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(54) **SURGICAL INSTRUMENT**

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(57) **ABSTRACT**

The present invention provides a surgical instrument allowing a surgeon to identify a location of a blood vessel in tissue by hearing a blood flow sound in a thoracoscopic or laparoscopic surgery. One end of a tubular member is introduced into a body of a patient and is allowed to contact the tissue in such a manner as to block a first opening of the tubular member. Accordingly, a sound within the tissue and a sound of the tissue being in contact with the one end of the tubular member are collected by a cone member which is disposed to the first opening of the tubular member and includes a microphone disposed to the tip portion thereof. Accordingly, the surgeon can use the sense of hearing to hear the collected sound instead of the sense of touch in the thoracoscopic or laparoscopic surgery. That is, in a case where the location of the blood vessel within the tissue is to be identified, the one end of the tubular member is allowed to contact the tissue. Accordingly, the blood flow sound of the blood vessel within the tissue can be collected where the blood vessel is present in the vicinity of the contact portion. The surgeon can auscultate the collected blood flow sound, thereby identifying the location of the blood vessel. That is, even in a case where fat is embedded in the blood vessel, the location of the blood vessel can be precisely identified.

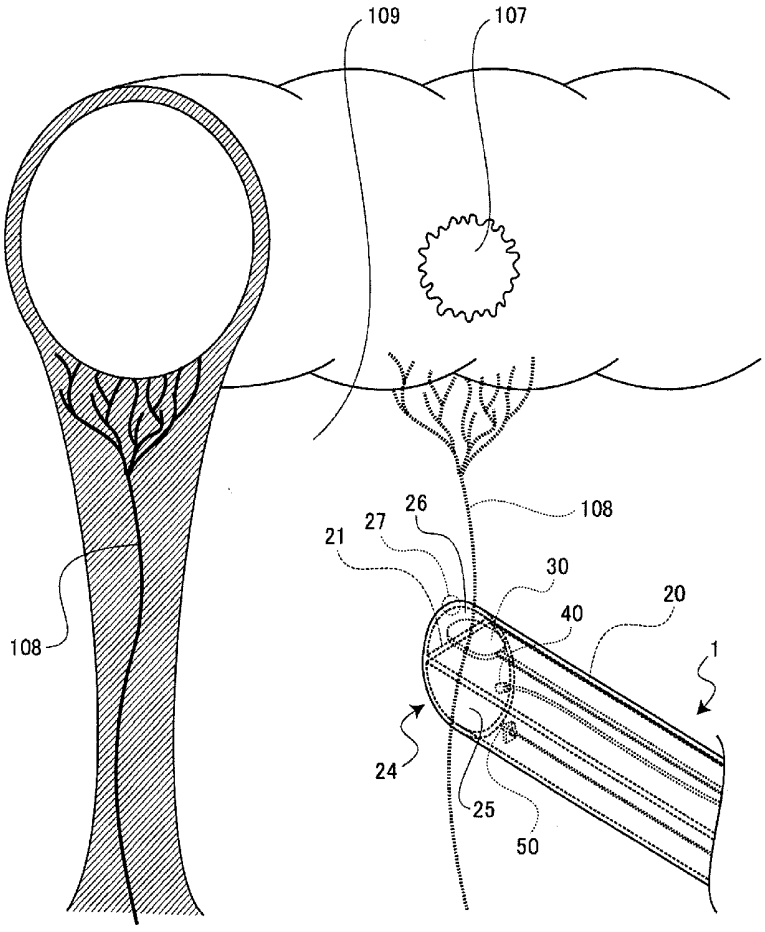
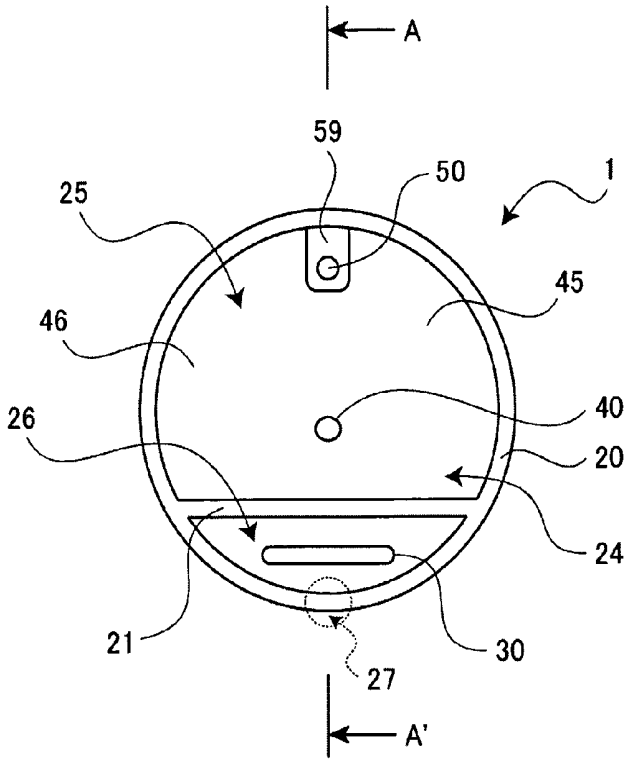


FIG. 1


A
59
50
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46
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A'

