



eBook

How to get started with Guided Surgery

Guiding You To Accuracy

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It is estimated
that nearly half
of the peri-
implantitis cases
could be traced
back to implant
malpositioning

(Canullo et al., 2016)

The Challenge of Implant Surgery

After years of research and clinical use, even in high-risk patients, we know that implants have good survival and clinical success rates¹.

Today, the focus of implant surgery has shifted from osseointegration to correct and accurate positioning of implants.

The main reasons for this change are due to the fact that correct positioning is considered a prerequisite for an optimal aesthetic outcome² and implant malpositioning increases the risk of complications³

¹ De Angelis et al., 2017; Derks et al., 2015; van Velzen, Ofec, Schulten, & Bruggenkate, 2015

² (Tahmaseb, Wismeijer, Coucke, & Derksen, 2014)

³ Canullo et al., 2016

Why Go Guided

The ability to accurately drill the osteotomy and place the implant in the correct position is an important factor for the long-term success of the procedure.

The addition of faster turn-around times, shorter chair time and an increase in the aesthetic and clinical options are all reasons for you to jump into digital implant planning and guided surgery.

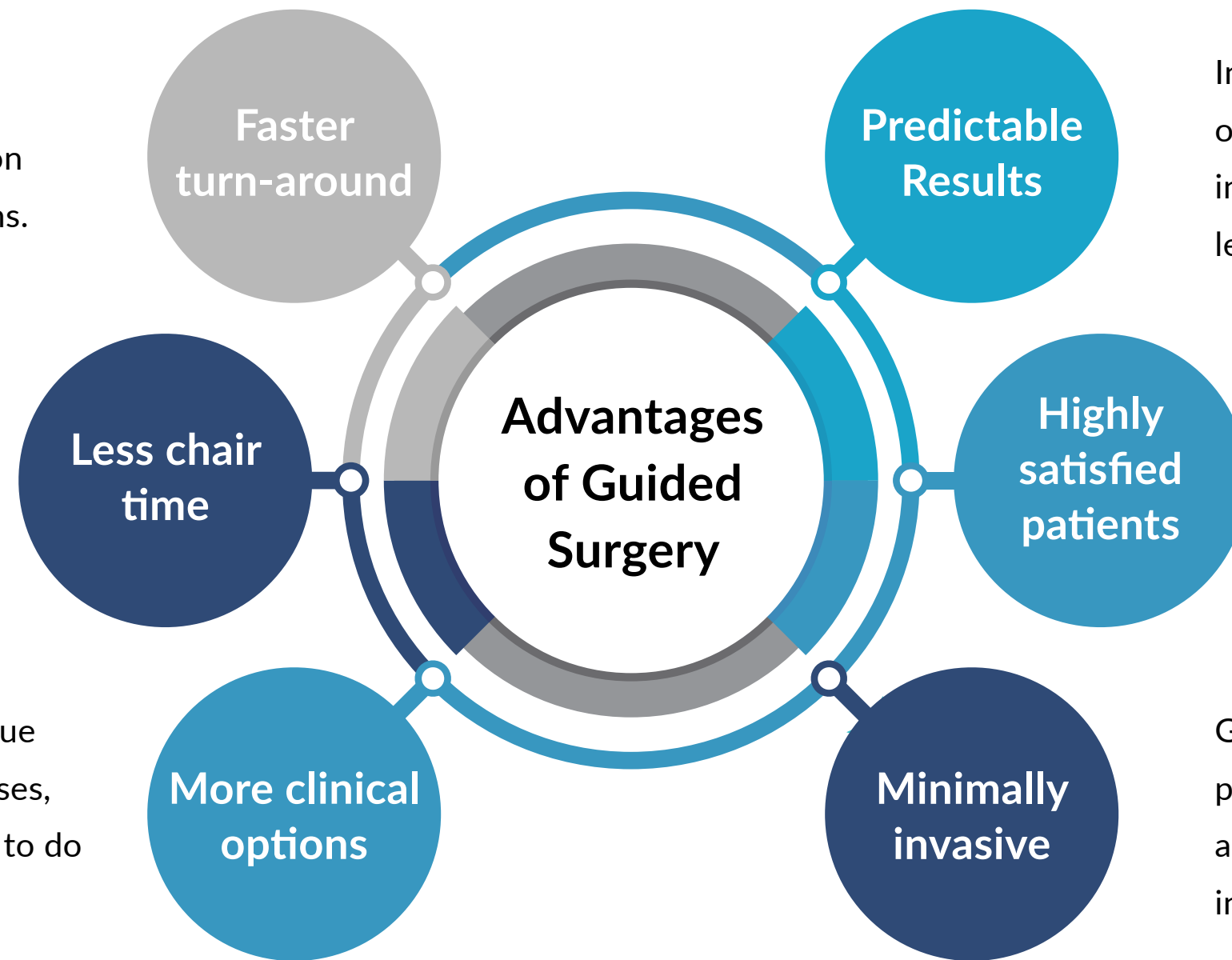
New technologies and equipment are just part of the formula for predictable results.

As new planning software continues to be developed, in order to gain the vast benefits and the accuracy that is required for predictable results, it is essential to understand the fundamentals of guided surgery, to learn the different systems and services available and to correctly implement the new technology.

Due to the accuracy of guided surgery, the technician can prepare the restoration before the surgical procedure even begins.

Since the surgical planning is done when the patient is not in the office, the time you spend with the patient or in the dental surgery is reduced by at least 10%-30%

If before you were referring your cases due to reluctance to do more complicated cases, guided surgery gives you the confidence to do many of the surgeries yourself.



Incorrect positioning can affect the aesthetic outcome of the implant procedure and increases the risk of complications that can lead to peri-implantitis.

