

SPECIFICATION

DENTAL IMPLANT

FIELD OF THE INVENTION

The invention relates to a dental implant to support the dental prosthesis.

BACKGROUND OF THE INVENTION

Dental implant treatment has been in practice for more than 50 years. The common types of dental implants are: blade dental implants, cylindrical dental implants, screw shape dental implants, anchor shape dental implants, trans-mandibular dental implants, frame dental implants and so on. In the late 1960's, Professor Branemark of Sweden initiated two-stage titanium implant system and presented the concept of osseointegration. In 1990, American Academy of Implant Dentistry (AAID) defined osseointegration as the direct and functional connection between the bone and dental implant without intervening soft tissue, which allows the implant's load to be continuously transmitted and dispersed in the bone tissue. A number of researches and clinical studies have confirmed that the immediate implant placement after extraction also allows osseointegration and the implants can be used to support the dental prostheses.

One of the main reasons for the failure of dental implant therapy is inflammation and necrosis that occur around the dental implant, leading to the destruction of gums and bones. The degree of pathological change of tissues around dental implant depends on the inflammatory damages of the soft and hard tissues around implant, such as reversible gingival inflammation, or deeper involvement of the bone bed leading to bone resorption and implantitis. If the latter is not timely treated, it will lead to continuous bone resorption and separation of the bone-implant interface, finally resulting in the implant loosening and dislodgement.

Current dental implants include one-piece dental implants and two-piece dental implants. The two-piece dental implant consists mainly of three parts, namely: the body part that is placed in the alveolar bone, an abutment part that is above the bone and

mucous membranes to provide support and retention of the dental prosthesis, and a retention screw connecting the abutment to the implant body. One-piece dental implant is to form the above three parts into one as a whole. The upper surface of current dental implants is generally designed as a smooth surface, forming a smooth interface between the body part and the neck part. The interface makes the dental implant implanted into human tissue produce a micro-gap, which is not conducive to the adhesion of the alveolar bone and the filling of the gum tissue, the bacteria in the mouth easily accumulate in the interface. The micro-gap causes inflammation around the implant, which then leads to bone resorption and the separation between implant and bone interface as described above; in addition, the micro-gap will also reduce the stability of the dental implant, which is easy to cause micro-movement during biting motion, which causes the retention screws to loosen, bone resorption around the dental implant, making the abutment part and the implant loose and dislodge, which eventually leads to failure of implant therapy.

SUMMARY OF THE INVENTION

In view of the above issues, the objective of the Invention is to provide a dental implant to address those issues. The dental implant provided by the present invention can eliminate the micro-gap of the body part and the abutment part. A horizontally oriented platform rough surface is formed on the platform on the top end of the body part which is not covered by the bottom end of the neck part, which can guide alveolar bone to extend and grow to the platform surface on the top end of the body part, thereby enhancing the stability of the dental implant after implantation, improving the success rate of operation, relieving the pain of the patient, and has a high practical value.

The invention discloses a dental implant, comprising: a body part implanted inside the alveolar bone, an abutment part for fitting a dental prosthesis and a neck part connecting the body part and the abutment part; the side surface and the bottom surface of the body part are rough surfaces, and the neck part is a conical structure gradually shrinking toward the bottom end of the neck part; the radial dimension of the bottom end of the neck part is less than the radial dimension of the top platform of the body part, so that a horizontally oriented platform surface is formed on the area on the top end of the body part which is not covered by the bottom end of the neck part, wherein the platform

surface is a rough surface.

Preferably, the roughness of the platform surface is 1 micron -20 micron.

Further, the side surface of the neck part is a rough surface, and the roughness of the side surface of the neck part is 0.1 micron - 2 micron. The side surface of the neck part is similarly designed as a rough surface, its roughness is lower than the roughness of the above platform surface. It's conducive to the adhesion and growth of soft tissue, also can reduce or even eliminate the micro-gap between the body part and the abutment part of the dental implant, enhance the stability of the dental implant after implantation.

Preferably, the abutment part is a cone structure, the radial dimension of the top end of the neck part is 3mm, 3.8mm, 4.8mm or 5.8mm, and the radial dimension of the bottom end of the abutment part is less than the radial dimension of the top end of the neck part, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the top end of the body part is 3mm, 3.8mm, 4.8mm or 5.8mm, and the radial dimension of the bottom end of the neck part is less than the radial dimension of the top end of the body part, the difference of the radial dimensions between them is 0.5mm or 1mm; the radial dimensions of the bottom end of the body part is 2.5mm, 3.1mm, 3.9mm or 4.8mm; the axial length of the abutment part is 4mm, 5mm or 6mm; the axial length of the neck part is 1mm, 2mm or 3mm; the axial length of the body part is 8mm, 10mm or 12mm.