FIG. 2

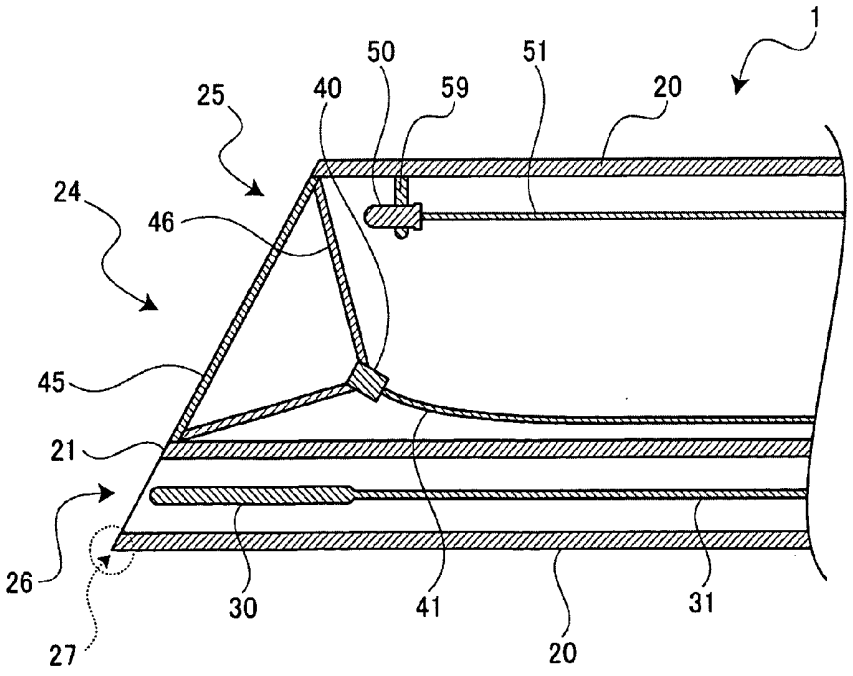
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FIG. 3

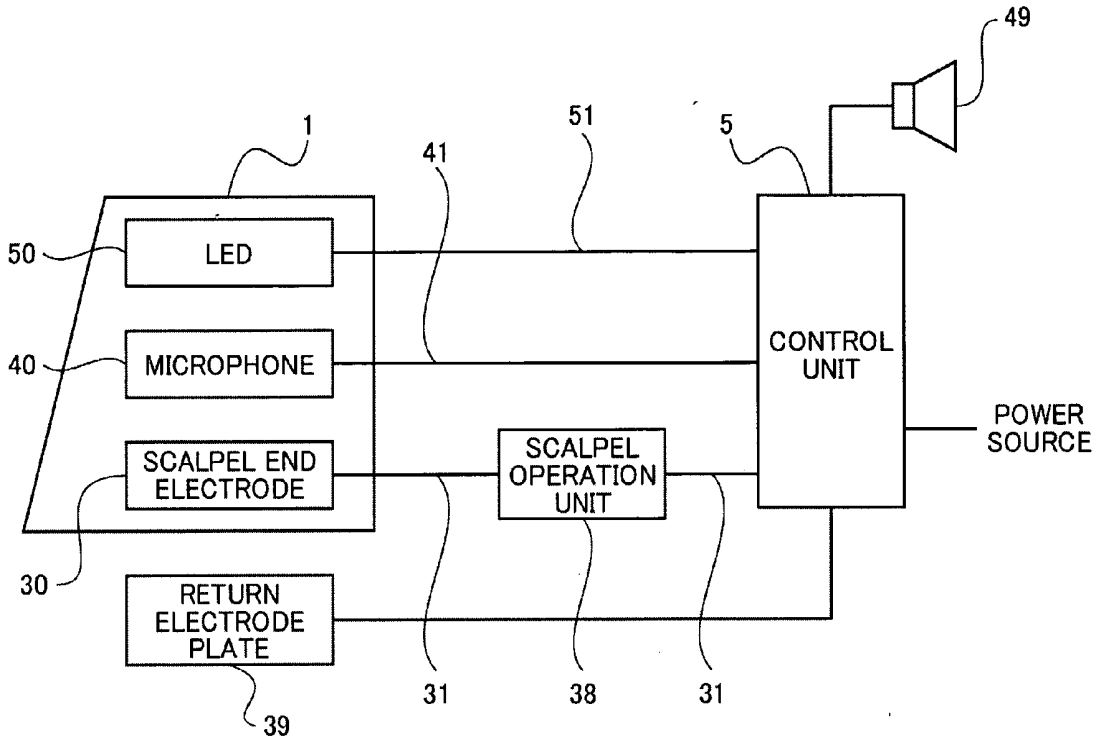

49
1
41
51
5
50
LED
40
MICROPHONE
CONTROL UNIT
POWER SOURCE
SCALPEL END ELECTRODE
SCALPEL OPERATION UNIT
30
RETURN ELECTRODE PLATE
31
38
31
39

