

## [54] SURGICAL BUTTONS

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[22] Filed: July 6, 1970

[21] Appl. No.: 52,449

[52] U.S. Cl. .... 128/335

[51] Int. Cl. .... A61b 17/04

[58] Field of Search..... 128/334 R, 334 C, 335, 335.5, 128/339

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## [57] ABSTRACT

A surgical button for retaining a suture after passing through the skin on one side of an abdominal or other wound. The button comprises a non-metallic disc made of nylon or other suitable plastic material which has an axial orifice therethrough for passage of the suture and which axial passage or orifice is intersected by a radial orifice extending diametrically therethrough to receive a locking pin which engages the suture in a wedging action to hold it tightly in the disc. The button also comprises a pad of soft, spongy material, such as sponge rubber, secured to one face of the disc with a covering of cloth or fabric which lies against the skin and prevents irritation or maceration. No tying of the suture is involved. It is held in place by the wedging action of the disc.

10 Claims, 4 Drawing Figures

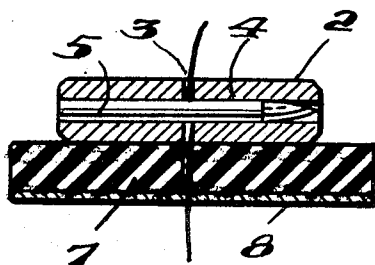


Fig. 1.

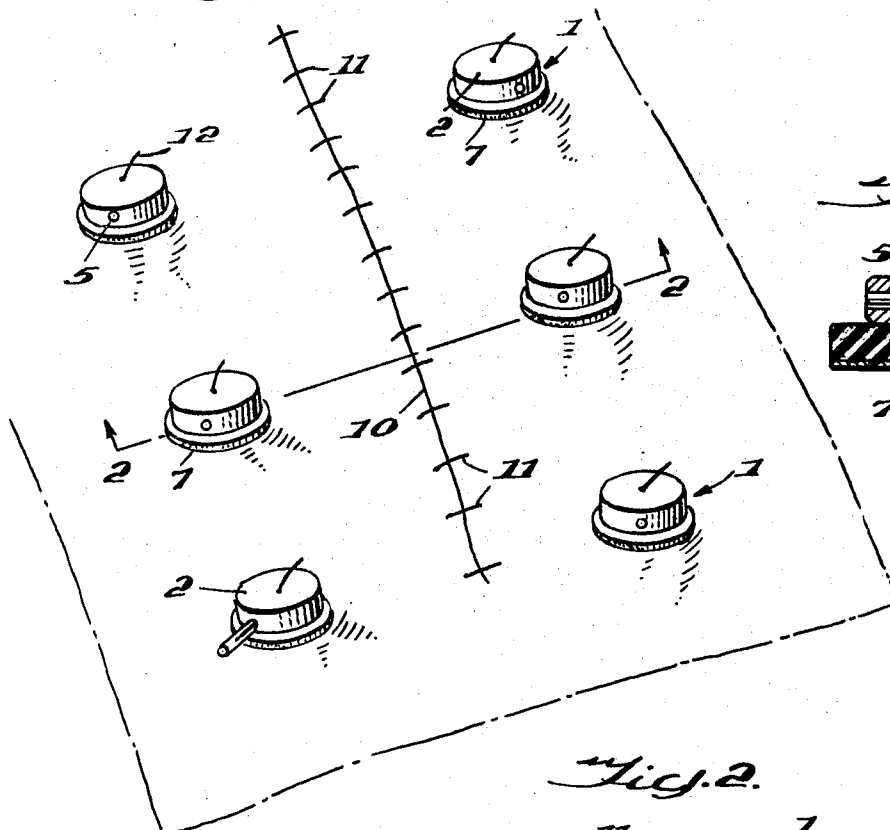


Fig. 3.

