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(54) **A DEVICE USED IN THE IMPLEMENTATION OF LAPAROSCOPIC HYDATID CYST OPERATIONS**

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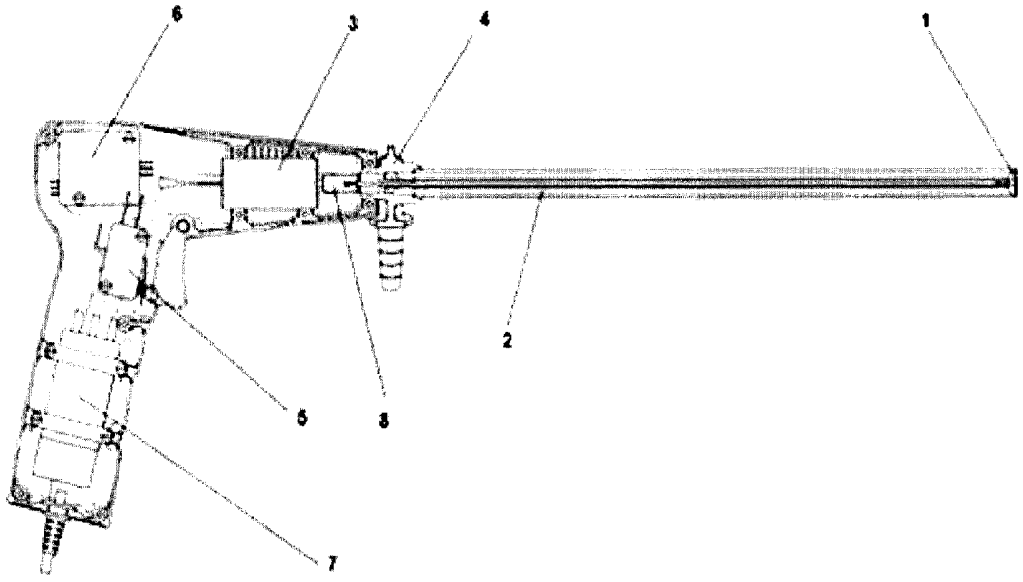
(57) **ABSTRACT**

The present invention relates to a laparoscopic device used in laparoscopic cyst hydatid operations, which has a shaft that enables simultaneous performance of the breaking of the cyst content in the area by the blade in the conical slot at the end of the shaft, aspiration of the cyst fluid and the broken female vesicles and if required, washing processes and an electrically connected hand unit. The mentioned laparoscopic device contains a motor inside the hand unit, motor drive unit, cycle unit, cycle control unit and trigger and the shaft part contains aspiration channel, washing channel, the shaft enabling the blade movement and blade unit in