Further, the radial dimension of the top end of the abutment part is less than the radial dimension of the bottom end of the abutment part, so that the abutment part presents as a cone structure with narrow top end and wide bottom end, the angle range between the central axis and the side generatrix of the cone structure is 2 degrees to 4 degrees. Further, the abutment part is a cone structure, the radial dimension of the bottom end of the abutment part is less than the radial dimension of the top end of the neck part, the difference of the radial dimensions between them is 1.5mm or 2mm, the axial length of the neck part is 1mm, 2mm or 3mm, the axial length of the abutment part is 4mm, 5mm or 6mm.

Preferably, the middle axes of the body part and the neck part are coincident with each other.

Preferably, the middle axes of the body part and the neck part are coincident with each other, an angle is formed between the middle axis of the abutment part and the

middle axis of the neck part, and the angle is 15 degrees, 20 degrees or 25 degrees.

Further the body part is a tapered cone structure gradually shrinking toward the bottom end, the side surface of the body part contains the first screw thread part, the second screw thread part and the third screw thread part which are connected from top to bottom in sequence; the screw thread shape of the first screw thread part is the micro-screw thread serrated shape with the screw thread tip in the same level, and the pitch is 0.5mm-1.0mm; the screw thread shape of the second screw thread part is rectangular screw thread, and the pitch is 1.0mm-2.0mm; the screw thread shape of the third screw thread part is the serrated screw thread with the screw thread tip downwards, and the pitch is 1.0mm-2.0mm; and the length ratio of the first screw thread part 6, the second screw thread part 7 and the third screw thread part 8 is 1:2:3.

Preferably, the first screw thread part, the second screw thread part and the third screw thread part are double threaded.

Further, a side-cut groove is designed on the side surface of the body part, and the side-cut groove is arranged on the third screw thread part in the entire axial length.

Preferably, the side-cut groove is one or multiple side-cut grooves evenly distributed, and the side-cut groove is a straight groove or a curved groove.

Further, the abutment part is tetrahedron, pentahedron or hexahedron.

Further, an insert hole for inserting screwdriver is present in the abutment part, and the middle axis of the abutment part is perpendicular to the top surface of the body part.

Preferably, the insert hole is quadrilateral, pentagonal, or hexagonal.

In summary, using the Dental implant of the present invention, the rough design of the platform surface can guide the alveolar bone to grow further to the upper surface of the body part, thus reduce the micro-gap and micro-dynamic movement, enhance the stability of the dental implant after implantation, improve the success rate of operation, relieve the pain of the patient, and have a high practical value.

To make the above content of the invention more obvious and understandable, preferred embodiments will be described in detail below combined with the drawings.

BRIEF DESCRIPTIONS OF THE DRAWINGS

FIG.1 is a structure view of the dental implant with a straight abutment part of the embodiment I of the present invention;

FIG.2 is a structure view of the dental implant with a angled abutment part of the embodiment I of the present invention;

FIG.3 is a structure view of the screw thread design on the body part of the dental implant of the embodiment III of the present invention;

FIG.4 is a structure view of the insert hole on the straight abutment part of the dental implant of the embodiment of the present invention;

FIG.5 is a structure view of the insert hole on the angled abutment part of the dental implant of the embodiment of the present invention;

FIG.6 is a top view of the insert hole on the straight abutment part and the angled abutment part of the dental implant of the embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The invention will be illustrated by specific embodiments of the invention, and a person in the art can easily understand the other advantages and effects according to the content revealed in the description. Though the invention will be described in combination with preferred embodiments, it doesn't mean the characteristics of the invention are limited to the embodiments. On the contrary, the purpose of the invention described in combination with preferred embodiments is to cover the other extending options or modifications based on the claims of the invention. In order to make the invention to be understood in depth, many specific details will be included in the following description. However, the invention can also be implemented without using these details. In addition, in order to avoid confusing or blurring the focus of the present invention, some specific details will be omitted from the description.

In addition, the "up", "down", "left", "right", "top" and "bottom" used in the following descriptions should not be construed as the restrictions for the invention.