FIG. 4

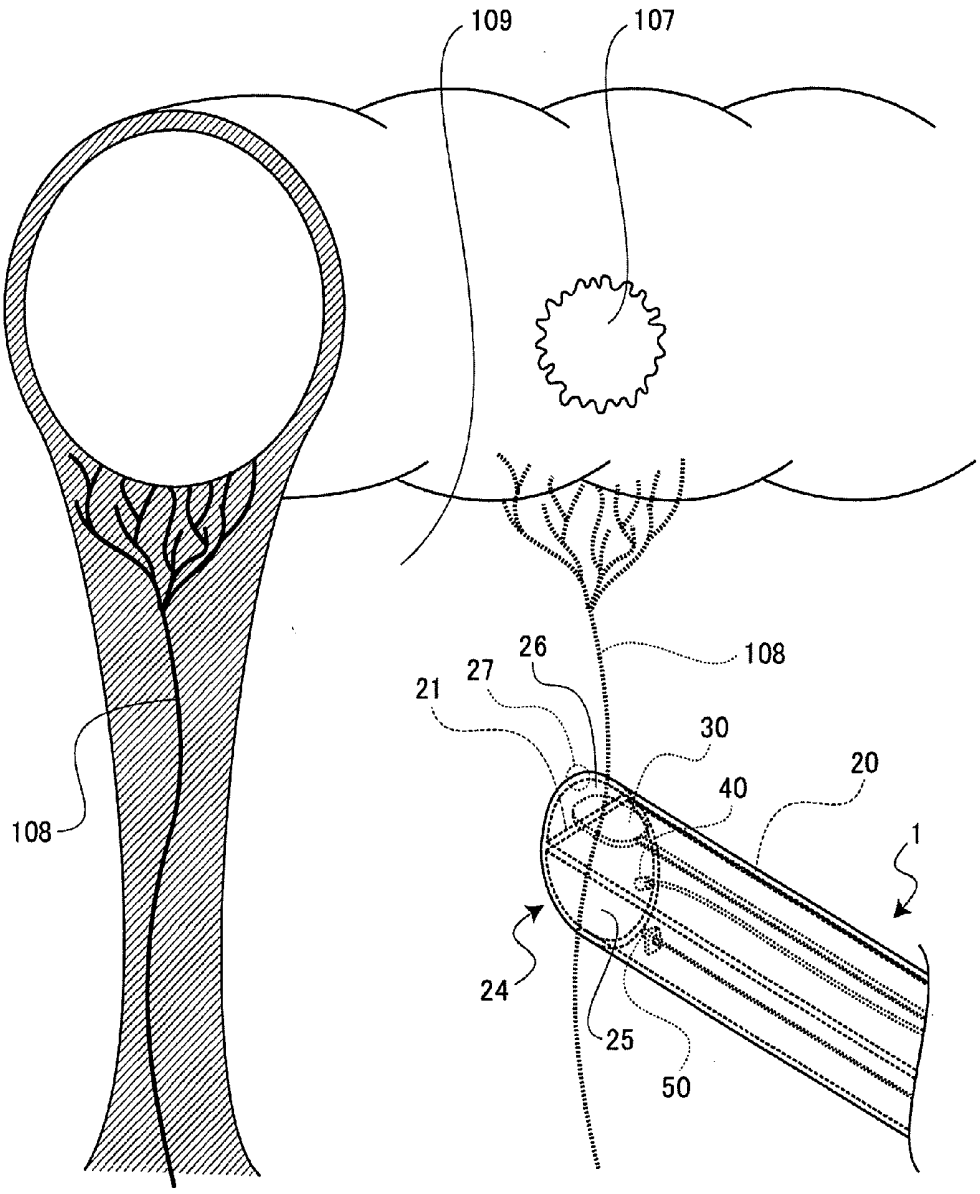
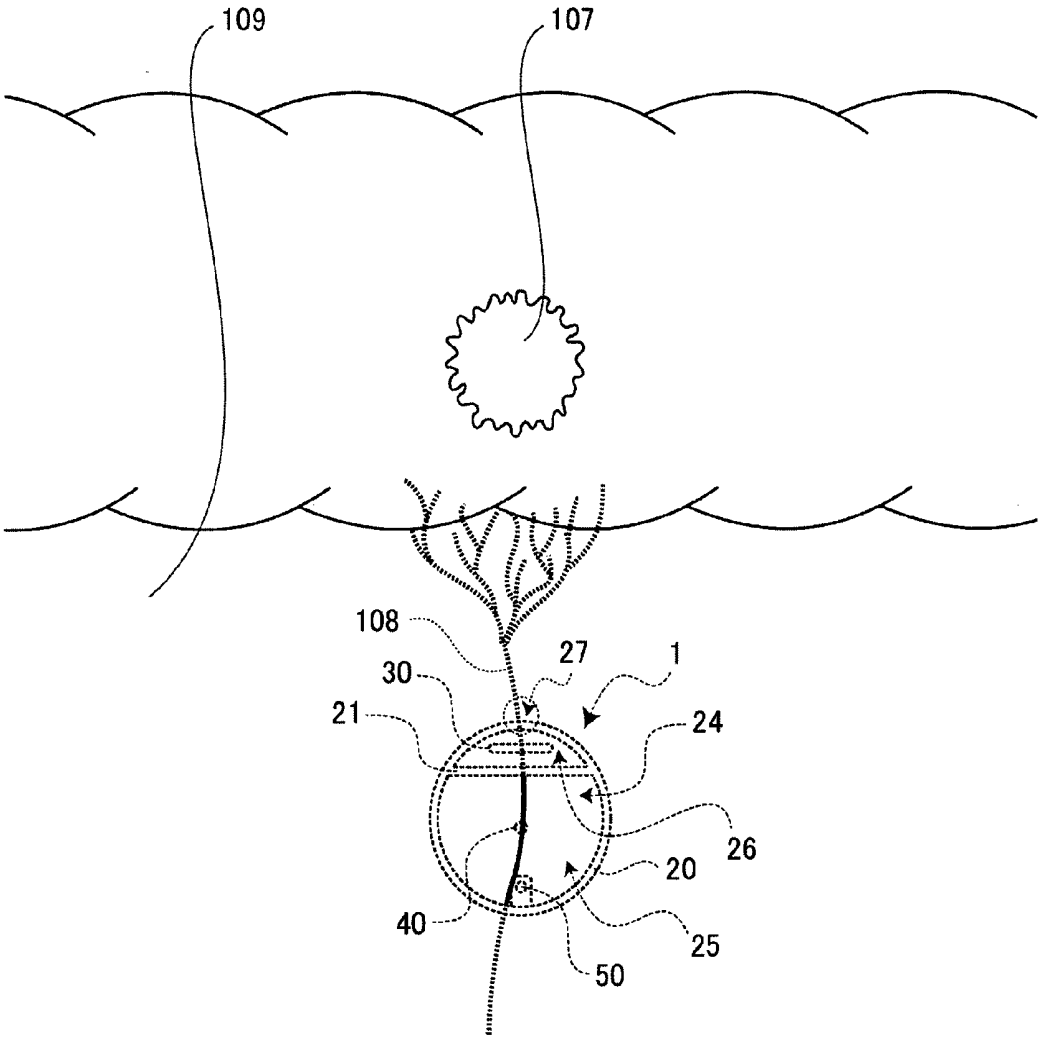


