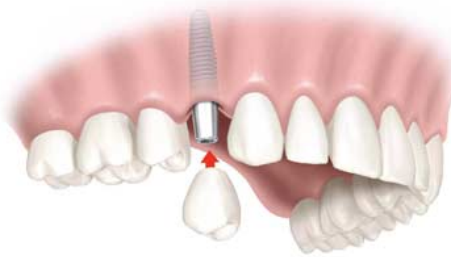


Implant, Bone Grafting, and Platelet Growth Factors Guide for Patients and Instructions for Surgery.

What you should know before agreeing to treatment

During the last 40 years, the use of dental implants has changed dentistry beyond recognition. Implants are no longer considered experimental and it is equally rare to come across situations where they cannot be used.



What is a dental implant?

A dental implant is a titanium cylinder which is placed in the jaw and fuses with the bone. After the titanium cylinder has fused with the jaw bone which takes typically 2-4 months, depending on the complexity of the procedure, a post (“abutment”) is screwed to it and a crown can be cemented, screwed or snapped in place. Almost all implants in use today are made from titanium or titanium alloy, materials that have been shown over many years to be well tolerated by bone. The terms ‘*osseointegrated implants*’ or ‘*endosseous implants*’ are widely used to describe dental implants that can develop and maintain a close union with bone in order to support replacement teeth.

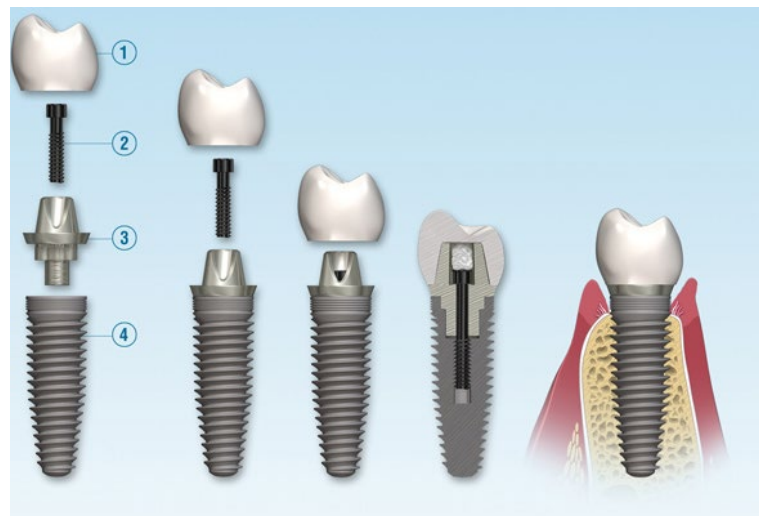
There are many different implant systems and implant types available and when competently used they can deliver a reliable outcome. Within Antwerp Dental Group, we use several systems and surfaces that have been subject to rigorous research, and generally only consider market leading brands. The type of implant suitable for each patient is decided by the treatment provider, depending on factors such as bone volume, quality, and training.

A dental implant is essentially a substitute for a natural tooth root and commonly is screw or cylinder shaped. Each implant is placed into either an existing tooth socket immediately after extraction or a carefully drilled socket at the precise location of the intended tooth. If an implant has a screw-thread on its outer surface it can be screwed into position and if it does not, it is usually tapped into place. The main aim during installation of any implant is to achieve immediate close contact with the surrounding bone. This creates an initial stability, which over time is steadily enhanced by further growth of bone into microscopic roughness on the implant surface.



In order to support replacement teeth, dental implants normally have some form of internal screw thread or post space that allows components to be fitted. Once fitted, these components provide the foundation for long-term support of crowns, bridges or dentures. When the implant has healed after the 2-4 months, it is then exposed by a small scalpel incision or a laser to take impressions so that the abutment (post) and final crown can be

screwed on.



Am I suitable for dental implants?

