

MASTER PLANNING OF THE IMPLANT CASE

Over the past three decades implant dentistry has become the leading and most dynamic discipline in the dental field. Oral reconstruction with dental implants has gone from just single-tooth replacements and over-dentures to encompass sophisticated surgical and prosthetic techniques and principles. Every specialty within dentistry plays an important part in the successful outcomes of these very rewarding cases. This chapter describes the interdisciplinary approach to comprehensive treatment planning and the many facets involved in quality, long-standing aesthetic and functional treatment.^{1,2}

Initial Consultation

The initial consultation, or at least an appointment to expose the patient to implant or other oral reconstruction, can be initiated by a variety of dental practitioners. An orthodontist may evaluate a patient with congenitally missing teeth. An endodontist may determine that a tooth is fractured and is not suitable for endodontics. A periodontist may feel that progressive, uncontrolled or refractory periodontal disease may not benefit from further traditional treatment. An oral surgeon might prepare teeth being extracted for ridge preservation or determine that ridge augmentation will provide optimal support for dental implants. Most often, though, the general dentist, or prosthodontist, sees a patient with reconstructive needs and makes the appropriate initial consultation for treatment.

In the initial consultation the patient's medical and dental status can be identified and evaluated. If implant therapy is an

appropriate option, then a preliminary treatment plan can be developed.

The patient's health status should be evaluated in a way similar to the screening admissions procedure conducted with patients entering the hospital.³⁻⁵ The main components to be considered are:

1. The chief complaint
2. The history of the present illness
3. The medical history
4. The dental status

Chief Complaint

The chief complaint may range from "I don't like how I look" to "I have worn dentures for 37 years, and I can no longer function with them." The focus in evaluation of the patient's chief complaint is whatever factors prompted the person to seek rehabilitation at this time. Sometimes the discussion will reveal concerns beyond those the patient first mentions. For example, patients may say that their dentures no longer function well, but subsequently, they may describe pain during mastication. This additional information can be an important diagnostic aid. If patients cite cosmetic concerns, these must be placed in context. Implant dentistry often cannot match the needs, wants, or desires of the person whose primary goal is to look fundamentally different. However, if functional concerns are the primary goals and cosmetic concerns are secondary, implant dentistry usually can give such patients what they want.

History of Present Illness

The next component of interest is the history of the present illness. The practitioner must identify what in the patient's history produced the present situation, especially in cases in which atrophy in the maxilla or mandible is severely advanced. Did the patient have poor quality care? Did the patient decline to seek any care at all? Did the patient lose teeth prematurely and not have the appropriate dietary intake to sustain good levels of bone support? Has the patient been edentulous for several decades, and did this extended time lead to severe atrophy? Was the patient involved in a traumatic injury: Did a baseball bat, a thrown ball, a fist or some other object traumatize one of more teeth and cause their demise? Was any pathological lesion or tumor involved in the cause of tooth loss and subsequent bone loss?

Medical History

In gathering the patient's medical history, special attention should be given to whether the patient has the ability to physically and emotionally sustain all the procedures that may be required in implant therapy, including surgery, a variety of anesthetics and pain-control drugs, and prosthetic rehabilitation.⁶⁻⁸ The American Dental Association provides a long-form health questionnaire on their website that is an excellent tool for gathering this information, available at https://siebel.ada.org/ecustomer_enu/start.swe?SWECmd=Start.⁹ Figure 5-1 shows an example of a typical health history questionnaire.

In addition to obtaining the patient's health history, the doctor must assess vital signs (blood pressure, pulse, and respiration) and record these assessments in the patient's chart. When a patient has not had a comprehensive medical work-up for several years or when findings are positive on the health questionnaire, additional laboratory testing may be advisable. These tests may include complete blood count, urinalysis, or sequential multiple analysis of the blood chemistry (SMAC).

The results can contribute to the patient's medical profile (Table 5-1).^{2,3}

Combining the information from the health questionnaire, the vital signs, and the laboratory test results will enable the doctor to categorize each patient into one of the five classifications of presurgical risk formulated by the American Society of Anesthesiology (Box 5-1).⁸ According to this scheme, a Class I category includes the patient who is physiologically normal, has no medical diseases, and lives a normal daily life-style. The Class II category includes the patient who has some type of medical disease, but the disorder is controlled with

TABLE 5-1 Complete metabolic panel

Test procedure	Units	Reference range
Sodium	mmol/L	135-146
Potassium	mmol/L	3.5-5.3
Chloride	mmol/L	98-110
Carbon dioxide	mmol/L	21-33
Calcium	mg/dL	8.6-10.2
Alkaline phosphate	Units/L	33-130
AST	Units/L	10-35
ALT	Units/L	6-40
Bilirubin, total	mg/dL	0.2-1.2
Glucose	mg/dL	65-99
Urea nitrogen	mg/dL	7-25
Creatinine	mg/dL	0.60-1.18
BUN/creatinine ratio		6-22
Protein, total	g/dL	6.2-8.3
Albumin	g/dL	3.6-5.1
Globulin, calculated	g/dL	2.2-3.9
A/G ratio		1.0-2.1
Egfr non-African American	mL/min/	1.73 m ² > or = 60
Egfr African American	mL/min/	1/73 m ² > or = 60

BOX 5-1 The American Society of Anesthesiologists' classification of presurgical risk

Patients who manifest systemic disease that interferes with their normal daily living pattern (e.g., inhibits their employment, restricts their social activity, or otherwise does not allow them to function physically and mentally in a normal or almost normal manner) should not be considered as candidates for an elective procedure such as oral implant reconstruction (R,R). Classifying patients according to the following numerical ratings as established by the American Society of Anesthesiology is helpful in the selection process (R):

Class I: A patient who has no organic disease or in whom the disease is localized and causes no systemic disturbances.

Class II: A patient exhibiting slight to moderate systemic disturbance which may or may not be associated with the surgical complaint and which interferes only moderately with the patient's normal activities and general physiologic equilibrium.

Class III: A patient exhibiting severe systemic disturbance which may or may not be associated with the surgical complaint and which seriously interferes with the patient's normal activity.

Class IV: A patient exhibiting extreme systemic disturbance which may or may not be associated with the surgical complaint, which interferes seriously with the patient's normal activities, and which has already become a threat to life.

Class V: The rare person who is moribund before operating, whose preoperative condition is such that the patient is expected to die within 24 hours even if not subjected to the additional strain of surgery.

Class VI: A patient who is considered brain dead and is a potential organ donor.

HEALTH QUESTIONNAIRE

Patient's Name: _____ Date: _____

I. In the following questions, circle yes or no, whichever applies. Your answers are for our records only and will be considered confidential.

1. Yes No Has there been any change in your general health within in past year?
2. Yes No My last physical examination was on _____
3. Yes No Are you under the care of a physician? _____
If so, what is the condition being treated? _____
4. Yes No Name and address of physician _____
5. Yes No Have you had any serious illness or operations?
If so, what was it? _____
6. Yes No Have you been hospitalized or had a serious illness within the past five (5) years?
If so, what was the problem? _____

II. DO YOU HAVE OR HAVE YOU HAD ANY OF THE FOLLOWING DISEASES OR PROBLEMS:

- | | | | |
|------------|---|------------|--|
| 7. Yes No | Rheumatic fever or rheumatic heart disease | 18. Yes No | Inflammatory rheumatism (painful swollen joints) |
| 8. Yes No | Congenital heart lesions, mitral valve prolapse | 19. Yes No | Stomach ulcers |
| 9. Yes No | Cardiovascular disease (heart trouble,
heart attack, coronary insufficiency,
coronary occlusion, high blood pressure,
arteriosclerosis, stroke | 20. Yes No | Kidney trouble |
| 10. Yes No | Allergies | 21. Yes No | Tuberculosis |
| 11. Yes No | Sinus trouble | 22. Yes No | Do you have a persistent cough or cough up blood? |
| 12. Yes No | Asthma or hay fever | 23. Yes No | Low blood pressure |
| 13. Yes No | Hives or skin rash | 24. Yes No | Venereal disease/herpes/AIDS |
| 14. Yes No | Fainting spells or seizures | 25. Yes No | Other _____ |
| 15. Yes No | Diabetes | 26. Yes No | Have you had abnormal bleeding associated with
previous extractions, surgery, trauma? |
| Yes No | Do you urinate (pass water) more than six times
a day? | Yes No | Do you bruise easily? |
| Yes No | Are you thirsty much of the time? | Yes No | Have you ever had a blood transfusion?
If so, explain _____ |
| Yes No | Does your mouth frequently become dry? | 27. Yes No | Do you have any blood disorders, such as anemia? |
| 16. Yes No | Hepatitis, jaundice, or liver disease | 28. Yes No | Have you had surgery or x-ray treatment for tumor,
growth, or other conditions of your mouth or lips? |
| 17. Yes No | Arthritis | 29. Yes No | Are you taking any drying medicines?
If so, what _____ |

III. ARE YOU TAKING ANY OF THE FOLLOWING:

- | | | | |
|------------|----------------------------------|------------|--|
| 30. Yes No | Antibiotics or sulfa drugs | 36. Yes No | Aspirin |
| 31. Yes No | Anticoagulants (blood thinners) | 37. Yes No | Insulin, tolbutamide (Orinase) or similar drug |
| 32. Yes No | Medicine for high blood pressure | 38. Yes No | Digitalis, or drugs for heart trouble |
| 33. Yes No | Cortisone (steroids) | 39. Yes No | Nitroglycerin |
| 34. Yes No | Tranquilizers | 40. Yes No | Other _____ |
| 35. Yes No | Antihistamines | | |

IV. ARE YOU ALLERGIC OR HAVE YOU REACTED ADVERSELY TO:

- | | | | |
|------------|--|------------|--|
| 41. Yes No | Local anesthetics | 50. Yes No | Do you have any disease, condition, or problem not
listed that you think I should know about? |
| 42. Yes No | Penicillin or other antibiotics | 51. Yes No | Are you employed in any situation that exposes
you regularly to x-rays or other ionizing radiation? |
| 43. Yes No | Sulfa drugs | 52. Yes No | Are you wearing contact lenses? |
| 44. Yes No | Barbiturates, sedatives or sleeping pills | 53. Yes No | Do you smoke cigarettes, cigars, pipe, or chew tobacco?
How many each day? _____ |
| 45. Yes No | Aspirin | 54. Yes No | Do you use recreational drugs? |
| 46. Yes No | Iodine | | |
| 47. Yes No | Codeine or other narcotics | | |
| 48. Yes No | Other _____ | | |
| 49. Yes No | Have you had any serious trouble associated
with any previous dental treatment?
If so, explain _____ | | |

V. WOMEN:

- | | | | |
|------------|-------------------|------------|--|
| 55. Yes No | Are you pregnant? | 56. Yes No | Do you have any problems with your menstrual period? |
|------------|-------------------|------------|--|

Signature of Patient _____

Doctor's Signature _____

Figure 5-1. Health history questionnaire.

medications. The patient can thus engage in normal daily activity. An example of this category of patient is one with hypertension who has been placed on antihypertensive medication and, as a result, has normal blood pressure and no other impairments. The Class III category includes the patient who has multiple medical problems, such as advanced-stage hypertensive cardiovascular disease or insulin-dependent diabetes, with impaired normal activity. Patients in the Class IV and V categories have advanced states of disease. Class VI is a patient who is considered brain dead and is a potential organ donor. For example, a patient in the Class IV category has a serious medical condition requiring immediate attention, such as the

person with acute gallbladder disease who needs immediate treatment. The patient in the Class V category is usually moribund and will not survive the next 24 hours. Most patients who seek implant reconstruction fall into the Class I or II categories and sometimes Class III. For obvious reasons, patients in Classes IV and V are not appropriate candidates for implant procedures. However, consideration of whether a patient falls into Class I, II, or III will enable the implant practitioner to more effectively decide what kinds of procedures should be undertaken, where the surgery should be performed, and what kind of anesthesia is appropriate. Furthermore, cases with patients categorized as Class III may

require preparatory measures such as stabilizing or controlling a diabetic patient before implant surgery can be considered.

Dental Status

It is essential to obtain a comprehensive understanding of the patient's dental, as well as medical, status. In addition to questioning patients about their dental history, a thorough examination should be conducted. An evaluation of the hard and soft tissues of the entire maxillofacial skeleton should be included and appropriate radiographic studies must be obtained.

