

[54] TOOL FOR LOWER COLON SURGERY

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[58] Field of Search..... 128/20, 303 R, 305, 334 C, 128/334 R, 240, 241

[56]

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[57]

ABSTRACT

A combination of an obturator designed to be apposed to the bowel and an external perineal tractor for assisting a surgeon during lower colon surgery. By fixing the relative axial positions of the obturator and tractor on a supporting pipe or rod, maximum "stretch" of the bowel is achieved and upward pressure can be applied on the perineum to assure the surgeon of an adequate length of bowel for anastomosis.

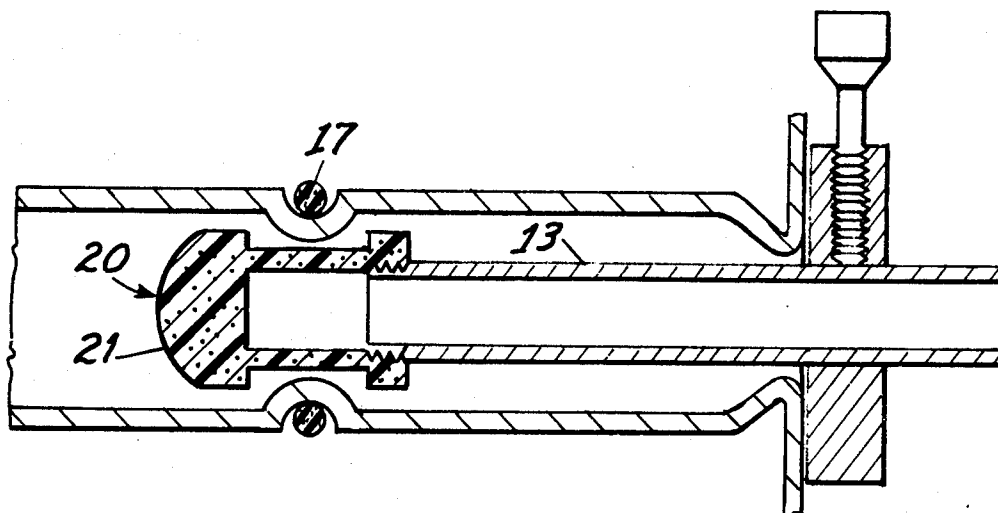
4 Claims, 10 Drawing Figures

Fig. 1

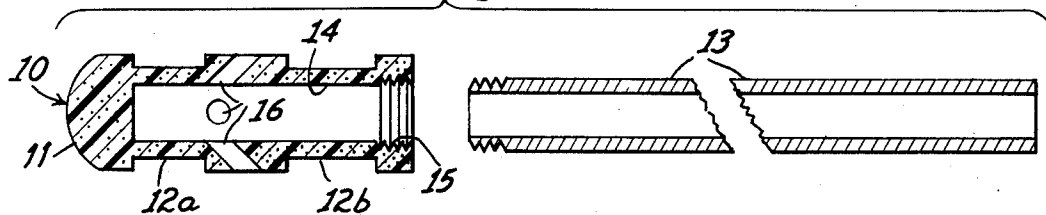


Fig. 2

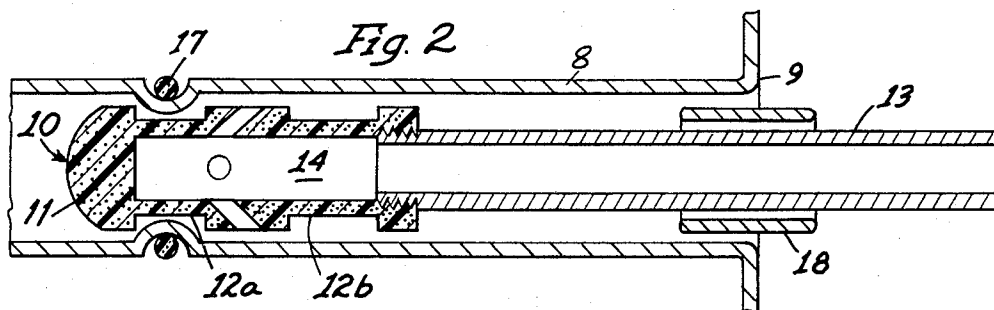


Fig. 3

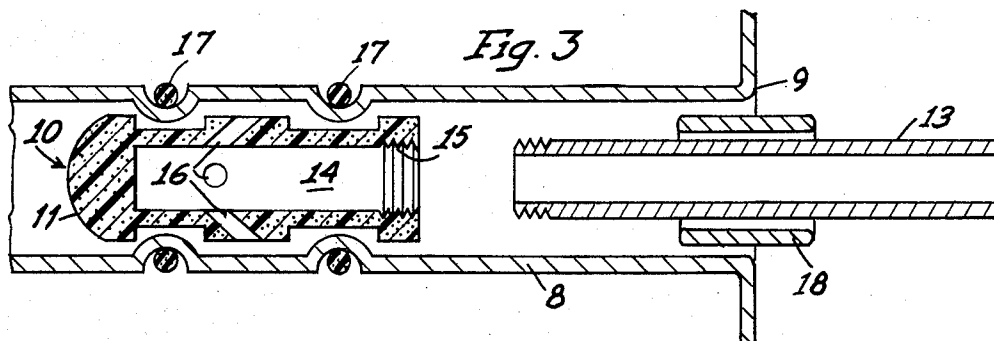
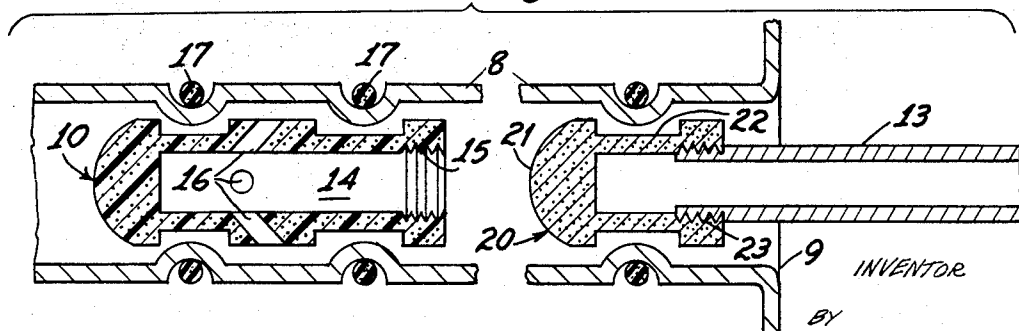