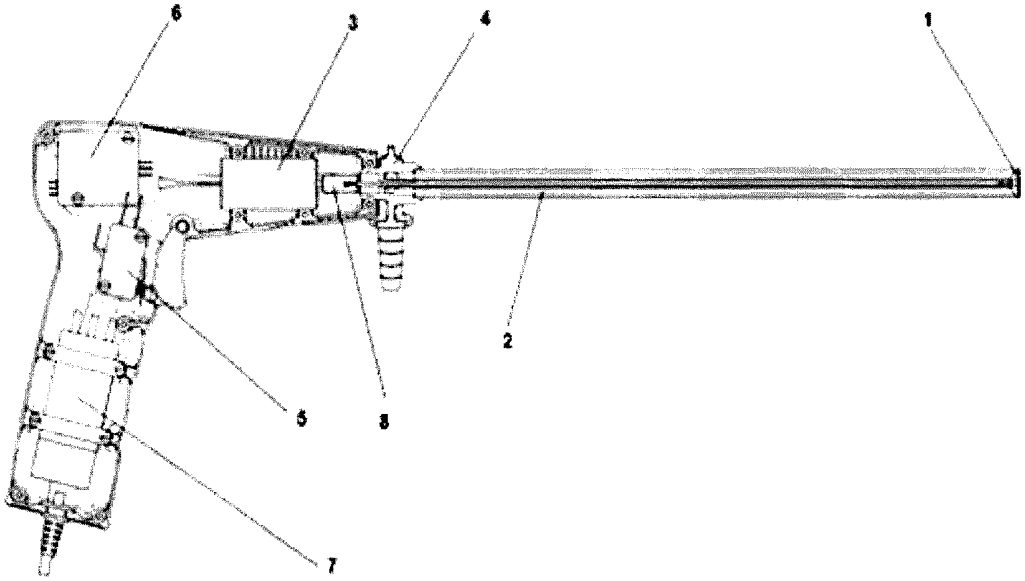


FIGURE 1

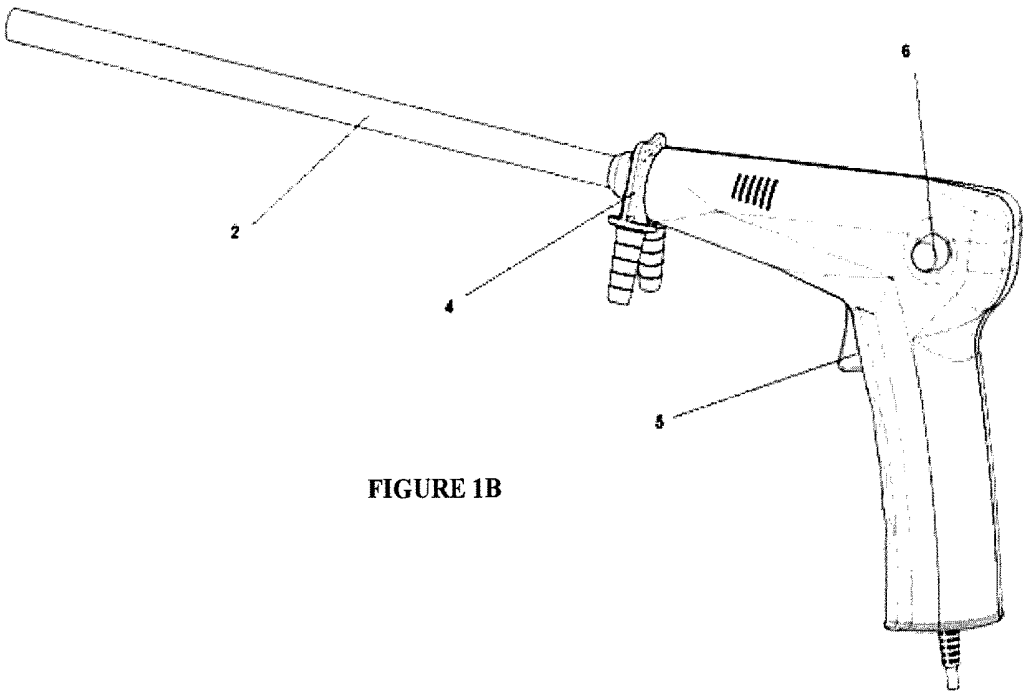


FIGURE 1B

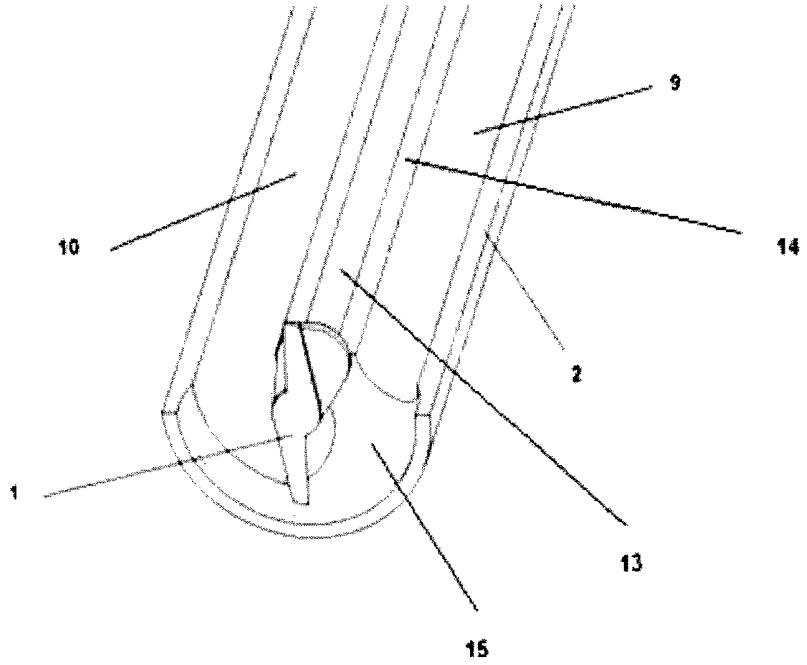


FIGURE 2

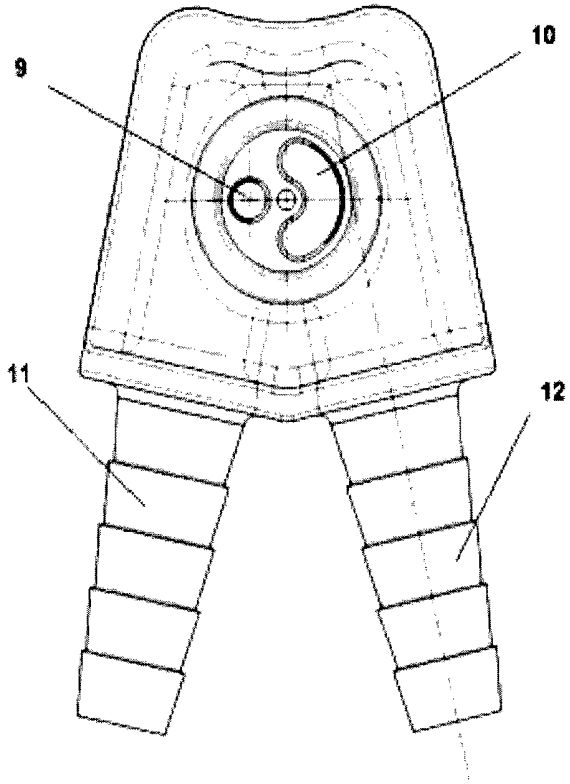


FIGURE 3

