(10)

Description

The present invention relates to hemostatic clips and more particularly to hemostatic clips fabricated from biocompatible polymeric materials which may be absorbable or non-absorbable in body tissue.

Background of the Invention

In many surgical procedures, it is often necessary to ligate a plurality of vessels within the surgical site. The vessels may be severed downstream of the ligated portion. In some instances, the vessel may be ligated at two spaced apart areas and the portion of the vessel between the ligation removed. A primary reason for ligating vessels is to maintain the surgical site free from an excess of blood and to reduce blood loss in the patient. Also in certain surgical procedures wherein tumors or parts of organs and the like are to be removed, the tumor or organ may have to be separated from certain vessels. Before separating, the vessels are ligated. Once a blood vessel is completely shut off, hemostasis, that is the natural closing of the ligated end of the vessel so as to stop blood flow, will occur in several days, depending on the vessel. The body, in the meantime, will continue to allow blood flow around the ligated area through appropriate capillaries and secondary vessels with the natural physiological function of the body enlarging these by-pass vessels until adequate blood flow is obtained. Hence, when ligating the vessel, there should be positive stopping of the blood flow in the main vessel; that is, no leakage which might cause blood loss in the patient and may also disrupt the natural hemostasis and concurrent manufacture of new paths of blood flow in the patient should occur.

In the past, this closing of the vessel was usually accomplished using ligatures, i.e. threads or filaments, which the doctor tied around the vessel desired to be closed. This is a time consuming process and one wherein positive closure of the vessel is not always accomplished. In recent years, hemostatic clips have replaced ligatures in many surgical procedures to close blood vessels and other fluid ducts. Very often these hemostatic clips are narrow U or V shaped strips formed of tantalum or stainless steel which are capable of being deformed and possess sufficient strength to regain the deformation when clamped about a blood vessel.

In published British patent application GB—A—2 054 026 there are disclosed hemostatic clips made from bio-compatible polymeric materials which are absorbable or non-absorbable in body tissue. These clips comprise a pair of leg members connected at their proximal ends by a resilient hinge section and terminating at their distal ends in a locking latch means. The distal end of one of the leg members comprises a deflectable hook section. The distal end of the other leg member is configured to be engaged by the hook section when the leg members are pivoted about the hinge to close the clip about a blood vessel. These clips as described have been found satisfactory for ligating most blood vessels. However, in certain instances if the vessel is large and the pressure in the vessel great, the clips may fail. The failure usually occurs at the latch or hook section. In certain instances, sufficient pressure is placed between the vessel clamping surfaces of the legs of the clip that the hook section will deflect allowing the opposite leg to spring out from underneath the hook member and the clip open.

US—A—3 612 475 (Dinger) discloses a device for closing tubes, such as those used to transport blood to and from flexible blood bags. The device comprises a pair of leg members resiliently hinged together at one end and provided with latch members at the other. In order to produce a more secure closure of the tube, the tube engaging surface on one of the leg members is longitudinally or transversely convexly curved and the other tube engaging surface is flat.

GB—A—2 054 026 discloses a hemostatic clip comprising first and second leg members joined at their proximal ends by resilient hinge means and terminating at their distal ends in latch means, each leg member having an outer surface and a vessel clamping inner surface, said vessel clamping inner surface being in opposition to the vessel clamping inner surface of the other leg member, the outer surface of each leg member being configured to be accepted by the jaws of a clip applier whereby the clip may be clamped about a vessel, said first leg member terminating at the distal end thereof in a portion of the latch means, said portion comprising a deflectable hook member extending from the inner face of said leg member, said hook member having an inner surface spaced from the inner surface of said leg member, said second leg member terminating at the distal end thereof in a complementary locking portion of the latch means whereby when said first and second leg members are pivoted about said hinge means, the distal end of said leg member deflects and engages the hook member of the first leg member to lock the clip in a closed position.

The hemostatic clip of the present invention, in one aspect, is characterised in that the vessel clamping surface of said first leg member has a concave radius of curvature between the hinge means and the hook member and the vessel clamping surface of the second leg member has a convex radius of curvature between the hinge means and its distal end, the radius of curvature of the vessel clamping surface of said second leg member being smaller than the radius of curvature of the vessel clamping surface of said first leg member, whereby the hook member is urged towards the hinge means when pressure is placed on the vessel clamping surfaces of the leg members when the clip is in the closed position to aid in securing the clip in the closed position.

