

[54] **LIGATURE AND APPLICATOR THEREFOR**

[72] Inventor: **Mary Alice Flores**, New Orleans, La.

[73] Assignee: **C. R. Bard, Inc.**, Glens Falls, N.Y.

[22] Filed: **Apr. 8, 1970**

[21] Appl. No.: **26,488**

[52] **U.S. Cl.**.....128/326, 128/346

[51] **Int. Cl.**.....A61b 17/12, A61b 17/10

[58] **Field of Search**128/326, 327, 334, 346

[56] **References Cited**

UNITED STATES PATENTS

671,337	4/1901	Gibson.....	128/326
3,043,308	7/1962	Seltzer.....	128/346
3,476,114	11/1969	Shannon et al.	128/346

OTHER PUBLICATIONS

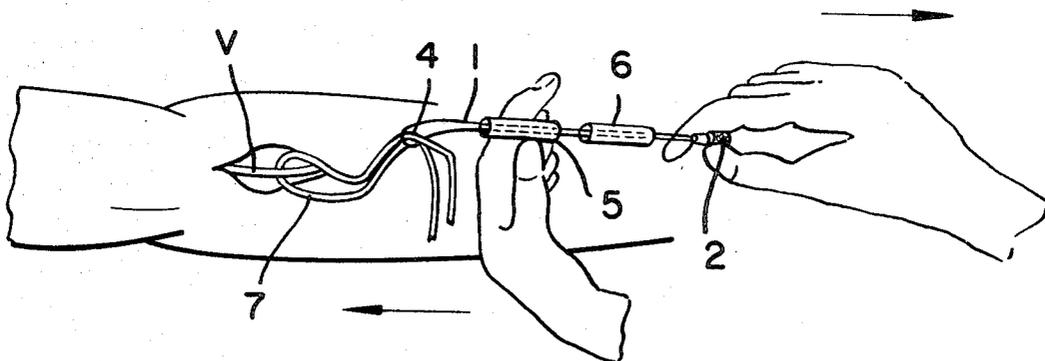
Plaut et al., *A modification of Campbell's Noose*, in *Surgery*, 56: No. 6; 1,078-1,079. 1964.

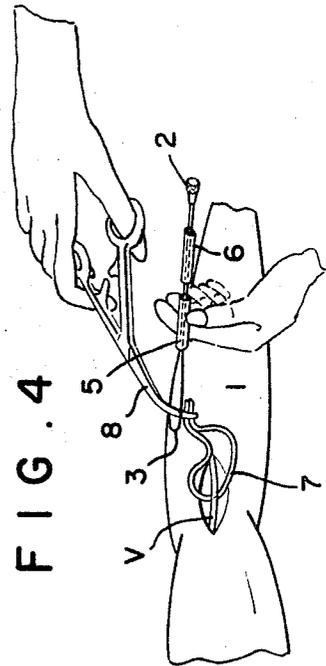
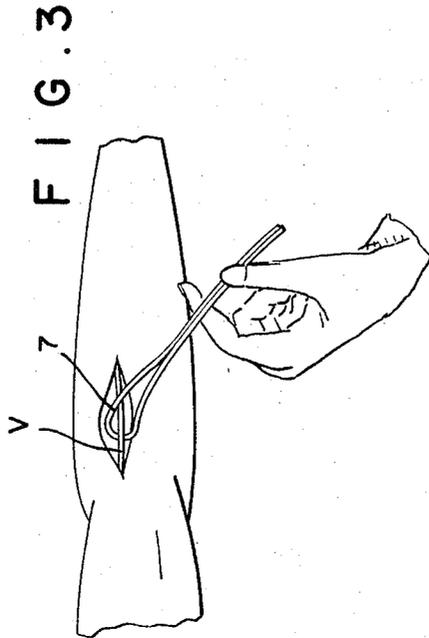
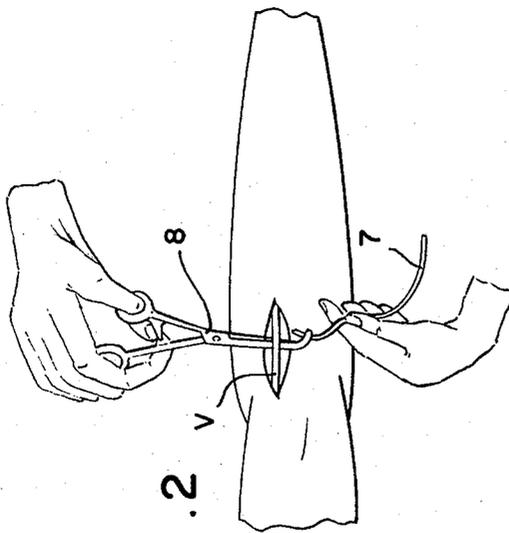
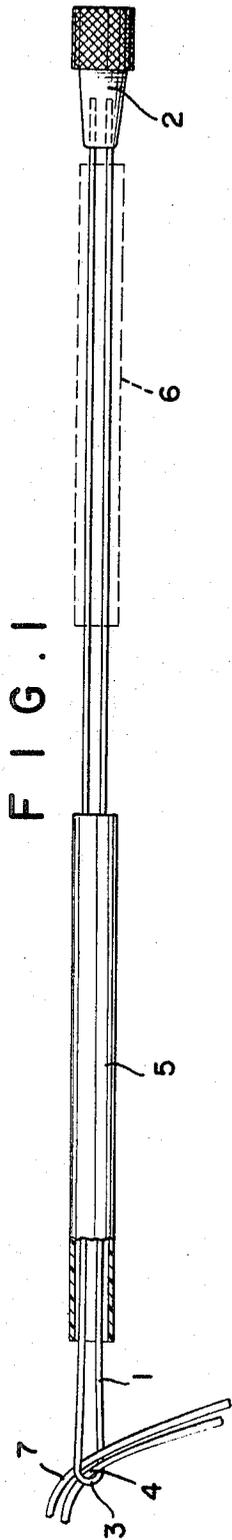
Primary Examiner—Channing L. Pace
Attorney—W. Saxton Seward

