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(54) SURGICAL INSTRUMENT

(75) Inventors: **Matthew Richard Hall**, Reading (GB); **Mark George Marshall**, Berkshire (GB); **Colin Charles Owen Goble**, Oxfordshire (GB); **Francis Amoah**, Cardiff (GB); **Kelvin John Varney**, Monmouthsire (GB); **Julian Mark Ebbutt**, Cardiff (GB)

Correspondence Address:
NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203 (US)

(73) Assignee: **Gyrus Medical Limited**, Cardiff (GB)

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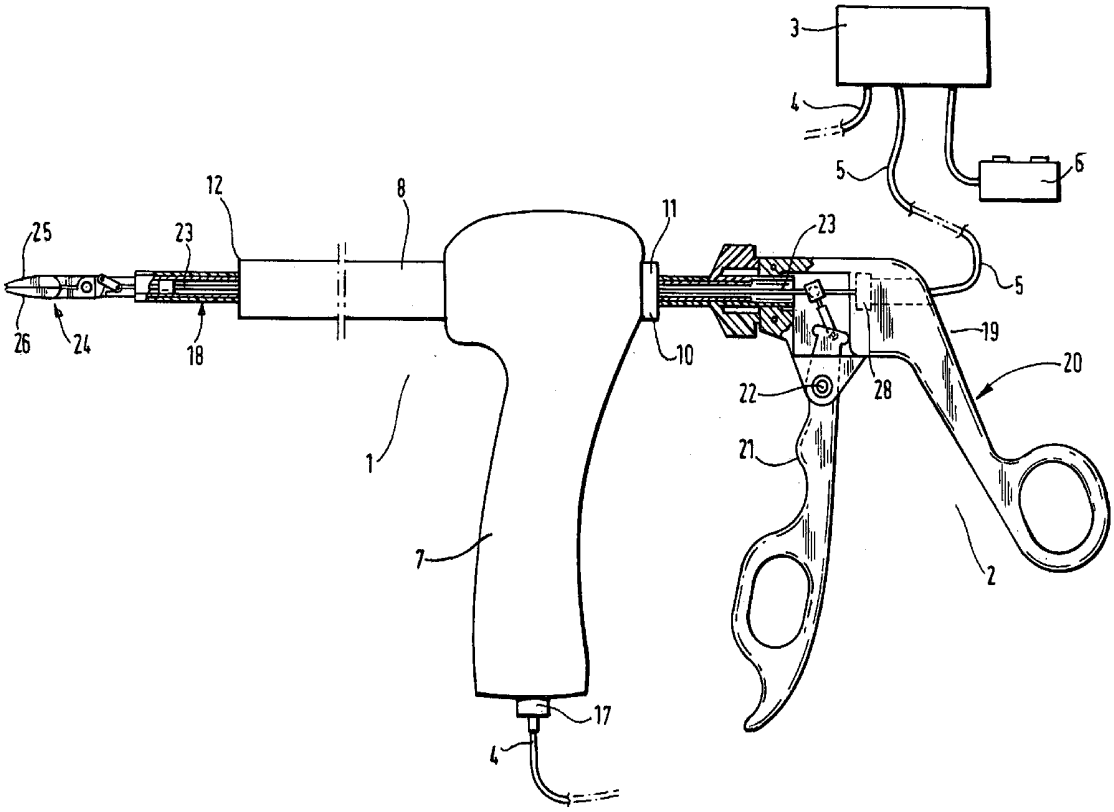
(57) ABSTRACT

A device for morcellating tissue within a body cavity of a patient comprises a stationary tube having a distal end portion, and a bipolar electrosurgical electrode assembly located at the distal end of the tube. The electrosurgical electrode assembly comprises first and second electrodes separated by an insulation member, the bipolar electrosurgical electrode assembly extending around the circumference of the distal edge of the tube. When an electrosurgical cutting voltage is applied to the electrode assembly, and relative movement is initiated between the tube and the tissue, a core of severed tissue is formed within the tube such that it can be removed from the body cavity of the patient. A tissue-pulling device such as a jaw assembly can be employed to pull tissue against the distal end of the tube.



