Suction apparatus for body cavities

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Abstract
An apparatus for removal, by scraping or cutting, of a sample of the internal wall of body cavities and collecting the sample in a container. It consists of a cylindrical container, adapted to be held in one hand and carrying a cannula, the end of which is closed, with a sharp-edged slot being provided closely behind the end. The cannula, during use, is rigidly connected with the container so that it can be manoeuvred therewith using the container as a handle device. The container has a sieve to longitudinally divide the container and to retain the sample, while permitting passage of liquids therethrough, and is connectable with a vacuum tube.

5 Claims, 8 Drawing Figures
SUCTION APPARATUS FOR BODY CAVITIES

In surgery the suction withdrawal of blood and fluid from wounds and body cavities is well known. In later years such method has also been applied when emptying the uterus of pregnant women of abortion tissues, amniotic fluid, and blood in connection with induced abortions.

For this purpose an apparatus has been used, consisting of a tube to be inserted in the uterus and having a closed, rounded end and an opening in the side very close to the end of the tube, said tube being connected to a vacuum source through a suction flask. The diameter of the tube must necessarily be 8–12 mm in order to allow the pregnancy product to pass. Also the suction flask must have a sufficient volume in order to hold the rather great amount of tissue and fluid which has been so withdrawn. The use of this apparatus implies hospitalizing and is carried out under general anesthesia or local anesthesia.

It has now turned out that a suction method of a similar nature could be used in such cases where the object is to take specimen samples or to remove parts of the surface layer of the inner wall of a body cavity for diagnostic or therapeutic purposes. Examples of such body parts from which the mentioned specimens are taken may include the inner wall of the uterus, and the endometrium.

The present invention relates to an apparatus adapted for such purposes and capable of being used for ambulant treatment. Like the above mentioned apparatus it comprises a suction tube, hereinafter termed "cannula," having a side opening immediately behind its rounded, closed end, said cannula being connected with a vacuum source through a container intended for holding the withdrawn material. According to the invention the apparatus is characterized in that the cannula is in rigid connection with the said container in such a position that the cannula, the size of which is such that it can be readily inserted in a one hand, may serve as a handle for the cannula by means of which the cannula can be inserted into the cavity during operation and that, after having been brought into contact with the wall of the cavity, it can be moved in a well-controlled manner relatively to said wall, the cannula being provided at a suitable operating distance from the container with a pressure equalizing opening adapted to be closed by means of a finger. The presence of this pressure equalizing opening permits the use of cannulae having a diameter down to 3 mm., which is necessary in order to allow easy insertion into the uterus without the application of a general or local anesthesia and avoid the normal hospitalizing of 4 days for such operations.

In this way the side opening of the cannula which opening normally has the shape of an elongated slot, can be brought into contact with the wall of the cavity and that by means of the edge of the slot, which for this purpose may be sharp, material such as epithelium tissue or coatings can be removed by cutting or scraping, said removed material then being carried forth to the container by suction through the cavity of the cannula. When the side opening at the end of the tube is moved towards the wall and the pressure equalizing opening is closed, the suction through the side opening will draw the tube into contact with the wall of the cavity. When such contact has been achieved, the cannula can be either turned or moved along the wall according to the object or the operation and the shape of the slot in the end side of the cannula. If the tube is thereby adhering too strongly to the wall so as to prevent or unduly impede the movement along the wall, the suction can be reduced by complete or partial pressure equalization. In the same way opening and closing of the pressure equalizing opening can promote the passage through the cannula of tissue pieces, the size of which tends to obstruct the transport through the cannula en route to the reception container. The container in this way provides a safe handle for the maneuvering of the cannula. According to the invention the handle of the container may be produced of a light weight and cheap material for use only once, for instance a polymer. After the operation the whole apparatus can then be sent to a laboratory for testing, and the work involved in cleaning and sterilizing for re-use and the uncertainty connected thereto is thus avoided.

Preferably, the container can be provided with a sieve in front of the connection opening to the vacuum source in order to retain tissue samples thus collected by cutting or scraping. The cannula may be connected to the container by inserting through an opening provided in a removable lid. Said lid with the cannula attached can be removed and be replaced by another sterile and closely fitting lid which is more appropriate for use during the transportation and storing of the container until the contents thereof can be tested.

The connection to the vacuum source can be effected by means of a hose union which, when removed, can be closed with a closely fitting, sterile cap. The hose might, however, be placed also on the same lid as the cannula and is then removed together with the cannula, as an alternative form.

For further explanation of the invention reference is made to the drawing in which some embodiments and details are shown.

FIGS. 1 and 2 show an embodiment adapted for repeated use, FIG. 1 representing shows another axial sectional view through the container and the cannula, FIG. 2 the same viewed from the side, perpendicular to the section shown in FIG. 1.

