RETRACTOR FOR SOFT TISSUE FOR EXAMPLE BRAIN TISSUE


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ABSTRACT

A retractor for tissue comprising a deformable metal blade having a pair of opposite faces and a peripheral edge bounding and interconnecting the faces. A sheath comprising a flexible material which is non-adherent to brain tissue, such as silicon elastomer, includes a cover portion that covers at least part of the blade, having an exposed bearing face for bearing against soft tissue, such as brain tissue, and a flexible skirt portion extending from the said cover portion and projecting beyond the peripheral edge. The sheath may be reinforced by a mesh and have an irregular surface, if desired.

12 Claims, 4 Drawing Figures
RETRACTOR FOR SOFT TISSUE FOR EXAMPLE BRAIN TISSUE

This invention relates to a retractor for tissue. Among other uses, it is useful in the process of dissecting the brain during surgery on the brain.

The usual method of protecting the brain when using brain retractors is by padding the area with cottonoid paddies. The use of such cottonoids poses significant problems. Among these is their tendency to adhere to the brain tissue and cause bruising of the underlying brain. Also, because cottonoids do not slide, it is necessary to use numerous of them during a dissection, thereby forming a wa-d beneath the retractor which can obscure the area which must be visualized. Moving a retractor under these circumstances is complicated by the necessity of concurrently readjusting the position of these paddies. It is not infrequent that the edge of a cottonoid paddle used to protect the leading edge of the retractor may obscure the surgeon's vision, particularly when working in a small area, and this is a hazardous situation. Additionally, cottonoid paddies constitute a substantial hazard when the surgeon is working with a drill, because they tend to adhere to its rotating tip, and can then be whipped about, damaging the surrounding tissues.

The foregoing problems and objections have been overcome by this invention. This invention utilizes a deformable metal blade with a sheath enveloping at least the part of it which contacts the tissue. The sheath is made of a flexible material which is not adherent to the tissue. A flexible skirt portion of the sheath projects beyond the peripheral edge of the metal blade. Silicone elastomer, Kel-F, teflon, mylar, and polyethylene are examples. When suitably wetted, a retractor covered with any of these materials can readily be moved along the surface of brain tissue without damaging it. Similarly, when a drill is used adjacent to such materials, the materials will not adhere to the whirling tip of the drill and will not be moved in such a manner as to damage surrounding tissue.

The invention will be fully understood from the following detailed description and the accompanying drawings, in which:

FIG. 1 is an edge view, partly in cutaway cross-section, of the presently preferred embodiment of the invention;

FIG. 2 is a top view of FIG. 1;

FIG. 3 is a top view of an alternate embodiment of the invention with part of one of its cover portions and skirt portion removed for purposes of illustration; and

FIG. 4 is an enlarged view of a portion of FIG. 1.

The presently preferred embodiment of the invention is shown in FIG. 1 wherein a retractor 10 for brain tissue is shown, which includes a deformable metal plate 11 having a pair of opposite faces 12, 13 and a peripheral edge 14 which bounds and interconnects faces 12 and 13. By “deformable” is meant an inherently shape-retaining metal blade which is sufficiently malleable that it can be bent to any shape desired by the surgeon. An annealed iron plate is an example.

A sheath 20 envelops at least that part of the blade which is intended to make contact with brain tissue. In most practical embodiments, the entire plate will be enveloped. The sheath includes a cover portion 21 which is defined as that portion of the sheath which makes contact with the parts of the opposite faces of the plate which are covered by the sheath. The cover portion provides exposed bearing faces 22, 23. In the preferred embodiment of the invention, as schematically shown in FIGS. 2 and 3, by surface shading, the entire bearing surfaces are irregular in surface contour. The irregularities may be formed by depressions such as pits 24 in a regular pattern.

The sheath also includes a flexible skirt portion 30 which extends from the cover portion. The skirt portion and cover portion are preferably integral. The skirt portion projects beyond the peripheral edge of the plate. As best shown in FIG. 4, it is thicker adjacent to the peripheral edge than it is at its free edge 31. It may be said to be “feathered” at its edge.

While the sheath may be formed by dipping the metal plate into an uncured silicone elastomer, and then curing it to the illustrated shape, with or without using a mold, it may more readily be constructed from a pair of sheets 35, 36, comprising a material such as silicone elastomer, within which there are embedded respective reinforced mesh reinforcements 37, 38, preferably of woven dacron thread. The shape of this weave will cause the pits in the bearing surface already described when the coating of the silicone elastomer over the mesh is suitably thin. The mesh reinforcement is optional. Sheets of material without reinforcement may be used instead.

The sheets include extensions 39, 40 which project beyond the peripheral edge. They are joined beyond the peripheral edge by adhesives or the like to form the skirt portion. Sheet 36 projects farther from the peripheral edge than sheet 35. By this means, the thickness of the skirt portion is greater adjacent to the peripheral edge than it is at the free edge 31 of the skirt, at least by the difference of thickness of one of the sheets.

The sheets are shown tapered at their edges, which accentuates the difference in thickness, and makes the edges more flexible. Instead of a tapered edge as illustrated, the edges may be cut square as by a shear. The objective of flexibility will still be attained. In the drawings, especially in FIG. 4, the thickness of the sheath has been exaggerated compared to the thickness of the metal plate. In practice, the metal plate may be on the order of 0.020 inch thick, while the sheets 35 and 36 may each be on the order of approximately 0.005 inch. The free edge of sheet 36 may project approximately 3mm beyond the peripheral edge, and the free edge of sheet 35 approximately 1.5mm beyond the peripheral edge. The thickness of the sheath adjacent to the peripheral edge will therefore be about 0.010 inch, and at the free edge about 0.005 inch (and less if tapered as shown).

