

[54] GENERAL PURPOSE SURGICAL DRAIN

[57] ABSTRACT

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A surgical drain for operative and post operative usage providing a core comprising a pliant drainage conduit having through wall passages throughout its length from its distal end to a point inset from its proximal end and a co-extensive pliant irrigation conduit open at its ends, a padding layer of soft, non-friable absorbent material surrounding said core from its distal end to a point opposite the proximal end passages of the drainage conduit, a soft rubber or like sheathing surrounding the padding layer from end-to-end and having through wall passages throughout its length from its distal end to a point opposite the proximal end passages of the drainage conduit, and a securing suture extending through the proximal ends of the padding layer and sheath and encircling the core to retain the parts assembled. Fittings are provided at the proximal ends of the respective conduits adapting them respectively for connection to a suction line and to an irrigation line and the fitting of the irrigation conduit includes a normally closed plug valve selectively opened to provide irrigation when needed.

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[52] U.S. Cl. 128/350 R

[51] Int. Cl. A61m 27/00

[58] Field of Search 128/350 R, 350 V

[56] References Cited

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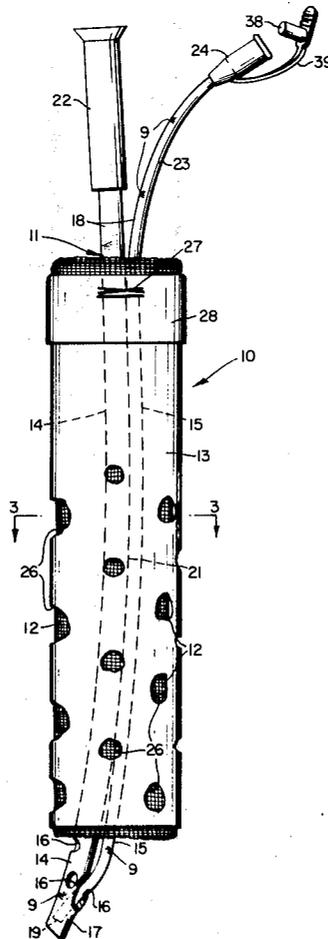
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6 Claims, 4 Drawing Figures



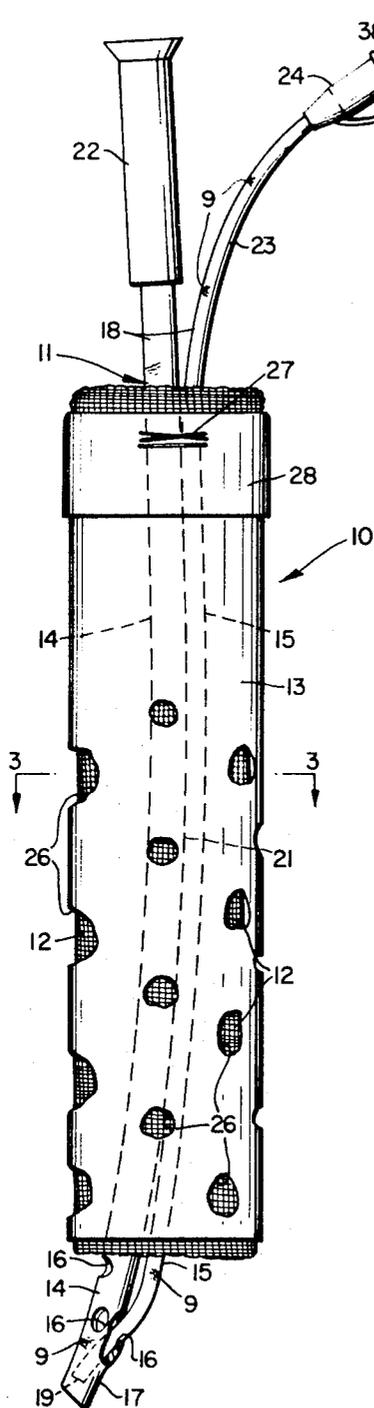


FIG. 1

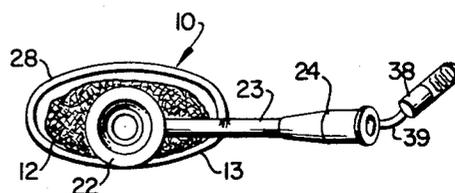


FIG. 2

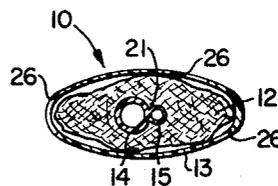


FIG. 3

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GENERAL PURPOSE SURGICAL DRAIN