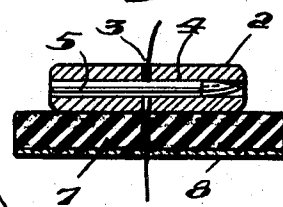


Fig. 2.

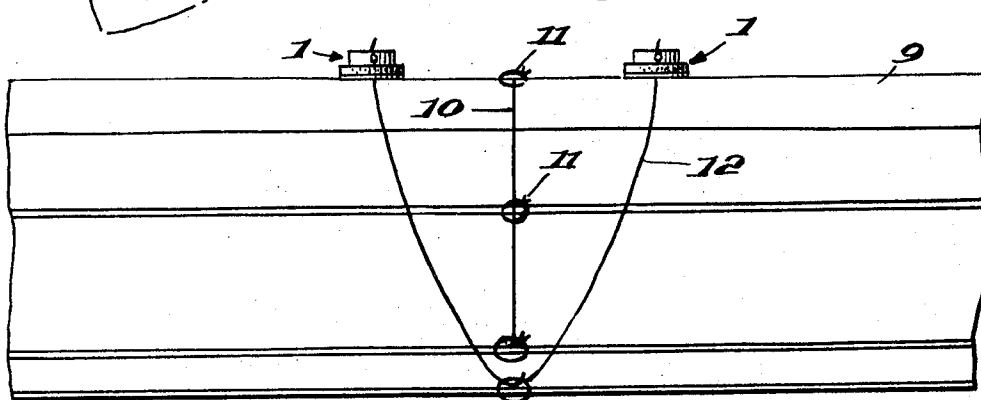
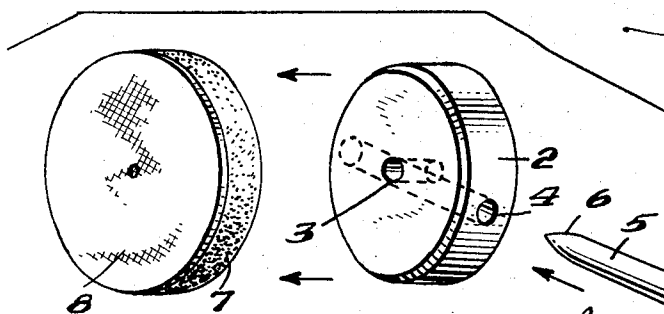


Fig. 4.



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## SURGICAL BUTTONS

## SUMMARY OF THE INVENTION

This invention relates to improvements in surgical buttons used for holding sutures for abdominal and other wounds without damage to the skin even when left in place over several weeks.

Since the dawn of medicine, surgeons have sought to improve the methodology and technics of wound closure. The ancient enemy of the healing tissue is tension. Tension on the tissues at the line of closure poses an ever present threat of mechanical disruption of the wound itself. Moreover, tension interferes with the healing process per se, by increasing edema, and interference with the blood supply to the parts caught between the sutures.

Historically, various technics have been used to place retention sutures in wounds, designed to relieve the tension on the primary line of closure. Abdominal wounds (laparotomy incisions) have constituted the chief use of retention sutures because wound dehiscence (wound rupture) here results in evisceration, a physiologic catastrophe.

Heretofore, there has been no satisfactory, and easily applicable method of accomplishing the desired objective, that is, to take the tension off the primary closure. The conventional method of using retention sutures consists of placing large strong sutures of silk, wire, monofilament nylon, etc. through all layers of the abdominal wall except the peritoneum (inner lining) and then pulling tightly and tying, usually over some sort of cloth or rubber padding.

Often a section of small rubber tubing (catheter) is used to protect the skin. Since wounds require three weeks to attain their maximal tensile strength of healing, it is necessary to leave all retention sutures in for approximately this long, if they are to serve any useful function. The forces exerted by tying a loop, as is conventionally done, inevitably produce necrosis (death) of living tissues subjected to the constant strong linear pressure along a very narrow area (the width of the contacting (inner) side of the wire or material). This is a well recognized phenomenon, and discourages the widespread use of retention sutures. The cutting in of the sutures is oftentimes extremely painful to the patient and the resulting scars are unsightly. Even more important, from a functional standpoint, the more necrosis that occurs, the looser the loop becomes so that, by the end of three weeks (the critical period) the retention sutures are so loose that they offer no protection from dehiscence whatsoever.

