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(54) **SYSTEM FOR DIALYSIS AND SHOCK TREATMENT**

SYSTEM FÜR DIALYSE UND SCHOCKBEHANDLUNG

SYSTEME DE DIALYSE ET DE TRAITEMENT DE L'ETAT DE CHOC

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Description

Background of the Invention

5 [0001] The present invention is directed to a dialysis system especially useful for removing toxic matter from the serum of the large intestine, and to a system for shock treatment.

Summary of the Invention

10 [0002] It is an object of the present invention to replace normal hemodialysis in the filtration of toxic substances in the serum.

[0003] It is another object of the present invention to provide a dialysis system for a patient which will result in substantially no blood loss during dialysis treatment.

15 [0004] It is yet another objection of the present invention to provide a dialysis system which substantially eliminates the risk of infection.

[0005] It is a further object of the present invention to provide a dialysis system using components which are relatively low in cost so that each patient should be able to afford his or her own individual system, which will further allow for increased time available for dialysis, therefore increasing treatment proficiency, and also reduce or substantially eliminate the risk of cross infection.

20 [0006] It is a yet further object of the present invention to provide a dialysis system having components which are of simple design and easy to use, thereby obviating the need for specially trained medical technicians.

[0007] It is a yet further object of the present invention to provide a system for treating shock.

[0008] A prior art system suitable for dialysis and shock treatment is known e.g. from US Patent 5,620,604.

25 [0009] In accordance with the present invention, a dialysis system for removing toxic matter from the serum of the large intestine is provided, comprising means for introducing a dialysis filtrate solution to the large intestine of a patient at a first location, said filtrate providing a vehicle for removing toxic matter from the serum of the large intestine, said means for introducing comprising a flexible input tube having a distal end for insertion into the large intestine and having a first inflatable balloon at the distal end of said input tube, means for removing waste filtrate from the large intestine at a second location spaced from the first location after the filtrate removes toxic matter from the serum, said means for removing comprising a flexible output tube having a distal end for insertion into the large intestine and having a second inflatable balloon at the distal end of said output tube, said first and second balloons being spaced from each other for sealing off a portion of the descending colon of the large intestine, a third inflatable balloon between said first and second inflatable balloons, and means for providing fluid to said first, second and third inflatable balloons to thereby inflate said balloons, said means for providing fluid being independent from said means for introducing a dialysis filtrate solution.

35 [0010] A dialysis method for removing toxic matter from the serum of the large intestine of a patient, comprises the steps of introducing into the large intestine of a patient a tube having a distal end with first and second inflatable balloons spaced from each other at the distal end thereof, and a third inflatable balloon between the first and second inflatable balloons, inflating the first and second inflatable balloons, to seal off a portion of the large intestine of the patient, and the third inflatable balloon, introducing a dialysis filtrate solution to the large intestine of the patient from the third inflatable balloon at a first location adjacent the first inflatable balloon independently after said inflating step, said dialysis filtrate solution providing a vehicle for removing toxic matter from the serum of the large intestine, and removing waste filtrate from the large intestine through the third inflatable balloon at a second location which is spaced from the first location and adjacent the second inflatable balloon to remove toxic matter from the serum between the first location and second location.

45 [0011] The invention also provides a system for treating shock.

[0012] A filtrate composition for use in dialysis, comprises a vasodilator, a high molecular weight protein to effect osmotic pressure to achieve diffusion of element across the large intestine membrane into the filtrate, and mineral constituents for maintaining proper serum levels in the large intestine.

50 [0013] The dialysis filtrate composition may comprise electrolyte ingredients, buffers and a high molecular weight osmotic agent for removing nitrogenous waste.

[0014] The invention also provides a system for treating shock, which can be adapted from the same system and method for dialysis. The composition for treating shock may comprise electrolyte ingredients, buffers and a rehydrating agent.

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Brief Description of the Drawing**[0015]**

Fig. 1 is a block diagram of a system according to the present invention;

Fig. 2 is an elevational view of a balloon donut design for the system according to the invention; and

Fig. 3 is an elevational view of a balloon donut design having an inflatable central cylinder.

Detailed Description of the Preferred Embodiment

[0016] As shown in Fig. 1, the dialysis system 10 according to the present invention comprises an input pump 12 connected to an input dialysis solution container 14. The input pump 12 has its output 16 connected in line with two pressure gauges, the first one being a 75mm Hg pressure gauge 18 and the second one being a 45mm Hg pressure gauge 20. To the output of input pump 12 is connected a flexible plastic input tube 22 which is fed through the sidewall of an output tube 24 also being made of flexible plastic. The input and output tubes 22, 24 are concentric, with the input tube having a distal end 26 about 14-22 inches longer than the distal end 28 of the output tube 24. The differential in the lengths of the two tubes will be determined according to patient size, and of course may be outside of this range. Adjacent the distal end 26 of the input tube are a plurality of openings 29 for introducing the dialysis fluid into the large intestine at a first location. The fluid is removed at a second location as shown by the arrow at the distal end 28 of the output tube 24.

[0017] Also shown in the Fig. 1 is an output suction pump 30 connected to an output container 32. The output container 32 has a capacity of about 8 liters and has a float switch 34 to detect when the level of fluid in the output container 32 is greater than about 105% of its capacity, i.e. about 8.4 liters. When the float switch 34 detects that the fluid level exceeds 8.4 liters, the output pump 30 is disabled or de-energized. This action guards against the patient becoming dehydrated. However, if the patient does become dehydrated, he or she may have to drink a small quantity of water or juice to return to normal osmotic balance.

[0018] The capacity of the input container 14 is also about 8 liters and also has a float switch 36 disposed close to its bottom. When the level of fluid in the input container 14 is less than a predetermined level of perhaps 1 liter or less, the input pump 12 is disabled.

[0019] The 45mm Hg pressure gauge 20 is connected to the output suction pump 30 so that the output suction pump 30 is enabled or energized when the input pressure is greater than about 45mm Hg.