FIG. 5



SURGICAL INSTRUMENT

BACKGROUND

[0001] 1. Field of the Invention

[0002] The present invention relates to a surgical instrument to be introduced into a body of a patient during a thoracoscopic surgical procedure or a laparoscopic surgical procedure.

[0003] 2. Description of Related Art

[0004] Conventionally, when an open abdominal surgery is performed, a surgeon palpates with his/her finger(s) to identify a location of a blood vessel within tissue inside of a body of a patient. The surgeon, however, needs to have a lot of experiences to become capable of identifying a precise location of the blood vessel. Another method for identifying the location of the blood vessel is irradiation of light of a lighting device from a backside of the tissue, that is, the light is irradiated in a direction towards the surgeon while the tissue is being provided between the light and the surgeon, so that the blood vessel within the tissue is illuminated.

[0005] Aside from the open abdominal surgery, a thoracoscopic surgery or a laparoscopic surgery, being not in need of opening the abdomen, has tended to be performed. The surgeon performs the thoracoscopic surgery or the laparoscopic surgery by creating a hole (port) to introduce a medical instrument into the abdomen or thorax and the like of the patient while watching an image provided from a camera. Accordingly, an illuminating device (e.g., Patent Document 1) or an electric scalpel to be used for the thoracoscopic surgery or the laparoscopic surgery has been developed. The illumination device includes a light emitting tube formed in a tubular shape, and is provided in the port to illuminate the inside of the body.

[0006] Patent Document 1: Japanese Unexamined Patent Application Publication No. 2006-166969

[0007] However, there is an increasing necessity of identifying the location of the blood vessel within the tissue inside of the body as the thoracoscopic or laparoscopic surgery is advanced. In the open abdominal surgery, the surgeon is allowed to easily move an organ inside the body of the patient, so that the light of the lighting device or the like is easily irradiated from the backside of the tissue. In the thoracoscopic surgery or the laparoscopic surgery, on the other hand, the surgeon is not allowed to move the organ easily, causing no space to illuminate the blood vessel within the tissue by introduction of the lighting device and the like into the body from the port. Since Patent Document 1 discloses the illuminating device to be provided in the port, the illumination device cannot be introduced into the body. Even in a case where the illuminating device as disclosed in Patent Document 1 is decreased in size, and the tissue is placed between the camera and the illuminating device, the precise location of the blood vessel embedded in the fat is difficult to be identified.

[0008] During the open abdominal surgery in general, the surgeon can identify a state of the inside of the patient's body, for example, the location of a pathological change or the blood vessel, with the sense of sight or touch. During the thoracoscopic surgery or the laparoscopic surgery, on the other hand, the surgeon can identify a state of the inside of the patient's body with only the sense of sight using the image provided from the camera so as to perform an incision and the like.

[0009] Accordingly, an inventor of the present invention has focused attention on the sense of hearing as an alternative method to the sense of touch used during the open abdominal surgery, and has found that a location of the blood vessel can be identified by a sound of the blood flowing in the blood vessel. That is, the present invention is proposed in consideration of the aforementioned situations, and provides a surgical instrument allowing a surgeon to identify a location of the blood vessel within the tissue inside the body of the patient by hearing the blood flow sound in the thoracoscopic surgery or the laparoscopic surgery.

BRIEF SUMMARY OF THE INVENTION

[0010] According to an aspect of the present invention, a surgical instrument is introduced into a body of a patient in a thoracoscopic or laparoscopic surgery, and the surgical instrument includes: a tubular member, being hollow inside, including an opening at one end thereof; a partition member separating the opening of the tubular member into a first opening and a second opening; a cone member, disposed to the first member, formed in a taper shape towards inside of the tubular member from the first opening; a microphone disposed to a tip portion of the cone member; and a scalpel end electrode, disposed protrudably from the second opening, serving for an electric scalpel allowing coagulation and incision with electric energy.

