

A PATIENT'S GUIDE TO

Dental Implants

First Edition



A patient education project by
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Dr Winston Tan

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Preface

Today, millions of people across the world suffer from tooth loss brought about by decay, gum disease, wear and tear or trauma. Losing your teeth can be an emotional experience especially if it involves your front teeth or affect your ability to speak and eat. Replacing lost teeth has traditionally involved making dentures or porcelain bridges but these are not without disadvantages. Advances in science and technology have made dental implants a very viable option to fully restore form and function and most importantly, aesthetics to someone who has lost his teeth.

The authors have counselled and treated thousands of patients with dental implants over the years. It is their hope that this booklet will serve as a guide if you are contemplating having dental implants as an option to replace your missing teeth. The information has been organized in such a way that you will be turning the pages in the same treatment sequence that every implant patient goes through so that you have a better idea of the entire process and what it involves.

You are encouraged to consult your own dental surgeon or any of the authors if you require any further information.

A soft copy of this book is available for free download at www.implantdontics.com.

Dear readers!

As manufacturer of the Q-Implant and a proponent of the idea of immediate loading it is a great pleasure and an honour to support the publication of this book.

The many years of my company's international experience in implantology has made me deeply convinced that a well informed patient, knowledgeably cooperating with his doctor has a much greater chance of successful implant treatment.

In the present day, where achievements of modern medicine and technology allow for rapid success of implant treatment, promotion of implantology helps many people to get rid of their physical and mental problems connected with losing their teeth. I know personally hundreds of patients who could socialise with a smile the day after implant placement.

The satisfaction and gratitude of these patients inspire our team of specialists to search for optimal technological and medical solutions.

By placing into your hands this patient information book I would like to express my deep hope that you will be satisfied with this modern method of medical treatment.

I thank the group of dental specialists who lead this project for their trust in our products and for giving me a possibility to cooperate with such a professional team.

With best regards,

Mirosław Pienkowski

*CEO Trinon Titanium GmbH
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Profiles Of Authors



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Dr Leong obtained his Bachelor of Dental Surgery degree from the National University of Singapore in 1984. From 1991, he spent two years training at Northwestern University, Chicago, one of the major dental implant centres in the United States and obtained a Master of Science degree as well as a specialist Certification in Prosthodontics. In 1999, he attained a Master of Business Administration from Imperial College, University of London.

Dr Leong's clinical passion is in the areas of cosmetic dentistry, crowns, bridges, veneers, all types of implant prostheses, partial and complete dentures and in particular extensive procedures such as full mouth reconstruction.

He has published in international refereed journals and is a member of the Prosthodontic Society (Singapore). Dr Leong has also taught undergraduate prosthodontics on a part time basis at the National University of Singapore. He is currently in private practice at Camden Medical Centre, Singapore.

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Dr Adrian Yap is the Clinical Director of The MyoHealth Clinic – Treatment Center for TMJ and Sleep Disorders and a Visiting Consultant to the National University Hospital. He is also the Director of Global Research and Development for MyoHealth, an Australian-based multinational corporation providing solutions for Headaches, TMJ and Sleep Disorders. Prior to his current appointment, Dr Yap was an Associate Professor at the Faculty of Dentistry, National University of Singapore (NUS).



Dr Adrian Yap

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Dr Yap received his Bachelor's degree with a distinction in Prosthodontics from NUS and his specialty training/Master's degree from the University of London. He obtained his Doctor of Philosophy from NUS in 2001. In addition to his dental and research training, Dr Yap also holds a Graduate Diploma in Psychotherapy from the Faculty of Medicine, NUS.

Dr Yap has authored more than 140 international refereed journal articles, 190 conference papers and 3 book chapters. He serves in the editorial boards of a number of journals including Operative Dentistry (USA), American Journal of Dentistry (USA), Practical Procedures and Aesthetic Dentistry (USA) and is the Editor of the Singapore Dental Journal.

Temporomandibular Disorders (TMD) and bruxism are Dr Yap's clinical passion. He has lectured internationally and conducted courses on TMD and sleep-related dentistry throughout Asia. Dr Yap's research focuses on the biopsychosocial characterization of Asian TMD patients and the development of innovative diagnostics/treatment modalities.

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Dr Juliet Tay obtained her Bachelor of Dental Surgery degree from the National University of Singapore where she received numerous awards, including the FAC Ohlers Award for the best clinical student and the prestigious Lee Kuan Yew Gold Medal for the best overall graduate.

Following a two-year posting as a dental officer at the National Dental Centre, she was awarded a traineeship to undergo specialist training in Oral and Maxillofacial Surgery. She completed her specialist training and graduated with a Masters of Dental Surgery degree. She was admitted as a Fellow of the Royal Australasian College of Dental Surgeons during the second year of her specialist training.

Her clinical interests include dental implantology, orthognathic surgery (jaw reconstruction), dentoalveolar surgery, maxillofacial trauma, as well as oral pathology. Passionate about patient care and the latest developments in implantology, she is actively involved with research on bone physiology and advances in implant design. Dr Tay has published in international journals and presented at international conferences. She has also taught with the undergraduate programme at the National University of Singapore.

Dr Tay is a member of the Association of Oral and Maxillofacial Surgeons (Singapore) as well as a fellow of the International Association of Oral and Maxillofacial Surgeons. She has also been involved in dental charity mission trips in the region organised by UNIFEM.

Profiles Of Authors

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Dr Winston Tan is a private practitioner with clinics at Mount Elizabeth Medical Centre and Camden Medical Centre, Singapore. He received his Bachelor of Dental Surgery in 1992 (with a distinction in Oral and Maxillofacial Surgery) and his Masters of Dental Surgery in Oral and Maxillofacial Surgery in 1997, both from the National University of Singapore.



He is a Fellow of the Royal Australasian College of Dental Surgeons and also a Fellow of the Academy of Medicine, Singapore.

Dr Winston Tan

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He served as assistant professor in the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, National University of Singapore from 1997 to 2003. While with NUS, he spent time at the Karolinska Institute in Stockholm, where he conducted research on an overseas attachment scholarship.

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Dr Tan has conducted many workshops and lectures related to implant dentistry and Oral and Maxillofacial Surgery both in Singapore and internationally.

His current clinical work encompasses oral implantology, dento-alveolar surgery, orthognathic surgery and management of oral pathology.

A close-up, low-angle shot of a family of four (mother, father, and two children) smiling and huddled together. A dental professional's hand is visible on the left side of the frame. The background is a bright, clear blue sky.

chapter 1: Treatment Options

Throw the dentures away. They are a pain in the neck or mouth. Implants are comfortable, no problems and carefree (as long as you clean them). Also, you will have the most beautiful smile to face the world for the rest of your life.