Embodiment I

The invention discloses a dental implant, as shown in the Fig. 1, the dental implant including a body part 1 implanted inside the alveolar bone, an abutment part 2 for fitting of a dental prosthesis and a neck part 3 connecting the body part 1 and the neck of the abutment part 3; the side surface and the bottom surface of the body part 1 are rough surfaces, and the neck part 3 is a cone structure gradually shrinking toward the bottom end of the neck part 3; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, so that a horizontally oriented platform surface 4 is formed on the area on the top end of the body part 1 which is not covered by the bottom end of the neck part 3, and the platform surface 4 is a rough

surface.

The roughness of the platform surface⁴ is 1 micron-20micron, and the platform surface⁴ is treated by sandblasting, acid etching, and so on. Further, both the side surface and the bottom surface of the body part 1 are rough surfaces, the roughness of which is 1 micron -20 micron and can also be treated by sandblasting, acid etching, and so on. The rough treatment of the side surface and the bottom surface of the body part 1 is beneficial to the adhesion of osteoblasts and the growth of bone, so as to obtain the stability of the dental implant implantation, and the rough treatment of the platform surface⁴ is beneficial to the adhesion of osteoblasts extending from side surface of the body part 1 to the platform surface⁴, thus, the osteoblasts are able to fill in the micro-gap at the junction between the body part 1 and the neck part 3, enhancing the stability of the dental implant implantation.

According to the dental implant disclosed in the invention, the side surface of the neck part 3 can also be designed as rough surface, further, the side surface of the neck part 3 is arranged to be convex rough cambered surface or concave rough cambered surface, which can be formed as the cambered surface with a certain roughness by laser treatment, and its roughness is smaller than that of the above platform surface⁴. The design is conducive to the adhesion and growth of soft tissue and can further reduce or even eliminate the micro-gap between the body part 1 and the neck part 3 of the dental implant and eliminate effectively the bone resorption caused by the intersection interface, and enhance the stability of dental implant implantation.

In this embodiment, the radial dimension of the top end of the abutment part 2 is less than the radial dimension of the bottom end of the abutment part 2, so that the abutment part 2 presents as a cone structure with narrow top end and wide bottom end. The angle range between the central axis and the side generatrix of the cone structure is 2 degrees to 4 degrees. Thus, the shape of the abutment part 2 is similar with the shape of the prepared natural tooth, so that it is easy for doctors to directly take impression mould to make the dental prosthesis.

More specifically, the abutment part 2 is a multi-sided cylindrical structure, such as tetrahedron, pentahedron or hexahedron. The multi-sided cylindrical structure makes the abutment part 2 act as an external insertion design. The outer structure design can be engaged by a universal implant manual torque wrench or machine sleeve wrench, which is easy for doctors in operation to grip the abutment part 2 by using tetrahedron, pentahedron or hexahedron wrenches compared with a cylindrical base part.

Further, an insert hole 11 for inserting screwdriver is also designed on the abutment part 2, and the middle axis of the abutment part 2 is perpendicular to the top surface of the body part 1. As shown in the FIG.4, the middle axis of the insert hole 11 is coincident or is parallel with the middle axis of the body part 1, the abutment part 2 and the neck part 3 when the dental implant has a straight abutment part. As shown in the FIG.5, the middle axis of the insert hole 11 is coincident or is parallel with the middle axis of the body part 1 and the neck part 3 when the dental implant has an angled abutment part, therefore, the middle axis of the insert hole 11 and the middle axis of the abutment part 2 forms a certain angle. More specifically, the insert hole 11 is designed as a hollow polygonal structure, such as a quadrilateral, pentagonal, or hexagonal. As shown in FIG.6, the insert hole 11 is designed as a hollow hexagonal structure, which makes it easy for doctors to use tools to operate on the implant site in a narrow oral space. For example, the universal implant torque wrench or machine sleeve wrench cannot be used to engage the outer structure design since the missing space of the tooth is very narrow due to the limitations of the teeth on both sides during the dental implant implantation. In this case, an auxiliary screwdriver can be inserted into the insert hole 11 to operate by the torque principle of the torque wrench tool, and the dental implants can also be easily implanted in narrow spaces, thus avoid damage to healthy teeth around them.

In the dental implant disclosed in the present invention, the whole dental implant can be one-piece dental implant integrated by the body part 1, the abutment part 2 and the neck part 3 which cannot be separated from each other. The one-piece dental implant can be implanted as a whole at one time. Also, the dental implant can be two-piece dental implant, each part of which is generally connected by screws or other fixed mechanism when the dental implant is a two-piece dental implant. Whether it is one-piece dental implant or two-piece dental implant, the designs of making the platform surface on the top end of the body part a rough surface is beneficial to the adhesion of osteoblasts extending from side surface of the body part to the platform surface on the top end of the body part, which can reduce the micro-gap between the body part and the neck part of the dental implant. Meanwhile, the side surface of the neck part 3 is also be designed as rough surface, which can guide the adhesion of soft tissue and further reduce or even eliminate the micro-gap between the body part and the neck part of the dental implant, therefore reach a result of enhancing the stability of dental implant implantation and improving surgical success.