Today's modern dental offices can provide a host of radiographic information through digital and computer analog equipment that allows unprecedented detail and data applications never available before. Digital panoramic cone beam CT scanners (Figure 5-2) are now readily available. These devices can give studies that accurately define the full scope of the maxilla and mandible, as well as the accompanying vital structures (i.e., sinus, floor of the nose, position of the mandibular canal, mental foramen) (Figure 5-3). In addition, information about the thickness of cortical plates, bone densities, and soft tissue contours is easily obtained. Chapter 8, *Contemporary Radiographic Evaluation of the Implant Candidate*, and Chapter 18, *An Introduction to Guided Surgery*, expand on this technology. There still is a place for conventional film-based radiographs because much valuable information can be learned from them. These might include occlusal films, lateral cephalometric images, and periapical or panoramic images (Figure 5-4).¹⁰ However, with the advent of digital referenced planning software our ability to diagnose and plan procedures virtually takes radiographic diagnosis and treatment planning to a new level (Figures 5-5 and 5-6).

In addition to gathering the dental history, a thorough clinical exam should include the patient's teeth, soft tissue, and hard tissue. Mounted casts also should be obtained, and become an important component of the patient's treatment plan (Figure 5-7).

The patient's facial appearance also should be documented with preoperative extraoral and intraoral photographs (Figure

5-8). In addition to acting as risk management tools, these preoperative documents usually serve as references for all members of the implant team during detailed case planning. Nontangible considerations also deserve attention. The patient's needs, wants, desires, and psychosocial conditions should be ascertained and recorded. Issues of self-confidence and self-esteem should also be reviewed (Figure 5-9).



Figure 5-2. I-CAT cone beam CT scanner installed in a dental office environment.

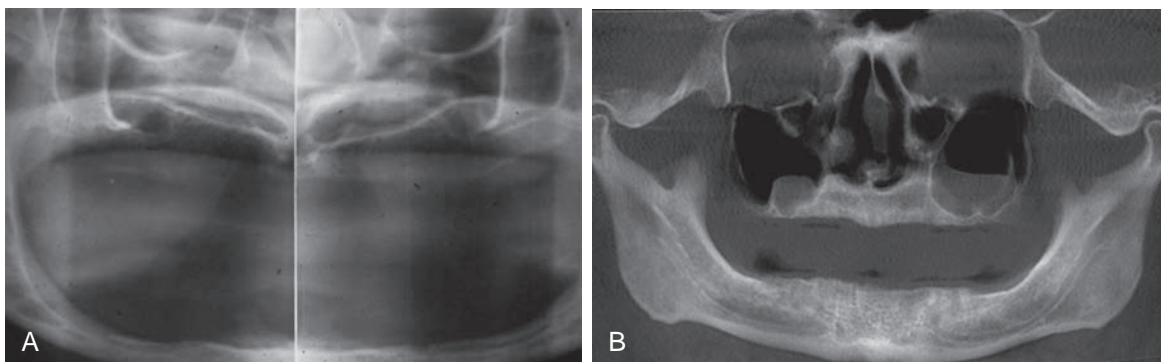


Figure 5-3. **A**, Panoramic radiograph demonstrating severe advanced maxillary and mandibular atrophy. **B**, Panoramic radiograph demonstrating the maxillary sinus cavities, nasal anatomy, defined inferior alveolar canals, and mental foramen.

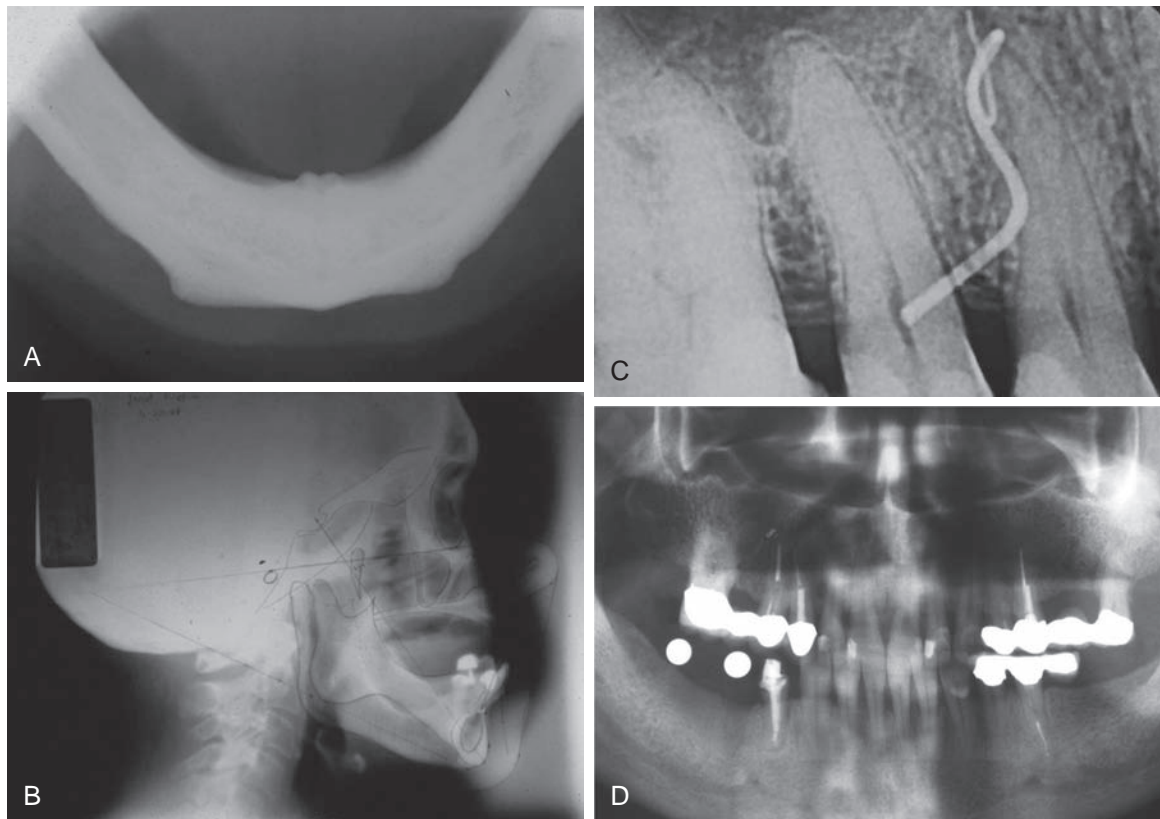


Figure 5-4. **A**, Conventional occlusal radiograph. **B**, Conventional lateral cephalometric radiograph. **C**, Conventional periapical radiograph. **D**, Conventional panoramic radiograph.

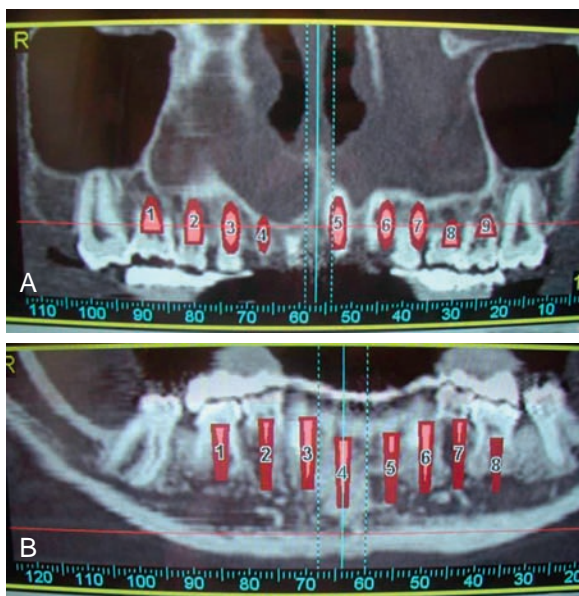


Figure 5-5. CT scan 3-D SimPlant surgical planning program demonstrates a well-planned implant reconstruction in both the maxilla (**A**) and mandible (**B**).

Patient Education

In addition to providing the practitioner with crucial information concerning the patient's needs and wants, the initial consultation also should serve to educate and orient the patient. Various visual aids can assist with this task, including models representing completed forms of single-tooth, multiple-tooth, and full-arch reconstruction (Figure 5-10). Photographs also can communicate to the patient the potential appearance of the final reconstruction in the oral cavity (Figure 5-11). Videotapes and DVDs, available from most commercial companies that sell implants, can demonstrate various implant procedures and provide a general overview. All of these presentation aids should be noted in the patient's chart as risk-management tools.

Printed literature can serve multiple purposes. Brochures that introduce implants and explain how they work can be sent to patients who inquire about implant reconstruction. Patients going through an implant consultation should be given a portfolio of literature to take home. This information will enable them to better communicate with friends and relatives about the process of implant reconstruction. Printed literature also can serve as an educational tool if public education lectures are part of the doctor's practice domain (Figure 5-12).

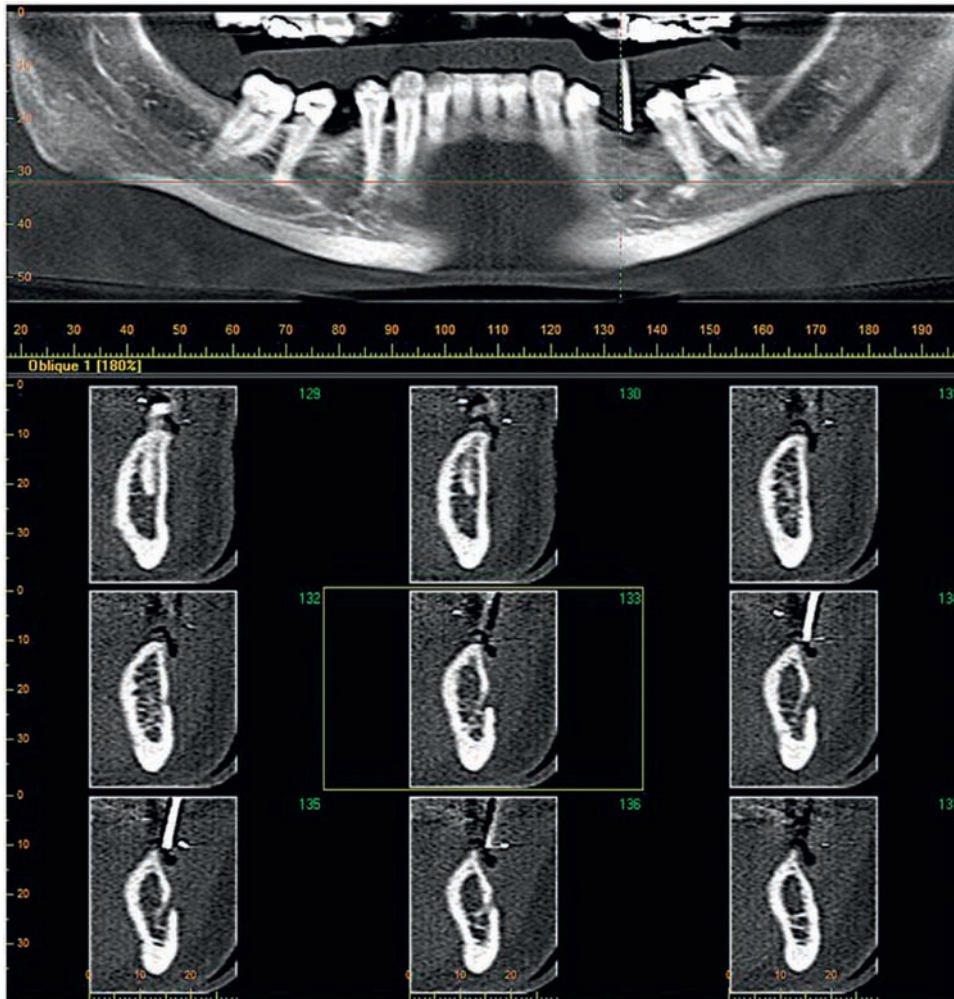


Figure 5-6. A cone beam CT scan demonstrating a panoramic view (*top*) and cross-sectional views (*bottom*) of an intended implant placement.