[57] **ABSTRACT**

A vessel ligature constituted by a tape applied around a vessel by means of a hemostat adapted to pass under the vessel, engage the tape, and draw the engaged tape back below the vessel, the tape ends being then passed through an elongated wire loop and drawn with the loop into a plastic sleeve, the sleeve being slidable over the wire loop and along the tape toward the vessel to tighten the bight of the tape around the vessel, and the bight being maintained in vessel-closing position by means of a hemostat clamped on the plastic sleeve and/or tape at a distance from the vessel; and the method including said steps.

5 Claims, 8 Drawing Figures





INVENTOR.
MARY A. FLORES
BY
Nolte and Nolte
ATTORNEYS

FIG. 5

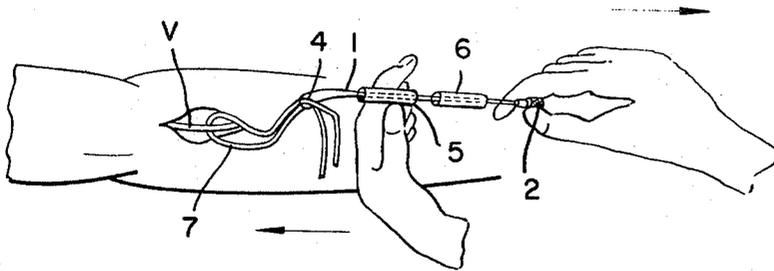


FIG. 6

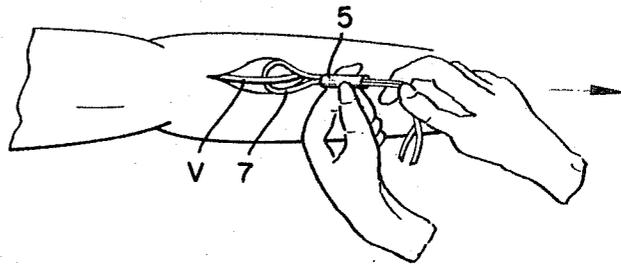


FIG. 7

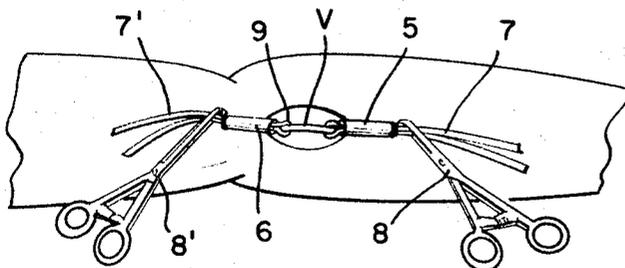
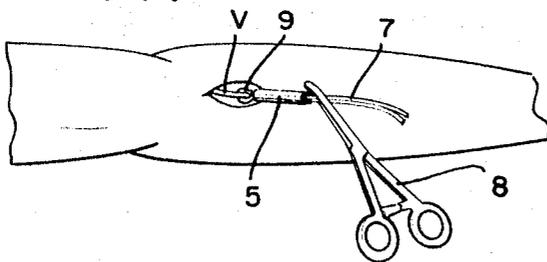


FIG. 8

INVENTOR.
MARY A. FLORES
BY
Holte and Holte
ATTORNEYS

LIGATURE AND APPLICATOR THEREFOR

There are many surgical procedures in which closure of a vessel (e.g., vein or artery) for short or long periods of time is indicated, to arrest the flow to or from other organs or to or from specified portions of the vessel which are to be treated or observed. Metal clamps or the like are normally used to effect such closures, but metal clamps are heavy, hard, frequently in the way, and likely to damage the vessel or adjacent tissues.

It is an object of the present invention to provide a simple, light, non-metallic vessel closing element, and the means for applying it.

The device comprises three cooperating parts: an elongated wire loop with handle, a short plastic tube through which the wire loop may be passed, and a suitable length of tape (e.g., braided umbilical tape) of a size such that its end portions can be drawn, doubled, through the tube by means of the loop. The wire loop may be provided with two pieces of plastic tube for use in effecting two spaced ligations of the same vessel.

