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REMOVABLE, ADJUSTABLE-LENGTH, SNAP-IN PORTAL SAVER, DECOUPLED FROM DERMAL FIXATION

Abstract

A portal saver assembly with a dermal fixation device that is removably attached to a length-adjustable portal saver. The portal saver assembly includes a tubular body having a rigid proximal end with threads and a proximal adjustment body having an outer ridge and an inner bore with threads. The threads on the rigid proximal end of the tubular body are configured to mate with the threads on the inner bore of the proximal adjustment body. The portal saver assembly also includes a dermal fixation device with a central bore and a locking mechanism around the central bore. The outer ridge of the proximal adjustment body is removably attached to within the central bore by the locking mechanism.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of U.S. Non-Provisional patent application Ser. No. 17/278,061, now U.S. Pat. No. 12,274,470, filed on Mar. 19, 2021, which is a national stage application under 35 U.S.C. 371 based on international patent application PCT/US19/54520 filed on Oct. 3, 2019, which claims priority to U.S. Provisional Patent Application Ser. No. 62/740,992 filed on Oct. 4, 2018 and entitled "Removable, Adjustable Length, Snap-in Portal Saver, Decoupled From Dermal Fixation," and U.S. Provisional Patent Application Ser. No. 62/741,806 filed on Oct. 5, 2018 and entitled "Removable, Adjustable-Length Snap-in Portal Saver, Decoupled From Dermal Fixation," the entireties of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION
1. Field of the Invention
[0002] The present invention is directed generally to a portal saver device and, more particularly, to a portal saver assembly with a dermal fixation device that is removably attached to a length-adjustable portal saver.
2. Description of Related Art
[0003] In order to maintain arthroscopic intra-articular hip joint access, a series of access tools (switching stick, slotted cannula, disposable cannula, etc.) are conventionally used frequently for insertion and removal of the instruments performing work on the patient. The use of access tools account for a great percentage of the time spent in procedure by the surgeon. During the time spent using the access tools, the surgeon is not performing any actual work on the patient's pathology.
[0004] A common access tool in the field of arthroscopic surgery is a "cannula." The cannula is used to maintain an open portal leading from outside the patient's body to inside the body to the location where the arthroscopic procedure is to be performed. It is important that this cannula stay inside the body, maintain this path, and not fall out, migrate outward, or migrate farther inward. This is accomplished by a number of means today, most frequently by placing aggressive threads on the outside of the cannula to auger (or drill) into the dermal layer and tissue below it. This can require a sizable incision be made to admit such screw threads, resulting in a corresponding-sized scar.
[0005] Current cannulas mostly use mechanical threads on the exterior of the tube-like body of the cannula itself. Some of these cannulas have stiff tube-like bodies or less rigid bodies with virtually no radial movement. While some current cannulas are more flexible, they are still not flexible enough to accommodate a wide range of instruments. Conventional cannulas additionally have a fluid seal on the proximal end to prevent the leakage of fluid from the surgical site. Some cannulas also include indicators along the tube-like body for customizing the size of the tube-like body. These cannulas are often screwed in with an obturator.
[0006] Some cannulas alternatively or additionally have barbs, and these cannulas can be inserted straight into the surgical site while benefiting from a bit of oscillating rotation during advancement into the body. Still, cannulas use a collapsing accordion-like member which can be stretched to

decrease its diameter and compressed to increase its diameter. None of these conventional cannulas, however, provide the large displacement of rigid bodies sub-dermally that allow insertion and subsequent removal through a small incision. Further, none of these conventional cannulas provide for a small incision size or minimize trauma to the region surrounding the incision site. Even further, none of the conventional cannulas provide a wide a range of motion and freedom.
[0007] Achieving dermal fixation and inserting a means of dermal fixation during conventional cannula insertion can often be accompanied by large forceful motions and twisting motions while attempting to drive dermal fixation structures through and into the patient. If portal saver is attached to the dermal fixation while this is being done, there could be potential for the distal end of the portal saver itself to move about in ways that could pose a risk to structures deep inside the patient. Also, during surgery, it can be necessary to remove the portal saver, such as to trim it to a shorter working length. Or, it can be necessary to replace the portal saver with a longer portal saver.
[0008] Therefore, a need exists for a portal saver assembly with a dermal fixation device that is removably attached to a length-adjustable portal saver.
[0009] Description of the Related Art Section Disclaimer: To the extent that specific patents/publications/products are discussed above in this Description of the Related Art Section or elsewhere in this disclosure, these discussions should not be taken as an admission that the discussed patents/publications/products are prior art for patent law purposes. For example, some or all of the discussed patents/publications/products may not be sufficiently early in time, may not reflect subject matter developed early enough in time and/or may not be sufficiently enabling so as to amount to prior art for patent law purposes. To the extent that specific patents/publications/products are discussed above in this Description of the Related Art Section and/or throughout the application, the descriptions/disclosures of which are all hereby incorporated by reference into this document in their respective entirety(ies).