Angela Sansom
homemaker, Kenya

I have lost my teeth. Do I have to replace them? What happens if I do not?

The possible consequences include:

- Drifting of adjacent teeth and over-eruption of opposing teeth into the empty spaces resulting in food trapping and possible decay
- Difficulty in eating possibly resulting in indigestion
- Loss of youthful appearance
- Loss of lip support
- Difficulty in speaking especially if you have lost your front teeth
- Bone loss in areas where teeth used to be. This may lead to loss of facial contours which will affect your appearance

What are my options for replacing the missing teeth?

There are three main options, namely:

- Dentures
- Fixed bridges
- Implant-supported crowns or bridges

What are dentures?

Dentures are removable appliances with artificial teeth. There are two types:

- Partial dentures – if you have lost some of your teeth only. They usually come with visible metal hooks wrapped around surrounding teeth for stability and retention
- Complete dentures – if you have lost all your upper or lower teeth

They are made of wholly plastic or a combination of plastic and cobalt chromium, a form of metal.



Figure 1: A plastic complete denture replacing all the missing lower teeth

Figure 2: A plastic lower complete denture seated in the mouth



You need to remove the dentures daily for cleaning and they should not be worn during sleep. They may move during eating especially for complete lower dentures because they rest on a smaller surface of bone, thus making retention of the dentures problematic. Upper dentures also tend to interfere with speech. You may have to take a while to get used to them. Dentures also tend to accelerate bone loss which make denture-wearing more uncomfortable in later years.

Dentures need to be adjusted and relined periodically and replaced every 3-5 years.



Figure 3: A cobalt-chromium partial denture replacing only two front teeth.

What are bridges?

A bridge is essentially several artificial teeth joined together to replace missing ones. Your dentist has to make permanent changes by grinding the adjacent healthy teeth. This may compromise the life expectancy of these teeth but is necessary to create space to support a bridge which is essentially several artificial teeth joined together to replace the missing ones. Bridges are usually made of porcelain and gold and held onto the supporting teeth by dental cement. Through time, the cement may deteriorate allowing bacteria to attack the underlying teeth thereby causing dental decay and increasing the risk of additional tooth loss. Gum tissues also tend to shrink over time exposing the junctions between the bridges and supporting teeth.

Figure 4: Adjacent teeth have to be reduced in size (lower left) to provide space for a three-unit bridge (lower right and far left) to be seated over them to replace the single missing tooth in the middle (far right).

Bridges need to be replaced about every five to ten years due to wear and tear and leakage.



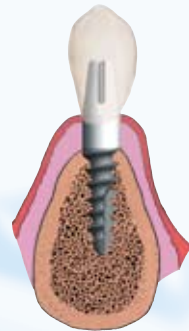


Figure 5: The gums have receded and exposed the junction between a ten-year old bridge and the underlying teeth making it unsightly. Leakage has also set in and caused decay.

What are dental implants?

Dental implants are root-like structures made of titanium, a material which our body easily accepts. They come in all shapes and sizes.

They can be used to replace as few as one tooth or all the teeth in the mouth. Other applications include replacing missing eyes, ears, noses and fingers.

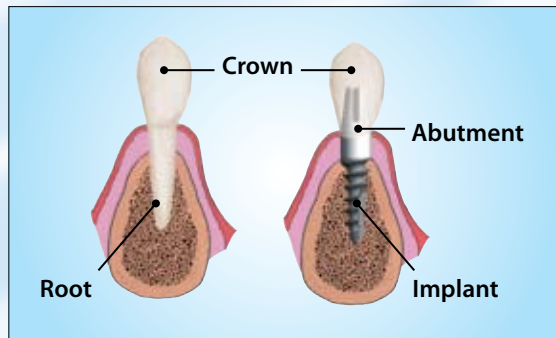


How do dental implants work?

Implants are artificial roots which are inserted into the bone to replace the natural roots you have lost. A strong bond is formed between the implants and the bone over several weeks or months. The implants provide a stable foundation for crowns, bridges or dentures which are placed over them. An abutment is the interface that connects the new tooth to the implant.

Due to the extreme stability of the implants, the new teeth are very firm and make eating and chewing feel as natural and comfortable as your original teeth. They can also be made to look very real too. Implants also slow down bone loss.

Figure 6: Diagram (right) showing the similarities between an implant-supported crown and a natural tooth. Such a crown (below) does not require the adjacent teeth to be ground down unlike conventional fixed bridges.



How many teeth can implants replace?

They can be used in all kinds of situations even if you have lost only

- One tooth
- Several teeth or
- All the teeth

What is the track record of dental implants over the long term?

They have been scientifically tested and documented for over forty years. The long term success rate is as high as 95%.

What are the advantages of dental implant therapy?

It is an advanced treatment that most closely mimics natural teeth in look, feel and function such as speech and chewing.

Implant-supported teeth will not move during function unlike non-implant-supported dentures.

It minimizes bone loss.

It minimizes changes to adjacent healthy teeth.

It preserves facial contours and appearance.



Figure 7: Implant-supported and conventional crowns can be made almost indistinguishable from natural teeth

Can you show me some examples of implant-supported teeth?

Case 1

A 40-year old gentleman complained of eating difficulties as he had lost his molars on the upper and lower right side. Implants were inserted as shown in the radiographs. Porcelain crowns were then made (Figure 7) and cemented over the implants. In this case, the adjacent teeth also needed new crowns as they had broken down but the roots were still intact and implants not needed. The appearance of the new crowns was matched to his other natural teeth.

Case 2

A 35-yr old Chinese lady initially had a 5-tooth long fixed bridge at the upper right side. The bridge kept dislodging and eventually broke as the span was too long. She opted for three implants to be inserted and new crowns made over them (Figure 8). The two adjacent teeth that used to support the bridge were unfortunately damaged and needed new crowns too. She now has five new crowns each supported by either a natural tooth or an implant. The appearance was matched to the opposing lower teeth. Had she placed implants at the beginning, it would not have been necessary to involve the adjacent teeth.

Figure 8: Photos showing the similarities between implant-supported and conventional crowns.



Case 3

A 28-year old Caucasian lady fractured her front tooth during sports (Figure 9). The tooth had to be extracted and an implant was placed immediately. It was initially covered by a temporary plastic crown. Six months later, the final crown was made to match the adjacent teeth.



