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(54) **RETRACTOR WITH MEMORY**

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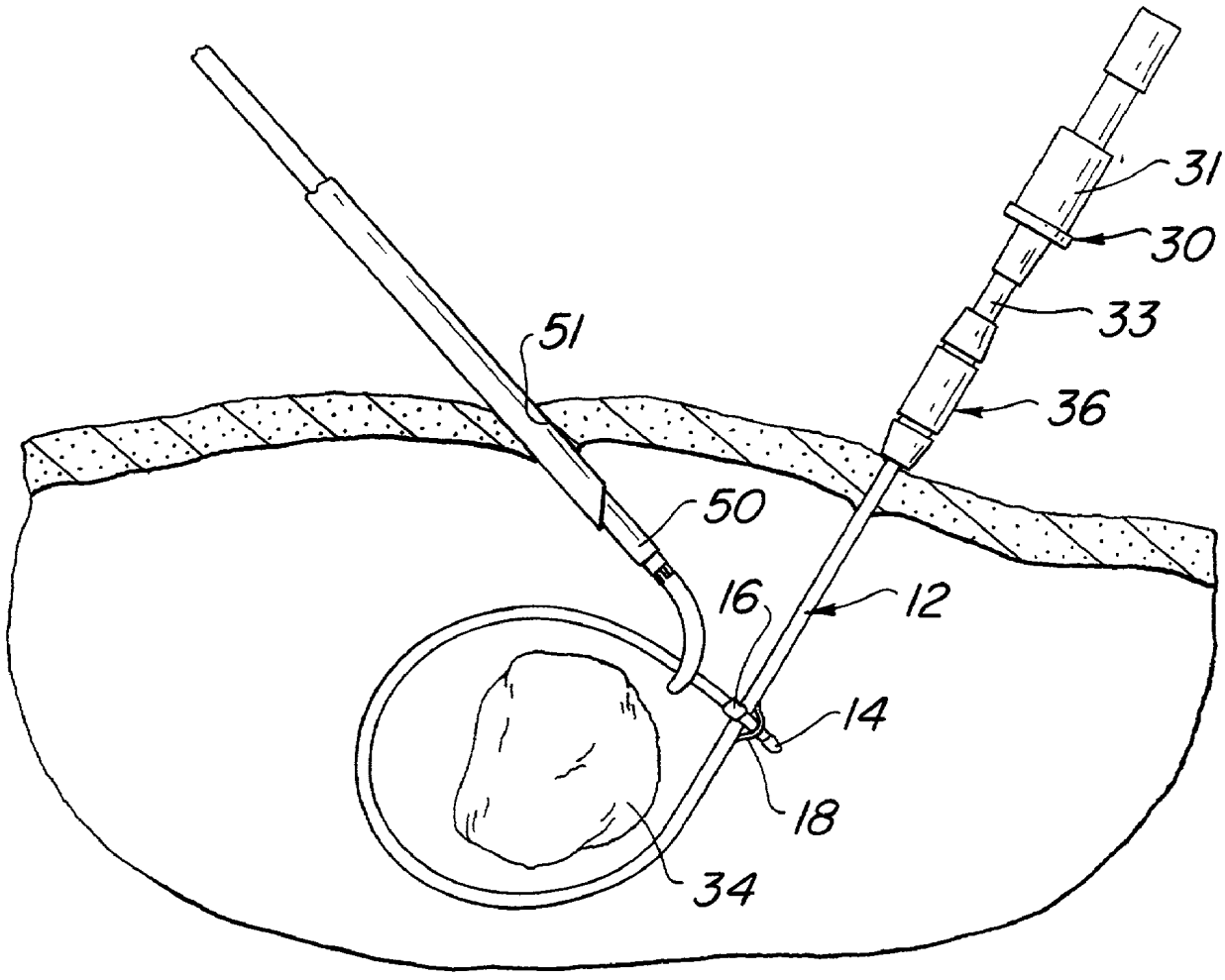
(52) **U.S. Cl.** **600/37**

(57) **ABSTRACT**

A laparoscopic/thorascopic support device is described that engages and supports a body part in a non-traumatic manner while it is being acted upon by a surgical instrument. The support device is capable of lifting or otherwise moving a body part into a desired position to be operated upon or isolated from another body part. The support device includes an insertion device that punctures a covering of a body tissue to provide a passageway for access to the desired body part and a catheter. The catheter extends through the passageway and engages and temporarily supports the desired body part in a non-traumatic manner. The catheter (or manipulating device) includes a shaft having a distal end with a curved configuration that is made of a material having sufficient elastic memory that can be straightened for insertion into the passageway or placement about the desired body part, and that resumes its curved configuration due to its elastic memory to at least partially encircle and support the desired body part.