[0020] Of course, the pressure may be different as determined by various clinical trials. The input pump 12 is connected to the 75 mm Hg pressure gauge 18, so that the input pump 12 is disabled when the input pressure exceeds 75mm Hg. Of course, this value may also be changed depending upon clinical trials.

[0021] The pumps 12 and 30 may be operated by AC or DC power. If AC electricity is not available because of power outage or other reasons, a gravity and pressure valve arrangement may be employed.

[0022] The length of the concentric tubes is on the order of 36-48 inches. Its outer dimension is about 5/8 inches and its inner dimension is about 3/8 inches. The tubes may be made of flexible plastic to allow for flexibility and ease of cleaning and disinfecting. These may be available as either pre-sterilized and disposable, or reusable after proper sterilization. The ends of the tubes should preferably be rounded and free of sharp angles so as not to perforate the bowel wall of the patient.

[0023] In cases where the ileo-cecal has been damaged through disease or surgery, it may be necessary or desirable to incorporate inflatable doughnut-shaped balloons 40, 42 at the end of the tubes, as shown. The balloons are connected to an air line 44 embedded in the input tube, which air line 44 is connected to a balloon pump 46, of conventional design, for inflating and controlling the deflating of the balloons 40, 42.

[0024] A wire 48 encased in the input tube may also be provided which carries a low voltage current, for controlling ion flow and increasing osmotic effect of the filtrate solution. The wire 48 is connected to a DC voltage source 50, which is grounded to the patient by a skin electrode, for example.

[0025] Fig. 2 shows a balloon donut design having balloons 40, 42 particularly suited to limit movement from peristalsis, thereby assuring the sealing off of a segment of the large intestine in an area suitable for rapid diffusion. The cellular make-up of the approximately 25 cm of colon proximal to the rectum is stratified, leaving no available diffusible surface area. The balloon 42 is located preferably at least 25 cm from the rectum and is formed of two spaced donut portions 42A and 42B. Each donut portion is inflatable to a 150 mm maximum diameter. The inner or middle portion 42C is inflatable to maximum diameter of 75 mm. The width of the inner portion 42C is about 20 mm, and the width of the outer portions 42A, 42B are each about 10 mm, these dimensions being exemplary and not limiting. Balloon 40 is similarly arranged. Leaving a 20 mm gap (between the portions 42A, 42B) in which the myenteric plexus will not be

activated by distention should eliminate/reduce peristalsis and thereby maintain ideal position of the sealed off segment in an area richly supplied with cells with great diffusion capability as well as greatly expanded surface area.

[0026] Fig. 3 shows a balloon donut design similar to that of Fig. 2, while also including an inflatable central balloon cylinder 52 disposed between donuts 40 and 42 and surrounding the input and output tubes 22, 24. The inflatable cylinder 52 is, during insertion and removal of the device, in a deflated condition like the donuts 40 and 42. The cylinder is in fluid communication with the donuts 40 and 42 through ports 54 and will thus inflate and deflate with the donuts 40 and 42. Actually, during inflation, donut 42 will inflate first, followed by cylinder 52, and then donut 40. The cylinder 52 insures maximal interface of the dialysate and the large intestine semi-permeable membrane 58 in the dialysis region 56 between the cylinder 52 and membrane 58. The dialysate will flow in the direction of the arrows through openings 29 at the distal end 26 of the input tube 22, through connecting input tubes 60 into the region 56, then through connecting output tubes 62 to openings 28 into the output tube 24.

[0027] The large intestine is a semi-permeable membrane allowing transport or diffusion of water soluble elements. The purpose of the filtrate solution is to provide a vehicle in which undesirable elements or toxins may be removed from the serum of the large intestine without affecting the basic homeostatic mechanisms and important mineral and pH balances. The filtrate composition preferably consists of the following components:

Table A

Sodium Chloride	120 mEq/liter
Potassium Gluconate	5.0 mEq/liter
Magnesium Citrate	2.4 mEq/liter
Calcium Lactate	18 mEq/liter
Ferrous Citrate	220 mg./liter
Zinc Citrate	205 mcg./liter
Vitamin C (Ascorbic Acid)	400 mg./liter
Lemon bioflavonoids	15 mg./liter
Rutin	15 mg./liter
Hesperidin	15 mg./liter
Acerola	15 mg./liter
Niacin	20 mg./liter
Casein (to achieve a filtrate osmolality of 450 mosm/kg)	
Sodium Bicarbonate (min. of 40 mEq/liter) and Glucuronic Acid to produce a highly buffered pH of about 7.38 pH.	

[0028] The mineral constituents serve to maintain proper serum levels of the associated minerals. Niacin is provided for its vasodilator effect and the concomitant effect to increase blood supply to the area, thereby shorting time for serum filtration. Casein is provided to introduce a high molecular weight protein that is not available to transport through the membrane wall, i.e. to effect the osmotic pressure that will achieve diffusion of elements across the membrane into the filtrate. The filtrate is in a water base and is buffered preferably to a pH of about 7.38. It should of course be understood that the concentration values given may be adjusted or changed after clinical test. The make up of the components may be modified to adjust to individual, metabolic distortions or to sensitivities to the components of the patient.

[0029] The purpose of another embodiment of a dialysis filtrate composition is to remove about 24 grams of urea daily. The dialysis filtrate composition has as its goals: (1) the re-establishment of proper electrolyte concentrations, (2) maintaining proper acid-base equilibrium, and (3) removal of nitrogenous and other associated waste. The dialysis filtrate composition according to this embodiment preferably comprises the following ingredients with the preferred values and ranges indicated:

Table B

Electrolytes	Sodium	135 mmol/l,	range	134-147 mmol/l
	Potassium	4 mmol/l,	range	3-5 mmol/l
	Magnesium	1 mmol/l,	range	0.75-2.3 mmol/l
	Calcium	2 mmol/l,	range	1-3.5 mmol/l
	Chloride	105 mmol/l,	range	95-110 mmol/l
Buffer	Bicarbonate	37 mmol/l,	range	35-45 mmol/l
	Lactate	8 mmol/l,	range	0-9 mmol/l

Table B (continued)

High Mol. Weight Osmotic Agent	range	3-16%
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[0030] The lactate could be reduced or eliminated, in which case it would preferably be replaced on almost a mmol/l per mmol/l basis by bicarbonate, which could then be increased up to 45 mmol/l if no lactate is used. The bicarbonate is an ideal physiological buffer. The lactate also serves as a buffer, and as a vasodilator.

