Implants modern history dates back over five centuries.

It is reported that in 1565, a Roman, Petronius, used a gold plate to fill palace and teeth cracks
The most amazing materials are then used, for example, ivory teeth fixed on gold roots.
Other teeth are made with porcelain, rubber or even lead ...
Today, there are different compounds, but in general metals or ceramics are also used

The Maya civilization has been shown to have used the earliest known examples of endosseous implants (implants embedded into bone), dating back over 1,350 years before Per-Ingvar Brånemark started working with titanium. While excavating Maya burial sites in Honduras in 1931, archaeologists found a fragment of mandible of Maya origin, dating from about 600 AD. This mandible, which is considered to be that of a woman in her twenties, had three tooth-shaped pieces of shell placed into the sockets of three missing lower incisor teeth. For forty years the archaeological world considered that these shells were placed after death in a manner also observed in the ancient Egyptians. However, in 1970 a Brazilian dental academic, Professor Amadeo Bobbio studied the mandibular specimen and took a series of radiographs. He noted compact bone formation around two of the implants which led him to conclude that the implants were placed during life.

In the 1950s research was being conducted at Cambridge University in England to study blood flow in vivo. These workers devised a method of constructing a chamber of titanium which was then embedded into the soft tissue of the ears of rabbits. In 1952 the Swedish orthopaedic surgeon, P I Brånemark, was interested in studying bone healing and regeneration, and adopted the Cambridge designed ‘rabbit ear chamber’ for use in the rabbit femur. Following several months of study he attempted to retrieve these expensive chambers from the rabbits and found that he was unable to remove them. Per Brånemark observed that bone had grown into such close proximity with the titanium that it effectively adhered to the metal. Brånemark carried out many further studies into this phenomenon, using both animal and human subjects, which all confirmed this unique property of titanium.

Dr. Leonard Linkow placed his first dental implant in 1952, four months after he graduated from dental school. By 1992, Dr. Linkow had placed over 19,000 dental implants and stopped counting. He retired from private practice in 2002 leaving a body of work that included 12 books

and 36 patents. Many implant dentists refer to Dr. Linkow as the father of modern implant dentistry.

Meanwhile an Italian medical doctor called Stefano Melchiade Tramonte, understood that titanium could be used for dental restorations and after designing a titanium screw to support his own dental prosthesis, started to use it on many patients in his clinic in 1959. The good results of his clinical studies on humans were published in 1966.

Although Brånemark had originally considered that the first work should centre on knee and hip surgery, he finally decided that the mouth was more accessible for continued clinical observations and the high rate of edentulism in the general population offered more subjects for widespread study. He termed the clinically observed adherence of bone with titanium as ‘osseointegration’. In 1965 Brånemark, who was by then the Professor of Anatomy at Gothenburg University in Sweden, placed his first titanium dental implant into a human volunteer.

Contemporaneous independent research in the United States by Stevens and Alexander led to a 1969 US patent filing for titanium dental implants.

Over the next fourteen years Brånemark published many studies on the use of titanium in dental implantology until in 1978 he entered into a commercial partnership with the Swedish defense company, Bofors AB for the development and marketing of his dental implants. With Bofors (later to become Nobel Industries) as the parent company, Nobelpharma AB (later to be renamed Nobel Biocare) was founded in 1981 to focus on dental implantology. To the present day over 7 million Brånemark System implants have now been placed and hundreds of other companies produce dental implants. The majority of dental implants currently available are shaped like small screws, with either tapered or parallel sides. They can be placed at the same time as a tooth is removed by engaging with the bone of the socket wall and sometimes also with the bone beyond the tip of the socket. Current evidence suggests that implants placed straight into an extraction socket have comparable success rates to those placed into healed bone. The success rate and radiographic results of immediate restorations of dental implants placed in fresh extraction sockets (the temporary crowns placed at the same time) have been shown to be comparable to those obtained with delayed loading (the crowns placed weeks or months later) in carefully selected cases

Some current research in dental implantology is focusing on the use of ceramic materials such as zirconia (ZrO_2) in the manufacture of dental implants. Zirconia is the dioxide of zirconium, a metal close to titanium in the periodic table and with similar biocompatibility properties. Although generally the same shape as titanium implants, zirconia, which has been used successfully for orthopaedic surgery for a number of years, has the advantage of being more cosmetically aesthetic owing to its bright tooth-like colour. However, long-term clinical data is necessary before one-piece ZrO_2 implants can be recommended for daily practice.

A typical implant consists of a titanium screw (resembling a tooth root) with a roughened or smooth surface. The majority of dental implants are made out of commercially pure titanium,

which is available in 4 grades depending upon the amount of carbon and iron contained. More recently grade 5 titanium has increased in use. Grade 5 titanium, Titanium 6AL-4V, (signifying the Titanium alloy containing 6% Aluminium and 4% Vanadium alloy) is believed to offer similar osseointegration levels as commercially pure titanium. Ti- 6Al-4V alloy offers better tensile strength and fracture resistance. Today most implants are still made out of commercially pure titanium (grades 1 to 4) but some implant systems are fabricated out of the Ti-6Al-4V alloy. Implant surfaces may be modified by plasma spraying, anodizing, etching, or sandblasting to increase the surface area and osseointegration potential of the implant.

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