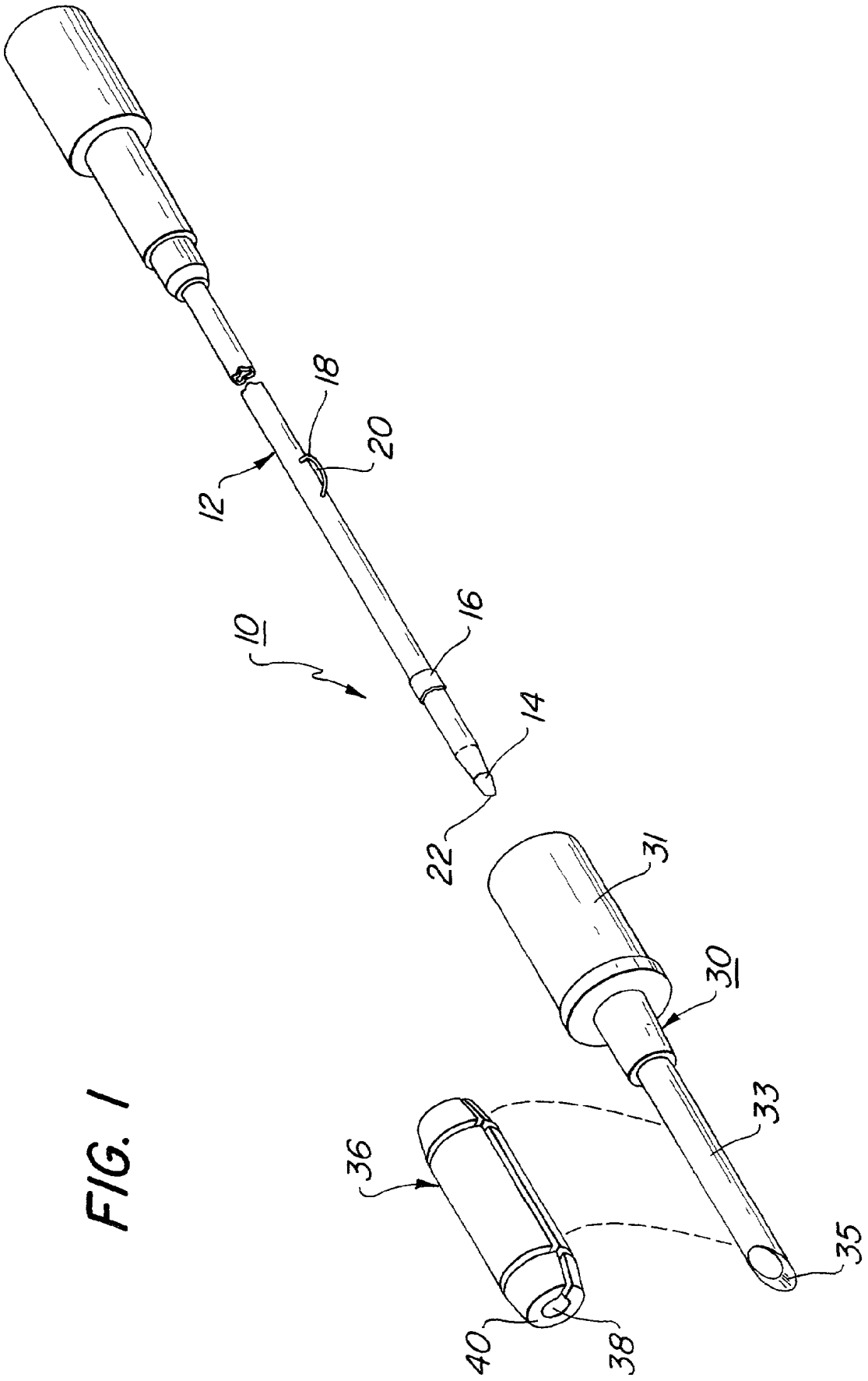


FIG. 1

FIG. 2

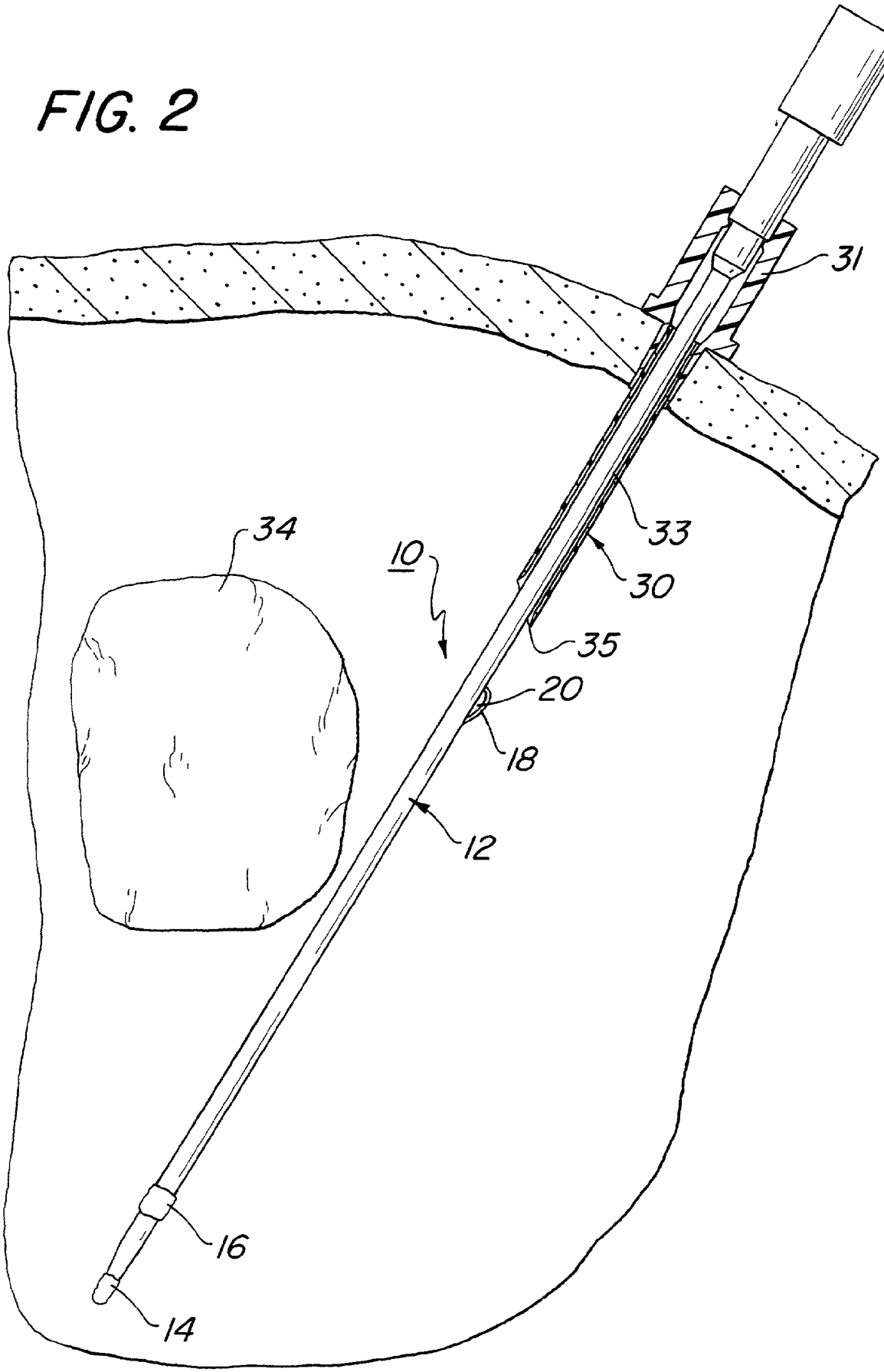


FIG. 3

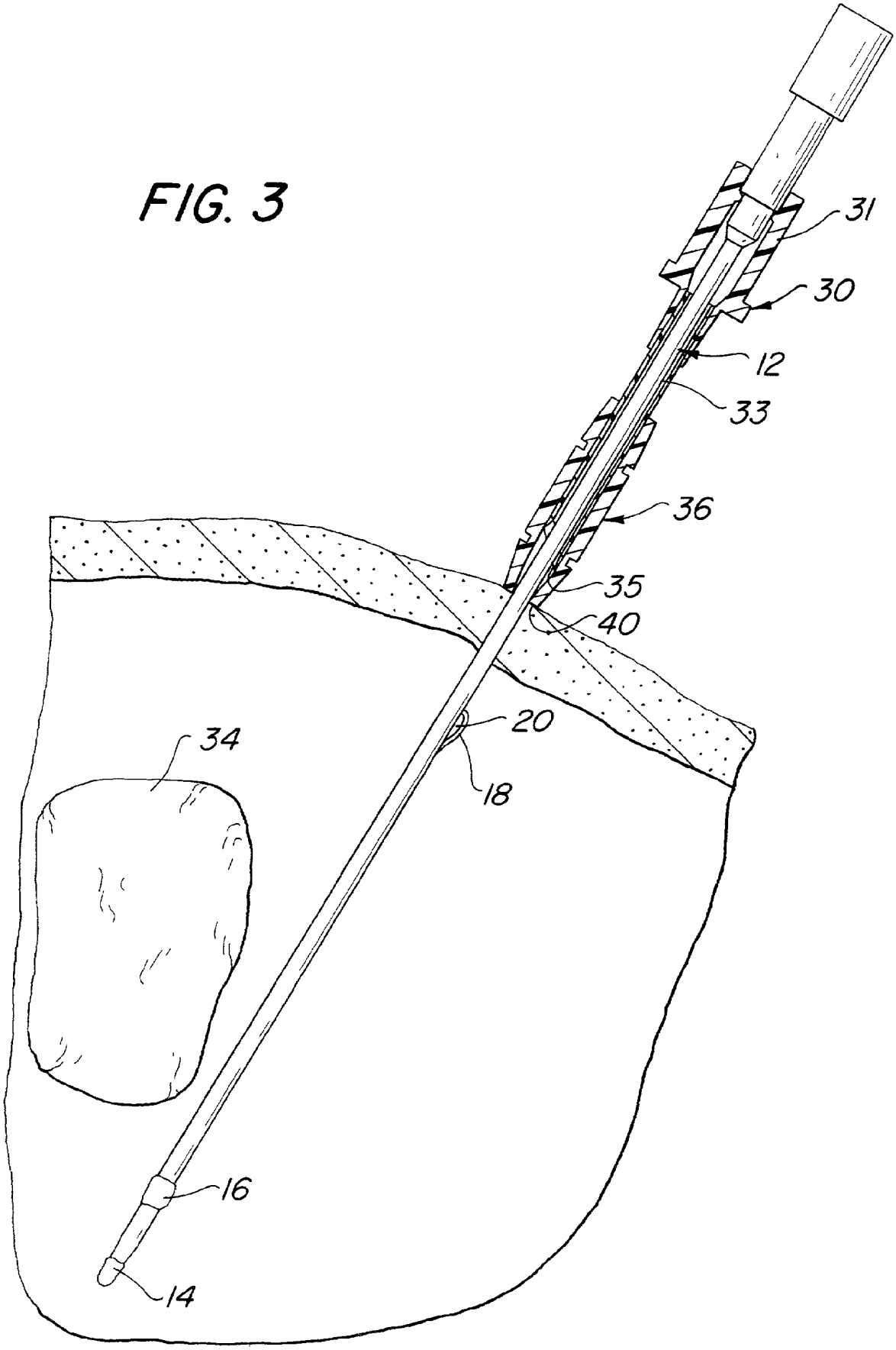


FIG. 4

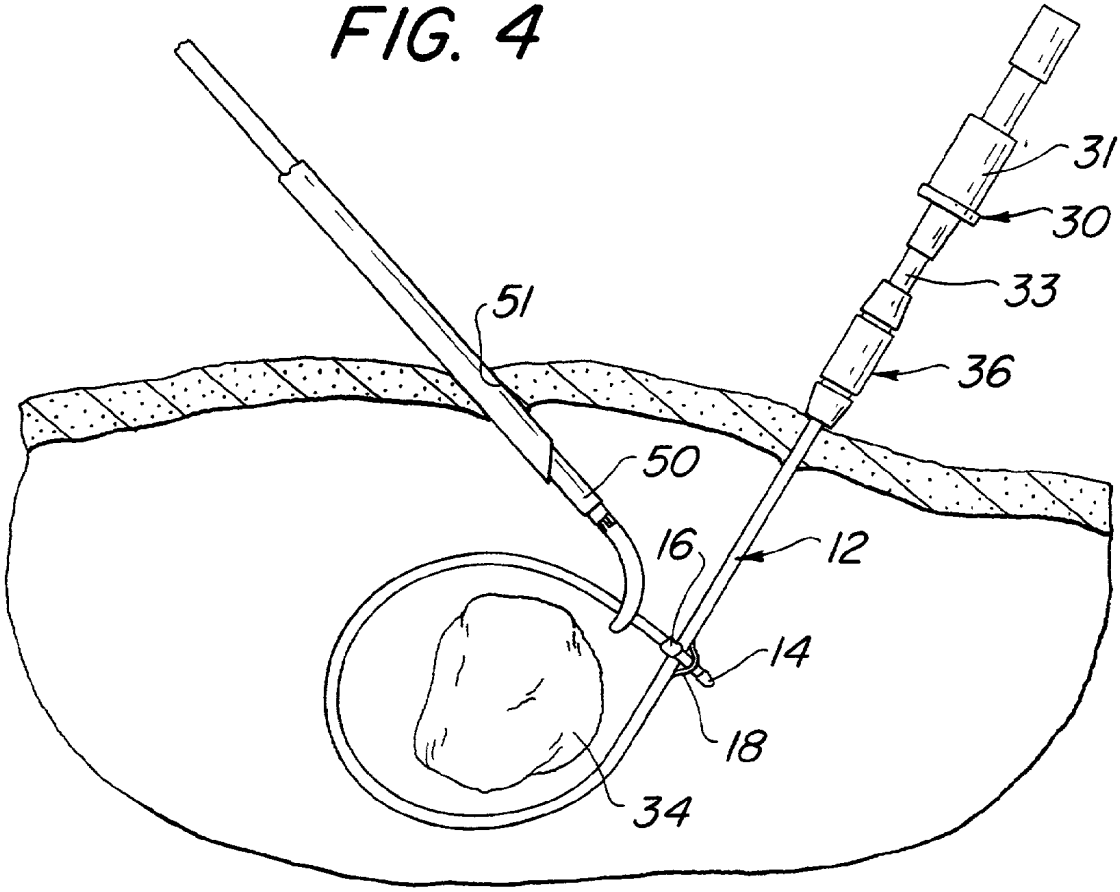


FIG. 5

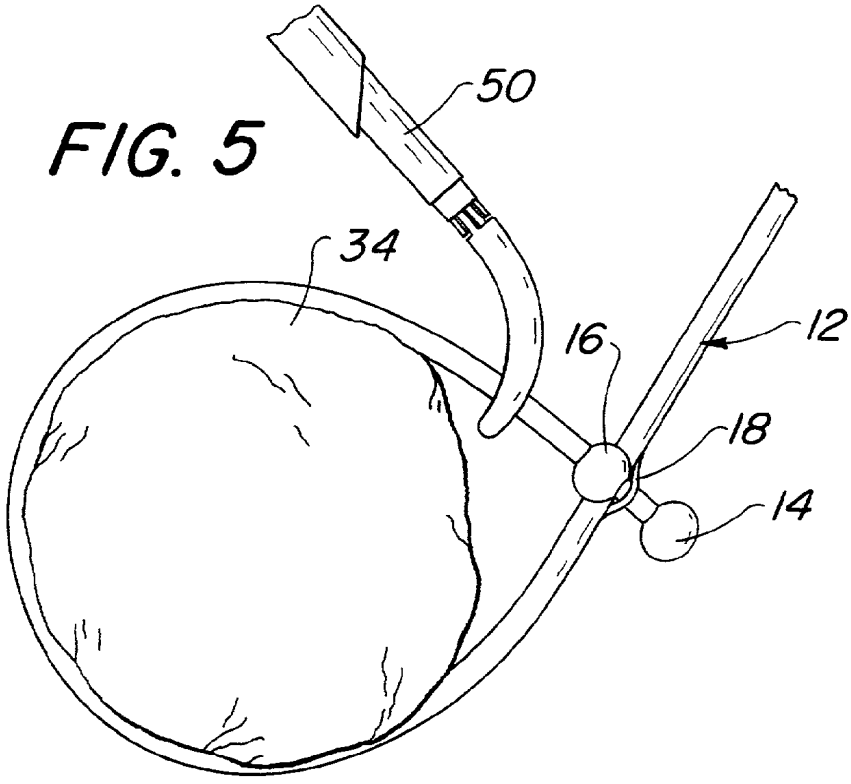


FIG. 6

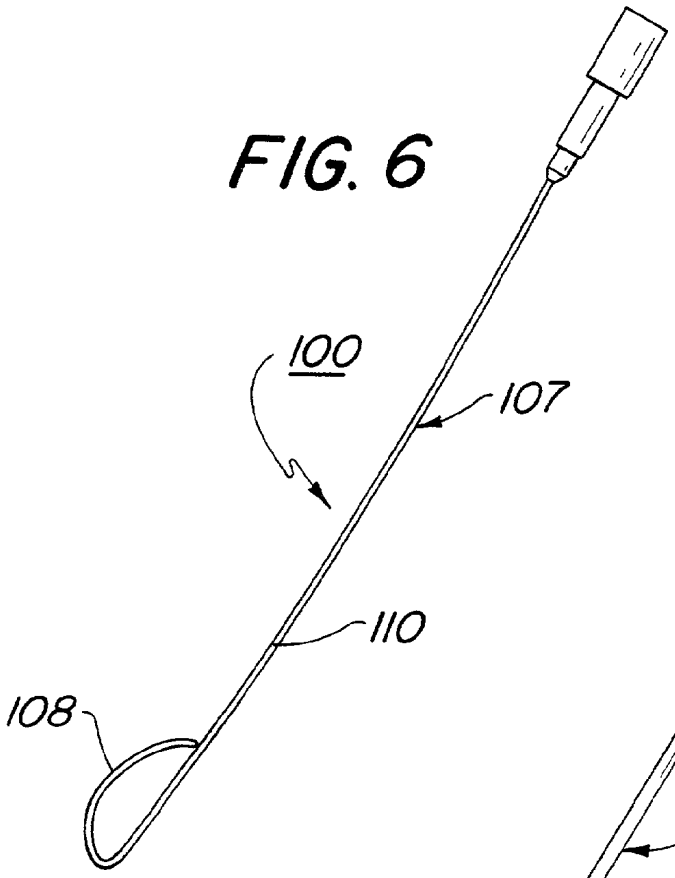


FIG. 7

FIG. 8

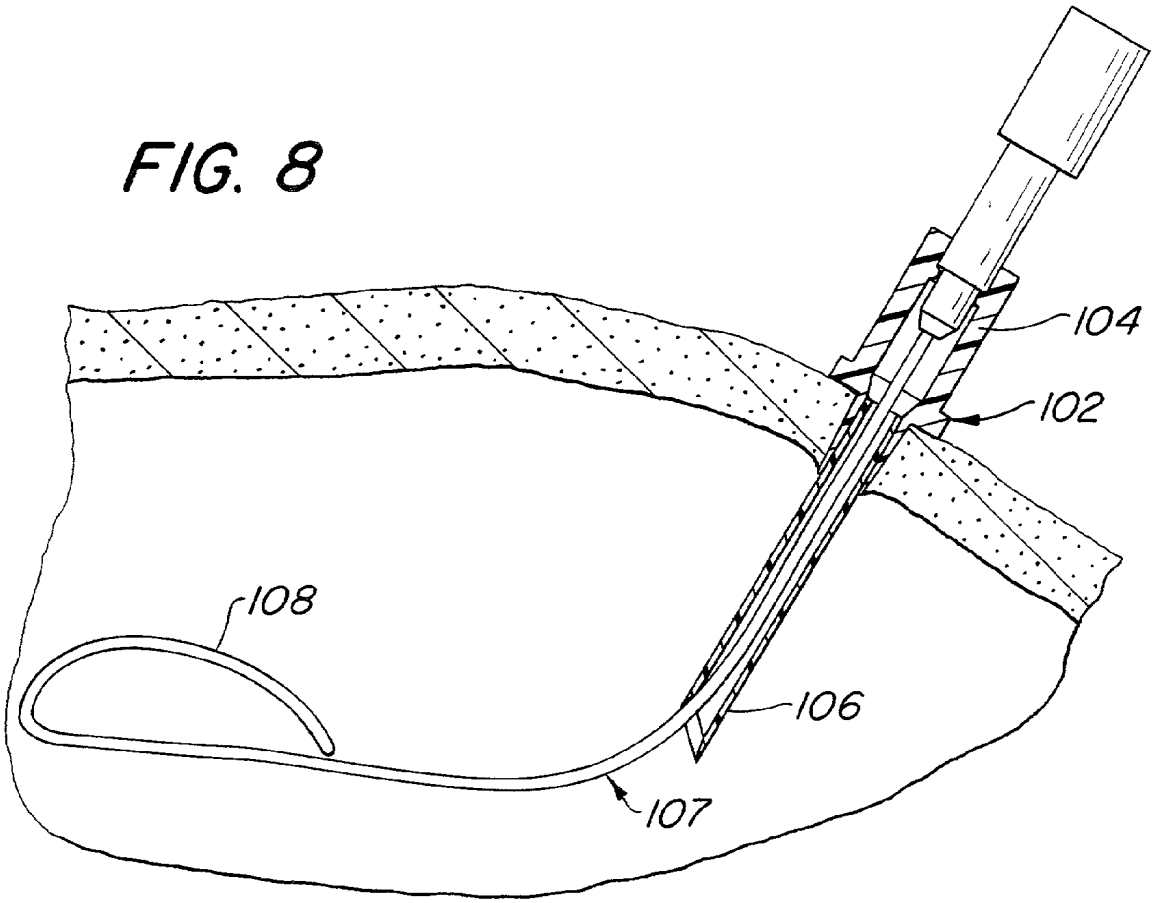
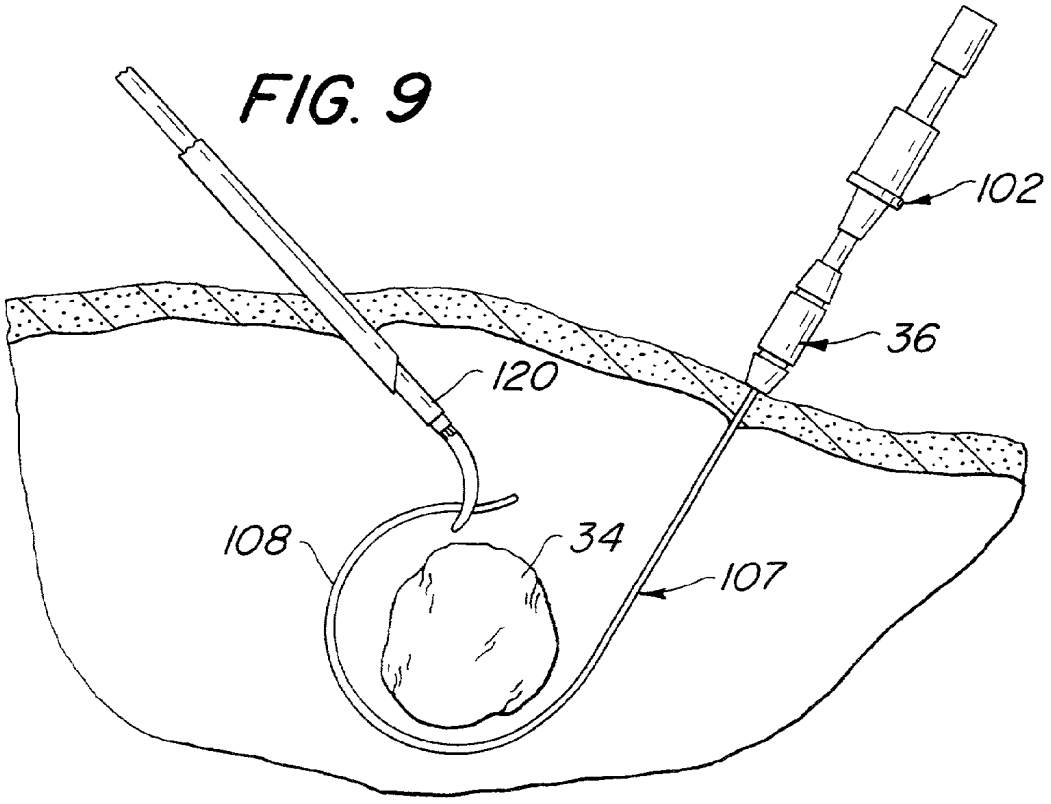


FIG. 9



RETRACTOR WITH MEMORY

FIELD OF THE INVENTION

[0001] This invention relates to generally to surgical instruments, and more specifically, to laparoscopic and thorascopic instruments that engage and support a body part.

BACKGROUND OF THE INVENTION

[0002] In laparoscopic and thorascopic surgical procedures, it is often necessary to engage and/or support a body part, especially of tubular shape (e.g., bowel, fallopian tube, esophagus, appendix, etc.) to be worked upon by, or isolated from, a surgical device (e.g., dissector, scissors, biopsy