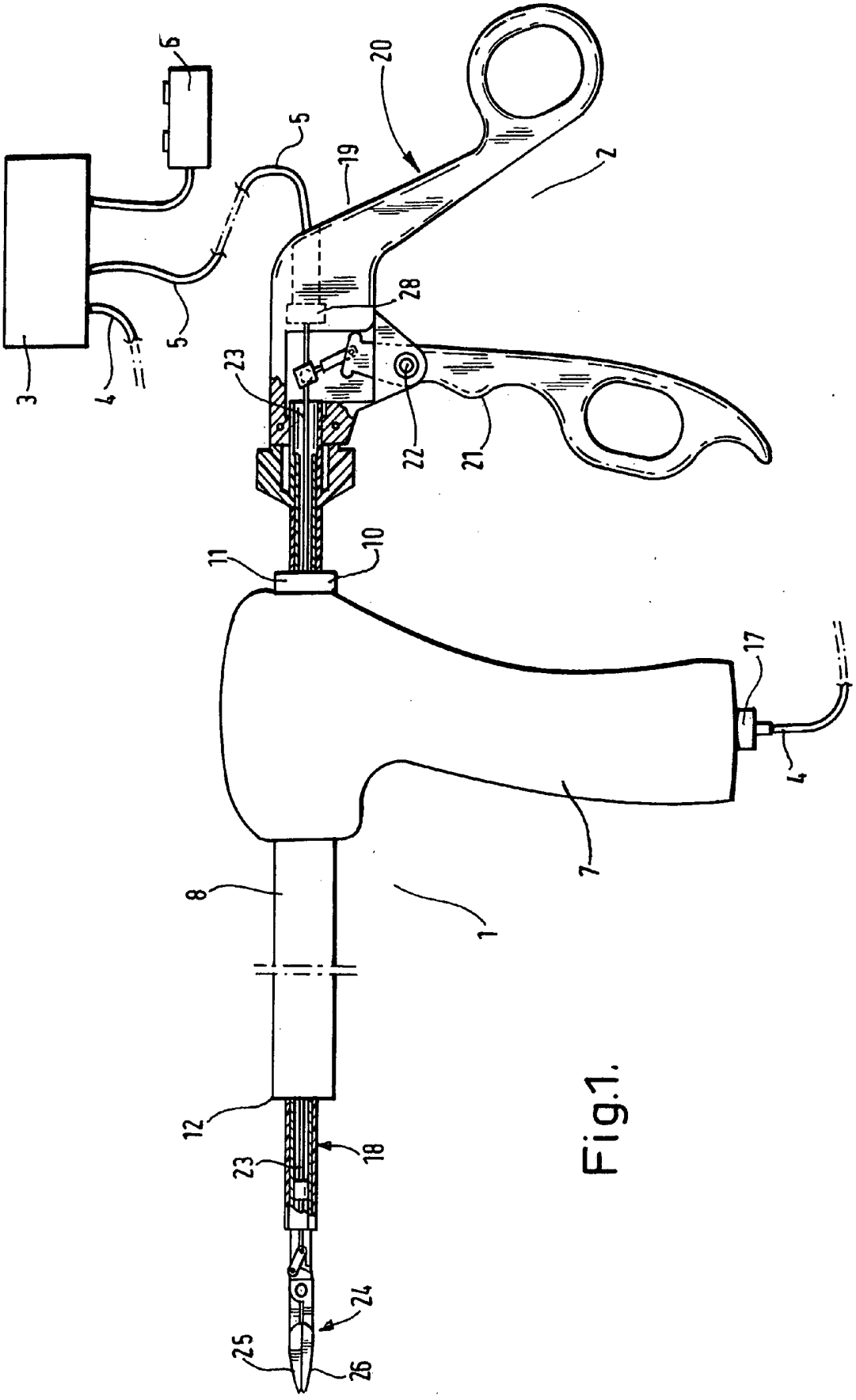


Fig.1.

