

ANKYLOS[®]

SynCone[®] Concept



*Immediate loading –
faster than ever*

ANKYLOS[®] SynCone[®]

The Concept

Nowadays, high-grade, patient-specific prosthetics are hardly possible without the use of implants. While functional and esthetic restoration is the primary benefit of implant-supported prosthetics, another important advantage for both patients and dentists is the reduced time required, especially the chairside time.

Background

Ledermann already proved in 1979 that a restoration can be fitted to implants postoperatively – in this case, four implants were placed in an edentulous mandible and splinted with a bar. The rapid functional and esthetic rehabilitation of the patient, the fact that no further operations are required, and the reduction in patient stress are the main advantages of such an approach. However, the original concept involving a bar-borne restoration is not perfect. Considerable amounts of material and lengthy laboratory procedures are required and the 12 – 24 hour delay is unpleasant for the patient. The stress for the patient can only really be reduced significantly by placing the immediate restoration while the anaesthetic is still effective. In this case the denture can also serve as a pressure dressing, thus reducing the swelling of the wound. Due to the effort required in the dental lab this is hardly possible in bar-type overdentures.

Current Systems

Current immediate loading systems cannot be used without laboratory-fabricated mesiostructures. Thus, considerable time passes and the anaesthesia will have worn off before the restoration can be fitted, which is usually painful for the patient. In addition, they require very invasive, complex surgical procedures and/or a special implant and instruments. This represents a further cost factor since there is no allowance for flexibility during the operation in the event that immediate loading is contraindicated.

Requirements

Continued development of this attractive approach to treatment must meet the following requirements:

- Optimum consideration of the requirements of an immediate treatment concept for geriatric patients
- Curtailed total treatment time
- Simplification of technical procedures through prefabricated components for the chairside procedures
- Inclusion in an implant system with multiple indications
- Freedom to choose alternative conventional treatment

The ANKYLOS® SynCone® Concept

is this revolutionary advancement. It combines the capability of ANKYLOS® implants to withstand immediate loading, proven with animal experiments and clinically, with an innovative telescopic crown technique.

It has long been reported that full dentures can be retained with telescopic crowns (1/2/3). The most important advantages of the telescopic crown technique are the excellent three-dimensional immobilization of the restoration, defined release force, flexibility of design and optimum access for oral hygiene.

However, the high costs and labour-intensive laboratory procedures required for telescopic crowns often hindered application of this superior concept. The ANKYLOS® Implant System is a significant move toward the symbiosis of technical precision and economic prosthetics.

Prerequisites

It is not only essential that the endosseous section of the implant can be loaded immediately, but also that it supports the restoration dependably. The conical connector joins the abutment to the implant extremely firmly and has proven highly reliable even for highly loaded non-splinted, single posterior implants. The conical connector is the basis for the success of the SynCone® concept (4). With the geometry of the cone and its high rotation stability it is possible to align angulated abutments in a 360° circle, thus balancing possible axial divergences. Unless intermediate structures are fitted, the torkelcone principle, essential for angled abutments, can only be attained with the smooth-sided joint/ retention geometry of a conical connector. The superstructure splints the implants as required for immediate loading. There is much more to the ANKYLOS® conical connector than is apparent at first glance: The SynCone® concept.

The procedure described here is based on 4 implants placed interforaminally. As no reliable clinical data are available on the use of higher/lower numbers of implants or SynCone® abutments in the maxilla, it is not advisable to deviate from the following procedure.

**Many things work –
but some only work using ANKYLOS®**



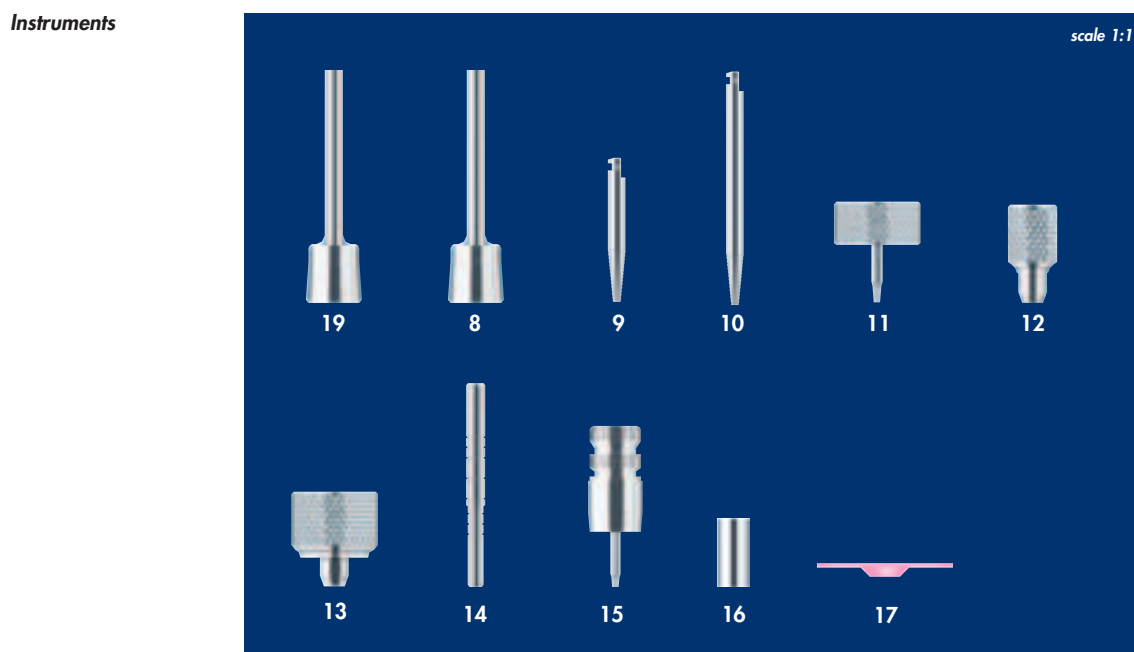
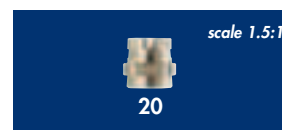
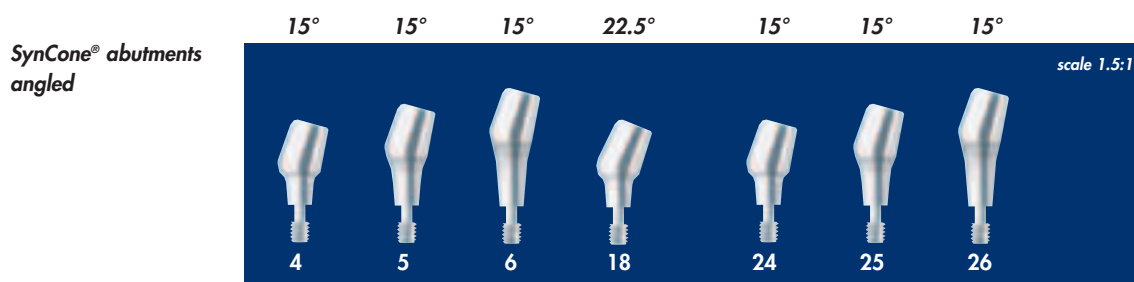
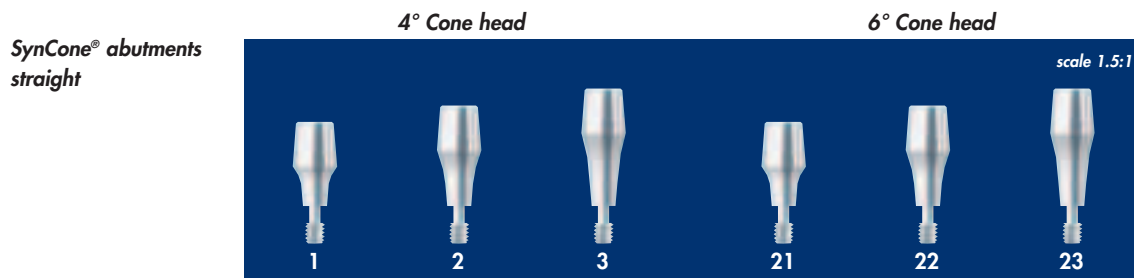
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2. Heckmann S, Farmand M, Wahl G: Erste Erfahrungen mit Resilienzteleskopen bei der prothetischen Versorgung enossaler Implantate. *Zahnärztl Implantol* 1993; 9: 188-193
3. Rinke S, Schütz JF, Hanselmann C: Die Versorgung des zahnlosen Unterkiefers mit einer implantatgestützten Resilienzteleskop-Prothese – eine Falldarstellung. *Dent Implantol* 1999; 3: 314-321
4. Romanos, G E, Nentwig G H: Single Molar Replacement with a Progressive Thread Design Implant System: A Retrospective Clinical Report. *Int J Oral Maxillofac Implants* 2000; 15 (6): 831-836