SUMMARY OF THE INVENTION

[0010] Embodiments of the present invention are directed to a portal saver assembly with a dermal fixation device that is removably attached to a length-adjustable portal saver. According to one aspect, the present invention is a portal saver device. The portal saver device includes a tubular body having a flattened section between two rounded sections and a rigid proximal end with threads. The device also includes a proximal adjustment body having an inner bore with threads. The threads on the rigid proximal end of the tubular body are configured to mate with the threads on the inner bore of the proximal adjustment body. In a first configuration, the flattened section is a first distance from proximal adjustment body. In a second configuration, the flattened section is a second distance from the proximal adjustment body, and the second distance is smaller than the first distance.
[0011] According to another aspect, the present invention is portal saver assembly. The portal saver assembly includes a tubular body having a rigid proximal end with threads and a proximal adjustment body having an outer ridge and an inner bore with threads. The threads on the rigid proximal end of the tubular body are configured to mate with the threads on the inner bore of the proximal adjustment body. The portal saver assembly also includes a dermal fixation device with a central bore and a locking mechanism around the central bore. The outer ridge of the proximal adjustment body is removably attached to within the central bore by the locking mechanism.
[0012] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] One or more aspects of the present invention are particularly pointed out and distinctly

claimed as examples in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention are apparent from the following description taken in conjunction with the accompanying drawings in which:

[0014] FIG. **1** is a perspective view of an exemplary portal saver assembly, according to an embodiment;

[0015] FIG. **2** is an exploded perspective view schematic representation of a portal saver assembly, according to an embodiment;

[0016] FIG. **3** is a partial exploded perspective view schematic representation of a portal saver assembly, according to an embodiment;

[0017] FIG. **4** is a detailed side section view schematic representation of the proximal dermal fixation device of the portal saver assembly, according to an embodiment;

[0018] FIG. **5** is a top perspective view schematic representation of the portal saver assembly in a first configuration, according to an embodiment;

[0019] FIG. **6** is a top perspective view schematic representation of the portal saver assembly in a second configuration, according to an embodiment;

[0020] FIG. **7** is a perspective view schematic representation of the portal saver assembly in a second configuration, according to an embodiment;

[0021] FIG. **8** is another perspective view schematic representation of the portal saver assembly in a second configuration, according to an embodiment;

[0022] FIG. **9** is a top perspective view schematic representation of the proximal dermal fixation device of the portal saver assembly, according to an embodiment;

[0023] FIG. **10** is a side view schematic representation of the portal saver assembly in an extended position, according to an embodiment; and

[0024] FIG. **11** is a side view schematic representation of the portal saver assembly in a retracted position, according to an embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0025] Aspects of the present invention and certain features, advantages, and details thereof, are explained more fully below with reference to the non-limiting examples illustrated in the accompanying drawings. Descriptions of well-known structures are omitted so as not to unnecessarily obscure the invention in detail. It should be understood, however, that the detailed description and the specific non-limiting examples, while indicating aspects of the invention, are given by way of illustration only, and are not by way of limitation. Various substitutions, modifications, additions, and/or arrangements, within the spirit and/or scope of the underlying inventive concepts will be apparent to those skilled in the art from this disclosure.