[0031] The high molecular weight osmotic agent can be any medium weight (eg. about 200 Daltons) to high molecular weight polymer, protein or amino acid, or combination thereof, that is non-irritating and not readily absorbed in the colonic mucosa. Such examples are maltodextrin (having a molecular weight of 16k Daltons), and casein.

[0032] If necessary or desirable another vasodilator such as niacin in an amount of about 0.25 mg/l may be added to promote increased local/systemic vasodilation.

[0033] If necessary or desirable, an ingredient to promote increased ammonium binding may be added to lessen the time necessary for treatment. Such ingredient could be activated charcoal or other synthetic sorbent in an amount of about 15 g/l.

[0034] If necessary or desirable, an ingredient may be added to promote increased creatinine binding and removal, such as zirconium phosphate in an amount of about 2 g/l.

[0035] To increase the effective removal of cholesterol and triglycerides, the concentration of the osmotic agent can be increased to thereby increase the osmotic pressure, at only a slight increase in risk of irritation, which should be tolerable.

[0036] Through the use of the iontophoretic component, antigen/antibody complexes should be removable with or without addition of binding agents.

[0037] The present invention also provides an apparatus for treating shock. The same apparatus described for dialysis could be adapted for treating shock. The composition would be more tailored to treating shock.

[0038] In treating shock the invention has three goals: (1) the correction of any electrolyte composition deviations, (2) the maintenance of proper acid-base equilibrium, and (3) rehydration as well as increased serum osmotic pressure to curtail capillary leakage. The shock treatment composition preferably comprises the following ingredients:

Electrolytes	Sodium	135 mmol/l,	range	134-147 mmol/l
	Potassium	4 mmol/l,	range	3-5 mmol/l
	Magnesium	1 mmol/l,	range	0.75-2.3 mmol/l
	Calcium	2 mmol/l,	range	1-3.5 mmol/l
	Chloride	105 mmol/l,	range	95-110 mmol/l
Buffer	Bicarbonate	37 mmol/l,	range	35-45 mmol/l
	Lactate	8 mmol/l,	range	0-9 mmol/l
Rehydrating Agent	3-6% by weight			

[0039] The lactate could be reduced or eliminated, in which case it would preferably be replaced by bicarbonate, which could then be increased almost on a mmol/l per mmol/l basis with the amount of lactate reduced, or up to 45 mmol/l of bicarbonate if no lactate is used.

[0040] The rehydrating agent is preferably a non-irritating readily absorbed saccharide disaccharide, e.g. sorbitol, which would increase the serum osmotic pressure.

[0041] While all the above percentages and concentrations described are believed to be appropriate and efficacious, these values may be increased or decreased as the need arises or as may be dictated by clinical trials.

Claims

1. A system for treating shock, comprising:

means for introducing a shock treatment solution to the large intestine of a patient at a first location, said shock treatment solution correcting electrolyte deviations, maintaining acid-base equilibrium and rehydrating, said means for introducing comprising a flexible input tube having a distal end for insertion into the large intestine and having a first inflatable balloon at the distal end of said input tube;

means for removing shock treatment solution from the large intestine at a second location spaced from the first location, said means for removing comprising a flexible output tube having a distal end for insertion into the large intestine and having a second inflatable balloon at the distal end of said output tube;

said first and second inflatable balloons being spaced from each other for sealing off a portion of the descending colon of the large intestine;

a third inflatable balloon between said first and second inflatable balloons; and

means for providing fluid to said first, second and third inflatable balloons to thereby inflate said balloons, said means for providing fluid being independent from said means for introducing a shock treatment solution.

2. The system according to claim 1, wherein the means for introducing shock treatment solution comprises input pump means for introducing shock treatment solution under pressure.

3. The system according to claim 1, wherein the means for removing shock treatment solution comprises output pump means for removing waste shock treatment solution under suction.

4. The system according to claim 1, wherein the means for introducing shock treatment solution comprises a first flexible input tube, and the means for removing the shock treatment solution comprises a flexible output tube concentric with the flexible input tube, each of said tubes having a distal end for insertion into the large intestine.

5. The system according to claim 4, wherein the respective distal ends of flexible input and output tubes are spaced from each other.

6. The system according to claim 4, wherein the flexible input tube has a smaller diameter than the flexible output tube.

7. The system according to claim 2, further comprising means for regulating the input pressure of the shock treatment solution.

8. The system according to claim 7, wherein the means for regulating comprises gauge and control means for de-energizing the input pump means in response to the input pressure exceeding a certain pressure level.

9. The system according to claim 3, wherein the means for removing the waste shock treatment solution comprises gauge and control means for energizing the output pump means in response to the input pressure exceeding a certain pressure level.

10. The system according to claim 3, further comprising an output tank connected to said output pump means, said output tank containing waste shock treatment solution and having a float switch for de-energizing said output pump means in response to the waste shock treatment in the output tank exceeding a predetermined level.

11. The system according to claim 1, wherein each of the first and second inflatable balloons have a first inflatable portion spaced from a second inflatable portion by an inner middle portion, said first and second inflatable portions being inflatable to a larger diameter than said inner middle portion.

12. A dialysis system for removing toxic matter from the serum of the large intestine, comprising:

means for introducing a dialysis filtrate solution to the large intestine of a patient at a first location, said filtrate providing a vehicle for removing toxic matter from the serum of the large intestine, said means for introducing comprising a flexible input tube having a distal end for insertions into the large intestine and having a first inflatable balloon at the distal end of said input tube; means for removing waste dialysis filtrate solution from the large intestine at a second location spaced from the first location after the dialysis filtrate solution removes toxic matter from the serum, said means for removing comprising a flexible output tube having a distal end for insertion into the large intestine and having a second inflatable balloon at the distal end of said output tube; said first and second inflatable balloons being spaced from each other for sealing off a portion of the descending colon of the large intestine; a third inflatable balloon between said first and second inflatable balloons; and means for providing fluid to said first, second and third inflatable balloons to thereby inflate said balloons, said means for providing fluid being independent from said means for introducing a dialysis filtrate solution.

