

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 December 2009 (23.12.2009)

(10) International Publication Number
WO 2009/155236 A1

- (51) International Patent Classification:
A61B 17/08 (2006.01)
- (21) International Application Number:
PCT/US2009/047348
- (22) International Filing Date:
15 June 2009 (15.06.2009)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/061,823 16 June 2008 (16.06.2008) US
- (71) Applicant (for all designated States except US): **MORRIS INNOVATIVE RESEARCH, INC.** [US/US]; 907 West Second Street, Bloomington, IN 47403 (US).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **MORRIS, Edward, J.** [US/US]; 716 South Fieldcrest Avenue, Bloomington, IN 47401 (US). **DENARDO, Andrew, J.** [US/US]; 16220 Joliet Road, Westfield, IN 46074 (US).
- (74) Agent: **BARKER, Ryan, C.**; Baker & Daniels, 300 North Meridian Street, Suite 2700, Indianapolis, IN 46204 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report (Art. 21(3))

(54) Title: METHOD AND APPARATUS FOR SEALING ACCESS

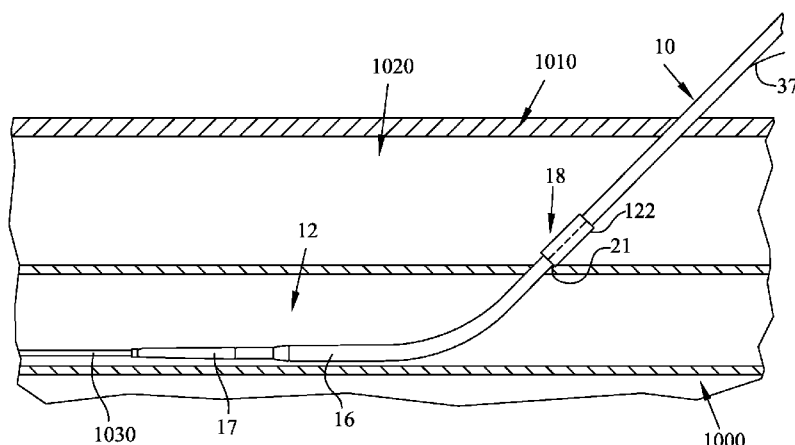


FIG. 1

(57) Abstract: An apparatus and a method for sealing a puncture in a tubular tissue structure or the wall of a body cavity are provided. The apparatus and method include a bioabsorbable member that is partially external to and partially internal to an introducer sheath before and during placement thereof.

WO 2009/155236 A1

METHOD AND APPARATUS FOR SEALING ACCESS

CLAIM FOR PRIORITY

The present application claims priority to US Provisional Application 61/061,823 filed June 16,
5 2008, the disclosure of which is incorporated herein by reference.

FIELD OF THE DISCLOSURE

The present disclosure relates to an apparatus and a method for sealing a puncture in a tubular tissue
structure or the wall of a body cavity. More particularly, the present disclosure is directed to sealing
10 a puncture site with submucosal tissue or another extracellular matrix-derived tissue capable of
remodeling endogenous connective tissue or with a synthetic bioabsorbable material.

BACKGROUND AND SUMMARY

The control of bleeding during and after surgery is important to the success of the procedure. The
15 control of blood loss is of particular concern if the surgical procedure is performed directly upon or
involves the patient's arteries and veins. Well over one million surgical procedures are performed
annually which involve the insertion and removal of catheters into and from arteries and veins.
Accordingly, these types of vasculature procedures represent a significant amount of surgery in
which the control of bleeding is of particular concern.
20 Typically, the insertion of a catheter creates a puncture through the vessel wall and upon removal the
catheter leaves a puncture opening through which blood may escape and leak into the surrounding
tissues. Therefore, unless the puncture site is closed clinical complications may result leading to
increased hospital stays with the associated costs. To address this concern, medical personnel are
required to provide constant and continuing care to a patient who has undergone a procedure
25 involving an arterial or venous puncture to insure that post-operative bleeding is controlled.
Surgical bleeding concerns can be exacerbated by the administration of a blood thinning agent, such
as heparin, to the patient prior to a catheterization procedure. Since the control of bleeding in anti-
coagulated patients is much more difficult to control, stemming blood flow in these patients can be
troublesome. A common method of healing the puncture to the vessel is to maintain external
30 pressure over the vessel until the puncture seals by natural clot formation processes. This method of

-2-

puncture closure typically takes about thirty to ninety minutes, with the length of time usually being greater if the patient is hypertensive or anti-coagulated.