A practical embodiment of the invention and illustration of its method of use are shown in the accompanying drawings, wherein:

FIG. 1 represents an elevation of the entire device, on an enlarged scale, with tape inserted in the wire loop (only a small piece of the tape being shown) and with one piece of plastic tubing carried by the loop, the position of a second piece of tubing, when desired, being indicated in broken lines;

FIGS. 2 to 8 are detail, somewhat diagrammatic views showing successive steps in the practice of the method.

Referring to the drawings, the applicator is constituted by an elongated wire loop 1, the ends of the wire being securely fixed in a suitable metal or plastic handle 2. The wire may suitably have a diameter of 0.014 inch and a convenient length for the applicator is approximately 6 inches. The end 3 of the wire loop is preferably curved to provide an opening 4, the purpose of which will be evident. As shown, two pieces of soft and flexible plastic tubing 5,6 are threaded on the loop and the ends of a ligature 7, such as umbilical tape, extend through the opening 4, in the position which they assume at an early stage of the ligating operation, just before the tubing 5 has been pushed over the doubled ends of the tape, as the first step toward tightening it around a vessel (V in FIGS. 2 to 8).

The openness of the loop end results from making it smoothly curved rather than bent and is designed to facilitate the insertion through the loop of strands of ligating material such as umbilical tape 7, when the applicator is in use as described below.

Referring to FIGS. 2 to 8, a vessel to be tied off at one or more points is shown at V. The vessel is freed sufficiently (e.g., by an arterial cut-down) to permit introduction beneath it of the end of a hemostat 8 or similar instrument (FIG. 2) which grips an end of the ligature (tape) 7 so that it may be drawn under the vessel. The ends of the tape are brought together (FIG. 3), held by the hemostat, and passed through the opening 4 in the wire loop (FIG. 4) where they remain as the hemostat is removed (FIG. 5). The piece of plastic tubing 5 is moved down past the end of the wire loop (FIG. 6) which draws the tape through the tubing, this movement being continued until the ends of the tape are free and can be disengaged from the wire loop (FIG. 7). The clamping of the vessel can then be effected by sliding the tubing along the tape until the small bight 9 in the latter is tightened around the vessel (also FIG. 7), the tubing then being held in position by clamping the tape and/or tubing at a point spaced from the vessel.

The sizes of the tape and of the tubing are coordinated to

provide a loose engagement between them since the hemostat serves to hold them in vessel closing position. A tighter fit can be effected if the free ends of the tape are long enough to remain in the tubing when the vessel is closed, the wire loop being detached by cutting the tape, but this would tend to make removal more difficult.

In FIG. 8 is shown the closing of the vessel at two spaced points, as frequently required, the second closure being effected by the use of a second tape 7' applied and secured as described above, using the second piece of tubing 6 and clamping it in place by means of a second hemostat 8'.

To release the tie-offs, the hemostats (or the like) are removed, the tubing is retracted and the tape may be cut on one side or the other of the vessel permitting the end beneath the vessel to be withdrawn.

The only materials resting in contact with the vessel and adjacent parts of the patient's body are the soft textile tape and the soft flexible pieces of plastic tubing, so that trauma and the danger of possible damage to delicate body parts are minimized. The applicator is so simple and inexpensive that it may be considered disposable, but its simplicity also adapts it for ready cleaning and sterilization if desired. At least the tape and plastic tubing would normally be discarded after use. The term "tape" is used herein to include flexible cord-like elements, whether braided, twisted, plied or monofilament. While the arrangement of a bent wire having both ends fixed in a handle is particularly convenient, a possible alternative could be a wire or the like, having a handle on one end and a suitably shaped loop on the other; such a device could be made from a single piece of plastic material. The term "loop" is intended to include a hook of suitable shape, i.e., one over which the tubing can be passed without catching.

What is claimed is:

1. A vessel ligature or clamp applicator comprising an elongated wire element terminating at one end in an integral loop, a piece of plastic tubing shorter than said element and fitted thereon, said tubing being slidable past said loop onto a piece of tape having both its ends passed through said loop, the plastic tubing being further slidable along said tape and a handle fixed to the opposite end of said wire element.

2. A vessel ligature or clamp applicator according to claim 1 in which the elongated wire element is a wire doubled on itself adjacent its middle, and in which the handle is affixed to both ends of said wire.

3. A vessel ligature or clamp applicator according to claim 2 in which the wire loop is curved to form an opening through which the tape ends can readily be passed.

4. A vessel ligature and applicator assembly comprising an elongated wire element terminating at one end in an integral loop, a piece of plastic tubing shorter than said element and fitted thereon, said tubing being slidable past said loop, a handle fixed to the opposite end of said wire element, and a piece of tape having two ends adapted to be doubled on itself around a vessel to be ligated, the end portions being engaged in the loop and adapted to be drawn through the tubing by relative sliding movement of the tubing and the wire element and to be released from the loop when the tubing is slid therefrom.

5. A vessel ligature and applicator assembly according to claim 4 in which the plastic is of a soft composition and is adapted, by sliding along the double tape, to tighten the bight of the tape around the vessel with minimum danger of damage to the vessel.

* * * * *