[0026] Referring now to the figures, wherein like reference numerals refer to like parts throughout, FIG. **1** shows a perspective view of an exemplary portal saver assembly **200**. In general, a portal saver and obturator assembly **200** maintains the path from outside the body (e.g., the skin) to the surgical site (e.g., the joint), which allows the surgeon to move an instrument from one portal to another in two steps or actions (as opposed to 9 steps or actions with conventional devices). A portal saver and obturator assembly **200** typically includes a proximal handpiece **202** configured to removably attach to a portal saver assembly **204**. The portal saver assembly **204** comprises a distal tubular (or cannulated) body **206** extending from a proximal dermal fixation device **208**. A purpose of an embodiment of the present invention is to allow for the proximal dermal fixation device **208** shown in FIG. **1** to decouple from the tubular body **206**, while providing a mechanism for adjusting the length of the tubular body **206**.

[0027] The tubular body **206** is preferably flexible. It can be composed of thermoplastic urethane (hereinafter “TPU”)). TPU is a thermoplastic elastomer comprising block copolymers. Specifically, TPU comprises linear alternating hard segments and soft segments-as should be understood by those of ordinary skill in the art. The hard segments are composed of diisocyanates with short-chain diols (i.e., “chain extenders”), making them short, high polarity segments. The soft segments are

composed of diisocyanates with long-chain diols, making them long, low polarity segments.
[0028] The rigidity of TPU can be fine-tuned by increasing or decreasing the ratio of hard segments to soft segments. TPU has high mechanical properties, high heat resistance, high resistance to mineral oils, high hydrolysis resistance, high low-temperature flexibility, high resistance to microbiological degradation, and high elasticity across the entire hardness range. TPU has a hardness of 30 Shore A to 60 Shore D under standard atmospheric conditions-as should be understood by those of ordinary skill in the art in conjunction with a review of this disclosure. An example of TPU is Elastollan®. Another example of TPU is Isothane grade 5090A, made by Greco.
[0029] TPU provides a number of advantages for use as the composition for the tubular body **206**. In an embodiment, the tubular body **206** is formed via extrusion and is an extruded TPU composition that can retain its shape after being manipulated. It is more flexible and thinner than conventional cannulas and can be moved into various twisted and knotted configurations. The flexibility and resiliency of the tubular body **206** gives a better range of motion for the surgeon, as if they were operating percutaneously. The tubular body **206** is free to move anywhere and is only limited during use by the proximal dermal fixation device **208**, which is fixed to the dermis. TPU is also resistant to cuts or other damage from sharp instruments, such as a shaver blade or bur. Further, the heat resistant qualities TPU mentioned briefly above allow for the passage of ablation instruments without deformation or other damage to the tubular body **206**.
[0030] In alternative embodiments, there are one or more seals along a length of the tubular body **206**. The seals can be angled or perpendicular to each other along the longitudinal axis of the tubular body **206** (which is approximately parallel to the length to the tubular body **206**). In other embodiments, the tubular body **206** comprises indicators along its length for customizing the size of the obturator **204**.
[0031] Turning now to FIG. **2**, there is shown an exploded perspective view schematic representation of an obturator **204** of a portal saver assembly **200**, according to an embodiment. As shown, the tubular body **206** of the portal saver assembly **204** has two round sections **211** with the flattened section **210** therebetween. The flattened (or narrow) section **210** acts as a seal and can be constructed through heat forming processes. The flattened section **210** is heat scaled to make the tubular body **206** flat. The flattened section **210** can be used as an alternative to a welded flat sheet material with scams. In some situations, the flattened section **210** for the tubular body **206** is preferable to welded seams because the compression force on the tubular body **206** with welded scams creates high frictions, which tends to grab onto instruments within the tubular body **206**. This can lead to accidental withdraw of instruments from a portal and can add a dimension (i.e., “noise) to the sense of feel for the surgeon. The flattened section **210** forms a seal between itself and an instrument extending through the tubular body **206**. Thus, the tubular body **206** is tighter around the instrument. After the instrument is removed, the flattened section **210** (i.e., the heat pressed or scaled portion) returns to the flat shape. The flattened section **210** also prevents fluid from leaking out of the tubular body **206** from the incision site. The flat region **210** can be located anywhere along the tubular body **206**. The flat region **210** can be located directly between the proximal end and the distal end of tubular body **206**, closer to the proximal end of the tubular body **206**, or closer to the distal end of the tubular body **206**. For example, in the circumstance where the flat region **210** is located closer to the proximal end of the tubular body **206**, there is more tubular body **206** positioned distally to the flat region **210** in order to increase the range of sizes a surgeon can trim to for maximum length adjustability.
[0032] Still referring to FIG. **2**, the tubular body **206** extends distally from an adjustment body **234** and the adjustment body **234** is configured to releasably connect to the proximal dermal fixation device **208**. The tubular body **206** includes a rigid proximal end **236**. The rigid proximal end **236** is a non-flexible lead-in portion of the tubular body **206**. The rigid proximal end **236** functions to provide a secure, stable connection between the tubular body **206** and the adjustment body **234**.