Furthermore, it should be appreciated that utilizing pressure, such as human hand pressure, to control bleeding suffers from several drawbacks regardless of whether the patient is hypertensive or anti-coagulated. In particular, when human hand pressure is utilized, it can be uncomfortable for the patient, can result in excessive restriction or interruption of blood flow, and can use costly professional time on the part of the hospital staff. Other pressure techniques, such as pressure bandages, sandbags, or clamps require the patient to remain motionless for an extended period of time and the patient must be closely monitored to ensure the effectiveness of these techniques.

Other devices have been disclosed which plug or otherwise provide an obstruction in the area of the puncture (see, for example, U.S. Pat. Nos. 4,852,568 and 4,890,612) wherein a collagen plug is disposed in the blood vessel opening. When the plug is exposed to body fluids, it swells to block the wound in the vessel wall. A potential problem with plugs introduced into the vessel is that particles may break off and float downstream to a point where they may lodge in a smaller vessel, causing an infarct to occur. Another potential problem with collagen plugs is that there is the potential for the inadvertent insertion of the collagen plug into the lumen of the blood vessel which is hazardous to the patient. Collagen plugs also can act as a site for platelet aggregation, and, therefore, can cause intraluminal deposition of occlusive material creating the possibility of a thrombosis at the puncture sight. Other plug-like devices are disclosed, for example, in U.S. Pat. Nos. 5,342,393, 5,370,660 and 5,411,520.

Accordingly, there is a need for surgical techniques suitable for sealing punctures in a tubular tissue structure or in the punctured wall of a body cavity, such as a heart chamber, or a body cavity of another organ. Such techniques require rapid, safe, and effective sealing of the puncture. It would also be useful to close the puncture without disposing any occlusive material into the vessel or body cavity, and without introducing infectious organisms into the patient's circulatory system.

The present disclosure is directed to an apparatus and method for sealing punctured tubular tissue structures, including arteries and veins, such as punctures which occur during diagnostic and interventional vascular and peripheral catheterizations, or for sealing a puncture in the wall of a body cavity. More specifically, the apparatus and method of the present disclosure employ submucosal tissue or another extracellular matrix-derived tissue or a synthetic bioabsorbable material to seal punctures in tubular tissue structures, such as blood vessels, or in the wall of a body cavity. The

submucosal tissue or other extracellular matrix-derived tissue is capable of inducing tissue remodeling at the site of implantation by supporting the growth of connective tissue in vivo, and has the added feature of being tear-resistant so that occlusive material is not introduced into the patient's circulatory system. Also, submucosal tissue or another extracellular matrix-derived tissue has the
5 feature of being resistant to infection, thereby reducing the chances that the procedure will result in systemic infection of the patient.

In one embodiment, a device for sealing a puncture site in the wall of a body is provided. The device comprising an elongated element having a tissue wall contact exterior portion and having a length adapted to be inserted into the puncture site so that the length forms intravascular, intermediate and
10 extracorporeal portions, and a bioabsorbable member releasably attached to the tissue wall contact exterior portion of the elongated element.

In another embodiment a device for sealing a puncture site in the wall of a blood vessel is provided. The device comprising an elongated element having a tissue wall contact exterior portion and a bioabsorbable member releasably attached to the tissue wall contact exterior portion of the elongated
15 element.

In an alternate embodiment a method of sealing a puncture site in tissue is disclosed. The method comprises the steps of providing an elongated element having a bioabsorbable member disposed on the exterior thereof, the elongated element being configured to be introduced into a body with the bioabsorbable member disposed thereon; and providing a deposit member that allows the
20 bioabsorbable member to be left within a body when the elongated element is removed from the body.