Figure 9: This lady had her broken tooth extracted (top left), implant inserted (top right) and a temporary crown placed all within the span of two hours. This protocol enabled her to have a replacement tooth on the same day she lost her natural one. The final crown (bottom) was made six months later after the wound had healed completely.

Case 4

A 50-year old expatriate banker did not like the look of his 3-unit bridge which was only ten years old (Figure 10). The gums had receded and exposed the unsightly margins. Decay had also set in. He realized that when one part of a bridge failed, the entire bridge had to be replaced thereby making the long term cost rather high. He opted to separate the three teeth by having an implant inserted in the middle. Highly aesthetic all-porcelain crowns were then made over the teeth and implant. He also opted for a screw-retained implant crown which allows it to be unscrewed for maintenance and repair. This means that he is unlikely to need to replace that crown ever again.



Figure 10: An implant was placed in the middle and three new individual crowns replaced the aging three-unit bridge.



Case 5

A 16-yr old Caucasian girl had a congenitally missing upper left lateral incisor (Figure 11). This means she was never born with it. Braces were used to realign her other teeth and create a space for a normal replacement tooth. An implant was inserted into the space and an all-ceramic crown was made over it. Her self-confidence has never been better ever since.

Figure 11: This teenage girl no longer had to be self-conscious about her missing tooth after an implant was inserted.

Case 6

A 48-yr old Caucasian lady had a 3-unit bridge on the lower right side (Figure 12). After several years, it started to get loose at one end. It was impossible to remove the entire bridge without damaging it. As she preferred to reuse the bridge, time was allowed to pass with the hope that the other side would eventually loosen. Unfortunately, the underlying teeth became so badly decayed that they had to be extracted. Two implants were inserted with much difficulty as there was hardly any bone left. Eventually, a new 3-unit implant-supported bridge was made.



Figure 12: Implants are normally placed parallel to each other in order to accommodate a bridge but the lack of bone in this case resulted in the implants being placed otherwise. Special components had to be used before the new bridge could be seated.

Case 7

A 46-yr old German gentleman lost all his upper and some of his lower teeth. He had been wearing dentures for many years and found them uncomfortable. His oral surgeon in Germany placed eight implants in the upper jaw (Figure 13). As he was on a round-the-world tour, he decided to have his upper teeth made in Singapore. Full-arch fixed implant-supported prostheses were fabricated and secured onto the implants by screws. He is now planning to do the same for the lower jaw.

Figure 13: The implants were placed in Germany and the new upper bridge incorporating thirteen teeth were made in Singapore. The seamlessness in treatment over wide geographic distances facilitates patients' mobility without compromising the standard of care during and after treatment.



Case 8

A 59-yr old Chinese lady constantly had problems with the many sets of upper dentures made for her. The pain and discomfort she experienced was due to trauma and bone loss arising from the bite of her lower natural teeth against her gums through the upper denture. Three implants were placed to support a special bar and denture attachment (Figure 14). The use of the bar significantly improved the retention of her new upper denture and prevented trauma to her gums. She is finally able to enjoy all the food that she likes.



Figure 14: A horizontal metal bar (left) connects all the three implants in the upper jaw. An overdenture (right) has an internal attachment that allows it to grip the bar for greater retention and stability. The overdenture can be removed for daily cleaning.

Who are involved in providing dental implant treatment?

Implant treatment typically involves a team comprising

- A prosthodontist or a restorative dentist trained in implant treatment. He will be the one who fabricates the crowns.
- An oral surgeon who will place the implants in the bone
- A technician who helps to make those beautiful crowns.

What is the process of dental implant treatment?

The treatment sequence is as follows:

- Pre-treatment evaluation and treatment planning
- Implant Placement
- Crown placement
- Implant protection and maintenance

How do I know if I'm suitable for dental implants and whether that's the best option for me in the first place?

Everybody's treatment needs are different. It depends on many factors including your health, the condition of your underlying bone and remaining teeth, if any.

It is best that you seek a consultation with a prosthodontist or your dental surgeon so that he can objectively evaluate and explain the options to you.

How long should I wait after tooth extraction to get my teeth replaced by implants?

Ideally implant replacement for teeth should be planned even before tooth extraction! Special care will then be taken for the extraction, with bone preservation methods where required. Immediate implantation after extraction may also be possible.

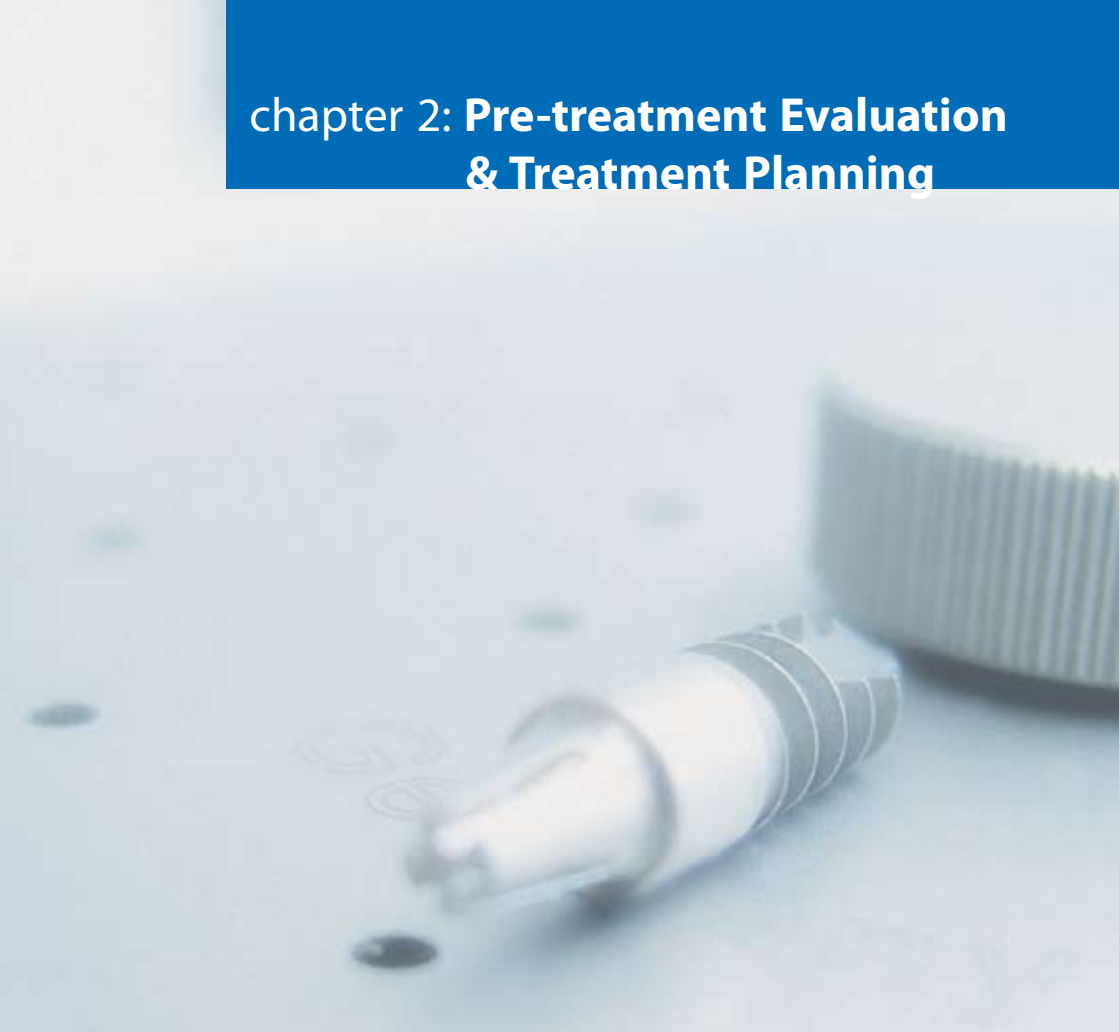
The amount of bone available tends to shrink with time, and the opposing teeth tend to drift into the space left by the extracted tooth. In addition, teeth next to the space also tend to tilt over time making replacement difficult.