instrument, etc.). Morever, during these and other surgical procedures, it is quite common to employ a clamp or other gripping device to immobilize or engage a body part to be acted upon or isolated from, a laparoscopic/thorascopic surgical instrument which may cause undesired trauma to that body part. Unfortunately, the related art does not show an effective laparoscopic or thorascopic tool that would allow a surgeon to manipulate a body part without causing undesired trauma to that body part. Accordingly, a need exists for a laparoscopic/thorascopic support device that supports the body part in a non-traumatic manner while it is being acted upon by or isolated from a laparoscopic/thorascopic surgical instrument.

[0003] References throughout this application to "laparoscopic," in referring either to a surgical procedure or a surgical device, or instrument, is intended to include within its scope thorascopic procedures, devices or instruments, unless the context of the reference to laparoscopic clearly indicates otherwise.

[0004] Accordingly, it would be beneficial to substantially obviate one or more of the problems associated with the related art. It would also be beneficial to provide a laparoscopic/thorascopic support device. It would also be beneficial to provide a support device that moves or supports a body part in a non-traumatic manner. It would also be beneficial to obviate the need for one or more airlock standard trocars, especially in more complex procedures during which extra trocars and retractors are routinely required. It would also be beneficial to provide a support device that is capable of lifting or otherwise moving a body part to a desired position.

SUMMARY OF THE INVENTION

[0005] One exemplary embodiment of the invention is described as a support device for engaging and temporarily supporting a desired body part of the patient's body comprising an insertion device and a catheter or manipulating device. The insertion device punctures a covering of a body tissue to provide a passageway for access to the desired body part. The catheter (or manipulator) extends through the passageway, engages and temporarily supports a desired body part in a non-traumatic manner, and includes a shaft made of a material that is sufficiently flexible to bend to a desired straight or curved orientation and is sufficiently rigid to maintain the desired orientation. A distal end of the shaft bends about the desired body part to form a loop and secure the desired body part within the loop.

[0006] Another exemplary embodiment of the invention is described as a retractor for manipulating a body part in a cavity of a patient's body. The retractor is an elongate member including a generally curved distal end, and is formed with an elastic memory for this latter configuration. The curved distal end is adapted to at least partially encircle a body part to be retracted.