Embodiment II

In the dental implant disclosed by the present invention, the abutment part 2 is a cone structure. The radial dimension of the top end of the neck part 3 is 3mm, 3.8mm, 4.8mm or 5.8mm, and the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3; the difference of the radial dimensions between them is 1.5mm or 2mm. The radial dimension of the top end of the body part 1 is 3mm, 3.8mm, 4.8mm or 5.8mm, and the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1; the difference of the radial dimensions between them is 0.5mm or 1mm. The radial dimensions of the bottom end of the body part 1 are 2.5mm, 3.1mm, 3.9mm or 4.8mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm; the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm. It should be noted that, the radial dimension of the top end of the neck part 3 should not be greater than the radial dimension of the top end of the body part 1, and the radial dimension of the top end of the body part 1 should be less than the radial dimension of the top end of the body part 1. As shown in the FIG.1, the middle axes of the body part 1, the abutment part 2 and the neck part 3 coincide with each other when the dental implant disclosed by the present invention is a straight abutment part. In this case, the dental implants disclosed by the present invention should include the following conditions:

1. The radial dimension of the top end of the neck part 3 is 3mm, the radial dimension of the top end of the body part 1 is 3mm, the radial dimension of the bottom end of the body part 1 is 2.5mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

2. The radial dimension of the top end of the neck part 3 is 3mm, the radial dimension of the top end of the body part 1 is 3.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm or 3.1mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the

body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

3. The radial dimension of the top end of the neck part 3 is 3mm, the radial dimension of the top end of the body part 1 is 4.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm or 3.9mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

4. The radial dimension of the top end of the neck part 3 is 3mm, the radial dimension of the top end of the body part 1 is 5.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm, 3.9mm or 4.8mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

5. The radial dimension of the top end of the neck part 3 is 3.8mm, the radial dimension of the top end of the body part 1 is 3.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm or 3.1mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the

axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

6. The radial dimension of the top end of the neck part 3 is 3.8mm, the radial dimension of the top end of the body part 1 is 4.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm or 3.9mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

7. The radial dimension of the top end of the neck part 3 is 3.8 mm, the radial dimension of the top end of the body part 1 is 5.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm, 3.9mm or 4.8mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

8. The radial dimension of the top end of the neck part 3 is 4.8mm, the radial dimension of the top end of the body part 1 is 4.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm or 3.9mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial

length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

9. The radial dimension of the top end of the neck part 3 is 4.8mm, the radial dimension of the top end of the body part 1 is 5.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm, 3.9mm or 4.8mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

10. The radial dimension of the top end of the neck part 3 is 5.8mm, the radial dimension of the top end of the body part 1 is 5.8mm, the radial dimension of the bottom end of the body part 1 is 2.5mm, 3.1mm, 3.9mm or 4.8mm; the radial dimension of the bottom end of the abutment part 2 is less than the radial dimension of the top end of the neck part 3, the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the bottom end of the neck part 3 is less than the radial dimension of the top end of the body part 1, the difference of the radial dimensions between them is 0.5mm or 1mm; the axial length of the abutment part 2 is 4mm, 5mm or 6mm, the axial length of the neck part 3 is 1mm, 2mm or 3mm; the axial length of the body part 1 is 8mm, 10mm or 12mm.

Further, as shown in the FIG.2, when the dental implant disclosed by the present invention is an angled abutment part, the middle axes of the body part1 and the neck part 3 are coincident with each other, an angle δ is formed between the middle axis of the abutment part 2 and the middle axis of the neck part 3, and the angle δ is 15 degrees, 20 degrees and 25 degrees. In this case, the dental implant disclosed by the present invention further includes the following conditions:

11. The angle δ between the middle axis of the abutment part 2 and the middle axis of the neck part 3 is 15 degrees. The radial dimension of the top end of the neck part 3,

the radial dimension of the top end of the body part 1, the radial dimension of the bottom end of the body part 1, the difference of the radial dimensions between the bottom end of the abutment part 2 and the top end of the neck part 3, the difference of the radial dimensions between the bottom end of the neck part 3 and the top end of the body part 1, the axial length of the body part 1, the axial length of the abutment part 2, and the axial length of the neck part 3 correspond in turn to the 1-10 conditions described above;

