

[54] INGROWTH SHROUD AND IMPLANTING METHOD UTILIZING THE SAME

[75] Inventor: Louis Bucalo, Holbrook, N.Y.

[73] Assignee: Inventors In Ventures, Inc., New York, N.Y.

[22] Filed: Oct. 19, 1973

[21] Appl. No.: 407,991

[52] U.S. Cl. 128/1 R; 3/1; 128/334 R

[51] Int. Cl. A61b 19/00

[58] Field of Search 128/1 R, 334 R, 334 C, 128/335.5; 3/1, DIG. 1

[56] References Cited

UNITED STATES PATENTS

2,671,444	3/1954	Pease	128/334 R X
3,054,406	9/1962	Usher	128/334 R
3,155,095	11/1964	Brown	128/334 C
3,435,823	4/1969	Edwards	128/334 C
3,707,957	1/1973	Bucalo	128/1 R
3,820,528	6/1974	Rogers	128/1 R

FOREIGN PATENTS OR APPLICATIONS

703,123	3/1941	Germany	128/334 R
---------	--------	---------------	-----------

OTHER PUBLICATIONS

Austenal Catalogue, 1964, pg. 65 (Item 6510).

Primary Examiner—Dalton L. Truluck
Attorney, Agent, or Firm—Steinberg & Blake

[57] ABSTRACT

An implanting method according to which, in connection with the implanting procedure, a shroud is connected to a body organ to reinforce the latter in a manner which will prevent kinking of the body organ. The shroud has in engagement with the body organ a surface of sufficient porosity to promote the ingrowth of tissue between the body organ and the shroud. The shroud may consist of a bendable sheet material in the form of a filamentary mesh capable of being placed around the body organ at the part of the latter which receives the implant with the sheet material extending along the body organ beyond the implant to prevent kinking of the body organ at the region where it extends beyond the implant.

