

CLAIMS

1. An apparatus APP for implantation of a zygomatic implant ZI in coincidence with an implantation vector V, previously derived by use of imaging and computer program facilities, the apparatus APP being characterized by comprising:
 - a dental implantation guide comprising a guide shell GDS and at least one dedicated dental tool DDNTL, with guide shell GDS being configured to support guides GD and to conform with and for releasable affixation to a portion of a maxillary bone MAX,
 - the guides GD having an anterior guide AGD operative in association with a posterior guide PGD to form a pair of guides PRGD which are distanced apart relative to each other, and are aligned with the vector V,
 - and which guides GD are further configured as concave troughs TRG for support of a cylindrical body CB, which is one out of a zygomatic implant ZI, an implantation drill IMPDR, a preliminary drill DRL, and the at least one dedicated dental tool DDNTL, and
 - at least one gap GAP, pierced through the guide shell GDS between the distanced apart pair of guided PRG, and configured for release of the guide shell GDS from the maxilla MAX, wherein the pair of guides PRG is further configured into inverted disposition by disposing of each trough TRG of the anterior guide AGD and of the posterior guide PGD in diametrically opposite disposition relative to the cylindrical body CB, and
 - whereby a moment of forces M applied about an axis Y perpendicular to a longitudinal axis X of the cylindrical body CB, urges the cylindrical body CB into stable and firm support in the pair of guides PRGD, whereby the cylindrical body CB is correctly aligned with the vector V.
2. The apparatus of claim 1, wherein the anterior guide AGD and the posterior guide PGD cover one out of at most half and less than, of the periphery of the cylindrical body CB.
3. The apparatus of claim 1, wherein the guide shell GDS is configured for zygomatic implantation in a sinus which is one out of an extra maxillary sinus and an intra maxillary sinus.
4. The apparatus of claim 1, wherein the guides GD are shaped as a portion of a concave trough TRG, including a semi-circular SCRC shape and a concave V- shape.

5. The apparatus of claim 1, wherein the at least one dedicated dental tool DDNTL includes a dedicated burr DBR2 comprising:
- a smooth spherical head SMSHD configured for guidance by the posterior guide PGD and operative as a fulcrum,
 - a cylindrical abrasive body CYLAB, coupled by a neck NCK to the spherical head SMSHD, and configured for osteotomy,
 - a shank SHNK which is coupled to the body CYLAB,
- whereby the dedicated burr DBR2 is configured for operation in rotation and in pivotal motion about the fulcrum, for motion in a plane defined by the posterior guide PGD and the anterior guide AGD, to open a recess RCS parallel to the vector V in the maxilla MAX, until seated into the anterior guide AGD.
6. The apparatus of claim 1, wherein:
- a drill guide DRGD is configured to be supported and guided by the posterior guide PGD, and
 - the drill guide DRGD axially centers a preliminary drill PRLDR supported therein and urged into the anterior guide AGD, in alignment with the vector V.
7. The apparatus of claim 1, wherein the guide shell GDS is produced by three-dimensional lithographic additive printing.
8. The apparatus of claim 1, wherein the guide shell GDS supports at least one pair of guides PRGD for one zygomatic implant ZI.
9. The apparatus of claim 1, wherein the zygomatic implant ZI is limited to freedom of motion in rotation and in longitudinal translation by being urged in firm seated disposition into the pair of guides PRGD.
10. The apparatus of claim 1, wherein:
- at least one out of the pair of guides PRGD supports at least one pair of parallel rods RD disposed parallel to the vector V, the rods RD forming a guide GD for support of a portion of the cylindrical body CB, and
 - the rods RD are made out of material which is one out of a same material and material(s) different from the material(s) of the guide shell GDS.

11. The apparatus of claim 1, wherein the guide shell GDS is individually tailor-made in conformance with a topography of the maxilla MAX.
12. The apparatus of claim 1, further characterized by comprising a slit guide SLTGD configured to guide the at least one dedicated dental tool DDNTL in alignment with the vector V.
13. The apparatus of claim 12, wherein the slit guide SLTGD is formed as a slit SLT opened in the posterior guide PGD.
14. The apparatus of claim 13, wherein:
the at least one dedicated dental tool DDNTL includes a first dedicated spherical headed burr tool DBR1 comprising:
an abrasive coated spherical head SPHD which is coupled via a neck piece NCK supporting a disk DSK, to a shank SHNK which terminates the dedicated burr DBR1, wherein:
the neck NCK is configured to engage the slit guide SLTGD for guidance by the slit SLT,
the disk DSK is configured for limiting osteotomy perpendicular to the slit,
and
the spherical head is configured for osteotomy parallel to the slit SLT.
15. The apparatus of claim 13, wherein:
the at least one dedicated dental tool DDNTL includes a sleeve guide SLVGD configured for:
insertion in the slit SLT and mechanical releasable affixation to the posterior guide PGD, and
operation as a drill guide DRLGD for a preliminary drill PRLDR and operation as a fulcrum whereabout a dedicated spherical headed burr tool DBR2 is pivoted for osteotomy.
16. The apparatus of claim 12, wherein:
the guide shell GDS is configured to support at least three guides TRGD including the pair of guides PRGD and the slit guide SLTGD, and

the at least three guides TRGD are mutually operative for guiding implantation preparations and for implantation of one zygomatic implant ZI.

17. The apparatus of claim 12, wherein the at least one dedicated dental tool DDNTL is a dedicated spherical headed burr tool DBR1 having a disk DSK and a neck NCK portion configured for, respectively, support by the posterior guide PRG and guidance by the slit guide SLTGD.