12. The angle δ between the middle axis of the abutment part 2 and the middle axis of the neck part 3 is 20 degrees. The radial dimension of the top end of the neck part 3, the radial dimension of the top end of the body part 1, the radial dimension of the bottom end of the body part 1, the difference of the radial dimensions between the bottom end of the abutment part 2 and the top end of the neck part 3, the difference of the radial dimensions between the bottom end of the neck part 3 and the top end of the body part 1, the axial length of the body part 1, the axial length of the abutment part 2, and the axial length of the neck part 3 correspond in turn to the 1-10 conditions described above;

13. The angle δ between the middle axis of the abutment part 2 and the middle axis of the neck part 3 is 25 degrees. The radial dimension of the top end of the neck part 3, the radial dimension of the top end of the body part 1, the radial dimension of the bottom end of the body part 1, the difference of the radial dimensions between the bottom end of the abutment part 2 and the top end of the neck part 3, the difference of the radial dimension between the bottom end of the neck part 3 and the top end of the body part 1, the axial length of the body part 1, the axial length of the abutment part 2, and the axial length of the neck part 3 correspond in turn to the 1-10 conditions described above.

The above models of the dental implant provided by the present invention, the radial dimension of the top end of the abutment part 2 is less than the radial dimension of the bottom end of the abutment part 2, so that the abutment part 2 present as a cone structure with narrow top end and wide bottom end. The angle range between the central axis and the side generatrix of the cone structure is 2 degrees to 4 degrees. Thus, the abutment part 2 based on the above models can be constructed as a whole with the size suitable for the dental prosthesis, thus, in the process of the dental implant implantation, doctors do not need to re-prepare the shape and size of the abutment part 2 on the dental implant by burs due to different patients, and just need to select the appropriate

model of the dental implant to operate according to the patient's missing teeth and gingival thickness, etc. The bottom horizontal line of the abutment part 2 is placed below the gums, or at the same level of the gum, which can reduce the infection due to the vibration of the dental implant during preparation of the abutment part 2 in the operation and the foreign body left around the wound produced by the use of the burs; at the same time, the right model of the dental implants selected facilitates the restoration of a temporary prosthesis immediately after implanting the dental implant, or the doctor can directly take the impression mould to make the final prosthesis, so that the patient does not need to perform two surgeries, which can alleviate the patient's pain. In addition, as shown in the FIG.2, the dental implant with an angled abutment part can provide a dental implant with suitable angle according to the location and condition of the missing tooth when implanting the dental implant, which is convenient for the doctor to operate.

According to the dental implant disclosed in the invention, the side surface of the neck part 3 can also be designed as rough surface, further, the side surface of the neck part 3 is arranged to be convex rough cambered surface or concave rough cambered surface, which can be formed as the cambered surface with a certain roughness by laser treatment, and its roughness is smaller than that of the above platform surface 4. The design is conducive to the adhesion and growth of soft tissue and can further reduce or even eliminate the micro-gap between the body part 1 and the neck part 3 of the dental implant and eliminate effectively the bone resorption caused by the intersection interface, and enhance the stability of dental implant implantation.

More specifically, the abutment part 2 is a multi-sided cylindrical structure, such as tetrahedron, pentahedron or hexahedron. The multi-sided cylindrical structure makes the abutment part 2 act as an external insertion design. The outer structure design can be engaged by a universal implant torque wrench or machine sleeve wrench, which is easy for doctors in operation to grip the abutment part 2 by using tetrahedron, pentahedron or hexahedron wrenches compared with the traditional cylindrical base part.

Further, an insert hole 11 for inserting screwdriver is also designed on the abutment part 2, and the middle axis of the abutment part 2 is perpendicular to the top surface of the body part 1. As shown in the FIG.4, the middle axis of the insert hole 11 is coincident or is parallel with the middle axes of the body part 1, the abutment part 2 and the neck part 3 when the dental implant has a straight abutment part. As shown in the FIG.5, the middle axis of the insert hole 11 is coincident or is parallel with the middle axes of the body part 1 and the neck part 3 when the dental implant has an angled abutment part,

therefore, the middle axis of the insert hole 11 and the middle axis of the abutment part 2 forms a certain angle. More specifically, the insert hole 11 is designed as hollow polygonal structure, such as a quadrilateral, pentagonal, or hexagonal. As shown in FIG.6, the insert hole 11 is designed as a hollow hexagonal structure, which makes it easy for doctors to use tools to operate on the implant site in a narrow interdental space. For example, the universal implant torque wrench or machine sleeve wrench cannot be used to engage the external structure since the missing tooth space is very narrow due to the limitations of the teeth on both sides during the dental implant implantation. In this case, an auxiliary embedded screwdriver can be inserted into the insert hole 11 to operate by the torque principle of the torque wrench tool, and the dental implants can also be easily implanted in narrow spaces, thus avoiding damage to healthy teeth around them.