If you have good general health and do not possess risk factors cited below then dental implants are likely to work well. Here are some of the main risk factors we consider before recommending dental implant therapy:

- Previous history of gum disease
- Poor stability of the restorative status of teeth
- Smoking history
- Medical factors such as diabetes
- History of bone disease
- Nutrition and alcohol intake
- Bruxism i.e. Grinding and the impact on your teeth such as tooth wear
- A poor bite, with a reduced number of remaining teeth

There is often a genetic basis and a family history of gum disease, which when combined with poor oral hygiene causes loss of bone, and loss of teeth. The genetic susceptibility and plaque will also cause dental implants to fail prematurely. If teeth have fillings and crowns which are not stable, this can alter the tooth relationships, and cause unfavourable load distribution on implants. This will make treatment planning less certain. Some-times we spot very significant tooth wear of the front teeth. This results in a failure of correct guidance of the jaw. In these situations, we recommend correction of this wear before embarking on your implant journey.

Smoking has a profoundly negative effect on the healing and regenerative capacity of the gums and results in a significantly increased chance of implant failure. As a result, smoking severely compromises the ability for an implant to integrate with the jaw bone. Whereas implant success rates over 5 years are often cited at approximately 97-98%, success rates in smokers is cited at up to 90%, which equates to a 5-times increase in failure rate in non-smokers. Sometimes there is a need to 'augment' the jaw with a bone graft. In our experience 50% of bone grafts will fail in smokers. As a result, we will discuss treatment strategies to avoid bone grafting if you are a smoker.

Currently there is no clear evidence of a 'safe' level of smoking, and we cannot advise you of a lesser risk because you smoke minimally. If you are a smoker, you will be given counselling to give up smoking before you embark on your journey to receive dental implants. There is currently some support within the NHS to help your effort to quit. Please refer to the following website to obtain your free personal quit plan:

<https://www.nhs.uk/smokefree>

It may be in your interest to consider an alternative non-implant based plan if you do not wish to give up smoking.

There are various medical conditions which affect the body's healing capacity such as patients who have received radiotherapy or chemotherapy, which render the bone poorly vascularised and unable to heal. Diabetes mellitus, especially when poorly controlled is associated with poor healing. Poor nutrition and excessive alcohol intake can also affect the body's healing capacity.

It is vitally important that you provide your implant surgeon with a detailed history outlining your medical details, and social preferences such as oral hygiene activity, tobacco and alcohol use so that an accurate risk assessment can be carried out.

You can be reassured that it is rare for a medical condition to completely prevent the consideration of dental implant therapy.

Bruxism – Patients who have a habit of clenching or grinding (bruxing) their teeth may be at risk of overloading their implants. For most people bruxism occurs during sleep, which is why they are generally not aware of it. Heavily worn or flattened teeth, chipped enamel edges and/or regularly breaking pieces of heavily filled teeth are the most common clinical signs of bruxism. The effects of bruxism need to be considered during treatment planning and can be compensated for by some preparatory work before implant therapy, placing additional implants, selecting appropriate restorative materials and providing a night-time bite guard to protect the teeth.



What conditions are required in my mouth?

Basic dental health, which includes the treatment of gum disease, repair of decay and the elimination of abscesses will be very important in the long-term success of your treatment.

If you are aware of bad breath, loose teeth, or have noticed excessive bleeding, particularly when your teeth are cleaned professionally, you may have gum problems. Periodontal (gum) disease is a major cause of bone loss and with reduced bone, dental implant treatment can be more complicated and expensive.

Bone atrophy is also caused by the lack of a tooth in the proposed implant site. When a tooth is extracted, bone will start to disappear due to the reduced functional stimulation due to the lack of chewing forces. This is described as '*bone resorption*'. Although the rate and amount of bone resorption is highly variable between individuals, it will always occur to some extent unless specific care is taken to reduce the effects. Sometimes, the simplest measure to minimise bone loss after an extraction is to place the implant immediately or within the first

few weeks. At other times a 'socket graft' is considered as this has been shown to preserve bone volume.

How many implants are needed?

If you are missing just one natural tooth, then one implant is normally all that will be needed to provide a replacement. Larger spaces created by two, three or more missing teeth do not necessarily need one implant per tooth. In fact, placing dental implants too close together is not recommended practice as this can result in bone loss between them. The exact number of implants will depend upon the quality of bone at each potential implant site.

All the common forms of tooth replacement, such as bridges or dentures can be replaced by dental implants. Occasionally, it is even possible to join natural teeth to implants with a conventional bridge although this is avoided where possible.