7 Claims, 3 Drawing Figures

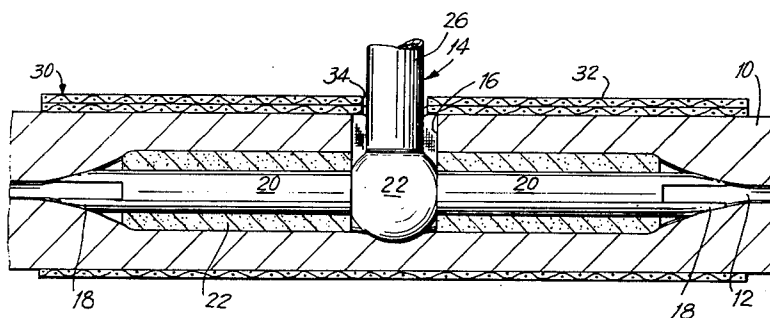


FIG. 1

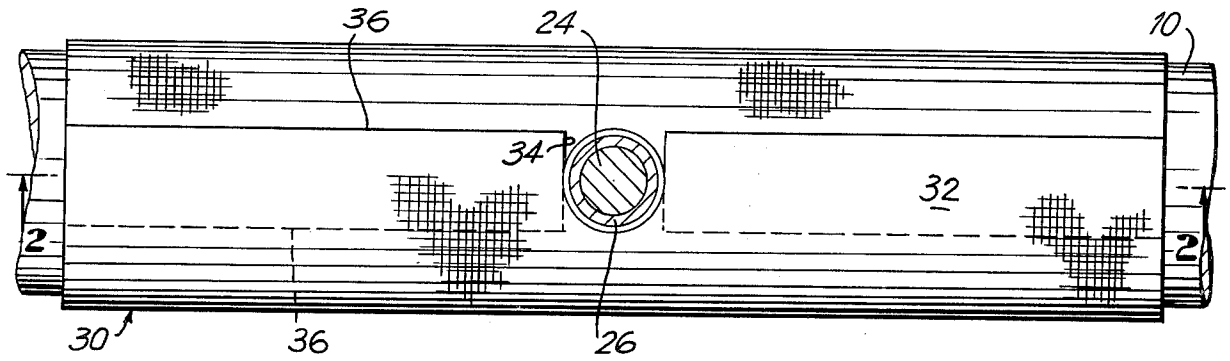


FIG. 2

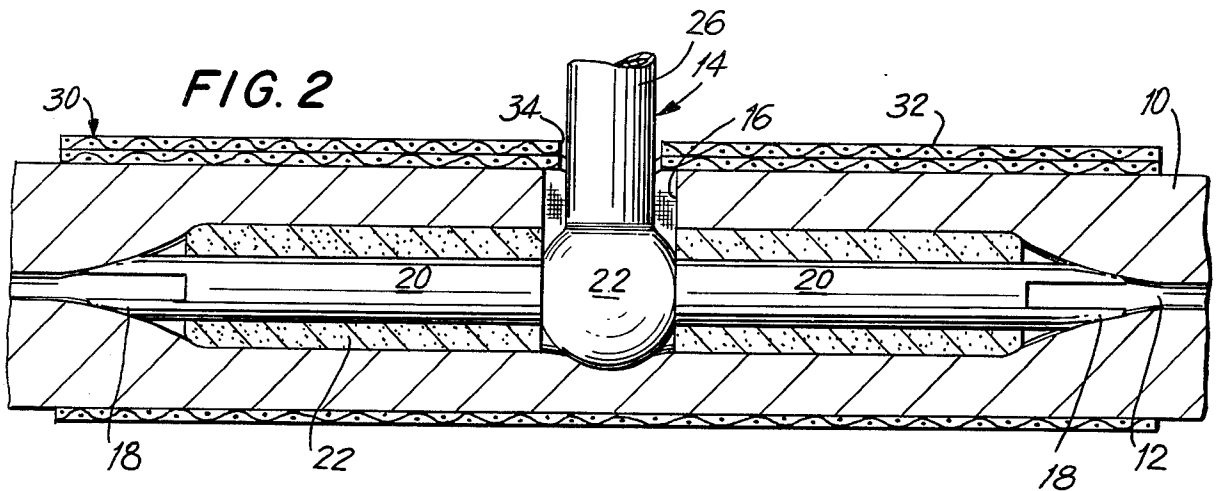
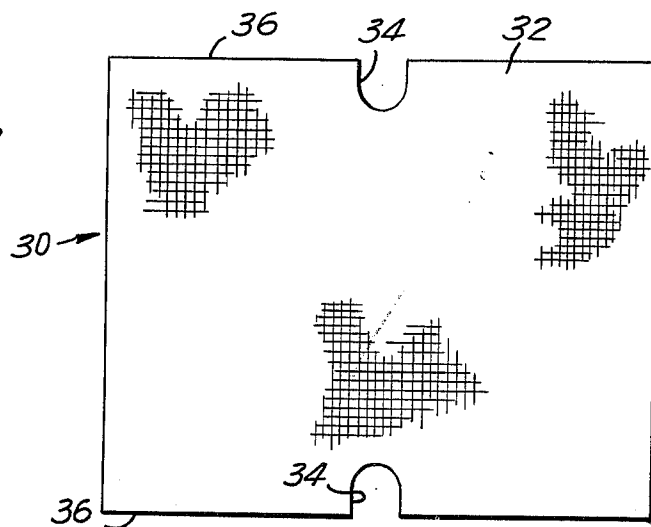


FIG. 3



INGROWTH SHROUD AND IMPLANTING METHOD UTILIZING THE SAME

BACKGROUND OF THE INVENTION

The present invention relates to implanting methods and devices used in connection with the implanting methods.

As is well known, most implants which are introduced into the interior of a body organ of a living being are relatively rigid in nature. On the other hand, the body organ is normally flexible, so that the degree of flexibility of the body organ is necessarily reduced by the implant therein. This loss of flexibility at the exact part of the body organ which receives the implant in itself creates no particular problem, but where the body organ extends beyond the implant the flexibility of the body organ will tend to form an undesirable kink in the body organ at the region where it extends beyond an end of the implant. Furthermore, the flexibility of the body organ is such that it may tend to deflect itself away from the implant in an undesirable manner.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a method and device which will avoid the above drawbacks.

In particular, it is an object of the present invention to provide a method and device which will prevent undesirable bending or kinking of a body organ with respect to an implant.

Also it is an object of the present invention to provide a method and device which will assure the security of the connection between the body organ and the device of the invention.