In another aspect, the hemostatic clip is characterised in that the cross-section of the first leg

member is substantially less than the cross-section of the second leg member in the region of clamping of the blood vessel, whereby the hook member is urged towards the hinge means when pressure is placed on the vessel clamping surfaces of the leg members when the clip is in the closed position to aid in securing the clip in the closed position.

Summary of the Present Invention

We have discovered a new and improved hemostatic clip made from bio-compatible polymeric materials which comprises a pair of leg members connected at their proximal ends by a resilient hinge section and having a deflectable hook type latching means.

The hemostatic clips of the present invention have good *in vivo* strength properties and have vessel clamping surfaces with minimal or no gap or in certain instances a controlled gap between the surfaces when the clip is in the closed position to provide positive clamping of vessels and, hence, obtain the desired hemostasis within the period of time of from about 3 to 5 days. The latching means becomes secure or more secure the greater the pressure placed on the vessel clamping surfaces which ensures that the clip remains in the closed and locked position in use.

The hemostatic clips of the present invention comprise first and second leg members joined at their proximal ends by resilient hinge means and terminating at their distal ends in latching means. The hinge section is resilient, i.e. it has elastic memory and acts as a spring which assists in the packaging of the clip as well as the handling and placement of the clip.

Each leg member has an outer surface and a vessel clamping inner face. The vessel clamping inner face is in opposition to a vessel clamping inner face of the other leg member. When the clip is in the closed position, there is a minimal or no gap or in certain instances a controlled gap between the vessel clamping faces. One leg member terminates at its distal end in a portion of the latch means. This portion comprises a deflectable hook member extending from the inner face of the leg member. The hook member has an inner face spaced from the inner face of the leg members and in certain embodiments substantially parallel thereto. The end face of the hook member may be beveled so as to form an acute angle with the inner face of the hook member. The other leg member terminates at its distal end in a complementary locking portion of the latch. This portion comprises an end face which fits underneath the hook member of the other leg. The end face of the other leg member may have a bevel complementary to the bevel on the end face of the hook member. The complementary bevel forms an obtuse angle with the inner face of the second leg member and is adapted to deflect the hook member as the clip is closed.

The clip is closed by pivoting the leg members about the hinge means. The distal end of one leg member deflects and engages the hook member of the other leg member to lock the clip in the closed position. The leg members of our new clip are configured so when the clip is in the closed position the bending of the leg member carrying the hook member is greater than the bending of the opposite leg member. In use, this difference in bending causes the hook member to be urged towards the hinge means and secures the clip in the closed position. The greater the pressure placed on the vessel clamping surface of the leg member carrying the hook member, the more the hook member is urged towards the resilient hinge means and the tighter and more secure the clip becomes. In one aspect of the present invention, the vessel clamping surface of the leg member carrying the hook member has a concave radius of curvature extending from the hinge means to the hook member while the vessel clamping surface of the other leg member has a convex radius of curvature extending from the hinge means to the distal end of the member. The radius of the curvature of the vessel clamping surface of the latter leg member is smaller than the radius of curvature of the vessel clamping surface of the leg member carrying the hook member.

In a second aspect of the present invention, the cross-section of the leg member carrying the hook member is substantially less than the cross-section of the other leg member in the region of clamping of the blood vessel. By decreasing or varying the cross-sections of the leg members, one can control the amount of force placed on the vessel clamping surface and, hence, bend the leg member carrying the hook member to a greater degree than the other leg member in accordance with the present invention. A clip according to this second aspect of the present invention may also have the vessel clamping surfaces of both leg members with a convex radius of curvature. This double convex configuration provides a squeezing force to the vessel equivalent to a clip having different cross-sections of the leg-members thus allowing for a reduction of the bulk of the clip and the amount of material placed in the body.

The outer surfaces of the leg members carry suitable means for allowing the clip to be picked up in the jaws of an appropriate forceps type hemostatic clip applier and closed about the vessel. In certain embodiments of the present invention this may be accomplished merely by providing the outer surface with an appropriate radius of curvature so that it will be held in the jaws of a forceps type clip applier. In preferred embodiments of the present invention, each outer surface includes a boss extending transverse of the leg member which bosses are adapted to fit into channels disposed in the jaws of a forceps type clip applier and are used to pick up the clip and close the clip about a blood vessel. In certain embodiments of the improved clip of the present invention, the legs of the clips include interlocking means which prevent relative transverse movement between the vessel clamping surfaces when the clip is in the closed position.

