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SURGICAL BURS

Abstract

A surgical bur is disclosed having cutting and trailing edges and associated flutes and lands. Each flute includes a cutting edge. Each of the trailing edges relatives in a selected dimension to a preceding cutting edge.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] The application is a continuation of U.S. patent application Ser. No. 16/390,476 filed on Apr. 22, 2019, which is a divisional of U.S. patent application Ser. No. 14/840,217 filed on Aug. 31, 2015, now U.S. Pat. No. 10,265,082. The entire disclosure of the above applications are incorporated herein by reference.

FIELD
[0002] The disclosure relates to a surgical systems for bone cutting or shaping, and more particularly to surgical burs.
BACKGROUND
[0003] This section provides background information related to the present disclosure which is not necessarily prior art.
[0004] Surgical burs need sharp and durable cutting edges in order to efficiently dissect, cut, and/or shape bone during a surgical procedure. Human anatomy tends to locate sensitive soft tissue structures, such as nerves and blood vessels, near bones for protection. These structures can include the dura mater. Dura mater, or dura, refers to the outermost layer of protective soft tissue surrounding the brain and spinal column of a patient. During cranial and spinal procedures, the distal end of a bur can come in contact with dura mater. The term “distal” means away from a medical practitioner holding a surgical tool with a rotating bur. The term “proximal” means towards the medical practitioner and away from the patient.
[0005] It is desirable for the surgical burs to provide stability while drilling in an axial direction and to be able to efficiently cut while being moved in a radial direction. The axial direction may be, for example, a direction parallel to, along, and/or in line with a longitudinal axis of the surgical bur. The radial direction may be, for example, a direction away from and not parallel to the longitudinal axis of the surgical bur. The radial direction may be a direction away from and/or perpendicular to the longitudinal axis.
SUMMARY
[0006] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.
[0007] A surgical bur is disclosed, the bur may include flutes and lands. Each of the flutes includes a cutting edge, rake surfaces, and a clearance surface. Each of the lands is disposed between a pair of the flutes. Each of the flutes may have multiple rake surfaces with respective rake angles. Each of the lands is disposed between a pair of the flutes.
[0008] A surgical bur may further include a trailing edge that follows the cutting edge. In operation, the surgical bur may rotate so that a cutting edge is configured to cut bone as the surgical bur rotates in a selected direction. The trailing edge may follow the cutting edge as the surgical bur rotates. The trailing edge may also engage bone, but not cut the bone.
[0009] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

Description

DRAWINGS
[0010] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.
[0011] FIG. **1** is a perspective environmental view of a surgical dissection cutter assembly