In the dental implant disclosed in the present invention, the whole dental implant can be one-piece dental implant integrated by the body part 1, the abutment part 2 and the neck part 3 which cannot be separated from each other. The one-piece dental implant can be implanted as a whole at one time. Also, the dental implant can be two-piece dental implant, each part of which is generally connected by screws or other fixed mechanism when the dental implant is a two-piece dental implant. Whether it is one-piece dental implant or two-piece dental implant, the designs of making the platform surface on the top end of the body part rough surface are both beneficial to the adhesion of osteoblasts extending from side surface of the body part to the platform surface on the top end of the body part, which can reduce the micro-gap between the body part and the neck part of the dental implant. Meanwhile, the side surface of the neck part is also designed as rough surface, which can guide the adhesion of soft tissue and further reduce or even eliminate the micro-gap between the body part and the neck part of the dental implant, therefore reach a result of enhancing the stability of dental implant implantation and improving surgical success.

Embodiment III

As shown in the FIG.3, according to the dental implant disclosed in the present invention, the body part 1 is a tapered structure gradually shrinking toward the bottom end, which can reduce the drilling resistance and is easy to implant the body part 1 into the alveolar bone. The side surface of the body part 1 contains the first screw thread part 6, the second screw thread part 7 and the third screw thread part 8, which are connected

from top to bottom in sequence, wherein, the screw thread shape of the first screw thread part 6 is the micro threaded serrated shape with the screw thread tip in the same level, and the pitch is 0.5mm-1.0mm; the screw thread shape of the second screw thread part 7 is trapezoid screw thread or rectangular screw thread, and the pitch is 1.0mm-2.0mm; the screw thread shape of the third screw thread part 8 is the serrated screw thread with the screw thread tip downwards, and the pitch is 1.0mm-2.0mm; and the length ratio of the first screw thread part 6, the second screw thread part 7 and the third screw thread part 8 is 1:2:3.

Preferably, the side surface of the body part 1 contains three screw thread parts that can be designed for a single threaded or can be designed for double threaded. The dental implants with the double threaded design can move forward double pitches when the body part 1 rotates 360 degrees, which can implant faster than the single threaded dental implants, therefore, it can speed up the dental implant implantation, shorten the operation time, reduce the heat emitted during the operation, and avoid bone necrosis and resorption of the surrounding bone because of excessive heat caused by threading the implant into the bone.

More specifically, in the process of dental implant implantation, first, the cancellous bone at the bottom of the groove is cut by the jagged screw thread of the third screw thread part 8 with its tip downwards, the self-tapping screw thread of which allows the dental implant to be quickly implanted into the alveolar bone; secondly, the rectangular screw thread of the second screw thread part 7 in the middle section of the body part 1 is conducive to compress the cancellous bone spun up from the third screw thread part 8; finally, the dental implant is further stabilized in the alveolar bone by the micro screw thread first screw thread part 6. The combination of three screw thread parts makes it easier and faster to implant one-piece dental implant, and achieves better initial stability. Thus, it can shorten the duration of dental implant surgery and relieve pain for the patient. The screw thread design on the side surface of the body part 1 of the present invention 1 is not limited to the above, which should also include other screw thread designs that can achieve the same function.

Further, as shown in the FIG.3, a side-cut groove 9 is also available on the side

surface of the body part 1, and the side-cut groove 9 is arranged on the third screw thread part8 in the entire axial length, and can be evenly distributed with multiple side-cut grooves, such as two, three or four. The shape of the side-cut grooves can be a straight groove parallel to the middle axis of the body part1, or an oblique groove with a certain angle to the middle axis of the body part 1, or a curved groove such as a helical shape surround the third screw thread part8. The side cutting groove9combined with the third screw thread part8 is used to cut the cancellous bone at the bottom of the alveolar, then, the side-cut grooves9 is capable of forming a surface for bone debris accumulation, which can guide the cancellous bone cut by the third screw thread part 8 smoothly upward from the bottom of the body part 1, so that dental implant implantation process is faster and achieve more stable implantation, while avoiding bone debris scattered and periodontal inflammation caused.