The rigid proximal end **236** comprises threads **238** for attachment to the adjustment body **234**. The threaded, rigid distal end **244** also serves as a length adjusting mechanism for telescoping the tubular body **206**, as described in detail below.

[0033] As shown in FIG. **2**, the adjustment body **234** comprises a threaded inner bore **240**. The threaded inner bore **240** extends entirely through the adjustment body **234** from its proximal end **242** to its distal end **244**. The adjustment body **234** also comprises an outer surface **246** having an adjustment wheel **248** extending radially therefrom. The adjustment wheel **248** extends around the entire circumference of the adjustment body **234**. The adjustment wheel **248** may have protrusions **250** (or other like projections/ridges) extending radially therefrom to improve the grip of the user and can be used during procedures for length adjustment. The adjustment body **234** additionally includes a ridge **252** extending around its entire circumference, as shown in FIG. **2**. The ridge **252** extends radially from the adjustment body **234**. In the depicted embodiment, the ridge **252** is distal relative to the adjustment wheel **248**.

[0034] Turning now to FIG. **3**, there is shown a partial exploded perspective view schematic representation of the portal saver assembly **204** of a portal saver and obturator assembly **200**, according to an embodiment. As shown in FIG. **3**, the adjustment body **234** is connected to the tubular body **206**. The rigid proximal end **236** and threads **238** (FIG. **2**) of the tubular body **206** are threaded into the threaded inner bore **240** from the distal end **244** of the adjustment body **234**, resulting in an adjustable-length portal saver device **254**. As mentioned above, the portal saver device **254** can be removably connected to the dermal fixation device **208**.

[0035] Referring briefly back to FIG. **2**, the proximal end **242** of the adjustment body **234** can be removably attached to the dermal fixation device **208**. The dermal fixation device **208** comprises a body **212** (e.g., rectangular body) with a central bore **214** extending therethrough. As shown in the exemplary embodiment of FIG. **4**, the central bore **214** extends through a rotating portion **216** and a non-rotating portion **218**. The rotating portion **216** and the non-rotating portion **218** are configured to work in conjunction to fine tune the attachment of the dermal fixation device **208** to a tube-like (or cannulated) rod **220** of the handpiece **202**, as shown in FIG. **1**. A handpiece **202** may be temporarily connected to the dermal fixation device **208** in order to insert and deploy the dermal fixation device **208** (separate from the portal saver device **254**).

[0036] The rotating portion **216** is a movable female connector, such as a threaded channel **222** extending from the central aperture **214**. The non-rotating portion **218** is a non-threaded (or relatively smooth) channel **224** connected within the threaded channel **222**. The non-threaded channel **222** is also connected to the tubular body **206** near the flattened section **210**, as shown. When the dermal fixation device **208** is attached to the handpiece **202**, the rotating portion **216** and the non-rotating portion **218** receive the tube-like rod **220** and the rotating portion **216** is rotated such that the threaded channel **222** tightens around the tube-like rod **220**. In use, instruments can be inserted proximally into the tube-like rod **220** and pass through the tubular body **206**.

[0037] Turning now to FIG. **5**, there is shown a top perspective view schematic representation of the obturator **204** in a first configuration, according to an embodiment. The dermal fixation device **208** comprises one or more petals **228** extending distally from within the body **212** of the dermal fixation device **208** (also shown in FIG. **4**). The petals **228** are movable from a first configuration to a second configuration using an actuator **230** on the body **212**. As shown in FIGS. **4** and **5**, the petals **228** are in the first configuration, closed against the tubular body **206**. In the depicted embodiment, the petals **228** extend in a direction parallel to a length of the tubular body **206** in the first configuration. When the petals **228** are in the first configuration, the actuator **230** is in a first position, as shown. In an embodiment, the first position is the unlocked position wherein the petals **228** are approximately flush with the tubular body **206** for insertion into the patient.