In another embodiment a method of sealing a puncture site in the wall of a body cavity is provided. The method comprises the step of providing an access device having an elongated element having a lumen therein and a tissue wall contact exterior portion and having a bioabsorbable member
25 releasably disposed on the tissue wall contact exterior portion of the elongated element; placing the access device in contact with tissue; locating an instrument within the lumen of the elongated element; releasing the bioabsorbable member from the elongated element; and removing the elongated element from contact with tissue while allowing the bioabsorbable member to remain in contact with the tissue.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an introducer element for use in sealing access to a tubular tissue structure or a body cavity partially disposed in a tubular tissue structure;

FIGS. 2 & 2A illustrates the introducer element of Fig. 1 with a graft sheet deployed therefrom;

5 FIG. 3 illustrates the graft sheet secured in the tubular tissue structure; and

FIGS 4A & 4B show the graft sheet and tether attached thereto.

DETAILED DESCRIPTION

The disclosures of U.S. applications with Ser. Nos. 11/180,379, 10/863,703, 10/166,399, 11/879,426,
10 11/546,079, and 60/297,060 are incorporated herein by reference.

The present disclosure is related to an apparatus and a method for sealing a puncture in a tubular tissue structure, such as a blood vessel, or in the wall of a body cavity, with submucosal tissue, another extracellular matrix-derived tissue, or a synthetic bioabsorbable material capable of supporting the growth of endogenous connective tissue in vivo resulting in remodeling of
15 endogenous connective tissue at the puncture site and in formation of a static seal. The apparatus and method of the present disclosure can be used to seal a puncture in a tubular tissue structure, such as a blood vessel, or in the wall of a body cavity, that has been created intentionally or unintentionally during a surgical procedure or nonsurgically (e.g., during an accident). Punctures made intentionally include vascular punctures made in various types of vascular, endoscopic, or orthopaedic surgical
20 procedures, or punctures made in any other type of surgical procedure, in coronary and in peripheral arteries and veins or in the wall of a body cavity. Such procedures include angiographic examination, angioplasty, laser angioplasty, valvuloplasty, atherectomy, stent deployment, rotablator treatment, aortic prosthesis implantation, intraortic balloon pump treatment, pacemaker implantation, any intracardiac procedure, electrophysiological procedures, interventional radiology, and various
25 other diagnostic, prophylactic, and therapeutic procedures such as dialysis and procedures relating to percutaneous extracorporeal circulation.

Referring now to the drawings, FIG. 1 illustrates an introducer 10 adapted for catheterization, exemplary of the type of introducer element that may be used in accordance with the present disclosure. Although an introducer 10 adapted for use in catheterization procedures is illustrated in
30 FIG. 1, it is understood that the present disclosure is applicable to any type of introducer element used to provide access to the lumen of a tubular tissue structure, such as a blood vessel, or to a body

-5-

cavity. For example, the present disclosure is applicable to an introducer element such as a needle, a cannula, a guide wire, an introducer element adapted for dialysis, a trocar, or any other introducer element used to access the lumen of a tubular tissue structure or a body cavity.

An introducer 10 as depicted in FIG. 1 can be used when performing catheterization procedures in coronary and peripheral arteries and veins 1000. Typically, a catheter is introduced into the vascular system by first penetrating the skin 1010, underlying muscle tissue 1020, and the blood vessel 1000 with a needle, and guide wire 1030 is inserted through the lumen of the needle and enters the blood vessel. Subsequently, the needle is stripped off the guide wire and introducer 10 is fed over guide wire 1030 and pushed through skin 1010 and through the vessel wall to enter vessel 1000. Guide wire 1030 can then be removed and a catheter is fed through the lumen of the introducer 10 and advanced through the vascular system until the working end of the catheter is positioned at a predetermined location. Alternatively, guide wire 1030 may be left in place throughout the procedure and the introducer 10 removed before guide wire 1030 is removed. At the end of the catheterization procedure, the catheter is withdrawn. Introducer 10 is also removed and the opening through which, for example, introducer 10 is inserted must be sealed as quickly as possible once the procedure is completed. Although a typical catheterization procedure utilizing introducer 10 is described, the described procedure is non-limiting. Furthermore any embodiment of introducer 10 described below is applicable to any other introducer element for use in accessing the lumen of a tubular tissue structure or a body cavity.