Preferably, as shown in the FIG.3, the apex 10 on the body part 1 of the dental implant disclosed by the present invention is rounded, and screw threads are not designed on the surface of the apex 10. On the one hand, during the dental implant implantation, the rounded design makes the apex of the body part 1 not too sharp to avoid the damage of the soft tissue in the bone, as well as alveolar bone damage caused by destructive force or impact force due to the stress concentration around the implant when the implant in the alveolar bone bears the bite force of food chewing; on the other hand, the rounded design makes the apex of the body part 1 not flat, which otherwise will result in greater penetration resistance when the dental implant is implanted into alveolar bone and is not conducive to dental implant implantation.

According to the dental implant disclosed in the invention, the side surface of the neck part 3 is rough surface, further, the side surface of the neck part 3 is designed to be convex rough cambered surface or concave rough cambered surface, which can be formed as the cambered surface with a certain roughness by laser treatment, and its roughness is smaller than that of the above platform surface 4. The design is conducive to the adhesion and growth of soft tissue and can further reduce or even eliminate the micro-gap between the body part 1 and the neck part 3 of the dental implant and eliminate effectively the bone resorption caused by the intersection interface, and enhance the stability of dental implant implantation.

In this embodiment, the radial dimension of the top end of the abutment part 2 is less than the radial dimension on of the bottom end of the abutment part 2, so that the abutment part 2 is showed as a cone structure with narrow top end and wide bottom end. The angle range between the central axis and the side generatrix of the cone structure is 2 degrees to 4 degrees. Thus, the shape of the abutment part 2 is similar with the shape of the prepared natural tooth, so that it easy for doctors to directly take impression mould to make the dental prosthesis.

More specifically, the abutment part 2 is a multi-sided cylindrical structure, such as tetrahedron, pentahedron or hexahedron. The multi-sided cylindrical outer structure makes the abutment part 2 act as an external insertion design. The outer structure design can be engaged by a universal implant torque wrench or machine sleeve wrench, which is easy for doctors in operation to grip the abutment part 2 by using tetrahedron, pentahedron or hexahedron wrenches compared with the traditional cylindrical abutment part.

Further, an insert hole 11 for inserting screwdriver is also designed on the abutment part 2, and the middle axis of the abutment part 2 is perpendicular to the top surface of the body part1. As shown in the FIG.4, the middle axis of the insert hole 11 is coincident or is parallel with the middle axes of the body part 1, the abutment part 2 and the neck part 3 when the dental implant has a straight abutment part. As shown in the FIG.5, the middle axis of the insert hole 11 is coincident or is parallel with the middle axes of the body part 1 and the neck part 3 when the dental implant has an angled abutment part, therefore, the middle axis of the insert hole 11and the middle axis of the abutment part 2 forms a certain angle. More specifically, the insert hole 11 is designed as a hollow polygon structure, such as a quadrilateral, pentagonal, or hexagonal. As shown in FIG.6, the insert hole 11 is designed as a hollow hexagonal structure, which makes it easy for doctors to use tools to operate on the implant site in a narrow oral space. For example, the universal implant torque wrench or machine sleeve wrench cannot be used for the outer structure design since the missing space of the tooth is very narrow due to the limitations of the teeth on both sides during the dental implant implantation. In this case, an auxiliary screwdriver can be inserted into the insert hole 11 to operate by the torque principle of the torque wrench tool, and the dental implants can also be easily implanted in narrow spaces, thus avoid damage to healthy teeth around them.

In the dental implant disclosed in the present invention, the whole dental implant can be one-piece dental implant integrated by the body part 1, the abutment part 2 and the

neck part 3 which cannot be separated from each other. The one-piece dental implant can be implanted as a whole at one time. Also, the dental implant can be two-piece dental implant, each part of which is generally connected by screws or other fixed mechanism when the dental implant is two-piece dental implant. Whether it is one-piece dental implant or two-piece dental implant, the designs of making the platform surface on the top end of the body part rough surface of them are both beneficial to the adhesion of osteoblasts extending from side surface of the body part to the platform surface on the top end of the body part, which can reduce the micro-gap between the body part and the neck part of the dental implant. Meanwhile, the side surface of the neck part 3 is also designed as rough surface, which can guide the adhesion of soft tissue and further reduce or even eliminate the micro-gap between the body part and the neck part of the dental implant, therefore reach a result of enhancing the stability of dental implant implantation and improving surgical success.

