An apparatus used with a helical suture device has a first end and a second end. The first end includes a spatulate member having a length along a first axis. The second end includes a guide shaped to receive a cylindrical axle of the helical suture device for rotation on a second axis. The guide is shaped to constrain the first axis in fixed position relative to the second axis, the first and second axes each lying within a plane. The spatulate member extends, typically symmetrically, in a first direction and a second direction from the first axis, the first direction and second direction being on opposite sides of the plane. The apparatus lies between a first tissue that is to be sutured, and a second tissue that is desired not to be sutured.
SUTURING APPARATUS, METHOD AND SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. appl. No. 60/302,338 filed Jun. 28, 2001, which application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The invention relates generally to suturing and relates more particularly to suturing in which it is desired to suture a layer of tissue without puncturing or damaging another layer of tissue.

[0003] It is well known to suture tissue, for example to close wounds and incisions in living tissue. Some historical background of suturing is found in PCT appl. no. PCT/US00/29508, filed Oct. 26, 2000, designating the United States, published as PCT publication no. WO 01/30245, published May 3, 2001 and assigned to the same assignee as the assignee of the present application, incorporated herein by reference.

[0004] One goal in suturing is to bring two tissue edges together by means of the sutures. It is also typically desired that the sutures not puncture a deeper tissue. It is also typically desired that the points at which the sutures puncture the tissue be in a particular relationship with the tissue edges. For example, it is typically desired that the points not be too close to the edges. Competing with the latter goal is the previously mentioned goal that the suture not puncture the deeper tissue.

[0005] It is also known to perform a series of sutures with the assistance of a helical suture device such as that set forth in the above-mentioned PCT application designating the United States. With such a helical suture device, it is necessary to draw some balance between large and small diameters. If the diameter is too small, the punctures may be undesirably close to the edges of the tissue being sutured. If the diameter is too large, there is the concern that the suture device may undesirably pierce the tissue below would thus be extremely desirable if a way could be devised in which a helical suture device could be employed to suture tissue, while minimizing the risk that the device may puncture tissue below.

SUMMARY OF INVENTION

[0006] An apparatus used with a helical suture device has a first end and a second end. The first end includes a spatulate member having a length along a first axis. The second end includes a guide shaped to receive a cylindrical axle of the helical suture device for rotation on a second axis. The guide is shaped to constrain the first axis in fixed position relative to the second axis, the first and second axes each lying within a plane. The spatulate member extends, typically symmetrically, in a first direction and a second direction from the first axis, the first direction and second direction being on opposite sides of the plane. The apparatus lies between a first tissue that is to be sutured and a second tissue that is desired not to be sutured.

BRIEF DESCRIPTION OF DRAWINGS

[0007] The invention is described with respect to a drawing in several figures, of which:

[0008] FIG. 1 is a side view of an embodiment of a tissue shield and helical suture instrument.

[0009] FIG. 2 is a front view of an embodiment of a spatulate member of a tissue shield and a helical suture instrument.

[0010] FIG. 3 is an embodiment of a guide from a tissue shield.

[0011] FIG. 4 is a top view of several embodiments of spatulate members.

[0012] FIG. 5 is a front view of several embodiments of spatulate members.

[0013] FIG. 6 is a side view of several embodiments of spatulate members.

[0014] FIG. 7 is an illustration of the tissue shield and helical suturing instrument may be placed during use.

[0015] FIG. 8 is an illustration of a helical suturing instrument in use.

[0016] Where possible, like reference designations have been used among the figures to designate like features.

DETAILED DESCRIPTION

[0017] The present invention, a tissue shield, in combination with a helical suturing instrument, results in the placement of a continuous suture with substantially increased efficiency, and with a minimized risk of inadvertently puncturing or damaging underlying or surrounding tissue.

[0018] A first embodiment of the invention is the tissue shield itself, which comprises an apparatus having a first end 11 and a second end 12, as illustrated in FIG. 1. The first end comprises a spatulate member having a length, an embodiment of which may be greater than one inch and less than seven inches, along a first axis 13. As illustrated in FIG. 2, the spatulate member extends in a first direction and a second direction from the first axis 13, the first direction and second direction are on opposite sides of the plane. The extensions in the first and second direction from the first axis define a width 20. In an exemplary embodiment, the width defined by the extensions is less than one third of the length. It is not required, but the spatulate member may be symmetric relative to the first axis.

[0019] The second end comprises a guide 14 shaped to receive a cylindrical axle 15 for rotation on a second axis 16. A possible configuration for the guide is illustrated in FIG. 3. Here the guide comprises two members 30 and 31. Each member extends toward the second axis 16 from the first axis 13. Each of the members has a hole shaped to receive the cylindrical axle as defined below. The guide is shaped to constrain the first axis in fixed position relative and substantially parallel to the second axis, the first and second axes each lying in a plane. For this embodiment of the invention, the terms “substantially parallel” mean that the axes may be constrained to be within 15 degrees of parallel. Alternatively, the confinement angle could be 10 degrees or 5 degrees. An exemplary embodiment of this configuration is where the first and second axes are greater than one-quarter inch apart.

