



## **Implants: The whole story.....**

### **Implant development**

Dental implants have been available for around 50 years since the pioneering work of Professor Per-Ingvar Branemark in Goteborg, Sweden. A Swedish orthopaedic surgeon, he is regarded as the father of modern implant dentistry, having discovered osseointegration in 1952. This is the process whereby the bone actively grows onto the implant surface, bonding it into the bone as a permanent fixture. Through his extensive work, and research by many workers throughout the world, leading to a National Institute of Health Conference on implants held in the USA in 1978, implants are now considered an established and reliable mode of replacing missing teeth.

### **Modern implant technology**

Modern implants have highly specialised surfaces that encourage bone growth onto the implant surface and this ensures that the implant integrates with the bone, becoming part of the jaw. This process of osseointegration is the foundation of an implant's success. Failure to osseointegrate will result in the loss of the implant. Generally nowadays, we see implant success rates in the order of 96-98% across most implant systems.

Implant technology is one of the principle areas of dentistry that has benefited from many of the major technological and scientific advances associated with bone growth, bone healing and modern dental material science and metallurgy. Nowadays when dentists and patients are making the decision on how best to replace missing teeth, the benchmark against which all other methods are compared, is the dental implant based restoration.

### **Care and Maintenance**

Like all technology, the successful performance of an implant, now and into the future, depends on the daily care and professional servicing that is provided. This includes the patient maintaining good plaque control on a daily basis and attending regular visits to the dental hygienist for cleaning of the implant crown and regular checks on the health of the gum tissue surrounding the implant and crown.

Regular servicing and careful use will result in successful performance for many years. However, abuse or a lack of servicing and care will result in faults, technical failures and eventually the need to replace the implant.

### **Many different implants are now available**

Initially dental implants were only provided by a small number of very highly trained and specialised surgeons using a few "high tech" implants manufactured by a couple of implant companies using only pure Titanium, with the highest possible standard of quality control.

As the years have passed and as implant therapy has become established as a reliable and successful form of treatment, many more surgeons and general practitioners have undergone training to place and restore implants and therefore the number of implants placed in patients worldwide has grown exponentially.

As a result of the large number of implants being used, more implant companies have seen the opportunity to benefit from the increase in the implant market and hence an increased number of makes and models of implants are being manufactured using different materials.

### **The premier implants**

Not all implants are the same. They differ in their design, shape, composition and quality control. The premier implants are made of Pure Type 4 Commercial Grade Titanium. However a number of implant companies are now also manufacturing *Titanium-alloy* implants. These are made of Titanium, with other elements added. With this diverse range of implants available, both short and long term success rates are likely to vary to some degree. However, success rates for dental osseointegrated implants are very high. Very few implant failures are seen in practice and when a failure is encountered, it is often related to known factors that contribute to failure, the most common being smoking and poor oral hygiene.



### Why do implants fail?

There are several factors that can lead to implant failure. Such factors include:

- Poor patient general health
- a compromised immune system or regular use of oral steroid medication
- uncontrolled diabetes
- smoking
- inadequate disruption of biofilm/plaque by home cleaning measures
- active gum disease
- absence of keratinised attached gingiva
- severe tooth grinding known as bruxism
- poor surgical technique
- poor implant primary stability in the bone at the time of placement
- poor implant design
- poor implant materials
- poor implant quality control
- poor implant surface characteristics
- bad design of the prosthesis attached to the implant(s)
- inappropriate or excessive implant loading
- excess crown cement beneath the gum

It is probable that there are other reasons that may account for implant failures but at this stage we are not in a position to state we know all about implant failure.

Research into implant failure is ongoing as there continue to be failures in patients despite apparently favourable oral environmental factors including good plaque control, an absence of active gum disease and apparently good general health. However, such failures are extremely rare and in general implants are successful in most patients.

Recent research published in professional research journals reports that the Neoss ProActive implants used in this practice have a 5 year cumulative survival rate of 98% and that bone loss around the implants is minimal less than 1mm over 5 years of implant function (*Coppe M et al. Journal of Dental Maxillofacial Research 2019; 2(2): 1-5*). This demonstrates the high degree of implant predictability using the implant system chosen by Dr Colin Priestland.

### Pure Titanium implants versus Titanium alloy implants

At NQ Surgical Dentistry, Dr Colin Priestland only places Pure Type 4 Commercial Grade Titanium implants. He holds the opinion that until we have many years of clinical data including success rates on large numbers of Titanium alloy implants; he prefers to continue using the tried and tested pure Titanium implants. It is possible that alloy and ceramic implants will provide an acceptable success rate in the medium and long term, but at this stage, it is felt that more research data and clinical trial results are required.

### Inflammatory implant conditions

Currently there appear to be two known conditions that are associated with implants that may relate to their failure. These are described as *peri-implant mucositis* and *peri-implantitis*. However, it is the latter condition that is responsible for loss of bone supporting the implant leading to failure.