[0007] Yet another exemplary embodiment of the invention is described as a method for engaging and temporarily supporting a desired body part of a patient's body comprising puncturing a covering of a body tissue to provide a passageway for insertion of a catheter into an area of the desired body part, inserting a shaft of the catheter into the passageway, engaging the body part by directing a distal end of the shaft about the desired body part to form a loop, and securing the desired body part within the loop.

[0008] Still another exemplary embodiment of the invention is described as a support system for engaging and temporarily supporting a desired body part of a patient's body, comprising an elongated hollow needle, a catheter, and a grasping device. The elongated hollow needle includes a distal sharp end that punctures and penetrates a covering of a body tissue, with the needle defining a cylindrical compartment that provides the passageway for access to the desired body part. The catheter extends through the passageway to engage the body part. The catheter includes a shaft made of a material that is sufficiently flexible to bend to a desired straight or curved orientation and is sufficiently rigid to maintain the desired orientation. The grasping device directs a distal end of the shaft about the desired body part to form a loop for securing the desired body part.

[0009] Further scope of applicability of the present invention will become apparent in the description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention will be described in conjunction with the following drawings in which like referenced numerals designate like elements, and wherein:

[0011] **FIG. 1** is an exploded isometric view showing a support device in accordance with a preferred embodiment of the invention;

[0012] **FIG. 2** is a sectional view illustrating the support device of **FIG. 1** extending into a body cavity;

[0013] **FIG. 3** is a sectional view of the supporting device of **FIGS. 1 and 2** after the insertion device has been retracted from an abdomen wall;

[0014] **FIG. 4** is a sectional view illustrating the supporting device of **FIG. 3** with a shaft forming a loop;

[0015] **FIG. 5** is an enlarged view illustrating the supporting device of **FIG. 4** gripping, or supporting, an internal body part;

[0016] **FIG. 6** is an elevational view illustrating a catheter in accordance with another preferred embodiment of the invention;

[0017] **FIG. 7** is an enlarged sectional view of the catheter shown in **FIG. 6** and an insertion device that together form

a supporting device in accordance with yet another preferred embodiment of the invention;

[0018] **FIG. 8** is a sectional view illustrating the supporting device shown in **FIG. 7**; and

[0019] **FIG. 9** is a sectional view illustrating the supporting device of **FIGS. 7 and 8**, but being manipulated about a body part.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The present invention relates to a unique laparoscopic/thorascopic support device that engages and supports a body part in a non-traumatic manner while it is being acted upon by a laparoscopic/thorascopic surgical instrument. The laparoscopic/thorascopic support device of the invention is capable of lifting or otherwise moving a body part into a desired position to be operated upon or isolated from a surgical site.

[0021] Referring to FIGS. **1-5**, a support device **10** of a preferred embodiment of this invention includes an elongate, balloon catheter **12** that is connectable to a syringe (not shown) at a proximal end thereof, in a conventional manner. Preferably, the catheter **12** is sufficiently rigid to retain a desired orientation as it is being manipulated within the abdomen of a patient to move under, or partially about a body part to be supported. Accordingly, the catheter may be formed of plastic and resilient metals, such as titanium.

[0022] In the illustrated embodiment of FIGS. **1-5**, the catheter **12** is a double lumen member including two balloons **14**, **16** spaced apart from each other at a distal end. Spaced proximally of the balloons and attached to the outer wall of the catheter body is a loop or eyelet **18** including a central passage **20** for receiving the distal end **22** of the catheter, in a manner which will be explained hereinafter.

[0023] It should be understood that in accordance with the broadest aspects of this invention, the catheter can be of a single lumen type, and can employ a single balloon (e.g., **14**) at the distal end thereof. However, in the most preferred embodiments of the invention, a double lumen catheter is employed with two balloons **14** and **16**, for purposes that will become apparent by the discussion that follows.

[0024] The balloons **14** and **16** are normally in a collapsed condition, until filled with a fluid injected into the catheter from a syringe at the proximal end thereof, in a conventional manner. Most preferably the balloons are relatively stiff; similar to balloons employed in balloon angioplasty procedures in human arteries.

[0025] The manner of employing the laparoscopic/thorascopic support device **10** of this invention will now be described.

[0026] Referring to **FIGS. 1 and 2**, an insertion device **30** includes an upper cap member **31** and a lower, or distal, needle **33**. The needle **33** has a width of, for example, about **14** gauge, and is employed to puncture the abdomen **32** of a patient, and thereby provide a passageway for the catheter **12** to be inserted into an area of the body near the body part **34** to be acted upon. After the catheter **12** has been inserted through the insertion device **30** into the abdomen, as is shown in **FIG. 2**, the insertion device is retracted, as shown in **FIG. 3**, to move the distal sharp edge **35** of the needle **33** into a region outside of the patient's body. Thereafter, a clip **36**, in the form of a split sleeve defining a cylindrical compartment **38** therethrough is inserted about the distal end of the needle **33** of the insertion device **30**, and about an adjacent section of the catheter **12**. This clip **36** is of a well-known construction, and is employed to prevent the distal needle **33** of the device **30** from canting, or rotating, relative to the catheter **12** and thereby cutting the catheter **12** during a surgical procedure.

[0027] Moreover, in a preferred form of the invention as shown in **FIGS. 3 and 4**, the clip **36** also functions as a keeper, with the lower, or distal surface **40** thereof engaging the outer surface of the abdomen and thereby maintaining the catheter **12** in a desired orientation and position within the patient's body. Thus, prior to applying the clip **36** to the needle **33** and the catheter **12**, it is important that the catheter **12** be properly located in the operating site.

[0028] Referring to **FIG. 4**, after positioning the catheter **12** within the abdomen, a laparoscopic grasping device **50** of any suitable design is inserted through a trocar or other passage **51** in a different area of the abdomen from the insertion device **30** and the catheter **12**, and then is directed into the operating site near the body part **34** to be acted upon, to grip a region of the catheter **12** adjacent the distal end thereof, (See **FIGS. 4 and 5**) and manipulate that region about the body part **34** to be supported. The distal region of the catheter **12** is then directed through the central passage **20** of the loop or eyelet **18**; preferably with the collapsed balloons **14** and **16** being located on opposed sides of the eyelet **18**. Thereafter, a syringe (not shown) connected to the proximal end of the catheter **12** in a well-known manner is operated to direct fluid into both inner and outer lumens of the catheter **12** to thereby expand the balloons **14** and **16** on opposite sides of the eyelet **18**, as is shown most clearly in **FIG. 5**. The catheter **12** supports the body part **34** in a non-traumatic fashion, and the engagement of the balloons **14** and **16** on opposite sides of the eyelet **18** retains the catheter **12** about the body part **34** and prevents the catheter **12** from cinching down and crimping, or otherwise traumatizing, the body part **34**. In this condition, the catheter **12** can then be manipulated to position the body part **34** in a desired orientated relative to the operating instruments and the surgical field to permit a laparoscopic surgical procedure to be carried out in an efficient, safe manner.

