the ureter. With my form of loop it can be released without injury.

With the present type of extractor in which the end is formed into a loop, if upon withdrawal of the extractor to engage the calculus and the calculus is not engaged, the extractor must be removed entirely from the ureter, straightened out and again reinserted, repassed by the calculus, advanced to the renal pelvis and the entire operation repeated. It is usually difficult to pass by the calculus.

With my device the extractor being withdrawn to engage the calculus under cystoscopic vision, if the loop is seen to exit from the ureter without having engaged the calculus, the loop may be collapsed and the extractor readvanced to the proper position for re-forming the loop with ease, because the upper end of the extractor is still above the calculus, in the case of calculi in the lower end of the ureter, the usual location from which calculi has to be removed.

In my extractor, after the loop has been formed or while the stone is engaged or held within the loop, the upper end of the extractor catheter remaining extended up the ureter to a level above the calculus with the openings in the tip above the level of the calculus, it may function as a catheter to drain the ureter above the level of the calculus or to introduce contrast media for X-ray or medication, whereas the type in which the upper end or tip is looped over and formed in a return bend will not function as a catheter.

With my type of extractor, the space required for it within the ureter while engaging, or after having engaged

2

the calculus, is less than that required for the type of extractor in which there is a loop formed by the end of the catheter being bent over into a loop. The space required with my extractor is that of the width of the stone plus the width of one single diameter of the extractor catheter.

The primary object of my invention is to provide means for removing calculi or stones from the ureter or to make conditions in the ureter more favorable for the passing of calculi down the ureter.

A further object of my invention is the providing of means within the catheter or tube for the forming of an offset or loop in the said catheter for expanding the ureter or directly removing the stones lodged in the ureter.

Briefly, my invention comprises a tubular catheter having means for forming a loop within the tube below its upper inner end or tip, this loop being of such a design that the tip will not be looped back in the forming of the loop, but will remain extended up the ureter.

With my new and improved ureteral stone extractor, I can control the size of the loop being used and the removing of the stone from the ureter, also the stone can be easily released if desired.

A further object of my invention is to provide a device having characteristics of a simple tube which will permit the injection of fluids, or the removal of fluids from the ureter, as well as extracting foreign bodies.

Another object of my invention is to provide a device that may be inserted into a ureter with the ease, facility and safety of an ordinary ureteral catheter.

These and other incidental objects will be apparent from the following description when read in connection with the accompanying drawing in which:

Figure 1 is a side view of an extractor catheter or tube, partially broken away for convenience of illustrating the principle of forming my invention;

Figure 2 is a diagrammatic sectional lay-out of a bladder and ureter leading thereto, showing the position of the extractor catheter before forming a loop, part of the tube broken away for convenience of illustration;

Figure 3 illustrates how I form a loop in the catheter or tube within the ureter, and

Figure 4 illustrates how the stone is removed by the loop formed in the extractor catheter or tube.

Referring now to the drawing, specifically to Figures 2 and 4, a section is shown through a bladder 1, having ureteral openings 2 providing communication with the ureters 3. A calculus or stone 4 is shown as being lodged within one of the ureters and must be removed.

My invention comprises an extractor catheter or flexible tube 5 terminating in a tip 6 and having one or more openings 5A adjacent said tip 6 and one or more pairs of apertures spaced from the tip 6. A thread or wire 7 is threaded through the tube 5 and is passed out of the tube through said pair of apertures to form with the tube a loop that is spaced from the tip 6. Specifically, the thread 7 is threaded up through the tube and out through an aperture 10, back into the tube through an aperture 8, out of the tube through an aperture 13, back in through an aperture 14 and out through an aperture 9, and back into the tube through an aperture 11 and threaded back down through the tube 5, thus providing two strands of thread or wire, as indicated at 7A and 7B. The object of threading the thread or wire through the openings 13 and 14 is to provide an additional safety feature in case the tube would break where being flexed at the portions which are weakened by the apertures 8, 9, 10 and 11, the tip would still remain connected to the thread or wire, permitting it to be removed from the ureter.

In operation, referring to Figures 2-4, the tip 6 is inserted up through the bladder 1 and through one of the openings 2 into the respective ureter 3 as shown in Figure

3

2. When the extractor catheter or tube is in place within the ureter, the strands 7A and/or 7B are pulled through the tube by the operator to form a loop 12 within the said tube to the desired size, as shown in Figure 3. When the catheter with this loop is pulled down through the ureter, it will grasp, snare or engage the stone 4, as shown in Figure 4, removing the same from the ureter.

When the thread 7 is pulled down through the tube 5, a loop is formed between the pair of apertures 8 and 9 and/or the pair of apertures 10 and 11, as best illustrated in Figures 3 and 4. Openings 5A are formed in the tip of the tube 5 for drawing fluid from the ureter through the tube or injecting fluid through the tube into the ureter.

The apertures 10 and 11 are offset from one another as are the apertures 8 and 9 so as to prevent weakening of the tube. The pairs of apertures preferably are in offset but overlapping relation, that is an aperture of one pair are disposed longitudinally of the tube between the other pair of apertures so that the loop 12 may be formed between either pair by traction on the respective strand or the loop may be formed between the intermediate portion of the tube between both pairs of apertures by traction on both strands of the thread or wire 7. Moreover, the pairs of apertures are offset circumferentially of the tube so that the tube and two strands can surround or engage a stone 4 at three points.

The loop 12 is of a sufficient distance from the tip 6 of the tube 5 so that the point of the tube will not reverse on itself. This is a very important feature as brought out in the objects of my invention. Another advantage of my extractor catheter is that a loop of any desired size can be formed, which is ideal in the expanding of the ureter in the treatment of the same, or for the extraction of stones therefrom. Further, the said loop can be formed, eliminated or re-formed while in the ureter.

What is claimed is:

4

1. A ureteral stone extractor comprising a flexible catheter tube, an insertion tip on one end of said tube, said tube having two pairs of apertures with one pair of apertures being closely spaced and adjacent said tip and the other pair of apertures being relatively widely spaced longitudinally of said tube, and a thread-like element threaded through said tube and anchored to said tube by passing through said one pair of closely spaced apertures and back through said tube, one strand of said element passing through said other pair of widely spaced apertures and outside said tube between said latter pair of apertures, the aperture of said latter pair nearest said tip being adjacent said tip but spaced therefrom a distance sufficient to prevent reverse bending or looping of said tip, whereby traction on said element will cause said tube to curve or form a loop only between said latter pair of apertures for snaring or dislodging a calculus or dilating the ureter and without bending or looping said tip.

2. A ureteral stone extractor as defined in claim 1 wherein said tube has two pairs of widely spaced apertures with the strands of said element respectively passing through said pairs of widely spaced apertures.

3. A ureteral stone extractor as defined in claim 2 wherein said apertures of each widely spaced pair are spaced substantially a like distance from each other and the apertures of one pair are offset in overlapping relation longitudinally of said tube with respect to the apertures of the other pair to preclude weakening of said tube.

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