All clinical photos courtesy of
Dr. Dittmar May, Lünen/D

ANKYLOS[®] SynCone[®]

List of Products



Product guide ANKYLOS® SynCone®

Product-No.	Description	Material	Illu.
<u>SynCone® abutments 4°</u>			
3102 1712	SynCone® abutment 1.5, straight, 4°	Ti6Al4V	1
3102 1722	SynCone® abutment 3.0, straight, 4°	Ti6Al4V	2
3102 1732	SynCone® abutment 4.5, straight, 4°	Ti6Al4V	3
3102 1772	SynCone® abutment 1.5, 15°/4°	Ti6Al4V	4
3102 1782	SynCone® abutment 3.0, 15°/4°	Ti6Al4V	5
3102 1792	SynCone® abutment 4.5, 15°/4°	Ti6Al4V	6
3102 1912	SynCone® abutment 1.5, 22.5°/4°	Ti6Al4V	18
<u>SynCone® abutments 6°</u>			
3102 1710	SynCone® abutment 1.5, straight, 6°	Ti6Al4V	21
3102 1720	SynCone® abutment 3.0, straight, 6°	Ti6Al4V	22
3102 1730	SynCone® abutment 4.5, straight, 6°	Ti6Al4V	23
3102 1770	SynCone® abutment 1.5, 15°/6°	Ti6Al4V	24
3102 1780	SynCone® abutment 3.0, 15°/6°	Ti6Al4V	25
3102 1790	SynCone® abutment 4.5, 15°/6°	Ti6Al4V	26
<u>SynCone® Cap 4°</u>			
3102 1752	SynCone® Cap 4°, with retention	Degulor® 3406	7
<u>SynCone® Cap 6°</u>			
3102 1750	SynCone® Cap 6°, with retention	Degulor® 3406	20
<u>Instruments</u>			
3103 3620	Parallel gauge for SynCone® 4°	Ti6Al4V	8
3103 3618	Parallel gauge for SynCone® 6°	Ti6Al4V	19
3103 3434	Unscrew instrument for cover screws, short	Surgical steel	9
3103 3435	Unscrew instrument for cover screws, long	Surgical steel	10
3103 3400	Hexagon screwdriver, 1.0	Surgical steel	11
3103 3410	Handle for screwdriver, standard, Ø 7 mm	Surgical steel	12
3103 3415	Handle for screwdriver, standard, Ø 12 mm	Surgical steel	13
3103 3026	Parallel gauge for twist drill	Surgical steel	14
3103 3625	Insert for prosthetic ratchet screwdriver 1.0 mm Hex, 15 Ncm	Surgical steel	15
3104 5490	Drilling sleeve for SynCone®	Ti6Al4V	16
3102 1405	Polymerisation sleeve for SynCone®	Dental Silicone	17

	<i>Au</i>	<i>Ag</i>	<i>Cu</i>	<i>Pt</i>	<i>Pd</i>	<i>Zn</i>	<i>Ir</i>
Degulor® 3406	65.0	13.0	11.5	8.9	1.0	0.5	0.1

ANKYLOS® SynCone®

Clinical Application – Immediate Loading

Basic requirements

During the preoperative diagnostic examination, it is important to ensure that only patients in a generally good state of health plan to undergo this procedure. Anatomical requirements of the mandible for placing implants: at least 11 mm, preferably 14 mm.