[0038] Turning now to FIGS. **6**-**8**, the petals **228** are in the second configuration. To move the petals **228** into the second configuration, the actuator **230** is activated. In the depicted embodiment, the actuator **230** is rotated or otherwise moved to a second position. (The first and second positions

of the actuator **230** can be denoted by indicators **232** on the **212**, as shown in FIGS. **6**). When the petals **228** are in the second configuration, they are expanded and extending at an angle relative to the tubular body **206**, as shown. In the second configuration, the petals **228** function to retain the portal saver assembly **204** within the patient.

[0039] Referring now to FIG. **9**, there is shown a top perspective view schematic representation of the proximal dermal fixation device **208** of the portal saver assembly **204**, according to an embodiment. The proximal dermal fixation device **208** of FIGS. **2** and **11** comprises a central bore **214** extending therethrough. The central bore **214** is configured to receive the ridge **252** of the adjustment body **234** (FIG. **2**). In an embodiment, the ridge **252** of the adjustment body **234** is configured to snap into the central bore **214**.

[0040] The dermal fixation device **208** of FIGS. **2** and **11** also comprises a locking mechanism **256**. In the depicted embodiment, the locking mechanism **256** is a spring clip. In the depicted embodiment, the spring clip **256** is a double-wishbone shaped retaining spring clip. In other words, it comprises a bowed first arm **258** with three connected, substantially straight segments **260** and a bowed second arm **262** with three connected, substantially straight segments **260**. The first arm **258** and the second arm **262** are oriented or otherwise arranged such that they unite or meet within the body **212** of the dermal fixation device **208**, forming a substantially hexagonal shape. The spring clip **256** is configured to snap over the ridge **252** of the adjustment body **234**.

[0041] The spring clip **256** comprises an exposed portion **264** and a non-exposed portion **266**. As shown in FIG. **11**, the non-exposed portion **266** is within the body **212** of the dermal fixation device **208**. The non-exposed portion **266** includes the first arm **258** and the second arm **262** of the spring clip **256**. The exposed portion **264** is a tab **268** attached to both the first arm **258** and the second arm **262**. The tab **268** extends from the body **212** of the dermal fixation device **208**, as shown in FIGS. **2** and **11**. By depressing the tab **268** toward the body **212** of the dermal fixation device **208**, the spring clip **256** is opened. In other words, by pushing the tab **268** inward, the first arm **258** and the second arm **262** move away from each other in opposing directions, opening the spring clip **256**.

[0042] When the spring clip **256** is opened (by pressing the tab **268**), the ridge **252** of the adjustment body **234** can be inserted therein. Then, when the tab **268** is released, it catches or otherwise snaps onto the ridge **252** of the adjustment body **234**, locking the tubular body **206** into the dermal fixation device **208**, as shown in FIG. **7**. To release the ridge **252** of the adjustment body **234**, the tab **268** is pressed again, thereby opening the spring clip **256** and releasing the adjustment body **234** (with the attached tubular body **206**), as shown in FIG. **3**. Thus, the adjustment body **234** can be coupled to and decoupled from the dermal fixation device **208**. This allows for removal of the portal saver device **254**, as shown in FIG. **3**. In other words, the dermal fixation device **208** can be inserted and deployed before the portal saver device **254** (with its integrated length adjustment) is added. The decoupling also allows for potentially safer insertions of both the dermal fixation device **208** and the portal saver device **254**.

[0043] Referring now to FIG. **10**, there is shown a side view schematic representation of the obturator **204** in an extended position, according to an embodiment. In the extended position, the flat section **210** of the tubular body **206** is a first distance from the dermal fixation device **208**. To achieve the extended position, the adjustment wheel **248** is rotated in a first direction, exposing the rigid proximal end **236** and thereby causing the tubular body **206** to be telescoped in a distal direction. This increases the working length of the entire portal saver assembly **200**. The adjustment wheel **248** can be rotated at any time during a procedure to lengthen the portal saver assembly **200**.