BACKGROUND OF THE INVENTION

In performing many surgical procedures, it is necessary to insert surgical drains to dispose of the fluids which accumulate in the operative wound (the incision made to perform the required surgery) during the operation and, oftentimes, to provide for post operative drainage of the operative wound. Prior to this invention, it has been the general practice to provide drainage devices of varying construction for use during the operation and for post operative drainage. These drainage devices customarily take the form of devices known as "drain catheters" typified by United States Letters Pat. No. 3,524,427 issued Sept. 15, 1970 to David G. Sheridan or surgical wound drains typified by United States Letters Pat. No. 3,384,089 issued May 21, 1968 to Walter Shriner. Some of these types of drainage devices, due to the semi-rigid nature of the material from which they are made, may produce pressure necrosis of the surrounding tissues. Other drains, although made of soft material utilised as sump drains may collapse or cause complete collapse of the body tissues over the drainage device and therefore fail to maintain their patency for the desired period of time.

SUMMARY OF THE INVENTION

The present invention overcomes the aforementioned disadvantages of prior art drainage devices by providing a padded, multi-purpose drainage device which may be applied to more efficiently remove the accumulating fluids while at the same time preventing complete collapse of the body tissues over the drainage device maintaining its patency and eliminating much of the patient discomfort attendant upon use of a surgical drainage device.

It, accordingly, is a primary object of the present invention to provide a surgical drain having a soft rubber tubular envelope or outer tube which may be sutured to the skin at a selected point adjacent the operative wound to fix the drain in a desired position in the operative wound and a non-friable spacer layer of adsorbent material disposed between the outer tube and the portion of a semi-rigid two way catheter to form an air and fluid permeable chamber around the portion of the catheter positioned in the operative wound, which avoids pressure necrosis of the tissues.

A further important object of the present invention is to construct the soft rubber tubular envelope or outer tube and spacer layer of a length such that their distal ends are inset inwardly from the distal end of the two way catheter and their proximal ends extend beyond the proximal end drainage passage of the catheter to provide said air chamber and fixedly connecting the proximal ends of the outer tube and spacer layer to the catheter at a point beyond the proximal end drainage passage by a suture which encircles the catheter.

Another object of the present invention resides in providing the catheter of the primary object in the form of a one piece dual passage tubing member the distal end of which is separated longitudinally throughout a portion of its length to provide respectively a drainage passage terminal connection and an irrigation passage afferent end connection.

A further object of the present invention resides in providing the side walls of the tubing member of the preceding object defining the drainage passage with ra-

dially directed through passages leading to the air chamber and angularly staggered throughout its length from its distal end to a point a predetermined distance inwardly from the drainage passage terminal connection serving suction or drainage to the whole depth or length of the wound, in providing the distal end of the irrigation passage with a discharge opening, and in providing the afferent end connection of the irrigation passage with a normally closed, valve to be selectively opened when the need for irrigation arises, adding the advantage of asyptic irrigation system.

BRIEF DESCRIPTION OF THE DRAWINGS

Still further objects will appear from the following description and appended claims when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of the surgical drain of this invention;

FIG. 2 is a top plan view of the surgical drain of FIG. 1;

FIG. 3 is a transverse sectional view of the surgical drain of FIG. 1 when taken substantially on line 3—3 of FIG. 1; and

FIG. 4 is a perspective view illustrating the surgical drain in use to drain a body cavity or abscess cavity.

DESCRIPTION OF PREFERRED EMBODIMENT

With continued reference to the drawings wherein the same reference numerals are used throughout the several views to indicate the same parts, the numeral 10 indicates generally a padded surgical drain made in accord with the present invention. Surgical drain 10 is made up of three principal elements, namely, a two way catheter 11 surrounded by a soft padding layer of non-friable material, for example, surgical gauze or similar wide mesh adsorbent material 12 and an outer tube sheath 13 of soft, non-adsorbent material, for example, soft rubber or synthetic material.

The two way catheter 11 is formed of pliable rubber or a suitable pliable synthetic material, preferably with radio-opaque lines 9 scattered throughout to enable the drain to be located by x-ray to determine its position when employed as a post operative drain, formed to provide a first conduit 14 and a second conduit 15. The conduit 14, as best seen in FIG. 4, is in the form of an open ended tube the side wall of which is provided with a multiplicity of through passage 16 haphazardly located in angularly, and logarithmically axially spaced relation throughout a portion of its length beginning at a substantial distance inwardly from its proximal end 18 and terminating at its distal end 17. The conduit 15, as best seen in FIG. 4, is in the form of a smaller diameter, imperforate open ended tube the open distal end 19 (FIG. 4) of which is preferably inserted through one of the distal end passages 16 of tube 14 to dispose the open distal end 19 in fluid communication with the open distal end 17 of tube 14. While tubes 14 and 15 could be separate tubes suitably fixedly secured together from a point inwardly from their extreme distal ends to a point slightly beyond the proximal end passage 16 of tube 14, it is preferred that they be integrally formed as best seen in FIG. 3. When such an integrally formed tube is employed, the line of connection 21 (FIGS. 1 and 3), preferably, will be longitudinally slit inwardly from the distal end sufficiently to free the distal end of tube 15 so it may be bent and inserted through a selected distal end passage 16 of tube 14 and