In general, tooth replacement should be considered as soon as possible after dental extraction. Occasionally if the infection around the tooth is severe, your dentist may suggest a wait of two to three months after tooth removal. However, the longer the wait beyond this time, the harder it may be for implant placement.

How long will I have to wait until I get my teeth?

Nowadays, it is possible to receive your teeth on the day of surgery. These are usually acrylic teeth. A final set will be made later. The delay for the final set is due to the fact that the bone supporting the implant actually requires a period of healing before it can be fully loaded. This takes anytime from several weeks to a few months. You may be given a denture or temporary bridge in the meantime. In compromised cases, the waiting time is likely to be longer, especially if bone augmentation is involved. Complex cases may even take up to a few years, especially if you do not wish to have all the treatment at once. Your dentist will be best able to advise you on this.

chapter 2: Pre-treatment Evaluation & Treatment Planning



I had a Branemark implant inserted in Singapore ... the implant replaced an existing crown and was painless and trouble-free. I was able to do this without losing any time from my busy schedule. The final result is impossible to distinguish from my natural teeth. I also experienced no problems with eating or speaking. I strongly recommend this procedure for its ease of execution and natural appearance.

Nigel Romano

Banker/Chartered Accountant, Trinidad & Tobago

What happens during the evaluation phase?

Your prosthodontist or dentist will carry out a detailed assessment of your mouth. He will examine your teeth, gums and bone structure. Radiographs will be needed to check the quality and quantity of bone. He may also take impressions to make study models so that he can examine your oral structures from all angles.

He will then explain to you the various options of replacing your missing teeth including the advantages and disadvantages of each.

If dental implants are deemed to be beneficial to you, he will refer you to an oral maxillofacial surgeon for a surgical evaluation.

What does the oral surgeon look for?

The surgeon will determine if it is feasible for the implants to be placed in the optimum positions based on the anatomy of your jaw bone. There must be adequate bone to surround an implant. Should there be a deficiency due to previous bone loss, the surgeon will suggest ways in which he can augment the bone to accommodate the implants.

Sometimes, he may require more detailed radiographs such as CT scans to be obtained by a radiologist at a hospital in order to ascertain the exact anatomy of your bone.

If you have a tooth that needs to be extracted, it may be necessary to wait one to three months before an implant can be placed. During this period, a denture may be made as an interim measure.

A detailed treatment plan formulated by both the prosthodontist and the oral surgeon will then be presented to you before the commencement of actual treatment. Any questions you may have can also be addressed at this point.

chapter 3: Implant Placement

I have been wearing complete upper and lower dentures most of my life. I am already 80 years old and I want to eat comfortably for a change. My new implant bridges have given me just that!

B. Rostron
retired, Chicago, USA



How is the procedure done?

Presently, implant placement is commonly carried out in one stage. This method has simplified the procedure both for patients and dentists. However, not all patients are suitable for this method and the oral surgeon will advise you accordingly.

Single-Stage Treatment

This involves placement of the titanium implant within the jaw bone. Local anaesthetic will be given to numb the area where the implant is to be placed. A small incision is made in the gums to expose the underlying jaw bone and the bone is then prepared to receive the implant. This has to be carried out gently to ensure bone vitality and to maximize success. During this process, you will feel some vibration, similar to that of having a tooth filled. Subsequently, the implant is inserted into the prepared site. The gums are then repositioned and held in place with sutures around the implant, exposing a portion of the implant in the mouth.

Two-Stage Treatment

It is occasionally necessary to stage the implant placement in two parts. This is done for various reasons, usually if the area to receive the implant is sub-optimal, or the treatment is more complex.

The procedure is identical to that of the single stage surgery, except that the gums are closed completely over the implant. The implant is then left to adhere to the bone for a period of three to six months, depending on the quality of the bone. During the healing period, a provisional prosthesis may be fabricated, if desired, until the permanent prosthesis is issued.

When the healing is complete, a small incision is then made to expose the implant and the gums repositioned around the implant. The restorative process is then similar for both the single-stage and two-stage techniques.

In what situations are bone augmentation procedures necessary ?

Depending on your condition, additional bone augmentation procedures may be necessary prior to the implant placement. A key to implant success is the quantity and quality of the bone where the implant is to be placed. Over a period of time, the jawbone associated with missing teeth atrophies or is resorbed. This often leaves a condition in which there is poor quality and quantity of bone suitable for placement of dental implants.

Sinus lift procedure

The back part of the upper jaw has traditionally been one of the most difficult areas to successfully place dental implants due to insufficient bone quantity and quality and the close proximity to the maxillary sinus. A sinus lift procedure involves elevating the sinus membrane and placing a bone graft onto the sinus floor. Sinus augmentation has been shown to greatly increase your chances for successful lasting implants.

Ridge-augmentation

In severe cases, the jaw bone has resorbed so much that it is impossible to place an implant fixture. A bone graft is necessary to increase ridge height and/or width.

These procedures may be performed separately or together, depending upon the individual's condition. There are several areas of the body which are suitable for obtaining bone for grafting. Bone grafts can be taken from inside the mouth, in the area of the chin or third molar (wisdom tooth) region or in the upper jaw behind the last tooth. Additional sources of bone may also be obtained from animals or synthetic materials.