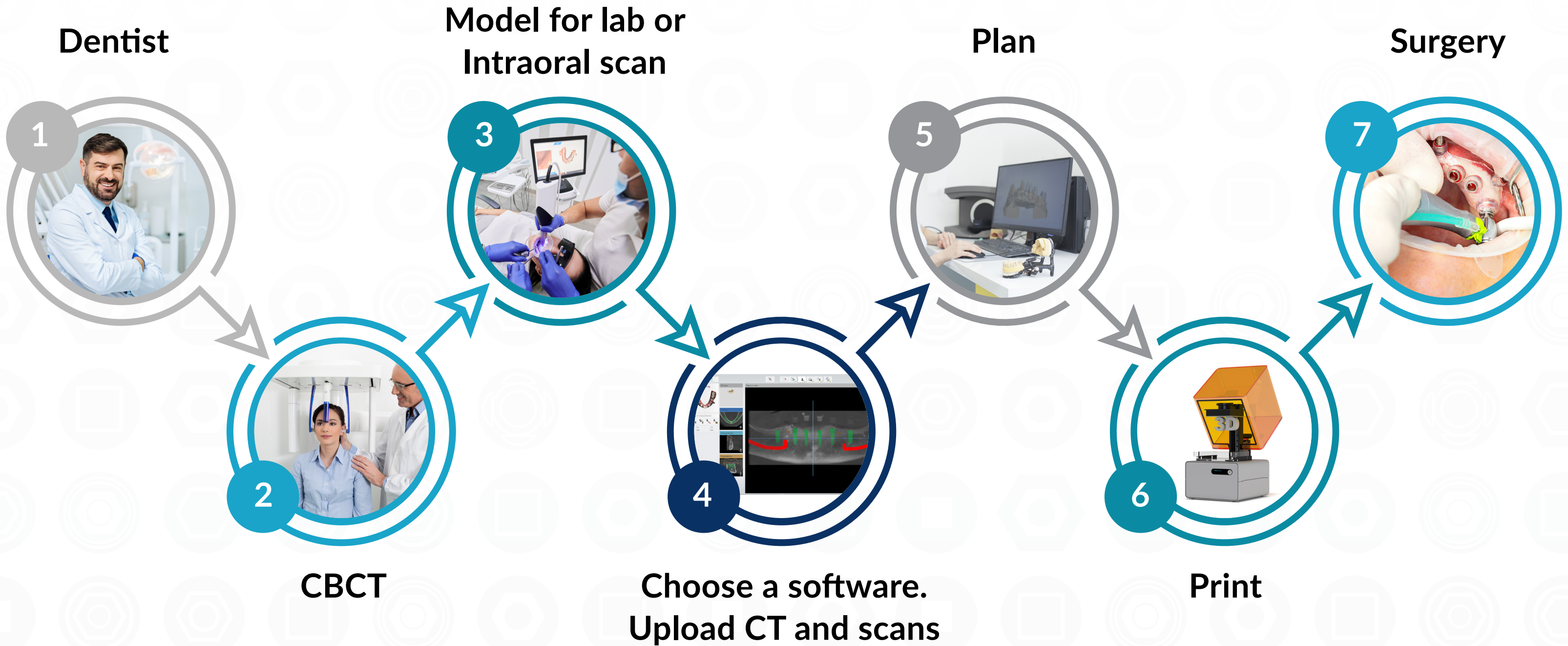
With guided surgery, there is less pain, faster healing and shorter waiting time to receiving the final aesthetic restoration.

Guided surgery enables accurate implant placement without the need for performing a flap. This means less pain, less chance of infection and faster healing for the patient.*

Guided Surgery has many advantages, but the main objective is to provide our patients with a predictable long term, aesthetic and functional solution.

* https://www.researchgate.net/publication/328931343_Minimally_invasive_transgingival_implant_therapy_A_literature_review
<https://onlinelibrary.wiley.com/doi/full/10.1111/clr.13578>

Guided Surgery - Complete Process Workflow



Deciding which Guided Surgery model to implement in your practice

When it comes to placing implants with guided surgery, you have several options

By being your own planner, you have full control of the planning process. The main advantages are that you can plan the case at your own convenience and since you know the case the best, you are able to plan the final implant position based on the treatment plan and the prosthetic outcome. Yet, in this case, you need to upload the CBCT and scans into the software, mark the anatomic features, choose the implant size, place it in position in the software and design and sometimes even print the surgical guide. Though this can seem simple, for a beginner to guided surgery, this can be quite time consuming. In addition, though the software has safety features that warn you if you placed the implant too close to a blood vessel or nerve, it does not advise the position, angle, or depth for placing the implant.