Buttons and frames have been used down through the years in order to change the direction of forces and still relieve the tension on the primary wound. A commercially available button, known as the Davy button, has been available for several years and is easier to apply than clothing buttons. While it is true that the use of external fixation via buttons improves the situation by eliminating the cutting action resulting from a tightly tied loop, buttons have not gained widespread acceptance. One reason that buttons are not more widely used is that the edge of the button digs in to the skin and, over a period of three weeks, produces pressure necrosis around one or more of the buttons.

The defects of the commercially available buttons are as follows:

1. The thin metal edge predisposes to pressure necrosis of the skin.
2. The absence of padding on the surface next to the skin results in pressure necrosis.
3. Gripping of the retention suture by crushing the metal nipple requires a special tool as part of the sterile operating room equipment.
4. The hardness of the metal precludes performing this maneuver with any of the surgical clamps ordinarily available.
5. Gripping of the suture so that it is held securely requires practice by the surgeon before it can be done properly, and consistently. If not crushed just right the suture pulls out.

6. The protruding nipple from the outer side of the button interferes with wearing of abdominal supports and clothing post-operatively by reason of the fact that it protrudes approximately three-eighths inch above the surface.

7. The crushed metal nipple presents an irregular, jagged projection which snags on clothing, dressing, etc.

One object of this invention is to obviate the objections to the buttons used heretofore and to improve the construction thereof and the method of holding in place sutures after passage from abdominal or other wounds.

Another object of the invention is to eliminate the tying of sutures to buttons and to provide for secure connection therebetween by a wedging action.

Still another object of the invention is to eliminate skin necrosis by contact of the button or a pad thereon with the surface of the skin.

In carrying out these objects, we have provided a surgical button comprising a disc of suitable non-metallic material, such as nylon. This disc has an opening extending axially therethrough for passage of the suture and a diametrically extending or radial opening which intersects the axial opening and receives a pin that extends into wedging relation, clamping the suture against a side of the axial opening, thereby retaining it securely in the disc. The face of the disc toward the skin is provided with a suitable cushion material or pad thereon, preferably larger in diameter than the diameter of the disc and which is covered with a layer of fabric or cloth which lies in contact with the skin between the latter and the pad.

Padded buttons and discs have been used in approximately two hundred cases, with an average of six buttons per case. This constitutes an experience in observing approximately twelve hundred padded discs or buttons in patients. Since the adoption of the bottom-faced rubber pads, there have been no instances of skin necrosis.

## BRIEF DESCRIPTION OF DRAWINGS

One embodiment of the invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view, diagrammatically illustrating an incised abdominal wall and showing the application of the buttons for holding sutures in place;

FIG. 2 is a vertical section through the abdominal section, substantially on the line 2—2 in FIG. 1;

FIG. 3 is a cross section through the surgical button, illustrating the clamping of a suture therein; and

FIG. 4 is a disassembled perspective view, showing the parts of the surgical button.

The surgical button is designated generally at 1 and comprises a disc 2 of suitable, preferably non-metallic material. This disc may be made by cutting a section from a nylon rod of a suitable diameter, such, for example, as three-eighths inch or three-fourths inch, according to the size of surgical button desired. The thickness of the button should be sufficient to hold firmly as, for example, one-eighth inch or three-sixteenths inch.

