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Spinal implant system and methods of use

Abstract

A spinal implant includes a first member configured to penetrate tissue and a second member. The second member has an abutment engageable with a surgical instrument and at least one peripheral capture element engageable with a moveable arm of the surgical instrument. Systems, spinal constructs, surgical instruments and methods are disclosed.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS (1) This application is a continuation of U.S. application Ser. No. 16/599,580, filed on Oct. 11, 2019, the entirety of which application is incorporated herein by reference, for all that it teaches and for all purposes.

TECHNICAL FIELD
(1) The present disclosure generally relates to medical devices for the treatment of musculoskeletal disorders, and more particularly to a surgical system and method for treating a spine.
BACKGROUND
(2) Spinal disorders such as degenerative disc disease, disc herniation, osteoporosis, spondylolisthesis, stenosis, kyphosis, scoliosis and other curvature abnormalities, tumor and fracture may result from factors including trauma, disease and degenerative conditions caused by injury and aging. Spinal disorders typically result in symptoms including pain, nerve damage, and partial or complete loss of mobility.
(3) Non-surgical treatments, such as medication, rehabilitation and exercise can be effective, however, may fail to relieve the symptoms associated with these disorders. Surgical treatment of these spinal disorders includes correction, fusion, fixation, discectomy, laminectomy, laminoplasty and implantable prosthetics. For example, surgical treatment may include laminoplasty, which can employ implants such as plates and bone fasteners to provide stability to a treated region. These implants can redirect stresses away from a damaged or defective region while healing takes place to restore proper alignment and generally support the vertebral members. During surgical treatment, the plates and bone fasteners can be delivered to a surgical site. Surgical instruments are employed, for example, to engage the fasteners for attaching the plates to the exterior of one or more vertebral members. This disclosure describes an improvement over these prior technologies.
SUMMARY
(4) In one embodiment, a spinal implant is provided. The spinal implant comprises a first member configured to penetrate tissue. A second member includes an abutment engageable with a surgical instrument and at least one peripheral capture element engageable with a moveable arm of the surgical instrument. In some embodiments, systems, spinal constructs, methods and surgical instruments are disclosed.
(5) In one embodiment, a surgical instrument is provided. The surgical instrument comprises a shaft extending between a proximal end and a distal end. The distal end is configured for engagement with an abutment of a spinal implant. An opening is disposed at the distal end and configured for disposal of a portion of the spinal implant. A moveable arm extends along the shaft and is configured to engage at least one peripheral capture element disposed with the spinal implant.
(6) In one embodiment, a spinal implant system is provided. The spinal implant system comprises a spinal implant including a first member configured to penetrate tissue and a second member including an abutment and at least one peripheral capture element. A surgical instrument includes a shaft extending between a proximal end and a distal end. The distal end is configured for engagement with the abutment. An opening is disposed at the distal end and is configured for

disposal of a portion of the second member. A moveable arm extends along the shaft and is configured for rotation between a capture orientation engaging the least one peripheral capture element and a release orientation.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) The present disclosure will become more readily apparent from the specific description accompanied by the following drawings, in which:

(2) FIG. **1** is a side view of components of one embodiment of a surgical system in accordance with the principles of the present disclosure;

(3) FIG. **2** is a perspective view of the components shown in FIG. **1**;

(4) FIG. **3** is an axial view of the components shown in FIG. **1**;

(5) FIG. **4** is a break away side view of the components shown in FIG. **1**;

(6) FIG. **5** is a side view of components of one embodiment of a surgical system in accordance with the principles of the present disclosure;

(7) FIG. **6** is a break away perspective view of the components shown in FIG. **5**;

(8) FIG. **7** is an axial view of the components shown in FIG. **5**;

(9) FIG. **8** is a break away cross section view along the lines Y-Y of the components shown in FIG. **7**;

(10) FIG. **9** is a break away side view of the components shown in FIG. **5**;

(11) FIG. **10** is an axial cross section view along the lines Z-Z of the components shown in FIG. **9**;

(12) FIG. **11** is a break away cross section view of components of one embodiment of a surgical system in accordance with the principles of the present disclosure; and

(13) FIG. **12** is a plan view of components of one embodiment of a surgical system in accordance with the principles of the present disclosure disposed with vertebrae.