Will the treatment be painful?

The discomfort experienced after the placement of implants is generally equivalent to that experienced from the extraction of a tooth.

Most implants are placed using local anaesthetic only. Sedation can be used with the more apprehensive patients and occasionally, if extensive surgery is required, a general anaesthetic may be recommended.

What precautions should I take before surgery?

Before or after the surgery you may be asked to take oral antibiotics and use antiseptic mouthwash. You will also be asked to brush your teeth carefully the morning of your surgery. If you smoke, you should stop smoking at least two weeks before the surgery, as smoking has been shown to decrease the success rate of implant placement significantly.

What happens after surgery?

As with all surgical procedures, there may be mild discomfort and swelling. An ice-pack held to your face will reduce the swelling. The medication prescribed should adequately control the pain.

The first day after the surgery, you may drink liquids and start a soft diet. Take your antibiotics and pain medications as prescribed and continue to use ice-packs and gauze as needed. Proper home care with frequent rinsing helps prevent infection and assists the healing process. Tooth brushing should commence although the surgical area should be avoided for the first two weeks.

The sutures are removed one to two weeks after the surgery. At two weeks you will be asked to clean your mouth with a soft-bristled toothbrush to prevent plaque build-up.

When can I resume my normal activities?

Most people return to work within a day or two of surgery. One to two weeks after surgery, your old denture may be relined to ensure a better fit.

You can then wear your denture, which may have to be adjusted during the healing period. Should any soreness develop, be sure to contact your dentist who will relieve the pressure under your dentures.

IMMEDIATE IMPLANT LOADING (SAME DAY TEETH)

What is immediate implant loading?

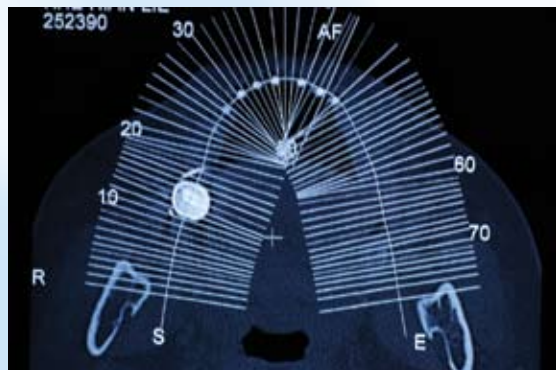
Under certain circumstances, it is possible to provide you with teeth on the same day or within a few days of implant placement (Figure 15).



Figure 15: The dentures were made on the same day that the implants were inserted

Teeth are prepared based on impressions (models) of your jaws or from the CT scans taken before placement (Figure 16). Occasionally, they may even be prepared from stock teeth by the chair-side. The teeth may be temporary teeth (in tooth-coloured plastic) or even the final teeth (porcelain/metal crowns).

Figure 16: CT scans are sometimes required to enable your surgeon to study the detailed anatomy of your jaw bones



Why should I consider immediate implant loading?

Immediate implants have the advantage of minimizing the time that you have to be without teeth, or wear a replacement denture/temporary bridge. Under special circumstances, the final teeth may be made on the same day.

Is everyone a candidate for immediate implant loading?

Not everyone is suitable. This is usually dependent on various factors such as the quality and quantity of the jaw bone, the amount of bite force that the teeth have to absorb and the type of implant used. Infection around the implant area is occasionally a reason for not loading or even placement of the implant. It is important to understand that the bone has not had enough time to grow to the surface of the implant, and excessive movement of the implant will result in failure.

Do immediate implants have a higher chance of failure?

Under carefully controlled conditions, immediate implant loading does not lead to increased chance of implant failure. However, strict protocols are usually necessary to achieve predictable results. Indiscriminate immediate loading is likely to lead to high failure rates.

Are immediate implants more costly?

Ironically, some immediate implants may cost less than their conventionally – loaded counterparts! There are certain cost savings to having a single procedure done, and this may also be offset against the need to place a temporary denture or bridge while healing is taking place. In some situations however, they may cost more, as additional procedures are sometimes required. Special scans and computer-aided placement may also be necessary in more complex cases, which will increase the final treatment fee.

COMPUTER SOFTWARE AND IMPLANT PLACEMENT

Does computer technology have a place in dental implant placement?

Computer-aided systems may be used to help accurately place implants. Planning can also be done using these systems. Some computer systems (example SIMPLANT) also allow for guides to be made to help the surgeon (Figure 17). The majority of computer systems require information from a CT scan of your jaws.

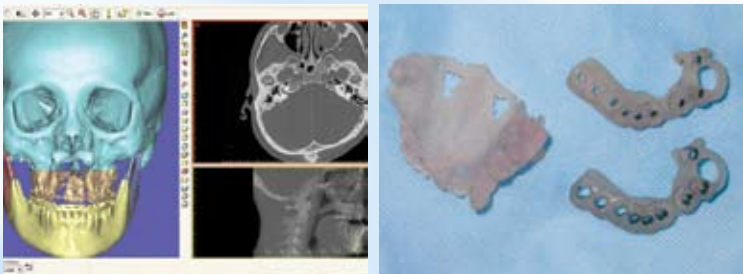


Figure 17: CT scans (left) are used to guide the construction of highly accurate surgical guides (right) for use in implant placements

How do these systems help your dentist?

The systems can help your dentist look at the amount of bone available for the implants, often from a 3D point of view. In addition, many of these allow for planning of the implant position and angulation. Some will even facilitate the construction of teeth over the implant.

Should these be used in every situation?

Although most patients will benefit from this, not every situation requires computer-aided implant placement. The benefits of accurate implant placement have to be weighed against the cost and added inconvenience of taking a CT scan. Your dentist should be able to advise you on the need for such software.

OTHER USES OF IMPLANTS

Are there any other applications of implants?

Implants may be used to retain different restorations – ear, eye, nose and even finger (Figure 18) and hand prostheses may be held in position with implants. Implants are inserted into adjacent bony structures and act as retentive supports for the prosthesis.



*Figure 18: An implant-retained finger prosthesis (with ring)
– Photo courtesy of Dr Lim Beng Hai.*

chapter 4: Crown Placement

I am absolutely delighted with my recent dental implant.

The surgery was completely pain-free at all stages, and I would happily reassure anyone contemplating this procedure. There was quite a long period between losing my own tooth and the implant being finally in place, but the wait was definitely worth while. I now have a completely natural-looking and natural-feeling tooth.