13. The system according to claim 12, wherein the means for introducing dialysis filtrate solution comprises input pump means for introducing dialysis filtrate solution under pressure.

14. The system according to claim 12, wherein the means for removing waste dialysis filtrate solution comprises output pump means for removing waste dialysis filtrate solution under suction.

15. The system according to claim 12, wherein the means for introducing dialysis filtrate solution comprises a first flexible input tube, and the means for removing the waste dialysis filtrate solution comprises a flexible output tube concentric with the flexible input tube, each of said tubes having a distal end for insertion into a large intestine.

16. The system according to claim 15, wherein the respective distal ends of flexible input and output tubes are spaced from each other.

17. The system according to claim 15, wherein the flexible input tube has a smaller diameter than the flexible output tube.

18. The system according to claim 13, further comprising means for regulating the input pressure of the dialysis filtrate solution.

19. The system according to claim 18, wherein the means for regulating comprises gauge and control means for deenergizing the input pump means in response to the input pressure exceeding a certain pressure level.

20. The system according to claim 14, wherein the means for removing the waste dialysis filtrate solution comprises gauge and control means for energizing the output pump means in response to the input pressure exceeding a certain pressure level.

21. The system according to claim 14, further comprising an output tank connected to said output pump means, said output tank containing waste dialysis filtrate solution and having a float switch for de-energizing said output pump means in response to the waste dialysis filtrate solution in the output tank exceeding a predetermined level.

22. The system according to claim 12, wherein each of the first and second inflatable balloons have a first inflatable portion spaced from a second inflatable portion by an inner middle portion, said first and second inflatable portions being inflatable to a larger diameter than said inner middle portion.

Patentansprüche

1. System zur Schockbehandlung, aufweisend:

eine Einrichtung zum Einführen einer Schockbehandlungslösung in den Dickdarm eines Patienten an einer ersten Stelle, wobei die Schockbehandlungslösung Elektrolytabweichungen korrigiert, das Säure/Base-Gleichgewicht aufrechterhält und rehydriert, die Einrichtung zum Einführen einen flexiblen Eingabeschlauch mit einem distalen Ende zum Einsetzen in den Dickdarm besitzt und einen ersten aufblasbaren Ballon an dem distalen Ende des Eingabeschlauches besitzt;

eine Einrichtung zum Entfernen von Schockbehandlungslösung aus dem Dickdarm an einer von der ersten Stelle beabstandeten zweiten Stelle, wobei die Einrichtung zum Entfernen einen flexiblen Ausgabeschlauch mit einem distalen Ende zum Einsetzen in den Dickdarm und mit einem zweiten aufblasbaren Ballon an dem distalen Ende des Ausgabeschlauches enthält;

wobei die ersten und zweiten aufblasbaren Ballone voneinander beabstandet sind, um einen Abschnitt des absteigenden Kolons des Dickdarms abzuschließen;

einen dritten aufblasbaren Ballon zwischen den ersten und zweiten aufblasbaren Ballonen; und

eine Einrichtung zum Zuführen von Fluid zu den ersten, zweiten und dritten aufblasbaren Ballonen, um **dadurch** die Ballone aufzublasen, wobei die Einrichtung zum Zuführen von Fluid unabhängig von der Einrichtung zum Einführen einer Schockbehandlungslösung ist.

2. System nach Anspruch 1, wobei die Einrichtung zum Einführen von Schockbehandlungslösung eine Eingabepumpeneinrichtung zum Einführen von Schockbehandlungslösung unter Druck aufweist.

3. System nach Anspruch 1, wobei die Einrichtung zum Entfernen von Schockbehandlungslösung eine Ausgabepumpeneinrichtung zum Entfernen von Abfallschockbehandlungslösung unter Sog aufweist.

4. System nach Anspruch 4, wobei die Einrichtung zum Einführen der Schockbehandlungslösung einen ersten fle-

xiblen Eingabeschlauch aufweist, und die Einrichtung zum Entfernen der Schockbehandlungslösung einen zu dem flexiblen Eingabeschlauch konzentrischen flexiblen Ausgabeschlauch aufweist, wobei jeder von den Schläuchen ein distales Ende zum Einsetzen in den Dickdarm besitzt.

5 5. System nach Anspruch 4, wobei die entsprechenden distalen Enden der flexiblen Eingabe- und Ausgabeschläuche voneinander beabstandet sind.

6. System nach Anspruch 4, wobei der flexible Eingabeschlauch einen kleineren Durchmesser als der flexible Ausgabeschlauch besitzt.

10 7. System nach Anspruch 2, welches ferner eine Einrichtung zum Regeln des Eingabedrucks der Schockbehandlungslösung aufweist.

15 8. System nach Anspruch 2, wobei die Einrichtung zum Regeln eine Meß- und Steuereinrichtung zum Deaktivieren der Eingabepumpeneinrichtung als Reaktion auf den einen bestimmten Druckpegel überschreitenden Eingabedruck aufweist.

20 9. System nach Anspruch 2, wobei die Einrichtung zum Entfernen der Abfallschockbehandlungslösung eine Meß- und Steuereinrichtung zum Deaktivieren der Ausgabepumpeneinrichtung als Reaktion auf den einen bestimmten Druckpegel überschreitenden Eingabedruck aufweist.

25 10. System nach Anspruch 3, welches ferner einen mit der Ausgabepumpeneinrichtung verbundenen Ausgabebehälter aufweist, wobei der Ausgabebehälter Abfallschockbehandlungslösung enthält und einen Schwimmerschalter besitzt, um die Ausgabepumpeneinrichtung als Reaktion darauf zu deaktivieren, daß die Abfallschockbehandlungslösung in dem Ausgabebehälter einen vorbestimmten Pegel überschreitet.

