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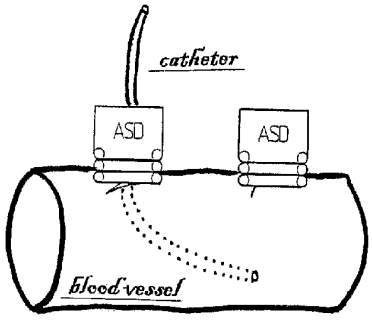
(54) Title: ANCHORING SCREW DEVICE



(57) Abstract: The present invention, the ASD, is a mechanical device for anchoring hollow tube-like structures in the human body, such as blood vessels and ureters. It facilates positioning needles or catheters in blood vessels and it prevents those from dropping out of the vessel or from "wandering off" in the vessel. The ASD can be used in every interventional medical situation for diagnostic or therapeutic purposes. The ASD is very easy to fix onto the vessel wall. Screwing is a fast technique saving operating time and requiring only basic microsurgical skills. The manufacturing is easy. It should be understood that the foregoing is illustrative and nor limiting, and that modifications may be made by those skilled in the art, without departing from the scope of the invention.

ANCHORING SCREW DEVICE

DESCRIPTION

This invention relates to a screw device for anchoring onto a tube-like structure, for example a blood vessel, in such a way (1) that a needle or a catheter can be passed safely into the hollow structure and (2) that this needle or catheter can be positioned firmly in the vessel so that it cannot slip out or be displaced (i.e. be carried away by the fluid in the vessel).

BACKGROUND ART

In many interventional medical procedures we want to reach hollow structures like a blood vessel or a ureter. During these procedures we want to place a catheter or a needle into the hollow structure to have access to it, mostly for therapeutic reasons such as the administration of medication, the placing of a stent or a coil, dilatation and so one. Sometimes access to the aforementioned hollow structures is necessary for diagnostic purposes.

The firm and stable fixation of a catheter into the wall of a hollow structure is essential since the catheter should under no circumstances fall out of the vessel or 'wander off' into the vessel. In the human body some hollow structure are embedded in surrounding tissue which enables the catheter to stay in place. This is the case for example with the blood vessels in a limb. It is completely different in the thorax, skull, or abdomen, where hollow structure are surrounded by less connective tissue and a catheter can easy slip out or be displaced. To prevent this, the catheter has to be fixated by suturing it to the wall of the vessel, but this is difficult and time consuming.

The screw device of the preferred embodiment of the present invention, hereafter referred to as the ASD (anchoring screw device), can easily be screwed onto the vessel-wall, where it gives a maximum stability and support for the catheter, which can then safely be inserted into the vessel.

Interventional fields include diagnostic procedures that involve the implantation of a catheter or needle; and therapeutic procedures that involve interventions (such as placing a catheter for medication) or that involve surgical operations, laparascopy, possibly in combination with endoscopic procedures.

SUMMARY OF INVENTION

The invention makes it possible to anchor a hollow structure, like a blood vessel, easily and quickly. More specifically, the ASD allows the physician dealing with medical intervention to make a stable and safe connection with a hollow structure in such a way that a catheter can be firmly positioned without any need for time consuming suturing.

According to the present invention, there is provided a surgical screw-device adapted for being anchored onto a wall of a tube-like structure inside the human body, such as for example a blood vessel or a ureter, the screw-device comprising a hollow screw with windings, between which in use the wall of the tube-like structure is anchored, characterised in that the windings of the hollow screw are loose from each other in axial direction of the hollow screw and end on a single spiral winding having a non-cutting perforating end for perforating the wall of the tube-like structure in such a way that passage of the windings of the hollow screw by screwing is enabled.

DETAILED DESCRIPTION OF THE ASD INVENTION

1 The ASD takes the form of a hollow screw, with an ending that is not-as in the regular screw-a point, but one full spiral winding (360 degrees). The end of the winding is sharp and round, i.e. it is non-cutting but it is capable of perforating the wall of the hollow tube-like structure in which it is screwed. The sharp, round point is bent inwardly and downwardly in an angle of 10 to 20 degrees (α) (see figure la), Alternatively, this sharp, round, non-cutting point may bend downwardly in an angle of 90 degrees (α) (see figure lb). In this case, the end resembles a cork-screw, but the end is not situated in the middle of the final winding but on the periphery.

2 The ASD the same as mentioned in 1 but with the body of the screw filled with thrombostatic or haemostatic material that functions as a sponge against leakage of the vessel after the catheter has been removed (see figure 2).
3 The ASD with removable head. This device consists of two basic parts: first, the removable head with applicator (i.e. a long, thin shaft with a handle used to drill the head into the vessel wall) and second, a hollow ASD with a hollow screw of three windings, which remains in place (i.e. in the vessel wall).
The removable head consists of two windings, and ends in the form of a corck-screw (see figure 3a, 3b). This is, again, a round, sharp, non-cutting point. The head forms one whole with the applicator. Once the head is in place (i.e. in the middle of the vessel wall) (see figure 3c), it is removed, together with the applicator, from the rest of the ASD that stays within the vessel wall.
The second part is the body of the ASD. It consists of three hollow windings attached to the head by means of internal, anti-clockwise windings (see figure 3d). Every winding is wider than the previous one, thus expanding the vessel wall. The opening in the wall is made by the head in a non-occlusive way, i. e. the receptor vessel need not be temporarily occluded.