Julie Evans

*Community Liaison Officer,
British High Commission Singapore*



What happens after implant healing is completed?

By this time, the implants would have integrated with the bone and you are ready for the next phase of making the artificial teeth.

You will return to your prosthodontist or restorative dentist to continue with the treatment, which will involve the following steps:

- Impression taking of the implants, remaining natural teeth and gums.
- Fabrication of the teeth in a dental laboratory by a highly skilled dental technician.
- Trial fitting of the artificial teeth over the implants. The teeth will be matched in terms of color, shape and size. Sometimes, it may take several visits before achieving this.
- Delivery of your new teeth.
- Review and sealing of screw access holes, if any.

What are screw access holes?

There are two ways the new teeth can be secured to your implants:

Cement-retained – titanium components called abutments are firstly screwed onto the implants. The artificial teeth are then glued onto the abutments. Once cemented (Figure 19), it is virtually impossible to retrieve the crowns.



Figure 19: Healing cap (left) covering underlying implant. Cement-retained crown (right) secured onto implant



Figure 20: Screw-retained crowns with access holes before being sealed with tooth-coloured fillings

Screw-retained – instead of being glued, the artificial teeth are held onto the underlying abutments by screws. This requires openings (Figure 20) to be made at the top of the artificial teeth for the screws to pass through. These holes are not visible when you smile as they are sealed with tooth-coloured filling material.

Which is better – cemented or screw-retained?

Screw-retained crowns offer retrievability should there ever be a need to remove the crowns for repair before reinstalling them in your mouth. Cemented crowns cannot be removed without firstly being destroyed after which new crowns will have to be made thereby increasing the overall long term costs.

However, cemented crowns have the advantage of not having the access holes which may be a cosmetic issue to some.

The likelihood of having to retrieve the implant crowns is low as most of them function very well without giving any problems.

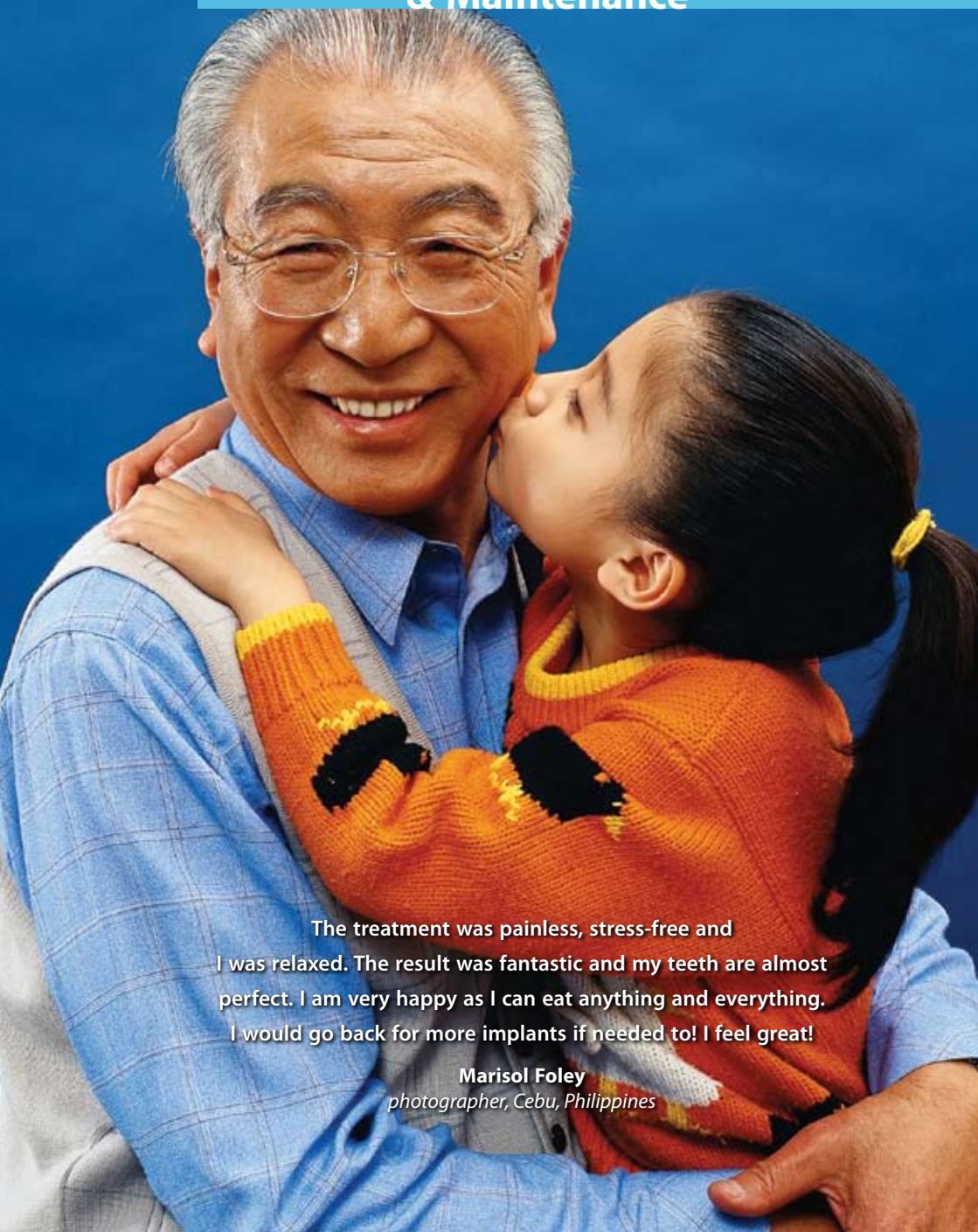
How long does it take to make the new teeth?

Depending on the complexity of the prostheses, it may take one week to a month to make them.

How soon thereafter can I begin to eat and function?

You should be able to function immediately after the prostheses have been installed in your mouth. Your dentist may seal the screw access holes at a separate visit. He or she may also want to see you again for a final review.

chapter 5: Implant Protection & Maintenance



The treatment was painless, stress-free and I was relaxed. The result was fantastic and my teeth are almost perfect. I am very happy as I can eat anything and everything. I would go back for more implants if needed to! I feel great!

Marisol Foley
photographer, Cebu, Philippines

What causes implant failure after crown placement?

Implant complications after crown placement can involve both structural components and surrounding tissues. Suggested causes include (a) medical conditions (e.g. diabetes, smoking etc), (b) reduced body resistance, (c) plaque accumulation and (d) stress from your bite. It presents as gum redness/swelling, bone loss as well as implant mobility.

How are implants stressed by my bite?

