



Dr Vincent J. Morgan (President of Bicon, left) and Georg Isbaner (Editorial Manager of *implants*).

The logic behind the Bicon **SHORT** implant

When the Bicon system was first introduced in 1985, its freestanding 8mm length implants were considered quite short. Since then, the natural progression of Bicon's design philosophy has resulted in 5mm SHORT implants, all with proven clinical success. Impressively, the design of the Bicon implant system has remained essentially unchanged since it was first conceived in the late 1960s. At the first Giornate Veronesi congress, which celebrated its debut in the Italian village of Valpolicella in April, *implants* spoke with Dr Vincent J. Morgan, Founder and President of the company, about Bicon's early days, its eventual copycats, and what makes its SHORT implant so special.

Dr Morgan, how did you initially become involved with implants?

I never intended to become a medical device entrepreneur. I have only had two intentions throughout my entire professional career: to treat my patients and to support my family. We were very fortunate that we were involved with implants long before most people were. I placed my

first implants in 1970, which were Miter blade implants. I placed them in a colleague, who had lost his posterior maxillary teeth. If he were not a colleague, we would have advised the extraction of his anterior maxillary teeth and restoration with a denture. However, being a dentist who had worked with dentures all his life, he knew their disadvantages and resisted the idea of having one himself. We saw a little ad for the Miter dental implant in a throwaway dental magazine. We ordered six of them. We opened the package and, without any instructions, knowledge, or experience—just with common sense—I gave him local anaesthesia and reflected bilateral flaps. I had never cut bone before. I used a fissure bur, made grooves big enough for the implants, put them in and they worked. Beginner's luck, I guess. That was my introduction to implants in 1970.

Could you please elaborate on the history of Bicon?

Between 1970 and the early 1980s, we did not place many implants. However, with the introduction of a

Swiss implant to North America in 1985, there became an increased awareness, and implants became more acceptable. The oral surgeon with whom I worked, Dr Norman J. Shepherd, was a Professor of Oral Surgery at Tufts University in Boston. In those days, Tufts University used a German implant, which was Axel Kirsch's IMZ implant. Thus, we began using it, and before long, we were the largest user of the IMZ implant in the United States. As a result, we placed some 2,500 implants in our little practice between the late 1980s and 1992. In 1992, I started to question the efficacy of screws,

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IME abutments, and all of their intra-mobile elements. Dealing with loose and broken screws and IMEs was madness. If you have one or two patients with a broken screw, you simply change the screw. That's not a big deal. When you have 2,500 of these cases, however, you realise that screws are inefficient and foolish. Screws were always a frustrating problem. It became such an issue that a patient once said to Dr Shepherd, "Hey, Shep, I got this figured out: you come in here and drop a few holes in the bone and then you leave Morgan with a broom for the next six months cleaning up after you." That was not far from the truth. The problems with screws just didn't go away. Dr Shepherd went back to Tufts and told Dr Robert Chapman, who was Professor and Chair of the Department of Prosthodontics and Operative Dentistry, that I wanted to quit doing implants. He was concerned since he was personally doing very well placing our implants.

Fortunately, Dr Chapman introduced us to the then Stryker implant, which had been developed by Thomas Driskell. Initially, I did not understand how an implant could function without a screw, but after only a couple of cases, I was amazed by its simplicity and ease of use. However, it took a few years before I truly realised and appreciated the many financial benefits and unmatched clinical capabilities it provided for me and, more importantly, for my patients.

The history of this implant design is quite interesting: Stryker had seen the sales of its drill units increasing and wondered why. When they learned that implants were becoming popular, they charged their engineers to iden-

tify the best-engineered implant. Curiously, the engineers from both Stryker and another orthopaedic company, Zimmer, both identified Driskell's implant as having the best design. Although Driskell initially resisted the sale of his implant to Stryker, his financial backers prevailed, and Stryker purchased the Driskell implant. Unfortunately, Stryker did not realise that, unlike the products they sold to purchasing agents at hospitals, implants entailed selling to thousands of individual dentists, who run small businesses. They initially thought it would be like their other products: the company would approach a surgeon, who would choose the device and then the company would discuss the terms with the hospital's purchasing agent. Since dental implants did not fit into Stryker's marketing model of going to purchasing agents, they decided to sell their best-engineered implant.