In the upper jaw, bone density is generally poorer than in the lower and if you have no teeth at all, most treatment providers will want to place a minimum of 6 implants to support a complete jaw of 10 or more replacement teeth. A technique is also described using 4 implants and this is known as the 'All-on-4' technique.



In the lower jaw, the bone towards the front of the mouth is often very strong and as a direct result, fewer implants may be needed than are required to treat a whole upper jaw. A simple treatment plan to provide 10 or more teeth in the lower jaw might be possible with as few as 4 implants, although it is still more common to use 5 or 6 implants.

When are Implants placed immediately in the extraction socket?

From time to time the clinician chooses to place an implant with a suitable thread design straight into a socket after extraction of the tooth. This is done when there is an opportunity to reduce treatment time without compromising healing. Immediate implantation is undertaken more often in upper posterior teeth when the maxillary sinus is close by, and there is limiting vertical height. A delayed healing period may allow the bone to resorb and dissolve away due to a low sinus. In this instance it is better to use existing bone, and place a shorter but often wider implant in a large extraction site, and left to heal under the gum for 3 months before performing procedures to place a crown on this implant.

How long does treatment take?

For routine cases, from the time of placing the implant to the time of restoring the teeth, treatment times can vary between 6 weeks and 6 months. The availability of good bone decreases treatment time, whilst more time and care is needed if a bone graft is required. You may need to be prepared to be patient and allow nature to take its course to ensure that your implant has the best possible chance of success. The uncomplicated dental implant where bone grafting is not necessary can be completed in 2 months.

Is it uncomfortable when the implants are placed? Can I be sedated?

Most patients will be very familiar with dental anaesthetic used for routine dentistry and will know how effective they are. Implants are placed using the same local anaesthesia. In other words, a simple injection will be enough to completely anaesthetise you for dental implant placement.



Depending upon the complexity of your case, the operation may take anything from 45 minutes to 3 hours for complex cases involving bone grafting and multiple implant placements. If surgery is expected to take a long time, we would recommend that you are sedated to aid comfort. Sedation is usually applied as an intravenous drug to make you drowsy but not unconscious. You need to remain responsive to verbal command.

Occasionally there is a need to modify the jaw anatomy when there is insufficient bone. Bone can be expanded with small tools known as 'ridge dilators'. This involves lightly splitting the bone with a fine ended instrument called a 'D-shaped osteotome' which is lightly tapped with a surgical mallet. The procedure is not painful at all, and the tapping only lasts a short while. When a more significant contour change is required of the jaw, a procedure known as a 'bone graft' may be needed. This is described below.

When simple treatment is carried out (1 or 2 implants for example), the discomfort is usually minor with some swelling, a slight limitation in opening of the mouth and minor bruising. The discomfort is usually controlled with routine painkillers like Paracetamol or Ibuprofen.

Since the surgery normally involves exposing the bone in the area where the implant and/or graft is to be placed you can expect minor swelling and bruising which lasts for approximately one week. For most patients, the usual painkillers that you might take for a headache will be all that you need. Healing is generally uneventful and stitches will dissolve within two weeks. You must follow all post-operative instructions carefully to avoid further discomfort.

During the first few days you should report any unexpected levels of pain or swelling so that this can be assessed. If in doubt always ask for advice, as early detection of a problem will often lead to simple management.

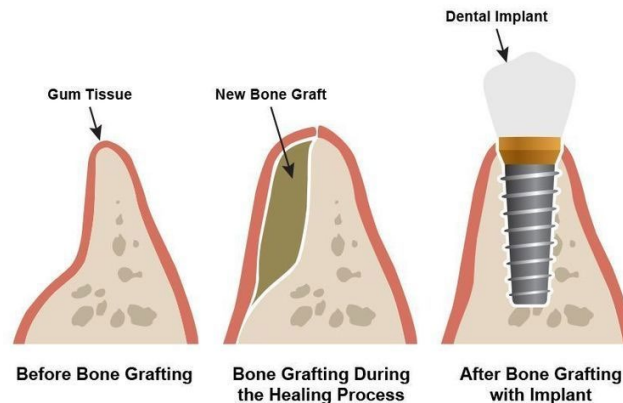
What do I need to know about bone grafting?