[0011] The tubular member has the one end to be intruded into the body of the patient, and allows the one end to be in contact with the tissue in such a manner as to block the first opening of the tubular member, so that a sound within the tissue and a sound of the tissue being in contact with the one end of the tubular member are collected by the cone member which is disposed to the first opening of the tubular member and includes the microphone disposed to the tip portion thereof. Accordingly, a surgeon can use the sense of hearing to hear the collected sound instead of the sense of touch in the thoracoscopic or laparoscopic surgery.

[0012] That is, in a case where a location of the blood vessel within the tissue of the body of the patient is to be identified, the one end of the tubular member is allowed to contact the tissue. Accordingly, the blood flow sound of the blood vessel within the tissue can be collected where the blood vessel is present in the vicinity of the contact portion. The surgeon can auscultate the collected blood flow sound, thereby identifying the location of the blood vessel. Therefore, even in a case where the blood vessel is embedded in the fat, the location of the blood vessel can be precisely identified.

[0013] Moreover, since the scalpel end electrode of the electro scalpel allowing the coagulation and incision by the surgeon using the electric energy is disposed protrudably from the second opening, the surgeon can perform treatment immediately after identifying the location of the blood vessel using the auscultation.

[0014] The core member has a translucent property. The tubular member includes thereinside a light emitting unit disposed on a side opposite to the first opening through the core member. That is, the first opening of the tubular member becomes luminous by the light emitted from the light emitting unit. That is, the luminous first opening disposed to the one end of the tubular member is allowed to contact the tissue, so that the blood vessel is illuminated on the opposite side to a side being in contact with the one end of the tubular member through the tissue.

[0015] Therefore, the location of the blood vessel being not embedded in fat can be identified not only by the sense of sight but also by the sense of hearing, thereby being identified more precisely. The cone member is preferably transparent, so that the tissue can be illuminated by the light emitted from the light emitting unit without blocking the light by the cone member. Therefore, the location of the blood vessel is identified more precisely.

[0016] A membrane member having a translucent property is disposed to the first opening. The membrane member can allow the blood flow sound to be clearly heard by the surgeon. The membrane member is preferably transparent, so that the tissue can be illuminated by the light emitted from the light emitting unit without blocking the light by the membrane member. Therefore, the location of the blood vessel is identified more precisely.

[0017] Moreover, the tubular member has an oblique shaped surface including the opening. The partition member is preferably disposed to the opening of the tubular member in such a manner that the second opening is placed to a tip portion of the one end of the tubular member. Accordingly, the introduction of the tubular member into the body of the patient can be facilitated, and an area of the opening can be increased even in a case where an inner diameter of the tubular member cannot be increased. The increase in the area of the opening can allow an increase in the area of the first opening having the cone member. Accordingly, the first opening can be allowed to contact a broader area of the tissue, and the sound in the broader area can be collected.

[0018] Therefore, the location of the blood vessel in the broader area can be identified. Moreover, since the partition member is disposed to the opening of the tubular member in such a manner that the second opening is placed to the tip portion of the tubular member, the electric scalpel can be used in a state that the first opening is being in contact with the tissue and in a state that the first opening is being separated from the tissue, thereby enhancing convenience thereof.

[0019] Therefore, the surgical instrument of the present invention allows the surgeon to use the sense of hearing instead of the sense of touch in the thoracoscopic or laparoscopic surgery. In a case where the location of the blood vessel within the tissue of the body of the patient is to be identified, the one end of the tubular member is allowed to contact the tissue. Accordingly, the blood flow sound of the blood vessel within the tissue can be collected where the blood vessel is present in the vicinity of the contact portion. The surgeon can auscultate the collected blood flow sound, thereby identifying the location of the blood vessel. Therefore, even in a case where fat is embedded in the blood vessel, the location of the blood vessel can be precisely identified.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. **1** is a schematic diagram illustrating an example of a surgical instrument according to the present invention;

[0021] FIG. **2** is a cross-sectional view illustrating of the surgical instrument taken along the line A-A' of FIG. **1**;

[0022] FIG. **3** is a schematic block diagram illustrating the surgical instrument of the present invention;

[0023] FIG. **4** is a schematic diagram illustrating a state in which a location of blood vessel is confirmed using the surgical instrument of the present invention; and

[0024] FIG. **5** is another schematic diagram illustrating a state in which a location of blood vessel is confirmed using the surgical instrument of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0025] A surgical instrument according to preferred embodiments of the present invention is now described in detail below with reference to drawings. The present invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. The embodiments, therefore, may be modified or varied without departing from the scope of the present invention.

[0026] Referring to FIGS. **1** and **2**, a surgical instrument **1** of the present invention is illustrated. The surgical instrument **1** includes a tubular member **20** formed in a cylindrical shape. The tubular member **20** serves as a flexible member being hollow inside, and includes an opening **24** disposed on at least one end thereof. The tubular member **20** includes the one end having a prescribed angle, for example, 45 degrees, with respect to a longitudinal direction thereof, thereby forming a surface having the opening **24**. That is, the tubular member **20** includes the oblique shaped surface having the opening **24**. Since the surface having the opening **24** is formed in the oblique shape, the tubular member **20** can be not only introduced into a body of a patient, but also inserted into a small space between the tissues.