Brief Description of the Drawings

The present invention will be described in greater detail in conjunction with the accompanying drawings wherein:

Figure 1 is a greatly enlarged view in perspective of a hemostatic clip in accordance with the first aspect of the present invention;

Figure 2 illustrates the clip of Figure 1 clamped about a blood vessel;

Figure 3 is a cross-sectional view showing the clip of Figure 1 closed about a blood vessel;

Figure 4 illustrates a forceps type applier useful with the clips of the present invention;

Figure 5 illustrates a clip retained in the jaws of a forceps type clip applier;

Figure 6 illustrates a clip closed and locked over a blood vessel in the jaws of the applier;

Figure 7 is a greatly enlarged view in perspective of an embodiment of a hemostatic clip according to the second aspect of the present invention;

Figure 8 is a cross-sectional view of the type of clip depicted in Figure 7.

Description of the Preferred Embodiments

Referring to Figure 1, there is shown a hemostatic clip 10 according to the first aspect of the present invention. The hemostatic clip comprises two leg members 11 and 12. The leg members are connected at their proximal ends by the resilient hinge section 13. Leg member 11 terminates at its distal end in a hook member 14. The hook member has an inner face 15. The end surface of the hook member may be beveled at 26 to assist in deflecting the hook member when the clip is closed. The vessel clamping surface 16 of the leg member 11 has a concave radius of curvature extending from the hinge to the start of the hook member. The other leg member 12 has vessel clamping surface 18 which has a convex radius of curvature extending from the hinge to the distal end of the leg member. The radius of curvature of the clamping surface 18 is smaller than the radius of curvature of clamping surface 16. Leg member 12 terminates in an end surface 19. Preferably this end surface is beveled and has a complementary bevel to the bevel on the hook member so as to assist in the deflection of the hook member when the clip is closed. The outer surfaces of the clip 20 and 22 are configured so as to be accepted by the jaws of a suitable forceps type applier and to allow those jaws to put pressure on the outer surfaces of the clip to close the clip. The clip is closed about a blood vessel as shown in Figure 2 by urging the distal ends of the two leg members together until the end surfaces 19 of the leg member 12 deflects the hook member 14 by engaging end surface 26 of the hook member on leg 11 as the two leg members are pivoted about the resilient hinge 13 and closed about the blood vessel 27.

As is more clearly shown in Figure 3, which is a cross-section of the closed clip, the radius of curvature of the vessel clamping convex surface 18 of the leg member 12 is smaller than the radius of curvature of the concave vessel clamping surface 16 of the leg member 11 carrying the hook member 14. The bulkier the closed blood vessel the more force is developed between the vessel clamping surfaces, and the more the clamping surface 16 of the leg member carrying the hook member is forced into a more concave position, thus drawing the hook member in the direction of the arrow towards the resilient hinge 13 and the more secure the clip becomes.

Figure 4 illustrates a forceps type ligating clip applier 60 comprising two handle members 61 and 62 crossing at a hinge point 63 and maintained in a normally open position by a spring 64. One handle extends beyond the hinge forming a jaw member 65 while the extension of the other handle also forms a corresponding jaw member 65.

Figure 5 illustrates the detailed construction of the jaws and the interaction of the jaws with a clip. The jaws are of identical design and are provided respectively with channels 66 and 67 extending rearwardly from the tips of the jaws. Each channel is provided with a cylindrical recess 68 and 69 disposed transverse of the channel and near the distal end thereof. The recesses are in alignment when the jaws of the applier are closed and are sized to receive the cylindrical lugs or bosses 41 and 42 of the clip. The channels forward of the recesses are deeper than to the rear of the recesses as illustrated in Figure 5. When the open clip is held in the applier, the cylindrical bosses on the clip extend into the cylindrical recesses in each jaw. Due to the angle of the clip in the applier, the distal ends of the legs extend into the deeper or forward section of each jaw. The resilient or elastic memory of the hinge retains the clip in the recesses of the applier. The clip is initially loaded in the applier in a position as illustrated in Figure 5. As shown in Figure 6, the jaws 65 of the applier have been moved and the clip positioned over the vessel 37 to be ligated. The jaws of the applier are closed and the clip is locked over the vessel. As the clip is closed, the cylindrical lugs or bosses 41 and 42 of the legs rotate journal like in the cylindrical recesses 68 and 69 of the jaws. After the clip has been securely latched over the vessel to be ligated, the jaws of the applier are opened to release the clip and vessel and a new clip is loaded in the applier. Since the jaws of the applier and the clip pick up features are identical, is it not necessary to orient the applier to the clip when loading the applier.