One night prior to any public announcement that Stryker had decided to sell their implant, we had dinner with Stryker's product manager in Cambridge, Massachusetts. Afterwards, I said to Dr Shepherd that something has to be wrong, because the product manager was not forthright, as we thought he should have been. The next morning, I told a patient, who was the CEO of a large public company, about our meeting the night before and he advised me to call Stryker's Chairman. I called Stryker and asked for John Brown. He didn't call back, but Ronald A. Elenbaas, who was President of six of Stryker's companies at that time, did. He said, "I don't know how you knew that we had issues with our implant business, since there are only three people in the company that knew of our concerns and, for some reason, you figured it out." At a subsequent meeting, he suggested that we buy their implant. And that's exactly what we did. Fools rush in where wise men don't. At the time, their implant was only sold in the US. Today, Bicon is sold in 92 countries. Our largest market outside the





US is China, where sales are phenomenal. China is our fastest-growing market at the moment. It has had significant double-digit growth for twelve or thirteen years. Today, there are Bicon implants in almost every Chinese dental hospital or school.

What distinguishes the Bicon system from other implant systems?

Bicon is totally different from other systems. You have to take your hat off to Driskell because he got it right at the outset. There is logic behind the Bicon design. I was taught by Dominican Friars and I remember one friar telling me, "If it's logical, follow it. If it's not logical, avoid it." There is no logic with threaded implants or screw-retained abutments. Nor is there logic in doing high-speed drilling and generating heat, for example. If you know anything about bone, you know that heat and pressure cause bone necrosis. They destroy bone. Moreover, what are you doing when you do high-speed drilling with irrigation? You are washing away the healing mechanism of the body, which is blood. Driskell was aware of this fact as early as 1968, which is when he started using slow drilling. There are numerous advantages to slow drilling. You can harvest the bone, you have wonderful visibility, you're not running the risk of bone necrosis, your assistant is free from suctioning, and your patient is more comfortable. And yet, for some reason, clinicians today are still using high-speed drilling with an irrigant. There is no logic in it—absolutely none. In fact, to replace internally-irrigated burs which can be sterilised (but never cleaned) is significantly more expensive than Bicon's titanium reamers, which can be used for hundreds of osteotomies.

Moreover, there is no logic in using screws either. Most dental implant screws mathematically cannot work for the tasks they are charged to perform. Manufacturers are asking more of the screw than it can deliver. The IMZ implant, for example, had some 45 threads. In contrast, the screw for the fixed-detachable abutment of the Bicon system has only three. For, when you are attaching metal to metal, you only need three threads. Have a look at your eyeglasses, for example. They probably only have three threads. Holger Zipprich from the dental school of Goethe University in Frankfurt, Germany, has an excellent YouTube presentation in which he states that threaded fasteners have micromovement under function. Where there is micromovement of the threads, then there is also peri-implantitis. Every dentist knows the cause of peri-implantitis, because every dentist knows that if you have a three-unit bridge and it becomes uncemented, it will have micromovement. As a result, the papillae get inflamed and swollen. All you have to do to resolve this issue is to recement the bridge and the gingival tissue will shrink back. Further, is it not hypocrisy for the profession to admonish patients about the deleterious effects of bacteria, not only to their alveoli, but also to their coronary arteries, while placing implants which act as a septic reservoir in their alveoli?

Implant designs have improved significantly over the years, but Bicon's plateau implant design is the same one that was used in 1981. Driskell's Titanodont implant had the same plateaus, with the only difference being that he had the male side of the connection on the implant, and the female side on the abutment. In 1985, he reversed it and put the female on the implant and the male on the abutment for aesthetic reasons. Yet, the implant has remained essentially unchanged since 1981. Shorter is just better. It is far easier to put a thumbtack in the wall than a nail and it is clearly less risky. Why drill 8, 10, 12, or even 20mm, when a 5mm implant works? In our clinic in Boston, we only use 5 and 6mm short implants. Initially, Bicon offered 14 and 11mm implants, but the 14mm was discontinued many years ago and the 11mm is sold minimally. Again, the accepted dogma that longer is better and one should not exceed an implant-to-crown ratio of more than one-to-one has no basis in either nature or mechanical engineering. Nor does it have any basis in dentistry. Every dentist knows that an ankylosed tooth with a minimal length root can support a molar tooth for decades. Longer implants are not logical. If clinicians could avoid drilling close to anatomical structures, such as the inferior alveolar nerve, they would be more relaxed at the end of their workday, and they could enjoy their family more easily.