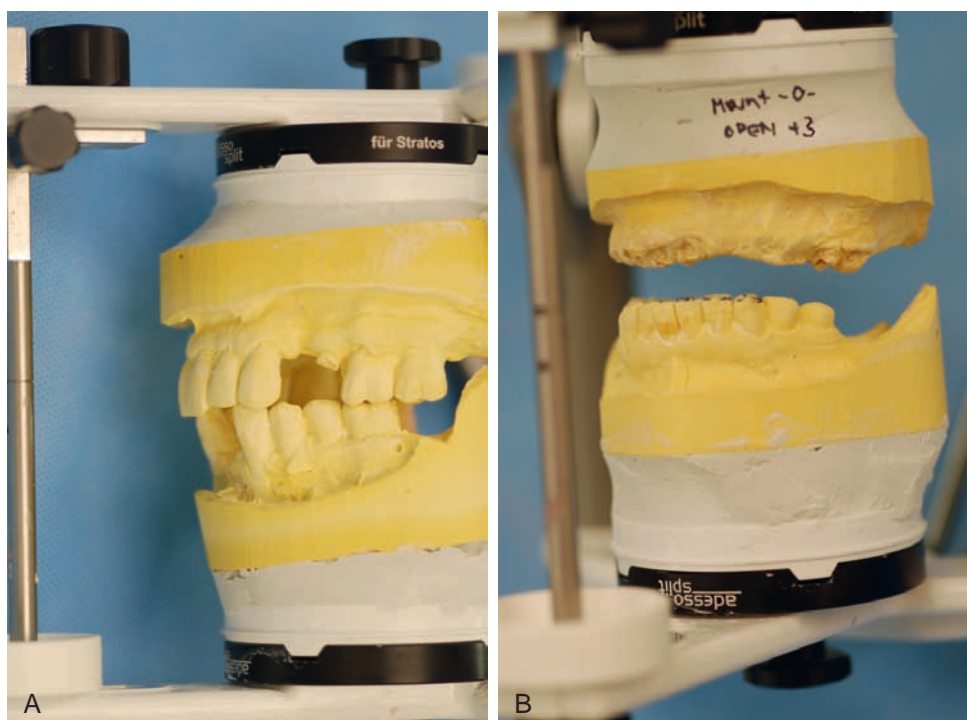


Figure 5-7. A, A study cast mounted in a semiadjustable articulator for the replacement of two bicuspid maxillary teeth. **B,** A study cast mounted in a semiadjustable articulator for the reconstruction of an edentulous maxilla.

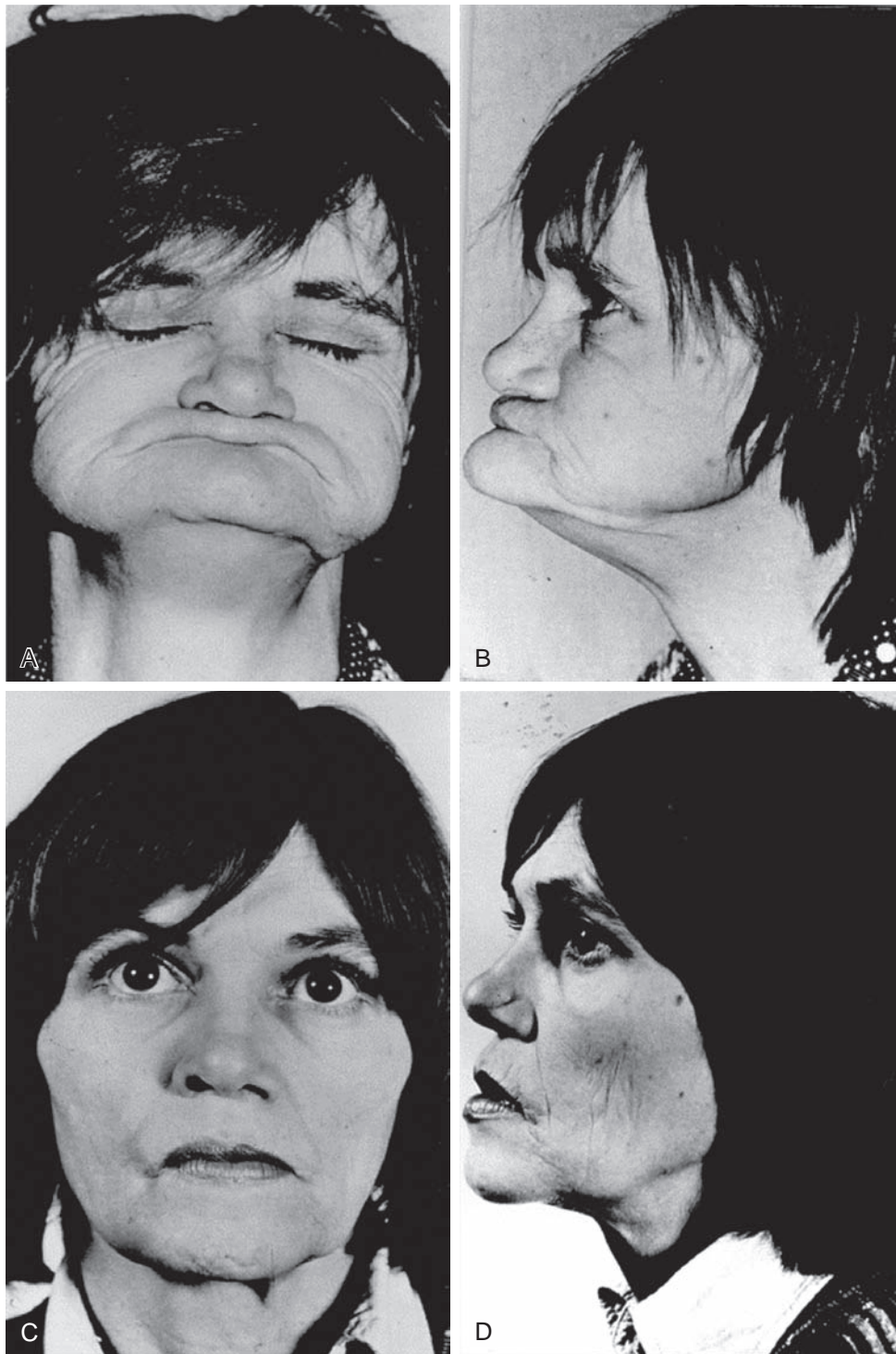


Figure 5-8. This series of facial photographs demonstrates the need to obtain pretreatment facial documentation (**A** and **B**; **E** and **F**) so that a valid comparison can be made with the final postsurgical/prosthetic results (**C** and **D**; **G** and **H**). (From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, The Dental Implant Center Press, 2004.)



Figure 5-8, cont'd.



Figure 5-9. The loss of self-esteem and self-confidence is evident in the patient's facial features. (From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, 2004, The Dental Implant Center Press.)

Joint Treatment Planning

The next phase in the treatment planning process involves the entire implant team. This phase typically begins with a conference between the surgeon and restorative dentist. Other specialties (e.g., periodontology, endodontics, orthodontics) may participate in this initial discussion and the hygienist or laboratory technician may also be included. The planning conferences, which often bring key individuals together physically but may also be conducted via telephone or email, provide opportunities for the team to review the patient's chief complaints, expectations, history, and current medical and dental status. Based on all this information, team members can formulate a detailed treatment plan (Figure 5-13).

Some patients must undergo one or more preliminary procedures before the treatment plan can be completed. If the patient's oral hygiene is poor or marginal the patient may need to make improvements and be reevaluated over a 6- to 12-month period (Figure 5-14). In more complex cases, orthodontic (Figure 5-15) or orthognathic procedures (Figure 5-16) may be necessary to correct abnormal jaw relationships before the patient is treated with implants. Periodontic, endodontic, prosthetic restorative, and oral surgical procedures may need to be performed with extractions (Figure 5-17).

In the course of this preparatory phase, some patients may be found to be inappropriate candidates for implant recon-

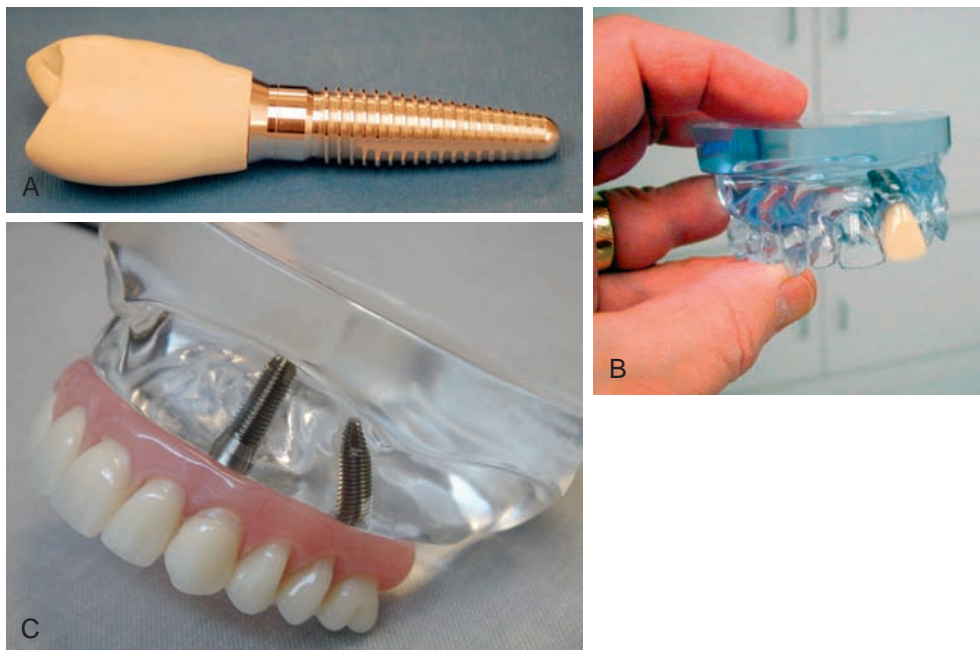


Figure 5-10. **A**, A giant model of an implant with an abutment and removable crown prosthesis that can be used to demonstrate the details of the parts and pieces to a patient. **B**, A Lucite model that can be used to demonstrate the actual size in a single-tooth implant reconstruction to a patient. **C**, A Lucite model which can be used to demonstrate a full-arch All-on-4 reconstruction to a patient. (B, From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, 2004, The Dental Implant Center Press.)

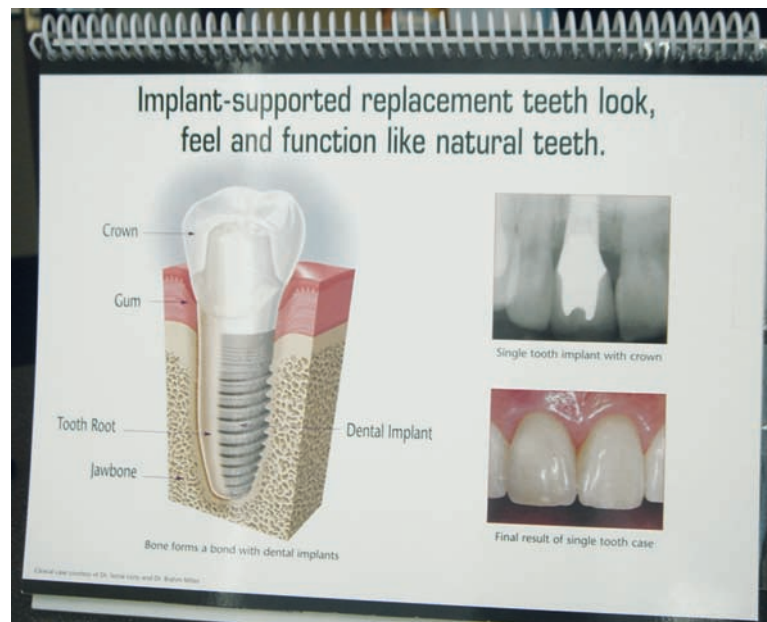


Figure 5-11. A flip chart with a variety of diagrams and clinical results demonstrating the implant process and outcome results.

Dentistry/Health

As Good As New

A Consumer's Guide to Dental Implants

"This book makes it crystal clear to the reader what implants are all about. It offers hope and remedy for so many who thought they had no alternatives."
—Dr. Jerold Goldberg, Dean, School of Dentistry, Case Western Reserve University

Discover the Reliability and Quality of Life Dental Implants Provide

The statistics are surprising. Almost half of the people in the United States are missing one or more teeth. Sports injuries alone knock out another 2 million teeth every year. A reliable technology exists that can help many of these individuals recover from the disaster of tooth loss.