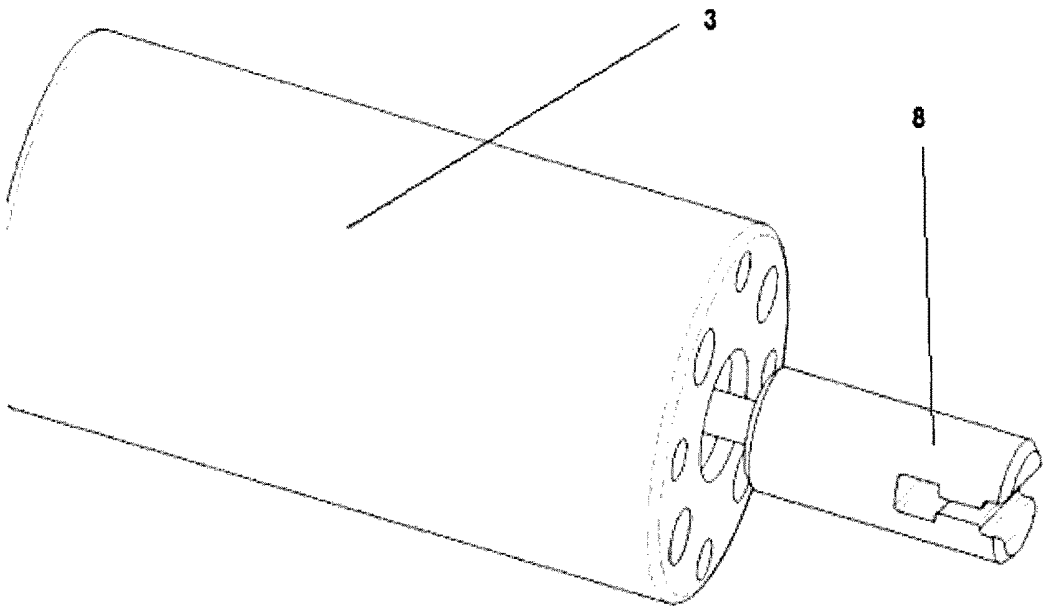


FIGURE 4

A DEVICE USED IN THE IMPLEMENTATION OF LAPAROSCOPIC HYDATID CYST OPERATIONS

TECHNICAL FIELD

[0001] The invention is related to a device used in laparoscopic cyst hydatid operations.