[0027] The tubular member **20** has a length that is not particularly limited. However, the tubular member **20** can be any length as long as another end thereof can stay outside of the patient's body in a case of introduction into the body in the thoracoscopic surgery or the laparoscopic surgery. The tubular member **20** has an outer diameter that is not particularly limited. However, since the tubular member **20** is introduced into the body from a port having a diameter of between approximately 1 centimeter (cm) and 2 cm provided on an abdomen or the like of the body, the outer diameter thereof is preferably approximately 10 millimeters (mm). The tubular member **20** has an inner diameter determined depending on a size of the outer diameter thereof. However, the inner diameter of tubular member **20** is preferably approximately 8 mm.

[0028] The tubular member **20** can be made of any material that is not particularly limited as long as the material has flexibility. The tubular member **20** is preferably made of a material having a light shielding property. The tubular member **20** includes the one end capable of being bent or curved by an operation unit (not shown) disposed to the side of the another end thereof.

[0029] The tubular member **20** has the opening **24** including a partition member **21** formed in such a manner that a first opening **25** and a second opening **26** are formed. The partition member **21** is disposed in a position in such a manner that the inner diameter of the tubular member **20** is divided by a ratio ranged between 3:1 and 5:1. A straight line passing through a center of a circumferential cross-section of the tubular member **20** is perpendicular with respect to the partition member **21**, and the tubular member **20** has a tip portion **27** placed on one end side of the straight line.

[0030] The partition member **21** can be short in length to divide only the opening **24**. However, the partition member **21** can have a length that is preferably between approximately onefold and twofold with respect to a scalpel end electrode **30** (described later). Accordingly, the partition member **21** hav-

ing the preferred length can reduce occurrences of making contact between the scalpel end electrode **30** and a microphone **40** (described later) or a light emitting diode (LED) **50** (described later) in a case where the scalpel end electrode **30** is moved in and out from the second opening **26**. Moreover, in a case where the scalpel end electrode **30** is protruded from the second opening **26**, the partition member **21** having the preferred length can guide the scalpel end electrode **30** along the tubular member **20** even in a curved state.

[0031] The first opening **24** includes a diaphragm **45**, serving as a membrane member, to cover the first opening **24**. The diaphragm **45** is made of a material such as resin having a translucent property allowing the light emitted from the LED **50** to be transmitted. For example, the diaphragm **45** can be made of resin such as glass epoxy resin, so that the LED **50** can emit the light to illuminate the tissue without light attenuation. The diaphragm **45** has a thickness that is not particularly limited. However, the diaphragm **45** can have a thickness to pick up a blood flow sound using the microphone **40**.

[0032] The first opening **24** includes a cone member **46** formed in a tapered shape in such a manner that a tip portion of the cone member **46** is disposed inside the tubular member **20**. That is, the cone member **46** is tapered from the first opening **25** towards inside the tubular member **20**.

[0033] The cone member **46** is made of a material such as resin having a translucent property allowing the light emitted from the LED **50** to be transmitted, and a degree of hardness not only allowing the tapered shape thereof to be maintained but also allowing the microphone **40** to be secured inside the tubular member **20**. For example, the cone member **46** can be made of transparent resin such as glass epoxy resin or acrylic resin, so that the LED **50** can emit the light to illuminate the tissue without light attenuation. The cone member **46** has a thickness that is not particularly limited, and the thickness thereof can be changed as necessary.

[0034] The microphone **40** is disposed to the tip portion of the cone member **46**. The microphone **40** is disposed in such a manner as to be positioned in a space between the diaphragm **45** and the cone member **46** capable of collecting the sound. The microphone **40** includes a connection line **41** transmitting an electric signal converted from the collected sound. The connection line **41** is connected to a control unit **5** (described later) provided outside of the patient's body through inside the tubular member **20**.

[0035] The LED **50**, serving as a light emitting unit, is disposed opposed to the first opening **25** through the cone member **46**. That is, the LED **50** is disposed to an inner side relative to the cone member **46** in the tubular member **20**. The LED **50** is applied with a prescribed voltage, thereby emitting the light. The LED **50** is secured by a securing member **59** disposed inside the tubular member **20**. The LED **50** includes a connection line **51** allowing the prescribed voltage to be applied to the LED **50**, and the connection line **51** is connected to the control unit **5** through inside the tubular member **20**.

[0036] The LED **50** has a size that is not particularly limited as long as the LED **50** can be disposed inside the tubular member **20**. However, the size of the LED **50** can be arranged, for example, between approximately one-quarter and one-tenth of the inner diameter of the tubular member **20**, so that the LED **50** can be disposed without contacting another member. According to the embodiment of the present invention, the LED **50** is used as an example, although the present invention is not limited thereto. For example, any substance, such as an electro-luminescent element and a light bulb, capable of emitting the light may be used as long as the size thereof is substantially similar to that of the LED **50**.

[0037] The scalpel end electrode **30** of an electric scalpel is disposed inside the tubular member **20**. The electric scalpel allows the coagulation and incision by the surgeon using the electric energy. The scalpel end electrode **30** is provided with a return electrode plate **39** (described later) provided outside or inside of the body in a location different from the location of the scalpel end electrode **30**, so that the incision or the coagulation of the tissue is performed by the surgeon using the heat generated by the flow of high frequency electric current. The scalpel end electrode **30** is provided in such a manner as to be movable in and out from the second opening **26** through a scalpel operation unit **38** (described later) provided outside of the body in the vicinity of the another end of the tubular member **20**. The scalpel end electrode **30** can be formed in a flat shape conforming to a shape of the second opening **26**, although a shape of the scalpel end electrode **30** is not particularly limited.

