

[54] **VESSEL OCCLUDER**

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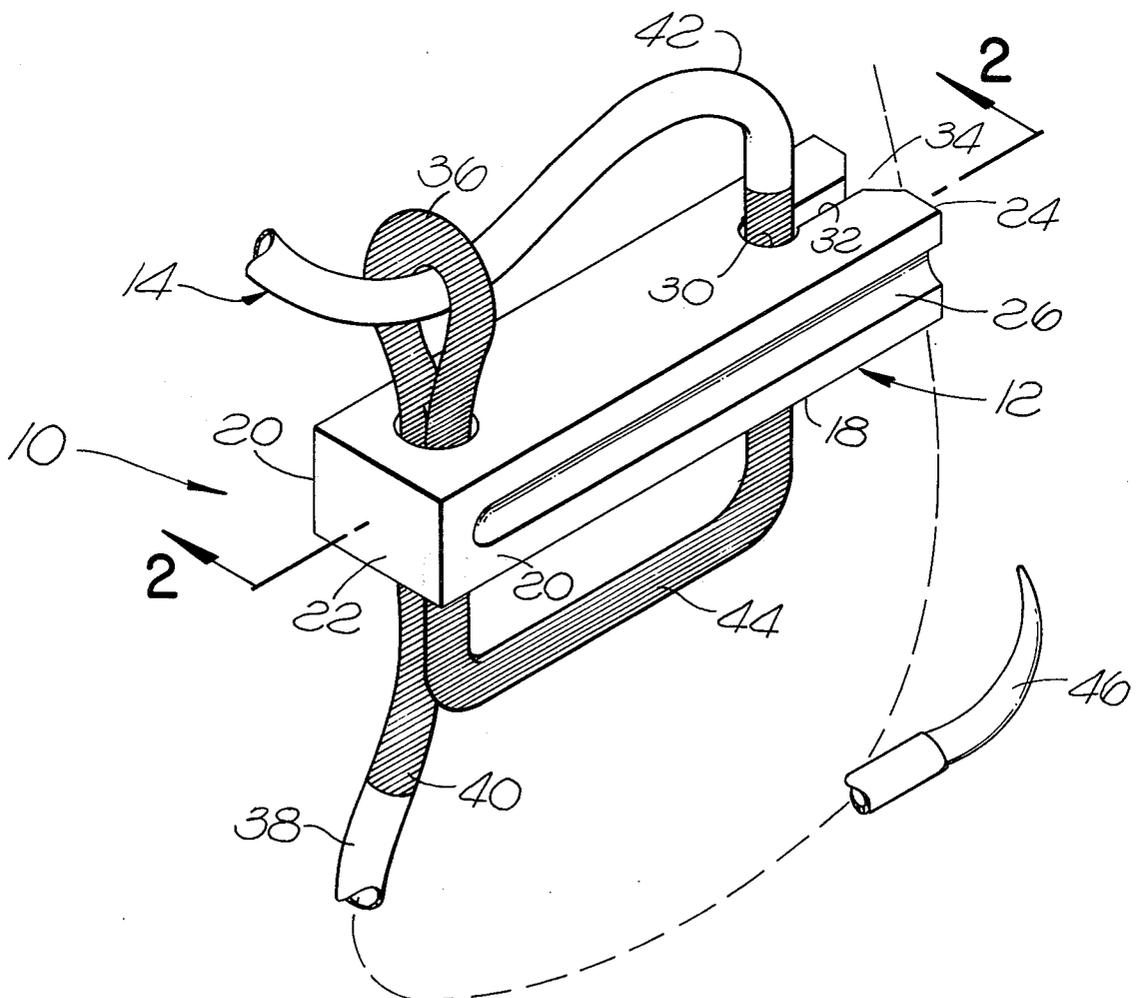
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[57] **ABSTRACT**

An instrument for atraumatic occlusion of small blood vessels, which includes a pad having one end thereof fastened to a length of resilient surgical tape adjacent the center portion thereof, the other end of the pad being constructed and arranged to receive and releasably maintain one end of said tape in a selected adjusted position to entrap and occlude a blood vessel between the pad and said one end of the tape.