30 11. System nach Anspruch 1, wobei jeder von den ersten und zweiten aufblasbaren Ballonen einen von einem zweiten aufblasbaren Abschnitt über einen mittleren Innenabschnitt beabstandeten ersten aufblasbaren Abschnitt enthält, wobei die ersten und zweiten aufblasbaren Abschnitte auf einen größeren Durchmesser als der innere mittlere Abschnitt aufblasbar sind.

12. Dialysesystem zum Entfernen von toxischem Material aus dem Serum des Dickdarms, aufweisend:

35 eine Einrichtung zum Einführen einer Dialysefiltratlösung in den Dickdarm eines Patienten an einer ersten Stelle, wobei das Filtrat ein Vehikel zum Entfernen von toxischem Material aus dem Serum des Dickdarms bereitstellt, die Einrichtung zum Einführen einen flexiblen Eingabeschlauch mit einem distalen Ende zum Einsetzen in den Dickdarm besitzt, und einen ersten aufblasbaren Ballon an dem distalen Ende des Eingabeschlauchs besitzt; eine Einrichtung zum Entfernen von Dialysefiltratlösung aus dem Dickdarm an einer von der ersten Stelle beabstandeten zweiten Stelle nachdem die Dialysefiltratlösung toxisches Material aus dem Serum entfernt hat, wobei die Einrichtung für die Entfernung einen flexiblen Ausgabeschlauch mit einem distalen Ende zum Einsetzen in den Dickdarm enthält und einen zweiten aufblasbaren Ballon an dem distalen Ende des Ausgabeschlauchs besitzt; wobei die ersten und zweiten aufblasbaren Ballone voneinander beabstandet sind, um einen Abschnitt des absteigenden Kolons des Dickdarms abzuschließen; einen dritten aufblasbaren Ballon zwischen den ersten und zweiten aufblasbaren Ballonen; und eine Einrichtung zum Zuführen von Fluid zu den ersten, zweiten und dritten aufblasbaren Ballonen, um **dadurch** die Ballone aufzublasen, wobei die Einrichtung zum Zuführen von Fluid unabhängig von der Einrichtung zum Einführen einer Dialysefiltratlösung ist.

50 13. System nach Anspruch 12, wobei die Einrichtung zum Einführen von Dialysefiltratlösung eine Eingabepumpeneinrichtung zum Einführen von Dialysefiltratlösung unter Druck aufweist.

14. System nach Anspruch 12, wobei die Einrichtung zum Entfernen von Dialysefiltratlösung eine Ausgabepumpeneinrichtung zum Entfernen von Abfalldialysefiltratlösung unter Sog aufweist.

55 15. System nach Anspruch 12, wobei die Einrichtung zum Einführen von Dialysefiltratlösung einen ersten flexiblen Eingabeschlauch aufweist, und die Einrichtung zum Entfernen der Abfalldialysefiltratlösung einen zu dem flexiblen Eingabeschlauch konzentrischen flexiblen Ausgabeschlauch aufweist, wobei jeder von den Schläuchen ein distales Ende zum Einsetzen in den Dickdarm besitzt.

16. System nach Anspruch 15, wobei die entsprechenden distalen Enden der flexiblen Eingabe- und Ausgabeschläuche voneinander beabstandet sind.
17. System nach Anspruch 15, wobei der flexible Eingabeschlauch einen kleineren Durchmesser als der flexible Ausgabeschlauch besitzt.
18. System nach Anspruch 13, welches ferner eine Einrichtung zum Regeln des Eingabedruckes der Dialysefiltratlösung aufweist.
19. System nach Anspruch 18, wobei die Einrichtung zum Regeln eine Meß- und Steuereinrichtung zum Deaktivieren der Eingabepumpeneinrichtung als Reaktion auf den einen bestimmten Druckpegel überschreitenden Eingabedruck aufweist.
20. System nach Anspruch 14, wobei die Einrichtung zum Entfernen der Abfalldialysefiltratlösung eine Meß- und Steuereinrichtung zum Deaktivieren der Ausgabepumpeneinrichtung als Reaktion auf den einen bestimmten Druckpegel überschreitenden Eingabedruck aufweist.
21. System nach Anspruch 14, welches ferner einen mit der Ausgabepumpeneinrichtung verbundenen Ausgabebehälter aufweist, wobei der Ausgabebehälter Abfalldialysefiltratlösung enthält und einen Schwimmerschalter besitzt, um die Ausgabepumpeneinrichtung als Reaktion darauf zu deaktivieren, daß die Abfalldialysefiltratlösung in dem Ausgabebehälter einen vorbestimmten Pegel überschreitet.
22. System nach Anspruch 12, wobei jeder von den ersten und zweiten aufblasbaren Ballonen einen von einem zweiten aufblasbaren Abschnitt über einen mittleren Innenabschnitt beabstandeten ersten aufblasbaren Abschnitt enthält, wobei die ersten und zweiten aufblasbaren Abschnitte auf einen größeren Durchmesser als der innere mittlere Abschnitt aufblasbar sind.

Revendications

1. Système pour traiter un état de choc, comprenant :

des moyens pour introduire une solution de traitement d'état de choc dans le gros intestin d'un patient en un premier site, ladite solution de traitement d'état de choc corrigeant des écarts d'électrolyte, maintenant un équilibre acide-base et réhydratant, lesdits moyens d'introduction comprenant un tube d'entrée flexible comportant une extrémité distale destinée à être insérée dans le gros intestin et comportant un premier ballonnet gonflable à l'extrémité distale dudit tube d'entrée ;

des moyens pour éliminer une solution de traitement d'état de choc du gros intestin en un deuxième site espacé du premier site, lesdits moyens d'élimination comprenant un tube de sortie flexible comportant une extrémité distale destinée à être insérée dans le gros intestin et comportant un deuxième ballonnet gonflable à l'extrémité distale dudit tube de sortie ;

lesdits premier et deuxième ballonnets gonflables étant espacés l'un de l'autre pour empêcher l'accès à une partie du côlon descendant du gros intestin ;

un troisième ballonnet gonflable entre lesdits premier et deuxième ballonnets gonflables ; et

des moyens pour délivrer un fluide auxdits premier, deuxième et troisième ballonnets gonflables pour, de ce fait, gonfler lesdits ballonnets, lesdits moyens de délivrance d'un fluide étant indépendants desdits moyens pour introduire une solution de traitement d'état de choc.