18. The apparatus of claim 12, wherein:

the slit guide SLTGD is formed in the posterior guide PGD as at least one pair of parallel slit rods SLTRD for disposition parallel to the vector V, and

the slit rods SLTRD are made out of material which is one out of a same material and material(s) different from the material(s) of the guide shell GDS.

19. The apparatus of claim 1, wherein the posterior guide PGD is configured for disposition away from the guide shell GDS into a maxillary sinus MXSN.

20. The apparatus of claim 19, wherein an extension member XTMB separates the posterior guide PGD away from the guide shell GDS.

21. The apparatus of claim 20, wherein the posterior guide PGD is affixed to the extension member XTMB on a side thereof which faces one out of an anterior side ANT and a posterior side PST.

22. A method for constructing an apparatus APP for implanting a zygomatic implant ZI in coincidence with an a priori derived vector V of implantation by using imaging and computer program facilities,

the method being characterized by comprising:

providing a dental implantation guide comprising a guide shell GDS and at least one dedicated dental tool DDNTL, wherein the guide shell GDS conforms with and in releasable affixation to a portion of a maxillary bone MAX,

selecting a cylindrical body CB, which is one out of a zygomatic implant ZI, a dental drill DRL, and at least one dedicated dental tool DDNTL, for use with the guide shell GDS,

disposing the cylindrical body CB guides GD, supported on the guide shell GDS which is disposed on a portion of a maxilla MAX according to the vector V, wherein the guide shell GDS is configured for:

supporting guides GD, operating an anterior guide AGD in association with a posterior guide PGD forming a pair of guides PRGD, which are shaped as concave troughs TRG for receiving the cylindrical body CB therein, and are mutually distanced apart and arranged in inverted support disposition relative to each other,

whereby the troughs TRG are inverted by the anterior guide AGD and the posterior guide PGD being disposed in diametrically opposite disposition on the cylindrical body CB, and

application of a moment of forces M about an axis Y, perpendicular to a longitudinal axis X of the cylindrical body CB, for urging the cylindrical body CB into stable and firm support in the pair of guides PRGD, whereby the cylindrical body CB is coaxially aligned with the vector V.

23. The method of claim 22, further characterized by:

constructing each one guide GD out of the inverted pair of guides PRGD, which is configured as a trough guide TRGD, to support the cylindrical body CB by at least two points of contact such that two trough guides TRGD geometrically align and support the cylindrical body CB inserted therein in alignment with the vector V on at least four points of contact.

24. The method of claim 23, further characterized by:

providing each one guide GD configured for independent operation as an independent guide TRGIN which includes at least three points of contact CP for geometrically aligning and supporting the cylindrical body CB inserted therein in alignment with the vector V.

25. The method of claim 22, further characterized by:

providing a slit guide SLTGD which is formed as a slit SLT which is opened in the posterior guide PGD.

26. The method of claim 22, wherein the apparatus APP is for one out of extra maxillary implantation and intra sinus implantation.

27. The method of claim 25, further characterized by:
providing at least one dedicated dental tool DDNTL having a neck NCK configured to engage the slit guide SLTGD for guidance thereby.
28. The method of claim 22, further characterized by:
constructing at least one out of the dedicated dental tools DDNTL as a sleeve guide SLVGD which is configured to be guided by at least one out of the guides GD including a slit guide SLTGD, the posterior guide PGD, and both the slit guide SLTGD and the posterior guide PGD, and is further configured to operate as one out of a fulcrum, and a drill guide DRLGD.
29. The method of claim 28, further characterized by:
providing one out of the at least one dedicated dental tool DDNTL as a first dedicated burr tool DBR1 configured to be guided by at least one out of the slit guide SLTGD and the posterior guide PGD, and by both the slit guide SLTGD and the posterior guide PGD.
30. The method of claim 22, further characterized by:
piercing at least one gap GAP through the guide shell GDS for release of the guide shell GDS from the maxilla MAX after implantation of at least one zygomatic implant ZI.
31. The method of claim 22, further characterized by:
constructing the guide shell GDS to support at least three guides GD, including the pair of guides PRGD and a slit guide SLTGD, which guides GD are mutually operative for implantation of one zygomatic implant ZI.
32. The method of claim 22, wherein the zygomatic implant ZI is aligned with the vector V when urged against and in firm seating into both the anterior guide AGD and the posterior guide PGD.
33. The method of claim 22, wherein the zygomatic implant ZI coincides with the vector V when implanted by use of the guide shell GDS.

34. The method of claim 22, further characterized by:
urging the zygomatic implant ZI against and in firm seating into the pair of guides PRGD to limit freedom of motion of the zygomatic implant ZI to rotation and to longitudinal translation.
35. The method of claim 22, further characterized by:
constructing at least one out of the pair of guides PRGD for supporting at least one pair of parallel rods RD disposed parallel with the vector V and configured to support therein of a cylindrical body CB of matching exterior diameter D in alignment with the vector V, and
constructing the rods RD out of material which is one out of a same material and material(s) different from material(s) of the guide shell GDS.
36. The method of claim 22, further characterized by:
forming a slit guide SLTGD in the posterior guide PGD as at least one pair of parallel slit rods SLTRD for disposition parallel to the vector V, and
constructing the slit rods SLTRD out of material which is one out of a same material and material(s) different from the material(s) of the guide shell GDS.
37. The method of claim 22, further characterized by:
providing the at least one dedicated dental tool DDNTL to be guided by at least two guides GD.
38. The method of claim 22, further characterized by:
constructing the at least one dedicated dental tool DDNTL with a disk DSK and a neck NCK portion configured for, respectively, support by the posterior guide PRG and guidance by the slit guide SLTGD.
39. The apparatus of claim 1, wherein the guide shell GDS is configured for guiding preparations for and implantation of zygomatic implants.