DIAMETER
Depending on the sort of hollow structure, like a blood-vessel, the diameter of ASD may vary from 1 millimetre to 2 centimetre, or even more.

SUBSTANCE
The ASD is made of inox material, or titanium, or super-elastic materials such as nitinol, or synthetic materials, or even resorbable materials.

THICKNESS OF MATERIAL
Depending on the diameter of the blood-vessel, the material may vary from 0,1 mm to any desirable thickness.

ELASTICITY
Depending on the material.

DESCRIPTION OF APPLICATION OF THE ASD.
The ASD is screwed one turn of 360 degrees into the receptor wall. This ensures a stable fixation on the wall. A needle or a catheter is then inserted through the ASD into the wall, and is fixed onto the ASD so that it cannot slip out of the vessel or 'wander off' into the vessel.

MANUFACTURING AND INDUSTRIAL APPLICABILITY
The SCREW-DEVICE can be manufactured commercially and be employed to anastomose two vessels of different or identical sizes. It can be used in all domains of vascular surgery, heart surgery, and neurosurgery.

BRIEF DESCRIPTION OF FIGURES

Figure 1a: ASD

Figure 1b: ASD onto the wall

Figure 2 : ASD filled with thrombostatic or haemostatic material

Figure 3a: ASD with removable head lateral view

Figure 3b: ASD with removable head top view

Figure 3c: ASD with removable head in situ view, position into the wall

Figure 3d: ASD with removable head, view of the way in which the removable head is attached to the boy of the ASD

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Surgical screw-device adapted for being anchored onto a wall of a tube-like structure inside the human body, such as for example a blood vessel or a ureter, the screw-device comprising a hollow screw with windings, between which in use the wall of the tube-like structure is anchored, characterised in that the windings of the hollow screw are loose from each other in axial direction of the hollow screw and end on a single spiral winding having a non-cutting perforating end for perforating the wall of the tube-like structure in such a way that passage of the windings of the hollow screw by screwing is enabled.

2. Surgical screw-device according to claim 1, characterised in that the front winding has a sharp and round end.

3. Surgical screw-device according to claim 2, characterised in that the sharp and round end is bent inwardly and downwardly in an angle of 10 to 20 degrees with respect to the other windings.

4. Surgical screw-device according to claim 2, characterised in that the sharp and round end is bent downwardly in an angle of 90 degrees with respect to the other windings.

5. Surgical screw-device according to any one of the previous claims, characterised in that the screw-device further comprises a hollow structure, fixed onto the hollow screw.

6. Surgical screw-device according to claim 5, characterised in that the hollow structure is provided with means for fixing a needle or a catheter onto the screw device.

7. Surgical screw-device according to claim 5 or 6, characterised in that the hollow structure is filled with thrombostatic or haemostatic material.

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8. Surgical screw-device according to any one of the previous claims, characterised in that the screw-device is made of inox material, or titanium, or super-elastic materials such as nitinol, or synthetic materials, or resorbable materials.

Figure 1a :

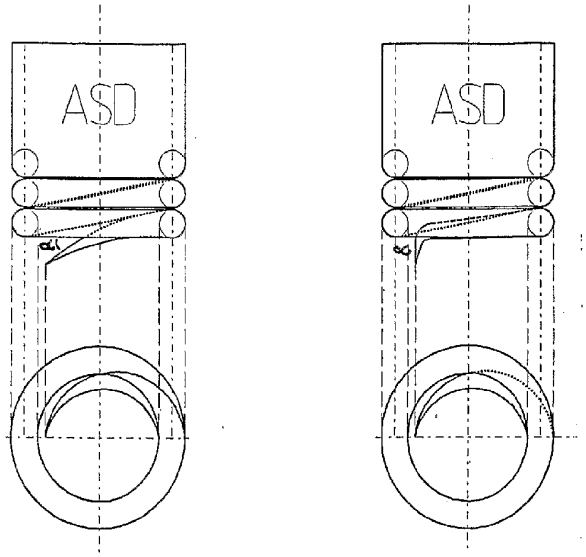


Figure 1b :

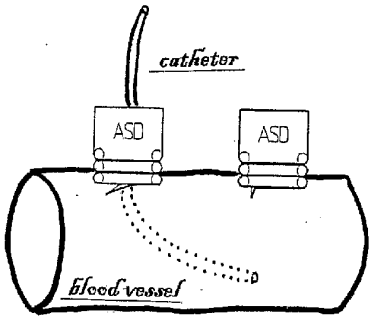
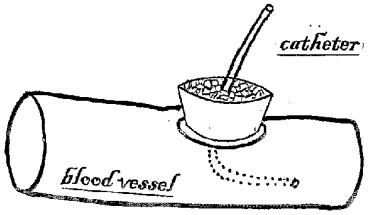


Figure 2 :



SUBSTITUTE SHEET (RULE 26)

Figure 3a :

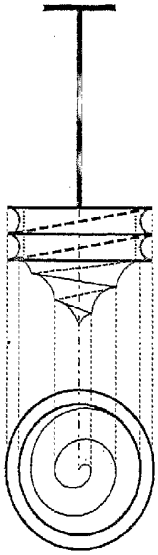


Figure 3b :

Figure 3c :

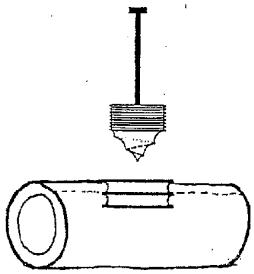


Figure 3d :