[0020] As shown in FIG. 1, the cylindrical axle 15 is a straight portion of a tubular member of a helical suture.
variations in the potential top views of the spatulate member, polygons with rounded corners as well as circular or elliptical shapes. It also may have, but is not limited to a leading edge that is curved downward away from the second axis 62 toward the second axis 14 or an edge that is curved upward toward second axis 61 toward the second axis 14 or an edge may or may not be flat 60 depending on the position of the sharp end of the helical suture needle and the direction of its turns. See FIG. 7 for an illustration of this process. The third step is to rotate the helical suture instrument in a second direction 81, which is the opposite of the first, to withdraw the helical suture instrument from the first tissue. The final step is to withdraw the spatulate member from between the first and second tissues as the helical suture instrument is rotated in the second direction.

1. Apparatus having a first end and a second end, the first end comprising a spatulate member having a length along a first axis; the second end comprising a guide shaped to receive a cylindrical axle for rotation on a second axis, the guide shaped to constrain the first axis in fixed position relative to the second axis, the first and second axes each lying within a plane;

the spatulate member extending in a first direction and a second direction from the first axis, the first direction and second direction being on opposite sides of the plane.

2. The apparatus of claim 1 wherein the first and second axes are more than one-quarter inch apart and less then an inch apart.

3. The apparatus of claim 1 wherein the length of the spatulate member is greater than one inch and less then seven inches.

4. The apparatus of claim 1 wherein the guide comprises two members each extending toward the second axis from the first axis, each of the two members having a hole shaped to receive the cylindrical axle.

5. The apparatus of claim 1, further characterized in that the extensions in the first and second directions define a width, the width being less than one-third of the length.

6. The apparatus of claim 1 wherein the spatulate member is symmetric relative to the first axis.
7. The apparatus of claim 1 further characterized as being sterile.
8. The apparatus of claim 7 further comprising a wrapper surrounding the first and second ends.
9. The apparatus of claim 1 further characterized as made of plastic.
10. The apparatus of claim 1 further characterized as made of metal.
11. A system comprising a helical suture instrument and apparatus having a first end and a second end,

the first end comprising a spatulate member having a first length along a first axis;
the helical suture instrument having a cylindrical axle defining a second axis and a helical portion, the helical portion having a helical outer diameter and having a second axial length along the second axis,
the second end of the apparatus comprising a guide shaped to receive the cylindrical axle for rotation on the second axis, the guide shaped to constrain the first axis in fixed position relative to the second axis, the first and second axes each lying within a plane;
the spatulate member extending in a first direction and a second direction from the first axis, the first direction and second direction being on opposite sides of the plane;
wherein the first and second axes are farther apart than the helical outer diameter, whereby there is space between the helical portion and the apparatus; wherein the first length is at least five-sixths of the second length.
12. The system of claim 11 wherein the first length is greater than the second length.
13. The system of claim 11 wherein the guide comprises two members each extending toward the second axis from the first axis, each of the two members having a hole shaped to receive the cylindrical axle.
14. The system of claim 11, further characterized in that the extensions in the first and second directions define a width, the width being less than one-third of the first length.
15. The system of claim 11 wherein the spatulate member is symmetric relative to the first axis.
16. A suturing method performed with a system comprising a helical suture instrument and apparatus having a first end and a second end, the first end comprising a spatulate member having a first length along a first axis; the helical suture instrument having a cylindrical axle defining a second axis and a helical portion, the helical portion having a helical outer diameter and having a second axial length along the second axis, the second end of the apparatus comprising a guide shaped to receive the cylindrical axle for rotation on the second axis, the cylindrical axle located within the guide, the guide shaped to constrain the first axis in fixed position relative to the second axis, the first and second axes each lying within a plane; the spatulate member extending in a first direction and a second direction from the first axis, the first direction and second direction being on opposite sides of the plane; wherein the first and second axes are farther apart than the helical outer diameter, whereby there is space between the helical portion and the apparatus; wherein the first length is at least five-sixths of the second length; the method performed with respect to a first tissue to be sutured between first and second edges, and a second tissue, the method comprising the steps of:

placing the spatulate member between the first and second tissues;
rotating the helical suture instrument in a first direction to pierce alternately the first and second edges of the first tissue;
rotating the helical suture instrument in a second direction to withdraw the helical suture instrument from the first tissue; and
withdrawing the spatulate member from between the first and second tissues as the helical suture instrument is rotated in the second direction.

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