

The invention relates to an endo-osseous single-tooth implant comprising a means for preventing twisting of a firmly-fixed dental prosthesis having securing devices having a head and a metal implant post connectable to a base member indirectly via a screw connection and comprising a metal spacer sleeve formed with a centring collar and intended for screwing into the open end of the base member and having a shoulder for pressing against the top edge of the base member, the implant post being screwable into the spacer sleeve, the sleeve comprising a bottom part having an outer insertion thread screwable into the base member and a top part comprising the shoulder for pressing against the distal edge of the base member, the top part being connectable in non-rotatable manner to the base member. An implant of this kind is known from EP-A-0 400 224.

Endo-osseous implants, described e.g. in EP-OS 0 216 031, have given consistently good results in practice. When they are used as individual-tooth implants, however, there is a difficulty in that the dental prosthesis cannot be reliably prevented from twisting relative to the base member, unless the individual parts of the implant and the dental prosthesis are stuck together, which will cause difficulties e.g. if the dental prosthesis or implant post has to be subsequently replaced, e.g. after failure through fracture.

To prevent twisting, according to the main patent, the top part of the spacer sleeve of the individual-tooth implant according to the preamble is in the form of a ring nut and has an inside counter-thread having a much

smaller pitch than the insertion thread of the spacer-sleeve bottom part, for screwing on to an outside thread provided on the bottom part near its distal end. Accordingly the base member, the spacer-sleeve top part and the spacer-sleeve bottom part can be clamped and locked together, thus preventing twisting, both of the top part and of the bottom part which receives the implant post. One disadvantage in many applications, however, is that the top part and the bottom part, when locked together, have to be secured by special tools to prevent relative rotation. These special tools are often difficult to operate, particularly by relatively inexperienced operators.

The aim of the invention therefore is to improve the twist-proof single-tooth implant according to EP-A-0 400 234 so as to obtain reliable prevention of twisting, using simpler means.

To this end, according to the invention, the distal end of the base member is formed with an annular recess for receiving the proximal centring collar of the spacer-sleeve top part, the recess containing at least one base-member locking element; the centring collar comprises at least one spacer-sleeve locking element complementary with the base-member locking element or elements; the distal region of the inner bore of the spacer-sleeve top part has a longitudinal portion wider than in the proximal region, in which its diameter is substantially equal to that of the inner bore of the base member, an abutment shoulder being formed in the transition between the two regions of different width; the distal region of the bottom part of the spacer

sleeve has a head portion, the outside diameter of which is equal to the inside diameter of the top part, which has a larger inside diameter in the distal region, the head part having an annular shoulder complementary with the abutment shoulder of the top part and merging into a proximal region whose outside diameter is substantially equal to the diameter of the inner bore of the base member and is formed with the insertion thread.

Optionally, the distal end of the bottom part, after being screwed into the base member, projects less far distally than the distal edge of the top part.

According to another feature of the invention, the base-member locking element or elements comprise at least one base-member locking pocket in the abutment shoulder of the annular recess and the spacer-sleeve locking element or elements correspondingly have at least one complementary spacer-sleeve locking tongue.

Another embodiment of the invention is characterised in that the base member and the spacer-sleeve top part are each formed with four locking elements spaced at uniform peripheral intervals.

According to another feature of the invention, the inside thread of the bottom part extends only over a distal part of the total length thereof.

According to another feature, the distal edge of the top part has assembly locking elements for twist-proof fitting of the dental prosthesis.

Optionally, the assembly locking elements have surface recesses and/or raised portions in the end edge and/or in the surface of the spacer-sleeve top part.

As proposed also in the invention, the region of the outer surface of the top part formed with locking elements tapers conically in the distal direction.

Alternatively, according to the invention, the distal end of the top part is in the form of a polygonal head for securing the dental prosthesis fitting.

The invention is based on the surprising discovery that reliable prevention of twisting can be obtained, without using special screwing and locking tools as required for the individual-tooth implant according to the parent patent, if a positive connection securing in the direction of rotation exclusively is provided between the top part and the bottom part of the spacer sleeve, and in turn is secured in the axial direction by the spacer-sleeve bottom part, which is in the form of a screw. Admittedly the bottom part and the implant post screwable therein are not prevented from twisting relative to the base member unless additionally stuck or cemented, but the spacer-sleeve top part is reliably prevented from twisting, e.g. by positively locking to the base member, so that a twist-proof dental prosthesis can be fitted thereto. More particularly the endo-osseous single-tooth implant according to the invention is suitable for twist-proof superstructures according to the simultaneously-filed patent application P 40 28 856.0. Of course, the single-tooth implants according to the invention can also be used as

normal implants, e.g. for securing bridges or the like, if prevention of twisting is specially important.