The material of the sheath must be non-adherent to brain tissue, and in thin sections sufficiently flexible as not to cut or tear soft tissue, such as brain tissue, and to bend to spread the force exerted by the surgeon over a substantial area. This, of course, excludes unyielding metal surfaces which do not deflect to spread the applied force. Many materials have the property of non-adherence and inherent flexibility. An elastomer seems to provide this property better than most other substances, and the preferred elastomer is medical grade silicone elastomer. The hardness of the elastomer is selected relative to the dimensions of the skirt portion so the skirt portion is unlikely to damage the brain tissue. Generally, it will be sufficiently rigid to tend to return to its original shape, but not so unyielding as to bruise or to cut the tissue. The dacron mesh reinforcement re-
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sists tearing of the sheath and provides the surface ir-
regularity already mentioned.

In addition to elastomers, other sterilizable materials
may also be used which are non-adherent to brain tis-
sue, and flexible in the dimensions used, and will not
bruise or cut the tissue. Other suitable materials are the
fluorinated hydrocarbons known as teflon, mylar and
Kel-F, and polyethylene. Therefore, the material may
advantageously be one selected from the group consist-
ing of silicone elastomer, polyethylene, mylar, teflon
and Kel-F.

FIG. 3 shows an attachment rod 45 attached to the
metal plate 46 of retractor 47, and projecting beyond
its sheath 48. This rod is attached to the plate by weld
49. In use, it can be attached to a mounting means to
hold the retractor in place. The retractor of FIG. 1 is
intended to be hand-held, and the retractor of FIG. 3
is intended to be held by an implement. The invention
is suited for use in both ways. The retractor of FIG. 3
is identical to that of FIG. 1, except for the attachment
rod. Part of one of the sheets has been removed in FIG.
3 to illustrate the attachment of the rod to the plate. It
is, of course, provided in the complete device.

In use, the padded retractor is wetted and used with
a thin strip of material which will not adhere to brain
tissue, such as silicone elastomer. A wetted strip of
this material is placed as far forward as possible toward
the area to be exposed, and the retractor of the invention
is then used to elevate the brain, after which tension
may be released and the retractor slid forwardly, using
the strip as a fulcrum. When the desired dissection has
been completed, a retractor provided with means such
as shown in FIG. 3 may be substituted for the hand-held
retractor to hold it in place during the remainder of the
operation.

Of major importance to this invention is the fact that
the material of the sheath does not include fibrous por-
tions which can adhere to and abrade tissue of the
brain, nor will it adhere to or be grabbed by a rotating
drill tip. It is readily sterilizable. The flexible skirt por-
tion enables the retractor readily to be moved into re-
stricted areas, and to bend to avoid bruising the brain
tissue. The metal blade provides adequate support for
the sheath.

The size of the metal blade is variable. In an example
such as FIG. 3, a blade 1/8 inch wide by 2½ inches long
is suitable, while in a device according to FIG. 2, one
as long as 7 inches and approximately 1/8 inch wide may
be utilized. The material may be soft malleable iron, or
any other suitably deformable metal.

This invention is not to be limited by the embodi-
ments shown in the drawings and described in the de-
scription, which are given by way of example and not
of limitation, but only in accordance with the scope of
the appended claims.

We claim:
1. A retractor for tissue comprising: a deformable
metal blade having a pair of opposite faces and a pe-
ripheral edge bounding and interconnecting said faces;
and a sheath enveloping at least a part of said blade,
said sheath comprising a cover portion covering at least
said part of both faces of said blade and having an ex-
posed bearing face for bearing against brain tissue, and
a skirt portion extending from said cover portion and
projecting to a free edge beyond said peripheral edge,
said portions comprising a material which is non-
adherent to brain tissue the skirt being thinner adjacent
to its free edge than it is adjacent to the peripheral edge
of the blade and being sufficiently flexible as to bend
upon contact with soft tissue such as brain tissue with-
out cutting, tearing, or bruising said tissue.
2. A retractor according to claim 1 in which the bear-
ing face is irregular in surface contour.
3. A retractor according to claim 1 in which the ma-
terial is one selected from the group consisting of si-
lcone elastomer, polyethylene, mylar, teflon and Kel-F.

4. A retractor according to claim 1 in which the ma-
terial is silicone elastomer.
5. A retractor according to claim 4 in which the cov-
er portion includes a mesh reinforcement which is
contained within said silicone elastomer.
6. A retractor according to claim 5 in which the mesh
is dacron.
7. A retractor according to claim 1 in which the shea-
ths comprise a pair of sheets of silicone elastomer,
each overlaying a said part of a respective face, and in-
cluding an extension that projects beyond said peripheral
ege, said extensions being joined together to form
said skirt portion.
8. A retractor according to claim 7 in which the ex-
tension of one layer projects farther beyond the periph-
eral edge than the extension of the other layer, whereby
the skirt is thicker adjacent to the peripheral edge than
at the free edge of the skirt.
9. A retractor according to claim 8 in which the bear-
ing face is irregular in surface contour.
10. A retractor according to claim 7 in which the cov-
er portion includes a mesh reinforcement which is
contained within said silicone elastomer.
11. A retractor according to claim 10 in which the mesh
reinforcement extends into the skirt portion.
12. A retractor according to claim 11 in which the bear-
ing face is irregular in surface contour.

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