[0038] The scalpel end electrode **30** includes an operation line **31**, transmitting the operation from the scalpel operation unit **38**, disposed thereto. The operation line **31** passes through inside the tubular member **20**, and is connected to the control unit **5** through the scalpel operation unit **38**. The operation line **31** can allow the high frequency electric current to be applied to the scalpel end electrode **30** through the control unit **5**.

[0039] Referring to FIG. **3**, the surgical instrument **1** according to the present invention is illustrated in a schematic block diagram. The surgical instrument **1** according to the present invention includes the return electrode plate **39**, the scalpel operation unit **38**, the control unit **5**, and a speaker **49** in addition to the components described above.

[0040] The return electrode plate **39** is provided outside of the body or in the location different from the location of the tissue to be in contact with the scalpel end electrode **30** for the incision or coagulation of the tissue to be in contact with the scalpel end electrode **30**. The return electrode plate **39** is connected to the control unit **5** and is connected with the scalpel end electrode **30** through the control unit **5**, thereby forming the electric scalpel.

[0041] The scalpel operation unit **38** serves to operate the scalpel end electrode **30**. The scalpel operation unit **38** is moved in and out from the another end of the tubular member **20**, so that the scalpel end electrode **30** can be physically moved in and out from the second opening **26** through the operation line **31**. However, the scalpel end electrode **30** may be moved in and out from the another end of the tubular member **20** based on the electric control. The scalpel operation unit **38** includes a switch (not shown), so that whether or not to apply the high frequency electric current to scalpel end electrode **30** is controlled using the switch. The scalpel operation unit **38** is connected to the control unit **5**.

[0042] The speaker **49** receives the electric signal converted by the microphone **40**, and converts the electric signal into the sound again, thereby outputting the sound collected by the microphone **40**. The speaker **49** is connected to the control unit **5**.

[0043] The control unit **5** is connected to a power source, and can control the light emission of the LED **50**, the sound collection using the microphone **40**, the sound output from the speaker **49**, and the application of the high frequency electric current to be applied to the scalpel end electrode **30**.

[0044] A description is now given of an example method for identifying the location of the blood vessel between the mesenteries from the aorta to the intestines using the surgical instrument **1**, for example, during the laparoscopic surgical procedure.

[0045] The blood vessel within the mesentery is sandwiched by the mesenteries with fat therebetween, causing difficulty of precisely identifying the location of the blood vessel by observation using a laparoscope only. Particularly, the location of the blood vessel embedded in the fat is difficult to be identified. For example, in a case where a portion of the mesentery is incised and excised by the laparoscopic surgery, such as a case where a cancer detected in the intestine and the like and a lymph gland in the mesentery in the vicinity of the cancer are excised by the laparoscopic surgery, the precise location identification of the blood vessel within the mesenteries is extremely important. Accordingly, the present invention provides the surgical instrument **1** allowing the surgeon to precisely identify, for example, the location of the blood vessel within the mesenteries during the laparoscopic surgical procedure.

[0046] For the location identification of the blood vessel in the mesenteries, a port is first provided by piercing the abdomen of the patient to introduce the surgical instrument **1** of the present invention into the body of the patient. The surgical instrument **1** of the present invention is introduced into the body in such a manner as to inert the side having the opening **24** into the body through the port. Herein, the surgical instrument **1** is introduced into the body in such a manner that the operation unit (not shown) disposed to the another end thereof is remained outside of the body. A laparoscope (not shown) allowing the inside of the body to be displayed is introduced into the body through another port (not shown) pierced.

[0047] The surgical instrument **1** introduced into the body is operated using the operation unit remained outside of the body, so that the diaphragm **45** included in the first opening **25** is allowed to contact a mesentery **109** as illustrated in FIG. **4**. Herein, where a blood vessel **108** is present in the vicinity of the diaphragm **45** being in contact with the mesentery **109**, the microphone **40** disposed to the cone member **46** collects the sound of the blood flowing in the blood vessel **108** through the diaphragm **45**. The collected blood flow sound is transmitted through the connection line **41** to the speaker **49** controlled by the control unit **5** disposed outside of the body, and is output from the speaker **49**.

[0048] Since the blood flow sound is not blocked by the fat, the speaker **49** can output the blood flow sound even in a case where the blood vessel is embedded in the fat. Herein, the diaphragm **45** can block an unnecessary noise, so that the sound of the blood flow is clearly output from the speaker **49**.

[0049] Where the blood vessel **108** is not present in the vicinity of the diaphragm **45** being in contact with the mesentery **109**, the blood flow sound is not heard. That is, the presence or absence of the blood vessel **108** in the portion being in contact with the diaphragm **45** can be determined by whether or not the blood flow sound is heard, and the location of the blood vessel **108** can be identified by the sense of sight using the laparoscope.

[0050] The surgical instrument **1** includes the scalpel end electrode **30**. The scalpel end electrode **30** is operated by the scalpel operation unit **38** and controlled by the control unit **5**, so that desired tissue can be incised or coagulated. For example, in a case where a pathological change **107** in need of excision is present in the intestine as illustrated in FIG. **4**, the high frequency electric current is applied with respect to the scalpel end electrode **30** in a state that the return electrode plate **39** is attached outside of the body.