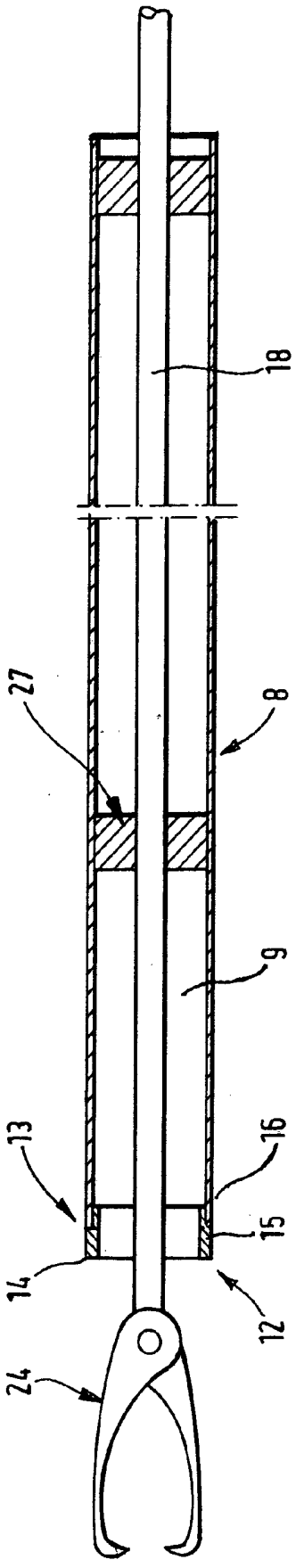


Fig.2.

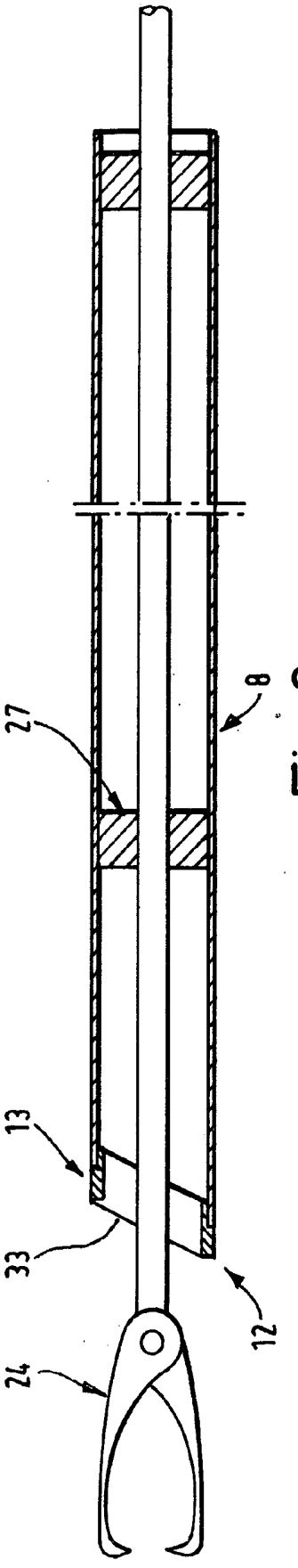


Fig.3.