In Figure 7 there is shown an embodiment of a hemostatic clip according to the second aspect of the present invention. In this embodiment, the clip 80 comprises a pair of leg members 81 and 82 connected at their proximal ends by a resilient hinge section 83. The leg member 81 terminates at its distal end in a return hook member 84. The inner surface 85 of the hook member is substantially parallel to the vessel clamping surface 86 of the leg. The vessel clamping surface of the leg member 81 is straight. The corresponding leg member 82 terminates at its distal end in a

beveled surface 89 adapted to deflect the hook member 84 when closing the clip. The vessel clamping surface 88 of this leg member is also straight and will be substantially parallel to the vessel clamping surface 86 when the clip is in a closed position. The outer surface 90 of the leg member 81 is curved to be accepted by the jaws of a suitable forceps type closing instrument while the outer surface of the other leg member 82 carries a boss 91 to be accepted by the opposite jaw of the forceps type clip applier. As is shown in Figure 8, which is a cross-sectional view of the clip shown in Figure 7 closed and in place about a blood vessel 92, the cross-section of the leg member 81 carrying the hook member is substantially less than the cross-section of the other leg member 82.

This reduces the area moment of inertia of the leg member carrying the hook member. When the clip is clamped about a blood vessel, the pressure applied to the leg member 81 carrying the hook member tends to deflect that leg member to a greater degree than the opposite leg member 82 and continually urges the hook member towards the resilient hinge means, securing the clip in the closed position.

The clips of the present invention may be constructed in various sizes according to their intended function. Hemostatic clips are usually less than 6 millimeters in length, about 1 1/2 millimeters in width and have a vessel clamping surface of about 3 millimeters in length. The dimensions of the clip may be reduced by about 50% for certain applications in microsurgery. Larger clips for special hemostatic applications and other functions such as closure of ova ducts or vasdeferens may have dimensions of about double those of a typical hemostatic clip. The various sizes of the clip are preferably matched with individual appliers having jaws tailored to the size of the clip for best performance.

The clips of the present invention are most conveniently molded of biologically acceptable polymeric materials which may be absorbable or non-absorbable by body tissue. Preferred absorbable polymers include homopolymers and copolymers of glycolide and lactide and poly(p-dioxanone). Preferred non-absorbable polymers include nylon, polyester, and polypropylene. All these materials have been demonstrated to be biologically acceptable when used as sutures or other implantable medical devices.

The clips of the present invention are preferably formed in an open position and may be easily and economically manufactured by injection molding or other suitable techniques.

Claims

1. A hemostatic clip (10) comprising first (11) and second (12) leg members joined at their proximal ends by resilient hinge means (13) and terminating at their distal ends in latch menas (14, 19), each leg member (11, 12) having an outer surface (22, 20) and a vessel clamping inner surface (16, 18), said vessel clamping inner surface (16, 18) being in opposition to the vessel clamping inner surface (18, 16) of the other leg member, the outer surface (22, 20) of each leg member (11, 12) being configured to be accepted by the jaws of a clip applier whereby the clip (10) may be clamped about a vessel (27), said first leg member (11) terminating at the distal end thereof in a portion (14) of the latch means, said portion (14) comprising a deflectable hook member extending from the inner face (16) of said leg member (11), said hook member (14) having an inner surface (15) spaced from the inner surface (16) of said leg member (11), said second leg member (12) terminating at the distal end thereof in a complementary locking portion (19) of the latch means whereby when said first (11) and second (12) leg members are pivoted about said hinge means (13), the distal end of said leg member (12) deflects and engages the hook member (14) of the first leg member (11) to lock the clip (10) in a closed position, the clip (10) being characterised in that the vessel clamping surface (16) of said first leg member (11) has a concave radius of curvature between the hinge means (13) and the hook member (14) and the vessel clamping surface (18) of the second leg member (12) has a convex radius of curvature between the hinge means (13) and its distal end (19), the radius of curvature of the vessel clamping surface (18) of said second leg member (12) being smaller than the radius of curvature of the vessel clamping surface (16) of said first leg member (11), whereby the hook member is urged towards the hinge means when pressure is placed on the vessel clamping surfaces of the leg members when the clip is in the closed position to aid in securing the clip in the closed position.

2. The clip according to claim 1 wherein the radius of curvature on said vessel clamping surfaces (16, 18) extend uniformly from the hinge means (13) to the distal ends (14, 19) of the leg members (11, 12).