For the past three and a half decades, Charles A. Babbush, D.D.S., M.Sc.D., has helped thousands of people with dental implants. He describes the entire process in easy-to-understand language—complete with success stories and numerous illustrations—in his informative new book, *As Good As New: A Consumer's Guide to Dental Implants*. No longer an experimental procedure, dental implants are now a dependable and effective way for people to return to their original state of wholeness—eating, speaking, and smiling without feeling self-conscious.

In this patient-friendly guide, you'll:

- Discover whether you would make a good candidate for implants and how to find the right implant doctor
- Understand what will happen below and above your gums, as well as what to do if you need more than implants
- Find out what to do if something goes wrong
- Learn how to live with your new implants

This a must-read for anyone with a dental challenge, as well as for dentists interested in becoming involved in implant reconstruction.

Charles A. Babbush, D.D.S., M.Sc.D., is one of the leading dental implant surgeons in the world. His distinguished career includes teaching positions at 3 premier universities across the world and 28 societal and academic offices and appointments. He has been the recipient of 9 grants and 13 research awards. Dr. Babbush has received 20 honors and professional awards and authored or co-authored 40 publications, including 3 textbooks. As a highly sought-after speaker on many oral-care topics, he has lectured at more than 750 seminars, workshops, and clinics over the last 35 years. The father of four and grandfather of six, Dr. Babbush resides in Ohio with his wife Sandra.

Charles A. Babbush, D.D.S., M.Sc.D.

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 The Dental Implant Center Press
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Figure 5-12. *As Good as New: A Consumer's Guide to Dental Implants* is a patient resource to be used by the doctor, staff, and patients for orientation to the implant process.



Figure 5-13. The implant team (surgeon, prosthodontist, and laboratory technician) formulate a detailed treatment plan.

struction. Alternative methods such as a fixed prosthesis, a removable partial denture, or full dentures may be indicated.

A definitive treatment plan eventually will be formulated, usually with collaboration by the surgeon and restorative dentist. After the treatment plan is finalized, fabricated templates or surgical guides from diagnostic set ups are made to use during surgery. In routine cases in which there is adequate bone and there are no anatomical anomalies, this may not be needed. When traditional radiographs (nondigital films) are used, a common reference to determine film distribution is the use of a fixed-size reference object such as 5-mm ball bearings (Figure 5-18). These markers can be placed within a diagnostic set up or surgical stent to assist in accuracy of transferring information to a diagnostic cast (Figure 5-19). Some of the advantages of cone beam CT scans is that the reconstruction can be made virtually on the screen or the digital information



Figure 5-14. **A**, A patient with poor oral hygiene and an existing pathology returned for additional implant placement. The disease process and oral hygiene maintenance must be revised and implemented prior to further treatment. **B**, A patient who required extraction of all remaining teeth and reconstruction of implants. All the acute pathological process must be eradicated prior to initiation of definitive treatment. (**B**, From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, 2004, The Dental Implant Center Press.)

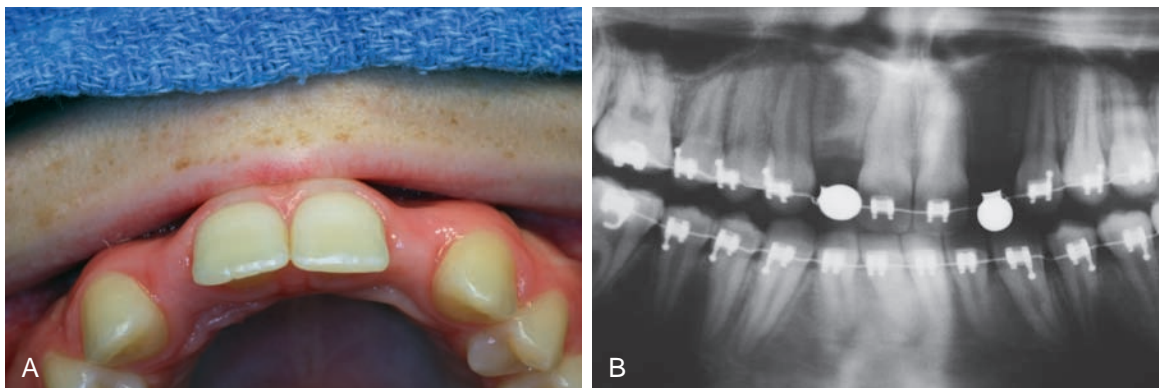


Figure 5-15. **A**, The spaces left by congenitally missing lateral maxillary incisor teeth were not adequate for implant placement. **B**, Orthodontic treatment was required to widen these spaces.

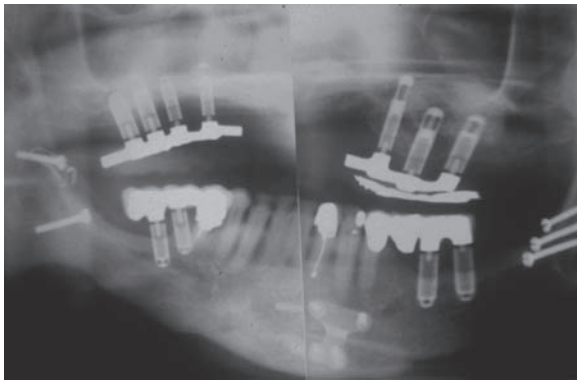


Figure 5-16. Orthognathic mandibular surgery and chin advancement were required prior to the implant reconstruction in this case.

can be sent out for rapid prototyping of stereolithic models (Figures 5-20 and 5-21).

Final Treatment Considerations

Various treatment options can be presented to the patient for approval. Every aspect of this discussion should be documented in the patient's chart as a risk management tool.

The patient should be informed of the anticipated number of implants and whether an ancillary procedure such as sinus grafting is necessary. If maxillary anthroplasty with augmentation bone grafting (a sinus lift) is indicated, the patient should be aware of the amount of bone remaining between the residual crest of the ridge and the sinus floor. The amount of residual bone will determine whether the sinus graft can be carried out as a staged procedure before implant placement or

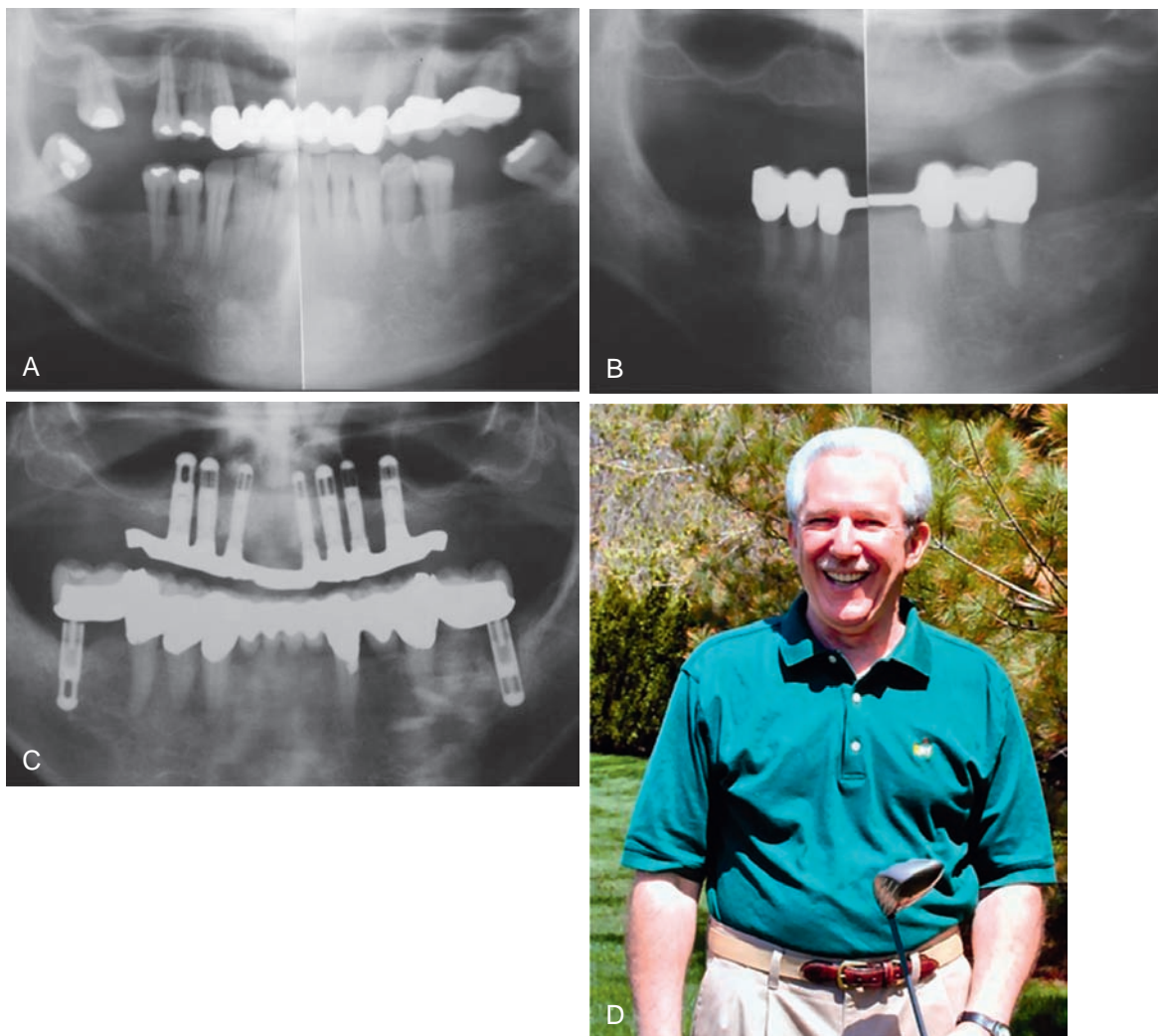


Figure 5-17. **A**, Panoramic radiograph demonstrating bone loss involving the maxillary dentition and the mandibular molars and incisors. **B**, Panoramic radiograph showing the 4-month postextraction healed sites. Panoramic radiograph **(C)** and facial photo **(D)** of the patient demonstrating the 20-year posttreatment results. **(D)**, From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, The Dental Implant Center Press, 2004.)

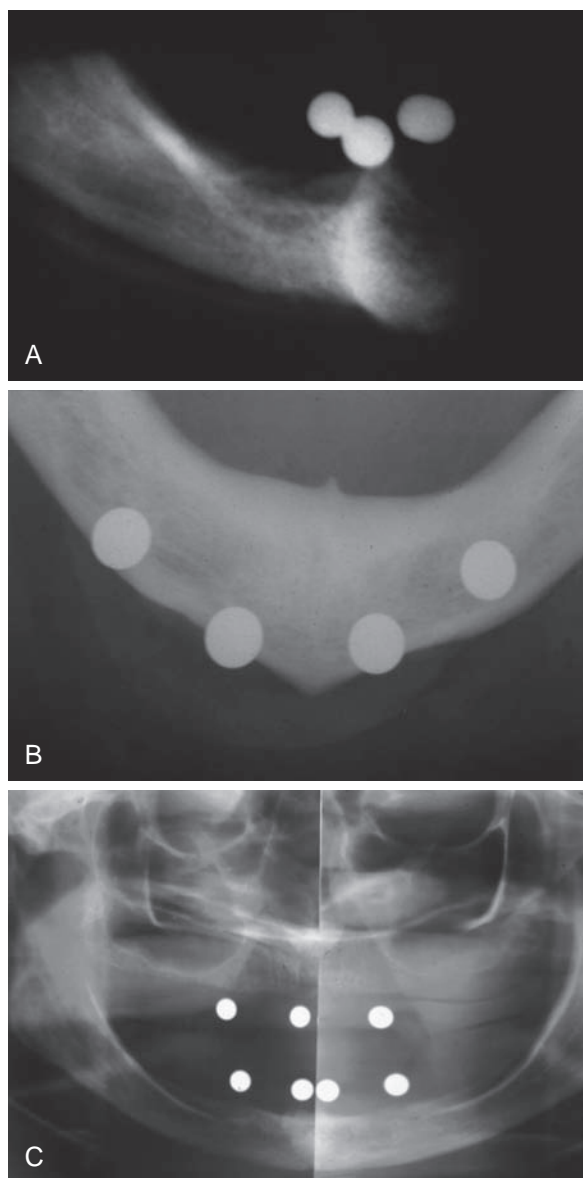


Figure 5-18. Five (5 mm) ball bearings often are used in temporary appliances or placed in wax and inserted into the oral cavity while radiographs are obtained to accurately measure the magnification-distortion factor at the intended implant site. **A**, Lateral jaw radiograph. **B**, Occlusal radiograph. **C**, Panoramic radiograph.

whether the two procedures can be performed simultaneously (Figure 5-22).¹¹

If a grafting procedure is indicated, the patient also must be aware of the various materials available for the graft. These materials include alloplasts, allografts, or autografts harvested from secondary sites such as the chin, ramus, or iliac crest. The patient should be presented with a review of the various procedures for harvesting autogenous bone from the tuberosity or, more likely, from the symphysis or external oblique ridge. These procedures can contribute to satisfactory horizontal and vertical augmentation of bone. The latest generation of bioim-

plants, such as DynaGraft, Cerasorb, and bone morphogenetic protein (BMP) (infuse, GFM, GenSci, Irvine, CA), also merit discussion. These materials, which have contributed significantly to the alternative of harvesting bone from the patient, have been demonstrated to be osteoinductive and osteoconductive (see Chapter 14).^{11,12} Patients should also be told if they are candidates for harvesting their own blood for production of platelet-rich plasma (Figure 5-23). This procedure is performed to gather a high concentration of platelets with accompanying growth factors in order to ensure a more successful graft outcome.^{11,13}

The patient may have insufficient posterior bone in the mandible to accommodate even the smallest of implants and may be a candidate for transpositioning or repositioning of the inferior alveolar nerve or the mental nerve. The indications, contraindications, and potential side effects of these procedures should be outlined. In the severely atrophic mandible, procedures such as the modified lip switch vestibuloplasty and the simultaneous placement of implants, either in small segments or in the total arch, should be discussed. Patients should also be aware of the consequences of inadequate vestibular tissue, as well as the improvement that can be achieved with various procedures (Figure 5-24).