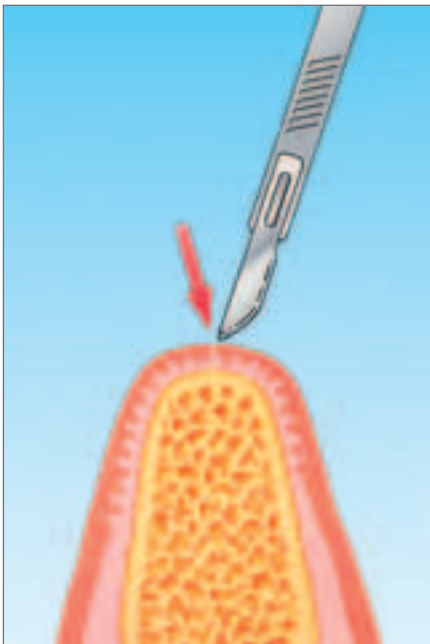
If the SynCone® concept is to be employed successfully, the denture must fit and occlude optimally and the SynCone® abutments must be parallel. Overextended functional peripheries may prevent the restoration fitting the tegument properly.

Preliminary steps

A surgical drilling template is fabricated using the study model impression or by duplicating the existing denture. The titanium guide tube must be positioned parallel in the template to ensure that the twist drill is guided exactly when drilling the pilot site.

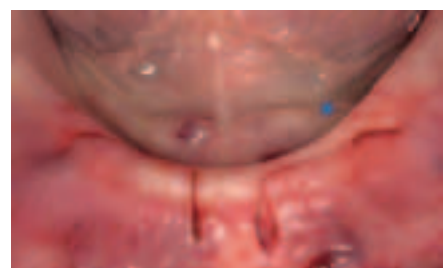
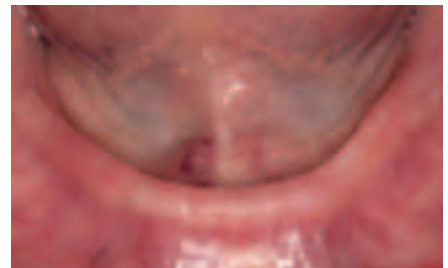
Surgical procedure

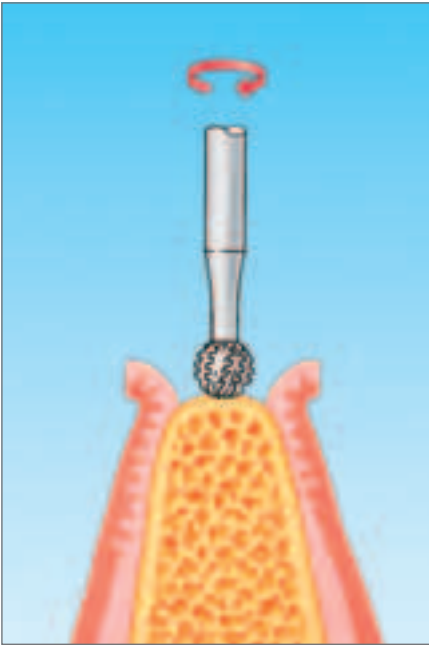
The type of treatment described here and involving edentulous mandibles with immediately loaded ANKYLOS® implants requires four implants to be placed interforaminally and fitted with 4° tapering SynCone® abutments.



Type of incision and anaesthesia

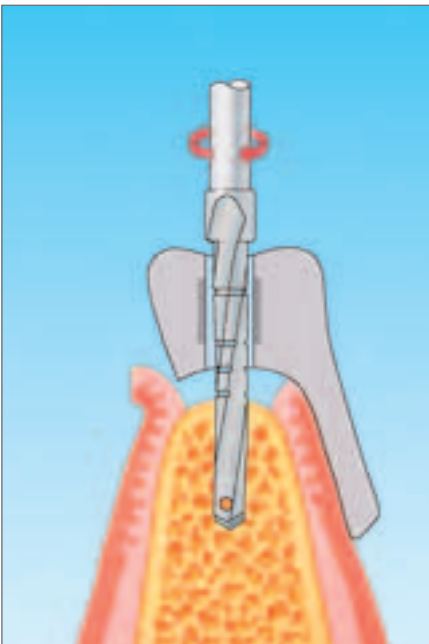
After administering peripheral infiltration anaesthetic, a crestal incision is carried out to ensure adaptation of the flaps after the operation. The remaining median tissue bridge also reduces the risk of dehiscence.





Smoothing the bone

Expose the interforaminal alveolar ridge of the mandible and level it if necessary. In order to minimize the risk of an injury of the nerve, the n. mentalis can be exposed. If required, the bone level is smoothed with an internally irrigated round drill.



Creating a purchase point and pilot site

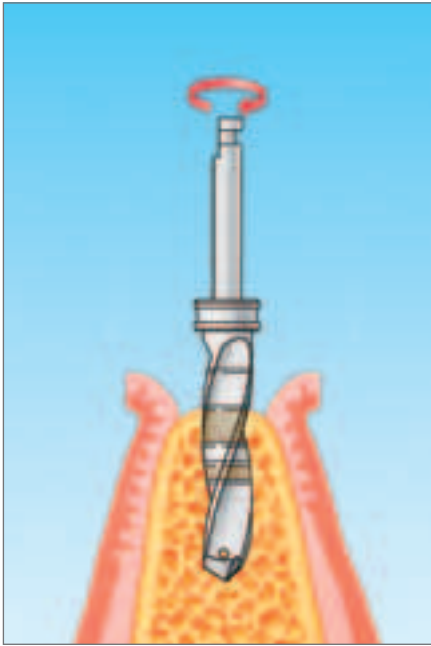
Place the drilling template in position and use a twist drill (option: Lindemann drill) to mark the implant position on the bone. The pilot site prepared with the twist drill establishes the axial alignment of the implant. This procedure requires the implants being aligned with their axes as parallel as possible. A drilling template with titanium guide tube may help guide the drill.

Simultaneous augmentation is not recommended when using SynCone® abutments.