[0002] The invention relates to a laparoscopic device, which also includes its own energy unit, that simultaneously provides the procedures of washing of the application area; breaking of the cyst with the help of the blade in the conical structure at the end of the shaft and aspiration of fluid together with these pieces.

STATE OF THE ART

[0003] In laparoscopic surgery, the organs to be operated are made visible through a screen by a camera to be placed and the operation is carried out by the images on the screen. Since detailed images 20 folds larger than those seen by a naked eye are obtained by a camera, it is possible to see the fine details of the anatomic structures. In laparoscopic operations, CO2 (carbon dioxide) gas given to the abdominal cavity with the help of cannulas (trocar) with the shape of a tube with various diameters and lengths, which is placed in the abdomen and this way, the abdominal cavity is insufflated. Accordingly, space with appropriate width is provided in the cavity formed between the abdominal organs and abdominal wall, for the operation of surgical instruments. Although the number of incisions (3-5) and the width of the incision vary based on the type of the operation, in general, the width of the incision is about 0.5-1 cm. the laparoscopic operations are generally applied under general anesthesia. The operations, same with those in the classical open surgery are performed with the instruments used by passing through trocars (cannulas in the shape of a tube). All the incisions are closed after the trocars are removed and the operation is concluded.

[0004] The cyst wall is pierced by a dissector or any manual instrument with piercing features and having connections with the cautery (hook etc.) inserted through a hole in laparoscopic cyst hydatid surgery and the fluid inside is aspirated. Afterwards, female vesicles in the cysts are taken in a single bag; the bag is puckered without contaminating the intra-abdominal area and it is pulled out. The bag used here is usually the bag which is used in gall blander operations in order to take the gall bladder out of the abdomen. In addition to these, there are some more instruments with breaker parts, which are used to facilitate the aspiration of the content of the cyst. Some of these instruments are quite bulky for the laparoscopic operations. The common characteristic of all is that the breaker part rotates vertically like a drill and breaks the content of the cyst and facilitates the aspiration. Such breaker instruments create safety concerns since they rotate vertically to the tissue (organ). Even if the breakers functioning vertically have pull-push mechanisms controllable from the handle, it is hard to claim that they are hundred percent safe. Moreover, not enough space is left for the cannula which aspirates within the same shaft, since the shafts driving the breakers are too thick. This makes the aspiration process difficult.

[0005] It is not possible to compare a successful laparoscopic operation with open surgery with respect to the parameters such as the patient's comfort and total cost. This is because a person can quickly return to his/her business life just like his/her normal life activities following a laparoscopic operation.

[0006] The surgeons usually try to aspirate the cyst content in a laparoscopic cyst hydatid operation by instruments which are not appropriate for the purpose. This state; can cause problems generally attributable to contamination during the aspiration of the cyst content. When female vesicles are directly aspirated, they block the aspirator since they have coarse particles. This slows down the speed of the process and naturally, extends the operation time. In the state of the art; even if there are a few number of non-professional breaker models with macro dimensions; the need for these to be positioned in the same body with the aspirator increased gradually.

[0007] In the utility model application with application no TR2013/08974; it shall be seen that there is an aspiration channel attached to the end of a drill and blade mechanism at the end of the shaft in this channel. The thickness of the blade shaft in the aspiration tube attached at the end of the device in the mentioned utility model does not leave enough space for the aspiration process, which is the general purpose. In addition, it should be taken into consideration that the blade at the end of the aspiration tube is very large and this causes blocking.

[0008] Moreover, when the utility model application with application no TR2013/08974 is examined; it shall be seen that there are two different trigger mechanisms in the device. (one trigger for taking the drill end out and another trigger for operating the drill). An application made this way, is not ergonomic and makes it difficult for the surgeon to provide the control of the device and even undesired traumas during the operation.

[0009] At the same time, the resonance increases during the operation due to the distance between the connection point of the shaft and drill and the blade part at the end of the aspiration tube and not containing a shaft channel. Moreover, a shaft passed directly through the aspiration tube, may cause aspirated fluid, broken tissue to flow back from the connection point of the drill when the aspiration is stopped and as a result may result in the risk of infection. In addition, although the mentioned utility model partly responds to the simultaneous performance of the breaking of the cyst and the aspiration procedure, it is also possible to have blocking during the aspiration process due to the direction of the breaker and its bulkiness. When the mentioned utility model is examined; it is evaluated that the end part is designed in order to break in an uncontrolled manner, not in order to perform an incision. Also, it is possible that it may damage the tissues if it moves openly in the abdomen. Since it is required that the breaker end to be taken out of the channel by a latch in a controlled manner as its rotation within the channel; undesired traumas could be resulted if the latch is touched accidentally. Hundred percent safety cannot be guaranteed for any breaker with its end outside or which rotates vertically to the tissue.