In accordance with the invention the body organ is reinforced at the part thereof which receives the implant by a shroud which is placed around the body organ and which extends somewhat beyond the ends of the implant along the body organ with this shroud having sufficient resistance to bending to prevent kinking of the body organ at the ends of the implant while at the same time avoiding a complete inhibition of bending of the body organ. The shroud preferably takes the form of a bendable sheet material in the form of a filamentary mesh which can be placed around the body organ at the region thereof which receives the implant with the open mesh promoting ingrowth of tissue between the body organ and the sheet material while at the same time the sheet material has the property of giving to the body the capability of some bending at the region where the body organ extends beyond the implant without, however, giving to the body organ the capability of kinking at the ends of the body organ.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a fragmentary partly sectional elevation schematically illustrating the method and structure of the present invention;

FIG. 2 is a sectional elevation taken along line 2—2 of FIG. 1 in the direction of the arrows; and

FIG. 3 illustrates the ingrowth shroud of the invention prior to utilizing the shroud in the method of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings and to FIGS. 1 and 2 in particular, there is schematically illustrated therein, as an example of a body organ to which the principles of the present invention are applied, a part of a vas deferens 10 having an interior lumen 12 which receives the implant 14. In the illustrated example the implant 14 is in the form of a valve for reversibly interrupting the flow of sperm-carrying fluid. Thus, the vas 10 is formed with a suitable incision 16 to enable the implant 14 to be introduced into the lumen 12 at the parts thereof which extend in opposed directions from the incision 16. The implant 14 thus is of an elongated configuration and has the opposed ends 18 which are suitably slotted so as to prevent plugging of the passage in the interior of the elongated portions 20 of the implant. The elongated portions extend from a central region 22 where a movable valve member is located, with the valve member being moved by way of a control member 24 situated in a hollow stem 26 which extends through the incision 16 beyond the organ 10. The exterior surfaces of the elongated portions 20 of the implant are surrounded by a porous matrix 22 deposited in any known way on the exterior surfaces of the portions 20 in order to promote the ingrowth of tissue between the inner surface of the organ 10 and the exterior surface of the implant, to achieve in this way not only a secure connection of the implant in the organ but also to achieve a fluid-tight engagement between the inner surface of the organ and the implant.

With the above conditions there may be a tendency for the organ 10 to bend, due to its flexibility, particularly at the ends 18 of the implant 14, to such an extent that the organ 10 may form kinks at the ends 18 of the implant, with such bending also having an undesirable tendency to displace a part of the inner surface of the organ 10 away from the matrix 22, thus creating a condition where the ingrowth of tissue will not take place in the desired manner over the entire exterior surface of the matrix 22 at each elongated portion 20 of the implant 14.

In accordance with the present invention in order to avoid undesirable kinking or bending of the organ with respect to the implant, an ingrowth shroud 30 is utilized. As may be seen from FIG. 3, the ingrowth shroud 30 consists of a sheet material means 32 which in the illustrated example is of a substantially rectangular configuration. This sheet material means 32 is in the form of a filamentary mesh. Thus, it is possible to form from fine gold wires, which themselves may be in the form of fine braided filaments, a woven mesh as illustrated in FIG. 3. While gold wire is referred to, it is emphasized that any material compatible with the body can be used. Thus, other metals as well as various plastics may be utilized to form the filamentary mesh of the sheet material means 32. The sheet material means 32 is flexible and bendable and has a relatively small degree of resiliency. The length of the sheet material means 32, as viewed in a horizontal direction in FIG. 3, is chosen so as to be longer than the total length of the implant. In addition, the opposed edges of the sheet material means 32, shown at the top and bottom of FIG. 3, are formed with centrally situated notches 34.

Thus, the ingrowth shroud means 30 may be placed by the surgeon around the organ 10 after the implant 14 has been introduced. This involves only bending the

sheet material means 32 around the organ 10 so as to engage the exterior surface thereof. The opposed edges 36 of the sheet material means 32 may overlap each other with the hollow stem 26 extending through an opening which is formed by the overlapping notches 34, as is particularly apparent from FIG. 1. Of course it is to be understood that the configuration of the sheet material means 32 which is illustrated in FIG. 3 is provided only for the specific example used to illustrate the present invention. When the invention is applied to other implants and to other organs the sheet material means 32 will of course have a different configuration.

However, in accordance with the invention the sheet material means 32 is placed around the organ at the exterior thereof in such a way that it will reliably maintain the organ in engagement with the implant. At the same time, the sheet material means 32 extends beyond the opposed ends 18 of the implant. As a result, the organ 10 is reinforced in such a way that while it may bend to some extent at locations beyond the ends 18 of the implant 14, bending to an extent sufficient to provide kinking is reliably avoided and at the same time the shroud maintains the inner surface of the organ 10 in engagement with the matrices 22, promoting a reliable ingrowth of tissue at the interior of the organ.