incorporating a surgical bur and in use on a patient in accordance with an embodiment of the present disclosure.
[0012] FIG. **2** is a perspective view of the surgical dissection cutter assembly of FIG. **1**.
[0013] FIG. **3** is a detail front perspective view of a surgical bur.
[0014] FIG. **4** is a front detail view of the surgical bur of FIG. **3**.
[0015] FIG. **5** is a side view of the surgical bur of FIG. **3**.
[0016] FIG. **6** is a detail front perspective view of a surgical bur.
[0017] FIG. **7** is a front detail view of the surgical bur of FIG. **6**.
[0018] FIG. **8** is a side view of the surgical bur of FIG. **6**.
[0019] FIG. **9**A is a detail environmental view of the surgical bur of FIG. **3** in use in a first position.
[0020] FIG. **9**B is a detail environmental view of the surgical bur of FIG. **3** in use in a second position.
[0021] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0022] Example embodiments will now be described more fully with reference to the accompanying drawings.
[0023] The following description includes disclosure of rotatable surgical burs (also referred to below as the surgical burs). Cutting edges and trailing edges, as disclosed below. The surgical burs may include one or more of a plurality of external geometries, such as a ball, a cylindrical, an oval, or other generally known shape, such as the Midas Rex® surgical burs sold by Medtronic, Inc. having a place of business in Minneapolis, MN. Surgical burs, including those disclosed herein, may be driven by high speed drills, such as the Midas Rex® Legend EHS Stylus High-Speed Surgical Drill which may be appropriate for a wide range of surgeries, including spine, neurology, and ear-nose-throat (ENT) procedures. The drills may drive the burs at appropriate and selectable speeds, such as about 200 to 75,000 rotations per minute (rpm), including about 7,000 to 70,000 rpms.
[0024] Example embodiments will now be described more fully with reference to the accompanying drawings. The following description is merely exemplary in nature and is not intended to limit the present disclosure, application, or uses. For example, although a human patient is illustrated as a subject, it is under stood that a subject may be any appropriate subject. Further, the subject may include inanimate and non-living subjects. Non-living subjects may include solid working materials such as a objects formed of wood, ceramics, metal, etc. Certain tissues, such as bone tissue, may be rigid and may be shaped with a cutting tool. It should be understood that throughout the drawings, corresponding reference numerals indicate like or corresponding parts and features.
[0025] FIG. **1** shows a surgical dissection cutter assembly **10** incorporating a dissection tool **20** in use on a patient **30** at a surgical access site **32**. The patient **30** is illustrated as undergoing a neurological operation. Access to a brain or other neurological structures of the patient **30** often requires delicate dissection of bone (e.g. a skull) and other tissues. FIG. **1** is provided for example purposes only; the surgical burs disclosed herein may be used in different tools and/or cutter assemblies and may be used for other procedures and/or operations. The dissection cutter assembly **10** includes a dissection tool driver **40**, which is being utilized to dissect a portion of bone and adjacent tissue of the patient **30** in the surgical access site **32**. The tool driver may include the Midas Rex® Legend EHS Stylus High-Speed Surgical Drill, as noted above, or other appropriate driver.
[0026] FIG. **2** is a perspective view of the surgical dissection cutter assembly **10**. The dissection tool driver **40** includes a motor housing **42** connected to a connector **44**, the connector may include a hose or cable assembly. The connector **44** supplies external power and control for a motor included within the motor housing **42**. The dissection tool driver **40** further includes an attachment

housing **46** that connects to the dissection tool **20**. A dissection tool distal end includes a surgical bur **64**. A dissection tool proximal end may include a driver connection **54**. The driver connection **54** may engage a connection within the attachment housing **46** to receive rotary power from the motor within the motor housing **42**.

[0027] Although the following described dissection tools, for example surgical burs, are disclosed and illustrated in the drawings as having a particular number of flutes, rake surfaces per flute, rake angles per flute, clearance surfaces per flute, lands, axial relief surfaces, clearance surfaces, etc., the surgical burs may have other quantities of each of these items.

[0028] FIG. **3** shows a side and perspective view of the dissection tool **20**. The dissection tool **20** may be used as part of the dissection assembly **10** of FIG.

[0029] **1**. The dissection tool **20** includes a shaft **62** and the surgical bur **64**. The surgical bur **64** has a design that may generally be referred to as a "match head", "neuro", or "matchstick" design and includes a body **66**. The body **66** has two convex lands **68** and two flutes **70**. Each of the flutes **70** is located between the lands **68** and has a corresponding chip space **72**. The lands **68** are convex-shaped and/or rounded and may be in respective 180° locations about a longitudinal axis **78** of the dissection tool **20**, the shaft **62**, and/or the surgical bur **64**. The surgical bur **64** is rotated about the longitudinal axis **78**. The flutes **70** may also be in respective **180**° locations about the longitudinal axis **78**. Each of the flutes **70** has one or more rake surfaces on or at a cutting edge **76**. A clearance surface **73**, which may be a flat or concave surface, may also correspond to the cutting edge **76**. The clearance surfaces **73** are formed relative to the flutes **70**, and may be on both proximal and distal portions of the flutes **70**, near respective bur proximal end **64***a* and bur distal end **64***b*.

[0030] With additional reference to FIGS. **4** and **5**, the surgical bur **64** further includes the cutting edge **76**. The cutting edge **76** is spaced a distance **82** from a center or central axis **78** of the bur **64**. Generally, the cutting edge **76** axially extends from and is spaced the distance **82** from the center axis **78**. Further, the cutting edge **76** is generally set on an edge of the flute **70**. The cutting edge **76** is a leading edge while cutting the bur **64** rotates in the direction of arrow **80** around the central point or axis **78**. The cutting edge **76** offset the distance **82** generally places the cutting edge **76** at a maximum distance from the center point **78** of the bur **64**. That is the cutting edge **76** is generally at a most exterior point or distance from the center **78** as the cutting edge **76** is cutting into a material, as discussed further herein. A rig surface **84** extends from the cutting edge towards a distal tip **86** at the bur distal end **64***b*, through which the central axis **78** may extend. The distal tip **86** may be a terminal distal tip of the dissection tool **20**.