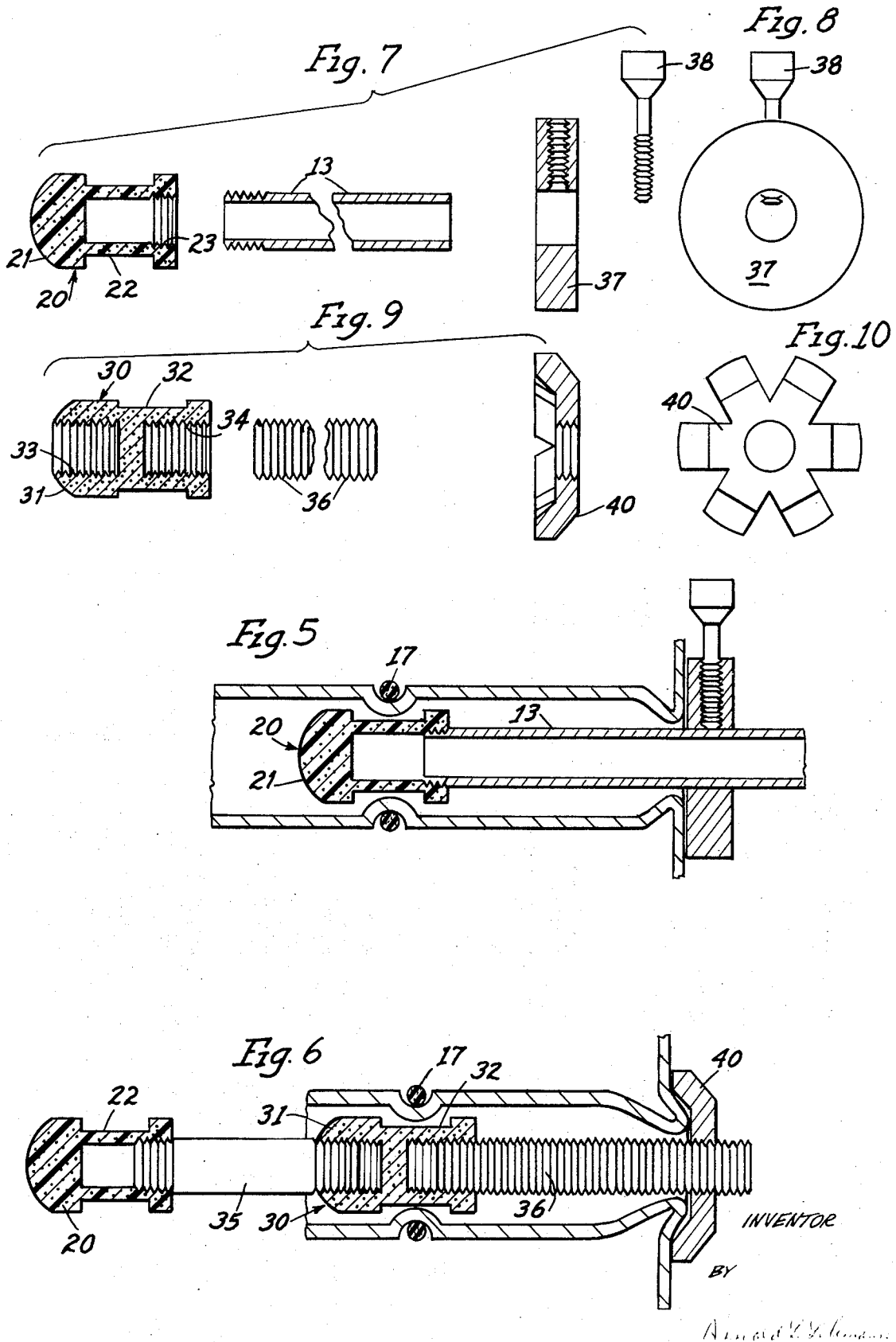
Fig. 4



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TOOL FOR LOWER COLON SURGERY

BACKGROUND OF THE INVENTION

This invention is concerned with lower colon surgery, which must be accomplished within the restricted confines of the pelvis. In such operations, particularly when removing lesions in the lower bowel, the short length of the remaining bowel sometimes renders it impossible to successfully accomplish anastomosis. This results in an ultimate need for a colostomy. The combination of obturators and tractors as described herein allows manipulation of the bowel to permit the surgeon to gain slightly more length in the remaining portion of the bowel upon which operative surgery is being performed.

SUMMARY OF THE INVENTION

The invention comprises a surgical tool including a cylindrical obturator having one end smoothly rounded and having an annular groove permitting the bowel to be brought into apposition to the obturator by application of a restrictive band about the bowel exterior within the groove confines. The obturator is mounted coaxially to a rigid elongated support member, and a radially protruding tractor is mounted to the supporting member at a location spaced axially outward from the obturator. This combination of an obturator and tractor enables the surgeon to move the obturator and tractor in unison to push the perineum inward and thereby improve internal access of the surgeon to the lower portions of the bowel.

It is the prime purpose of this invention to provide a tool to assist a surgeon during abdominal surgery on the lower bowel to gain added access and control of the lower portions of the bowel during anastomosis.

Another object of the invention is to provide a flexible combination of obturators and tractors suitable for lower colon surgery.