3. A hemostatic clip (80) comprising first (81) and second (82) leg members joined at their proximal ends by resilient hinge means (83) and terminating at their distal ends in latch means (84, 89), each leg member (81, 82) having an outer surface and a vessel clamping inner surface (86, 88) said vessel clamping inner surface (86, 88) being in opposition to the vessel clamping inner surface (88, 86) of the other leg member, the outer surface of each leg member (81, 82) being configured to be accepted by the jaws of a clip applier whereby the clip (80) may be clamped about a vessel (92), said first leg member (81) terminating at the distal end thereof in a portion (84) of the latch means, said portion (84) comprising a deflectable hook member extending from the inner face (86) of said leg member (81), said hook member (84) having an inner surface (85) spaced from the inner surface (86) of said leg member (81), said second leg member (82) terminating at the distal end thereof in a complementary locking portion (89) of the latch means whereby when

beveled surface 89 adapted to deflect the hook member 84 when closing the clip. The vessel clamping surface 88 of this leg member is also straight and will be substantially parallel to the vessel clamping surface 86 when the clip is in a closed position. The outer surface 90 of the leg member 81 is curved to be accepted by the jaws of a suitable forceps type closing instrument while the outer surface of the other leg member 82 carries a boss 91 to be accepted by the opposite jaw of the forceps type clip applier. As is shown in Figure 8, which is a cross-sectional view of the clip shown in Figure 7 closed and in place about a blood vessel 92, the cross-section of the leg member 81 carrying the hook member is substantially less than the cross-section of the other leg member 82.

This reduces the area moment of inertia of the leg member carrying the hook member. When the clip is clamped about a blood vessel, the pressure applied to the leg member 81 carrying the hook member tends to deflect that leg member to a greater degree than the opposite leg member 82 and continually urges the hook member towards the resilient hinge means, securing the clip in the closed position.

The clips of the present invention may be constructed in various sizes according to their intended function. Hemostatic clips are usually less than 6 millimeters in length, about 1 1/2 millimeters in width and have a vessel clamping surface of about 3 millimeters in length. The dimensions of the clip may be reduced by about 50% for certain applications in microsurgery. Larger clips for special hemostatic applications and other functions such as closure of ova ducts or vasdeferens may have dimensions of about double those of a typical hemostatic clip. The various sizes of the clip are preferably matched with individual appliers having jaws tailored to the size of the clip for best performance.

The clips of the present invention are most conveniently molded of biologically acceptable polymeric materials which may be absorbable or non-absorbable by body tissue. Preferred absorbable polymers include homopolymers and copolymers of glycolide and lactide and poly(p-dioxanone). Preferred non-absorbable polymers include nylon, polyester, and polypropylene. All these materials have been demonstrated to be biologically acceptable when used as sutures or other implantable medical devices.

The clips of the present invention are preferably formed in an open position and may be easily and economically manufactured by injection molding or other suitable techniques.

Claims

1. A hemostatic clip (10) comprising first (11) and second (12) leg members joined at their proximal ends by resilient hinge means (13) and terminating at their distal ends in latch menas (14, 19), each leg member (11, 12) having an outer surface (22, 20) and a vessel clamping inner surface (16, 18), said vessel clamping inner surface (16, 18) being in opposition to the vessel clamping inner surface (18, 16) of the other leg member, the outer surface (22, 20) of each leg member (11, 12) being configured to be accepted by the jaws of a clip applier whereby the clip (10) may be clamped about a vessel (27), said first leg member (11) terminating at the distal end thereof in a portion (14) of the latch means, said portion (14) comprising a deflectable hook member extending from the inner face (16) of said leg member (11), said hook member (14) having an inner surface (15) spaced from the inner surface (16) of said leg member (11), said second leg member (12) terminating at the distal end thereof in a complementary locking portion (19) of the latch means whereby when said first (11) and second (12) leg members are pivoted about said hinge means (13), the distal end of said leg member (12) deflects and engages the hook member (14) of the first leg member (11) to lock the clip (10) in a closed position, the clip (10) being characterised in that the vessel clamping surface (16) of said first leg member (11) has a concave radius of curvature between the hinge means (13) and the hook member (14) and the vessel clamping surface (18) of the second leg member (12) has a convex radius of curvature between the hinge means (13) and its distal end (19), the radius of curvature of the vessel clamping surface (18) of said second leg member (12) being smaller than the radius of curvature of the vessel clamping surface (16) of said first leg member (11), whereby the hook member is urged towards the hinge means when pressure is placed on the vessel clamping surfaces of the leg members when the clip is in the closed position to aid in securing the clip in the closed position.