Occasionally there is a deficiency of bone at the proposed site for the implant and this necessitates a bone graft. The bone graft can be obtained from bone shavings from a donor site from your jaws, or a bone block taken from your own jaw. Alternatively, commercial products can be used which are derived from bovine (cow) herds, equine (horse) herds, porcine (pig) herds, human cadavers or synthetic materials.

The particulate graft occasionally needs to be contained by a membrane. These are either porcine (pig) derived or made from calcium sulphate or Goretex or titanium mesh. Whereas most membranes dissolve Goretex and Titanium mesh does not and requires a separate surgical visit for removal.

All human and animal products go through a rigorous decontamination and sterilisation process which variably involves acidification, defatting, gamma irradiation and such like to ensure safety for human processing.

Bone Grafting Process



A joint decision is made between yourself and the surgeon as to which products are best suited for your jaw.

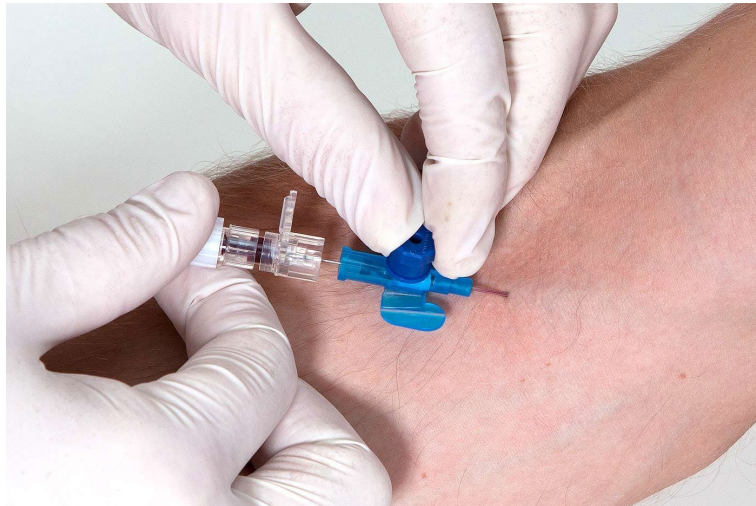
Sometimes the graft is left to consolidate for three to four months before the implant is inserted. In other circumstances bone grafts can be placed simultaneously with the implant. If the graft and implant have to be staged, the treatment time to completion is approximately 6-9 months. When a graft is placed at the same time as the implant, the treatment time is reduced to approximately four months. If no graft is needed the treatment time is approximately two months. Dental implant treatment must not be rushed. There are specific indications for when a bone graft is placed initially without the dental implant, or when they can be placed simultaneously with dental implant placement. An example of this is sinus lift surgery (described below).

In some cases treatment is more complex such as in the case of multiple implants, when the surgical site is in close proximity to a nerve, in the upper posterior jaw or where your sinuses are close to the apices of the proposed implants or where a major graft is needed which will involve resecting a small bone block from your jaw, and re-securing this block where the bone is deficient.

Use of platelet rich growth factor (PRGF)

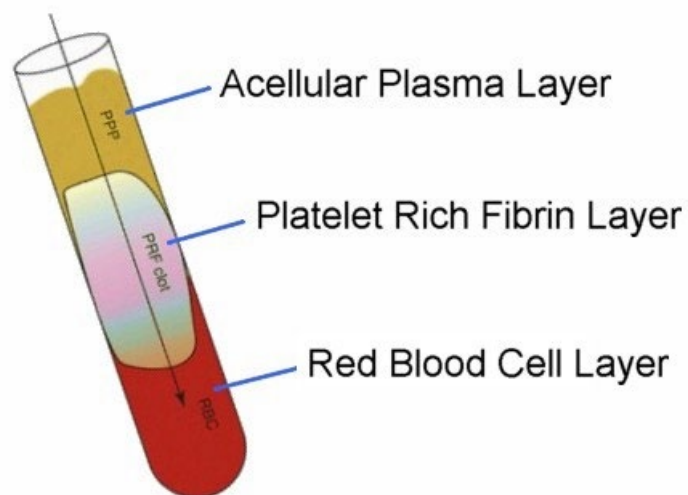
Bone grafts are typically not 'bioactive'. This means that in of themselves, they have no bone regeneration capacity. They simply act as a scaffold for the body to grow into. Your implant surgeon may recommend the use of PRGF. With this technique, the implant surgeon performs a venepuncture to obtain some of your own blood, and processes this in a centrifuge to separate the blood fragments. The platelet fraction is removed and is processed to add to an implant site or a bone graft. The platelet fraction consists of concentrated growth factors from your own body. As these growth factors are from your own body there is no chance of rejection. These growth factors are heat treated, and after processing become a small gelatinous matrix which can be mixed with your bone graft mineral with the aim of making this mix 'bioactive'. The result is a potentially increased regeneration capacity. Other benefits of PRGF include reduction of inflammation, pain and infection, and accelerating healing and recovery.

