

Part 4- A summary of the AQB implant system

Chapter 1 Concepts behind the AQB implant system

AQB Implant Team of Development and Clinical Research

I. Developmental history and its concepts (Fig. 4-1-1)

At the end of the 1980s when development of the AQB implant started, a significant number of dental implants were being developed and the concept of dental implants was becoming well-known in our society. The implants that were then under development, as well as those already on the market, were typically the two-piece type that required surgery twice (the two-stage method). The popularity of this type was due to the belief, from past experience (failed examples), that the implant should be buried in the gingiva until interaction with bone had been fully established.

The technical advances around this time must not be forgotten. Titanium metal that had been considered impossible to sculpt had become manageable with the development of precision instruments. This allowed small titanium implants to be cut with extreme precision, producing extremely precise screw fitting, thereby reducing episodes of loosening or breaking of screws.

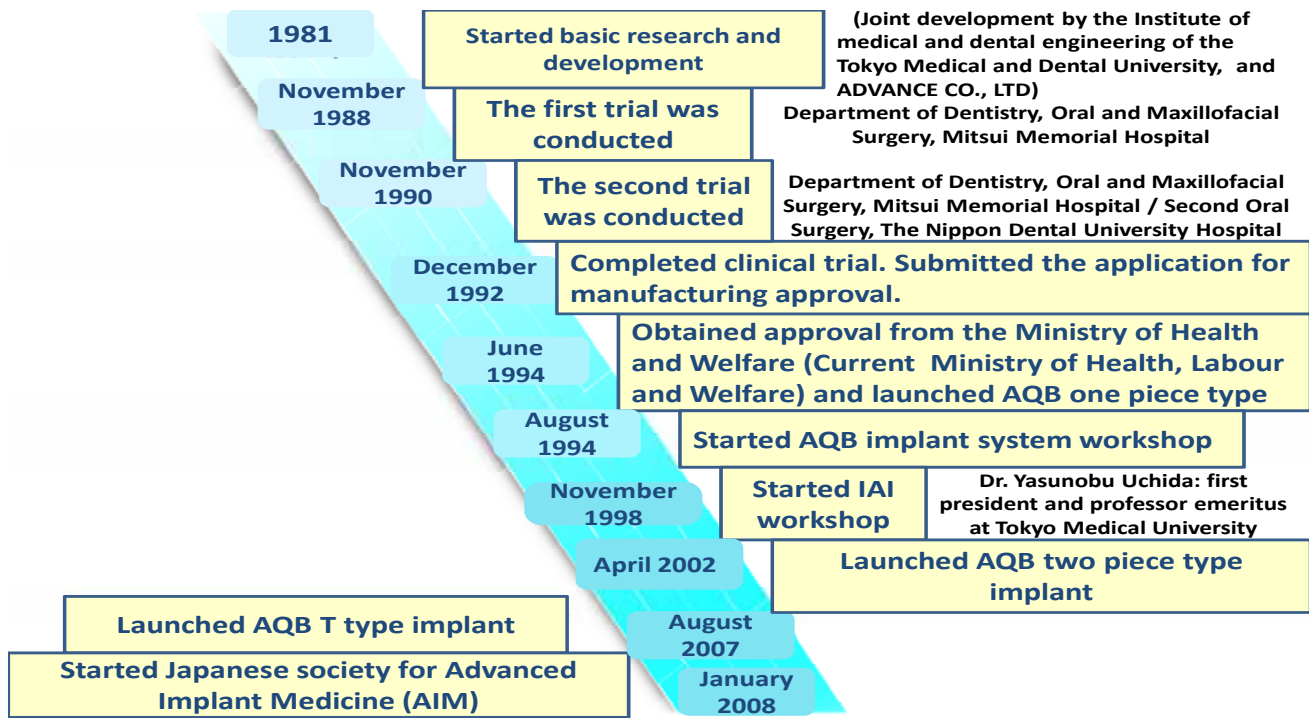
Two-piece, two-stage implants were adopted into dental implant practice because manufacturers followed the successful examples presented by past experience. However, from the patient's point of view, an implant treatment that is painless and feels like a natural tooth would be ideal. With two-piece, two-stage implants, a second operation is required after implantation into the jaw bone, which can impose added stress on the patient. A period of six months is required after the initial implantation before the second operation can take place; therefore, rapid functional recovery cannot be expected. Considering the burden of stress felt by the patient, the best treatment option would be one that reduces the treatment period. Using two-piece, two-stage implants, this criterion could not be met. The aim of developing the AQB implant therefore became a one-piece implant that only required one episode of surgery (a one-stage type).