2. The clip according to claim 1 wherein the radius of curvature on said vessel clamping surfaces (16, 18) extend uniformly from the hinge means (13) to the distal ends (14, 19) of the leg members (11, 12).

3. A hemostatic clip (80) comprising first (81) and second (82) leg members joined at their proximal ends by resilient hinge means (83) and terminating at their distal ends in latch means (84, 89), each leg member (81, 82) having an outer surface and a vessel clamping inner surface (86, 88) said vessel clamping inner surface (86, 88) being in opposition to the vessel clamping inner surface (88, 86) of the other leg member, the outer surface of each leg member (81, 82) being configured to be accepted by the jaws of a clip applier whereby the clip (80) may be clamped about a vessel (92), said first leg member (81) terminating at the distal end thereof in a portion (84) of the latch means, said portion (84) comprising a deflectable hook member extending from the inner face (86) of said leg member (81), said hook member (84) having an inner surface (85) spaced from the inner surface (86) of said leg member (81), said second leg member (82) terminating at the distal end thereof in a complementary locking portion (89) of the latch means whereby when

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said first (81) and second (82) leg members are pivoted about said hinge means (83), the distal end of said leg member (82) deflects and engages the hook member (84) of the first leg member (81) to lock the clip (80) in a closed position, characterised in that the cross-section of the first leg member (81) is substantially less than the cross-section of the second leg member (82) in the region of clamping of the blood vessel, whereby the hook member is urgedtowards the hinge means when pressure is placed on the vessel clamping surfaces of the leg members when the clip is in the closed position to aid in securing the clip in the closed position.

4. The clip according to any one of claims 1 to 3, wherein the outer surfaces of each leg member includes a cylindrical boss (41 or 42) extending transverse of the outer surface and being positioned to be engaged by the jaws (65) of a suitable forceps type clip applier (60).

5. The clip according to any one of claims 1 to 4 including means for preventing lateral movement between the leg members when the clip is in the closed position.

Patentansprüche

1. Eine hämostatische Klammer (10) mit einem ersten Schenkel (11) und einem zweiten Schenkel (12), die an ihren vorderen Enden durch eine elastische Knickbrücke (13) verbunden sind und an ihren freien Enden in einer Rastvorrichtung (14, 19) auslaufen, wobei jeder Schenkel (11, 12) eine Außenseite (22, 20) und eine innere Klemmfläche (16, 18) für ein Blutgefäß aufweist, wobei die genannte innere Klemmfläche (16, 18) für ein Blutgefäß in bezug auf die innere Klemmfläche (18, 16) für ein Blutgefäß des anderen Schenkels gegenläufig ist, und wobei die Außenseite (22, 20) jedes Schenkels (11, 12) eine solche Konfiguration aufweist, daß sie von den Klemmbacken eines Klammeranbringgerätes angenommen wird, mit welchem Klammeranbringgerät die Klammer (10) um ein Blutgefäß (27) herum geklement werden kann, wobei der erste Schenkel (11) an seinem freien Ende in einem Teil (14) der Rastvorrichtung ausläuft, welcher Teil (14) einen biegbaren Haken aufweist, der sich von der Innenseite (16) des genannten Schenkels (11) erstreckt, wobei der genannte Haken (14) eine Innenseite (15) im Abstand zu der Innenseite (16) des genannten Schenkels (11) angeordnet aufweist, und wobei der genannte zweite Schenkel (12) an seinem freien Ende in einen ergänzenden Verriegelungsteil (19) der Rastvorrichtung ausläuft, so daß bei einer Schwenkbewegung des genannten ersten Schenkels (11) und des genannten zweiten Schenkels (12) um die genannte Knickbrücke (13) das freie Ende des genannten Schenkels (12) den Haken (14) des ersten Schenkels (11) abbiegt und diesen im Sinne einer Verriegelung der Klammer (10) in geschlossener Stellung hintergreift, wobei die Klammer (10) dadurch gekennzeichnet ist, daß die Klemmfläche (16) für ein Blutgefäß des genannten ersten Schenkels (11) einen konkaven Krümmungsradius zwischen der Knickbrücke (13) und dem Haken (14) aufweist, und daß die Klemmfläche (18) für ein Blutgefäß des zweiten Schenkels (12) einen konvexen Krümmungsradius zwischen der Knickbrücke (13) und dessen freiem Ende (19) aufweist, wobei der Krümmungsradius der Klemmfläche (18) für ein Blutgefäß des genannten zweiten Schenkels (12) kleiner als der Krümmungsradius der Klemmfläche (16) für ein Blutgefäß des genannten ersten Schenkels (11) ist, wodurch der Haken in Richtung auf die Knickbrücke hin gezwängt wird, wenn Druck auf die Klemmflächen für ein Blutgefäß der Schenkel angewendet wird, wenn sich die Klammer in geschlossener Stellung befindet, um die Lage der Klammer in der geschlossenen Stellung zu unterstützten.