A full discussion should include whether these procedures will be performed in an office or outpatient surgical clinic or whether they will require overnight hospitalization. There should also be full disclosure as to whether these procedures will be performed under local anesthesia, local anesthesia sublimated with intravenous sedation, or full general anesthesia. The benefit/risk ratio of all these procedures should be presented.

The postoperative course should be carefully described to patients. They should be made aware of whether their dentures will be taken away and whether a transitional appliance will be provided for immediate use after surgery. Placement of immediate Provisional Implants (Nobel Biocare, Kloten, Switzerland) to achieve retention of a provisional prosthesis may be an option. If it is an option, it, too, should be discussed (Figure 5-25).¹⁴ In any case, patients should be informed as to how the temporary prosthesis, or lack of prosthesis, will affect their appearance and their ability to fulfill professional obligations and function in social situations. In addition, patients should be informed about the possible options of one-stage and immediate-load implants.

The full informed consent process, both oral and written, should be conducted with the patient. Written consents should be secured for both the surgical and restorative procedures. No promises or guarantees should be rendered when dealing with artificial replacements in a biologic system; this fact should be clearly communicated with the patient. A full disclosure of potential complications is essential. On the other hand, some patients may have been given overly negative and inaccurate information about implant success rates. The best course for the implant practitioner is to present the patient with global and domestic statistics for implant success rates, as documented in the literature. The individual clinician's own experience and clinical success rates should be shared, along with

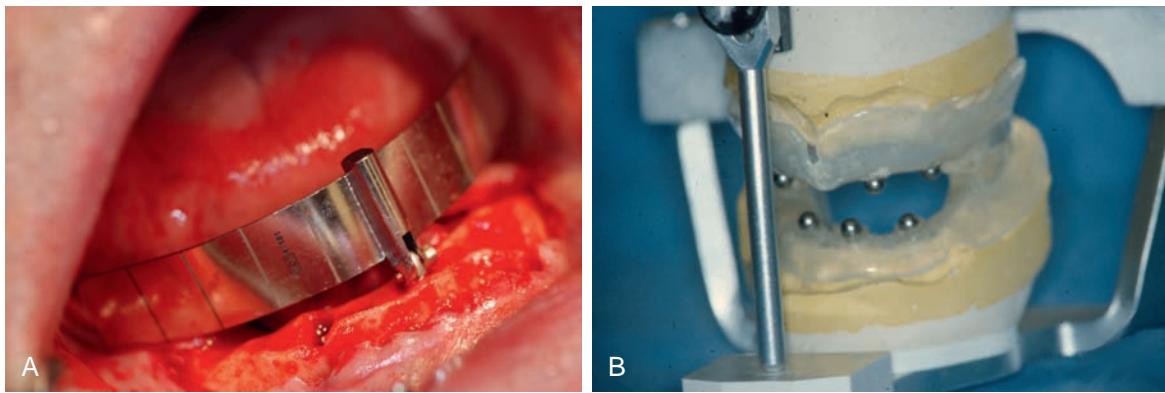


Figure 5-19. **A**, A surgical guide is used to establish proper alignment for a mandibular All-on-4 reconstruction. **B**, Mounted study cast with a surgical template with 5-mm ball bearings mounted in place.



Figure 5-20. **A** and **B**, A series of radiographic guides are used to obtain the proper relationships in radiographic information for treatment plan development. **C** and **D**, Radiographic guides in place in the mandible (**C**) and maxilla (**D**). **E** and **F**, SimPlant software images that are used to develop the final treatment recommendations.

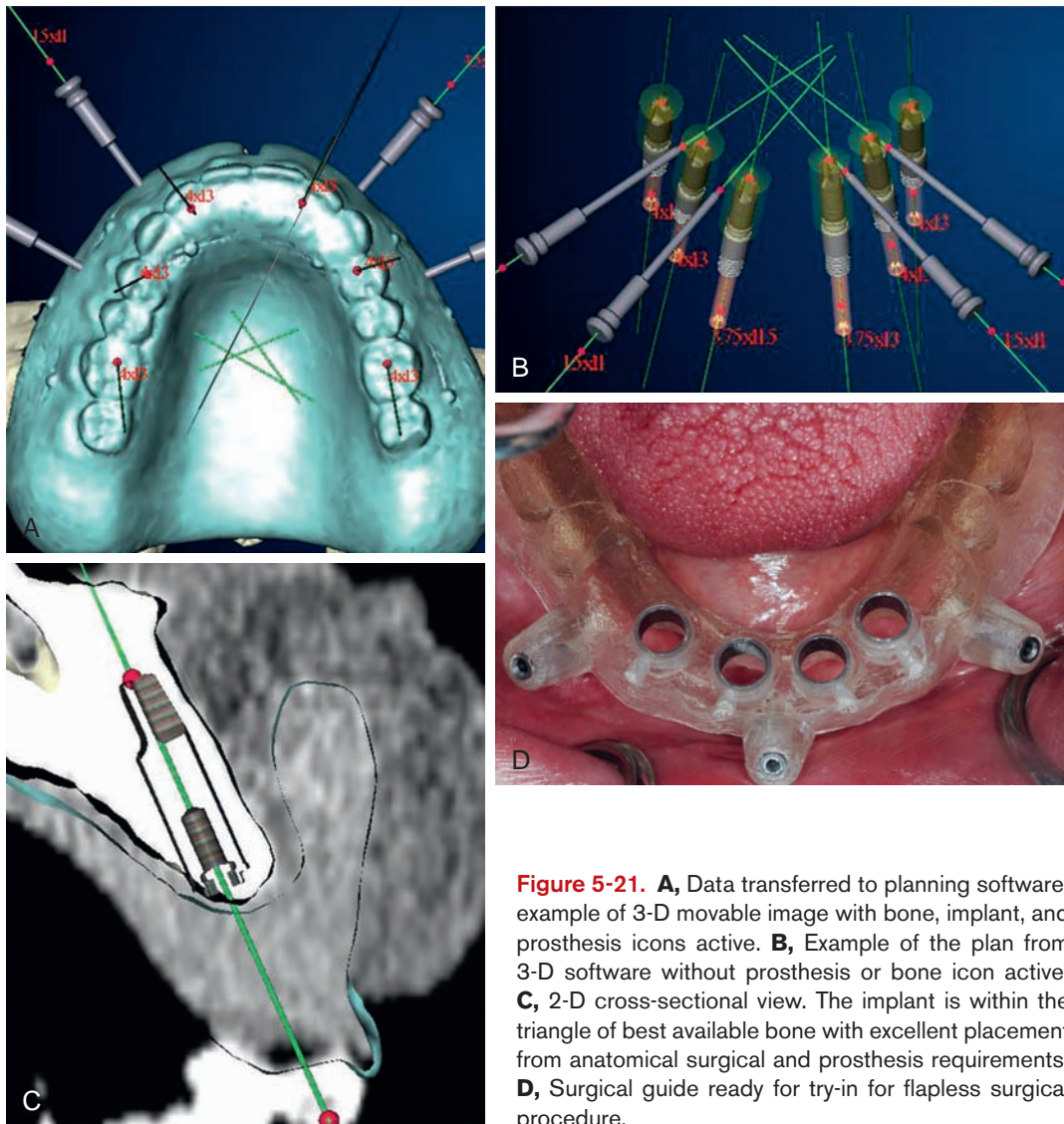


Figure 5-21. **A**, Data transferred to planning software, example of 3-D movable image with bone, implant, and prosthesis icons active. **B**, Example of the plan from 3-D software without prosthesis or bone icon active. **C**, 2-D cross-sectional view. The implant is within the triangle of best available bone with excellent placement from anatomical surgical and prosthesis requirements. **D**, Surgical guide ready for try-in for flapless surgical procedure.

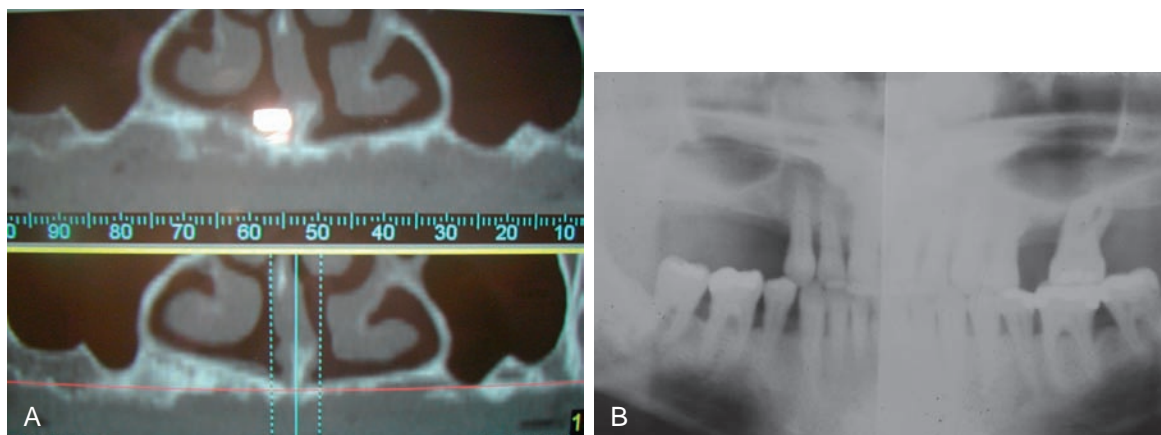


Figure 5-22. **A**, Panoramic radiograph demonstrating severe advanced maxillary atrophy requiring a staged procedure to graft the maxillary sinuses. **B**, Panoramic radiograph demonstrating adequate residual bone inferior to the sinus cavity making it possible to carry out simultaneous grafting and implant placement.