In summary, the one-piece dental implant provided by the present invention can guide alveolar bone to extend and grow to the platform surface on the top end of the body part, thereby reducing the micro-gap and micro-movement of the dental implant, enhancing the stability of the dental implant after implantation, improving the success rate of operation, shortening the operation time and relieving the pain of the patient, which has a high value of marketing. The above embodiment only illustrates the principle of the present invention and its efficacy, rather than being used to limit the invention. Any person familiar with this technology may modify or change the above embodiments without violating the spirit and scope of the present invention. As a result, all equivalent modifications or changes completed by a person with the usual knowledge in the technical field without separating the spirit and technical thought revealed by the present invention should still be covered by the claims.

CLAIMS

1. A dental implant, comprising: a body part to be implanted inside an alveolar bone, an abutment part for fitting a dental prosthesis and a neck part connecting said body part and said abutment part; wherein a side surface and a bottom surface of said body part are rough surfaces, and said neck part is a cone structure gradually shrinking toward a bottom end of said neck part; a radial dimension of the bottom end of said neck part is less than a radial dimension of a top end of said body part, so that a horizontally oriented platform surface is formed on an area on the top end of said body part which is not covered by the bottom end of said neck part, and wherein said platform surface and a side surface of the neck part are rough surfaces, the side surface of the neck part having a roughness lower than a roughness of the platform surface.
2. The dental implant of claim 1, wherein the roughness of said platform surface is 1 micron to 20 micron.
3. The dental implant of claim 1 or 2, wherein the roughness of the side surface of said neck part is 0.1 micron to 2 micron.
4. The dental implant of any one of claims 1 to 3, wherein said abutment part is of a cone structure, a radial dimension of a top end of said neck part being 3mm, 3.8mm, 4.8mm or 5.8mm, and a radial dimension of a bottom end of said abutment part is less than the radial dimension of the top end of said neck part; the difference of the radial dimensions between them is 1.5mm or 2mm; the radial dimension of the top end of said body part is 3mm, 3.8mm,

4.8mm or 5.8mm, and the radial dimension of the bottom end of said neck part is less than the radial dimension of the top end of said body part; the difference of the radial dimensions between them is 0.5mm or 1mm; a radial dimension of a bottom end of said body part is 2.5mm, 3.1mm, 3.9mm or 4.8mm; an axial length of said abutment part is 4mm, 5mm or 6mm; an axial length of said neck part is 1mm, 2mm or 3mm; an axial length of said body part is 8mm, 10mm or 12mm.

5. The dental implant of any one of claims 1 to 3, wherein a radial dimension of a top end of said abutment part is less than a radial dimension of a bottom end of said abutment part, so that said abutment part is showed as a cone structure with narrow top end and wide bottom end, an angle range between a central axis and a side generatrix of the cone structure is 2 degrees to 4 degrees.

6. The dental implant of claim 5, wherein middle axes of said body part and said neck part are coincident with each other.

7. The dental implant of claim 6, wherein an angle formed between the middle axis of said abutment part and the middle axis of said neck part is 15 degrees, 20 degrees or 25 degrees.

8. The dental implant of claim 1, wherein said body part is a tapered structure gradually shrinking toward a bottom end, the side surface of said body part contains a first screw thread part, a second screw thread part and a third screw thread part which are connected from top to bottom in sequence; a screw

thread shape of the first screw thread part is a micro screw serrated shape with a screw thread tip in a same level, and a pitch is 0.5mm-1.0mm; a screw thread shape of the second screw thread part is a rectangular screw thread, and a pitch is 1.0mm-2.0mm; a screw thread shape of the third screw thread part is a serrated screw thread with a screw thread tip downwards, and a pitch is 1.0mm-2.0mm; and a length ratio of the first screw thread part 6, the second screw thread part 7 and the third screw thread part 8 is 1:2:3.

9. The dental implant of claim 8, wherein the first screw thread part, the second screw thread part and the third screw thread part are double threaded.

10. The dental implant of claim 8, wherein a side-cut groove is arranged on the side surface of said body part, and the side-cut groove is arranged on the third screw thread part in an entire axial length.

11. The dental implant of claim 10, wherein the side-cut groove is one or multiple side-cut grooves evenly distributed, and the side-cut groove is a straight groove or a curved groove.

12. The dental implant of any one of the preceding claims, wherein said abutment part is tetrahedron, pentahedron or hexahedron.

13. The dental implant of any one of claims 1-12, wherein an insert hole for inserting a screwdriver is arranged on said abutment part, and a middle axis of said abutment part is perpendicular to a top surface of said body part.

14. The dental implant of claim 13, wherein said insert hole is quadrilateral, pentagonal, or hexagonal.