A small hole, indicated at 3, is drilled through the center of the disc to allow passage of a surgical needle therethrough and to receive the suture. A radial or diametrical opening or passage 4 extends transversely through the disc 2 intersecting the axial opening 3. A pin 5 of a diameter substantially to fit the radial passage 4 is inserted therethrough and preferably has a pointed or wedge-shaped end 6 thereon to squeeze the suture laterally in the axial opening 3. The pin 5 is shorter than the diameter of the disc and serves to wedge the suture in place in the axial opening 3. The pin 5 may be formed of nylon or stainless steel or other suitable material.

The surgical button 1 also includes a pad 7 formed preferably from latex foam rubber of a thickness suitable for effective cushioning action. A thickness of one-eighth inch or one-fourth inch has been found suitable for the purpose. This pad is secured to one face of the disc 2 by a waterproof adhesive so that it is effectively secured. The pad 7 may be of a

diameter or area larger than the disc 2 to distribute the force over a large area and to allow use of a smaller size disc. The face of the pad 7 opposite from the disc 2 is covered with a sheet of cotton webbing or fabric, illustrated at 8 in FIG. 4. This sheet 8 is secured to the pad 7 by a suitable adhesive.

The regular or large size disc is designed for use in laparotomy wounds and wounds involving large heavy tissues or flaps and the like. The small size disc is for smaller skin flaps such as radical neck flaps, thyroidectomy flaps, face flaps in plastic surgery, and incisions where no great stress is applied to the primary wound post-operatively. The regular size is designed to be used with large, strong retention sutures of the magnitude of No. 2 material. The small size, on the other hand, is designed for use with sutures of smaller size, e.g. No. 00 monofilament nylon. The discs are identical except for the differences in the dimensions.

The invention is illustrated in FIGS. 1 and 2 as applied to an abdominal section, generally indicated at 9, made up of a series of layers of muscular tissue and skin within which an incision 10 has been made. The sides of the incision 10 are closed by sutures 11 at suitable or desired points. The main suture material secured by the buttons is indicated at 12.

#### THE PROCEDURE FOR LAPAROTOMY WOUND CLOSURE IS AS FOLLOWS:

The retention sutures 12 may be placed before any of the layers are closed, after the peritoneum is closed, or after the musculofacial layer is closed, depending on the personal preference of the surgeon. In any event, it is considered important that the retention sutures not pass through into the peritoneal cavity. A free loop of suture inside the peritoneal cavity may occasionally be the source of intestinal obstruction. Whichever method is preferred, the technic of anchoring the retention sutures is similar. First, pass the needle containing the desired suture material 12 from the external surface of the disc 2 (the unpadded side) down through the central hole 3 through the foam rubber pad 7. Pull the suture 12 through, leaving a short section of the suture protruding from the external (nylon) surface, as shown in FIG. 1. Grasp the free end with a hemostat to keep under slight tension while the suture 12 is impacted by pushing the pin 5 through the horizontal hold 4 with a Kocher clamp until the pin 5 is flush with the edge of the disc 2. Test the grip on the suture manually, to make sure that it is held firmly. Then pass the needle through all layers of the abdominal wall, except the peritoneum. In other words, passing the suture from the (patient's) left hand side of a vertical abdominal wound, the needle (and suture) would pass through, successively, skin, subcutaneous tissue, musculofacial layer including transversalis fascia, then through the right hand side, musculofacial layers, subcutaneous tissue and skin.

The opposite (right hand) disc is then transfixated by passing the needle up through the foam rubber pad 7, through the center hole 3. A hemostat is placed on the suture 12, one or two inches above the disc and the suture cut. The same procedure is repeated at desired intervals until two, three, four or more pairs of retention sutures have been placed, depending on the length of the wound, the degree of protection desired and the personal preference of the surgeon. After all the sutures have been placed, the primary wound closure is completed according to the preference of the surgeon.

The tension sutures 12 are then completed one at a time as follows: The first is tightened by picking up the free end of the suture 12 and pulling it through the central hole 3 of the right hand disc 2 until the desired tension is achieved, keeping in mind that the tension will become greater when the anesthetic agent has worn off.