Implants lack the stress release provided by the ligaments that surround natural teeth. Loads applied to crown materials and bone around the implant is therefore potentially more damaging. Reversible problems include loosening or fracture of crown components. Irreversible complications can include bone loss, breakdown of the interface between implant and bone, or implant fracture. The problem is worse if you grind and clench your teeth (condition known as bruxism) as the loads applied to your implant and teeth can be up to 100% higher than during chewing.

What is bruxism and what causes it?

Bruxism is the unconscious gnashing, grinding or clenching (squeezing together) of teeth in non-chewing movements. It occurs in about 30% of people and 80% of bruxers are unaware of their habits. Bruxism usually takes place during sleep but can also occur when you are awake. Although the exact cause of bruxism is not known, current scientific studies suggest that it is regulated by physiological and psychological factors including altered brain chemistry, genetics, coffee consumption, stress and anxiety.

How do I know if I suffer from bruxism?



Figure 21: Patient with severe tooth wear due to bruxism

You may be suffering from bruxism if you have (a) worn, sensitive, mobile or fractured teeth (Figure 21), (b) frequent fracture or dislodgement of fillings, (c) jaw, ear or headache and (d) jaw joint clicking or locking. The latter two groups of complaints are part of a cluster of neuromuscular and musculoskeletal conditions known as Temporomandibular Disorders (TMDs). Active bruxism can only be determined by the use of diagnostic mouthguards (splints) or a novel device known as the “BiteStrip” (Figure 22) that can establish the frequency of bruxism.



Figure 22: The BiteStrip device for diagnosing active bruxism (courtesy of SLP)

Can I still have implants if I am a bruxer?

Yes, you can still have implants if you are a bruxer. Your dentist will modify the bite/design of your crown or select a more shock-absorbing and repairable crown material (e.g. ceramic composite system). By far, the most effective way of protecting your implant-crown is the use of dental mouthguards. Mouthguards are only worn at night and day-time bruxism is managed by habit and behaviour changes.

What kind of mouthguard should I get?

The type of mouthguards (splints) that you should get is largely dependent on the number/location of your implants and severity of your bruxism. Soft mouthguards are not as durable as hard splints made from acrylic and cannot be easily adjusted. Mini splints such as the MCI (MyoHealth Clenching Inhibitor) (Figures 23 and 24) are particularly useful for bruxers with posterior implants. Dental splints are worn during sleep when bruxism forces are at their greatest.



Figure 23: The MyoHealth Clenching Inhibitor (MCI)



Figure 24: The MCI inhibits the forces of clenching by up to 70%.

How do I take care of my implants?

Implants should be treated with care. They must be kept clean and plaque free twice a day using a small soft toothbrush and floss. Special attention should be given to all sides of the implant. Cleaning after meals is encouraged where practical. Other supplies may be recommended by your dentist and includes (a) anti-bacterial mouth rinses, (b) special floss with foam coating, (c) special interdental brushes and (d) plaque disclosing tablets. Careful maintenance of your implants will ensure that they will serve you well for years to come.

Do I need to get my implants checked by my dentist on a regular basis?

You will need to visit your dentist at least twice a year to have your implants, gum and jaws checked. Actual frequency of maintenance visits is largely dependent on your individual circumstance. The implants and crowns will be examined and cleaned with special instruments. X-rays are usually taken on an annual basis to assess bone health and implant stability. During such maintenance visits, daily care procedures are also reinforced.

chapter 6: **Complications**



For me the implant process has been a little more complicated than most but well worth the end result. Although not without some discomfort during the initial stages, I am so comfortable with my implant now that I can hardly discern it from my real teeth, and would repeat the process without question again should the need arise.

Fenella Dobson

TV Presenter/homemaker, New Zealand

Implants are an established treatment modality with a long history of clinical success. However, all medical procedures have inherent risks and complications. These are generally minor and manageable. They include those related to:

- 1 the implants and
- 2 the artificial teeth that sit on the implants

1 Complications relating to the implants

- Breakdown in bone-implant junction

The fusion of the implant to bone is known as osseointegration. Clinical studies have shed some light on its success. Approximately 90% of fixtures in the upper jaw, 95% in the front lower jaw and 90% in the back lower jaw are still in function after 10-15 years.

Loss of osseointegration may occur after implant placement, crown placement or after years of usage. The implants may become loose or unstable and will need to be removed. The implant site will heal within a period of three months after which a new implant may be inserted.

- Inability to use the fixtures for prosthetic rehabilitation. These implants may be left alone in the bone without usage.
- Bone resorption may occur around the necks of the fixtures. This may require additional bone grafting procedures to rectify the situation.
- There may be a slight risk of permanent numbness to the lips and chin, as well as injury to the teeth adjacent to the implant.

There is a higher risk of complications in certain individuals, for example, uncontrolled diabetics and

heavy smokers. Your dental surgeon will carefully plan and discuss your concerns in detail with you.

2 Complications relating to the artificial teeth

- ***Chipped teeth***

Like natural teeth, artificial teeth may undergo wear and tear over the years. The material used to make them include porcelain and acrylic. They may chip or break. For screw-retained designs and where the damage is relatively minor, the teeth can be unscrewed and sent to the lab for repairs. For cemented designs, the teeth will have to be removed, a process which may destroy them. New crowns will then have to be made.

- ***Loosening of screws***

Depending on the design, there may be one to two screws holding the artificial tooth to the underlying implant. Although the screws are tightened to specific torques to prevent loosening, it is theoretically possible that they may loosen over time if the load is excessive or if the tooth does not fit well in the first place. Your dentist should be able to retighten the screws. However, if it is a cemented design, the overlying tooth may be destroyed during removal and a new one will have to be fabricated.

- ***Gum inflammation***

It is important that you keep your implants clean. Poor oral hygiene can cause the gums surrounding the implant to become irritated, swollen and bleed easily. In severe cases, it may even lead to loss of the implant. Regular visits to your dentist is therefore important.

A photograph of a family of four outdoors. A man with short brown hair and a white shirt stands in the background. A woman with long blonde hair and a white t-shirt is in the middle ground, smiling. Two young girls are in the foreground; one is on the left, smiling, and the other is on the right, looking towards the camera. They are all in front of a house with greenery.

chapter 7: Financial Considerations

The entire implant treatment was hassle-free and pain-free.
Had I known this earlier, I wouldn't have made the
three-unit bridge on my upper front teeth ten years ago.