[0010] This state necessitated to develop a device which would facilitate the application especially for the liver cyst hydatid due to the insufficiency of the current solutions and to make new researches in the relevant technical field.

THE PURPOSE AND SHORT DESCRIPTION OF THE INVENTION

[0011] The purpose of the invention is to facilitate the application of laparoscopic cyst hydatid operation. The most important difficulty in the application of laparoscopic cyst hydatid operation is the unavailability of an instrument which would provide the application comfort for the process. On the other hand, if there is appropriate device equipment (to help to facilitate the laparoscopic application) for liver cyst hydatid just like laparoscopic cholecystectomy, then laparoscopic surgery would be the golden standard.

FIGURES TO HELP UNDERSTANDING THE INVENTION

[0012] FIG. **1**: is the general view of the present device used in laparoscopic cyst hydatid operations.

[0013] FIG. **1**B: is the general view of the present device used in laparoscopic cyst hydatid operations, from another angle.

[0014] FIG. **2**: is the detailed view of the shaft and concave end part of the present device.

[0015] FIG. **3**: is the detailed view of the washing and aspiration separator.

[0016] FIG. **4**: motor and coupling connection

NO—NAME OF THE PART

[0017] **1**. Blade unit
[0018] **2**. Shaft
[0019] **3**. Drive unit
[0020] **4**. Separator
[0021] **5**. Trigger mechanism
[0022] **6**. Cycle control unit
[0023] **7**. Power source
[0024] **8**. Coupling
[0025] **9**. Washing channel
[0026] **10**. Aspiration channel
[0027] **11**. Washing inlet
[0028] **12**. Aspiration inlet
[0029] **13**. Blade shaft
[0030] **14**. Shaft channel
[0031] **15**. Concave end part

DETAILED EXPLANATION OF THE INVENTION

[0032] In the present invention which was developed after long researches and trials; the breaking and aspirating functions are within the same shaft (**2**). In addition to these, in the mentioned shaft (**2**). In addition to these, washing feature is carried out from another channel [washing channel (**9**)] within the mentioned shaft (**2**). There is at least one aspiration channel (**10**) opened lengthwise, at least one washing channel (**9**) and at least one shaft channel (**14**) in the mentioned shaft (**2**). This way, three functions are enabled with the shaft (**2**) reaching the application area. Our desire to include three functions (breaking, aspirating and washing) in this device [in the shaft (**2**)] is due to two reasons. The first one is to complete the operation process faster and with minimum contamination without any need for inserting the instruments through the ports (incisions) many times. Another issue which is also as important as the first one is to advance the laparoscopic operation with the minimum number of ports in time.

[0033] The mentioned laparoscopic device is composed of two parts. The mentioned main parts are the shaft (**2**) and the device body. There is a power source (**7**), cycle control unit (**6**), trigger mechanism (**5**), coupling (**8**) and drive unit (**3**) on the body of the device which is in the form of a handle. There is at least one (pneumatic or hydraulic drive system, electric motor, electronic motor etc.) drive unit (**3**) on the body of the device. The energy required for the mentioned drive unit (**3**) is provided from a power source (**7**). The mentioned power source (**7**) can be an electricity line, battery, accumulator etc. The operation of the drive unit (**3**) can be followed up by the warning sounds within the structure of the device.

[0034] The shaft (**2**) is generally a cylindrical part where the end is as a concave structure. The shaft (**2**) is connected to the body of the device by a separator (**4**), from its end which is not in concave structure. There are at least three channels in the shaft (**2**) which are opened lengthwise. The mentioned channels are at least one aspiration channel (**10**), at least one washing channel (**9**) and shaft channel (**14**). There is a blade shaft (**13**) in the shaft channel (**14**). The end of the blade shaft (**13**) at the side of the device body is connected to the drive unit (**3**) by means of a coupling (**8**). There is a blade unit (**1**) at the other end of the blade shaft (**13**). The blade unit (**1**) operates in the concave end part (**15**) of the shaft (**2**).