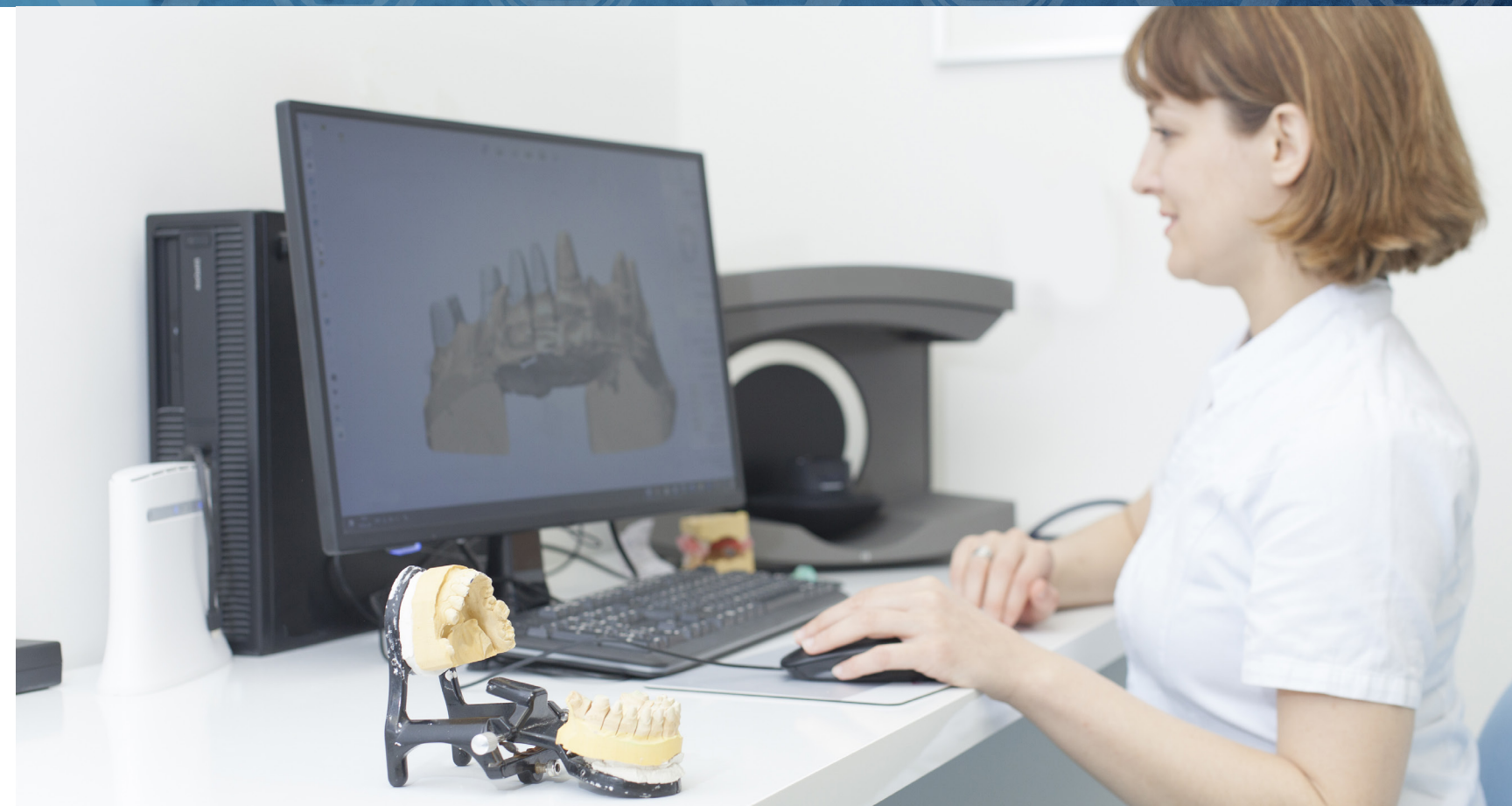
Be your own planner

Deciding which Guided Surgery model to implement in your practice

When it comes to placing implants with guided surgery, you have several options

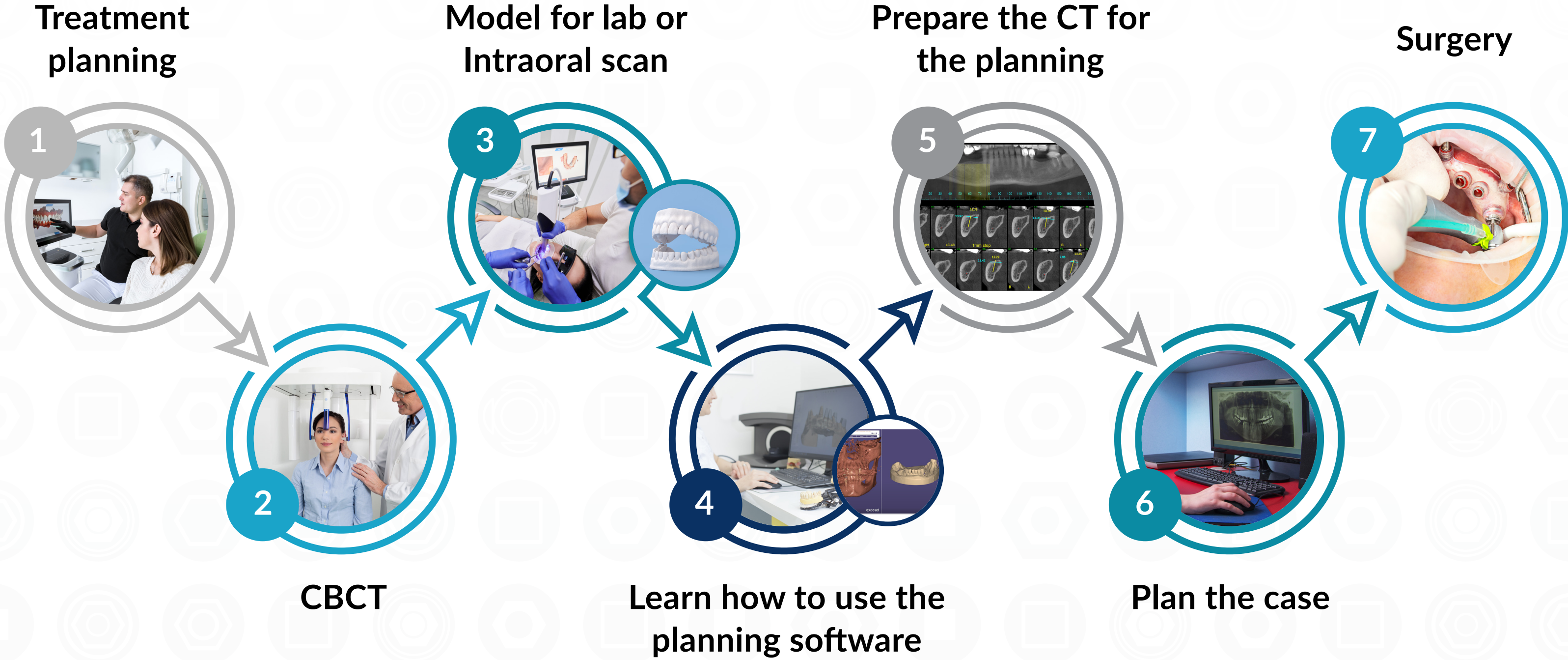
With this option, all you need to do is send the basic information of what implant type you want to use, impression (oral scan or traditional), CBCT, an order form detailing the teeth you want to replace and type of planned restoration, and then a third party with professional experience in guided surgery, will return the suggested plan within a few hours or 1-2 days. At this point, all you need to do is review the case and approve. Usually within a few days, you will receive the surgical guide based on the plan. Some services will even send you the implants and/or tools that are relevant for the case.