These and further objects will be evident from the following disclosure, taken together with the accompanying drawings, which illustrate several embodiments of the basic structure.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an axially-exploded cross-sectional view of a first embodiment of the invention, with a portion of the supportive pipe being broken away;

FIGS. 2-6 show the steps involved in use of the invention;

FIG. 2 is a longitudinal cross-sectional view through the bowel showing initial placement of the obturator;

FIG. 3 is a longitudinal cross-sectional view through the bowel showing the removal of the pipe;

FIG. 4 is a longitudinal cross-sectional view through the bowel showing insertion of a second obturator;

FIG. 5 is a partial longitudinal cross-sectional view through the bowel showing use of a first perineal tractor;

FIG. 6 is a partial longitudinal cross-sectional view through the bowel showing use of an alternate obturator and perineal tractors;

FIG. 7 is an axially-exploded cross-sectional view showing a first obturator and perineal tractor combination;

FIG. 8 is an end view of the assembled perineal tractor shown in FIG. 7;

FIG. 9 is an axially-exploded cross-sectional view of the alternate obturator and perineal tractor; and

FIG. 10 is an end view of the perineal tractor shown in FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drawings illustrate several forms of luminal obturators, which are used in combination with supportive pipes or rods and perineal tractors. These elements are designed for use by a surgeon during operations on the lower bowel and by a technical assistant assisting in the perineal area during such operations. While specifically designed to assist in lower colon surgery to remove cancerous sections, the apparatus has further application in cleansing and surgical procedures relating to the lower bowel.

The drawings illustrate three forms of the obturator and two illustrative perineal tractors used in combination with them. A cleansing obturator 10 is shown in various operative positions in FIGS. 1-4. A holding obturator 20 is illustrated in FIGS. 4-7. An intermediate or connecting obturator 30 is illustrated in FIGS. 6 and 9. One illustrative perineal tractor is shown in FIGS. 5, 7 and 8. A second form of tractor is shown in FIGS. 6, 9 and 10.

The cleansing obturator 10 is preferably made of plastic resin such as "Teflon" brand polytetrafluoroethylene. These materials are particularly well suited because they slip well and are resistant to heat. Metallic materials are suggested for the connecting obturator 30 to provide increase strength.

The cleansing obturator 10 is basically cylindrical in shape, having a first axial end 11 smoothly rounded to facilitate its insertion within the bowel. In FIGS. 2-6, the lower section of the bowel is generally shown at 8 and the surrounding perineum is designated at 9. The obturator 10 is provided with two annular grooves formed about its circumference, a proximal groove 12a adjacent end 11 and a distal groove 12b. The end of obturator 10 opposite to the rounded axial end 11 is provided with a central axial threaded opening 15 leading to an inner lumen or chamber 14. A plurality of radial apertures 16 are in open communication with chamber 14. A tubular supportive pipe 13 is threadably engaged within opening 15 and is used to permit external positioning and control of obturator 10 by the surgical assistant.

The holding obturator 20 is also provided with a smoothly rounded tip at one axial end 21 and an annular groove 22 about its circumference. The remaining end of obturator 20 has a threaded opening 23 formed therein to receive a supportive pipe 13 as described above.

The first form of perineal tractor is shown as an annular disc 37 (FIGS. 7, 8) made of metal or other suitable material. It has a manually adjustable locking bolt 38 threadably received through a radial aperture to permit the user to lock disc 37 at any desired axial position along pipe 13.

FIGS. 2-5 illustrate the general procedures by which the illustrative obturators 10 and 20 are used during bowel surgery. The cleansing obturator 10 is used initially to isolate the lower bowel section and facilitate cleansing. When operating on lower lesions, obturator 10 can be inserted on a 10 cm. pipe 13 by use of a rectal speculum 18 or by passing obturator 10 blindly with

care from the perineum below with the help of the surgeon's hand in the pelvis. For more proximal colon lesions, a 40 cm. pipe 13 would be used and inserted under vision through a proctoscope.