DETAILED DESCRIPTION

(14) The exemplary embodiments of a surgical system are discussed in terms of medical devices for the treatment of musculoskeletal disorders and more particularly, in terms of a surgical system and a method for treating a spine. In some embodiments, the systems and methods of the present disclosure are employed with a laminoplasty procedure.

(15) In some embodiments, the present surgical system comprises a surgical instrument, for example, a self-retaining screw driver configured for connection with a head of a spinal implant, for example, a bone screw. In some embodiments, the driver is configured to retain the bone screw and resist and/or prevent disengagement during insertion to a surgical site. In some embodiments, the driver is configured to retain the bone screw and resist and/or prevent disengagement from the bone screw during an applied torque for engagement with tissue. In some embodiments, the driver is easily detached from the bone screw after the bone screw is engaged with tissue. In some embodiments, the bone screw is utilized to secure spinal constructs, for example, a laminoplasty plate with patient anatomy.

(16) In some embodiments, the system of the present disclosure may be employed to treat spinal disorders such as, for example, degenerative disc disease, disc herniation, osteoporosis, spondylolisthesis, stenosis, scoliosis and other curvature abnormalities, kyphosis, tumor and fractures. In some embodiments, the system of the present disclosure may be employed with other osteal and bone related applications, including those associated with diagnostics and therapeutics. In some embodiments, the disclosed system may be alternatively employed in a surgical treatment with a patient in a prone or supine position, and/or employ various surgical approaches to the spine, including anterior, posterior, posterior mid-line, direct lateral, postero-lateral, and/or antero-lateral approaches, and in other body regions. The system of the present disclosure may also be

alternatively employed with procedures for treating the lumbar, cervical, thoracic, sacral and pelvic regions of a spinal column. The system of the present disclosure may also be used on animals, bone models and other non-living substrates, such as, for example, in training, testing and demonstration.

(17) The system of the present disclosure may be understood more readily by reference to the following detailed description of the embodiments taken in connection with the accompanying drawing figures, which form a part of this disclosure. It is to be understood that this application is not limited to the specific devices, methods, conditions or parameters described and/or shown herein, and that the terminology used herein is for the purpose of describing particular embodiments by way of example only and is not intended to be limiting. In some embodiments, as used in the specification and including the appended claims, the singular forms “a,” “an,” and “the” include the plural, and reference to a particular numerical value includes at least that particular value, unless the context clearly dictates otherwise. Ranges may be expressed herein as from “about” or “approximately” one particular value and/or to “about” or “approximately” another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent “about,” it will be understood that the particular value forms another embodiment. It is also understood that all spatial references, such as, for example, horizontal, vertical, top, upper, lower, bottom, left and right, are for illustrative purposes only and can be varied within the scope of the disclosure. For example, the references “upper” and “lower” are relative and used only in the context to the other, and are not necessarily “superior” and “inferior”.

(18) As used in the specification and including the appended claims, “treating” or “treatment” of a disease or condition refers to performing a procedure that may include administering one or more drugs to a patient (human, normal or otherwise or other mammal), employing implantable devices, and/or employing instruments that treat the disease, such as, for example, microdiscectomy instruments used to remove portions bulging or herniated discs and/or bone spurs, in an effort to alleviate signs or symptoms of the disease or condition. Alleviation can occur prior to signs or symptoms of the disease or condition appearing, as well as after their appearance. Thus, treating or treatment includes preventing or prevention of disease or undesirable condition (e.g., preventing the disease from occurring in a patient, who may be predisposed to the disease but has not yet been diagnosed as having it). In addition, treating or treatment does not require complete alleviation of signs or symptoms, does not require a cure, and specifically includes procedures that have only a marginal effect on the patient. Treatment can include inhibiting the disease, e.g., arresting its development, or relieving the disease, e.g., causing regression of the disease. For example, treatment can include reducing acute or chronic inflammation; alleviating pain and mitigating and inducing re-growth of new ligament, bone and other tissues; as an adjunct in surgery; and/or any repair procedure. Also, as used in the specification and including the appended claims, the term “tissue” includes soft tissue, ligaments, tendons, cartilage and/or bone unless specifically referred to otherwise.