Furthermore, because the ingrowth shroud 30 is made of a mesh, the surface of the sheet material means 32 which engages the surface of the organ 10 at the exterior of the latter has a sufficient porosity to promote the ingrowth of tissue between the organ and the shroud. Thus, before the sheet material means 32 is placed around the organ the exterior surface of the organ 10 will be wounded to some extent, either intentionally, or roughened as an incident to the implanting procedure, and during healing of the exterior surface of the organ 10 it will necessarily grow into the openings of the mesh providing in this way ingrowth of tissue between the organ 10 and the shroud so as to provide an exceedingly secure connection between the organ 10 and the reinforcing shroud. Initially, after the shroud is placed around the organ it may be secured thereto by suitable sutures which can be extended through meshes of the shroud.

Thus, with the method and device of the invention although the organ 10 is still bendable to some extent, particularly at the region where it extends beyond the ends of the implant, nevertheless the presence of the ingrowth shroud 30 will reinforce the organ so as to prevent excessive bending to such an extent that undesirable kinking will take place. Furthermore, because of the fact that the structure of the shroud is such that ingrowth of tissue takes place between the organ and the shroud, the security of the connection of the shroud with the organ is assured.

What is claimed is:

1. For use in connection with an implanting procedure, an elongated implant adapted to be situated in the interior of a body organ with said implant having opposed end regions beyond which the body organ is adapted to extend, and ingrowth shroud means adapted to surround the body organ at the region thereof where the implant is located, said ingrowth shroud means being adapted to extend along the exterior of the body organ beyond the opposed ends of the implant for reinforcing the organ to prevent kinking thereof at the ends of the implant, said ingrowth shroud means having, for engagement with the organ, a surface of sufficient po-

rosity to promote the ingrowth of tissue between the organ and the ingrowth shroud means.

2. The combination of claim 1 and wherein the body organ is a vas deferens while the implant is a valve adapted to be implanted in the vas deferens to reversibly prevent the flow of sperm-carrying fluid, said ingrowth shroud means being in the form of a bendable mesh adapted to surround the vas deferens at the part thereof where the valve is located and adapted to extend beyond opposed ends of the valve.

3. For use in connection with an implanting procedure, an ingrowth shroud consisting of a filamentary mesh sheet material means which is flexible and bendable while having a relatively small degree of resiliency so as to be bendable around and placed in engagement with the exterior of an organ for reinforcing the latter, said filamentary mesh sheet material means having a porosity sufficient to promote the ingrowth of tissue between the organ and the sheet material means, and said sheet material means having a dimension along the organ sufficiently great to enable the sheet material means to extend through substantial distances beyond opposed ends of an implant situated in the organ with said sheet material means having sufficient resistance to bending to prevent kinks from forming in the organ at the ends of the implant without completely eliminating the flexibility of the organ, the filamentary sheet material means having, for extending circumferentially around the organ, a dimension great enough to enable end regions of the sheet material means to overlap, the end regions of the sheet material means which are adapted to overlap being formed with notches which when the end regions overlap cooperate to define an opening through which a part of an implant is adapted to extend.

4. In an implanting method, the steps of situating in an elongated tubular organ an elongated implant which terminates in a pair of opposed ends, and bending around and in engagement with the exterior of the organ a filamentary mesh sheet material which is flexible and bendable while being of a relatively small degree of resiliency and which has dimensions great enough to extend completely around the organ and along and through substantial distances beyond the opposed ends of the implant, and situating the sheet material at a location where it extends through substantial distances beyond the opposed ends of the implant while bending the sheet material to an extent according to which it completely surrounds and engages the exterior surface of the organ for reinforcing the latter, for providing some degree of bending of the organ while preventing kinking thereof at the ends of the implant, and for promoting ingrowth of tissue between the exterior organ and the filamentary mesh sheet material.

5. In a method as recited in claim 4 and wherein end regions of the sheet material are placed in overlapping relation extending longitudinally along the organ during bending of the sheet material.

6. In a method as recited in claim 4 and wherein the organ is a vas deferens while the implant is a valve.

7. In a method as recited in claim 6 and wherein end regions of the sheet material are placed in overlapping relation extending longitudinally along the organ with the valve having a stem extending through a wall of the organ and said end regions of the implant being notched and receiving the stem in the notched end regions.

* * * * *