11 Claims, 4 Drawing Figures





## VESSEL OCCLUDER

## BACKGROUND AND BRIEF SUMMARY OF THE INVENTION

The present invention relates generally to the surgical field, and more particularly to a novel blood vessel occluder which provides for atraumatic occlusion of blood vessels without using large cumbersome clamps or clips. It is particularly useful for smaller vessels.

The necessity for an atraumatic means of occluding small vessels has greatly increased with the advent of coronary artery surgery. The anatomy, location and fragile nature of the coronary vessels precludes the use of conventional instruments such as clamps and clips for the routine occlusion of such vessels.

To obtain a secure anastomosis, the periarterial tissue must be left in place. Accordingly, the dissection of an artery in order to obtain a sufficient length of the artery to apply a conventional occluding device such as a clamp, significantly increases the technical difficulty of obtaining a secure anastomosis.

It is an object of the present invention, therefore, to provide a novel vessel occluder for the atraumatic occlusion of small vessels, which is light in weight, of low profile, and which causes no distortion of the vessel.

A further object is to provide such a novel occluder which provides for the occlusion of an artery in an anterior posterior direction without significant distortion of the arterial wall except at two points.

Yet another object is to provide a vessel occluder in which the vessel is entrapped and occluded between two resilient surfaces, whereby the trauma usually associated with unyielding materials is significantly diminished.

An additional object is to provide such a vessel occluder which includes means for manipulating vessels, as by pulling them from side to side or elevating them in order to obtain an unobstructed view of the vessel and without the necessity of pinching the structure between the fingers.

I have discovered that the above objects and advantages are achieved by a vessel occluder which includes a rigid pad which has two lengths of resilient tape extending from the top and bottom surfaces adjacent one end, a short portion of tape extending longitudinally of the pad in engagement with the bottom surface, and a slot at the other end of the pad for receiving and releasably holding one length of said tape in a selected adjusted position adjacent the short portion of tape, to occlude a vessel therebetween.

## BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a perspective view of a vessel occluder constructed in accordance with the teachings of the present invention, illustrating the manner in which the center portion of the tape is fastened to the occluder pad at the time of assembly;

FIG. 2 is a vertical sectional view taken on the line 2-2 in FIG. 1, with the tape shown in elevation;

FIG. 3 is an end view taken on the line 3-3 in FIG. 2; and

FIG. 4 is a side elevational view of the vessel occluder as it would appear in usage.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing more particularly by reference numerals, the number 10 indicates a novel vessel occluder embodying the teachings of the present invention, which includes an elongated pad 12 and a length of resilient tape 14.

The pad is made of a substantially rigid yet slightly resilient material, preferably plastic, and is elongated and generally rectangular in cross-section with top and bottom surfaces 16 and 18, respectively, opposed side walls 20, and first and second ends 22 and 24, respectively.

Each of the side walls contains a longitudinally extending groove 26 which extends from adjacent the first end 22 to the second end 24.

A first passageway 28 extends through the pad between the top and bottom surfaces, adjacent to the first end 22.

A second and similar passageway 30 extends through the pad adjacent to the second end 24. Extending from said second passageway toward the second end 24 is a slot 32 which is narrower than the diameter of the opening 30, the walls of the slot diverging outwardly as they approach the second end 24 to provide a throat 34 for a purpose to appear.

The resilient tape 14 is preferably of tubular construction and made from a conventional white silicone rubber, with opaque epoxy material in the center portion thereof.

As shown in FIG. 1, the occluder pad 12 is fastened adjacent the center portion of the tape 14 by turning the tape back upon itself and inserting the doubled portion upwardly through the opening 28 to form a bight 36. One end portion 38 of the tape containing epoxy material 40 is permitted to hang freely. The other end portion 42, which also contains epoxy material at 44, is drawn across the bottom surface 18 and pulled upwardly through the throat 34 and into the opening 30. The free end of said other end portion is then passed through the bight 36 and said one end portion 38 pulled downwardly, thereby securely fastening the pad to the tape.