2. Die Klammer nach Anspruch 1, worin der Krümmungsradius der genannten Klemmflächen (16, 18) für ein Blutgefäß sich gleichförmig von der Knickbrücke (13) zu den freien Enden (14, 19) der Schenkel (11, 12) erstreckt.

3. Eine hämostatische Klammer (80), mit einem ersten Schenkel (81) und einem zweiten Schenkel (82), die an ihren vorderen Enden durch eine elastische Knickbrücke (83) verbunden sind und an ihren freien Enden in einer Rastvorrichtung (84, 89) auslaufen, wobei jeder Schenkel (81, 82) eine Außenseite und eine innere Klemmfläche (86, 88) für ein Blutgefäß aufweist, wobei die genannte innere Klemmfläche (86, 88) für ein Blutgefäß in bezug auf die innere Klemmfläche (88, 86) für ein Blutgefäß des anderen Schenkels gegenläufig ist, und wobei die Außenseite jedes Schenkels (81, 82) eine solche Konfiguration aufweist, daß sie von den Klemmbacken eines Klammeranbringerätes angenommen wird, mit welchem Klammeranbringgerät die Klammer (80) um ein Blutgefäß (92) herum geklemmt werden kann, wobei der erste Schenkel (81) an seinem freien Ende in einem Teil (84) der Rastvorrichtung ausläuft, welcher Teil (84) einen biegbaren Haken aufweist, der sich von der Innenseite (86) des genannten Schenkels (81) erstreckt, wobei der genannte Haken (84) eine Innenseite (85) in Abstand zu der Innenseite (86) des genannten Schenkels (81) angeordnet aufweist, und wobei der genannte zweite Schenkel (82) an seinem freien Ende in einen ergänzenden Verriegelungsteil (89) der Rastvorrichtung ausläuft, so daß bei einer Schwenkbewegung des genannten ersten Schenkels (81) und des genannten zweiten Schenkels (82) um die genannte Knickbrücke (83) das freie Ende des genannten Schenkels (82) den Haken (84) des ersten Schenkels (81) abbiegt und diesen im Sinne einer Verriegelung der Klammer (80) in geschlossener Stellung hintergreift, dadurch gekennzeichnet, daß die Querschnittsfläche des ersten Schenkels (81) wesentlich kleiner als die Querschnittsfläche des zweiten Schenkels (82) im Bereich der Abklemmung des Blutgefäßes ist, wodurch der Haken in Richtung auf die Knickbrücke hin gezwängt wird, wenn Druck auf die Klemmflächen für ein Blutgefäß der Schenkel angewendet wird, wenn sich die Klammer in ge-

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schlossener Stellung befindet, um die Lage der Klammer in der geschlossenen Stellung zu unterstützen.

4. Die Klammer nach einem der Ansprüche 1 bis 3, worin die Schenkel jeweils auf ihrere Außenseite einen zylinderförmig ausgebildeten Ansatz (41 oder 42) aufweisen, der sich in der Querrichtung der Außenseite erstreckt, und so angeordnet ist, daß er von den Klemmbacken (65) eines geeigneten, zangenartigen Klammeranbringgerätes (60) erfaßt werden kann.

5. Die Klammer nach einem der Ansprüche 1 bis 4, umfassend Einrichtungen zur Verhinderung einer seitlichen Bewegung zwischen den Schenkeln, wenn sich die Klammer in der geschlossenen Stellung befindet.