To collect the blood, the surgeon needs to perform a single venepuncture in the arm or the back of the hand. This may result in some bruising. If you suffer from any disorder of platelet aggregation or contagious disease please do inform your surgeon.



PLATELET RICH FIBRIN

10 cc of blood centrifuged for 10 minutes



Sinus Lift Surgery

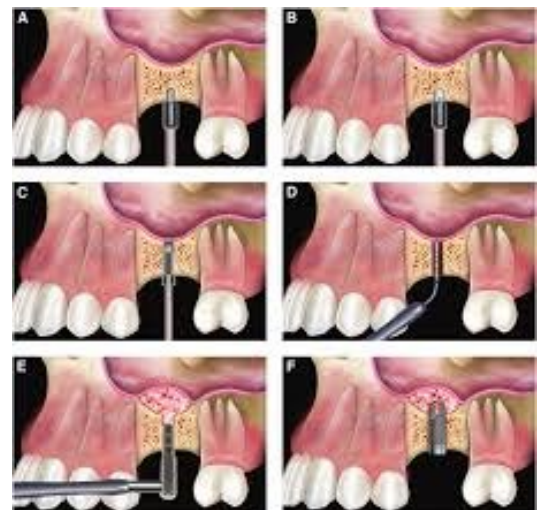
When we are placing dental implants at the back of the upper jaw, the bone volume is occasionally not tall enough to accommodate long dental implants as the sinus air space grows downwards. In these situations, your dental implant surgeon will recommend that you have a 'sinus lift' procedure.



There are two ways in which this surgery can be carried out (i) An osteotome mediated sinus lift OR a (ii) Lateral Antrostomy

(i) Osteotome mediated sinus lift

Sometimes a 'sinus lift' is carried out at the same time as placing the implants. The sinus floor is carefully pushed out of the way with a tool know as an osteotome, and a combination of bone graft and/or PRGF is pushed upwards to push the sinus membrane upwards ahead of the dental implant. The site is then reliant on the bone mineral that is pushed up to consolidate into real bone and heal around the dental implant.



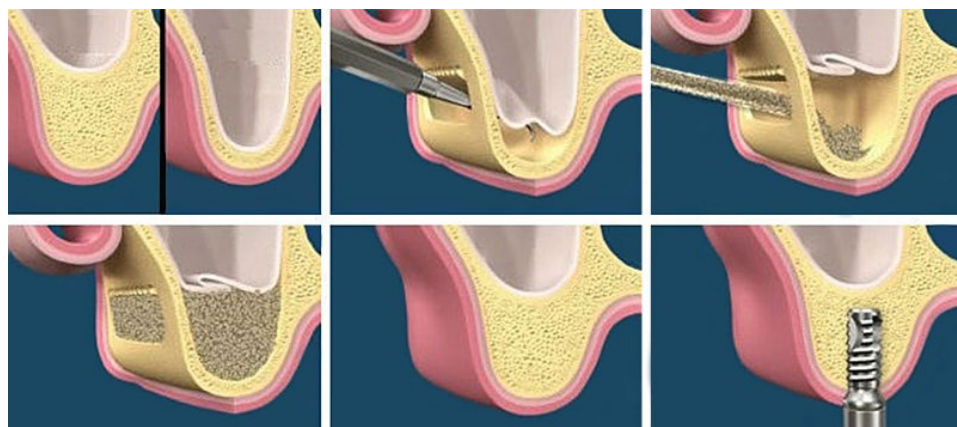
This is an 'osteotome-mediated' sinus elevation

PRGF is very flexible and adhesive and this usually naturally 'repairs' any sinus tears that occur as a result of this procedure.