the proximal end, will be longitudinally slit to separate the tubes 14 and 15 at their proximal ends. This separation at the proximal end is effected to render the respective tubes more readily adaptable for connecting the proximal end 18 of tube 14 to the suction intake of a suction pump (not shown) through tubular fitting 22 and to fit the afferent end 23 of tube 15 with a normally closed plug fitting 24 or a one way valve provided for connecting an irrigation syringe or the like (not shown) to provide for irrigation of the operative wound when necessary. Since the application of suction to tube 14 and the use of tube 15 as an irrigation conduit is conventional practice in the use of two way catheters, a detailed description of pump and irrigation means or the means of connecting them is not deemed necessary here.

The padding layer 12 of surgical gauze or similar fluffy wide mesh adsorbent material 12 is preferably loosely wound or packed around the perforated length of the two way catheter 11 to a desired radial thickness and is then enclosed within the outer soft rubber sheath 13 with the distal and proximal ends protruding slightly beyond the ends of sheath 13 by entering catheter 11 encased in the padding layer 12 endwise into sheath 13. Sheath 13 is provided with through passages 26 distributed randomly throughout its length from its distal end to a point inwardly from its proximal end opposite the proximal end passages 16 of tube 14. The catheter 11, padding layer 12, and sheath 13 are secured against relative axial movement by a silk suture 27 passed inwardly and outwardly through the preferably turned down proximal end 28 of sheath 13 and the proximal end of padding layer 12 and around catheter 11 several times. In this connection, it has been determined that a very soft, thin, highly flexible rubber sheath 13 and light, fluffy padding material 12 should be employed to assure that the catheter is softly cushioned on all sides throughout the portion entered into the operative wound by the enclosing padded sheathing. By constructing the drain in this manner, the patient's comfort is materially increased since the weight of the catheter will be widely distributed through the padding and sheath when the drain is employed as a regular wound drain, a cigarette drain or as a sump drain. In all such usages, the soft, pliable sheath and padding will be interposed between the catheter and the body tissues of the operative wound or body cavity to serve as a readily deformable sheathing which will conform to the contour of the walls of the wound or body cavity. As a consequence, localized pressure points are avoided.

Additionally, the padded drain of the present invention, as will be clear from an inspection of FIG. 4, permits the drain to be reasonably positively fixed in place in an operative wound or body cavity to minimize, if not eliminating, discomfort due to shifting movement. Referring for the moment to FIG. 4 where the drain is shown applied to drain a body cavity or abscess cavity 31, the drain 10 is entered endwise into the cavity 31 distal end first through the entrance opening 32. It passes first through the skin layer 33, then successively, in the case of an incision made to remove a tumor or puss cells of an abscess, through the subcutaneous tissues 34 and deep structure 35, to position the slightly protruding distal end of catheter 11 in suitably spaced relation to the cavity end wall and the proximal end passages 26 and 16 within the cavity. A holding suture 36 is then loosely run through the sheath 13 at the skin

level and the skin layer 33 immediately adjacent thereto to secure drain 10 against axial bodily movement relative to the incision opening 32. As a consequence of this sutured connection and the deformable and inherent nature of sheathing 13 to cling to the opening defining skin layer of the incision and cavity, sheath 13 and padding layer 12 of drain 10 are effectively fixed against movement relative to the incision and body cavity 31 with catheter 11 axially suspended by suture 27 in generally centered relation within the padding layer.

Bearing in mind that operative wounds necessitate incision of widely different length, depth and even axial curvature, the present invention contemplates that drain 10 (1) be readily bendable to maintain a longitudinal curvature to conform to the varying axial curvature of the incisions, (2) be produced in varying lengths from, for example, the dimensions of a cigarette to a length of 11 inches or more measured from the distal end to the proximal end of sheath 13, (3) be adaptable for use with or without suction and/or irrigation facilities; and (4) sterily prepared and packaged, and disposable after being used once. The surgical tubing employed in conventional catheters and pliability of the packing and sheathing heretofore described assures attainment of the first two objectives while the tubular fitting 22 and plug fitting 24 assures attainment of the third objective. In this latter connection, when drain 10 is used with or without suction, drain 10 is placed within the wound so that the imperforate proximal ends of catheter 11, sheath 13 and the padding layer 12 protrude outwardly from the wound or a conventionally located stab wound adjacently related to the operative incision. In either case, the skin layer defining the opening 32 through which the drain protrudes is loosely sutured to sheath 13. When used without suction, the plug 38, preferably fixedly joined to fitting 24 by a tie cord 39, is removed from fitting 24 as shown in FIGS. 1 and 2. With the plug 38 removed as there illustrated, drain 10 may be immediately employed to irrigate the operative wound merely by fitting a syringe or other irrigation means to fitting 24 at the afferent end 18 of tube 15.