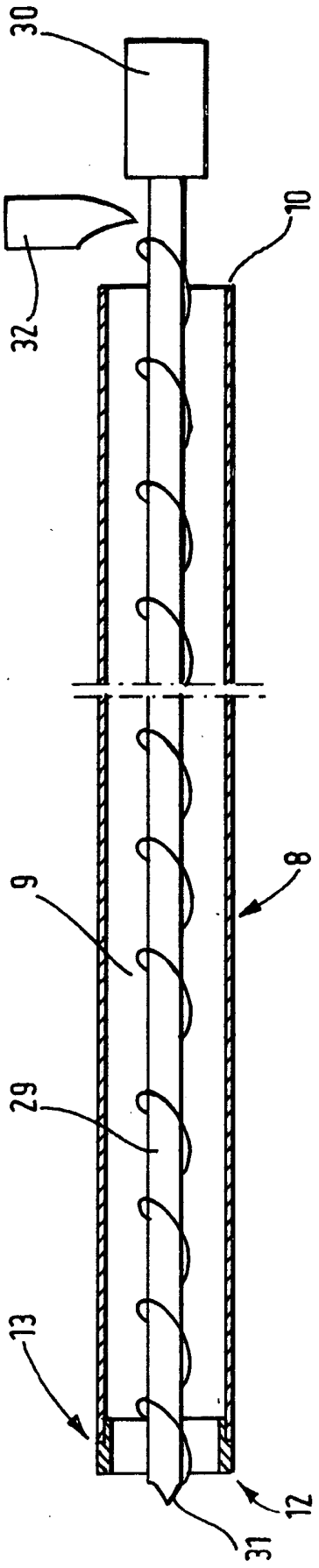


Fig.4.

SURGICAL INSTRUMENT

BACKGROUND OF THE INVENTION

[0001] This invention relates to a bipolar electrosurgical instrument for use in the bulk removal of tissue, as in a laparoscopic hysterectomy.

[0002] In a laparoscopic hysterectomy, the body of the uterus is resected from the stump or fundus, and then removed from the operative site. To enable the uterus to be removed through a limited surgical opening, it is desirable to morcellate it into relatively smaller pieces of tissue, which are easier to remove. The present invention relates to an instrument and method for morcellating and removing a uterus.

[0003] U.S. Pat. Nos. 5,957,884, 6,007,512 and 6,036,681 are examples of morcellating devices in which an element carrying an electrode is rotated in order to cause the morcellation of tissue. This rotation of the electrode necessitates a mechanical drive arrangement, which increases the complexity of the instrument. The present invention seeks to provide a simpler and hence more reliable arrangement for the bulk removal of tissue.

SUMMARY OF THE INVENTION

[0004] Accordingly, there is provided a combination of a device for morcellating tissue within a body cavity of a patient and a tissue-pulling device, the morcellating device comprising a stationary tube having a distal end portion, the tissue-pulling device being locatable within the tube, the combination including a bipolar electrosurgical electrode assembly including first and second electrodes, the first electrode being located at the distal end of the tube, such that, when an electrosurgical cutting voltage is applied to the electrode assembly, the tissue-pulling device can be moved to pull tissue against the distal end of the tube to form a core of severed tissue within the tube, and further moved in order to remove the severed tissue from the body cavity of the patient.

[0005] Conveniently, the electrosurgical electrode assembly extends around the circumference of the distal edge of the tube, preferably completely around the circumferential edge.

[0006] U.S. Pat. No. 5,304,124 describes an instrument for removing a myoma from the uterus of a patient, the device utilising a cauterising element at the end of a tubular member. This cauterising element is described as being a wire loop, or a "Bovie-type component". As this device is for the removal of a myoma (leaving the remainder of the uterus intact), the cauterising element will reduce the bleeding from the remainder of the uterus, which will still be vascularly connected to the patient. In contrast, the present invention provides a bipolar electrosurgical device, more suited to the bulk removal of tissue from a uterus which has been resected and will no longer have a vascular supply.

[0007] The second electrode of the bipolar assembly is preferably also located at the distal end of the tube, and separated from the first electrode by an insulation member. Conveniently, the tube itself constitutes the second electrode, and the first electrode may be a conductive track present on the insulation member, for example by the printing of the track on the insulation member.