ANKYLOS® SynCone®

Clinical Application – Immediate Loading

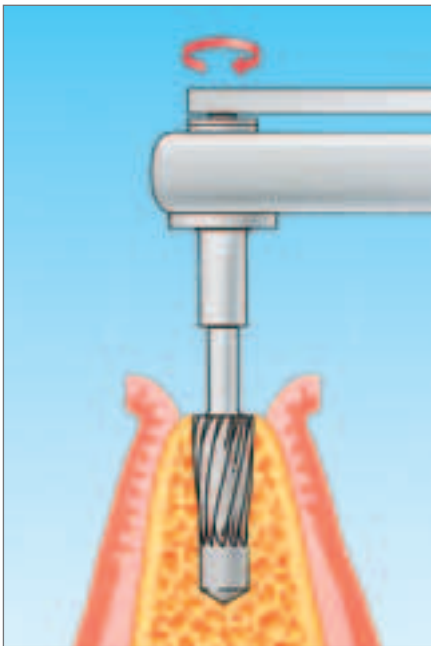
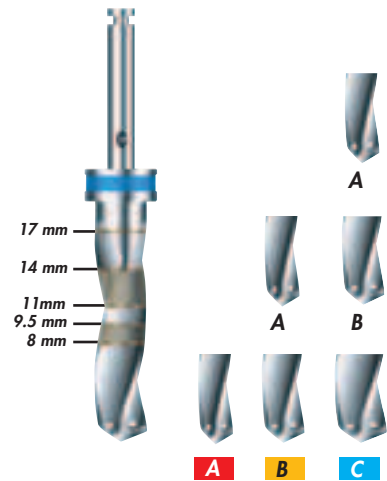
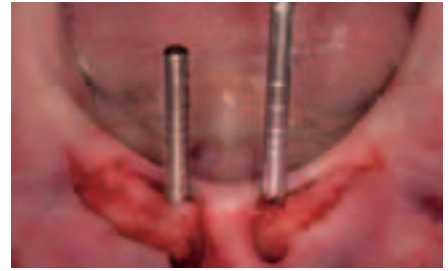


Widening the site

The sites are widened with the color-coded internally and externally irrigated drills. The drills are inserted to the correct depth to ensure that the implant can be placed slightly subcrestally. Paralleling pins are inserted in each pilot site to ensure that the parallel drill is aligned correctly.

Actual drilling depth = Implant length +

0.4 mm
0.5 mm
0.6 mm



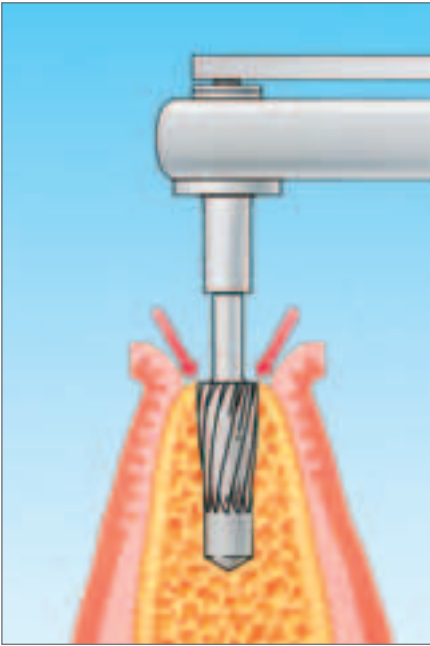
Reaming the site

The implant site is reamed conically to match the implant design. A separate conical reamer is available for every implant type. Assemble the correct reamer length and ratchet insert for instruments and insert them into the ratchet. Insert the tapered reamer into the site and start preparation without exerting pressure. Slight pressure should be applied in the last quarter only. The non-cutting tip will not increase the depth of the site. Rotate the reamer one revolution to the left before removing it.



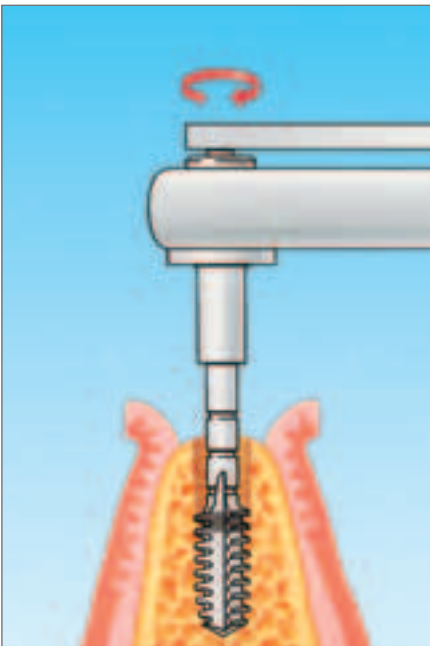
Optional: Bone condensation

In regions of reduced bone density, the conical reamer can be rotated counterclockwise to improve the bone of the implant site. This process compacts the bone structure in the wall of the cavity (= improved primary stability).



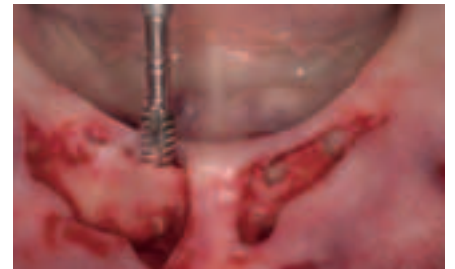
Measuring

The reamer is also used as a try-in implant. Depending on the planned implant position and after widening the implant site, the top edge of the reamer must be slightly below bone level (see optional subcrestal implant position). If this is not the case, the implant site must be deepened with the last used Tri-Spade drill. Remove the reamer and rinse the cavity with physiological saline solution.



Tapping the thread

Select the thread tap that matches the implant diameter and attach it to the ratchet insert for instruments at the appropriate length then, insert it into the ratchet. The depth is monitored with the depth markers and preparation is stopped when the specified depth has been reached. Otherwise, the thread will be stripped and the primary stability is adversely affected. After completing thread preparation, the thread tap is rotated counterclockwise out of the implant site and the cavity is rinsed with physiological saline solution again.

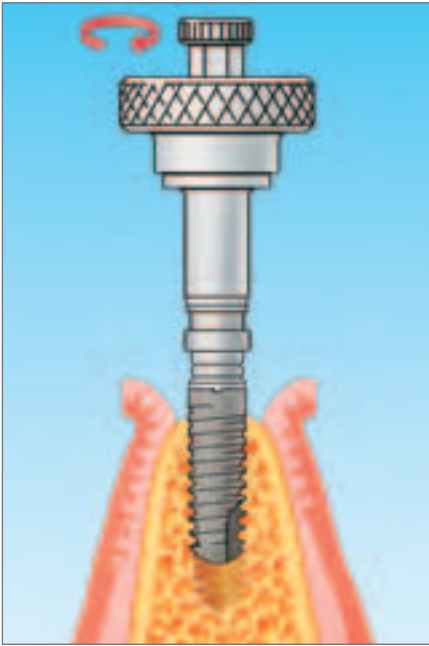


Optional: Reduced bone density

In cases with strongly reduced bone density, it is not necessary to tap the thread in advance. In this indication, the progressive thread design of ANKYLOS® implants can function as self-tapping during implant placement.