After insertion of obturator 10, the surgeon is able to bring the bowel into apposition to obturator 10 by application of a restrictive band 17 about the bowel exterior within the axial confines of the proximal groove 12a. Band 17 can be in the form of a penrose drain, a rubber band, a suture or suitable restrictive elements capable of apposing the bowel to the proximal groove 12a. Sterile water, or a saline, cleansing antiseptic, antibiotic, or other suitable solution is irrigated through pipe 13 at an appropriate pressure level and for an appropriate length of time to achieve the cleansing results desired. The fluid is free to pass out through the speculum 18. It is not advisable to apply suction to pipe 13 at this point. Suction would aspirate cancer cells or faeces into obturator 10. The washing action of the solution removes cancerous cells from the surface of obturator 10 and cleanses the interior of bowel 8 distal to the point at which the bowel is apposed to the proximal groove 12a.

Following cleansing of bowel 8 through the use of holes or apertures 16, the bowel 8 is apposed at the distal groove 12b by a second ligature or other band 17, (FIG. 3). Pipe 13 can then be removed by releasing the threaded connection between it and obturator 10. The bowel can again be washed by introduction of fluid through the open end of pipe 13. The solution can be allowed to flow out the anal canal through rectal speculum 18, or suction can be applied through the open end of pipe 13. The two stage procedure — irrigation with bowel 8 apposed at proximal groove 12a and subsequent irrigation with bowel 8 apposed at distal groove 12b — serves to decrease the seeding of shed cancer cells at the time of surgical resection of bowel 8.

When an adequate length of bowel exists distally, a ligature or band of heavy material (not shown) may be placed and tied distal to obturator 10 prior to sectioning of the bowel. This would prevent contents within obturator 10 from spilling back. However, this procedure is not feasible in the case of low lesions. Where the bowel cannot be tied distal to obturator 10, a small glove or sleeve (not shown) may be placed over the obturator and bowel to prevent further spillage of cancer cells.

When operating to remove a low lying lesion, the surgeon requires maximum access to the lower portions of the bowel to complete anastomosis. To accomplish this, the obturator 20 is inserted into the bowel as shown in FIG. 4. This is accomplished prior to transection of the bowel 8. The bowel is apposed to the groove 22 of obturator 20 (FIG. 4). In lower lesions, the obturator 10 and obturator 20 may be virtually contiguous, but sufficient length of colon should be free proximal to obturator 20 to allow anastomosis. After the bowel has been secured to both obturators 10, 20 as shown in FIG. 4, the mesentery and lymph nodes are excised by the surgeon in the usual manner.

One advantage of the use of obturator 20 is that it provides the surgeon with an adequate and known length of bowel for resection. Furthermore, when operating in the restricted confines of the pelvic area, conventional procedures often are inadequate to insure surgical resection in the lower reaches of the bowel. Inward pressure on the obturator 20, through the at-

tached pipe 13, can assist the surgeon in reaching and surgically joining the severed sections of the bowel. To safely accomplish this, a tractor 37 should be used as shown in FIG. 7. Tractor 37 is mounted about pipe 13 at a location spaced axially outward from obturator 20. It is adjustably fixed to pipe 13 by manipulation of bolt 38. The surgeon or assistant is then able to move the obturator and tractor in unison to push inwardly and move the perineum inward along with the bowel. This greatly improves the internal access of the surgeon to the lower portions of the bowel without further stretching or risk of damage to the bowel. This inward movement can often result in providing the surgeon with access to the bowel as necessary for successful anastomosis.

FIG. 5 illustrates the above structure in use. The obturator 20 has been inserted up the anal canal. The judgement of the surgeon, based on the level of the lesion to be removed, dictates the level of obturator 20 and the axial position of tractor 37 along the supportive pipe 13. The stretched distance between obturator 20 and the perineal tractor 37, plus the inward or upward pressure of the assistant or supportive pipe 13 brings the lower rectal segment closer to the surgeon for ease of anastomosis.