[0044] Turning now to FIG. **11**, there is shown a side view schematic representation of the portal saver assembly **204** in a retracted position, according to an embodiment. In the retracted position, the flat section of the tubular body **206** is a second distance from the dermal fixation device **208**. In an embodiment, the second distance is shorter or smaller than the first distance. To achieve the

retracted position, the adjustment wheel **248** is rotated in a second direction, opposing the first direction, which brings the rigid proximal end **236** into the dermal fixation device **208**. Turning the adjustment wheel **248** in the second direction causes the tubular body **206** to be telescoped in a proximal direction. This decreases the working length of the entire portal saver assembly **204**. The adjustment wheel **248** can be rotated at any time during a procedure to shorten the portal saver assembly **204**.

[0045] In use, the dermal fixation device **208** is advanced (via the handpiece **202** in FIG. **1**, for example) into the incision site without posing any risk to surrounding structures (e.g., femoral head) due to its small diameter. (The dermal fixation device **208** can be configured for the dermal openings used in most procedures, including a 12 mm dermal opening diameter, which is smaller than that used for most cannulas). The dermal fixation device **208** is advanced farther until the petals **228** are in the dermal layer. The actuator **230** is then moved from the first position to the second position, deploying the petals **228** and moving them from the first configuration to the second configuration.

[0046] With the dermal fixation device **208** in place, fixed to the dermal layer, the portal saver device **254** can be coupled to the dermal fixation device **208**. The user presses the tab **268** inward, moving the first arm **258** and the second arm **262** away from each other in opposing directions and opening the spring clip **256**. While pressing the tab **268** toward the body **212** of the dermal fixation device **208**, the user inserts the ridge **252** of the adjustment body **234**, which is configured to snap into the central bore **214**. Then, the tab **268** is released and the spring clip **256** locks around and onto the adjustment body **234** (at the ridge **252**), coupling the portal saver device **254** and the dermal fixation device **208**. With the portal saver device **254** coupled to the dermal fixation device **208**, the length of the portal saver device **254** can be adjusted during a procedure using the adjustment body **234**, as described above. When use of the portal saver device **254** is complete, the user can press the tab **268** inward toward the body **212** of the dermal fixation device **208** again, releasing the ridge **252** from the spring clip **256**. With the ridge **252** released, the user can remove the portal saver device **254** from the dermal fixation device **208** and from the original incision for easy removal without causing additional trauma or scarring to the skin or dermis of the patient.

[0047] All definitions, as defined and used herein, should be understood to control over dictionary definitions, definitions in documents incorporated by reference, and/or ordinary meanings of the defined terms.

[0048] While various embodiments have been described and illustrated herein, those of ordinary skill in the art will readily envision a variety of other means and/or structures for performing the function and/or obtaining the results and/or one or more of the advantages described herein, and each of such variations and/or modifications is deemed to be within the scope of the embodiments described herein. More generally, those skilled in the art will readily appreciate that all parameters, dimensions, materials, and configurations described herein are meant to be exemplary and that the actual parameters, dimensions, materials, and/or configurations will depend upon the specific application or applications for which the teachings is/are used. Those skilled in the art will recognize, or be able to ascertain using no more than routine experimentation, many equivalents to the specific embodiments described herein. It is, therefore, to be understood that the foregoing embodiments are presented by way of example only and that, within the scope of the appended claims and equivalents thereto, embodiments may be practiced otherwise than as specifically described and claimed. Embodiments of the present disclosure are directed to each individual feature, system, article, material, kit, and/or method described herein. In addition, any combination of two or more such features, systems, articles, materials, kits, and/or methods, if such features, systems, articles, materials, kits, and/or methods are not mutually inconsistent, is included within the scope of the present disclosure.

[0049] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms “a”, “an” and

“the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprise” (and any form of comprise, such as “comprises” and “comprising”), “have” (and any form of have, such as, “has” and “having”), “include” (and any form of include, such as “includes” and “including”), and “contain” (any form of contain, such as “contains” and “containing”) are open-ended linking verbs. As a result, a method or device that “comprises”, “has”, “includes” or “contains” one or more steps or elements. Likewise, a step of method or an element of a device that “comprises”, “has”, “includes” or “contains” one or more features possesses those one or more features, but is not limited to possessing only those one or more features. Furthermore, a device or structure that is configured in a certain way is configured in at least that way, but may also be configured in ways that are not listed.