A disadvantage with this choice, is that you do not have full control of the planning and information can be lost in the exchange causing the plan to not be in sync with the prosthetic plan.



Have a mentor consultant or guided surgery center plan the case

Be Your Own Planner



Be Your Own Planner



If you are the planner:

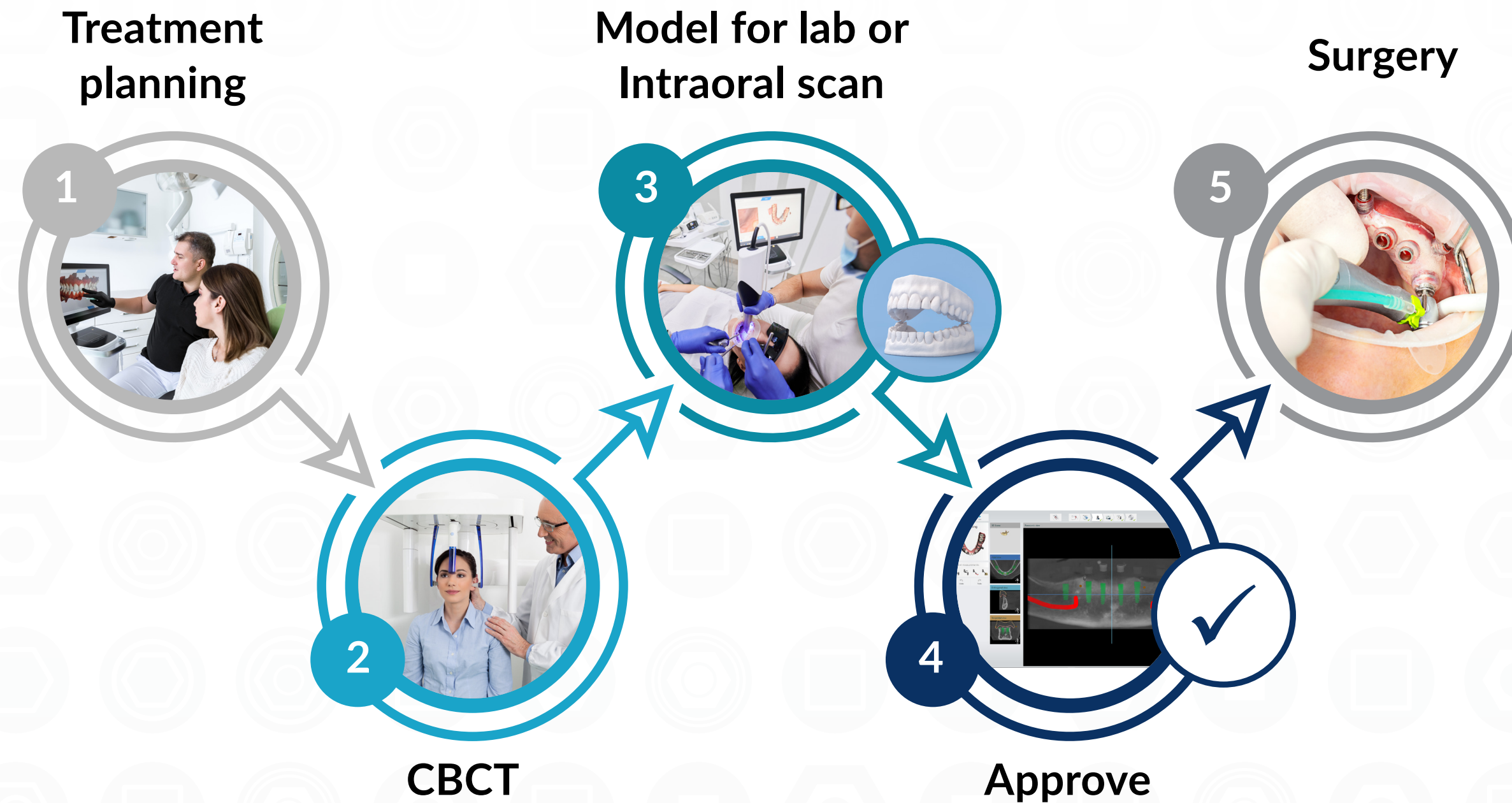
Pros

- You have full control of the process
- Lower initial cost and time saving
- The plan is exactly tailored to your knowledge of the case