(19) The following discussion includes a description of a surgical system including surgical instruments, spinal constructs, implants, related components and methods of employing the surgical system in accordance with the principles of the present disclosure. Alternate embodiments are also disclosed. Reference is made in detail to the exemplary embodiments of the present disclosure, which are illustrated in the accompanying figures. Turning to FIGS. **1-11**, there are illustrated components of a surgical system, for example, a spinal implant system **10**.

(20) The components of spinal implant system **10** can be fabricated from biologically acceptable materials suitable for medical applications, including metals, synthetic polymers, ceramics and bone material and/or their composites. For example, the components of spinal implant system **10**, individually or collectively, can be fabricated from materials such as stainless steel alloys,

aluminum, commercially pure titanium, titanium alloys, Grade 5 titanium, super-elastic titanium alloys, cobalt-chrome alloys, superelastic metallic alloys (e.g., Nitinol, super elasto-plastic metals, such as GUM METAL®), ceramics and composites thereof such as calcium phosphate (e.g., SKELITE™), thermoplastics such as polyaryletherketone (PAEK) including polyetheretherketone (PEEK), polyetherketoneketone (PEKK) and polyetherketone (PEK), carbon-PEEK composites, PEEK-BaSO.sub.4 polymeric rubbers, polyethylene terephthalate (PET), fabric, silicone, polyurethane, silicone-polyurethane copolymers, polymeric rubbers, polyolefin rubbers, hydrogels, semi-rigid and rigid materials, elastomers, rubbers, thermoplastic elastomers, thermoset elastomers, elastomeric composites, rigid polymers including polyphenylene, polyamide, polyimide, polyetherimide, polyethylene, epoxy, bone material including autograft, allograft, xenograft or transgenic cortical and/or corticocancellous bone, and tissue growth or differentiation factors, partially resorbable materials, such as, for example, composites of metals and calcium-based ceramics, composites of PEEK and calcium based ceramics, composites of PEEK with resorbable polymers, totally resorbable materials, such as, for example, calcium based ceramics such as calcium phosphate, tri-calcium phosphate (TCP), hydroxyapatite (HA)-TCP, calcium sulfate, or other resorbable polymers such as polyaetide, polyglycolide, polytyrosine carbonate, polycaroplaetohe and their combinations.

(21) The components of spinal implant system **10**, individually or collectively, may also be fabricated from a heterogeneous material such as a combination of two or more of the above-described materials. The components of spinal implant system **10** may be monolithically formed, integrally connected or include fastening elements and/or instruments, as described herein.

(22) Spinal implant system **10** can be employed, for example, with a minimally invasive procedure, including percutaneous techniques, mini-open and open surgical techniques to manipulate tissue, deliver and introduce instrumentation and/or components of spinal constructs at a surgical site within a body of a patient, for example, a section of a spine. In some embodiments, spinal implant system **10** can be employed, for example, in laminoplasty procedures to treat patients suffering from a spinal disorder to provide stabilization and decompression, as described herein.

(23) Spinal implant system **10**, as described herein, includes a spinal implant, for example, a bone screw **12** that is engageable with a surgical instrument, for example, a surgical driver **14**, as shown in FIGS. **1**-**11**. Surgical driver **14** is configured to retain bone screw **12** during engagement with tissue in a surgical procedure, for example, implant of a laminoplasty plate **300** (FIG. **12**).

(24) Bone screw **12** includes a member, for example, a shaft **16**, as shown in FIG. **1**. Shaft **16** extends between a proximal end **18** and a distal end **20**. Shaft **16** has a cylindrical cross-sectional configuration between ends **18**, **20**. In some embodiments, a portion of shaft **16** may have alternate cross section configurations, such as, for example, oval, oblong, triangular, square, polygonal, irregular, uniform, non-uniform, offset, staggered, and/or tapered. Shaft **16** defines an axis X**1**.

(25) Shaft **16** includes a thread form on an outer surface thereof. In some embodiments, the thread form may extend such that shaft **16** is threaded along the entire length thereof. In some embodiments, all or only a portion of shaft **16** may have various surface configurations, such as, for example, rough, threaded, arcuate, undulating, porous, semi-porous, dimpled, polished and/or textured.