While the resiliency of the pads will protect the skin post-operatively from necrosis, even with considerable abdominal distention, the degree of distension which may occur is unpredictable. For this reason, it is the practice to adjust the degree of tension so that the skin is depressed only slightly. The

remaining (right hand) disc is now depressed into the skin to a similar degree and the suture fastened by squeezing the pin 5 into place. The excess suture is cut off, leaving a few millimeters protruding (FIG. 1). Care should be taken to place the sutures far enough from the skin edge 10 so as not to interfere with skin closure; 1 to 1½ inches will usually suffice.

A similar technic can be used quite effectively on any surgical wound in which the incision is made through the skin. It is particularly useful in dissections involving flaps such as mastectomy wounds, radical neck dissections, thyroidectomies, rotated flaps to plastic surgery, and the like.

No special after-care is required. The stay sutures are left in place a minimum of 3 weeks (the time required of attaining maximal tensile strength in a cleanly healing wound). Skin sutures may be removed anytime after the first day. No dressing is required over or under the discs. The patient may bathe or shower as desired. An occasional patient may react to the suture material and develop irritation around the suture tract. In the majority, however, there is no reaction at all even after three weeks by reason of the protection of the cotton layer 8. The sutures are easily removed when desired. One side is lifted up enough to insert the point of a scissors between the skin and the disc and the suture clipped. The other disc with the remainder of the suture attached is then withdrawn.

We are convinced that the widespread use of this device will solve the ancient problem of retention sutures in closing abdominal wounds. Its use in a wide variety of other types of surgical wounds adds a new dimension to wound healing. Relieving of the distracting forces at the primary line of closure results in greatly improved patient comfort and cosmesis.

While a preferred embodiment of the invention is illustrated and described, it is recognized that variations and changes may be made therein without departing from the invention.

We claim:

1. A surgical button comprising a disc having an axial opening therethrough for passage of a suture, said disc having a radial opening extending from the periphery inward and intersecting said axial opening, and a pin inserted into the radial opening in position for wedging relation with the suture.

2. A surgical button according to claim 1, wherein the pin has a tapered end at the axial opening for wedging the suture.

3. A surgical button according to claim 1, wherein the disc is relatively thick and flat and is formed of non-metallic material.

4. A surgical button comprising a disc having an axial opening therethrough for passage of a suture, said disc having a radial opening extending from the periphery inward and intersecting said axial opening, a pin inserted into the radial opening in position for wedging relation with the suture, said button including a thick pad of cushioning material on one side of the disc, and a strip of fabric covering the side of the pad opposite from the disc to be disposed between the cushion pad and the skin.

5. A surgical button comprising a relatively flat non-metallic disc having an axial opening therethrough for passage of a suture through the disc, said disc having a second opening extending diametrically therethrough intersecting the axial opening, a pin inserted in the second opening for wedging the suture in the axial opening, a pad of cushion material secured to one face of the disc, and a fabric material covering the outer face of the pad opposite from the disc to be disposed against the skin.

6. A surgical button according to claim 5, wherein the pin has a tapered end for wedging the suture in place.

7. A surgical button according to claim 5, wherein the pad and fabric covering are of greater area than the disc.

8. A method of securing a suture in place after passage from the skin of a patient, comprising passing the suture through a perforated disc, and inserting a pin radially through the disc in wedging relation with the suture.

9. A surgical button comprising a relatively flat disc, a pad of cushion material secured to one face of the disc, a sheet of fabric extending over the opposite face of the pad from the

disc and substantially throughout said opposite face to lie in contact with the skin and to protect the skin from the cushion material, said pad and sheet of fabric being in position for passage of a suture therethrough from the skin to the disc, and means for securing the suture to the disc.

10. A surgical button according to claim 9, wherein the disc is non-metallic and the fabric sheet covers the entire area of the face of the pad to which said sheet is secured.

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