[0029] As explained earlier, in accordance with the broadest aspects of this invention, a single balloon can be employed in lieu of the double lumen-double balloon arrangement described above. In this case, the single balloon **14** will be positioned through the eyelet **18** and then expanded by fluid directed into the balloon **14** from the syringe to thereby lock the catheter **12** about a desired body part. However, in accordance with this embodiment of the invention it may be possible for the catheter **12** to actually cinch down and undesirably crimp the body part **34**. Therefore, for surgical procedures in which there is a significant concern regarding the possibility of crushing the body part to be acted upon, the double lumen-double balloon arrangement described earlier is preferred.

[0030] It also should be noted that, if desired, a separate disc-shaped keeper member (not shown) can be disposed solely about the catheter **12** in a region below the clip **36**, to provide the function of maintaining the catheter **12** in a proper position within the operating site.

[0031] Referring to FIGS. **6-9**, an alternative embodiment of the invention in the form of a support device/retractor is illustrated at **100**. The support device/retractor **100** is directed into the operating site through an insertion device **102**, which can be the same as insertion device **30**. In particular, the insertion device **102** includes an upper cap member **104** and a lower, or distal hollow needle **106**. This insertion device **102**, like the device **30**, is employed to percutaneously puncture a patient's skin, to thereby provide an entry passageway for the support device/retractor **100** of this invention.

[0032] In this later embodiment of the invention, and as is shown in **FIG. 6**, the support device/retractor **100** initially is formed with a shaft **107** having a curved distal end **108** that is sufficiently rigid to maintain its curvature during use, but is sufficiently springy to be manually moved into a substantially linear or straight condition generally aligned with elongate section **110** of the shaft **107** as shown within the hollow needle **106** of the insertion device **102**. (See **FIG. 7**) The shaft **107** of the support device/retractor **100** is made of a material having sufficient elastic memory for its initially formed condition so that the distal end **108** automatically will return to its curved configuration illustrated in **FIG. 6**, after an instrument employed to straighten the distal end **108** has been removed.

[0033] In view of the above construction, the curved distal end **108** of the support device/retractor **100** initially is straightened so that it can be directed through the central passage of the insertion device **102**, and after passage therethrough, the distal end **108** reassumes its curved configuration due to its elastic memory for that orientation. In this embodiment of the invention, the insertion device **102** can be partially retracted, and the clip **36** employed, in the same manner as described above in connection with the support device **10** (e.g., see **FIG. 9**).

[0034] In one use of the support device, the curved distal end **108**, as shown in **FIG. 8**, can be employed as a conventional retractor to push against tissue or organs that are obstructing a surgical site/procedure. For example, during gallbladder surgery, it is common for the caudate lobe of the liver to move into the surgical field; thereby requiring its retraction. The support device/retractor **100** of this invention can be employed for this latter purpose. Obviously, the support device/retractor **100** of this invention can be employed in a number of other surgical environments where other organs or tissue need to be removed from the surgical site.

[0035] In an alternative manner of using the support device/retractor **100**, as shown in **FIG. 9, a** separate, manipulating instrument **120** can be employed to open up the curved distal end **108** while it is in the surgical field, and then direct the open end about the organ or body part **34** to be supported by the support device/retractor **100** in a manner similar to that described earlier in connection with the support device of the first embodiment of the invention. Thereafter, the manipulating instrument **120** is removed from the support device/retractor **100**, thereby permitting the distal end **108** of the support device/retractor **100** to move toward its originally formed, curved configuration due to its elastic memory, to thereby at least partially encircle and support the organ **34** or other tissue to be acted upon and/or removed from the surgical site. **(FIG. 9)**

[0036] It should be understood that the shaft **107** of the support device/retractor **100** can be formed from any suitable material that is compatible with body tissues; that is capable of being formed into a shaped configuration; that has an elastic memory for its initially formed configuration and that is capable of being straightened or otherwise reoriented to a second position for permitting the support device/retractor **100** to be directed into a patient's body through an insertion device **102**, while still retaining the elastic memory of the shaft **107** for its initially formed, unstraightened configuration.

[0037] In particular, the support device/retractor **100** includes a shaft **107** that can be straightened to be received within the insertion device **102**, and the shaft **107** includes an elastic memory for its initially formed, curved configuration. Suitable materials usable to form the shaft **107** of the support device/retractor **100** include plastic materials which can be elastically oriented and set so as to retain memory for its deformed configuration, and also certain metals, such as titanium. Materials having an elastic memory for an initially formed configuration, while being physically movable into a straight or other configuration, are well known to persons skilled in the art; the specific material employed not constituting a limitation on the broadest aspects of this invention.

[0038] As described above, the support device/retractor **100** includes an elongate member or shaft **107** made of a material having elastic memory. While not being limited to a particular theory, the shaft **107** can be one (1) or two (2) millimeter diameter titanium wire or rod; it being understood that the specific dimensions and materials of the shaft **107** do not constitute a limitation on the broadest aspect of this invention. For example, the shaft **107** could also be formed with a coiled wire. What is important is that the shaft **107** have an elastic memory for its formed configuration.

[0039] As is apparent from **FIGS. 6 through 9**, the retractor **100** is an elongate member or shaft **107** preferably in the form of a rod or wire. The shaft **107** is initially formed into a generally "J" configuration, having a U-shaped loop at the curved distal end **108** of the shaft **107** for encircling a body part **34** to be retracted.

[0040] While not being limited to a particular theory, as can best be seen **FIG. 7**, in use the retractor **100** is flexed into an orientation for passage through a central passage of a catheter or insertion device **102**. As shown in **FIG. 8**, after clearing the distal hollow needle **106** located in an internal cavity of a patient, the curved distal end **108** of the retractor **100** assumes its pre-formed, generally U-shaped configuration do to its memory for that preformed configuration. In this configuration, the curved distal end **108** is positioned, or manipulated, to encircle a body part **34** to be retracted, and the retractor **100** then is employed to provide its desired retracting function. This positioning or manipulation can be provided as needed with the manipulating instrument **120**, as best seen in **FIG. 7** and described above.