(26) Bone screw **12** includes a member **30** that includes an abutment **32** and a head **34**. Abutment **32** includes a proximal face **36** and a tapered distal surface **38**, as shown in FIG. **1**. Surface **38** extends from proximal face **36** to proximal end **18**. Proximal face **36** extends transverse, for example, perpendicular to axis X**1**. In some embodiments, proximal face **36** extends at other angular orientations relative to axis X**1**, for example, acute or obtuse. Proximal face **36** is configured for a flush engagement with a portion of surgical driver **14**, as described herein. Proximal face **36** defines a stop for limiting translation of surgical driver **14** relative to head **34**, as described herein. For example, proximal face **36** resists and/or prevents surgical driver **14** from translating past a capture element disposed with head **34** to retain bone screw **12**, as described

herein.
(27) Head **34** extends from proximal face **36**. In some embodiments, head **34** extends along axis X**1** such that head **34** is perpendicular to proximal face **36**. In some embodiments, head **34** extends parallel or at other angular orientations relative to proximal face **36**, for example, acute or obtuse. Head **34** extends between a proximal end **40** and a distal end **42**. Head **34** includes a rectangular cross section configuration having walls **44** that define a perimeter P, as shown in FIG. **3**. Walls **44** merge at edges **46**. In some embodiments, head **34** may have alternate cross section configurations, such as, for example, oval, oblong, triangular, square, polygonal, irregular, uniform, non-uniform, offset, staggered, and/or tapered.
(28) Head **34** includes a plurality of peripheral capture elements, for example, divots **50**. Divots **50** are configured for engagement with a moveable arm, for example, a cantilevered tang **120** of surgical driver **14**, as described herein. Divots **50** each include a recess disposed at each edge **46**, as shown in FIGS. **1**, **2** and **4**. Divots **50** are equidistantly spaced apart and disposed in relative alignment about perimeter P, shown in FIG. **4**. In some embodiments, head **34** may include one or a plurality of capture elements for engagement with a moveable arm of surgical driver **14**. For example, head **34** may include a single divot. In some embodiments, surgical driver **14** may include one or a plurality of moveable arms, as described herein, for engagement with head **34**.
(29) Divots **52** each include a surface that defines a ramp **54**. Ramp **54** is oriented to decline from proximal end **40** to distal end **42**, as shown in FIG. **4**. During engagement of surgical driver **14** with bone screw **12**, ramp **54** facilitates aligning and/or guiding a prong **122** of tang **120** into divot **50** to capture bone screw **12**, as described herein. During disengagement of surgical driver **14** from bone screw **12**, ramp **54** facilitates releasable engagement of tang **120** with head **34**. For example, as tang **120** translates along ramp **54**, the incline of ramp **54** overcomes the bias of tang **120** to facilitate release of tang **120** from divot **50**.
(30) Divots **52** each include a surface that defines a ramp **56**. Ramp **56** is oriented to incline from proximal end **40** to distal end **42**, as shown in FIG. **4**. Ramp **56** facilitates limiting translation of prong **122** relative to head **34**.
(31) Head **34** includes an inclined surface, for example, a ramp **60** disposed at proximal end **40**. Ramp **60** is oriented to incline from proximal end **40** to distal end **42**, as shown in FIG. **4**. Ramp **60** and ramp **54** are disposed in alignment along edge **46** and meet at an apex **62**. During engagement of surgical driver **14** with bone screw **12**, ramp **60** facilitates engagement with head **34** to capture bone screw **12**, as described herein. For example, as tang **120** translates along ramp **60**, the incline of ramp **60** and apex **62** is configured to overcome the bias of tang **120** causing tang **120** to splay from a shaft **100** of surgical driver **14**. During disengagement of surgical driver **14** from bone screw **12**, ramp **60** facilitates releasable engagement of tang **120** with head **34**. For example, as tang **120** translates along ramp **54**, the incline of ramp **54** and apex **62** overcomes the bias of tang **120** to facilitate release of tang **120** from head **34**.
(32) Shaft **100** extends between a proximal end **102** and a distal end **104**, as shown in FIG. **5**. Shaft **100** defines an axis X**2**. Proximal end **102** is configured for connection with an actuator such as a handle and/or powered drill to facilitate engagement of bone screw **12** with tissue. Distal end **104** includes a distal face **106** configured for engagement with proximal face **36**, as shown in FIG. **5**. Distal face **106** includes a surface **108** that defines an opening **110**. Opening **110** is non-circular, for example, including a rectangular configuration such that opening **110** is configured for disposal of head **34** in a mating engagement. In some embodiments, opening **100** may have alternate cross section configurations, such as, for example, oval, oblong, triangular, square, polygonal, irregular, uniform, non-uniform, offset, staggered, and/or tapered. Surface **108** includes a beveled surface that is oriented to incline from distal face **106** towards proximal end **102**, as shown in FIG. **6**, to align and/or guide head **34** into opening **110**. Opening **110** incudes corners **114** configured for alignment with edges **46** such that divot **50** is aligned for engagement with prong **122**.
(33) Tang **120** extends along shaft **100** parallel to axis X**2**, as shown in FIG. **9**. Tang **120** extends