ANKYLOS® SynCone®

Clinical Application – Immediate Loading

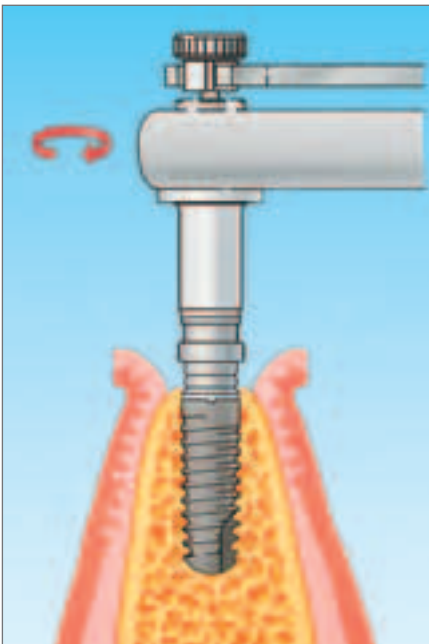


Seating the implant into the site

Implant selection: At least 11 mm, preferably 14 mm.
 Insert the implant until approximately 2/3 of its overall length are in the bone.
 Make sure not to trap any fibrous or epithelial tissue in the implant site. Should the implant become difficult to turn before the polished section reaches the bone, unwind the implant and rinse or tap the site again.

Caution:

For improved bone-formation the whole ANKYLOS® plus implant is now grit-blasted and acid-etched. This supports bone-formation on top of the ANKYLOS® plus implant. If subcrestal placement is desired at sufficient bone availability, the insertion tool is now equipped for better identification with two grooved marks at 1 and 2 mm distance. Please note that the insertion tool is silver coloured to maintain the appearance contrast between the ANKYLOS® plus implant and the tool itself. The implant ends where the colour changes from the dark ANKYLOS® plus implant to the silver colour of the insertion tool.

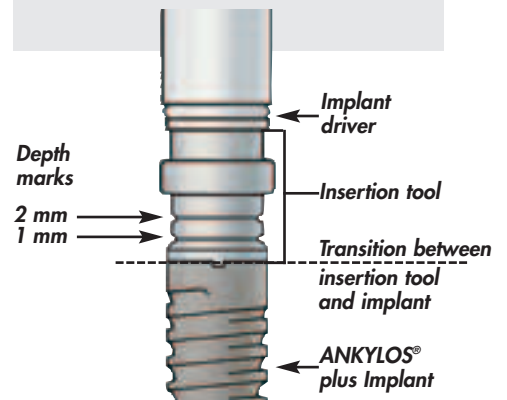


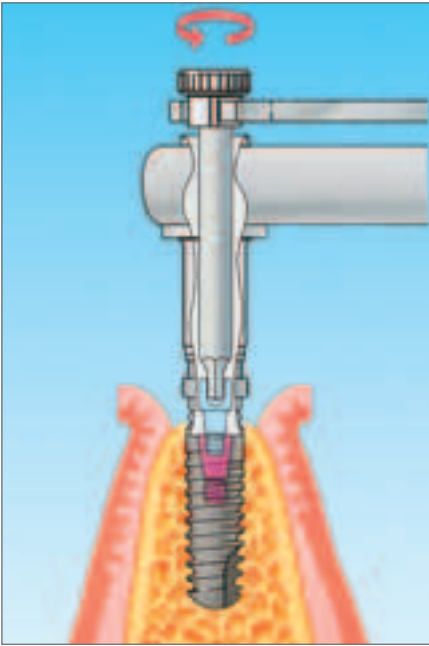
Final positioning

Instead of the finger wheel, fit the reversible ratchet to the ratchet insert for implants. Guide the ratchet insert with the stud on the open-end wrench. Once the implant reaches its final position, increased force must be exerted to move the ratchet.

Caution:

In high density bone (increased resistance) rotate the implant especially slowly due to the risk of overheating.





Dismantling

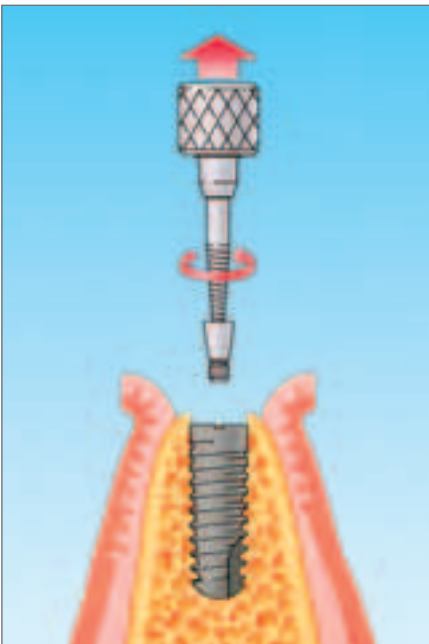
Once the endosseous section of the implant has reached its final position, check that it fits firmly. Use the screwdriver in the placement device to unscrew the retaining screw from the adapter.

First use the open-end wrench to loosen the screw and then turn the knurled end by hand until the placement device has been unscrewed from the implant completely (illustration on the right). Then remove the placement device, adapter and ratchet from the mouth (1). Press the knurled screw on the screwdriver to release the adapter from the placement device and pull



Dismantling adapter

it off (2). Should the adapter screw catch on the hexagon of the screwdriver, pull it off too (3). The placement device is then ready for picking up another implant.

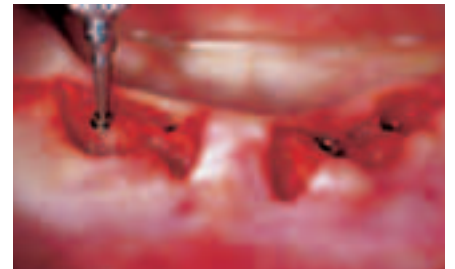


Removing the cover screws

Once the implants have been placed, remove the cover screws.