FIGS. 3 and 4 show another embodiment of the end of the cannula in two projections at right angle each other, FIG. 5 shows a side view of an embodiment having a container, the bottom of which is removable, FIG. 6 an embodiment in which the lid, to which the cannula is fastened, is interchangeable, FIG. 7 shows a cap for the closing of the hose union or stud to the vacuum source according to the embodiment of FIG. 6, and FIG. 8 shows compositely half plan and cross-sectional views of a lid to be placed on the container according to the embodiment of FIG. 6 after removal of the lid connected to the cannula.

In FIG. 1, 1 is a container comprising a cylinder 6 of glass or transparent polymer, which can be sterilized, and end closing lids 4 and 5. The lids can be placed on the cylinder 6 using gaskets 7 for sealing. Between the lids preferably a cylindrical form sieve 8 is placed, and both lids are operatively screwed together to concentrically hold the cylinder 6 and the sieve 8 by means of a nipple 3 which is provided at one end with a connecting stud 12 for attachment of a vacuum hose, and an extension tube 13 having holes 14 and terminating at an opposite end with a screw thread by means of which it can be screwed into a complementally threaded central recess in the lid 4. The extension tube passes through a central opening 15 provided in the lid 5, and the nipple 3 is tightened for sealed engagement against it by means of an interposed gasket 11.

In one side the lid 4 is provided with an opening 10, being threaded in part of its length, into which a threaded end of a cannula 2 is screwed. The cannula has a closed, rounded end 9 and closely behind the same it has a side slot 17. In the side of the cannula close to the container 1 there is provided a pressure equalizing opening 16, which is seen in FIG. 2. This opening 16 is placed in such a position that the operator, when embracing the container 1 with his hand, can easily open and close the pressure equalizing opening with a finger.

FIGS. 3 and 4, which need no further explanation, show different views of a modified embodiment of the end part of the cannula.

In the embodiment of FIG. 5, which is intended to depict one suited for being used only once, the container is made of transparent polymer, and only one end thereof is open and closed with a lid 5 provided with the vacuum connecting stud 12 which may also be made of polymer. The lid 5 encloses the opening of the container 1 resiliently and vacuum tight. The other end of the container is made in one piece with the cylindrical walls of the container, which end constitutes its front
end, and this part carries the cannula 2 which is secured therein. The apparatus is used in the same way as the apparatus shown in FIGS. 1 and 2; after use, however, the lid 5 is removed and is replaced by a different lid as will be explained in connection with FIGS. 7 and 8 mentioned below.

In FIG. 6 the container 1 is also a transparent polymer container with a sieve 8. In this embodiment, however, it is not the cannula but the vacuum connecting stud 12 that is placed in or integrally formed with the firm bottom of the container 1. In the lid, which by analogy with FIG. 1 is designated 4, the cannula 2 is similarly placed. After the operation this lid is removed and is replaced by a sterile lid 20 which is shown in FIG. 8. At the same time a sterile cap 21, shown in FIG. 7, is placed on the opening of the vacuum connection stud 12. Then the container 1 can be stored or sent to the laboratory for testing of the tissue retained therein.

What is claimed is:

1. A suction type catheter assembly for use particularly in performing a uterine curettage and the like wherein body tissue specimens are more easily obtained from various body cavities including the uterus, said catheter assembly comprising, in combination:
   a. a combined hollow handle and tissue specimen collection container having a longitudinal center axis and longitudinally opposed ends; said handle/container facilitating well-controlled manipulation of said catheter during operative use thereof;
   b. an elongated thin walled rigid cannula of relatively small diameter to facilitate insertion into small diameter body orifices and narrow body cavities, said cannula having one end connected rigidly to one longitudinal end of said handle/container, and an opposite rounded end portion with a sharp-edged aperture formed adjacent said rounded end;
   c. said cannula having a further pressure equalizing aperture adjacent the handle/container adapted for selective degrees of closure by the user's fingers for controlling the amount of suction through said cannula during use;
   d. said handle/container being divided longitudinally into two concentric compartments by means of a longitudinally disposed cylindrical filtering sieve which serves to pass fluids while retaining the removed specimen tissue within said handle/container for subsequent clinical examination; and
   e. one of said compartments being connected to said cannula and the other being connected to a vacuum source for suction of specimen tissue material from a body cavity through said cannula and into said container.

2. A catheter assembly as defined in claim 1 wherein said longitudinal end of the handle/container to which the cannula is attached is removably and sealingly connected thereto.

3. A catheter assembly as defined in claim 1 wherein said handle/container is constructed so that the opposed longitudinal ends are both detachably connected therewith.

4. A catheter assembly as defined in claim 1 wherein said container is fabricated of a disposable lightweight, relatively inexpensive plastic material to be used only once.

5. A catheter assembly as defined in claim 1 wherein said handle/container is provided with tube connection means in at least one end thereof for effecting said connection with said vacuum source and with said cannula.