The idea of a one-piece, one-stage type was not viewed with enthusiasm at this time due to the entrenched negative perception built from the accumulation of failed examples in the past. The majority of failed examples were one-piece (blade-type and cylinder-type) and the reason for disappointment was the high risk of infection due to exposure of the abutment within the gingiva. Furthermore, this was the period where the use of a one-stage surgical approach, and HA coating of the implant were not accepted. Therefore, research and development of the AQB implant can be said to have taken place against the flow of the general consensus.

A. Development of one-piece implant (Fig. 4-1-2)

The components of AQB implants were improved in several ways. In order to accelerate the speed of adhesion to the jaw bone, the fixture part of the implant was coated with hydroxyapatite. The purity of hydroxyapatite was improved with the development of a technique that allowed excellent biocompatibility with the jaw bone (hydro-thermal treatment).

The fixture, the part of the implant that is inserted into the jaw, takes the form of a cylinder. In contrast to the self-tapping screw-type that was the standard, the screw of the AQB implant lacks a blade that



Dr. Hiroshige Chiba : President of AIM and head of oral and maxillofacial surgery at Tokyo Medical and Dental University

Fig. 4-1-1

The timeline of AQB Implant system

cuts into the bone. The purpose of the screw on the AQB fixture is to ease the insertion process by rotating the implant to attain driving force. The AQB implant does not impose additional pressure on the bone, but instead, the concept is to merely to place it into the drilled hole, where a rapid and secure interaction with the bone takes place due to the high adsorption ability of the re-crystallized hydroxyapatite coating. The AQB implant was first placed on the market in 1994 after being approved by the Ministry of Health. Clinical trials were completed in Mitsui Memorial Hospital and The Nippon Dental University Hospital.