As shown in FIGS. 2 and 3, the opaque, epoxy-filled portion 44 of the tape is in engagement with the bottom surface 18 of the pad, to provide an elongated resilient surface which extends longitudinally of the pad and which has an arcuate face.

Fastened to the free end of said one end portion 38 of the tape is a 1/2 circle blunt needle 46.

In use, after an incision has been made, the artery is identified and the blunt needle 46 carefully passed about the artery and pulled through, the one end portion 38 of the tape passing through the tissue without resistance. The needle may pass around both the coronary artery and its associated vein.

The tape is pulled through until the occluder pad 12 approaches the coronary artery. A forcep is then used to grasp the pad at the grooves 26 to maintain the pad in position, and the one end portion 38 of the tape is pulled through the throat 34 of the pad and into the opening 30.

The artery is then entrapped and occluded between two resilient surfaces, i.e., the opaque portion 44 of the tape which is in engagement with the bottom surface 18 of the pad and the opaque portion 40 of said one end

of the tape. The use of two such resilient surfaces significantly diminishes the trauma usually associated with unyielding materials.

Also, the artery is occluded in an anterior posterior direction without significant distortion of the arterial wall, except at two points.

Both of the openings 28 and 30 are preferably of a diameter which is slightly less than the outside diameter of the tubular tape 14. The size of the opening 28 is not too important, other than to be certain that the bight 36 remains in holding position, but size is important at the opening 30 because it must be such that when two thicknesses of tape are in the opening 30, the end portion 38 must be retained in its selected adjusted position so as to occlude the vessel to the particular extent required.

The novel vessel occluder described herein can also be used for manipulating vessels, prior or subsequent to occlusion. Thus, by passing one end of the tape about the vessel, the vessel can be moved from side to side and elevated to provide an unobstructed view of the vessel without the necessity of pinching it between the fingers. Then, when it is desired to occlude the vessel, one end of the tape is pulled so as to move the occluder pad 12 adjacent to the vessel, the pad is held in position with a forcep and the one end of the tape pulled through the throat 34 and into the opening 30, all as previously described.

It should also be noted that traction on the resilient tape can be increased to any desired level so that partial or total occlusion of a tubular structure such as a vessel, can be easily accomplished.

Thus, it is apparent that there has been provided a novel vessel occluder which fullfills all of the objects and advantages sought therefore.

I claim

- 1. A vessel occluder, comprising:
  - an elongated rigid pad having top and bottom surfaces and first and second opposed ends;
  - a first length of resilient tape having one end thereof secured to the pad adjacent said first end and extending from the bottom surface, a resilient member in engagement with the bottom surface of the pad and extending longitudinally thereof; and
  - means at the second end of the pad for receiving and

releasably holding said first length of the tape in a selected, adjusted position.

2. A vessel occluder according to claim 1, in which the resilient tape is of tubular shape and the resilient member in engagement with the bottom surface of the pad comprises a length of tubular tape.

3. A vessel occluder according to claim 1, in which the means for receiving and holding the other end of the tape includes a slot which terminates in a circular opening.

4. A vessel occluder according to claim 3, in which the slot and circular opening extend between the top and bottom surfaces.

5. A vessel occluder according to claim 3, in which the width of the slot is less than the diameter of the opening and the walls of the slot diverge in the direction away from the opening.

6. A vessel occluder according to claim 1, in which the elongated pad includes opposed side walls, and a longitudinally extending groove is contained in each side wall.

7. A vessel occluder according to claim 1, in which the resilient member in engagement with the bottom surface of the pad and the portion of the tape adjacent to the pad are of the same color.

8. A vessel occluder according to claim 1, which further includes a blunt needle fastened to the free end of the resilient tape.

9. A vessel occluder according to claim 1, which further includes a length of resilient tape having an end thereof secured to the pad adjacent said first end.

10. A vessel occluder according to claim 1, in which the first length of resilient tape is secured in a first opening adjacent to said first end; the means for receiving and holding the other end of the tape includes a slot at said second end which terminates in a circular opening; a second length of resilient tape extends from the top surface of the pad adjacent said first opening.

11. A vessel occluder according to claim 10, in which: said lengths of tape and said member comprise a unitary piece of resilient tape of tubular configuration.

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