The present disclosure may be employed, for example, to rapidly seal a puncture site in a blood vessel upon completion of a catheterization procedure. Introducer 10 illustrated in FIG. 1 is an exemplary embodiment and has a user distal end 12 for insertion into blood vessel 1000 and a user proximal end 14. A standard introducer comprises dilator 17 and sheath 16 which extends axially over dilator 17, sheath cap 20 disposed axially over a portion of sheath 16 and valve cap 22 connected to sheath cap 20 and to side port tube 24. Dilator 17 includes a section of decreased diameter (not shown) that provides clearance within sheath 16 for flexible portion 19 of sheet 18 when flexible portion 19 is disposed within sheath 16 as discussed below. A standard introducer may also comprise three-way valve 26 connected to an end of the side port tube 24, and syringe connector 28, adapted for the attachment of a syringe to introducer 10 and connected to valve cap 22. Although not part of a standard introducer, introducer 10 depicted in FIG. 1 further comprises sheet 18 of

-6-

submucosal tissue or another extracellular matrix-derived tissue or a synthetic bioabsorbable material extending axially over a portion of sheath 16.

In the embodiment of the disclosure depicted in FIG. 1, sheet 18 of submucosal tissue or another extracellular matrix-derived tissue or a synthetic bioabsorbable material includes cuff section 122 that extends axially over a portion of sheath 16. Sheet 18 further includes flexible section 19 at a user distal end 30 that is disposed within sheath 16 prior to deployment. To this end, sheath 16 includes an access hole 21 that receives flexible section 19 therein while allowing cuff section 122 to remain outside and around sheath 16. Distal end 30 of sheath 16 is inserted into tubular tissue structure 1000, such as a blood vessel, and user proximal end 32 remains outside of the punctured vessel wall. Proximal end 32, cuff 122, of the sheet 18 extends axially over a portion of the introducer 10 as depicted in FIG. 1.

Cuff section 122 of sheet 18 may be held in place on sheath 16, for example, by a retaining tether (not shown) or other line attached thereto and to sheath cap 20 or valve cap 22. Cuff section 122 includes a loop (not shown) at a distal end thereof that passes through retaining hole 123 (see Fig. 2A, although cuff 122 is displaced from retaining hole 123) and is selectively engaged by the retaining tether. Retaining hole 123 is located at the substantially equal axial position as access hole 21 and offset therefrom by 90-degrees. As a result of the engagement between the loop and the retaining tether, cuff section 122 is prevented from being pushed along introducer 10 when the user inserts introducer 10 through, for example, a vessel wall with his hand in contact with sheet 18 or from friction provided by skin 1010, muscle 1020, or other encountered anatomy. Introducer 10 is inserted into the anatomy until cuff section 122 abuts the wall of vessel 1000, or other desired structure, as shown in Fig. 1. Such abutment provides increased resistance and tactile feedback indicating that cuff 122 is positioned at vessel 1000. Once positioned, the retaining tether may be removed to permit relative movement between sheet 18 (including cuff 122) and sheath 16.

Once sheet 18 is permitted to move relative to sheath 16, sheath 16 is further advanced into vessel 1000. During the moving of sheath 16, sheet 18 is held in place via the abutment of cuff section 122 against the wall of vessel 1000. Such relative movement results in flexible portion 19 being extracted from within sheath 16 through access hole 21 until flexible portion 19 is fully outside of sheath 16 and within vessel 1000.

As shown in FIGS. 1 and 2, in one illustrative embodiment the sheet 18 has a second tether 37 attached at or near to the proximal end 32 of the sheet 18.

-7-

Tether 37 is attached to sheet 18, see Figs. 4a, 4b, at or near proximal end 32 of sheet 18 and extends axially downwards through flexible portion 19 towards distal end 30 of sheet 18 and then back up through flexible portion 19 towards proximal end 32. Tether 37 is threaded through sheet 18 at many places. Thus, portions of tether 37 are inserted into blood vessel 1000 when the introducer 10 is
5 pushed through the vessel wall and the proximal end 43 of tether 37 remains externally exposed. Upon completion of the procedure, such as catheterization, or before completion if desired, proximal end 43 of tether 37 is pulled to gather distal end 30 of sheet 18 in the puncture site or on the inside of the vessel wall (see FIG. 3). Subsequent retracting of sheath 16 leaves gathered sheet 18 to form a plug at the puncture site of the vessel wall.

10 Sheet 18 may have any combination of tethers 37 and retaining tethers, or may lack one or more types of tethers. For example, the sheet 18 may lack a retaining tether. In this embodiment where only tether 37 is attached to the sheet 18, tether 37 is used to gather the sheet 18 in the puncture site and against the inside of the vessel wall.