The diagram shown in FIG. 6 illustrates intra-abdominal traction, applied through an intermediate or connecting obturator 30 and a second form of tractor 40. The details of these elements are illustrated in FIGS. 9 and 10. Obturator 30 is axially threaded at both ends, having a tapered end 31 to facilitate insertion. It is also provided with an intermediate annular groove 32 about its circumference. Its upper threaded opening is shown at 33 and lower threaded opening is shown at 34. It is designed to be carried between a connecting rod 35 and a supportive rod 36, both of which are threaded along their length to complement the threaded openings 33, 34 respectively.

The obturator 30 can be utilized with only the supportive rod 36 attached to it, in the manner described above with respect to obturator 20. It is inserted anally with care and a suitable band 17 can be used to appose bowel 8 to obturator 30.

The double-ended rod 35 permits attachment of a holding obturator 20 inward of obturator 30 as shown in FIG. 6. The inner obturator 20 provides the surgeon with a "handle" for internal manipulation or pulling to bring the apposed bowel and perineal area contacted by tractor 40 into the pelvic recess where anastomosis must be accomplished.

The obturator 30 can also be inserted internally after severing of the bowel. A spare holding obturator 20 and intermediate or connecting obturator 30 would be used in combination with a connecting rod 35 and supportive rod 36. The assembly would be passed into the lumen of the transected rectal segment and out of the anal canal in an orientation opposite to that shown in FIG. 6. A surgical assistant would then remove the obturator 20 and replace it with a tractor 40. The bowel would then be apposed to obturator 30 and tractor 20 would be threadably adjusted along the rod 35 to provide maximum "stretch" of the bowel between obturator 30 and tractor 40. The supportive rod 36, which protrudes into the surgical area can then be used by the surgeon, with or without an obturator at its inner end, to exert a pull on the bowel to facilitate placement of the posterior row of the anastomosis. The surgeon

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would then remove the interior obturator and rod 36 from obturator 30. The assistant can then exert a pushing force in the perineum area and elevate the operative area of the rectum by action of tractor 40 while the surgeon completes the anterior row of anastomosis. Finally, the band 17 about obturator 30 must be removed and the obturator and connecting rod are then withdrawn anally by the assistant.

The above description sets out the general concepts of the structure and its usage in facilitating anastomosis. Modifications might be made with respect to specific details while remaining within the intended scope of this disclosure.

Having thus described my invention, I claim:

1. A tool for use in lower colon surgery performed internally within a patient, comprising:

a cylindrical obturator having a first axial end smoothly rounded to facilitate its insertion within the bowel;

an annular groove formed about the circumference of the cylindrical obturator, enabling the surgeon to bring the bowel into apposition to the obturator by application of a restrictive band about the bowel exterior within the confines of the groove;

a rigid elongated member mounted coaxially to the remaining axial end of the obturator, whereby the location of the obturator within the bowel can be controlled by manual manipulation of the elongated member;

and a radially protruding tractor mounted to the elongated member at a location thereon spaced ax-

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ially outward from said remaining axial end of the cylindrical obturator enabling the surgeon to move the obturator and tractor in unison to move the perineum inward and thereby improve internal access of the surgeon to the lower portions of the bowel.

2. A tool as set out in claim 1 further comprising: adjustable mounting means operatively connected between the elongated member and said tractor for permitting axial adjustment of the spacing between the tractor and said remaining axial end of the cylindrical obturator.

3. A tool as set out in claim 2 wherein the cylindrical obturator has an inner lumen with radial apertures formed through the cylindrical walls of the obturator in communication with the inner lumen,

said rigid elongated member comprising a hollow tube in sealed communication with the inner lumen of said obturator;

the radial apertures being formed at the distal side of the annular groove about the cylindrical obturator; a second annular groove formed about the circumference of the cylindrical obturator at the distal side of said radial apertures.

4. A tool as set out in claim 1 further comprising: a second rigid elongated member selectively fixed coaxially to the smoothly rounded end of the obturator to enable the surgeon to manipulate the obturator and tractor from an internal location.

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