What are the differences when it comes to healing?

The Bicon SHORT implant works well, because the bone around it is cortical-like, Haversian bone with greater me-

chanical properties than the appositional bone around threaded implants. This scientific fact has been published multiple times over the past fifteen years by Dr Paulo Coelho of New York University College of Dentistry, but, sadly, many academics are still unaware of his work, which emphasizes that the macro-geometry of an implant is the key to its capabilities. Bicon's osteotomy is prepared with slow drilling of 50RPM, or even slower with hand reamers. The implant is placed into the osteotomy, and without osteoclastic activity, blood forms in its plateaus and turns into cortical-like Haversian bone right from the outset. Whereas, when you screw a threaded implant into bone, you put pressure on the bone. From orthodontics, every dentist knows that if you put pressure on bone, the bone resorbs. Today, everybody talks about primary stability, and yet, when you screw an implant into bone the first thing you get is osteoclastic activ-

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ity. The bone dies back, away from the threaded implant, and subsequently grows back towards the implant as appositional bone, which is bone without blood vessels. Such appositional bone has totally different mechanical properties than the Haversian bone around Bicon implants, which may be why Bicon SHORT implants work and other short implants do not.

What role does marketing play in your overall strategy?

I know that marketing is an extremely important factor for successfully selling an implant. However, our marketing strategy has always been very simple: we tell the truth as we know it. We don't even have sales representatives in the United States. Speaking of marketing, I would argue that marketing has contributed to a great deal of misinformation in dentistry. The entire profession has been hoodwinked by the marketing of large dental implant companies. For example, most people believe that Per-Ingvar Brånemark was the first person to publish a paper on the compatibility of titanium and bone. His 1983 article “Osseointegration and its experimental background” was published in the *Journal of Prosthetic Dentistry*. However, in 1951, Gottlieb S. Leventhal had already published an article titled “Titanium, a metal for surgery” in the *Journal of Bone and Joint Surgery*, a very prestigious orthopaedic journal, where he discussed the same anecdotal story about titanium and bone that was attributed to Brånemark 32 years later. And even before that, in 1940, R.T. Bothe and others had published an article titled “Reaction of bone to multiple metallic implants” in the journal *Surgery, Gynecology and Obstetrics*, in which they

reported on a tendency of bone to fuse with titanium. “To fuse” means “to become one”, which is the equivalent of the modern term “osseointegration”. And yet, the marketing strategy of the implant companies focused solely on Brånemark. It's not that he didn't do great things, but he was clearly not the first. In fact, Driskell marketed his Titanodont implant in 1981.

Apparently, some companies discovered that there's a clever idea behind the Bicon system. As a result, there are copies on the market. What's your take on that?

To be honest, I compliment everyone who has copied the Bicon system, because it means that they have realised that it was well designed and that it has worked for decades. However, Zipprich showed that the clones have a micro-gap under function, which will cause failures. Unfortunately, when the clones or copies fail they may give Bicon a bad name. It's not easy to make a consistently precise and quality-controlled connection. It's not easy to have a male component manufactured in 1985 and the female component manufactured in 2019, and still achieve a locking taper when they are put together. It can look like a Bicon, but is it truly bacterially-sealed like a real Bicon? It's sad to think that a dentist, who is supposed to be providing quality healthcare would take a chance with a clone because of price. That's the truth! Again, it may look like an original, but it clearly is not. The quality of the clones' manufacturing is just unproven and untested. The bacterial seal of Bicon implants has been proven at Boston University; it has also been proven at the Università di Roma Sapienza. The simple reality that Bicon implants can have bone gain over their interface of the implant to abutment is proof enough of its bacterial seal. The list goes on and on. But, I suppose, it's logical in the end. They want to emulate Bicon's success and capabilities. Small companies try to directly copy and clone our design, while we see the large implant companies slowly adopt features of it over the years—the deep fins and plateaus, the sloping shoulder, and the shorter implants. I guess it's the ultimate compliment. Fortunately for us, they cannot copy the dedication and integrity of Bicon's experienced and gifted individuals throughout our organisation. Our people are responsible for novel research and many innovations, but more importantly for the quality manufacturing and support of many discerning clinicians and their patients throughout the world. There is only one Bicon!

Thank you for the interview.

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