[0035] Aspiration channel (**10**) is connected to the aspiration inlet (**12**) within the structure of the separator (**4**). The fluid and particles sucked into the aspiration channel (**10**) at the end of the aspiration process are taken from the aspiration inlet (**12**). The aspiration inlet (**12**) is attachable to the aspiration devices available at the operating rooms.

[0036] The washing channel (**9**) is connected to the washing inlet (**11**) within the structure of the separator (**4**). This way, the fluid required for the washing process can be given to the washing channel (**9**) from the washing inlet (**11**). The washing inlet (**11**) is attachable to the aspiration devices available at the operating rooms. The separator (**4**) is detachable from the device body. Moreover, the shaft (**2**) is also attachable detachable to the device body.

[0037] There is a completely empty space at the middle section of the shaft (**2**) for the blade shaft (**13**) between the drive mechanism (**3**) of the device and the blade unit (**1**). This space is named as the shaft channel (**14**). The shaft channel (**4**) provides the blade unit (**1**) to operate at the desired level without any roll. The rotating motion transferred to the coupling (**8**) from the drive mechanism (**3**) is transferred to the blade shaft (**13**) without any roll. The blade unit (**1**) rotates together with the blade shaft (**13**). The blade unit (**1**) makes a transverse turn according to the shaft (**2**), in the concave end part (**15**) of the shaft (**2**). This way, the blade unit (**1**) rotates in a safe and controlled manner in the concave end part (**15**). The aspiration channel (**10**) and the washing channel (**11**) also open up to inside of the mentioned concave end part (**15**). In FIG. **2**, the cross-section of the shaft (**2**) enabling the breaking, washing and aspirating processes can be seen. Aspiration channel (**10**) is wider than the washing channel (**9**) in order to enable the passage of the cyst particles.

[0038] Thanks to the separator (**4**), it is enabled that the fluid given out for the washing process and the fluid received in the device for the aspiration fluid proceed in different channels over the same mechanism, without mixing. It contributes considerably to the ergonomics that the aspira-

tion inlet (**12**) and the washing inlet (**11**) are facing downwards and upwards at the connection section.

[0039] Moreover, the concave end part (**15**) of the shaft (**2**) is designed as a concave inner structure where the breaking, washing and aspirating procedures can be carried out. This feature of the device, enables the blade unit (**1**) (breaker) not to contact the wall within the cyst pouch. The design of the concave end part (**15**) of the mentioned shaft (**2**) is the most important safety key for prevention of the liver trauma during the process. In the present device; the safety is considered as much as simultaneous performance of the three functions (breaking, aspirating and washing). Blade units (**1**) of different forms can be used in the mentioned device. Blade unit (**1**) replacement can be carried out from the concave end part (**15**) of the shaft (**2**).

[0040] In addition to safety, the ergonomics of the hand instruments is one of the most important issues for the surgeons. In this regard, the device has a handle which the surgeons who are accustomed to performing laparoscopic cholecyctectomy can easily adapt to and work comfortably. For disinfection, the device is designed in a manner to be disinfected by dismantling the shaft (**2**) part completely from the handle. There are no structures within the power unit and drive mechanism (**3**) of the device which would endanger the sterilization. There is a cycle control unit (**6**) on the device. The speed control of the rotation of the blade unit (**1**) at the end of the shaft (**2**) is provided by the mentioned cycle control unit (**6**). Laparoscopic device has a titanium coupling (**8**) which provides the connection between the shaft (**2**) and drive mechanism (**3**) with its special lock system and prevents undesired vibrations by its structure, thus provides the safe operation of the blade.