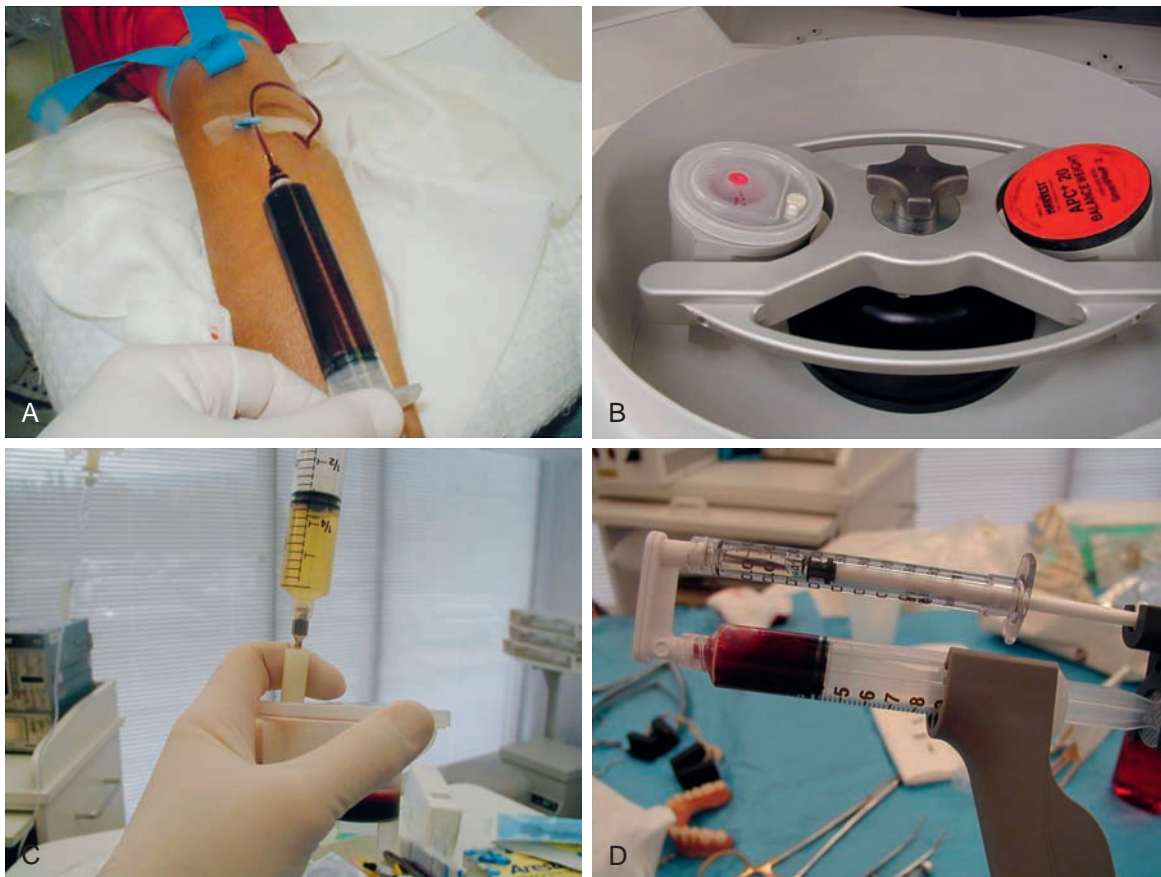


Figure 5-23. The production of platelet-rich plasma is an in-office, at the time of the surgical procedure. **A**, The patient's intravenous blood is drawn (22.5 mL) at the initiation of the surgical procedure. **B**, The anticoagulated blood sample is inserted into a disposable processing unit in the centrifuge for a two-level spin over 14 minutes. **C**, The platelet concentrate is reconstituted and removed from the processing unit. **D**, It is loaded into an application syringe with calcium chloride and topical thrombin in order to produce the final platelet concentrate gel.

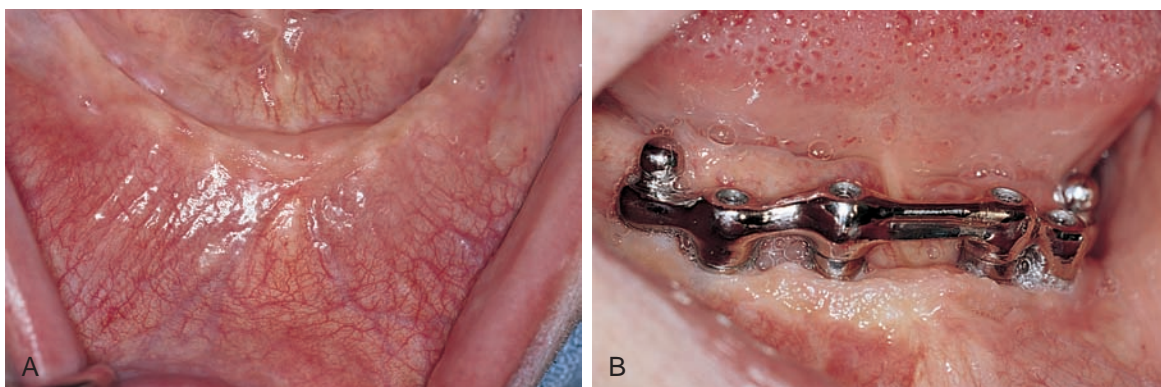


Figure 5-24. Preoperative (**A**) and postoperative (**B**) clinical photos demonstrate a completed vestibuloplasty case after 3 years.

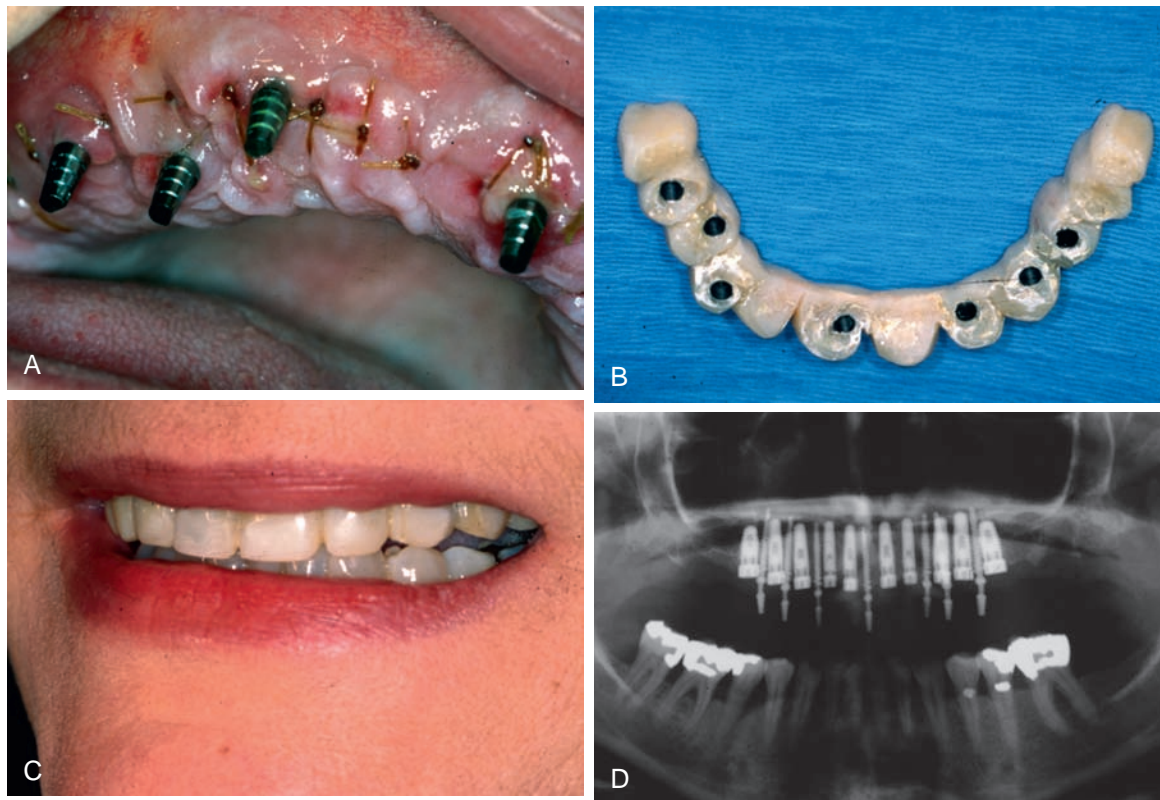


Figure 5-25. Immediate provisional implants (IPIs) mini-implants that can be utilized to stabilize a provisional prosthesis. **A**, The maxilla at the completion of maxillary reconstruction. **B**, Transfer copings are incorporated into the provisional prosthesis. **C**, The provisional prosthesis temporarily cemented in the maxilla. **D**, Panoramic radiograph demonstrating the IPI in place in maxilla.

some discussion of what options will likely be available in the event of an implant failure. Once again, this discussion should be noted in the patient's chart.¹⁵

Full discussion of fees and methods of payment should ensue, along with a discussion of potential reimbursement by third parties and managed-care groups and the impact of such reimbursement on the patient's financial obligation. The patient should understand that implant dentistry involves reconstructive procedures. The plates, cylinders, and screws used are orthopedic devices, comparable with the implants used in the tibia, fibula, and other skeletal areas of the body. An understanding of this fact may increase the likelihood of insurance compensation.

Patients should walk away from the final consultation with a clear understanding of their postsurgical obligations such as

ongoing home care. They should be given an overview of the armamentarium they will be using in this endeavor, including different types of manual and mechanical brushes, dental floss, super floss, and chemotherapeutic agents such as oral chlorhexidine antibacterial rinses. Finally, they should know what to expect as a schedule for periodic evaluations (see Chapter 30).^{16,17}

An open attitude, combined with a comprehensive and systematic approach to diagnosis and treatment planning, will predictably lay the foundation for successful results. Figures 5-26 through 5-34 present a variety of cases demonstrating successful outcomes. The following chapters of this text concentrate on the variety of procedures currently available to assist the implant practitioner in achieving routine success for the implant patient.

Text continued on p. 85.



Figure 5-26. **A**, Presurgical panoramic radiograph showing the failed dentition and nonrestored previously placed implants in the mandible approximately 4 years prior to the patient's initial consultation. **B** and **C**, Preoperative clinical photos of the maxilla and mandible showing a lack of any crowns in the mandible and severe advanced caries and periodontal disease in the maxilla. **D** and **E**, The mandibular over-denture prosthesis that the patient altered himself over many years of wear. **F** and **G**, The 5-year postsurgical follow-up photo and panoramic radiograph of the patient's maxillary and mandibular reconstruction bar over-denture prosthesis with internal locking mechanisms. (**F**, From Babbush CA: *As good as new: a consumer's guide to dental implants*, Lyndhurst, OH, 2004, The Dental Implant Center Press.)

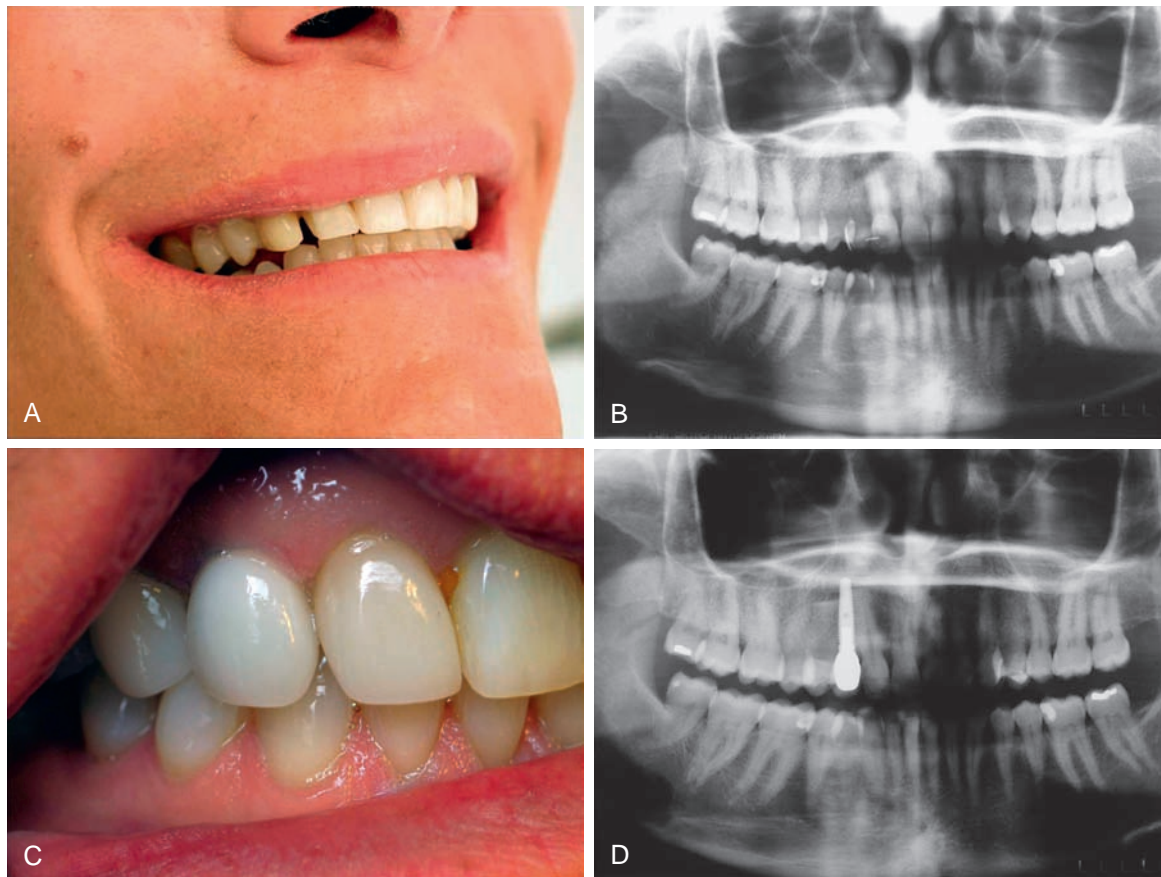


Figure 5-27. **A** and **B**, Preoperative photo and panoramic radiograph showing the retained deciduous cuspid in the right maxilla. **C** and **D**, The 4-year follow-up photo and panoramic radiograph showing the results of tooth extraction, immediate implant placement, immediate provisional restoration, and finally, permanent restoration.