[0050] The corresponding structures, materials, acts and equivalents of all means or step plus function elements in the claims below, if any, are intended to include any structure, material or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The embodiment was chosen and described in order to best explain the principles of one or more aspects of the invention and the practical application, and to enable others of ordinary skill in the art to understand one or more aspects of the present invention for various embodiments with various modifications as are suited to the particular use contemplated.

Claims

1. (canceled)

2. A method of using a portal saver assembly, the method comprising the steps of: providing the portal saver assembly comprising: a tubular body having a flattened section between two rounded sections having a first proximal end and a second distal end, respectively; a proximal adjustment body having an outer ridge; a dermal fixation device with a central bore; and wherein the outer ridge of the proximal adjustment body is removably attached within the central bore of the dermal fixation device; inserting the dermal fixation device into an incision site; and coupling the portal saver device to the dermal fixation device by inserting the outer ridge of the proximal adjustment body into the central bore.

3. The method of claim 2, further comprising an adjustment wheel extending radially from the proximal adjustment body.

4. The method of claim 2, wherein the adjustment wheel is rotatable in a first direction and an opposing second direction.

5. The method of claim 3, wherein rotating the adjustment wheel in the first direction moves the flattened section away from the proximal adjustment body.

6. The method of claim 3, wherein rotating the adjustment wheel in the second direction moves the flattened section toward the proximal adjustment body.

7. A method of using a portal saver assembly, comprising: providing the portal saver assembly, comprising: a tubular body having a flattened section between two rounded sections having a first proximal end and a second distal end, respectively; a proximal adjustment body having an outer ridge; a dermal fixation device with a central bore and one or more petals extending from the dermal fixation device; wherein the outer ridge of the proximal adjustment body is removably attached within the central bore of the dermal fixation device; and wherein the one or more petals are movable from a first configuration to a second configuration via an actuator; inserting the dermal fixation device into an incision site until the one or more petals are positioned within the

incision site; moving the petals from the first configuration to the second configuration via the actuator; and coupling the portal saver device to the dermal fixation device by inserting the outer ridge of the proximal adjustment body into the central bore.

8. The method of claim 7, wherein the actuator is configured to move from a first position to a second position to move the petals from the first configuration to the second configuration.

9. The method of claim 7, wherein the petals extend substantially parallel to a length of the dermal fixation device in the first configuration.

10. The method of claim 9, wherein the petals extend at an angle to the length of the dermal fixation device in the second configuration.

11. The method of claim 7, further comprising a locking mechanism positioned around the central bore.

12. The method of claim 11, wherein the outer ridge of the proximal adjustment body is removably attached within the central bore by the locking mechanism.

13. The method of claim 11, wherein the locking mechanism is a spring.

14. A method of using a portal saver assembly, comprising: providing the portal saver assembly comprising: a tubular body having a flattened section between two rounded sections having a first proximal end and a second distal end, respectively, and a rigid proximal end with threads, wherein the flattened section is closer to the first proximal end than the second distal end in a first position and the flattened section is closer to the second distal end than the first proximal end in a second position; a proximal adjustment body having an inner bore with threads; wherein the threads on the rigid proximal end of the tubular body are configured to mate with the threads on the inner bore of the proximal adjustment body; a dermal fixation device with a central bore; wherein the outer ridge of the proximal adjustment body is removably attached within the central bore; and an adjustment wheel extending radially from the proximal adjustment body, wherein the adjustment wheel is rotatable in a first direction and an opposing second direction and configured to move the flattened section from the first position to the second position; inserting the dermal fixation device into an incision site; coupling the portal saver device to the dermal fixation device by inserting the outer ridge of the proximal adjustment body into the central bore; and rotating the adjustment wheel in the first direction to move the flattened section to the second position.

15. The method of claim 14, further comprising a locking mechanism positioned around the central bore.

16. The method of claim 15, wherein the outer ridge of the proximal adjustment body is removably attached within the central bore by the locking mechanism.

17. The method of claim 16, wherein the locking mechanism is a spring.

18. The method of claim 15, wherein the locking mechanism further comprises a first portion and a second portion.

19. The method of claim 18, wherein the first portion of the locking mechanism is positioned within a body of the dermal fixation device and further comprises a first arm and a second arm.

20. The method of claim 19, wherein the second portion of the locking mechanism is a tab that extends from the body of the dermal fixation device.

21. The method of claim 20, wherein the tab is attached to the first and second arm of the first portion of the locking mechanism.