[0008] The second electrode is alternatively or additionally located on, or constituted by, the tissue-pulling device. If the second electrode is located on the tube, and there is no electrical connection between the second electrode and the tissue-pulling device, there will possibly be a situation in which tissue being pulled into the tube is in contact with the first electrode but not the second. Under these circumstances, the electrosurgical cutting of the tissue will not be effected until the tissue is pulled far enough so as to contact the second electrode. By placing the second electrode on the tissue-pulling device, or, if the second electrode is located on or constituted by the tube, by making the second electrode in electrical communication with the tissue-pulling device, the cutting of tissue will be effected by a bipolar electrode assembly constituted between the tissue-pulling device and the first electrode.

[0009] By providing both the second electrode on the tube, and making the tissue-pulling device effective as the second electrode, each will act as the second electrode at different times. When the tissue is first presented to the tube, the tissue-pulling device will act as the second electrode. Subsequently, as the tissue is pulled into the tube, the bipolar cutting will occur between the first electrode and the second electrode located on the tube. This arrangement ensures that, as the first tissue contact with the tube is established, the bipolar electrode assembly is capable of firing up successfully, and yet continues to be effective as more and more tissue is pulled into the tube.

[0010] Thus, it will be seen that the bipolar electrode assembly is constituted either by having two electrodes in the distal region of the tube, or one electrode in the distal region of the tube and the other on the tissue-pulling device, or both. Either of these arrangements constitute "bipolar" electrode assemblies, even if the tissue-pulling device constitutes one of the electrodes. A bipolar electrode assembly has at least two electrodes, manoeuvrable in the immediate region of the surgical site. This is in contrast to monopolar or "Bovie type" arrangements, in which an immovable return pad is attached to the patient at a point somewhat removed from the surgical site.

[0011] The tissue-pulling device is preferably longitudinally movable with respect to the tube. By the use of a pulling device, the tube can be maintained stationary and tissue pulled into the end of the tube. There is, therefore, no need to advance the tube or otherwise move it into the tissue to be removed, as with many of the prior art devices.

[0012] The tissue-pulling device is preferably a pair of jaw members movable between open and closed positions, the jaw members conveniently being mounted on a rod extending through the tube. The jaws can be closed around tissue, grasping it firmly, and the rod retracted within the tube to cause the tissue to be severed by the electrosurgical electrode assembly at the distal end of the tube.

[0013] Alternatively, the tissue-pulling device comprises a screw member rotatable with respect to the tube. Rotation of the screw member has the effect of pulling tissue into the tube. The tube preferably has an end face which is angled with respect to the longitudinal axis of the tube, conveniently at an angle of between 30 and 60 degrees to the longitudinal axis, and typically at 45 degrees thereto. This angled end face helps to ensure that the initial contact between the tissue and the electrode assembly is a point

contact, thereby assisting with the firing-up of the electrode assembly into a cutting or vaporisation mode and ensuring effective separation of the tissue.

[0014] The invention also extends to a method of laparoscopically removing a uterus, the method comprising the steps of:

[0015] a) dissecting the body of the uterus from the stump of the uterus,

[0016] b) laparoscopically inserting a morcellating device comprising a stationary tube having a distal end portion, and a tissue-pulling device located within the tube, the morcellating device and/or the tissue-pulling device including a bipolar electrosurgical electrode assembly, the electrosurgical assembly comprising first and second electrodes, at least one of the electrodes being located at the distal end of the tube,

[0017] c) grasping tissue with the tissue-pulling device and pulling it against the distal end of the tube,

[0018] d) energising the bipolar electrode assembly with an electrosurgical cutting voltage,

[0019] e) continuing to pull the tissue with the tissue-pulling device so that a core of tissue is formed within the tube, and

[0020] f) withdrawing the core of tissue from the tube.

