A vaginal delineator, capable of adjusting to varying lengths of the cervix and angles of the fornix is disclosed. A diaphragm for occluding the vagina, preventing leakage of carbon dioxide from the peritoneal cavity is attachable to the delineator. In an additional embodiment, the vaginal delineator comprises a cup to which a ring is pivotally attached. In this embodiment, the cup acts as the occlusion device.
VAGINAL DELINEATION AND OCCLUSION DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO MICROFICHE APPENDIX

[0003] Not applicable.

BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The present invention relates generally to a medical device. More particularly, the present invention relates to a vaginal occlusion and self-adjusting delineation attachment for use in a uterine mobilizer.

[0006] 2. Background Art

[0007] Conventional hysterectomy surgical procedures typically involve one of four approaches: vaginal hysterectomy, total abdominal hysterectomy (TAH), total laparoscopic hysterectomy (TLH), and laparoscopically assisted vaginal hysterectomy (LAVH). Vaginal, TLH and LAVH have become more popular among surgeons because these approaches are less invasive than TAH, with TLH being the least invasive approach. TLH is less invasive than LAVH because it avoids the trauma normally caused by the expansion induced to the vaginal area to permit access of the surgeon’s hands to the pelvic cavity. Unless medical indications require TAH (such as in the case of tumor removal and the associated need to avoid cell spillage), vaginal, TLH and LAVH are usually viewed as more preferable because each is less invasive when compared to major abdominal surgery. Thus, TLH and LAVH approaches usually result in shorter hospitalization and recovery times.

[0008] Difficulties arise in TLH and LAVH, however, in identification when the vagina is not well delineated. Another technicality is leakage of carbon dioxide from the peritoneal cavity when the vagina is opened laparoscopically.

[0009] Another problem, not appropriately addressed in the prior art, is that human bodies vary considerably. Any vaginal insertion device for surgical procedures must, therefore, be adjustable. Such devices are, preferably, self-adjusting.

[0010] There is therefore a need for a vaginal delineation device, attachable to a uterine mobilizer, that also provides occlusion to the vagina to disallow leakage of carbon dioxide. There is a further need for a vaginal delineation and occluding device that is adjustable, and as self-adjusting as possible.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] An object of the present invention is to provide a vaginal delineator for use in female pelvic surgical procedures that attaches to a uterine mobilizer, such as the Valtchev Uterine Mobilizer, and is self adjusting to various lengths of cervixes and angles of fornices.

[0012] The present invention is a device that inserts and locks into a uterine mobilizer, the device comprises a ring that adjusts in angle. The ring is made to bear against the vaginal fornx, conforming to its angle and providing delineation of that part of the vagina for identification thereof.

[0013] In a second embodiment, the ring is also self-adjusting as to distance from the uterine mobilizer, to accommodate varying lengths of the cervix. This is effected by pivotally mounting the ring onto four telescopic rods or legs, all spring loaded.

[0014] A third embodiment of the present invention is configured like a cup with a rigid ring, pivotally attached at the top of the cup. Again, the pivotal attachment provides accommodation for varying angles of the fornix.

[0015] Another object is to provide an occluder to prevent leakage of carbon dioxide from the peritoneal cavity when the vagina is opened laparoscopically. An enlarged portion of an extension being inserted into the uterine mobilizer, is made to receive a diaphragm made of an elastic material such as plastic, silicon, nylon, etc. The diaphragm obstructs the vaginal cavity toward the outside of the vaginal delineator, preventing leakage of carbon dioxide from the peritoneal cavity.

[0016] In the third embodiment of the invention, the cup is the occluding apparatus as well as the structure on which the variable-angle, rigid ring is mounted.

[0017] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

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[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

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[0014] A third embodiment of the present invention is configured like a cup with a rigid ring, pivotally attached at the top of the cup. Again, the pivotal attachment provides accommodation for varying angles of the fornix.

[0015] Another object is to provide an occluder to prevent leakage of carbon dioxide from the peritoneal cavity when the vagina is opened laparoscopically. An enlarged portion of an extension being inserted into the uterine mobilizer, is made to receive a diaphragm made of an elastic material such as plastic, silicon, nylon, etc. The diaphragm obstructs the vaginal cavity toward the outside of the vaginal delineator, preventing leakage of carbon dioxide from the peritoneal cavity.

[0016] In the third embodiment of the invention, the cup is the occluding apparatus as well as the structure on which the variable-angle, rigid ring is mounted.