[0031] A trailing edge **90** of the bur **64** can be formed at an edge of the curved land **68** and generally adjacent to the flute **70** of the bur **64**. The trailing edge **90** is generally an edge of the curved land **68** that follows the cutting edge **76** as the bur **64** rotates in the direction of arrow **80**. The trailing edge **90** may be at a distance **94** from the center axis **78**. The distance **82** of the cutting edge **76** from the central axis **78** and the distance **94** of the trailing edge **90** from the central axis **78** may be substantially the same or identical. With continuing reference to FIG. **4**, the leading edge **76** and the trailing edge **90** may generally lie on a circle **96** having a radius that is substantially equivalent to or defined by the distances **82** and **94** from the center **78**. Thus, the cutting edge **76** may not extend beyond the circle **96** or the trailing edge **90**. Both the cutting edge **76** and the trailing edge **90** may extend only to the circle **96**. Moreover, the cutting edge and the trailing edge may be include more than one of each, as discussed herein. A third distance **95** of a surface forming the convex land **68** may be less than either of the first distance **82** or the second distance **94**. Further, the clearance area **73** of the flutes, as discussed herein, may have a fourth distance **73***a* from the center **78** that is less than the first, second or third distance.

[0032] As further illustrated in FIG. **4**, two flutes may be included with the surgical bur **64**. A second flute **70***a* may include a second leading or cutting edge **76***a* and a second trailing edge **90***a*. Thus, the bur **64** may include two flutes **70**, **70***a* with equivalent two cutting edges **76**, **76***a* and two trailing edges **90**, **90***a*. The second cutting edge **76***a* and second trailing edge **90***a* may also be

formed on the circle **96** centered on the central axis **78** of the bur **64**.
[0033] The bur **64** may include any selected geometry for forming a dissection of a selected structure. For example, the flute may define an arc **97** that is about 5 degrees (°) to about 35°. The curved land **68** may also define an arc **99**, which may also be the arcuate distance from the trailing edge **90**, **90***a* to a cutting edge **76**, **76***a* that is about 175° to about 145°. The arcs **97**, **99**, however, may be formed with the bur **64** to be any selected arcuate angle. The distances **82**, **94** of the cutting edges **76**, **76***a* and the trailing edge **90**, **90***a*, however, may all generally be equivalent.
[0034] Turning reference to FIGS. **6**-**8**, a surgical bur **164** is illustrated. The surgical bur **164** can be used as the dissection tool **20** in the assembly **10** in the manner similar to the surgical bur **64**, as discussed above. The surgical bur **164** can also include various features and portions similar to the surgical bur **64**, as discussed above. Accordingly, this portion will not be described in substantial detail and have similar reference numerals as those noted above increased by **100**.
[0035] The surgical bur **164** may include a central axis **178** that extends through a shaft **162** of the surgical bur **164**. The surgical bur **164** includes a body **166**. The surgical bur **164** can include a flute **170** with a cutting edge **176**. Further, a trailing edge **190** can be formed on the body **166** and follow the cutting edge **176** as the surgical bur **164** rotates in a direction of arrow **180**. Further, a chip collection area **172** can be defined in the flute **170**. A convex land **168** is formed between the cutting edge **176** and the trailing edge **190**.
[0036] The surgical bur **164** may differ from the surgical bur **64** in that the surgical bur **164** includes three cutting edges **176**, **176***a* and **176***b*. Accordingly, the surgical bur **164** can also include three flutes **170**, **170***a* and **170***b*. Further, the surgical bur can include three trailing edges **190**, **190***a* and **190***b*.
[0037] Similar to the surgical bur **64**, the surgical bur **164** can define or have a circle **196** that defines an outer perimeter or edge of the surgical bur **164**. Accordingly, the cutting edge **176** may be formed at a distance **182** from the central axis **178**. The trailing edge **190** can be formed at a distance **194** from the central axis **178**. The distance **182** may be substantially equal or equivalent to the distance **194**. Therefore, the cutting edge **176** and the trailing edge **190** can both be positioned on the circle **196**. Additionally, the surgical bur may include a distal tip **186** that is generally on the axis **178** and other features that are similar to the surgical bur **164**. Also, the convex land **168** may have a surface that is a third distance **195** from the center axis **178** that is less than either of the first distance **182** or the second distance **194**.
[0038] The surgical bur **164**, therefore, includes three flutes **170**, **170***a*, **170***b* while the surgical bur **64** includes two flutes. On the bur **164**, the arcuate distance of the flutes **170**, **170***a*, **170***b* and the arcuate distance from a trailing edge to the next cutting edge **176**, **176***a*, **176***b* may be selected to be any appropriate distance. The arcuate distances between the various portions may be smaller than on the bur **64** given that there are a greater number of flutes on the bur **164**.
[0039] It is further understood that a surgical bur, according to the various embodiments, can include any appropriate number of flutes. Regardless, the cutting edge and trailing edge may both be generally on a circle that defines an outer extent of the surgical bur. Therefore, the distance from the central axis to the cutting edge and trailing edge may generally be substantially equivalent or identical, as discussed above. Further, it is understood that the surgical bur may be formed in any appropriate shape such as including a ball shape, a cylindrical shape, or other appropriate shape. The surgical bur, according to various embodiments, can therefore be used to form a dissection or resection of an appropriate portion of a subject, such as the patient **30** as illustrated in FIG. **1** and discussed further herein.
[0040] Turning reference to FIGS. **9**A and **9**B, the surgical bur **64** is illustrated relative to a bone structure or mass **210**. The surgical bur **64** includes the cutting edge **76** and the cutting edge **76***a*, as discussed above. The surgical bur **64** can move or bore axially generally along the axis **78** of the dissection tool **20**. Accordingly, as illustrated in FIGS. **9**A and **9**B, the surgical bur **64** can move along the axis **78** and generally directly out of the plane of the page. An additional movement of the