[0021] Finally, the invention also extends to a device for morcellating tissue within a body cavity of a patient, the device comprising a stationary tube having a distal end portion, and a bipolar electrosurgical electrode assembly located at the distal end of the tube, the electrosurgical assembly comprising first and second electrodes separated by an insulating member, the bipolar electrosurgical electrode assembly extending around the circumference of the distal edge of the tube, such that, when an electrosurgical cutting voltage is applied to the electrode assembly and relative movement is initiated between the tube and the tissue, a core of severed tissue is formed within the tube such that it can be removed from the body cavity of the patient.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, in which:

[0023] **FIG. 1** is a schematic side view, partly in section, of a morcellating system in accordance with the present invention,

[0024] **FIG. 2** is a schematic sectional view of a part of the system of **FIG. 1**,

[0025] **FIG. 3** is a schematic sectional view of an alternative embodiment of the part of **FIG. 2**, and

[0026] **FIG. 4** is a schematic sectional view of an alternative embodiment of morcellating system in accordance with the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0027] Referring to **FIG. 1**, a morcellating system comprises a morcellating device shown generally at **1**, a tissue-pulling device shown generally at **2**, and an electrosurgical generator **3**. The generator **3** is connected to the morcellating device **1** by means of cable **4**, and to the tissue-pulling device **2** by means of cable **5**. The generator **3** is controlled by means of a footswitch **6**.

[0028] As shown in **FIGS. 1 and 2**, the morcellating device **1** comprises a handle **7** and a cylindrical tube **8**. The cylindrical tube **8** is hollow, and defines a lumen **9** therein. The proximal end **10** of the tube **8** extends from the handle **7** as shown at **11**, and the distal end **12** of the tube is provided with an electrosurgical electrode assembly **13**. The electrosurgical electrode assembly **13** comprises an active tissue-cutting electrode **14**, and an insulating member **15**, both extending around the circumference of the tube **8**. The insulating member **15** separates the electrode **14** from the remainder of the tube **8**, which acts as a return electrode **16**.

[0029] The tube **8** is connected to one pole of the generator **3**, via the cable **4** and a connector **17**. The active electrode **14** extends around the entire circumference of the tube **8**, and is connected to the other pole of the generator **3**, via the cable **4**, the connector **17** and additional wiring (not shown). In this way, the electrodes **14** and **16** constitute a bipolar electrode assembly, which, when energised by the generator **3**, is capable of cutting tissue coming into contact with the distal end **12** of the tube **8**.

[0030] The tissue-pulling device **2** comprises a tubular shaft **18**, at the proximal end of which is a scissors-type handle mechanism **19**, having a first handle **20** and a second handle **21**. The second handle **21** is pivotable with respect to the first, about a pivot pin **22**. Pivoting of the second handle **21** causes longitudinal movement of a push rod **23** extending through the shaft **18** to the distal end thereof.

[0031] At the distal end of the shaft **18** is a jaw assembly **24**, with a first jaw member **25** and a second jaw member **26** movable between open and closed positions by the movement of the push rod **23**. The tissue-pulling device **2** is manually translatable in a longitudinal manner within the lumen **9** of the morcellating device **1**, with slidable guide members **27** supporting the shaft **18** of the tissue-pulling device within the tube **8**. The jaw members **25** and **26** are electrically connected to the shaft **18**, and the shaft **18** is electrically connected, via the lead **5** and the connector **28**, with the generator **3**. The shaft **18** is connected to the same pole of the generator **3** as the return electrode **16**, constituted by the tube **8**.

[0032] The operation of the morcellating system is as follows. The tube **8** of the morcellating device **1** is inserted into the body of a patient, typically through a trocar (not shown), and brought into position adjacent to the tissue to be removed (typically a resected uterus in the case of a laparoscopic hysterectomy). The tissue-pulling device **2** is then inserted through the lumen **9** of the morcellating device **1**. The handle **21** is operated to open the jaw assembly **24**, and the tissue-pulling device **2** is manoeuvred so that tissue from the uterus is located between the jaw members **25** and **26**. The handle **21** is then operated to close the jaw assembly **24**, grasping tissue therein.