[0017] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.
[0027] FIG. 4b is a side elevation view of the second embodiment of the vaginal delineating and occluding device;

[0028] FIG. 4c is a plan view from the bottom of the second embodiment of the vaginal delineating and occluding device;

[0029] FIG. 4d is a first side elevation view of an arm for the second embodiment vaginal delineating and occluding device;

[0030] FIG. 4e is a second side elevation view of an arm for the second embodiment vaginal delineating and occluding device;

[0031] FIG. 5a is a side elevation view of a third embodiment of the vaginal delineating and occluding device minus a solid ring to clearly show angles;

[0032] FIG. 5b is a cutaway side elevation view of a third embodiment of the vaginal delineating and occluding device;

[0033] FIG. 5c is a side elevation view of a third embodiment of the vaginal delineating and occluding device;

[0034] FIG. 5d is a plan view from the top of a third embodiment of the vaginal delineating and occluding device; and

[0035] FIG. 6 is a cutaway view of a female pelvis, the vaginal delineating and occluding device being mounted on a uterine mobilizer and inserted into the vagina.

DETAILED DESCRIPTION OF THE INVENTION

[0036] A first, preferred embodiment of a vaginal delineating and occluding device 100 is shown in FIG. 1 along with a uterine mobilizer 110 as disclosed in U.S. Pat. No. 5,562,679 which is hereby incorporated by reference. The vaginal delineating and occluding device 100 is attached to the head 120 of the uterine mobilizer 110. The device shown in detail in FIGS. 2a-e is a first embodiment of the vaginal delineating and occluding device 100 of the present invention. A base 205 has an extension 250 for insertion into the head 120 of the uterine mobilizer 110 and is locked therein. The proximal end 215 of the base 205 is for attaching obturators of various lengths. A solid metal ring 200 is attached to four legs 210, 230. The distal ends of a first pair of solid legs 210 are firmly affixed to the base 205. The proximal ends of the legs 210 are pivotally attached to the ring 200 via pins 220 about which the ring 200 may pivot. The ring 200 is permitted to pivot about 20° in both directions from a plane perpendicular to a longitudinal axis of the base 205. This pivoting permits the accommodation of various angles of the vaginal fornix 620 (see FIG. 6).

[0037] The first pair of legs 210 are preferably of a single piece, solid throughout.

[0038] The second pair of legs 230 are telescopic and comprise a plurality of parts as detailed in FIG. 2e. A distal end of a secure arm 255 is firmly affixed to the base 205. The proximal end of the secure arm 255 engages a pin 280 to which an inner telescoping arm 265 is pivotally attached. The inner telescoping arm 265 slides into the distal end of an outer telescoping arm 260. The outer telescoping arm 260 is pivotally attached to the ring 200 at its proximal end by a pin 270. The outer telescoping arm 260 is a hollow tube to receive the proximal end of the inner telescoping arm 265.

[0039] A diaphragm 225 of elastic material such as plastic, nylon, silicon, etc. is shown in FIGS. 3a and 3b. Its use is to obstruct the vagina for the prevention of carbon dioxide leakage from the peritoneal cavity when the vagina is opened laparoscopically. The diaphragm 225 has a hole 300 in its center through which an enlarged portion 275 of the base 205 of the vaginal delineating and occluding device passes and helps secure the diaphragm 225. When the distal end of the base 205 is inserted in the uterine mobilizer 110, the diaphragm 225 is held securely between the base 205 and the mobilizer 110. Various sizes of diaphragms 225 may be supplied to fit a variety of patients. About the circumference of the diaphragm 225 is an enlarged portion 310. A center annulus 320 is thicker than a center membrane 330.

[0040] A second embodiment of the vaginal delineating and occluding device 100 is shown in FIGS. 4a-e. In this embodiment, all the legs 410 are made as the telescoping legs 230, described above. In addition, a spring 440 applies a force to separate the solid ring 200 away from the base 205. The spring 440 may bear directly on the secure arm 255 and the outer telescoping arm 260 as shown in FIG. 4d or it may bear on the inner telescoping arm 265 and the solid ring 200 as shown in FIG. 4c. In this embodiment, the location of the solid ring 200 relative to the base 205 is adjustable to accommodate various lengths of the cervix.

[0041] A third embodiment of the present invention is shown in FIGS. 5a-d. Here, a cup 500 is illustrated the rim of which has a slope in two opposite directions, the slope having an angle, θ, where θ is about 15°. This cup 500 is attached in the same way into the head 120 of the uterine mobilizer 110 via the extension 250. Pivotally attached at the top if the cup 500 is a rigid ring 510, preferably constructed of a metallic material. The rigid ring 510 is pivotally attached to pins 520 that permit the ring to tilt through the angle, θ, as far as the rim of the cup 500, again, about 15°. The view in FIG. 5a is intentionally without the ring 510 to show the angle θ. The ring 510 bears against the fornix 620, while the cup 500 acts to occlude the vagina, replacing the diaphragm 225 of the previous embodiments.

[0042] The vaginal delineating and occluding device 100 of the first embodiment is shown in use in FIG. 6. The vaginal delineating and occluding device 100 is inserted into a vagina 610 using the uterine mobilizer 110 until the ring 200 of the vaginal delineating and occluding device 100 rests against the vaginal fornix 620.