surgical bur **64** can be to cut radially or generally away from the central axis **78**, such as in the direction of arrow **212**. As the surgical bur is moved in the direction of arrow **212** into the bone mass **210**, a channel or trough **214** may be formed. In forming the channel **214**, the cutting edge **76** can form one or more bone chips **218** from the bone mass **210**. The bone chips **218** can be moved into the flute **70** of the surgical bur **64**. In moving into the flute **70** of the surgical bur **64**, the bone chip **218** can be moved out of the cutting path of the surgical bur **64**, which generally in the direction of arrow **212**.

[0041] The surgical bur **64**, in cutting the bone **210**, is rotating in the direction of arrow **80**, as discussed above. Further, the bur **64** is moved in the direction of arrow **212** to form the channel **214** in the bone **210**. Therefore, the cutting edge **76**, moving in the direction of arrow **80**, cuts the bone chip **218** and then continues to rotate in the direction of arrow **80** and generally away from a front wall or cutting area **220** of the channel **214**. The cutting edge **76** in forming the bone chip **218**, therefore, moves the bone chip **218** towards the already formed portion of the channel **214**.

[0042] As illustrated in FIG. **9**B, the cutting edge **76**, after forming the bone chip **218**, is passing into or through the formed portion of the channel **214** and the trailing edge **90** trailing as the cutting edge **76** is engaging the front or forming wall **220** of the channel **214**. As discussed above, the trailing edge **90** can include the distance **94** from the central axis **78** that is substantially equivalent or equal to the distance **82** of the cutting edge **76** from the central axis **78**.

[0043] Therefore, the trailing edge **90** can engage the wall **220** at substantially the same distance from the central axis **78** as the cutting edge **76** and the forthcoming second cutting edge **76***a*. This an guide and or stabilize the bur **64**, as discussed further herein, during cutting with the cutting edge **76***a*.

[0044] The cutting edge **76***a* includes a distance **82***a* which is substantially identical to the distance **82** from the central axis **78**. Therefore, the cutting edge **76***a*, prior to cutting the wall **220**, is generally at substantially the same position as the trailing edge **90**. Because the radius or distance from the central axis **78** to the wall **220** is substantially identical for the trailing edge **90** and the second cutting edge **76***a*, there is no jump or jerking of the bur **64** prior to the second cutting edge **76***a* initiating a cut and formation of the bone chip **218**. Therefore, the trailing edge **90** can form or act as a stabilizing edge or surface relative to the wall **220** of the channel **214** prior to the second cutting edge **76***a* cutting the wall **220**. Similarly, the second trailing edge **90***a* can act as a stabilizing surface or edge relative to the cutting edge **76** prior to the cutting edge **76** cutting the forward wall **220** of the channel **214**.