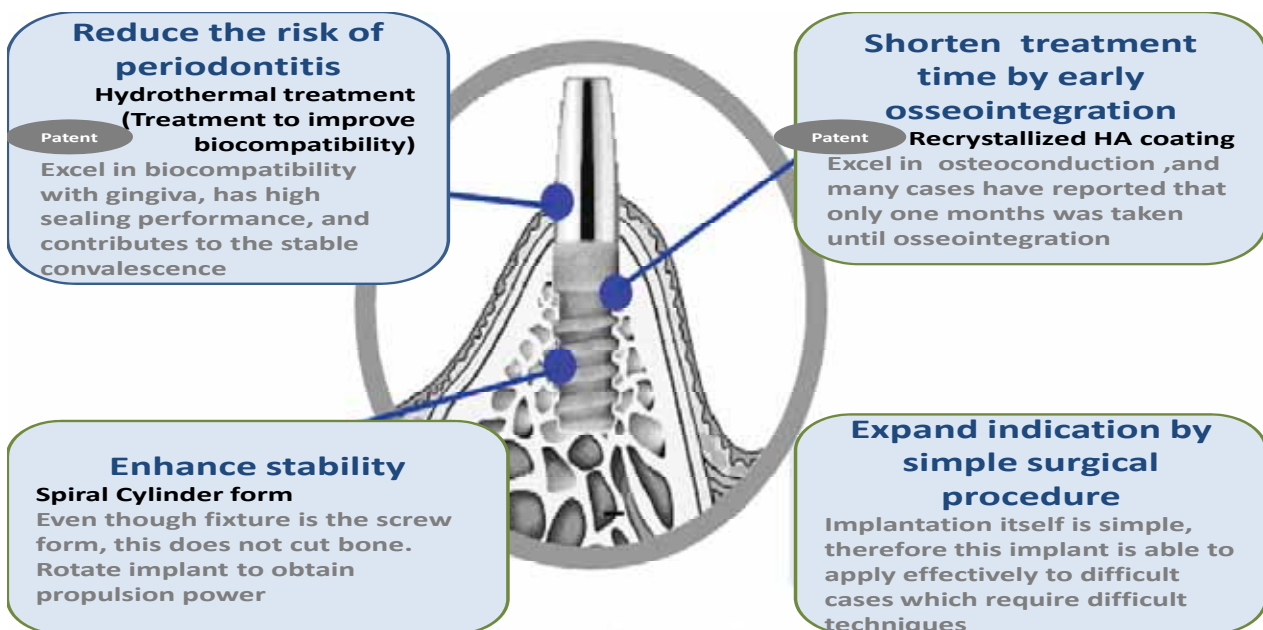


Fig. 4-1-2

Properties of AQB one-piece type implant

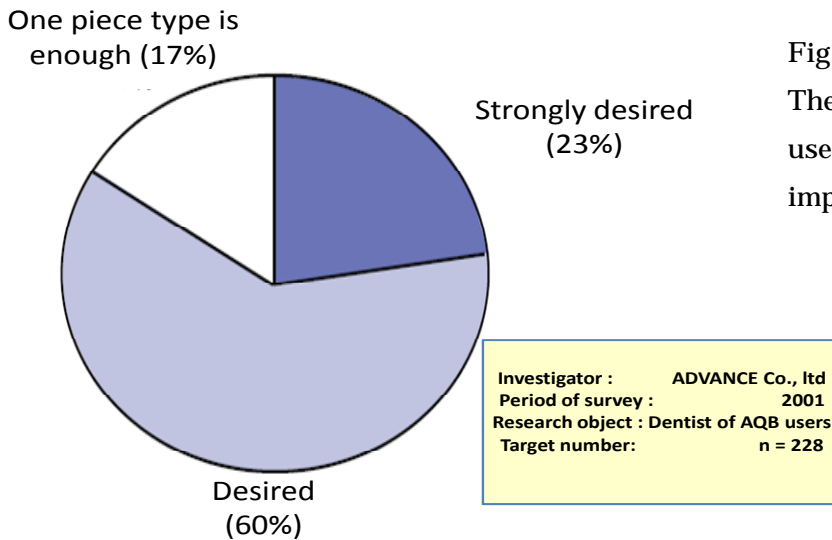


Fig. 4-1-3

The chart illustrating the views of the users for the necessity of two-piece type implants, 2001 survey.

B. Development of two piece implant

The properties that make the one-piece type superior are its simplicity and its mechanical strength, however, with regards to aesthetic recovery, it cannot surpass the two-piece type. With a two-piece type, several options exist with an abutment that allows angling or the formation of a superstructure from within the gingivae, providing a natural appearance. Unlike the two-stage type, the abutment of the one-piece type is exposed intra-orally after implantation, therefore its superstructure is fixed in the direction of initial insertion.

The AQB implant team conducted a survey to investigate consumer demand for a two-piece type (Fig. 4-1-3). This showed that 83% of users felt the need for a two-piece type. A two-piece AQB implant was developed to meet this demand. The research and development of the two-piece AQB used the results of analysis of the advantages and disadvantages of previous two-piece types, to overcome problems that included loosening of the screw and breaking, and resulted in manufacture of fixtures and abutments with improved contact (Fig. 4-1-4). The main problems encountered with the two-piece type included loosening of the contact between the fixture and the abutment, and risk of breakage. Intending to distribute the applied stress, a new bolting mechanism, the SOL system, was developed (described in more detail later on in this chapter). An octahedral shape without any edges was sculpted, in an attempt to disperse grinding pressure and therefore reduce the risk of breakage. The tools used for implantation were made to be the same as those used for the one-piece type, with some exceptions, to allow dental practitioners to readily incorporate both one- and two-piece types into their practice. The two-piece type also has a re-crystallized hydroxyapatite coating on the surface of the fixture, allowing the implant to adsorb more efficiently than those already on the market.