such that a gap G is disposed between shaft **100** and tang **120** forming a living hinge such that tang **120** is rotatable relative to shaft **100**. Gap G is disposed in communication with opening **110** to receive a portion of head **34**, as shown in FIG. **11**. Prong **122** is disposed at a distal end of tang **120**. Prong **122** projects inward in a hook configuration such that prong **122** is oriented to capture bone screw **12**. Tang **120** is rotatable relative to shaft **100** to orient prong **122** between a capture orientation and a release orientation. In the capture orientation, tang **120** is disposed parallel to axis X**2** and prong **122** is disposed with divot **50**. In the release orientation, tang **120** is rotated transverse to axis X**2** to disengage prong **122** from divot **50**, as described herein.

(34) For example, surgical driver **14** is positioned relative to bone screw **12** such that head **34** is disposed adjacent to opening **110**. Tang **120** is disposed parallel to axis X**2**. Head **34** is inserted into opening **110**, in a direction shown by arrow A in FIG. **11**. Surface **108** aligns and/or guides head **34** into opening **110** such that edges **46** are disposed with corners **114**. The surface of ramp **60** engages prong **122**. Prong **122** translates along ramp **60** towards apex **62**. Translation of prong **122** along ramp **60** and over apex **62** overcomes the bias of tang **120** causing tang **120** to rotate and/or splay outward, in a direction shown by arrow B in FIG. **11**. Prong **122** translates along ramp **54** into divot **50**. The resilient bias of tang **120** causes tang **120** to rotate, in a direction shown by arrow C in FIG. **11**, toward axis X**2** to capture bone screw **12**. As prong **122** translates into divot **50**, distal face **106** translates into abutting engagement with proximal face **36** to resist/and or prevent further translation of surgical driver **14** relative to head **34**. Ramp **56** resists and/or prevents further translation of prong **122**.

(35) To release bone screw **12**, surgical driver **14** is manipulated, for example, translated in a direction shown by arrow D in FIG. **11**. Prong **122** translates out of divot **50** and along ramp **54** towards apex **62**. Translation of prong **122** over apex **62** overcomes the bias of tang **120** causing tang **120** to rotate and/or splay outward, in a direction shown by arrow B in FIG. **11**. Prong **122** translates along ramp **60** to release bone screw **12** from surgical driver **14**. The resilient bias of tang **120** causes tang **120** to rotate, in a direction shown by arrow C in FIG. **11**, toward axis X**2**.

(36) In assembly, operation and use, spinal implant system **10**, similar to the systems and methods described herein, is employed with a surgical procedure, such as, for example, a laminoplasty treatment of a spine of a patient including vertebrae V, as shown in FIG. **12**. The surgical system may also be employed with other surgical procedures, such as, for example, discectomy, laminotomy, laminectomy, nerve root retraction, foramenotomy, facetectomy, decompression, and spinal, nucleus or disc replacement. For example, a laminoplasty procedure is employed to alter one or more of the bony vertebral structures that surround and define the spinal canal. For example, vertebral levels V1, V2 and V3 of vertebrae V can be cut and/or weakened to open the canal and provide additional room for the spinal cord. In one embodiment, spinal implant system **10** stabilizes vertebral levels V1, V2 and V3 for proper healing.