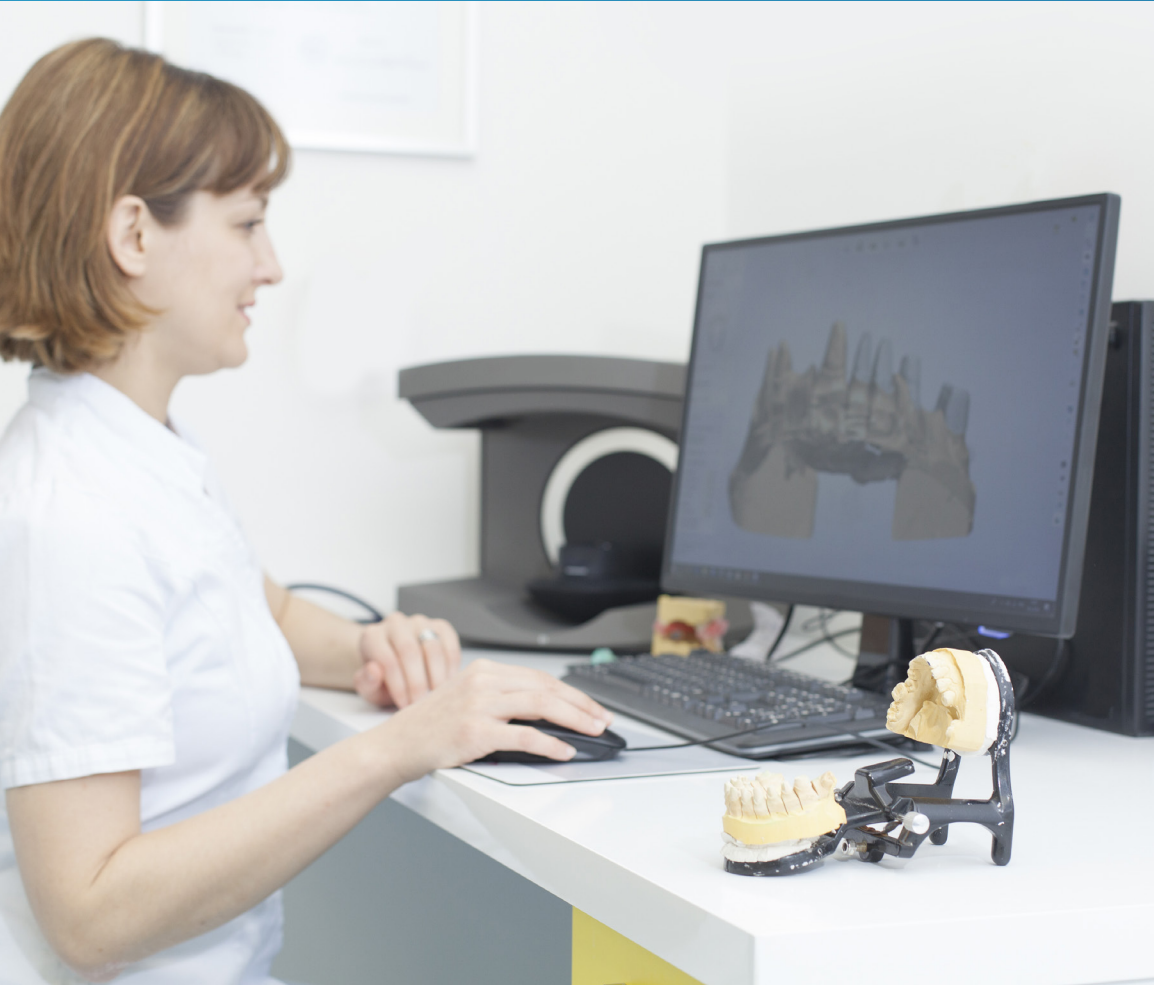
Cons

- You need to spend time scouting the market to decide which software is best for you as far as ease of use and cost
- You need to invest time to learn the software and many times the software has a license fee
- Lack of planning knowledge and the long learning curve can offset the cost and time savings
- Lack of experience can produce a surgical guide that does not fit properly, requiring time consuming adjustments or remakes

GS Service Center/Mentor



GS Service Center/Mentor



If you have the case planned by a Guided Surgery Center or a Mentor:

Pros

- You will have more free time for other activities/ patients/ coffee breaks
- Lower initial cost and time saving. There is usually no need to invest in a software package
- You will have the confidence that an experienced guided surgery professional is planning the case.

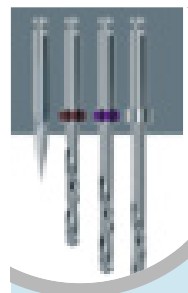
Cons

- Extra cost for the planning fee
- Turnaround time may be longer
- You and the planner may not always be in sync with what is needed for the case. This can offset the savings in time and may not be worth the extra cost of having a third party plan the case for you

What type of guided surgical kit should you use?

No matter whether you are planning the surgery by yourself or if you decide to have a third party plan the case, in the end, you are the one performing the surgery. Once the implant positioning has been decided upon, the design of the surgical guide and the type of surgical sleeves in the guide will need to be compatible with the guided surgery kit.

In the market, there are three types of kits.



Pilot Drill Surgery Kit

This type of kit is used with a pilot guide. It enables the pilot drill to achieve the correct angulation, depth, and trajectory.

Once you have drilled with the pilot drill, you will remove the guide and proceed freehand with the rest of the drilling process.



Partially Guided Kit

A partially guided kit provides depth and direction for each drill of the osteotomy process.

The drills have built in stoppers or separate “keys or spoons” that match the surgical guide’s sleeve diameter. The partially guided kit enables only guided drilling but not guided placement of the implant.



Fully Guided Surgical Kit

The fully guided kit includes drills, with an integrated stopper that fits the diameter and height of master sleeves in the guide, to enable accurate angulation depth and direction. The implants are attached to mounts and are placed through the sleeve into the site. The process allows the complete procedure to be performed with the utmost accuracy.

The main benefits of using computer-guided surgery include precise and accurate implant placement. Often the time required for implant surgery can be substantially reduced, which is of great benefit for you and your patient.



Guided Surgery

Step-By-Step Protocol

Preparing the Surgical Guide

Surgical guide Sterilization:

Cold Sterilization: Sterilize the surgical guide according to the manufacturer's instructions. The solution must not contain more than 15% alcohol and the process should not exceed more than 30 minutes. Prior to trying in the guide in the patient's mouth, the guide must be rinsed with sterile saline solution.

- The guide should not be heat sterilized!
- Store the guide in a cool place and avoid direct exposure to heat and humidity.

Proper Fit of the Surgical Guide: The accuracy of the surgical guide requires proper fit and positioning in the patient's mouth.

- The guide should sit securely without any "rocking".
- It is advised to check the fit of the guide in the mouth prior to surgery.



Preparing the Surgical Guide

Surgical guide try-in:

Prior to the surgery, check the guide in the patient's mouth to ensure the precision of the fit and to assure that the guide is not too loose and that it does not "rock" in place. This is best done by pressing alternately on the sides of the guide. If the guide feels tight due to the contour height or undercuts, use liquid marker or marker spray inside the guide and press the guide firmly onto the supporting teeth. Where the marker has come off, slightly grind the guide. Repeat the fitting procedure. If after adjustment the guide cannot be fitted on the supporting dentition correctly or has substantial leeway, new impressions need to be made and a new surgical guide should be produced.



Preparing the Surgical Guide

If you are planning on making a flap, this would be the time to consider the thickness of the flap. In the area of the flap. Shorten the edges of the guide as much as possible to reach a balance between a comfortable working space without compromising the stability and strength of the guide. If you trim the guide too thin, it may lead to breakage during the drilling process.