[0041] The operation of the laparoscopic device is as follows;

[0042] In laparoscopic cyst hydatid operations: specifically in the process of removing the female vesicles away from the area of application by aspiration procedure; aspiration channels and tubes may be blocked due to the large size of the female vesicles. The present invention enables the female vesicles with large particles, to be grinded at the same time with the aspiration process, by the help of the blade unit (**1**), which is placed in the concave end part (**15**) of the shaft (in the conical slot) and which operates (rotates) horizontally (transversely). This way, blocking of the aspiration channels (**10**) during the aspiration process is prevented. The movement of the present invention is provided by the transfer of energy from any power source (**7**) to the drive mechanism (**3**). The trigger mechanism (**5**) and cycle control unit (**6**) are two important parts used in adjustment of the rotation speed of the blade unit (**1**) rotating in the conical slot. The vesicles grinded by the blade unit (**1**) located at the concave end part (**15**) of the shaft (**2**) which accommodates washing channel (**9**), aspiration channel (**10** and shaft channel (**14**) within its structure are absorbed from the aspiration channel (**10**) and are transferred to the aspiration inlet (**12**) of the separator (**4**). At the same time, the fluid from the washing inlet (**11**) of the separator is used in the washing of the application area with the help of the washing channel (**9**) in the shaft (**2**).

1- The present invention relates to a laparoscopic device used in the application of laparoscopic cyst hydatid operations, that simultaneously provides the performance of the procedures of washing, breaking and aspirating of the operation area and it is characterized by containing;

Device body with at least one drive unit

At least one shaft connected to the mentioned device body and with a concave slot at one end;

At least one washing channel in the mentioned shaft, opened lengthwise;

At least one aspiration channel in the mentioned shaft, opened lengthwise;

At least one shaft channel in the mentioned shaft, opened lengthwise;

At least one blade shaft in the mentioned shaft channel which transfers the rotation received from the drive unit to the blade unit;

At least one blade unit positioned in the concave end part of the shaft, which rotates transversely to the shaft in the mentioned concave slot with the rotation received from the blade shaft.

2- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing a shaft with a diameter of 9.5-11.5 mm (appropriate for application from inside trocars of 10-12 mm) and a length of 250-350 mm, in the shaft channel through which the washing channel aspiration channel and blade shaft pass as independent of each other, which provide simultaneous performance of washing, breaking and aspiration,

3- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing an aspiration inlet and washing inlet appropriate for aspiration and washing devices used under the operating room standards and a washing aspiration separator easy to disinfect since it is detachable from the device body.

4- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing an ergonomic handle in full conformity with the hand, which enables easy performance of all the functions of the device, without getting tired and by the control of one hand.

5- It is the laparoscopic device mentioned in claim **1** and it is characterized by containing at least one coupling providing the connection between the shaft and the drive mechanism by its special lock system, which prevents undesired vibrations by its structure and enables the safe operation of the blade unit.

6- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing warning sounds which enables audio follow up for the operation state of the drive mechanism.

7- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing blade units prepared in various forms to respond to different needs of breaking, which provide the breaking of the cyst.

8- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing a concave end part located at the end part of the shaft, which prevents the blade unit to touch the wall in the cyst pouch during the breaking process and which is designed with a concave inner structure.

9- It is the laparoscopic device mentioned in claim **1** and it is characterized by; containing cycle control unit adjusting the drive mechanism speed, through the trigger mechanism or by the thumb through the setting button on the body, as based on the needs.

* * * * *

专利名称(译)	用于实施腹腔镜包虫囊肿手术的装置		
公开(公告)号	US20180235647A1	公开(公告)日	2018-08-23
申请号	US15/752808	申请日	2016-08-12
[标]申请(专利权)人(译)	银Artun turkyilmaz穆拉特		
[标]发明人	TURKYILMAZ ZELIHA		
发明人	TURKYILMAZ, ZELIHA		
IPC分类号	A61B17/32		
CPC分类号	A61B17/32002 A61B2017/00022 A61B2017/00424 A61B2017/320024 A61B2217/007 A61B2217/005 A61B2017/00115		
优先权	201510110 2015-08-14 TR		
外部链接	Espacenet USPTO		

摘要(译)

腹腔镜装置技术领域本发明涉及一种用于腹腔镜囊肿包虫手术的腹腔镜装置，该装置具有轴，该轴能够同时通过刀轴在轴端部的锥形槽中破坏该区域中的囊肿内容物。囊肿液和破碎的女性囊泡，如果需要，还有洗涤过程和电气连接的手持单元。上述腹腔镜装置包括手持单元内的马达，马达驱动单元，循环单元，循环控制单元和触发器，并且轴部分包含抽吸通道，清洗通道，使刀片运动的轴和刀片单元