2. Système selon la revendication 1, dans lequel les moyens pour introduire une solution de traitement d'état de choc comprennent des moyens formant pompe d'entrée pour introduire une solution de traitement d'état de choc sous pression.

3. Système selon la revendication 1, dans lequel les moyens pour éliminer une solution de traitement d'état de choc comprennent des moyens formant pompe de sortie pour éliminer une solution de traitement d'état de choc résiduaire par aspiration.

4. Système selon la revendication 1, dans lequel les moyens pour introduire une solution de traitement d'état de choc

comprennent un premier tube d'entrée flexible, et les moyens pour éliminer la solution de traitement d'état de choc comprennent un tube de sortie flexible concentrique avec le tube d'entrée flexible, chacun desdits tubes comportant une extrémité distale destinée à être insérée dans le gros intestin.

5 5. Système selon la revendication 4, dans lequel les extrémités distales respectives des tubes d'entrée et de sortie flexibles sont espacées l'une de l'autre.

6. Système selon la revendication 4, dans lequel le tube d'entrée flexible a un diamètre inférieur à celui du tube de sortie flexible.

10 7. Système selon la revendication 2, comprenant en outre des moyens pour réguler la pression d'entrée de la solution de traitement d'état de choc.

15 8. Système selon la revendication 7, dans lequel les moyens pour réguler comprennent des moyens de jaugeage et de commande pour désactiver les moyens formant pompe d'entrée lorsque la pression d'entrée dépasse un certain niveau de pression.

20 9. Système selon la revendication 3, dans lequel les moyens pour éliminer la solution de traitement d'état de choc résiduaire comprennent des moyens de jaugeage et de commande pour activer les moyens formant pompe de sortie lorsque la pression d'entrée dépasse un certain niveau de pression.

25 10. Système selon la revendication 3, comprenant en outre un réservoir de sortie relié auxdits moyens formant pompe de sortie, ledit réservoir de sortie contenant une solution de traitement d'état de choc résiduaire et comportant un interrupteur à flotteur pour désactiver lesdits moyens formant pompe de sortie lorsque la solution de traitement d'état de choc résiduaire dans le réservoir de sortie dépasse un niveau prédéterminé.

30 11. Système selon la revendication 1, dans lequel chacun des premier et deuxième ballonnets gonflables comporte une première partie gonflable espacée d'une deuxième partie gonflable par une partie centrale intérieure, lesdites première et deuxième parties gonflables étant gonflables à un plus grand diamètre que ladite partie centrale intérieure.

12. Système de dialyse pour retirer une substance toxique du sérum du gros intestin, comprenant :

35 des moyens pour introduire une solution de filtrat de dialyse dans le gros intestin d'un patient à un premier site, ledit filtrat fournissant un véhicule pour retirer une substance toxique du sérum du gros intestin, lesdits moyens d'introduction comprenant un tube d'entrée flexible comportant une extrémité distale destinée à être insérée dans le gros intestin et comportant un premier ballonnet gonflable à l'extrémité distale dudit tube d'entrée ;

40 des moyens pour éliminer une solution de filtrat de dialyse résiduaire du gros intestin à un deuxième site espacé du premier emplacement une fois que la solution de filtrat de dialyse a éliminé la substance toxique du sérum, lesdits moyens d'élimination comprenant un tube de sortie flexible comportant une extrémité distale destinée à être insérée dans le gros intestin et comportant un deuxième ballonnet gonflable à l'extrémité distale dudit tube de sortie ;

45 lesdits premier et deuxième ballonnets gonflables étant espacés l'un de l'autre pour empêcher l'accès à une partie du côlon descendant du gros intestin ;

un troisième ballonnet gonflable entre lesdits premier et deuxième ballonnets gonflables ; et

50 des moyens pour délivrer un fluide auxdits premier, deuxième et troisième ballonnets gonflables pour, de ce fait, gonfler lesdits ballonnets, lesdits moyens pour délivrer un fluide étant indépendants desdits moyens pour introduire une solution de filtrat de dialyse.

13. Système selon la revendication 12, dans lequel les moyens pour introduire une solution de filtrat de dialyse comprennent des moyens formant pompe d'entrée pour introduire une solution de filtrat de dialyse sous pression.

55 14. Système selon la revendication 12, dans lequel les moyens pour retirer une solution de filtrat de dialyse résiduaire comprennent des moyens formant pompe de sortie pour éliminer une solution de filtrat de dialyse résiduaire par aspiration.

15. Système selon la revendication 12, dans lequel les moyens pour introduire une solution de filtrat de dialyse comprennent un premier tube d'entrée flexible, et les moyens pour éliminer la solution de filtrat de dialyse résiduaire comprennent un tube de sortie flexible concentrique avec le tube d'entrée flexible, chacun desdits tubes comportant une extrémité distale destinée à être insérée dans un gros intestin.

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16. Système selon la revendication 15, dans lequel les extrémités distales respectives des tubes d'entrée et de sortie flexibles sont espacées l'une de l'autre.

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17. Système selon la revendication 15, dans lequel le tube d'entrée flexible a un diamètre inférieur à celui du tube de sortie flexible.

18. Système selon la revendication 13, comprenant en outre des moyens pour réguler la pression d'entrée de la solution de filtrat de dialyse.

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19. Système selon la revendication 18, dans lequel les moyens pour réguler comprennent des moyens de jaugeage et de commande pour désactiver les moyens formant pompe d'entrée lorsque la pression d'entrée dépasse un certain niveau de pression.