[0033] The surgeon operates the footswitch **6** to operate the generator **3** so that an electrosurgical cutting voltage is supplied between the tissue-cutting electrode **14** and the return electrode **16**. As mentioned previously, the push rod

23 and the jaw assembly 24 are also electrically connected to the same pole of the generator 3 as the tube 8, and so both the tube and the jaw assembly constitute the return electrode 16. With tissue firmly grasped in the jaw assembly 24, the device 2 is slowly withdrawn from the tube 8, pulling the tissue against the distal end of the tube and the tissue-cutting electrode 14. As the tissue contacts the tissue-cutting electrode 14, it is vaporised, allowing the device 2 to be withdrawn further into the tube 8. In this way, a cylindrical core of tissue is formed in the tube 8, the tissue being withdrawn though the proximal end 10 of the morcellating device 1 (which remains outside the body of the patient) for disposal.

[0034] The tissue-pulling device 2 can then be re-inserted into the tube 8 such that a further core of tissue can be removed from the body of the patient. By repeating this process, large quantities of tissue can be removed from the patient in a relatively short time, such that the entire uterus can be removed, if necessary, while still employing a laparoscopic approach.

[0035] FIG. 3 shows an alternative embodiment of the tube 8, in which the distal end 12 of the tube has an angled end as shown at 33. This angled end, which typically lies at an angle of 45 degrees to the longitudinal axis of the tube, helps to provide an initial point of contact between the tissue-cutting electrode 14 and the tissue being drawn into the tube 8. This assists in ensuring effective electrosurgical cutting of the tissue.

[0036] FIG. 4 shows the tube 8 of an alternative embodiment of the morcellating device 1, in which the tissue-pulling device is constituted by a screw-member 29. The screw-member 29 is rotatably driven at its proximal end by means of a motor 30, and has a sharp tip 31 at its distal end. The tip 31 of the screw-member 29 engages tissue, and the rotation of the screw-member causes the tissue to be pulled against the distal end of the tube 8, where it is vaporised by the electrosurgical electrode assembly 13 as previously described. Tissue travels up the tube 8 under the action of the rotation of the screw-member 29, until it exits from the proximal end 10 of the tube, to be removed from the screw-member by a stripping element 32. This arrangement has the advantage that the extraction of tissue can be effected on an almost continuous basis, without the need for the removal and re-insertion of the tissue-pulling device of FIGS. 1 and 2.

[0037] Those skilled in the art will appreciate that, in addition to the jaw device and screw-member described above, other means for pulling tissue into the tube 8 can be envisaged. The bipolar electrosurgical assembly 13 will be capable of cutting tissue pulled into contact therewith, by any suitable means.

[0038] Although the present invention has been described in terms of a particular embodiment and process, it is not intended that the invention be limited to that embodiment. Modifications of the embodiment and process within the spirit of the invention will be apparent to those skilled in the art. The scope of the invention is defined by the claims that follow.

What is claimed is:

1. In combination, a device for morcellating tissue within a body cavity of a patient and a tissue-pulling device, the morcellating device comprising a stationary tube having a distal end portion, the tissue-pulling device being locatable within the tube, the combination including a bipolar electrosurgical electrode assembly including first and second electrodes, the first electrode being located at the distal end of the tube, such that, when an electrosurgical cutting voltage is applied to the electrode assembly the tissue-pulling device can be moved to pull tissue against the distal end of the tube to form a core of severed tissue within the tube, and further moved in order to remove the severed tissue from the body cavity of the patient.

2. A combination according to claim 1, wherein the first electrode extends around the circumference of the distal edge of the tube.

3. A combination according to claim 2, wherein the first electrode extends completely around the circumference of the stationary tube.

4. A combination according to claim 1, wherein the second electrode is located at the distal end of the tube, and is separated from the first electrode by an insulation member.

5. A combination according to claim 4, wherein the tube constitutes the second electrode.

6. A combination according to claim 4, wherein the first electrode comprises a conductive track present on the insulation member.

7. A combination according to claim 6, wherein the conductive track is printed on to the insulating member.

8. A combination according to claim 1, wherein the second electrode is located on, or constituted by, the tissue-pulling device.