[0041] In a preferred embodiment of the invention, the material of the retractor **100** is designed so that the holding power of the U-shaped loop at the curved distal end **108**, i.e., the force it can experience without opening up, preferably will be in the range of five to six pounds; however, for many applications the holding power can be substantially less, e.g., on the order of one pound or less.

[0042] After employing the retractor **100** in, for example, a desired laporascopic or thorascopic surgical procedure, the body part **34** retained by the retractor **100** is manipulated out of the curved distal end **108** with or without aid from the manipulation instrument **120** as needed. The retractor **100** is then removed from the body through the insertion device **102**. Obviously, as best seen in **FIG. 7**, as the retractor **100** is pulled through the insertion device **102**, it will be forced into a configuration, e.g. linear, conforming to the configuration of the passage in the insertion device **102** to permit removal of the retractor **100** from the patient's internal body cavity.

[0043] It should be apparent from the aforementioned description and attached drawings that the concept of the present application may be readily applied to a variety of preferred embodiments, including those disclosed herein. Without further elaboration, the foregoing will also fully illustrate the invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. A support device for engaging and temporarily supporting a desired body part of a patient's body in a non-traumatic manner, comprising:

an insertion device arranged to puncture a covering of a body tissue to provide a passageway for access to the desired body part; and

a catheter arranged for extending through the passageway, and engaging and temporarily supporting the desired body part in a non-traumatic manner, said catheter including a shaft made of a material that is sufficiently flexible to bend to a desired straight or curved orientation and is sufficiently rigid to maintain the desired orientation, wherein a distal end of said shaft bends about the desired body part to form a loop and secure the desired body part within the loop.

2. The support device of claim 1, wherein said shaft includes a distal end having a curved configuration that is made of a material having sufficient elastic memory that can be straightened for insertion into the passageway or placement about the desired body part and reassumes its curved configuration due to its elastic memory to at least partially encircle and support the desired body part.

3. The support device of claim 2, wherein said material of the distal end includes titanium.

4. The support device of claim 1, wherein said insertion device comprises an elongated hollow needle having a distal sharp end that punctures and penetrates the covering of the body tissue, said needle defining a substantially cylindrical compartment that provides the passageway for insertion of said catheter through the covering.

5. The support device of claim 4, wherein said insertion device further comprises a cap member located at a remote end of said insertion device opposite said sharp end and having a radius larger than a radius of said needle for stopping penetration of said insertion device when said cap member abuts the outer surface of the covering of the body tissue, said cap member defining a cylindrical compartment therethrough and extending to said cylindrical compartment of said needle for receiving said catheter.

6. The support device of claim 4, further comprising a sleeve defining a substantially cylindrical compartment therethrough for insertion about said distal sharp end of said hollow needle and about a section of said catheter adjacent to said distal sharp end for preventing said insertion device from canting or rotating relative to said catheter.

7. The support device of claim 6, wherein said sleeve engages the outer surface of the covering to maintain said catheter in a desired orientation and position within the patient's body.

8. The support device of claim 1, further comprising a substantially disk-shaped keeper disposed around said catheter that engages the outer surface of the covering to maintain said catheter in a desired orientation and position within the patient's body.

9. The support device of claim 1, wherein the covering is an abdomen wall.

10. The support device of claim 1, wherein said material includes a plastic.

11. The support device of claim 1, wherein said material includes a metal.

12. The support device of claim 11, wherein said metal is titanium.

13. A retractor for manipulating a body part in a cavity of a patient's body, said retractor being an elongate member including a generally curved distal end and being formed with an elastic memory for this latter configuration, said curved distal end being adapted to at least partially encircle a body part to be retracted.

14. A method for engaging and temporarily supporting a desired body part of a patient's body in a non-traumatic manner, comprising:

(a) puncturing a covering of a body tissue with a sharp end of an insertion device to provide a passageway for insertion of a catheter through he covering and into an area of the desired body part;

(b) inserting a shaft of the catheter into the passageway;

(c) engaging the body part in a non-traumatic manner by directing a distal end of the shaft substantially about the desired body part to form a loop; and

(d) securing the desired body part within the loop.

15. The method of claim 14, further comprising moving the body part in a non-traumatic manner from the area.

16. The method of claim 14, wherein the distal end has a curved configuration that is made of a material having sufficient elastic memory to reassume its curved configuration upon the removal of an external bias, and the method further comprises straightening the distal end for insertion into the passageway or for placement about the desired body part to at least partially encircle and support the desired body part.

17. The method of claim 14, further comprising:

retracting the insertion device to a region outside the covering; and

inserting a clip about the sharp end of the insertion device and an adjacent section of the catheter to prevent the insertion device from canting or rotating relative to the catheter.

18. A support system for securing a desired body part of a patient's body in a non-traumatic manner, comprising:

an elongated hollow needle having a distal sharp end that punctures and penetrates a covering of a body tissue,

said needle defining a cylindrical compartment that provides the passageway for access to the desired body part;

a catheter extending through the passageway and engaging the body part in a non-traumatic manner, said catheter including a shaft made of a material that is sufficiently flexible to bend to a desired straight or curved orientation and is sufficiently rigid to maintain the desired orientation; and

a grasping device for directing a distal end of said shaft about the desired body part to form a loop for securing the desired body part.

19. The support system of claim 18, wherein said shaft includes a distal end having a curved configuration that is made of a material having sufficient elastic memory that can be straightened for insertion into the passageway or placement about the desired body part and reassumes its curved configuration due to its elastic memory to at least partially encircle and support the desired body part.

20. The support system of claim 18, wherein said material includes titanium.

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申请号	US10/099653	申请日	2002-03-15
申请(专利权)人(译)	LEVIN JOHN M.		
当前申请(专利权)人(译)	LEVIN JOHN M.		
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外部链接	Espacenet USPTO		

摘要(译)

描述了一种腹腔镜/胸腔镜支撑装置，其在被外科手术器械作用时以非创伤方式接合和支撑身体部分。支撑装置能够将身体部位提升或以其他方式移动到期望的位置以在另一个身体部位上操作或与其隔离。支撑装置包括插入装置，该插入装置刺穿身体组织的覆盖物以提供用于进入期望的身体部位的通道和导管。导管延伸通过通道并以非创伤的方式接合并临时支撑所需的身体部位。导管（或操纵装置）包括具有弯曲构造的远端的轴，该弯曲构造由具有足够弹性记忆的材料制成，该弹性记忆能够被拉直以插入通道或围绕期望的身体部位放置，并且恢复其弯曲配置由于其弹性记忆至少部分地环绕并支撑所需的身体部位。