NOTE: Precision of guided drilling and guided implantation, with the use of a specialized surgical kit for guided surgery, depends on the precision of the bone contour reproduced in the DICOM files (the mean error of the dental CBCT machine), on the precision of the silicone impression/scan and the working master cast/3D virtual model, on proper positioning of the dental implants within the planning software and computer-aided designing and manufacturing of a precise surgical guide (by milling or 3D-printing) as well as on the precise fit, anchoring and adequate stabilization of the guide during surgery.



Clinical Steps- Guide positioning

Setting and anchoring the guide

Mobility of the guide while drilling may cause inaccurate drilling of the osteotomy. To avoid mobility, hold the guide firmly on the teeth while drilling through the sleeve in order to stabilize the guide. In cases where there is insufficient support or in edentulous cases, it is recommended to use lateral and/or crestal pins to anchor the guide during drilling. Lateral pins are anchored through the securing sleeves and crestal pins are anchored through the master sleeves. Lateral anchoring should be planned in advance.



Clinical Steps- Guide positioning

How to secure the Guide:

1. Edentulous cases: Use 2-3 lateral pins in the lateral securing sleeve to fixate the guide in place.
2. Full or partial edentulous cases: Many systems offer crestal pins to anchor the implant in place. Choose the relevant crestal pin and fixate the pin through the master surgical sleeve in the guide.

NOTE: Fully securing the tooth supported guide is not required in most cases. However, since the guide is not self-retentive, it should be held in position during the drilling process.



After completing any fit adjustments to the guide, reposition the guide in the mouth and secure the guide to avoid intraoperative displacement during the surgery.

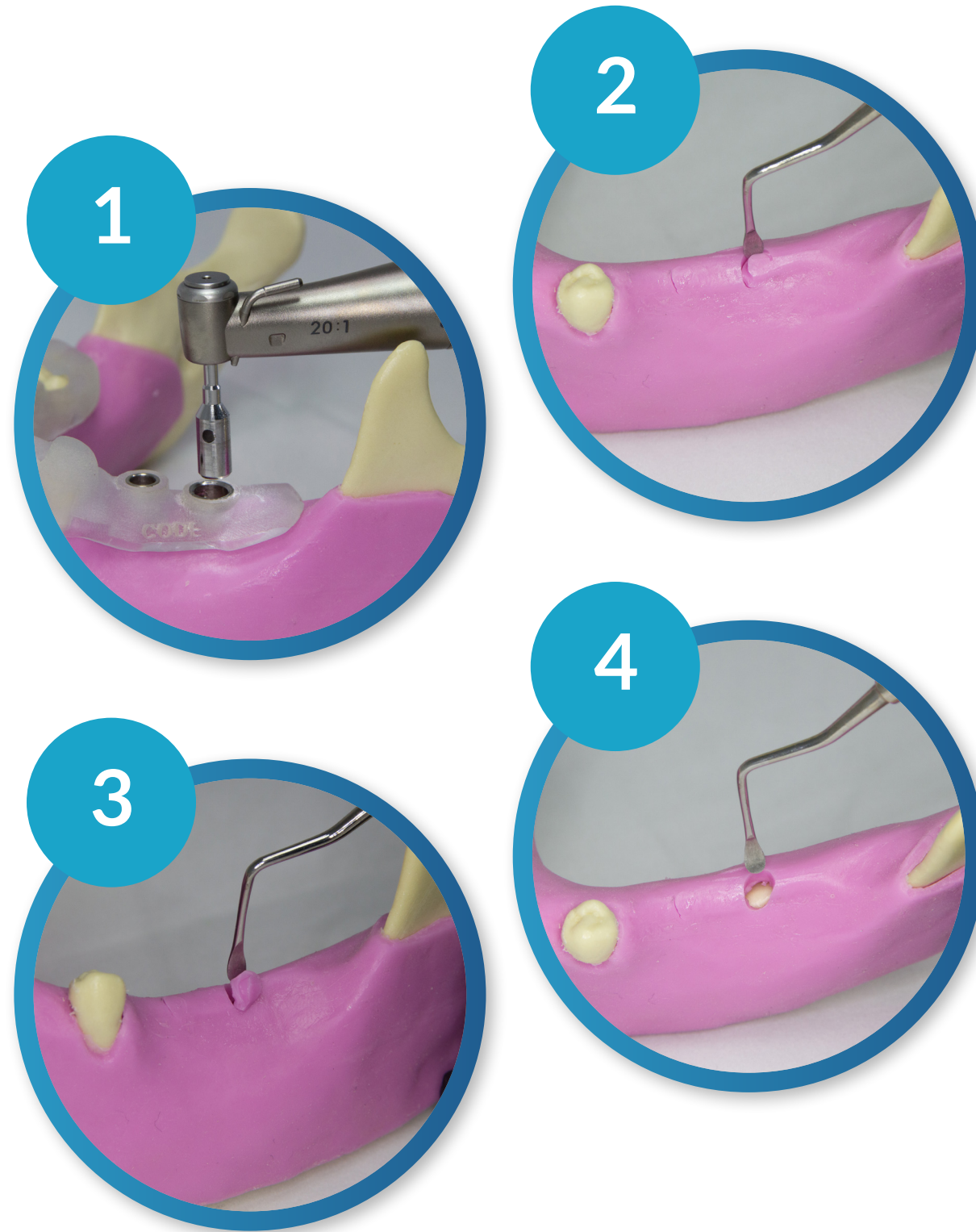
Clinical Steps- Flapless Surgery- Site Preparation

Transmucosal access with tissue punches

1. Once the surgical guide is properly positioned in the oral cavity, drive the tissue punch through the sleeve until there is a slight contact with the bone. Repeat the procedure in each drilling sleeve.

NOTE: It is usually recommended during this stage, to secure the guide with pins, especially in edentulous patients.