(37) In use, to treat the affected section of vertebrae V, a medical practitioner obtains access to a surgical site including vertebrae V in any appropriate manner, such as through incision and retraction of tissues. In some embodiments, spinal implant system **10** can be used in any existing surgical method or technique including open surgery, mini-open surgery, minimally invasive surgery and percutaneous surgical implantation, whereby vertebrae V is accessed through a mini-incision, or sleeve that provides a protected passageway to the area. Once access to the surgical site is obtained, the particular surgical procedure is performed for treating the spine disorder. Spinal implant system **10** is then employed to augment the surgical treatment. Spinal implant system **10** can be delivered or implanted as a pre-assembled device or can be assembled in situ. Spinal implant system **10** can be completely or partially revised, removed or replaced in situ. In some embodiments, one or all of the components of the implant system can be delivered to the surgical site via manual manipulation, image guided surgical navigation and/or a free hand technique.

(38) An incision is made in the body of a patient and a cutting instrument (not shown) creates a surgical pathway for delivery of the components of spinal implant system **10** within the patient

body to adjacent vertebral level V1.
(39) Laminoplasty plate **300** is positioned in alignment for attachment with vertebral level V1 for attachment to tissue adjacent lamina L1 and L2. A pilot hole or the like is drilled with lamina L1 and plate **300** is disposed such that aperture **302** is positioned in alignment with the pilot hole in lamina L1 and aperture **304** is positioned in alignment with the pilot hole in lamina L2. Upon positioning of plate **300**, bone screw **12** is utilized to attach plate **300** with tissue.
(40) Surgical driver **14** is engaged with bone screw **12**. Head **34** is inserted into opening **110** and surface **108** aligns and/or guides head **34** into opening **110** such that edges **46** are disposed with corners **114**. The surface of ramp **60** engages prong **122** to translate prong **122** along ramp **60** towards apex **62**. Tang **120** rotates and/or splays as prong **122** translates over apex **62**. Prong **122** translates along ramp **54** into divot **50**. The resilient bias of tang **120** causes tang **120** to rotate toward axis X**2** to capture bone screw **12**. As prong **122** translates into divot **50**, distal face **106** translates into abutting engagement with proximal face **36** to resist/and or prevent further translation of surgical driver **14** relative to head **34**. Ramp **56** resists and/or prevents further translation of prong **122**. Bone screw **12** is engaged with tissue. Driver **12** is utilized to manipulate, fasten, drive, torque or insert shaft **16** with tissue.
(41) Bone screw **12** is released by manipulating surgical driver **14**. Prong **122** translates out of divot **50** and along ramp **54** towards apex **62**. Translation of prong **122** over apex **62** causes tang **120** to rotate and/or splay to release bone screw **12** from surgical driver **14**, as described herein.
(42) Upon completion of a procedure, the surgical instruments and non-implanted components of spinal implant system **10** are removed and the incision(s) are closed. One or more of the components of spinal implant system **10** can be made of radiolucent materials such as polymers. Radiomarkers may be included for identification under x-ray, fluoroscopy, CT or other imaging techniques. In some embodiments, the use of surgical navigation, microsurgical and image guided technologies may be employed to access, view and repair spinal deterioration or damage, with the aid of spinal implant system **10**.
(43) In some embodiments, spinal implant system **10** includes an agent, which may be disposed, packed, coated or layered within, on or about the components and/or surfaces of spinal implant system **10**. In some embodiments, the agent may include bone growth promoting material, such as, for example, bone graft to enhance fixation of the fixation elements with vertebrae. In some embodiments, the agent may be HA coating. In some embodiments, the agent may include one or a plurality of therapeutic agents and/or pharmacological agents for release, including sustained release, to treat, for example, pain, inflammation and degeneration.
(44) It will be understood that various modifications may be made to the embodiments disclosed herein. Therefore, the above description should not be construed as limiting, but merely as exemplification of the various embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