Revendications

1. Pince hémostatique (10) comprenant une première branche (11) et une deuxième branche (12) réunies à leurs extrémités proximales par des moyens formant charnière élastique (13) et qui se terminent à leurs extrémités distales par des moyens de verrouillage (14, 19), chaque branche (11, 12) présentant une surface extérieure (22, 20) et une surface intérieure, de serrage du vaisseau (16, 18), ladite surface intérieure, de serrage du vaisseau (16, 18) étant opposée face à face à la surface intérieure, de serrage du vaisseau (18, 16) de l'autre branche, la surface extérieure (22, 20) de chaque branche (11, 12) étant conformée de manière à être reçue par les mâchoires d'un applicateur de pinces, au moyen duquel la pince (10) peut être serrée autour d'un vaisseau (27), ladite première branche (11) se terminant à son extrémité distale par une partie (14) des moyens de verrouillage, cette partie (14) comprenant un crochet flexible qui s'élève sur la surface intérieure (16) de ladite branche (11), ledit crochet (14) présentant une surface intérieure (15) espacée de la surface intérieure (16) de ladite branche (11), la deuxième branche (12) se terminant, à son extrémité distale, par une partie de blocage complémentaire (19) appartenant aux moyens de verrouillage, de sorte que, lorsqu'on fair pivoter la première branche (11) et la deuxième branche (12) autour desdits moyens formant charnière (13), l'extrémité distale de ladite branche (12) fléchit et attaque le crochet (14) de la première branche (11) pour verrouiller la pince (10) dans une position fermée, la pince (10) étant caractérisée en ce que la surface de serrage du vaisseau (16) de ladite première branche (11) présente un rayon de courbure concave entre les moyens formant charnière (13) et le crochet (14) et en ce que la surface de serrage du vaisseau (18) de la deuxième branche (12) présente un rayon de courbure convexe entre les moyens formant charnière (13) et son extrémité distale (19), le rayon de courbure de la surface de serrage du vaisseau (18) de ladite deuxième branche (12) étant plus petit que le rayon de courbure de la surface de serrage du vaisseau (16) de ladite première branche (11), de sorte que le crochet est attiré vers les moyens formant charnière lorsqu'une pression s'exerce sur les surfaces de serrage du vaisseau des branches alors que la pince se trouve dans la position fermée, pour contribuer à fixer la pince dans la position fermée.

2. Pince selon la revendication 1, dans laquelle les rayons de courbure desdites surfaces de serrage du vaisseau (16, 18) sont uniformes, des moyens formant charnière (13) jusqu'à l'extrémité distale (14, 19) des branches (11, 12).

3. Pince hémostatique (80) comprenant une première branche (81) et une deuxième branche (82) réunies à leurs extrémités proximales par des moyens formant charnière élastique (83) et qui se terminent à leurs extrémités distales par des moyens de verrouillage (84, 89), chaque branche (81, 82) possédant une surface extérieure et une surface intérieure, de serrage du vaisseau (86, 88), ladite surface intérieure de serrage du vaisseau (86, 88) étant opposée face à face à la surface intérieure de serrage du vaisseau (88, 86) de l'autre branche, la surface extérieure de chaque branche (81, 82) étant conformée de façon à être reçue par les mâchoires d'un applicateur de pinces, de sorte que la pince (80) peut être serrée autour d'un vaisseau (92), ladite première branche (81) se terminant à son extrémité distale par une partie (84) des moyens de verrouillage, ladite partie (84) comprenant un crochet flexible qui s'étend à partir de la surface intérieure (86) de ladite branche (81), ladite deuxième branche (82) se terminant, à son extrémité distale, par une partie de blocage complémentaire (89) appartenant aux moyens de verrouillage, de sorte que, lorsqu'on fair pivoter ladite première branche (81) et ladite deuxième branche (82) autour desdits moyens formant charnière (83), l'extrémité distale de ladite branche (82) fait fléchir et attaque le crochet (84) de ladite première branche (81) pour verrouiller la pince (80) dans une position fermée, caractérisée en ce que la section de la première branche (81) est sensiblement inférieure à la section de la deuxième branche (82) dans la région de serrage du vaisseau sanguin, de sorte que le crochet est attiré par les moyens formant charnière lorsqu'une pression est exercée sur les surfaces de serrage du vaisseau des branches alors que la pince est dans la position fermée, pour contribuer à fixer la pince dans la position fermée.

4. Pince selon l'une quelconque des revendications 1 à 3, dans laquelle la surface extérieure de chaque branche comprend un bossage cylindrique (41 ou 42) qui s'étend transversalement à cette surface extérieure et qui est positionné de façon à être attaqué par l'une des mâchoires (65) d'un applicateur de pinces du type pince à vaisseaux approprié (60).

5. Pince selon l'une quelconque des revendications 1 à 4, comprenant des moyens servant à s'opposer à tout déplacement latéral relatif entre les branches lorsque la pince est dans la position fermée.

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