2. Remove the guide in order to manually complete the soft tissue removal.
3. Using a small 2.5 – 3.5 mm periosteum elevator or a sharp 2.5 mm excavator, remove the soft issue.
4. Reposition the guide and secure with pins.



Guided Drilling- Drilling Protocol

NOTE: For preparing the osteotomy, use a crestal drill fitted in a contra-angle. Drill at a maximum speed of 800 rpm until the drill stopper engages the sleeve.

The crestal drill:

- creates the initial osteotomy to the depth required to allow the guided drills to be stable in the guide sleeve during drilling.
- removes bony prominences and interference from the alveolar crest and the ridge in the area of the neck of the future implant position.

The first surgical drill used in creating the surgical sequence is the 2.0mm pilot. Continue with the drilling sequence according to the implant length.

Note: The pilot drill is usually a few mm. shorter than the implant length to ensure that the active part of the next drill in the sequence (that corresponds to the implant length) is stable in the sleeve and positioned in the correct angle.



Guided Drilling for Different Diameter Implants: Narrow, Standard and Wide Implants

For different diameter implants, the master sleeve in the surgical guide will require adaptor sleeves or keys for adapting the drill diameter to the surgical sleeve. Depending on the surgical kit used, narrow or standard diameters may not require an adaptor piece or key. For the drilling of the wider implants, with a diameter above 4.2, usually an adaptor piece is required for part of the drilling protocol, to accommodate the narrower width of the smaller diameter drills.

Adaptor sleeves are preferred over the keys as they are attached to the master sleeve before the surgical guide is placed in the oral cavity and they do not require manual support.



Guided Drilling for Different Diameter Implants: Narrow, Standard and Wide Implants

1. Once the adaptor sleeve or key is securely in place in the surgical guide's master sleeve, continue with the drilling sequence according to the drilling protocol.

2. After the drilling of the osteotomy is completed, remove the adaptor sleeve and/or key.

NOTE: The adaptor or key must always be removed from the guide before the placement of the implant.