C. Development of a one-piece T type

In addition to the one-piece type, the AQB one-piece, one-stage T-type joined the lineup in 2007 (Fig. 4-1-4), with a tapered abutment design. The T-type was developed to protect the implant from subsidence and aberration into the maxillary sinus after a sinus lift or socket lift procedure. Its diameter is larger than the normal one-piece one-stage type by roughly 0.4 mm; it is thus possible to thicken the cervix of the superstructure, thereby improving the initial stability.

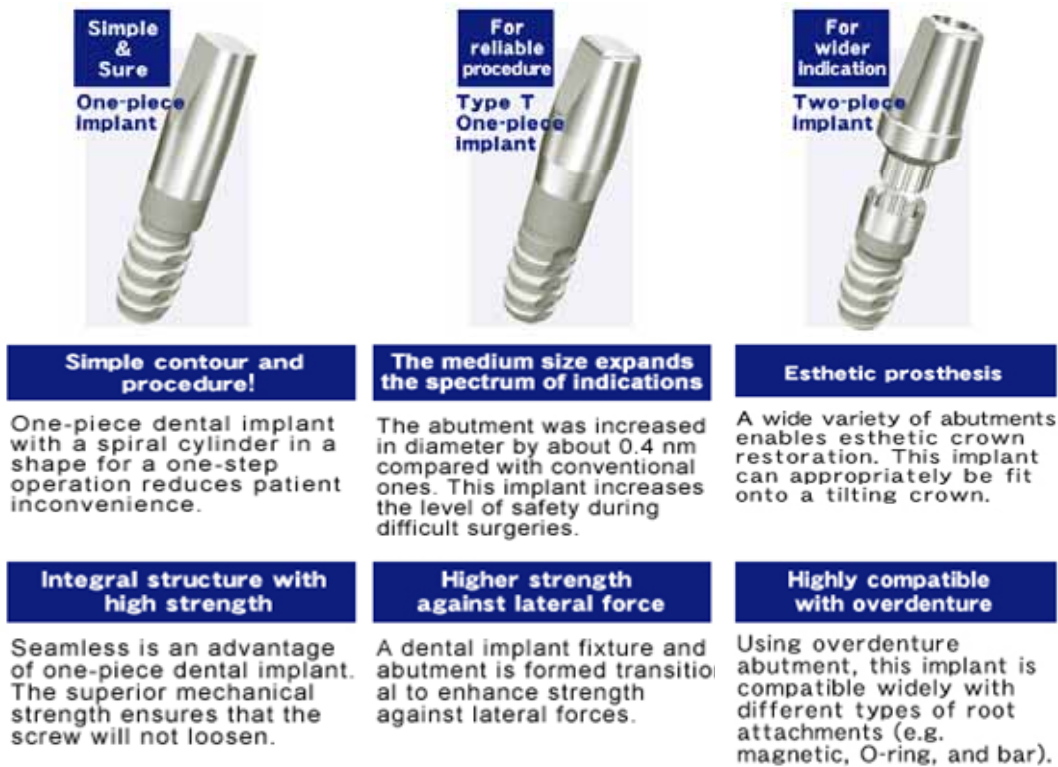


Fig. 4-1-4

The product line-up of AQB Implants

D. QOL improvement as the main objective, and implementing “Simple is best”

The development of the AQB has been founded upon the idea of QOL improvement not only for patients, but also for dental surgeons. The AQB implant system started with the one-piece type, which was an outcast at the start of its distribution, soon followed by the two-piece and T-type, in response to consumer demand. The concept, “simple is best” has been sustained throughout the various series since the initial development stages. Methods that allow rapid recovery, such as immediate placement in which the implant is placed immediately after tooth extraction, and immediate loading, are starting to be noticed. It can be said that the AQB implant suits our age.