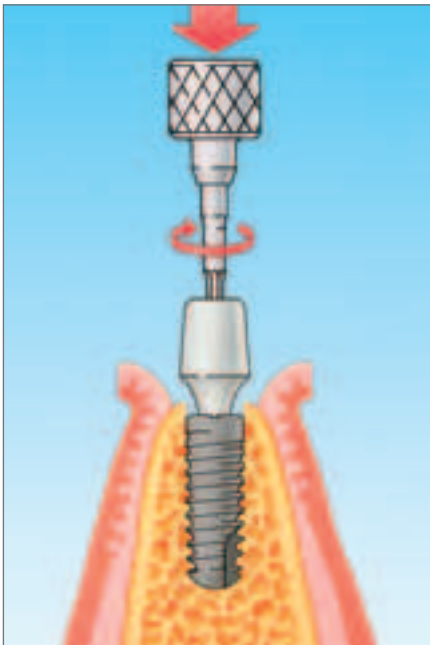
Important!

If the implants become loose when the cover screws are removed, initial stability was inadequate and the implants must not be loaded immediately. The ANKYLOS® system must then be used with the subgingival technique.



ANKYLOS® SynCone®

Prosthetic Procedure – Immediate Loading



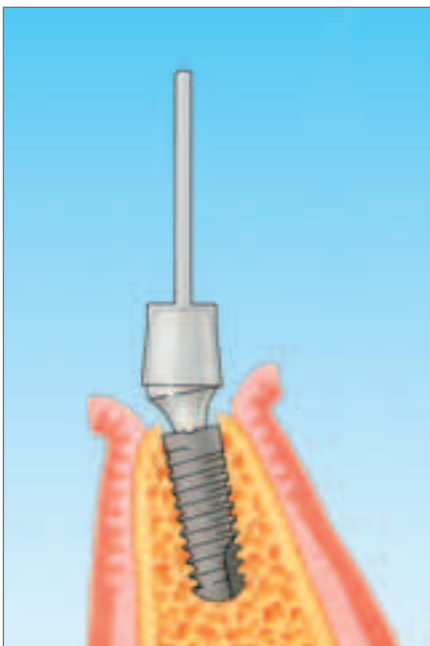
Inserting SynCone® abutments

The blue trial abutments of the Standard Abutment System can be used for selecting the sulcus height and angulation in advance. Sterilize* the pre-fabricated SynCone® abutments (4° taper) – they are available with sulcus heights of 1.5 mm, 3.0 mm and 4.5 mm to accommodate the various thicknesses of the mucosa. Then wind in the SynCone® abutment using the torque wrench (3103 3625) with a hex socket or a torque-controlled contra-angle. The recommended torque for the straining screw is 15 Ncm. Before inserting the abutment, make sure that the inner cone of the implant is carefully rinsed and dried. If the



SynCone® concept is to be employed successfully, the SynCone® abutments must be parallel.

* Please refer to the „Care of instruments“ manual

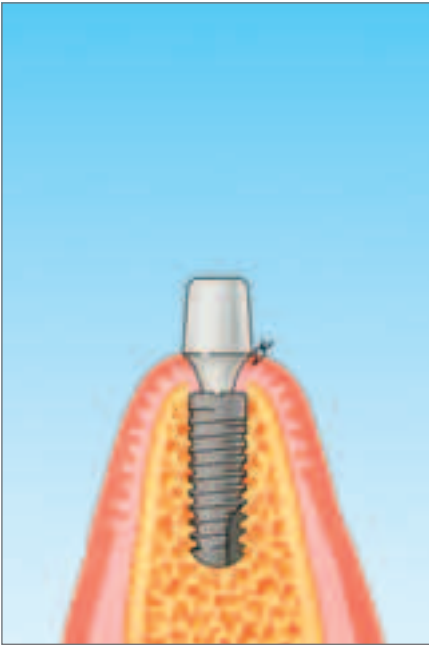


Option: Non-parallel implants

In case of a non-parallel implant placement, the insertion path of the abutments can be adapted by using the angled SynCone® abutment. During a try-in on the abutments the path of insertion can be checked with the SynCone® parallel gorge. However, it is essential that the abutments are not placed parallel to each other (minimum cone angle 1° for all surfaces). This may lead to problems in retention as the parallel walls of different abutments can neutralize the cone retention. In a non-parallel implant insertion, the



insertion path of the abutments can be synchronized with the angled SynCone® abutments.

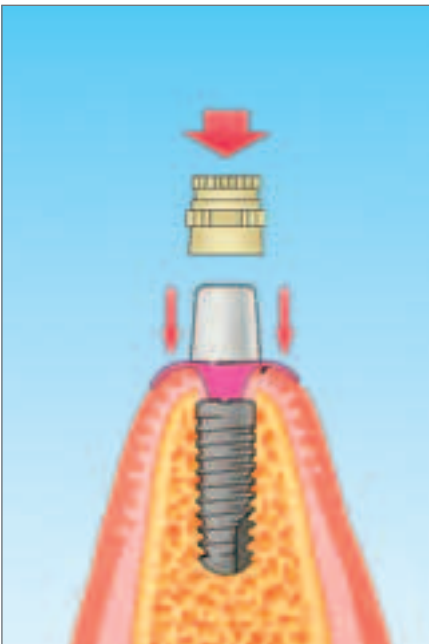


Closing the wound

The edges of the wound should be sutured carefully to keep out the saliva. The convergent sulcus section of the abutment allows the mucosa to form a tight seal around the implant – the edges of the wound adapt closely to the transmucosal zone of the abutment which is protected against irritation. A firmly retained connective tissue margin forms after a short time.



The denture must be fitted immediately after placing the implants and abutments. The caps must not be fixed into the denture using the usual laboratory techniques, i.e. an impression and model.