Maria Anita
homemaker, UK

Dental implants and their replacement teeth provide

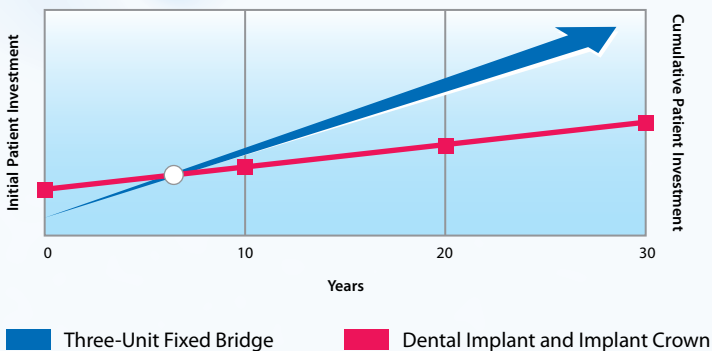
- Better chewing ability
- Improved appearance
- Greater self confidence and quality of life
- Increased durability

A relatively young person who replaces a missing tooth or teeth with a fixed conventional bridge or denture will expect to have to change it once every five to ten years throughout his life as opposed to implant-supported crowns which are essentially permanent and need only minimal low-cost maintenance.

A single-tooth implant and crown will initially cost more than the fixed bridge but the difference is equalized within several years. The lifetime cost of an implant crown is therefore far less than either a denture or a bridge. It is even more significant considering the biologic costs of cutting down good healthy adjacent teeth when making fixed bridges.

Patient Cost For Single-Tooth Replacements

The cost differential of a single-tooth dental implant and implant crown versus a three-unit fixed bridge to replace a single missing tooth.¹



1. Blackwell, R, Lowe, R, Morris, G, Priest, G *Implant Economics, A Supplement to Dental Practice Report*, September 2004.

Testimonials

The authors wish to thank all their patients below for the privilege of managing their treatment.

Finally, for the first time in my adult life, I am able to eat meat.

Paul J, *60-year old cleft palate patient, Chicago, USA*

I am 67 years old and have been wearing dentures for many years. Recently I went through the treatment and thanks to dental implants, I am once again able to enjoy my food without the slightest pain.

Suharno Gunawan, *retired, Jakarta, Indonesia*

After life with a denture for around 15 years, the decision to have implants was a difficult one. My own experience with dentistry filled me with trepidation. I am happy to report that the discomfort was kept to a minimum and the treatment has been very successful. The quality of life after implants is much greater and I can highly recommend the procedure. I was kept well informed before, during and after the procedure and given the very best of care.

Mary B, *business manager, Australia*

For years I have had problems with ill-fitting dentures. Dental implants have helped to improve the quality of dentures and thus, have also improved the quality of my life.

Mdm Chew A Y, *retired, Singapore*

After having my two teeth implanted with absolutely no pain, I feel more self confident and comfortable to eat anything now.

Herman Wong, *businessman, Jakarta, Indonesia*

From start to finish, all concerns and details were explained extremely clearly to me and my husband. I never felt pressured to commit to anything I was unsure of. I never felt any pain during the treatment. Ever since it was completed, I have been very happy and to date have not had any problems with the implant. I know I can smile with confidence and I am so proud of my two very straight front teeth!!!! Sure it was costly but I tell people not to be put off by this and talk to the dentist about payments. Teeth should be for life and I wouldn't want to be without mine.

Verna Gardiner, *homemaker, Italy*

My implants with the new teeth feel like my original teeth but the new teeth look much better.

Andreas von Ankershoffen, *retired, yacht owner and sailing around the world, Germany*

My surgeon and prosthodontist said that I had set them a new challenge. Indeed I had. My implant bridge was going to test their expertise to the limits! I wasn't disappointed – the results are fantastic and the procedure completely pain-free!

Dorothy Docherty, *homemaker, UK*

I found implantation of the receptor, including its bonding to the jaw bone, time consuming and the associated temporary crown somewhat bothersome, but the subsequent permanent implant crown was a gem, i.e., well-fitted, level with adjacent molars, solid, comfortable to chew on – and so much better looking than its neighbours. Flossing after meals is still a must, but that goes for my entire set of teeth. My implantation was well worth the pain, time and expense.

T. Juul-Dam, *Business Development, Indonesia*

Testimonials

When my left lower bridge failed and the teeth required extraction, I was at first not contemplating implants as replacements. This was simply due to ignorance. I changed my mind after receiving detailed explanations regarding the life-long benefits of implants. I was very happy with the whole procedure and each step was explained in detail. It was surprisingly much less painful than I had anticipated. After the healing period was over, the clinic handled the measurements for the crowns and did an excellent job. I did not have to return for any additional adjustments.

Let me reiterate that my implants have been perfect and I have had no discomfort whatsoever. I can chew any food I like and it is as if the implants are just like ordinary teeth. If I should need any teeth extractions in the future, I would not hesitate to insist on an implant again.

Svend Hansen, *retired, Florida, USA*

Having worn dentures for over 20 years, I was entreated by the possibility of leading a “denture-free” life. Although there was some initial discomfort, the results were beyond my highest expectations. The appearance of my teeth has improved immeasurably and I have rediscovered the joy of being able to eat anything that I want without any concern at all. It is no exaggeration to say that the quality of life has improved significantly since I have undergone this process and I would unreservedly and wholeheartedly recommend this treatment.

David Skillen, *shipping, UK*

Pretty, painless & PERFECT!

C. C., *student, Nanyang Technological University, Singapore*

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- **Do you have one or more teeth missing?**
- **Are you about to lose a tooth due to decay or trauma?**
- **Are you currently wearing a denture that is less than satisfactory? Is it uncomfortable? Is it loose or painful when you eat or when you speak? Or do you even wear it at all?**
- **Is your existing bridge starting to leak or show unsightly margins? Is the colour less than ideal?**
- **Is your speech affected by the empty spaces left by the missing teeth? Are your teeth starting to drift into the spaces? Is food getting caught in between the teeth?**
- **Are you still thinking of what to do to replace the tooth or teeth you lost some time ago?**

If any of the above situations applies to you, you may be a candidate for dental implants. In the last twenty five years, millions around the world have significantly improved the quality of their lives after receiving dental implants.

A man in his 60s was able to eat meat for the first time in his entire adult life. A 19-yr old girl regained her self esteem after losing her front tooth in a fall at a nightclub. A professional man in his 40s is no longer embarrassed by his denture flying out of his mouth when he spoke. Countless others started to enjoy eating and speaking better. Their lives were changed... for the better.

Perhaps you too will benefit.

This book was written specifically for you. It will take you on a journey of discovery and understanding through one of the most important innovations in dentistry ever.