9. A combination according to claim 1, wherein the tissue-pulling device is longitudinally movable with respect to the tube.

10. A combination according to claim 9, wherein the tissue-pulling device comprises a pair of jaw members movable between open and closed positions.

11. A combination according to claim 10, wherein the jaw members are mounted on a rod extending though the tube.

12. A combination according to claim 1, wherein the tissue-pulling device comprises a screw member rotatable with respect to the tube.

13. A combination according to claim 1, wherein the stationary tube has an end face which is angled with respect to the longitudinal axis of the tube.

14. A combination according to claim 13, wherein the end face of the tube is at an angle of between 30 and 60 degrees to the longitudinal axis of the tube.

15. A combination according to claim 14, wherein the end face of the tube is at an angle of 45 degrees to the longitudinal axis of the tube.

16. A method of laparoscopically removing a uterus, the method comprising the steps of:

a) dissecting the body of the uterus from the stump of the uterus,

b) laparoscopically inserting a morcellating device comprising a stationary tube having a distal end portion, and a tissue-pulling device located within the tube, the morcellating device and/or the tissue-pulling device including a bipolar electrosurgical electrode assembly, the electrosurgical assembly comprising first and second electrodes, at least one of the electrodes being located at the distal end of the tube,

c) grasping tissue with the tissue-pulling device and pulling it against the distal end of the tube,

d) energising the bipolar electrode assembly with an electrosurgical cutting voltage,

e) continuing to pull the tissue with the tissue-pulling device so that a core of tissue is formed within the tube, and

f) withdrawing the core of tissue from the tube.

17. A device for morcellating tissue within a body cavity of a patient, the device comprising a stationary tube having a distal end portion, and a bipolar electrosurgical electrode assembly located at the distal end of the tube, the electrosurgical assembly comprising first and second electrodes separated by an insulating member, the bipolar electrosurgical electrode assembly extending around the circumference of the distal edge of the tube, such that, when an electrosurgical cutting voltage is applied to the electrode assembly and relative movement is initiated between the tube and the tissue, a core of severed tissue is formed within the tube such that it can be removed from the body cavity of the patient.

* * * * *

专利名称(译)	手术器械		
公开(公告)号	US20050261676A1	公开(公告)日	2005-11-24
申请号	US10/924954	申请日	2004-08-25
[标]申请(专利权)人(译)	佳乐医疗设备有限公司		
申请(专利权)人(译)	GYRUS医药有限		
当前申请(专利权)人(译)	GYRUS医药有限		
[标]发明人	HALL MATTHEW RICHARD MARSHALL MARK GEORGE GOBLE COLIN CHARLES OWEN AMOAH FRANCIS VARNEY KELVIN JOHN EBBUTT JULIAN MARK		
发明人	HALL, MATTHEW RICHARD MARSHALL, MARK GEORGE GOBLE, COLIN CHARLES OWEN AMOAH, FRANCIS VARNEY, KELVIN JOHN EBBUTT, JULIAN MARK		
IPC分类号	A61B17/28 A61B17/32 A61B17/42 A61B18/14		
CPC分类号	A61B17/29 A61B17/320016 A61B17/32053 A61B2018/1412 A61B18/1485 A61B2017/320775 A61B2017/4216 A61B18/1442		
优先权	2004011270 2004-05-20 GB		
外部链接	Espacenet USPTO		

摘要(译)

一种用于在患者体腔内粉碎组织的装置包括具有远端部分的固定管，以及位于管的远端的双极电外科电极组件。电外科电极组件包括由绝缘构件分开的第一和第二电极，双极电外科电极组件围绕管的远端边缘的圆周延伸。当电外科切割电压施加到电极组件上，并且在管和组织之间开始相对运动时，在管内形成切断的组织芯，使得它可以从患者的体腔中移除。可以采用诸如钳夹组件的组织牵拉装置将组织拉向管的远端。