Placing the SynCone® cap

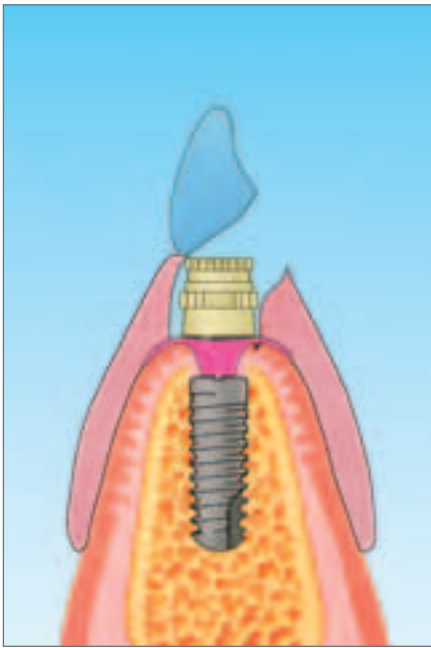
The flexible SynCone® polymerization sleeves are slipped over the SynCone® abutments, engaging the widest diameter of the abutment. This prevents the cold-curing resin from running into the sulcus region of the SynCone® abutment and protects the wound region. The same can be achieved using a rubber dam with an arched incision. The prefabricated SynCone® cap is made of a high-noble alloy. It should be sterilized according to the manufacturer's guidelines and then tightly placed on the SynCone® abutment. The raised retainer grips the cap in the acrylic denture.



Caution:
Ensure that no cords are trapped when placing the SynCone® abutment in position.

ANKYLOS® SynCone®

Prosthetic Procedure – Immediate Loading

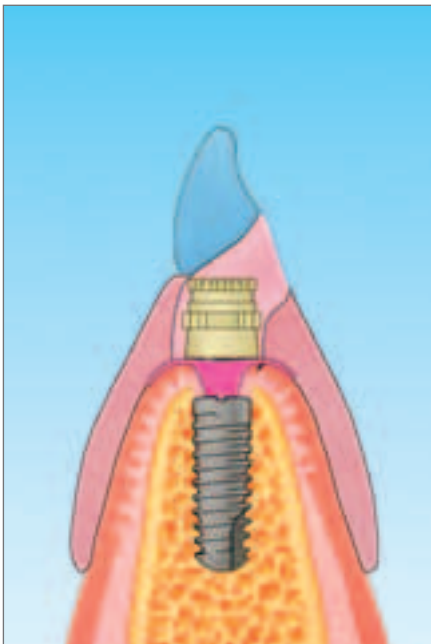


Preparing the denture

The existing denture has to fit accurately to the mandibular soft tissue, meeting all functional and esthetic requirements. Trim out openings in the denture as wide as necessary to prevent it interfering with the caps. The drilling template can be used as a guide. After suturing, an alginate impression of the implants can be taken to allow the denture to be relieved to fit the model, once it is cast. This procedure is especially recommended for dentures with metal bases. To prevent excessive polymerisation shrinkage, ensure that as little acrylic as possible is trimmed out.

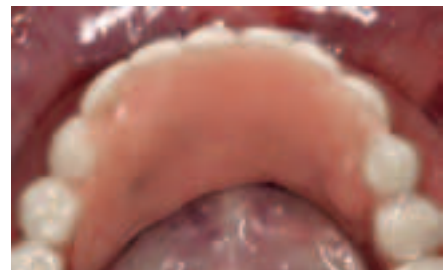


Before fixing the denture in place, check that the caps fit firmly.



Polymerization phase

To ensure that the SynCone® caps are retained in the denture base long-term and firmly, they must be totally enveloped with viscous, cold-curing acrylic (e.g. Dentsply DeTrey Selectaplus) which is free of bubbles. To prevent the caps from being displaced in the denture and to avoid subsequent changes in the occlusion, it is essential that the denture is not dislodged transversely and/or vertically while the acrylic is polymerising. The clinical procedure involves asking the patient to close the mouth carefully (in acquired centric relation) and keep the teeth firmly in contact (centric jaw relation) but only exerting minimal pressure while the acrylic polymerises. Simply stabilizing the denture with your fingers may lead to changes in the occlusion. Exerting excessive pressure while



closing may press the denture into the resilient soft tissue, which would prevent the denture from being replaced in exactly the same position. This may lead to a loss of friction between the SynCone® abutments and caps and thus to a loosening of the denture.



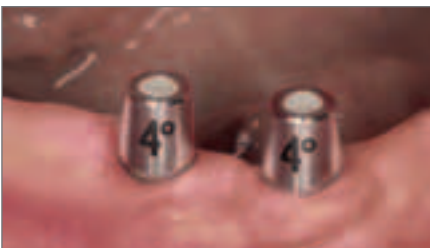
Finishing and delivery of the denture

Prior to removing the denture it is essential that the auto-curing resin is thoroughly cured. It has to be checked whether occlusion and articulation are free of interferences. For finishing and polishing, the denture is removed from the mouth after a complete curing of the resin. At the lower rim, 1 mm of the SynCone® caps has to be free from acrylic material, extending functional margins are shortened to the maximum. The delivered denture must possess the necessary cone retention without any functional interferences. A loosening of the denture due to movements of the patient's tongue, floor of the mouth, and cheek muscles must be avoided in order to guarantee the secondary splintage of the implants during the healing phase. The parallel alignment of the interforaminally inserted



implants resp. the SynCone® abutments is a precondition for the success of the SynCone® concept. A self-induced mobility of the denture must be avoided in both, the functional and the static phase. Finally, the patient must be able to insert and remove the denture himself without any difficulties.

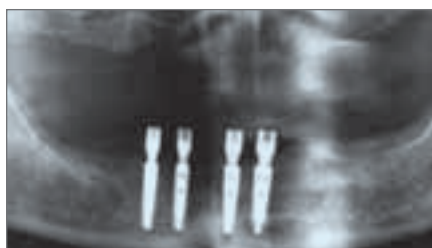
Eight weeks postoperative clinical findings



Radiological findings



June 07, 1999



Feb. 06, 2001

ANKYLOS® SynCone®

Postoperative Treatment – Immediate Loading



Advice to patients

- Wear the fixed denture continually for one week.
- Eat soft foods only for 14 days.
- Antibiotic prophylaxis is usually administered for one week. The patient should also use germ reducing mouthwash after meals. Both measures provide anti-infection prophylaxis as the implant sites are deprived of manual oral hygiene during this period.

After the implant healing

One week following removal of the sutures, the denture is removed from the mouth for the first time and then worn again for two consecutive three-day periods. At the end of these two weeks, the patient is instructed fully on how to maintain oral hygiene, including the denture, and how to handle the lower denture properly. After this time, there are no further restrictions on eating.