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20. Système selon la revendication 14, dans lequel les moyens pour éliminer la solution de filtrat de dialyse résiduaire comprennent des moyens de jaugeage et de commande pour activer les moyens formant pompe de sortie lorsque la pression d'entrée dépasse un certain niveau de pression.

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21. Système selon la revendication 14, comprenant en outre un réservoir de sortie relié auxdits moyens formant pompe de sortie, ledit réservoir de sortie contenant une solution de filtrat de dialyse résiduaire et comportant un interrupteur à flotteur pour désactiver lesdits moyens formant pompe de sortie lorsque la solution de filtrat de dialyse résiduaire dans le réservoir de sortie dépasse un niveau prédéterminé.

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22. Système selon la revendication 12, dans lequel chacun des premier et deuxième ballonnets gonflables comporte une première partie gonflable espacée d'une deuxième partie gonflable par une partie centrale intérieure, lesdites première et deuxième parties gonflables étant gonflables à un plus grand diamètre que ladite partie centrale intérieure.

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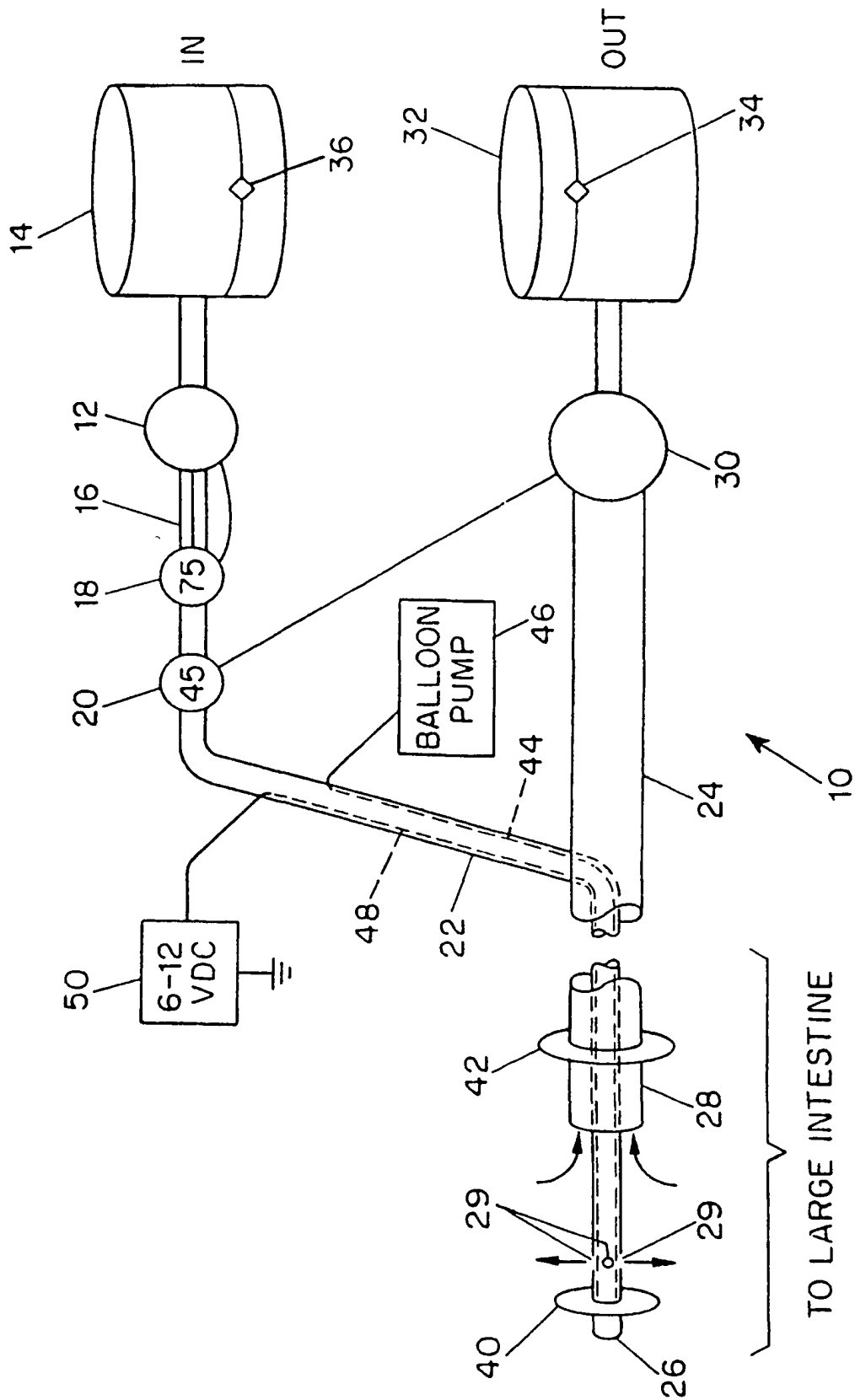