Other features and advantages of the invention will be clear from the following description, in which an embodiment is described in detail with reference to diagrammatic drawings in which:

Fig. 1 is an exploded view in axial longitudinal section of an embodiment of the endo-osseous single-tooth implant according to the invention;

Fig. 2 shows the single-tooth implant in Fig. 2, when fitted together;

Fig. 3 shows the bottom part of the spacer sleeve of the single-tooth implant in Figs. 1 and 2, in axial longitudinal section;

Fig. 4 is a plan view of the spacer-sleeve bottom part in Fig. 3;

Fig. 5 is a plan view of the base member of the single-tooth implant in Fig. 1 and Fig. 2;

Fig. 6 is a plan view of the top part of the spacer sleeve of the single-tooth implant in Fig. 1 and Fig. 2;

Fig. 7 is a view in axial longitudinal section of the top part of the spacer sleeve of the single-tooth implant in Fig. 1 and Fig. 2, and

Fig. 8 is a view from below of the top part of the spacer sleeve in Fig. 7.

As Figs. 1 and 2 show, in the embodiment shown therein the single-tooth implant has an base member 10 of known kind, made e.g. of hydroxylapatite as described in DE-OS 38 39 724, and also comprises a spacer-sleeve bottom part 12 and a spacer-sleeve top part 14.

The base member 10 has an inside thread 16 and, near its distal edge (uppermost in the drawing) has an annular recess 18 which at its proximal end is adjacent an abutment shoulder 20. The shoulder 20 is formed with four recessed locking pockets 22 disposed at uniform peripheral intervals.

The proximal end of the top part 14 has a centring collar 24, the outside diameter of which is equal to the diameter of the annular recess 18 in the base member 10. The collar 24 has four locking tongues 26 spaced at uniform peripheral intervals and matching the locking pockets 22 in the base member 10. The distal part of the inside bore of the top part 14 has a larger diameter than the proximal part, and an abutment shoulder 28 is formed in the transition between the two parts or sections.

The outer periphery of the bottom part has an insertion thread 30 corresponding to the inside thread 16 of the base member 10. In its distal region, the bottom part 12 has an inside thread 32, into which an implant post can be screwed as described e.g. in the main patent (where however it is cemented in) or in

DE-OS 38 39 724. The distal end of the bottom part 12 is formed with a larger-diameter head portion 34 which adjoins an annular shoulder 36 which points in the proximal direction and is complementary with the abutment shoulder 28 on the top part 14.

As shown in Figs. 3 and 4, a web 38 for engaging a screwdriver is formed on the distal end of the bottom part 12.

Fig. 5 shows the uniform peripheral arrangement of the locking pockets 22 in the annular recess 18 on the base member 10.

As shown in Fig. 10, the distal end of the centring collar 24 of the top part 14 is adjacent a shoulder 40 adapted to abut the distal peripheral edge of the base member 10, as described hereinafter. As shown in Fig. 6, the distal end of the top part has a conical outer surface 42 which can be formed with raised portions or recesses which can serve as locking members for a tooth fitting to be attached in twist-proof manner to the bottom part of the spacer sleeve. The same purpose can be served by locking elements 44 in the form of recesses in the upper region of the top part and pointing in the distal direction. Fig. 8 shows the uniform distribution of the aforementioned locking tongues 26 around the periphery of the centring collar 24 on the top part 14.

The aforementioned single-tooth implant is fitted together as follows. The top part 14 is placed in the base member 10, which is already secured in the body

tissue or the jawbone, and the tongues 26 co-operate with the pockets 22 to form a twist-proof plug-in connection. Next, the bottom part 12 is screwed into the base member 10, the shoulder 40 of the top part being pressed against the distal peripheral edge of the base member 10 and the annular shoulder 36 on the bottom part being pressed against the shoulder 28 on the top part, so that the base member 10, the top part 14 and the bottom part 12 are firmly connected in the axial direction. The overall result is that the head portion 34 of the top part 14 is secured relative to the base member 10, both in the axial direction and in the direction of rotation. The known implant post for the dental prosthesis fitting is then screwed into the inner thread 32 of the bottom part 12. Since the post itself is not prevented from twisting relative to the base member 10, because of course the bottom part 12 is simply screwed into the base member 10, the tooth-replacement fitting is secured against twisting, starting from the head portion 36 of the top part 14, which comprises suitable locking elements for attaching and securing the fitting in twist-proof manner.

List of reference numbers

- 10 Base member
- 12 Spacer-sleeve bottom part
- 14 Spacer-sleeve top part
- 16 Inside thread
- 18 Annular recess
- 20 Abutment shoulder
- 22 Locking pockets
- 24 Centring collar
- 26 Locking tongues
- 28 Abutment shoulder
- 30 Insertion thread
- 32 Inside thread
- 34 Head portion
- 36 Annular shoulder
- 38 Attachment web
- 40 Shoulder
- 42 Surface
- 44 Locking element