(ii) Lateral Antrostomy

Occasionally the procedure described above is not possible because of extensive bone loss and the need to place several implants. In this instance a different technique is used. The whole side of the wall of the sinus is carefully opened and folded in. The floor of the sinus is then filled extensively with a combination of bone and PRGF. Due to the extent of the bone fill, this usually needs to be left to heal for 9 months before implants are placed.

Where the residual bone at the floor of the sinus is approximately 5 mm thick, it is possible to place implants with a more aggressive thread pattern at the same time as the sinus lift procedure, and these can be left sunk into the composite mix of bone graft, and allowed to heal for a period of 9 months.



What happens if an implant fails?

If an implant does not achieve or cannot maintain a rigid fixation with the surrounding bone it will eventually become loose and no longer be able to support replacement teeth. If the implant becomes loose during the healing period or just after, then it is easily removed and healing takes place in the normal way. Once the jaw has healed, another implant can be placed there. Commonly the failing implant causes no discomfort.

Scientific literature reports that most treatment providers achieve a success of over 95%, however in practice this means 1 in 20 implants may not be successful sometimes for no apparent reason. The cost of repeat work undertaken within 1 year of placement of the dental implant is picked up by the practice.

How long will the implants last?

Once your dental implants are restored with good quality prosthetic teeth which are cleansable, it is the quality of your home care and willingness to present for regular maintenance that will most influence how long your dental implants will last.

When poorly cared for, implants will develop a covering of hard and soft deposits (calculus and plaque) which is very similar to that found on neglected natural teeth. Untreated, these deposits can lead to gum infection, bleeding, soreness and general discomfort, just as can occur around natural teeth. Uncared for dental implants are less robust than uncared for teeth, and rapid loss of bone and infection will occur which included loss of the dental implants.

Well maintained implants placed into adequate bone can be expected to last for many years and possibly your lifetime. However, just as you would expect conventional crowns, bridges and fillings to need repairs or replacement during their lifetime, your implant-supported teeth will also have similar maintenance requirements, the extent of which is affected by the mechanics of your bite, especially if you are a bruxist. From time to time, the internal screw called the 'abutment screw' loosens. This can be corrected easily if there is ready access to that abutment screw through a filled hole in the biting surface. The filled hole is cleared, the abutment screw is re-tightened using an implant 'torque' wrench, and the hole is re-filled with a white filling material. If your surgeon notes that you are a bruxist, he/she will also likely recommend that you have a specially constructed mouth-guard at the end of treatment which is to be worn at night. This ensures that your bite forces are correctly distributed to avoid excessive force on the implants that might cause failure.

After implant placement you will be asked to follow some simple procedures such as rinsing with salt water or an antiseptic mouth rinse. It is important to carry out these instructions to avoid complications that will compromise the implants.

Benefits, Risks and limitations

Implants can provide you with an excellent fixed teeth solution to avoid the need for removeable dentures and avoid unnecessary preparation and destruction of adjacent teeth which may be necessary with conventional bridges. By restoring individual teeth with an implant solution retains bite forces on those individual teeth rather than causing a disproportionate load on fewer teeth. Carefully constructed implant prosthetics looks very natural and can restore function, appearance and therefore promote self-esteem.

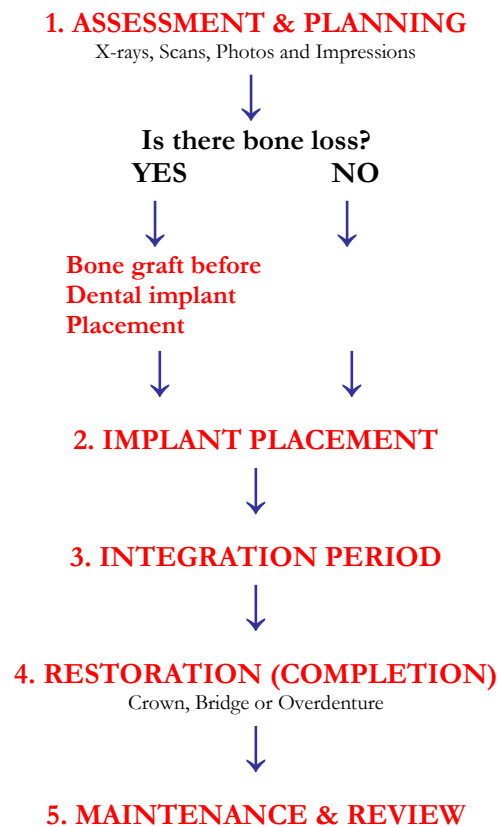
Although dental implant treatment has a remarkable safety record, all surgical procedures carry some risk:

- All surgical procedures result in some limited pain, swelling, and limitation of opening of the jaw. You will therefore need to make allowances for eating for 1-2 weeks and may need some time off work.
- There is the potential for infection around dental implants and this can result in some loss of jaw bone. Rarely a severe infection results in loss of an extensive amount of bone, and this will need additional bone grafting procedures to restore contour
- There is a small chance of dental implant failure, and this will need repeat surgical procedures
- Every surgical intervention of the jaw can result in some scar tissue formation around the gums, and some gum recession around natural teeth. This is not preventable and is governed by your body genetics and thickness of gums.
- When the jaw bone is very dense, bone fragments can fracture during implant insertion, and this will require repeat surgical procedures and further bone grafting to recover lost bone
- While placing an implant in extremely thick bone, an implant component can fracture, and this will need to be retrieved with placement of a new implant
- When placing an implant close to the maxillary sinus floor, or while undertaking a 'sinus lift' procedure, it is possible for the sinus lining to tear. This is usually self-limiting and self-healing. Rarely, an unhealed sinus lining results in an oro-antral fistula (soft tissue communication between the sinus and the mouth). This communication results in fluid interchange between the mouth and the nose. This is a complication of doing a sinus lift procedure, and will need to be corrected before undertaking repeat work.
- After a 'sinus lift' procedure it is possible to have to endure a period of sinusitis. Prolonged sinusitis is an indication of a sinus infection and this needs to be managed before proceeding with the implant procedure.
- When working in the lower jaw where bone volume has reduced, there is the possibility of working in close proximity to dental nerves (the inferior alveolar nerve) which can become damaged as a result of the dental implant procedure. Your surgeon will be able to identify the risk of this happening from pre-operative X rays and investigations and will inform you of what will be done to minimise the risk. While anaesthetising the tissues of the lower jaw, we tend not to provide a regional nerve block to retain sensation of the inferior alveolar nerve. This at least allows any discomfort you feel to be an early warning system. Nerve damage may range from mild pins and needles to frank loss of feeling on the side of the tongue of the affected side, the feeling on the affected jaw side, and the loss of sensation to the lower lip and chin area. The neurosensory disturbance can interfere with speaking, kissing and socialising. For the most part, neuro-sensory disturbance is temporary, but occasionally this is permanent
- The post-operative care regime involves the use of chlorhexidine rinses. These can impair your taste function for a few weeks post-surgery.

Implant Mentoring

From time to time an implant procedure is undertaken on a mentoring basis as dentists learn new skills to provide more complex work. We will seek your explicit consent to perform procedures under a mentoring basis. Under these arrangements, the dentist who is being mentored takes on the whole responsibility for your care, and is wholly responsible for their acts and omissions. The contract for treatment exists strictly between yourself and the mentored dentist. A mentee often applies a small discount to treatment fees as a gesture of goodwill to the patient for permitting the procedure on a mentored basis.

Summary of stages for dental implant placement



We would recommend six-monthly visits for a check-up to ensure that the tissues around the implant are remaining healthy. An implant consists of several mating surfaces clamped together with a screw. Due to mechanical cycling, and wear and tear, screws can become loose. If this happens, the implant crown will need to be removed, and the implant post (abutment screw) re-tightened. Unfortunately the implant crown may need to be re-made and this is a chargeable procedure. Depending on your gum risk assessment profile, which is recorded by your dentist, we would recommend a 3-6-monthly hygienist visit to maintain gum and implant health.

How do I prepare for surgery?