Tethers with different functions (i.e., the retaining tether and tether 37) may have different indicia
15 disposed thereon, such as different colors, so that the user can easily identify the tether with the desired function. Alternatively, tethers with different functions may have different caps attached to the externally exposed ends so that the tether with the desired function can be easily identified. In one illustrative embodiment, the tethers are made of resorbable thread and the tethers can be attached
20 to the sheet 18 by any suitable means. For example, the tethers can be tied to the sheet 18, hooked to the sheet 18 by using hooks, barbs, etc. (e.g., for tethers with attachment points that remain externally exposed when the introducer 10 is inserted into the vessel wall), or woven/sewn into sheet 18 as shown in Figs. 4a & 4b.

While certain embodiments of the present disclosure have been described in detail, those familiar
25 with the art to which this disclosure relates will recognize various alternative designs and embodiments for practicing the disclosure as defined by the following claims.

WHAT IS CLAIMED IS:

1. A device for sealing a puncture site in the wall of a blood vessel comprising:
an elongated element having a length adapted to be inserted into the puncture site and having
5 a distal end, a proximal end, and an access port disposed in a wall of the elongated element spaced
apart from and between the distal end and the proximal end, and
a bioabsorbable member including an external portion disposed on the exterior of the
elongated element, a portion extending through the access port of the elongated element, and an
internal portion within the elongated element, the bioabsorbable member being releasably fixed to
10 the elongated element.
2. The device of claim 1, wherein the elongated element has a tissue wall contact
exterior portion.
3. The device of claim 1, wherein the length forms intravascular, intermediate and
extracorporeal portions.
- 15 4. The device of claim 1, wherein the bioabsorbable member includes a cuff portion
disposed on the exterior of the elongated element.
5. The device of claim 4, wherein the cuff portion forms a lumen that receives the
elongated element therein.
6. The device of claim 4, wherein the cuff portion is slideable relative to the elongated
20 element.
7. The device of claim 6, wherein sliding of the cuff relative to the elongated element
causes at least some of the bioabsorbable member disposed within the elongated element to be
withdrawn from the elongated element via the access port.
8. The device of claim 1, further including a removable tether that fixes the position of a
25 portion of the bioabsorbable member disposed on the exterior of the elongated element

-9-

9. A method of sealing a puncture site in the wall of a blood vessel comprising:
providing an elongated element having an outer wall and defining a lumen therein, the wall
having a hole therein providing access to the lumen;

releasably attaching a bioabsorbable member to the elongated element by inserting the
5 bioabsorbable member into the hole in the wall of the elongated element such that a first portion of
the bioabsorbable member is within the lumen of the elongated member and a second portion of the
bioabsorbable member is outside of the lumen;

placing the elongated element and attached bioabsorbable member into the anatomy;
advancing the elongated element in the anatomy, wherein the advancement causes the first
10 portion of the bioabsorbable member to evacuate the lumen of the elongated element.

10. The method of claim 9, wherein the second portion of the bioabsorbable member
includes a cuff portion, and the cuff is positioned on the elongated member such that the step of
placing the elongated element into the anatomy causes the cuff to abut the anatomy and the abutment
of the cuff to anatomy prevents the cuff from advancing during the advancing step and causes the
15 portion of the bioabsorbable member within the lumen to evacuate the lumen as the elongated
element is advanced.

11. The method of claim 9, further including the step of retracting a tether coupled to the
bioabsorbable member to cause the first portion of the bioabsorbable member to abut the puncture
site.

20 12. The method of claim 9, wherein the placing step puts the entire bioabsorbable
member within the anatomy.

13. The method of claim 9, wherein the placing step places the hole in the wall of the
elongated element within the puncture site.

14. A device for sealing a puncture site comprising:
25 an elongated element having a length adapted to be inserted into the puncture site and having
a lumen therein, the elongated element further including a distal end access port, a proximal end
access port, and a side access port, each of the access ports providing access to the lumen, and
a bioabsorbable member including:

an external portion disposed on the exterior of the elongated element,
30 a portion extending through the side access port of the elongated element, and

-10-

an internal portion disposed within the lumen, the bioabsorbable member being releasably fixed to the elongated element.