[0045] The bur **64** can rotate by the motor generally at a selected rotational rate, such as about 700 to about 75,000 rpm. As an example, the bur **64** may rotate at about 7,000 rpm. Therefore, the engaging of the cutting edges **76** and **76***a* on the forward wall **220** and the stabilizing by the trailing edges services **90**, **90***a*, can substantially stabilize the bur **64** as the bur **64** forms the channel **214**.

[0046] Returning reference to FIG. **9**A, the bur **64** is stabilized during radial cutting, for example when the cutting edge **76** forms the bone chip **218** to cut or dissect the bone **210**. The bur **64** may experience reduced vibrational and forces and chatter during radial cutting. In one example, the bur **64** can experience a reduction of vibration by at least about 40%, including a reduction of about 20-40%, including about 42%. Vibration forces may be measured with an accelerator and reported in g-forces using units such as meters/second.sup.2.

[0047] During operation, the stabilization may occur by the bur **64** rotating within the channel, the cutting edge **76** moves away from the front wall **220** of the channel **214**. As the cutting edge **76** moves away from the front wall **220**, the trailing edge **90** can engage the wall **220** prior to the next cutting edge **76***a*. Due to the rotational speed of the bur **64**, the elapsed time between the cutting edge leaving the wall **220** and the trailing edge **90** engaging the wall may be very short, such as on the order of micro-seconds.

[0048] The trailing edge **90**, however, engages the wall **220** prior to the second cutting edge **76***a* beginning the cut of the front wall and formation of the bone chip **218**. Therefore, as the cutting

edge **76***a* begins to cut the front wall **220** of the channel **214**, the bur **64** may be substantially stabilized relative to the front wall **220**. This is at least because the trailing edge **90** is the same or substantially the same distance from the center **78** as the cutting edge **76***a*.

[0049] Further, the trailing edge **90** can continue to ride along the wall **220** to stabilize the bur **64** as the bur **64** rotates in the direction of arrow **80** and the cutting edge **76***a* cuts and forms bone chips along the wall **220**. Therefore, the trailing edge may act as a guide that stabilizes the bur **64**. The trailing edge **90** stabilizes the bur **64** as following cutting edge, for example the cutting edge **76***a*, follows the trailing edge **90** as illustrated in FIG. **9**B. This assists in stability of the bur **64** during cutting the channel **214**.

[0050] The contact of the trailing edge **90** with the front wall substantially simultaneously with the cutting edge **76***a* or immediately prior to may reduce chatter or vibration of the bur **64** while cutting or dissecting. This can reduce user fatigue during use of the assembly **10** including the bur **64**. This can also increase precision of the dissection when using the bur **64** due to reduced vibration and chatter. Thus, a user may be able to cut longer without a break to decrease time needed for a procedure and to increase precision of a cut. Accordingly, the bur **64** may also decrease a chance of a mic-cut. It is further understood, as discussed above, that the trailing edge and cutting edge may be any appropriate combination of edges and need not specifically be the ones referred to by reference number above.

[0051] In cutting the channel **214**, various surgical procedures may occur. For example, a bur hole may be formed in a scalp, as illustrated in FIG. **1**. The bur hole may be used to allow access to the brain dura and brain tissue for various procedures, such as placement of a deep-brain simulation probe, a resection of a tumor, and the like. Further, other procedures may include forming a hole in other cranial tissues, forming a depression or removal of tissue and other bone matter, including long bones and vertebrae, and other appropriate procedures. Regardless of the specific procedure, however, the bur **64** may cut the channel **214** and the bone **210** without substantial vibration due to the positioning of the trailing edge **90** at substantially the same radial position relative to the central axis **78** as the cutting edge **76***a*.

[0052] Example embodiments are provided so that this disclosure will be thorough, and will fully convey the scope to those who are skilled in the art. Numerous specific details are set forth such as examples of specific components, devices, and methods, to provide a thorough understanding of embodiments of the present disclosure. It will be apparent to those skilled in the art that specific details need not be employed, that example embodiments may be embodied in many different forms and that neither should be construed to limit the scope of the disclosure. In some example embodiments, well-known processes, well-known device structures, and well-known technologies are not described in detail. Moreover, the design and structure of a surgical bur may be altered from the specific examples provide above, but include a trailing edge that has a distance from a center equal to or substantially equal to a following, such as an immediately following cutting edge. This may allow a substantially smooth and jitter or jump free dissection of tissue, including boney tissue.

