Why Are Implants Failing?

The possible causes are many and more research is needed—and in the interim, dentists should try to retain natural teeth.

In the 1950s, titanium implants—“fixtures,” as named by the inventor—were introduced to medical professionals by Dr. Per-Ingvar Branemark, a Swedish physician. However, the concept named “osseointegration” was generally rejected by his medical colleagues; it was not until about 1982 that the concept started to be thought to be a useful one, subsequent to a well-received program in Toronto.

Before this time, numerous forms of dental implants had been introduced with varying success, but the titanium root-form osseointegrated implant concept looked very promising. Many dentists, including myself, eagerly became educated in implant techniques and started placing and restoring primarily edentulous patients. The concept grew rapidly, and advancements and refinements of the materials and techniques followed. Since then, millions of implants have been placed and restored with success. The advent of titanium implants has been one of the most significant introductions into dentistry in my long career.

But in recent years—more than 30 since their introduction—a relatively serious challenge has been observed and is causing concern in the profession. From the same geographic location that titanium root-form implants were introduced, conditions now named peri-implantitis and peri-implant mucositis have been observed and documented in numerous journals, including in the Journal of Dental Research. The JDR article states that of patients who had received implants nine years earlier, 45% of those studied had peri-implantitis (bleeding on probing/suppurateion and bone loss >0.5mm). Moderate/severe peri-implantitis (bleeding/suppurateion and bone loss >2mm) was diagnosed in 14.5%.

What factors may be causing these degenerative conditions? I have about 35 years of experience placing and restoring implants and can identify many of the potential causes of the current dilemma with implants.

The purpose of this article is to critically observe the many potential variables that may contribute to peri-implantitis and peri-implant mucositis and to make suggestions for readers relative to their future involvement with dental implants.
Potential causative factors for peri-implantitis and peri-implant mucositis

The microbiology division of the nonprofit Clinicians Report Foundation (Technology for Restorative and Caries Research, or TRAC) was asked by many to study the potential reasons for peri-implantitis. On observing the challenge, it became obvious that there are many factors involved, and that microbial activity is only one potential factor.

The potential causative factors in the following list are not prioritized, but they are factors that must be studied in this complex situation; any one of which will require significant thought, planning, time, effort and financial support. Until such research has been accomplished, clinicians should consider the potential negative influence of the following factors carefully when advising patients to consider tooth removal, implant placement and restorations including implants. The observations that follow are related to the current generation of titanium or titanium alloy root-form implants and not to all dental implants. They are based on research in the dental literature, surveys conducted by Clinicians Report Foundation and my personal clinical observations. Every one of them needs additional research!

Metal allergies
The original implants were pure titanium, and subsequently vanadium and aluminum were added because of the fracture of some of the originally designed implants. Why do we see inflammation around some implants and not others? The inflammation appears to be very similar to that seen around crowns having base-metal content (nickel). Metal allergies may have a role in implant failure.

Occlusion
Heavy occlusion is often unavoidable, especially in the approximately 25–30% of the adult population who have overt grinding or clenching bruxism, and in the frequently observed implant-supported prostheses that have inadequate occlusal design and prematurities. This has to have a role in implant failure.

Previous periodontal disease
The literature is mixed on the influence of this variable. The conditions causing periodontal disease are clearly present when placing implants in a patient who is having tooth extractions because of periodontal disease. The same factors that are discussed in this article were present before tooth extraction and may still be potential challenges contributing to implant failure.

Radiation
This was one of Branemark’s original cautions. Again, the literature reports are mixed. Can excess radiation contribute to failure?

Oral hygiene
We have all seen gross lack of oral hygiene in some implant patients. That same inadequate hygiene undoubtedly led to the removal of their teeth. This has to be a major factor for implant failure.
Diet
Poor diet is a significant factor in tooth loss. Has there been adequate research to say whether diet contributes to implant failure? Everyone placing implants has seen the enormous differences in bone quality and quantity from patient to patient. Bone health, including the presence of osteoporosis, has to be a significant factor related to diet.

Systemic disease
Numerous systemic diseases or conditions are recognized as contraindications for implant placement. Most practitioners placing implants know them well. These negative factors are probably related to implant failure due to whatever caused the systemic condition. Some of them are:
- Active treatment of a malignancy.
- Bleeding issues.
- Drug abuse.
- Immunosuppression.
- Intravenous bisphosphonate use.
- Psychiatric illness.
- Recent cerebrovascular accident.

Smoking
This is one factor that is negative in almost every study done on the subject. The actual reasons for the negative reports are many, and more research is still needed. Most dentists placing implants consider smoking to be a significant contraindication to placing implants.

Improper implant placement
There are innumerable potential negative factors related to improper implant placement, including inadequate lavage when making the osteotomy, lack of blood present when placing the implant, burning the bone when making the osteotomy, fracturing the bone when placing the implant, inadequate vascular supply. … This list goes on and on.

Angulation of implants
Many implants are now being placed with significant angulation from perpendicular to the occlusal plane. Again, there is controversy on the subject.

Inadequate bone
Many implants are placed in questionable bone that is potentially inadequate in density or in patients who have osteoporosis. In such cases, conventional procedures would often serve the patients better and with less risk.

Poorly planned prostheses
Some prostheses are made with anatomical characteristics that do not allow adequate oral hygiene or that have abnormal occlusion. Both of these factors could contribute to failure.

Loading too early
It is well known that if adequate bone is present, implant placement is acceptable on the day the tooth is removed. However, it is clear that some of these implants still fail when loaded too early. Waiting a few months to load in those cases is a better choice.

Microbes
Are there specific organisms that are related to peri-implantitis and peri-implant mucositis? It is quite likely. Although research is ongoing on this subject, little is known for sure.
Commentary

The complexity of the potential causes of peri-implantitis and peri-implant mucositis and subsequent implant failure is evident. The vast amount of research that will be necessary to know the reasons is also evident. I have often placed implants that looked excellent on placement and had them fail in a few months. On the contrary, I have placed implants that I thought were not going to survive and have had them serve well. The factors listed in this article should stimulate researchers to become involved with attempting to find finite reasons for this perplexing challenge.

Conclusions

Why some dental root-form implants have peri-implantitis and peri-implant mucositis and some eventually fail continues to be a mystery. Significant research is needed to provide direction on how to reduce this problem. Numerous potential causative factors are identified in this article, some with research and others lacking research. Often, meta-analyses provide only neutral conclusions with legitimate research projects on both sides of the question and a call for more research. In the meantime, I call for an overt emphasis on the part of the profession to retain natural teeth for as long as possible and to condemn the current, often wanton removal of teeth and bone to facilitate the unnecessary placement of implants.

There is nothing quite like a natural tooth!

References