### Peri-implant mucositis

This is most likely the equivalent to a condition many people suffer around their natural teeth. We refer to that condition as gingivitis. It is defined as inflammation that is limited to the soft tissues of the gum that surrounds the natural tooth. Gingivitis arises as a protective inflammatory response to the plaque bacteria and their toxic waste products. It is seen as red gum margins and may be detected by gentle probing of the gum margin that is followed by slight bleeding immediately afterwards, demonstrating the presence of inflammation.

Peri-implant mucositis is part of the body's protective immune response and an attempt to remove toxic plaque products. This indicates that the implant is not being cleaned well enough. However if the implant immediately receives improved cleaning regularly each day, then the inflammation in the gum will resolve and health will return.



Following a return to health, the soft tissues anatomy returns to normal. There will be no permanent damage affecting the attachment of the gum or the bone surrounding the implant.

### **Peri-implantitis**

Peri-implantitis by definition is an inflammatory destruction of the bone and gum attachment to the implant shoulder. It appears that this condition may arise from a pre-existing peri-implant mucositis or directly from a healthy situation (*de novo*). This has yet to be confirmed by research.

It is thought that the nature of the inflammation in peri-implantitis differs from that seen in peri-implant mucositis. The types of inflammatory cells present in the two conditions (*peri-implant mucositis and peri-implantitis*) appear to differ and in some individuals, there is no graded transition from health through a protective inflammation to a destructive disease, as we would see around natural teeth as represented by the transition from health, through gingivitis to periodontitis.

Healthy gums become inflamed as a result of plaque around natural teeth leading to gingivitis. In 87% of the population, such gingivitis will remain stable and will not progress beyond inflammation confined to the soft tissues of the gum. However, in the other 13% of people, the inflammatory cells seen in gingivitis are replaced with destructive cells leading to the transformation of the local inflammatory lesion to one that is destructive. Such destruction leads to loss of the gum's attachment and bone loss. This latter condition is known as periodontitis.

Unlike the tissues around natural teeth, those around implants may react differently to inflammation. This means that in some patients there is no warning sign or inflammation to bring to light the less than ideal implant cleaning. The first sign of inflammation may be associated with a destructive disease process, and a destructive type of inflammation, that damages the attachment of the gum to the implant shoulder and the bone crest around the implant. This destructive condition is peri-implantitis.

### **Recent research findings show**

In a number of large-scale and international research studies, patients have received implant therapy and have then returned to the ongoing care of their general dentists. Large numbers of such patients have then been recalled for re-examination to assess the health of the soft tissues of the gum and the bone surrounding the implants.

The results show that unless implant patients are given regular dental care after receiving implants (including professional cleaning and oral hygiene advice), the bone levels around implants reduce with time. This bone loss is peri-implantitis.

The extent of inflammation and bone loss around dental osseointegrated implants in those patients who fail to get the professional support they need is very disturbing.

- o The results do vary between studies but even so, the findings are that around 50 % of implant patients are found to have inflammation in the gum around their implants (Koldslund et al 2010). Many of these implants are suffering from peri-implant mucositis (non-destructive). However, of these, a proportion will undoubtedly be suffering from peri-implantitis and destructive bone loss will result.
- o The research showed that peri-implantitis (destruction of bone) was present in a significant proportion. Around 10-15% of implants and 20% of all implant patients were found to have suffered from bone loss with continued inflammation present (Mombelli et al 2012).

### **NQ Surgical Dentistry is committed to care and support**

These research findings are concerning and explain why, at NQ Surgical Dentistry, we go to such lengths to ensure that all our implant patients are made aware of the danger of bone loss around their implants and are fully briefed about the detailed oral care their implants need in the future.

Patients who will ultimately return to the future care of their own general dentist may obtain their future implant support with that dentist and their dental hygienist if they have one, or they may choose to attend Sharon Everett here at NQ Surgical Dentistry for their future implant maintenance. The choice remains with the patient.

### **Free implant care advice**



We offer a free implant hygiene support appointment with Sharon Everett, our experienced dental hygienist, once the implant has been restored with a crown for all our patients in whom we have placed implants. In this way we feel that the patient has been given every opportunity to understand how to clean the implant correctly and maintain healthy gums and bone around the implant.

At this important appointment, patients are taught the best way to clean around their implants. Depending on the size of the spaces between the implant crown and the adjacent teeth, various inter-dental brushes will be recommended. The method of their use will also be taught to make sure all our implant patients are able to maintain the near perfect plaque control that will ensure long term success and healthy gum and bone around the implant for years to come.

#### **Need for follow-up and support**

With implant treatment being so widely available, after the implant surgery has been completed, increasing numbers of patients are returning for ongoing dental and implant care and supervision by their general dentist. It is therefore extremely important that all dentists provide the necessary high standard of follow-up and regular cleaning of implants in conjunction with support of the patients in their home care and plaque removal.

This future support is a task that can be performed most effectively by dentists or dental hygienists who have experience with implants and their ongoing care and maintenance. These regular maintenance visits are the best support an implant patient can receive.

It is strongly recommended that all implants are monitored by intra-oral X-rays every year to assess if there is every any sign of bone loss around the collar of the implant at the earliest possible time.

Any implants that shows signs of bleeding from the gum margin after brushing should be reviewed and an X-ray taken as this may be a sign of bone loss due to inflammatory peri-implantitis that can be treated.