3. Once the drilling protocol is completed, remove the guide and check the osteotomy.

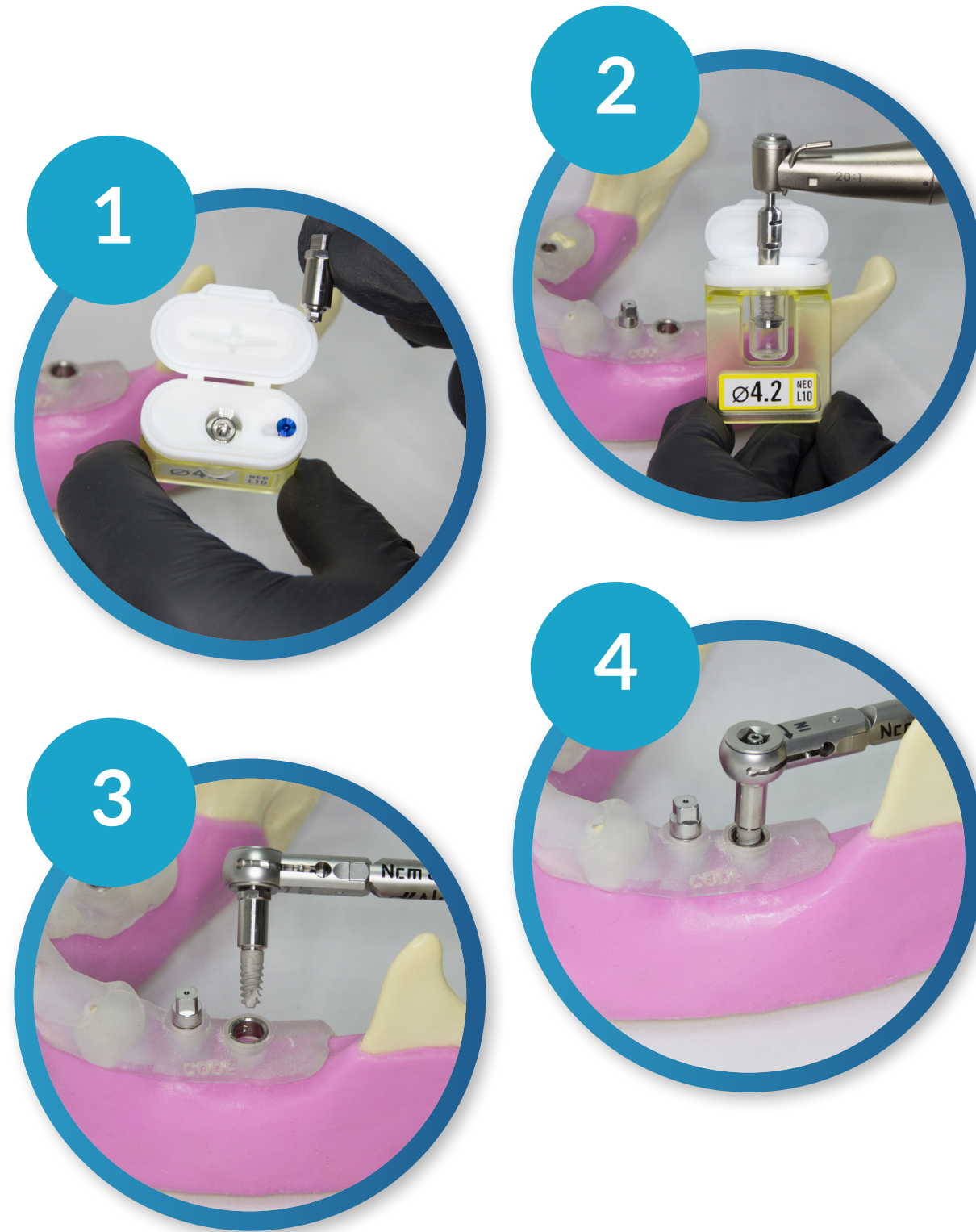


Step 3 Implant Placement

Clinical Steps- Implant Placement

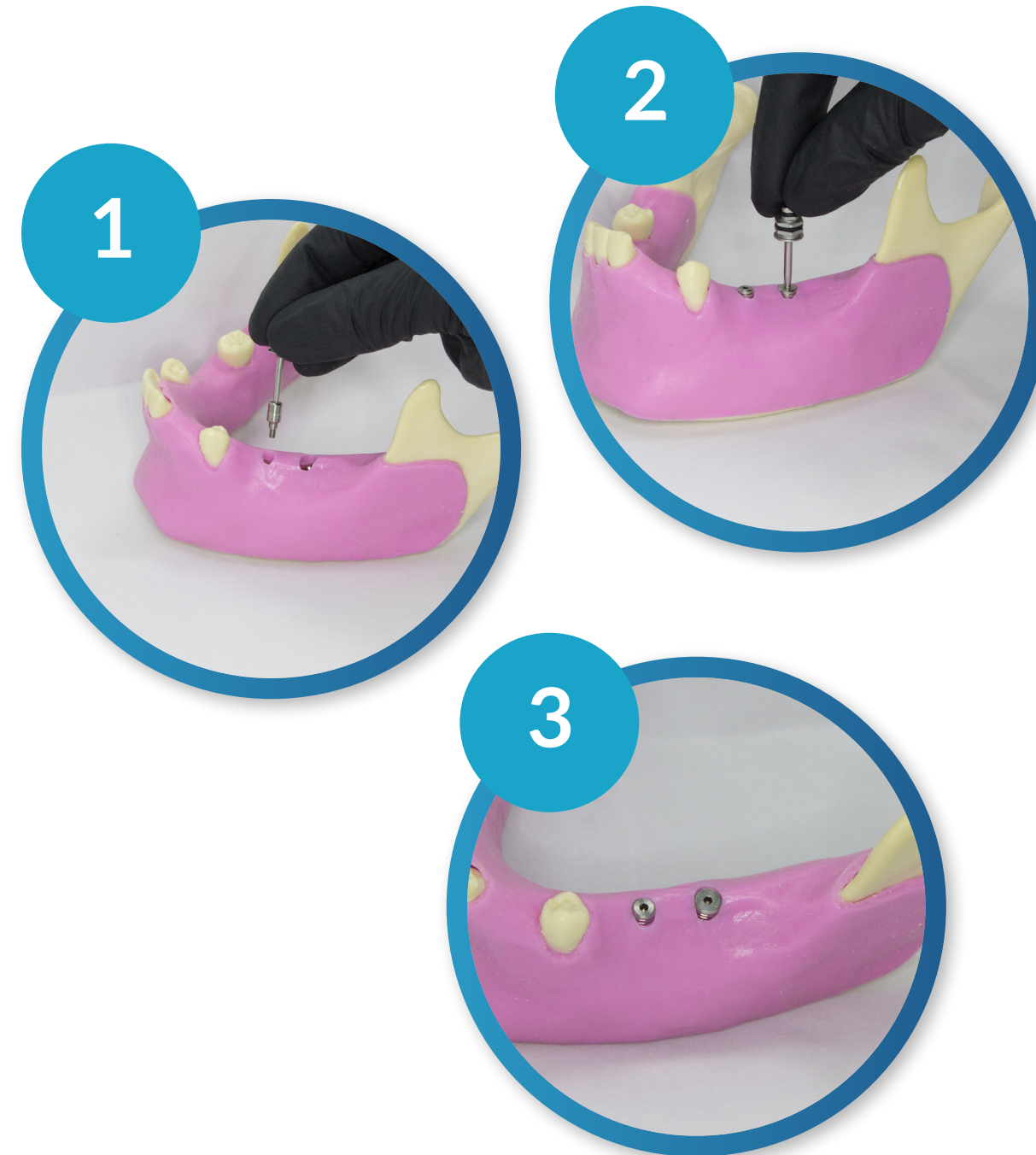
Guided Implant placement via the surgical guide

1. Open the implant package. Attach the corresponding implant mount to the implant.
2. Remove the implant from the package with the attached implant mount and place the implant in the prepared osteotomy.
3. Attach the preferred tool to the mount (torque ratchet or contra-angle driver) .
4. Insert the implant clockwise through the sleeve into the bone, until the desired depth is reached.



Clinical Steps- Completing the Procedure

1. After completing the insertion of the implant, disconnect the mount from the implant. Since the mount is quite secure in the guide due to friction of the mount to the implant and the guide sleeve, many guided surgery kits provide a dedicated tool for removing the mount from the implant: e.g. a mount extractor.
2. In cases where the guide is attached by lateral pins, remove the pins prior to removing the guide.
3. Remove the guide from the oral cavity and rinse the oral cavity.
4. At this point, connect the healing abutments/cover screws or continue with the prosthetic phase.





Tips for New Users



Accumulation of errors. It is very important to minimize the number of errors in each step of the planning process. Metal artifacts, patient movement during x-ray exposure, inaccurate impressions, improper guide position or drilling sequence and many other common errors can affect the outcome of the treatment.



Adequate STL (digital impressions) and Dicom files (3D xray) alignment are key factors in minimizing planning errors.



Digital wax up. It is very important to digitally design the ideal future prosthetic restoration in order to position the implant in the adequate 3D position, taking as a reference the gingival margin of the future restoration.



Inspection windows. It is recommended to create inspection windows in different areas of the surgical guide to allow you to validate its position and maximum insertion of the guide.

Guided surgery allows you to expand your clinical options

You can achieve predictable results and high patient satisfaction by implementing guided surgery protocols and surgical guides into your practice.

The many advantages include:

- Your clinical decisions are taken at the planning stage before surgery
- Not only is the outcome more predictable than freehand placement, but it is also fully consistent with the planning
- Your patient will benefit from a less invasive (flapless) surgery and faster healing time
- Saves you chair time and speeds up implant placement
- You can simplify the implant procedure even more by using the services of mentors or guided surgery centers and utilizing a fully guided surgical kit that enables the entire process from site preparation, osteotomy and implant placement.



 **ALPHA BIO**^{TEC}
Implantology



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