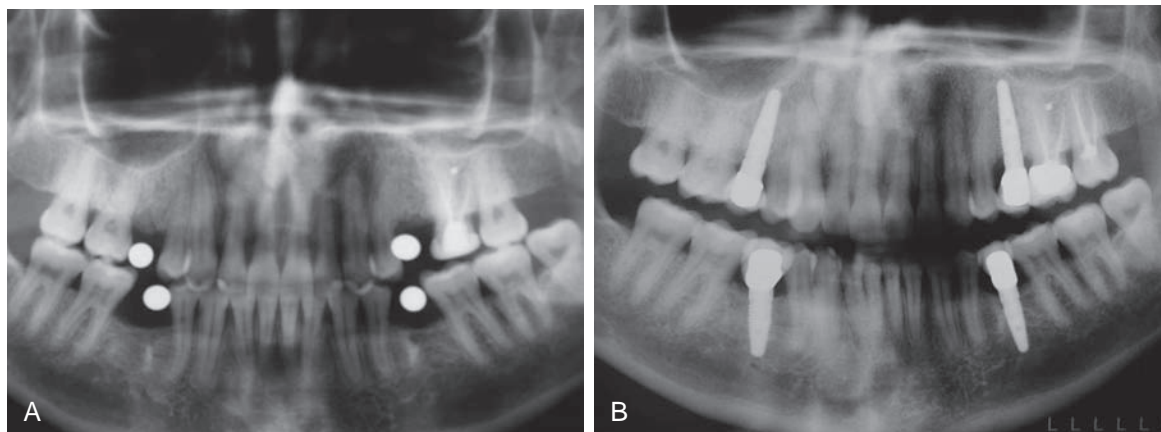


Figure 5-28. **A**, A 36-year-old patient with congenitally missing second bicuspids. The initial treatment plan had been to make four three-unit bridges for this patient, but when she heard about dental implants she decided to come for a consultation. **B**, The 4-year postsurgical follow-up panoramic radiograph showing four individual self-standing implant reconstructions.

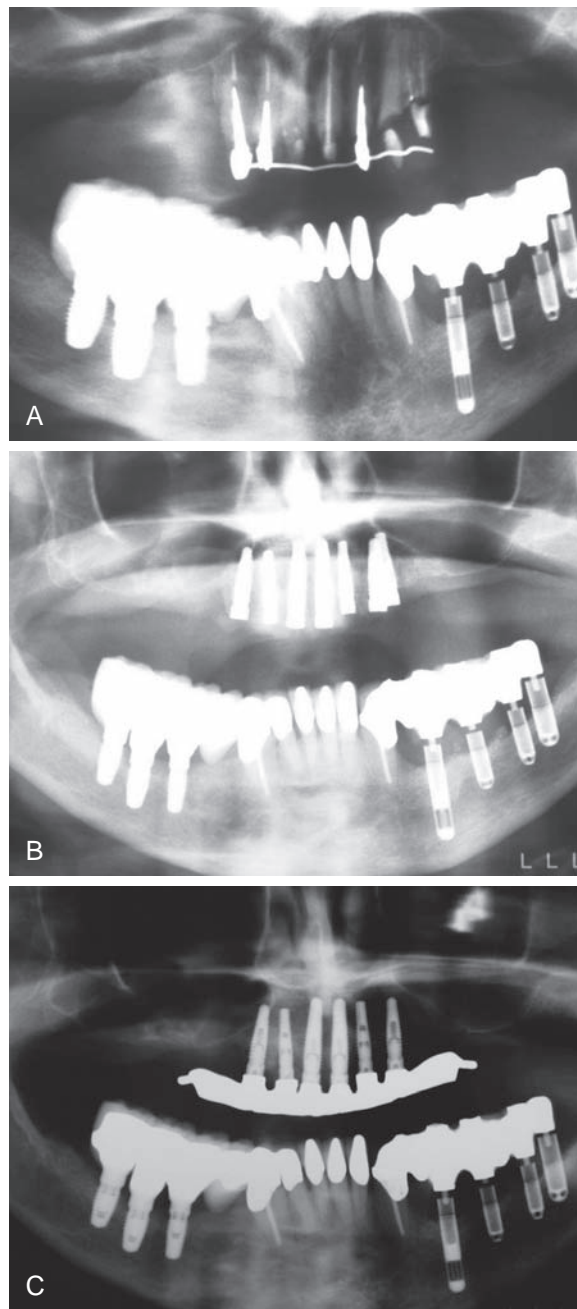


Figure 5-29. **A**, The presurgical radiograph of the patient's maxilla and mandible showing the terminal dentition in the maxilla. The patient had an over 20-year history of implant reconstruction starting in the left mandible with IMZ press-fit cylinders followed by Replace Root Form implants in the right mandible. **B**, Panoramic radiograph showing the immediate postextraction implants in the maxilla. **C**, The 5-year follow-up panoramic radiograph of the maxillary reconstruction, a connector bar overdenture with internal fixation mechanism with no palatal coverage.

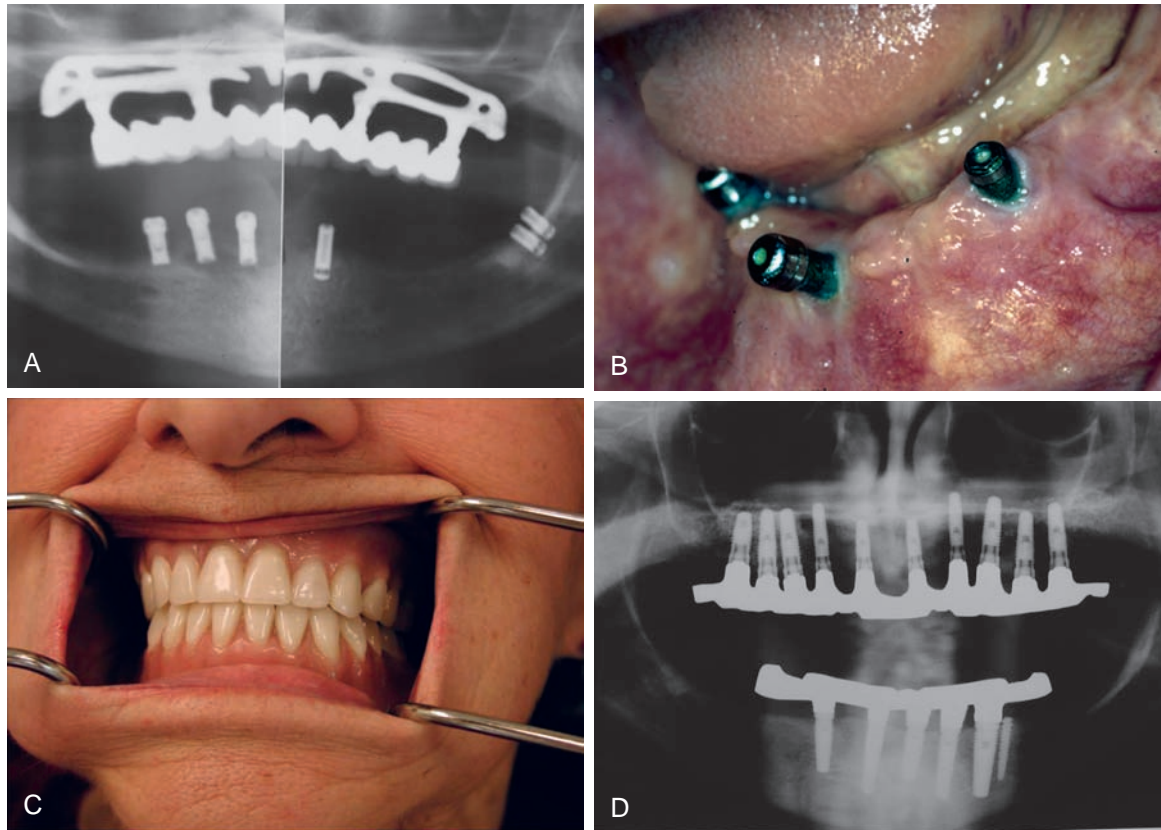


Figure 5-30. **A**, A female patient with a multiyear history of a failed maxillary subperiosteal implant (with cast metal Ceramco prosthesis cemented to the subperiosteal implant) that had invaded and settled into the maxillary sinus and nasal cavity. **B**, The mandibular reconstruction showed implants that were malposed, undersized, and under-engineered to hold the prosthesis. The failure of the prosthesis was total. **C** and **D**, The 5-year postsurgical follow-up clinical photo and panoramic radiograph show the patient restored with connector bars, over-denture, and internal locking mechanism.

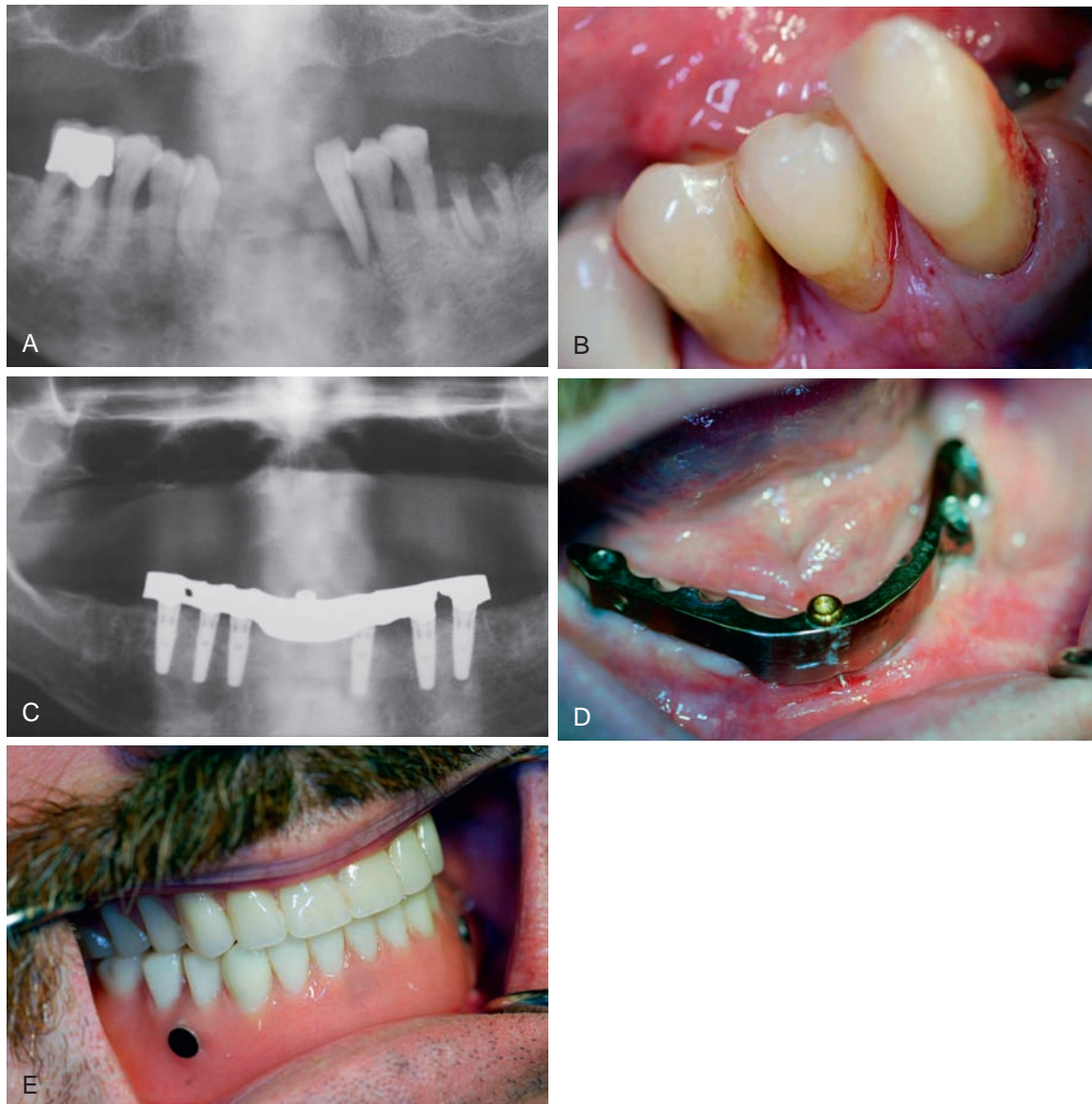


Figure 5-31. **A** and **B**, Presurgical panoramic radiograph and clinical photo of terminal dentition in the mandible. All the teeth were extracted and, simultaneously, six endosteal Replace implants were positioned. The healing abutments were put into place immediately and held in place by a provisional prosthesis. **C** and **D**, Four months later the patient was reconstructed with a cast milled bar with fixation devices and restored with over-dentures in the mandible and a regular maxillary removable full prosthesis in the maxilla. **E**, The mandibular prosthesis was retained with Low-passive attachments.