When drain 10 is to be used with suction, plug 38 is inserted into fitting 24 to shut off tube 15 at its extreme afferent end and a conventional suction device is plugged into tubular fitting 22. The suction applied to tube 14 effectively increases the drainage flow through tube 14 and is maintained, so long as the drainage fluid entering through the distal end and/or passages 26 of sheath 13 enters the free spaces provided by the fluffy padded layer 12, to aspirate the fluid into tube 14 through passages 16. To assure proper drainage under suction or when drain 10 is used without suction, it is essential that the drain be properly positioned to dispose all passages 26 and passages 16 within the operative wound and that ambient air have free access into the padding layer 12 that protrudes through the proximal end of sheath 13.

In addition to providing a primary air flow path when drain 10 of this invention is used as a suction drain, the padding layer 12 acts by adsorption and capillary action to convey the drainage fluid from the wound or body cavity to catheter passages 16 where the inrushing air passing through padding layer 12 and passages 16 picks up the drainage fluid constantly and carries it into and through drainage tube 14 keeping the wound dry

and hastening the healing processes. Removal of drain 10, when the physician feels the drain is no longer needed, is readily effected by merely removing the holding suture 36 and grasping the protruding proximal ends of the drain 10 (including sheath 13, padding 12 and catheter 11) and pulling the drain 10 as a unit out through opening 32.

From the preceding description, it will be appreciated that the padded surgical drain of the present invention provides a surgical drain which, in addition to providing a drain which stays in proper placement and is maintainable fully functional longer than the surgical drains heretofore provided, also provides a surgical drain which (1) reduces patient discomfort, and (2) can be used as an all purpose drain, i.e., as a regular wound drain, a cigarette drain, a sump drain, and an irrigation drain.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. A general purpose disposable surgical drain for placement in a surgical wound or body cavity during operative and post operative surgical procedures comprising a drain core including an elongated open ended drainage conduit having through wall passages therein angularly staggered throughout its length from its distal end to at least a point a predetermined distance inwardly from its proximal end and a second conduit of a length substantially equal to the length of said drainage conduit having respective openings at its distal and afferent ends, said second conduit having at least its distal end fixedly connected to the distal end of said drainage conduit and its afferent end freely related to the proximal end of said drainage conduit; a soft pliable tube sheathing said core in radial spaced relation from

a point inset from the distal end of said core to a point beyond the proximal end passage of said drainage conduit, said sheathing tube having through passages therein angularly staggered throughout its length from its distal end to the proximal end passage of said drainage conduit; and adsorbent padding of non-friable material interposed between said core and said sheathing tube and fixedly secured to said core and said sheath, said padding maintaining said sheath expanded and forming an air and fluid passage chamber surrounding said core.

2. The surgical drain of claim 1 wherein said padding comprises a fluffy, mesh-like material loosely enclosing said core and said sheathing tube and padding are secured to said core outwardly of the proximal end passage by a suture encircling said core.

3. The surgical drain of claim 1 wherein the proximal end of said drainage conduit includes means adapting said drainage conduit for connection to a suction line adapting the drain for use as a sump drain and wherein said padding permits air to enter the proximal end of said sheath and pass through the padding into the drainage tube through its wall passages thereby aspirating the tissue drainage from the wound or cavity and in normal usage reduces the suction force applied to the sheath and body tissues forming the walls of the wound or body cavity sufficiently to prevent collapsing of the padding and sheathing tube around the drainage conduit and entry of the body wall tissues into the drainage passages under influence of the applied suction.

4. The surgical drain of claim 1 wherein the afferent end of said second conduit is provided with means adapting said second conduit for selective use as an irrigation conduit should irrigation be required.

5. The surgical drain of claim 4 wherein said means comprises a plug member carried by a tie cord fixedly secured at one end to the second conduit wall near its proximal end.

6. The surgical drain of claim 3 wherein said means adapting said drainage conduit for connection to a suction line comprises a tubular plug fitting secured to the proximal end of said drainage conduit.

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