Claims

1. An implant comprising: a shaft comprising a proximal end and a distal end, the proximal end and the distal end of the shaft being oppositely disposed to one another; an abutment comprising a distal surface extending between a proximal face thereof and the proximal end of the shaft, the distal surface of the abutment being connected to the proximal end of the shaft; and a head comprising a proximal end and a distal end, the proximal end and the distal end of the head being oppositely disposed to one another, the distal end of the head being connected to the proximal surface of the abutment, the head comprising a plurality of walls each extending from the proximal end to the distal end thereof and a divot extending into two of the walls, the divot being defined by a first ramp and a second ramp, and the head further comprising at least a third ramp disposed around the proximal end of the head and oriented to incline from the proximal end to the distal end

of the head.
2. The implant recited in claim 1, wherein the divot is equidistantly spaced apart about a perimeter of the head, the perimeter being defined by the walls.
3. The implant recited in claim 1, wherein the divot is disposed in relative alignment about a perimeter of the head, the perimeter being defined by the walls.
4. The implant recited in claim 1, wherein a perimeter of the head is defined by the walls, the perimeter having a rectangular cross section configuration.
5. The implant recited in claim 1, wherein the walls merge at edges of the head, the divot including a recess configuration relative to a corresponding edge of the head.
6. The implant recited in claim 1, wherein the divot is defined by a first ramp and a second ramp.
7. The implant recited in claim 1, wherein the divot is defined by a first ramp and a second ramp, the first ramp being oriented to decline from the proximal end to the distal end of the head, the second ramp being oriented to incline from the proximal end to the distal end of the head.
8. The implant recited in claim 1, wherein the at least third ramp extends from the first ramp to a proximal surface of the proximal end.
9. The implant recited in claim 1, wherein the at least third ramp is disposed in alignment with an adjacent first ramp.
10. The implant recited in claim 1, wherein the walls merge at edges of the head, the at least third ramp being disposed in alignment with an adjacent first ramp along one of the edges.
11. The implant recited in claim 1, wherein the walls merge to define corners of the head, the divot extending into one of the corners.
12. The implant recited in claim 1, wherein the distal surface tapers from the proximal face of the abutment to the proximal end of the shaft.
13. The implant recited in claim 1, wherein a perimeter of the head is defined by the walls, the perimeter having a diameter that is less than a diameter of the abutment.
14. The implant recited in claim 1, wherein the shaft has a cylindrical cross-sectional configuration between the proximal and distal ends, the shaft including a thread formed on an outer surface of the shaft.
15. The implant recited in claim 1, wherein the shaft extends along a longitudinal axis between the proximal and distal ends, the proximal face of the abutment extending perpendicular to the longitudinal axis.
16. The implant recited in claim 1, wherein the shaft extends along a longitudinal axis between the proximal and distal ends, the head extending along the longitudinal axis such that the head is perpendicular to the proximal face of the abutment.
17. An implant comprising: a shaft comprising a proximal end and a distal end, the proximal end and the distal end of the shaft being oppositely disposed to one another; an abutment comprising a distal surface extending between a proximal face thereof and the proximal end of the shaft, the distal surface of the abutment being connected to the proximal end of the shaft; and a head comprising a proximal end and a distal end, the proximal end and the distal end of the head being oppositely disposed to one another, the distal end of the head being connected to the proximal surface of the abutment, the head comprising a plurality of walls each extending from the proximal end to the distal end thereof and a divot extending into two of the walls, the divot being defined by a first ramp and a second ramp, the first ramp being oriented to decline from the proximal end to the distal end, the second ramp being oriented to incline from the proximal end to the distal end, and the head further comprising at least a third ramp disposed around the proximal end of the head and oriented to incline from the proximal end to the distal end of the head.
18. An implant comprising: a shaft comprising a proximal end and a distal end, the proximal end and the distal end of the shaft being oppositely disposed to one another; an abutment comprising a tapered distal surface extending between a proximal face thereof and the proximal end of the shaft, the distal surface of the abutment being connected to the proximal end of the shaft; and a head

comprising a proximal end and a distal end, the proximal end and the distal end of the head being oppositely disposed to one another, the distal end of the head being connected to the proximal surface of the abutment, the head comprising a plurality of walls each extending from the proximal end to the distal end thereof and a divot extending into two of the walls, the divot disposed in a spaced apart relation to the abutment and being defined by a first ramp and a second ramp, the first ramp being oriented to decline from the proximal end to the distal end, the second ramp being oriented to incline from the proximal end to the distal end, the head further comprising a plurality of third ramps each one disposed around the proximal end of the head and oriented to incline from the proximal end to the distal end of the head, the walls merging at edges of the head, the first ramp and the second ramp adjacently disposed to one another and collectively defining a recess configuration relative to a corresponding edge of the head, and each one of the plurality of third ramps adjacently disposed to and in alignment with a first ramp of an adjacent divot.