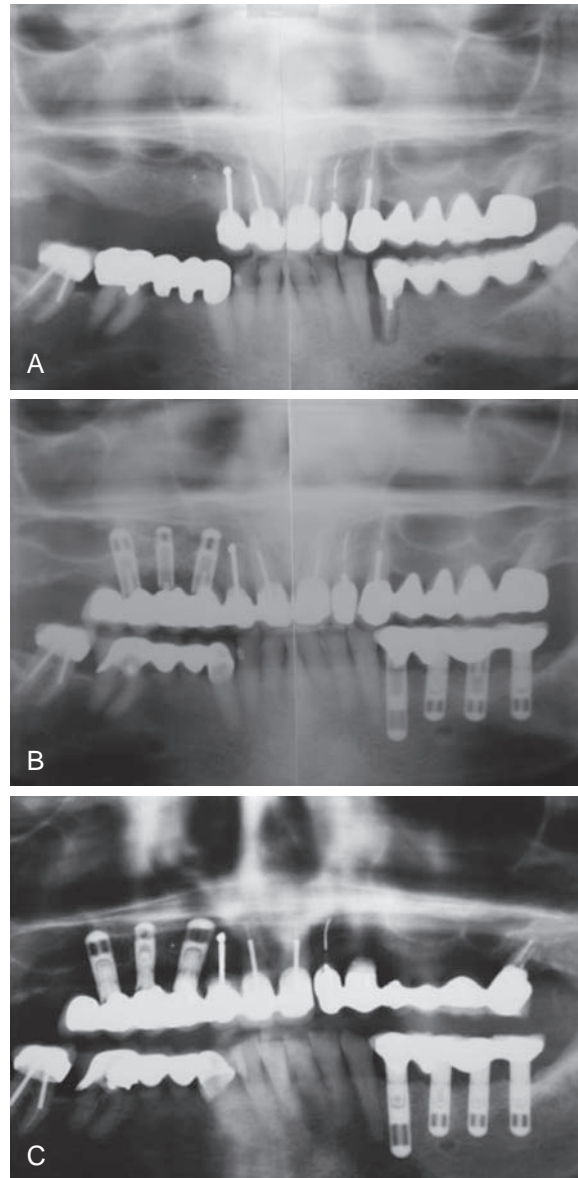


Figure 5-32. **A**, Panoramic radiograph showing the patient's presurgical condition, which consisted of a fractured left mandibular prosthesis and edentulous area in the right maxilla. This patient (age 87) sought treatment for a reconstruction. **B**, The 1-year follow-up panoramic radiograph shows the patient reconstructed with a fixed prosthesis over a series of IMZ press-fit implants. **C**, The patient's follow-up panoramic radiograph (taken on her 105th birthday in 2008) demonstrates the long-range follow-up for this individual.

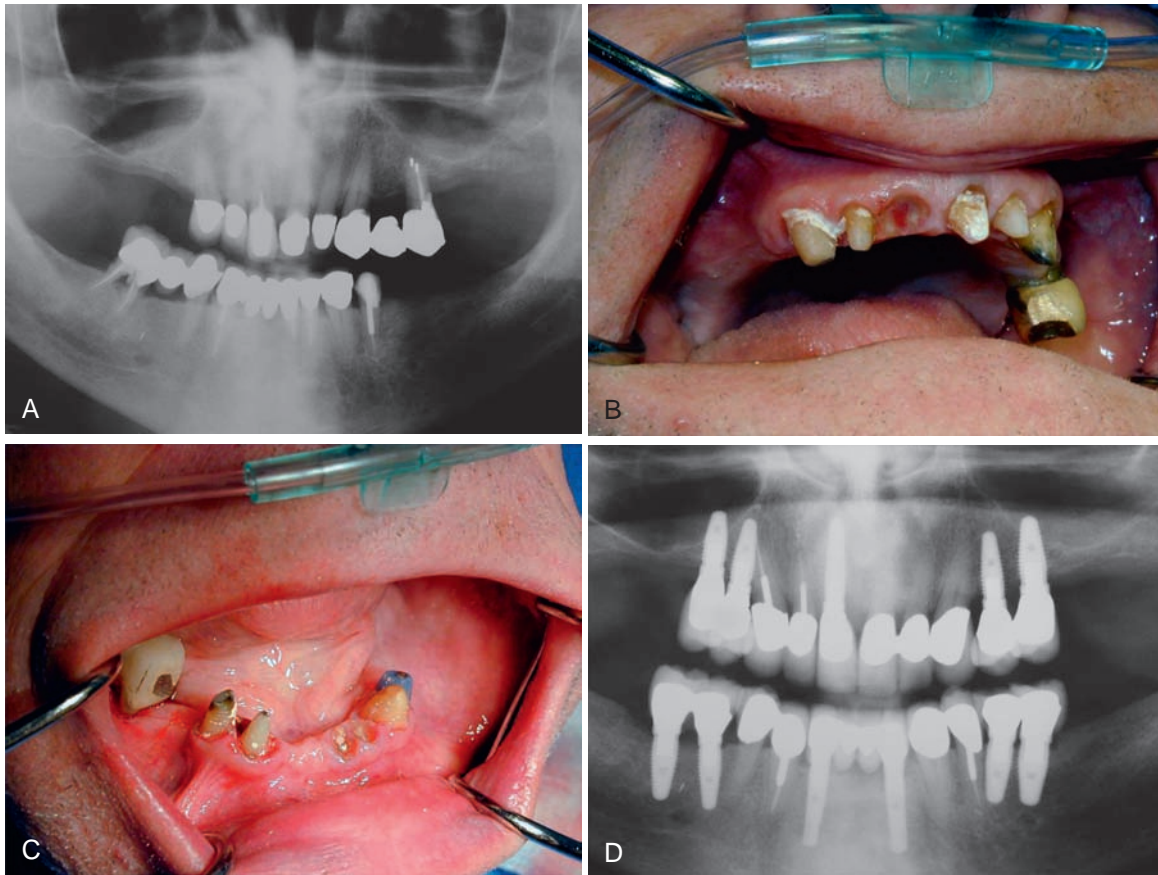


Figure 5-33. **A**, The presurgical panoramic radiograph of the patient's mixed dentition, which had selected failures and was ultimately treatment-planned for removal. **B** and **C**, Preoperative views of the maxilla and mandible. **D**, Panoramic radiograph showing the patient's final reconstruction with endosteal Replace implants in each quadrant. These were ultimately restored with porcelain-fused-to-metal fixed appliances.

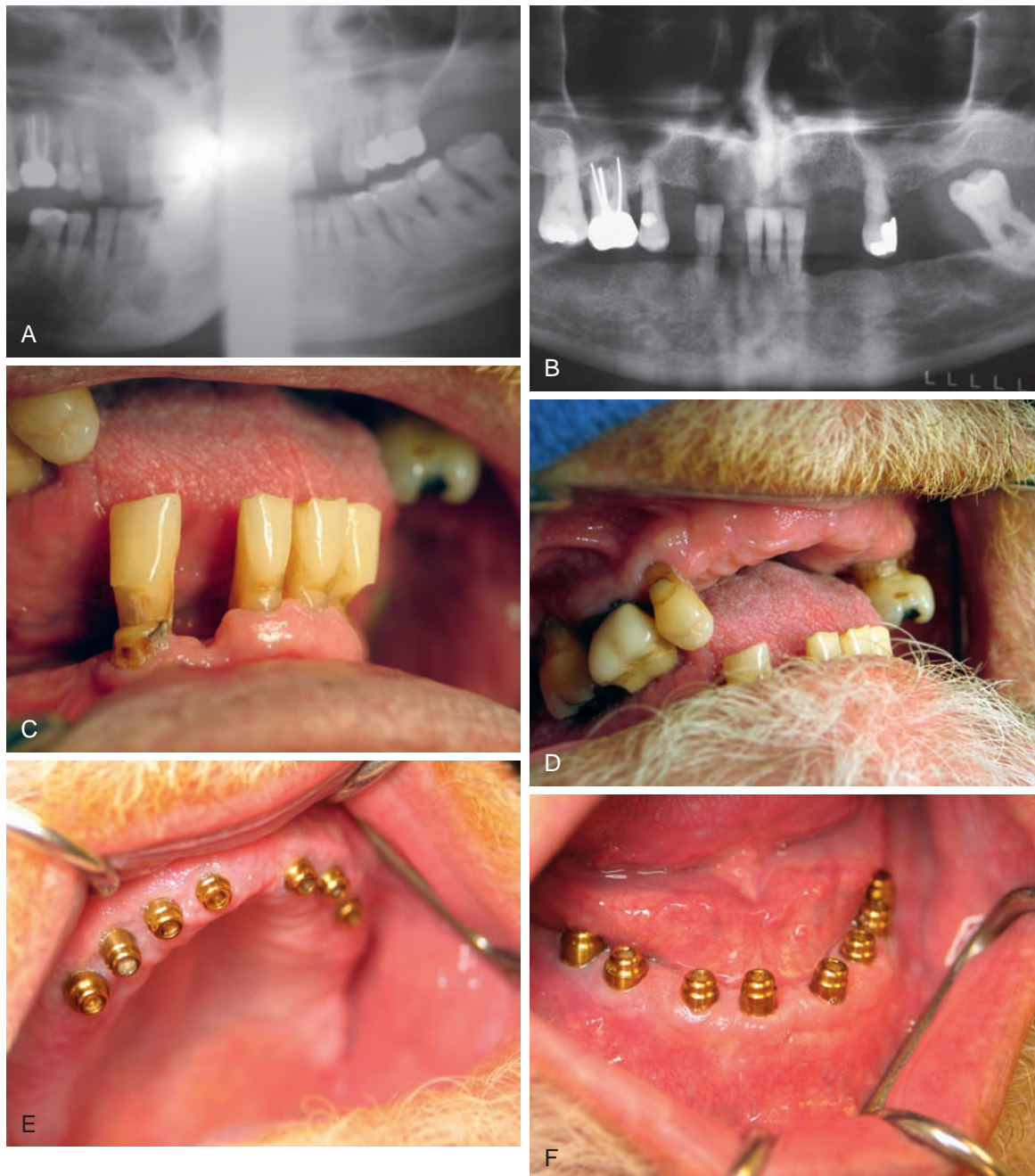


Figure 5-34. **A**, The initial panoramic radiograph of the patient taken 10 years ago when the patient first came in for consultation. **B** to **D**, The panoramic radiograph and clinical photos of the patient 10 years later, when he had finally reached the demise of his total dentition. All of the remaining teeth were removed and immediately replaced with implants in both the maxilla and mandible. They were then reconstructed with locator attachments. **E** to **G**, The patient's clinical photos and a photo of the prosthesis (**E** to **G**) and 4-year clinical photo and panoramic radiograph (**H** and **I**) showing the follow-up of the reconstruction.



Figure 5-34, cont'd.

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