[0051] Accordingly, the surgeon can incise the vicinity of the pathological change **107** using the scalpel end electrode **30** with the heat generated, thereby excising the pathological change **107**. The excised pathological change **107** can be collected using forceps included in the laparoscope, and the excised portion can be coagulated with the scalpel end electrode **30** operated and controlled respectively by the operation unit **38** and the control unit **5**.

[0052] Herein, since the location of the blood vessel traveling within the mesentery **109** and the intestine needs to be identified, the above described method can be applied to identify the location of the blood vessel. That is, the surgical instrument **1** according to the present invention can allow the surgeon to excise the pathological change **107** immediately after identifying the location of the blood vessel.

[0053] In a case where a scalpel end electrode is not included, an instrument having the scalpel end electrode needs to be newly introduced into a body of a patient, causing an increase in burdens on the patient due to a new port piercing and prolongation of the surgical procedure. Moreover, a tubular member having no scalpel end electrode needs to be spaced apart from the mesenteries, causing an increase in difficulty of identifying the location of the blood vessel **108**. The surgical instrument **1** according to the present invention, on the other hand, can allow the surgeon to excise the pathological change **107** immediately after identifying the location of the blood vessel **108**, thereby reducing risks of damaging the blood vessel **108**.

[0054] The scalpel end electrode **30** allowing the incision and excision by the surgeon is disposed inside the tubular member **20**, and is protruded from the second opening **26** along the tubular member **20**. Accordingly, the surgeon can perform treatment on a portion covered with the opening **24** of the tubular member **20**, and the operability can be enhanced compared to a case where a scalpel end electrode is operated separately from a tubular member. Moreover, a space can be used efficiently in the thorocoscopic or laparoscopic surgery performed with the limited space unlike the open abdominal surgery, thereby reducing the burdens on the patient.

[0055] The surgical instrument **1** according to the present invention includes the LED **50**. The LED **50** emits the light by application of prescribed voltage based on the control by the control unit **5**. The light emitted from the LED **50** is used to illuminate the mesentery **109**, so that the blood vessel within the mesentery **109** can be shown through and confirmed. In such a case, the tubular member **20** is allowed in such a manner that the laparoscope is moved to a backside of a place in which the location of the blood vessel of the mesentery **109** needs to be identified as illustrated in FIG. **5** so as to contact the first opening **25** of the tubular member **20** with the mesentery **109**. Where the blood vessel **108** is present in the place in which the first opening **25** of the tubular member **20** is being in contact with the mesentery **109**, the blood vessel **108** is shown through, and the location thereof can be identified by the laparoscope.

[0056] The surgical instrument **1** according to the present invention, therefore, allows the first opening **25** to be in contact with the mesentery **109**, so that the diaphragm **45** is allowed to contact the mesentery **109**. That is, the location of the blood vessel **108** can be confirmed not only by the sense of sight through the laparoscope, but also by the sense of

hearing using the blood flow sound output through the speaker **49**. Accordingly, in a hypothetical case where the blood vessel **108** is not confirmed by an image displayed using the laparoscope, the presence of the blood vessel **108** can be confirmed by the blood flow sound output from the speaker **49**. Therefore, the location of the blood vessel **108** can be identified more precisely.

What is claimed is:

1. A surgical instrument to be introduced into a body of a patient in a thoracoscopic or laparoscopic surgery, the surgical instrument comprising:

a tubular member, being hollow inside, including an opening at one end thereof;

a partition member separating the opening of the tubular member into a first opening and a second opening;

a cone member, disposed to the first member, formed in a taper shape towards inside of the tubular member from the first opening;

a microphone disposed to a tip portion of the cone member; and

a scalpel end electrode, disposed protrudably from the second opening, serving for an electric scalpel allowing coagulation and incision with electric energy.

2. The surgical instrument according to claim **1**, wherein the cone member has a translucent property, and

wherein the tubular member includes thereinside a light emitting unit disposed on an opposite side to the first opening through the core member.

3. The surgical instrument according to claim **2**, comprising a transparent membrane member blocking the first opening.

4. The surgical instrument according to claim **1**, wherein the tubular member has an oblique shaped surface including the opening; and

wherein the partition member is disposed to the opening of the tubular member in such a manner that the second opening is placed to a tip portion of the one end of the tubular member.

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专利名称(译)	手术器械		
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摘要(译)

本发明提供一种手术器械，其允许外科医生通过在胸腔镜或腹腔镜手术中听到血流声音来识别组织中血管的位置。将管状构件的一端引入患者体内，并允许其以阻塞管状构件的第一开口的方式接触组织。因此，组织内的声音和与管状构件的一端接触的组织的声音由锥形构件收集，该锥形构件设置在管状构件的第一开口上并包括设置在尖端部分的麦克风它们。因此，外科医生可以使用听觉来听取收集的声音而不是胸腔镜或腹腔镜手术中的触觉。也就是说，在要识别组织内的血管位置的情况下，允许管状构件的一端接触组织。因此，可以在血管存在于接触部分附近的地方收集组织内血管的血流声音。外科医生可以听到收集的血流声音，从而识别血管的位置。即，即使在脂肪嵌入血管的情况下，也可以精确地识别血管的位置。