- All routine dental treatment, including hygiene treatments and periodontal management, and stabilisation of decay and broken fillings and poor bite should be carried out before undertaking surgery. Your surgeon will advise you on this.
- Ensure that you continue taking your usual medication unless advised otherwise.
- Plan the day that you have surgery carefully. Healing and pain can be unpredictable. Make provision to take time off work the next day. It is important that you do not drive or operate machinery straight after surgery.
- Eat beforehand - there is no need to fast before implant surgery. A good meal 2 hours before surgery is ideal.
- Please wear old clothing as we use an iodine solution for decontamination which can stain heavily.
- It is advisable to use Corsodyl mouthwash the week running up to the day of surgery. **Remember not to use within 30 minutes of toothbrushing – this will deactivate Corsodyl.**
- If you are feeling unwell on the day of surgery for any reason, please call the practice at least 2 hours before your appointment to speak with your surgeon or nurse and we shall advise you how to proceed.
- If possible you should bring an escort along with you for assistance and transport.
- There is no need to take any painkillers before you arrive - we shall provide you with 600 mg Ibuprofen or 1000 mg of Paracetamol before we start surgery.
- Please ensure that you are available for a review 7-14 days after surgery.

What should I do after surgery?

- Some patients are happy to go back to work, some prefer to go home and rest. It is completely your prerogative. However please ensure that you take things easy and do not over-exert yourself.
- The main cause of pain is swelling and inflammation. Therefore you should use a cold compress or ice pack (an ice cube in a handkerchief held over the site, or a bag of peas) to reduce swelling. A good protocol is 6 times a day for half an hour. You should use hold the ice-pack on to your face near the surgical site – 5 minutes on, 5 minutes off.
- If pain control is required, routine painkillers can be taken for 2 days after surgery. Ibuprofen and Paracetamol are usually all that is needed. If symptoms persist longer than this please contact us for review.
- Apply Curasept ADS rinse 2-3 times a day held over the site
- Avoid use of an electric tooth-brush for 1 month. Do use a manual tooth-brush and exercise care by travelling gently over the surgical site.
- Use hot salt water rinses after food to remove debris
- It is extremely important that you **do not touch the wound with your fingers** – this could cause infection.
- Be gentle around the surgical site when brushing to ensure you do not catch the stitches or reopen the healing wound.
- The stitches are dissolvable, usually within 14 days. If they are causing irritation your implant surgeon can remove them for you at your review appointment.

CONTACT YOUR SURGEON OR NURSE AS SOON AS POSSIBLE SHOULD YOU EXPERIENCE THE FOLLOWING AT ANY TIME AFTER SURGERY:

Bad taste, Pus formation, Odd sensations or unusual bruising or swelling.

Informed consent to treatment

1. I have been informed and understand the purpose and the nature of the implant surgery procedure planned.
2. My dentist has carefully examined my mouth and I have been informed of ideal and desirable preparatory work needed prior to the implant procedure
3. I have had the opportunity to discuss alternative strategies and treatments to dental implant treatment but my preference is for dental implant treatment
4. I have been informed about possible complications and risks of surgery, drugs and anaesthesia. Such complications will include pain, swelling, infection, discoloration, and gum recession. Sensory complications may include numbness of the lip, tongue, cheek or teeth. The exact nature and duration of sensory complications may not be determinable and may be irreversible. Other complications may include injury to vessels, bone fractures, sinus penetration, delayed healing, allergic reactions to drugs, or medications
5. I understand that accurate prediction of gum and bone healing is impossible due to biologic and genetic uniqueness of individuals, and as a result it is impossible to restore the aesthetics of the smile perfectly due to small differences in symmetry of tissues between the left and right
6. I understand that implants can become infected and can fail, and sometimes have to be removed especially if careful oral hygiene practices are not followed
7. I understand that smoking, compromised bite, bruxism (and lack of wear of a mouthguard for such), use of bisphosphonates and steroids may limit the success of dental implant treatment

I confirm that I have read and understood the information contained within this guide, and I have had the opportunity to ask questions.

Name of Patient _____

Date of Birth _____

Patient signature _____ Dated _____

Parent/Guardian/
Legal Representative _____ Dated _____