The usual regular recall examinations are required to determine changes due to atrophy, especially the congruency between the denture base and tegument, at an early stage. In this case reseal the denture margins.

After 3 to 6 month the denture is renewed using a cast-metal reinforcement bar. The SynCone® Caps are luted into the reinforcement bar intraorally.

ANKYLOS[®] SynCone[®]

Option: Using SynCone[®] abutments as prefabricated attachments on osseointegrated implants

Just as loading them immediately as described above, SynCone[®] abutments can also be fitted to conventionally submerged or transmucosal osseointegrated implants. The same prosthetic procedures are employed as for the Balance abutment system (refer to the Balance Abutment System Manual).

Surgical procedures:

- Transfer the implant position

Technical procedures:

- Cast the model in the dental laboratory
- Select and align the abutments on the master model
- Fabricate the denture and prepare it for the SynCone[®] caps
- Provide the abutments with locking surfaces and fabricate the positioning template

Surgical procedures:

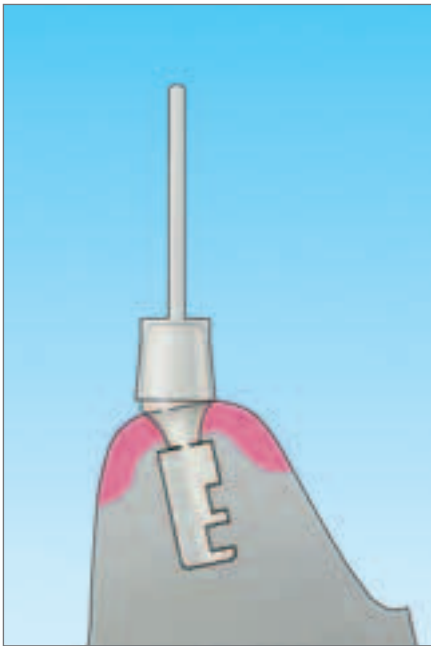
- Place the SynCone[®] abutments using the positioning template
- Fit the curing sleeve and SynCone[®] cap
- Adhere or polymerize the SynCone[®] cap into the prepared denture

SynCone[®] can be used as a prefabricated attachment instead of other retainers such as bars. SynCone[®] must not be used in conjunction with other retainers. 4 implants with 4° tapering SynCone[®] abutments must be used in the mandible whereas 6 implants with 6° tapering SynCone[®] abutments are required in the maxilla.

The following pages show the modifications to the treatment procedure required for using laboratory-fabricated SynCone[®] abutments on osseointegrated implants.

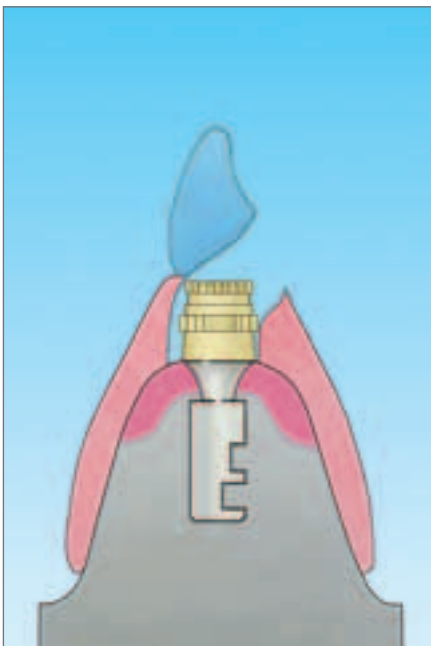
ANKYLOS® SynCone®

Prosthetic Procedure – Late Loading



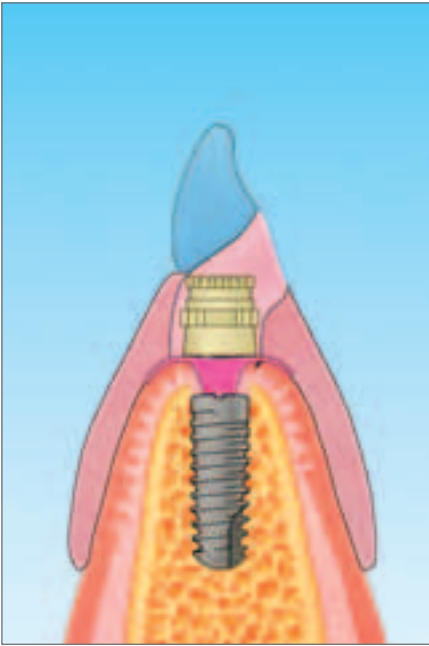
Selecting, aligning and locking the abutments in position on the master model

Once the implant position has been transferred and the model cast (refer to the Balance Abutment System Manual), the abutment is selected on the master model taking into account the level of the gingiva, the angulation and the taper of the cone. All abutments include a small retainer (a bevel or notch) to prevent them from rotating in the positioning template. A SynCone® paralleling gauge is then used in a parallelometer to ensure that all abutments have the same path of insertion. Following this, the positioning template is fabricated.



Preparing the denture on the master model

The SynCone® caps can either be integrated directly into the denture (caps with retainers) or into a reinforcing metal framework (caps without retainers). The denture must be trimmed as much as necessary to prevent it interfering with the caps, but as little as possible to rule out excessive polymerisation shrinkage.



Fixing the caps in place

To rule out inaccuracies during the transfer procedure, the SynCone® caps must be fixed in the denture in the patient's mouth. To do so, place the caps on the abutments and check that they fit firmly.

Adhere/polymerize the caps into place as described on pages 13–15:

- Fitting the SynCone® cap
- Polymerisation
- Finishing and fitting the denture

FRIADENT Class I medical products 

Class I medical products compliant with Directive 93/42/EEC are

- non-active, handheld surgical and prosthetic instruments for implant placement and grafting
- components for impression technique that do not remain in the patient's mouth
- non-active components for the planning phase

FRIADENT Class IIa, IIb, III medical products  0123

Class IIa, IIb and III medical products compliant with Directive 93/42/EEC are

- dental implants, membranes, membrane tacks and bone grafting materials
- active surgical instruments for implant placement and grafting
- components for impression technique and prosthetic restoration that remain in the patient's mouth

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