15. The device of claim 14, wherein the bioabsorbable member is pre-loaded onto the elongated element prior to use.

5 16. The device of claim 14, wherein the bioabsorbable member is a sheet of bioabsorbable material.

17. The device of claim 14, wherein the external portion of the bioabsorbable member forms a cuff having a lumen that receives the elongated element therein.

10 18. The device of claim 14, wherein the external portion, the portion extending through the side access port and the internal portion are of made of a substantially homogenous and continuous material.

19. The device of claim 14, further including a removable tether, wherein removing the tether permits the bioabsorbable member to move relative to the elongated member.

15 20. The device of claim 14, further including a tether that is woven into the bioabsorbable member prior to use

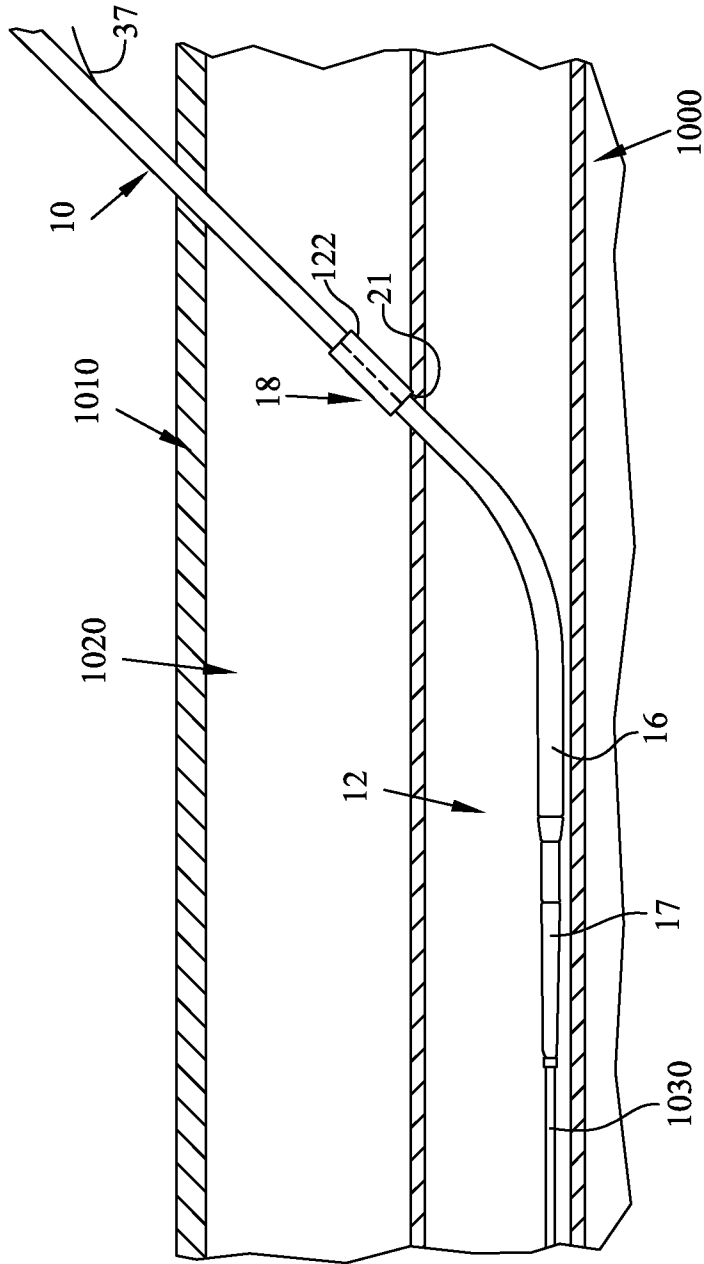


FIG. 1

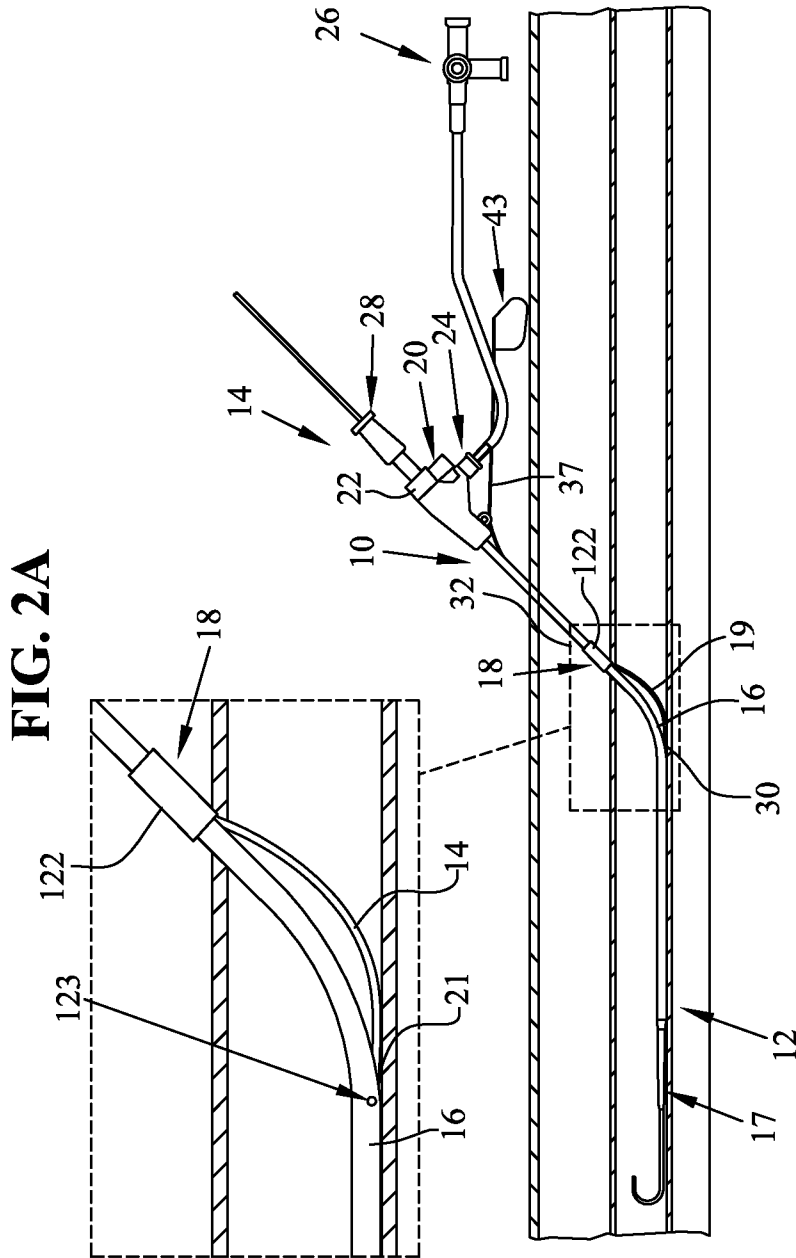


FIG. 2A

FIG. 2

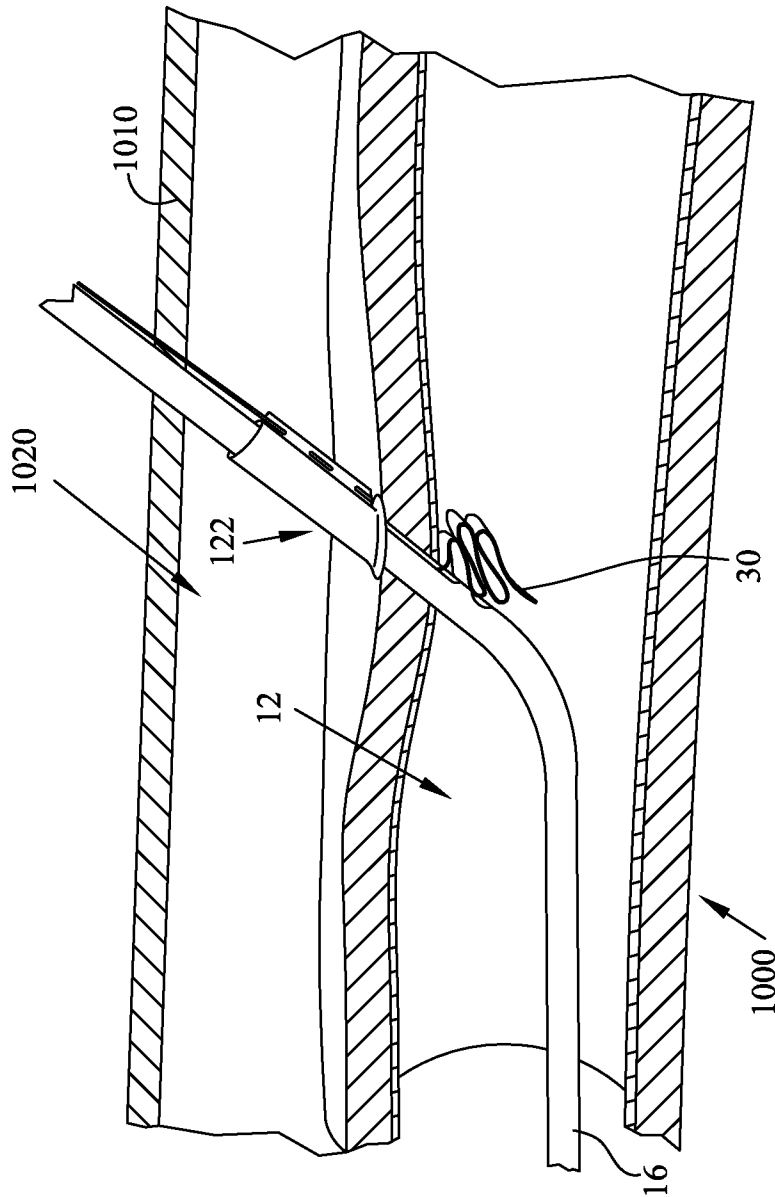


FIG. 3

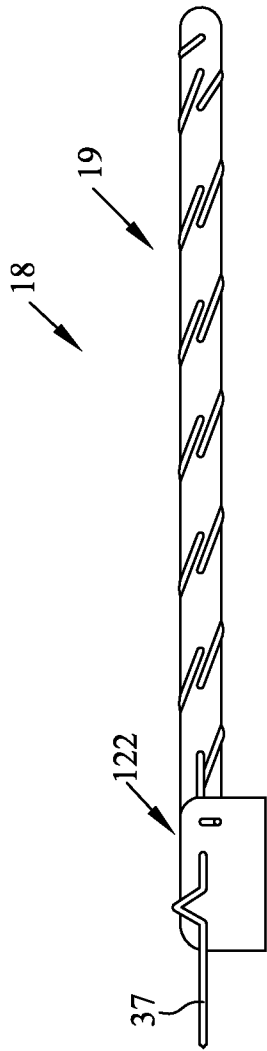


FIG. 4A

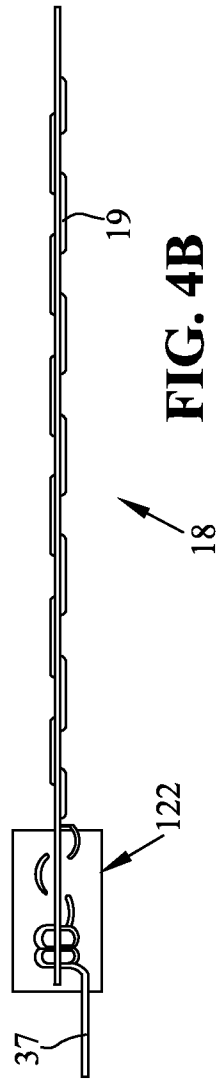


FIG. 4B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/047348

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61B 17/08 (2009.01) USPC - 606/215 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A61B 17/00, 17/08, 17/12 (2009.01) USPC - 606/151, 213, 215; 623/23.72 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatBase		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2007/0038244 A1 (MORRIS et al) 15 February 2007 (15.02.2007) entire document	1-20
Y	US 2006/0009802 A1 (MODESITT) 12 January 2006 (12.01.2006) entire document	1-20
A	US 2001/0003158 A1 (KENSEY et al) 07 June 2001 (07.06.2001) entire document	1-3, 8, 9, 11-20
A	US 2005/0065549 A1 (CATES et al) 24 March 2005 (24.03.2005) entire document	1-3, 8, 9, 11-20
A	US 5,728,114 A (EVANS et al) 17 March 1998 (17.03.1998) entire document	1-3, 8, 9, 11-20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 20 July 2009		Date of mailing of the international search report 29 JUL 2009
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774