FIG. 1

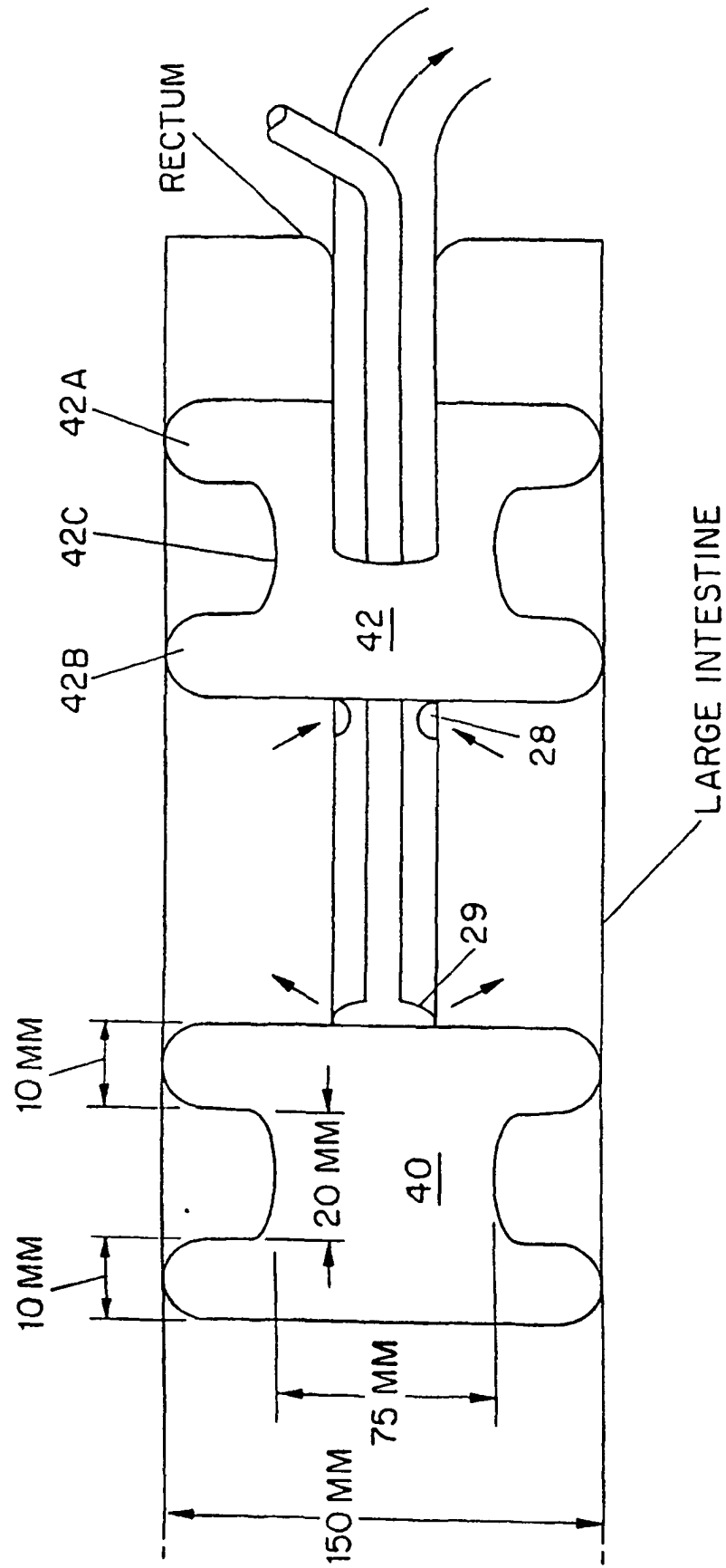


FIG. 2

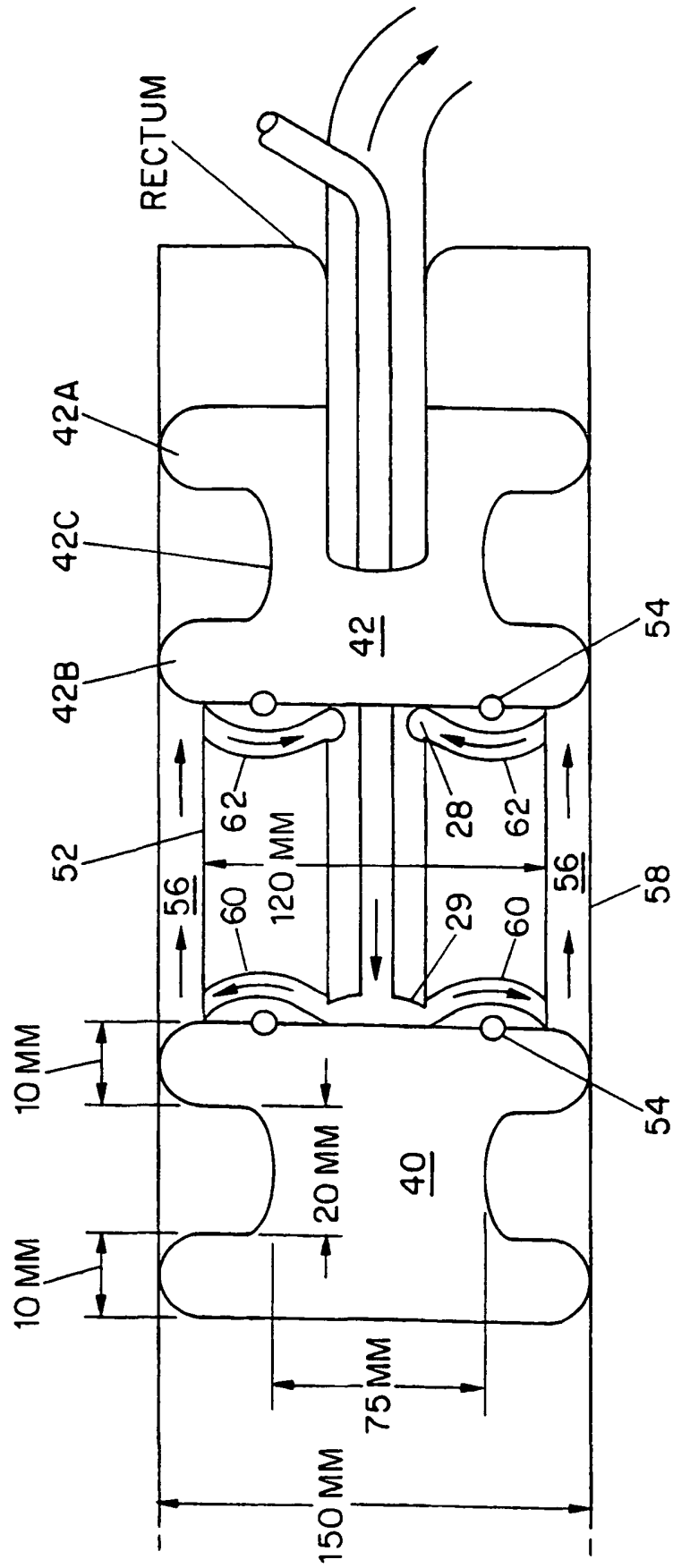


FIG. 3