[0043] The above embodiments are the preferred embodiments, but this invention is not limited thereto. It is, therefore, apparent that many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. A method of constructing a vaginal delineator and occluder comprising a solid ring, a plurality of legs, and a base for securing said apparatus to a uterine mobilizer; said method comprising:

(a) operably, pivotally mounting the solid ring to the plurality of legs; and

(b) operably affixing the legs to the base.
2. The method of claim 1 wherein at least some of the plurality of legs comprise a distal arm, an outer telescoping arm, and an inner telescoping arm, the method additionally comprising:

(a) operably, securely affixing the distal arm to the base;
(b) operably, pivotally affixing the outer telescoping arm to the solid ring;
(c) engaging a proximal end of the inner telescoping arm into the outer telescoping arm; and
(d) operably, pivotally attaching a distal end of the inner telescoping arm a proximal end of the distal arm.

3. The method of claim 2, each of the at least some of the plurality of legs also comprising a spring tending to separate the base from the solid ring, the method additionally comprising engaging said spring between the distal arm and the outer telescoping arm such that the spring bears on the distal arm and the outer telescoping arm and forces them apart.

4. The method of claim 2 wherein all the plurality of legs comprise a distal arm, an outer telescoping arm, and an inner telescoping arm.

5. A method of constructing a vaginal delineator and occluder comprising a solid ring, a base for securing said apparatus to a uterine mobilizer, and a cup to obstruct a vagina to prevent leakage of carbon dioxide from a peritoneal cavity, said method comprising:

(a) operably, pivotally mounting the solid ring to a rim of the cup; and
(b) operably, rigidly mounting the base to the cup.

6. The method of claim 5 wherein the solid ring is circular and the pivotal mounting has an axis through a diameter of the ring.

7. The method of claim 5 wherein the solid ring pivots on its pivotal mounting about 15°.

8. The method of claim 7 additionally comprising the steps of:

(a) sloping a rim of the cup is about 15° each way from a diameter to allow clearance for the ring to pivot; and
(b) operably, pivotally attaching said ring at an apex of the rim.

9. The method of claim 1 wherein the vaginal delineator additionally comprises a diaphragm of elastic material used to obstruct a vagina to prevent leakage of carbon dioxide from a peritoneal cavity, the method additionally comprising the steps of:

(a) constructing the diaphragm with a thicker periphery than a middle membrane;
(b) constructing the diaphragm with a thicker inner annulus than the middle membrane; and
(c) providing a hole in a center of the diaphragm for receiving the base of the vaginal delineator and occluder.

10. The method of claim 9 wherein a plurality of sizes of the diaphragm of elastic material is available.

11. An apparatus for vaginal delineation and occlusion, said apparatus being inserted into a uterine mobilizer, the apparatus comprising:

(a) a solid ring;
(b) a plurality of legs to which the ring is operably, pivotally mounted; and
(c) a base for securing said apparatus to the uterine mobilizer, the legs being operably affixed to the base.

12. The apparatus of claim 11 additionally comprising a plurality of legs, the length of said legs being variable to permit the solid ring to tilt to accommodate various angles of a fornix.

13. The apparatus of claim 12 wherein the variable-length legs comprise:

(a) a distal arm, securely, operably affixed to the base;
(b) an outer telescoping arm, pivotally affixed to the solid ring; and
(c) an inner telescoping arm connecting the distal arm and the outer telescoping arm, the inner telescoping arm sliding into the outer telescoping arm.

14. The apparatus of claim 13 additionally comprising a spring tending to force the distal arm and the outer telescoping arm apart.

15. An apparatus for vaginal delineation and occlusion, said apparatus being constructed to be inserted into a uterine mobilizer, the apparatus comprising:

(a) a cup to obstruct a vagina to prevent leakage of carbon dioxide from a peritoneal cavity;
(b) a solid ring operably, pivotally mounted to the cup; and
(c) a base for securing said apparatus to the uterine mobilizer, said base being operably, rigidly mounted to the cup.

16. The apparatus of claim 15 wherein the solid ring is substantially circular, the apparatus additionally comprising a pivotal axis through a diameter of the solid ring at which the solid ring is operably, pivotally mounted to the cup.

17. The apparatus of claim 15 additionally comprising clearance to permit the solid ring to pivot about 15°.

18. The apparatus of claim 17 additionally comprising:

(a) a sloped rim of the cup, said slope being about 15° each way from a diameter to allow clearance for the ring to pivot; and
(b) an attachment pin, having an axis at an apex of the cup’s rim to which the ring is operably, pivotally attached.

19. An elastic diaphragm for use with a vaginal delineation and occlusion device, said diaphragm comprising:

(a) a hole in a center of the diaphragm for engaging a base of the vaginal delineation and occlusion device;
(b) a first annulus surrounding said hole;
(c) a membrane of annulus shape bordering an outer circumference of the first annulus, said membrane being of thinner material than the first annulus; and
(d) an outer periphery being of thicker material than the membrane.

20. The elastic diaphragm of claim 19 wherein said diaphragm is made of silicone.