[0053] The terminology used herein is for the purpose of describing particular example embodiments only and is not intended to be limiting. As used herein, the singular forms “a,” “an,” and “the” may be intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0054] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

Claims

1.**-20**. (canceled)
21. A surgical bur, comprising: a body including a proximal end and a distal end, the distal end including a first flute and a second flute; a first cutting edge on the first flute and an opposing second cutting edge on the second cutting flute; and a first trailing edge on the first flute and an opposing second trailing edge on the second flute; wherein the first cutting edge and the second cutting edge are configured to cut tissue and are spaced a first distance from a center axis of the surgical bur, wherein the first trailing edge and the second trailing edge are spaced the first distance from the center axis of the surgical bur, and wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration during cutting.
22. The surgical bur of claim 21, wherein the respective trailing edge proceeding the respective cutting edge during rotation stabilizes the surgical bur during rotation thereof.
23. The surgical bur of claim 21, wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration by about 42% during cutting.
24. The surgical bur of claim 21, wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration in the range of about 20% to about 42% during cutting.
25. The surgical bur of claim 21, wherein the distal end is configured to cut axially along the center axis into the tissue.
26. The surgical bur of claim 21, further comprising: a motor configured to drive the surgical bur; and a motor housing to house the motor and configured to be manipulated by a user to cut the tissue with the surgical bur.
27. The surgical bur of claim 26, wherein the motor is configured to drive the surgical bur in a first rotational direction; wherein the first trailing edge is configured to engage a surface of the tissue to be cut prior to the second cutting edge cutting the tissue.
28. The surgical bur of claim 21, further comprising: a first convex land defined between the first cutting edge and the first trailing edge extending from the distal end to the proximal end, and a second convex land defined between the second cutting edge and the second trailing edge extending from the distal end to the proximal end.
29. The surgical bur of claim 21, further comprising: a first chip space defined between the first cutting edge and the second trailing edge and a second chip space defined between the second cutting edge and the first trailing edge.
30. The surgical bur of claim 28, wherein the first convex land extends on a first arc around the center axis from the first cutting edge to the first trailing edge and the second convex land extends on a second arc around the center axis from the second cutting edge to the second trailing edge.
31. The surgical bur of claim 21, further comprising: at least three flutes, each flute including a cutting edge and a trailing edge.
32. The surgical bur of claim 28, wherein an entire radial length of each convex land is disposed at a varying distance from the center axis, the varying distance being less than the first distance.
33. A surgical bur, comprising: a body including a proximal end and a distal end, the distal end including a first flute and a second flute; a first cutting edge on the first flute and an opposing second cutting edge on the second cutting flute; a first trailing edge on the first flute and an opposing second trailing edge on the second flute; a first convex land defined between the first cutting edge and the first trailing edge extending from the distal end to the proximal end, and a second convex land defined between the second cutting edge and the second trailing edge extending from the distal end to the proximal end; and a first chip space defined between the first cutting edge and the second trailing edge and a second chip space defined between the second cutting edge and the first trailing edge; wherein the first cutting edge and the second cutting edge are configured to cut tissue and are spaced a first distance from a center axis of the surgical bur,

wherein the first trailing edge and the second trailing edge are spaced the first distance from the center axis of the surgical bur, and wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration during cutting.

34. The surgical bur of claim 33, wherein the first convex land extends on a first arc around the center axis from the first cutting edge to the first trailing edge and the second convex land extends on a second arc around the center axis from the second cutting edge to the second trailing edge.

35. The surgical bur of claim 33, wherein the respective trailing edge proceeding the respective cutting edge during rotation stabilizes the surgical bur during rotation thereof.

36. The surgical bur of claim 33, wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration by about 42% during cutting.

37. The surgical bur of claim 33, wherein spacing the respective cutting and trailing edges at the same first distance reduces vibration in the range of about 20% to about 42% during cutting.

38. The surgical bur of claim 33, wherein an entire radial length of each convex land is disposed at a varying distance from the center axis, the varying distance being less than the first distance.