
Devorah Schwartz-Arad · Ridge Preservation & Immediate Implantation



Devorah Schwartz-Arad



Ridge Preservation & Immediate Implantation

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Acknowledgements

In loving memory of my parents, Sarah and Leon Schwartz, and my beloved brother Rafi.

This book is one of my most significant achievements. It is based on a lifetime of work and experience, which I hope will become a useful and innovative textbook, and a source of knowledge for practitioners, students and colleagues.

This achievement, however, would not have been possible without the endless support of my family, colleagues and friends.

First and foremost, I would like to thank my husband Udi Arad, for his everlasting love and patience. You have been and will forever remain my source of energy and my strength. You are my fountain of peace and calm, as well as an eternal source of fire that ignites me to strive forward. You are my anchor and my wings embodied in one.

I wish to thank my children, Jonathan, Avigail, Naama and Dikla, who have been my joy and inspiration, to whom I hope I bequeathed the drive for knowledge, but will forever remain my greatest teachers.

I am thankful to everyone who has contributed time, energy, knowledge and expertise to make this book the best it can be.

I am grateful to my co-authors who kindly contributed their time and wisdom, and agreed to participate in this venture that has finally come to fruition.

I would like to express my appreciation to all my colleagues and friends with whom I have worked in close cooperation for many years, for their confidence and trust, and for all the patients who are part of this book (just a small part of so many challenging cases).

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I also wish to thank Rita Lazar who has assisted me throughout my career, for her impeccable professionalism and knowledge that made this book so eloquent.

I thank Consult-PRO® and Dental Master® for their educative and elaborate simulations and imaging.

Finally, I am grateful to the editing staff for bearing with me and making this book a unique and special experience.

I am truly blessed, thank you all.



Foreword

It is always special when a person's life's work can be summarized and put down for others to learn from. That is what we are now so privileged to witness with the writing and publishing of this fine textbook by Dr. Devorah Schwartz-Arad – affectionately known to all of her friends as "Dubi". This textbook covers all aspects of immediate placement, immediate loading and temporization, including informative chapters on treatment planning, case selection, esthetics, occlusion, and the psychological aspects for the patient to name a few.

Dubi has written many of the chapters herself, but has also recruited some of the finest teachers, researchers, and educators in the world to be part of this major work. Perhaps the best part of this textbook is the fact that almost everything presented is evidence-based whenever possible. Articles are referenced throughout the chapters by all of the authors. This is a refreshing change from other textbooks in which we only get the opinion of the authors without documentation to back up the ideas.

On a personal note, I have known Dubi for many years. She is a great educator and serious teacher, who makes herself available to share her knowledge with students and fellow teachers around the world. She is at the "cutting edge" of knowledge and skill, and is not afraid to think outside the box when indicated. She has excellent documentation of her work and this is visible in this fine textbook.

Her training as an oral surgeon has certainly given her great skills to manage simple as well as advanced cases. But this book reflects far more than the surgical and teaching skills of one person. It organizes the totality of what a practitioner should understand and master, to achieve an elegant level of the clinical practice of implant dentistry.

This textbook is valuable for all members of the treatment team. It will give the reader organization and direction, medical and dental evaluation principles, bioengineering concepts, surgical principles, alternative treatment planning, and pharmacological considerations, from single teeth to full arch rehabilitations.

It is a book to be read and reread, by the serious student and practitioner of implant dentistry. It projects the tremendous dedication, thoroughness, and commitment of one person: Dubi Schwartz-Arad.

With great admiration,

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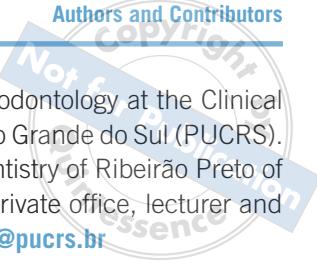
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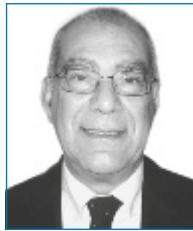
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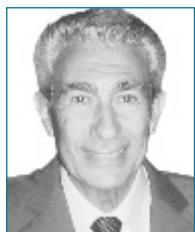
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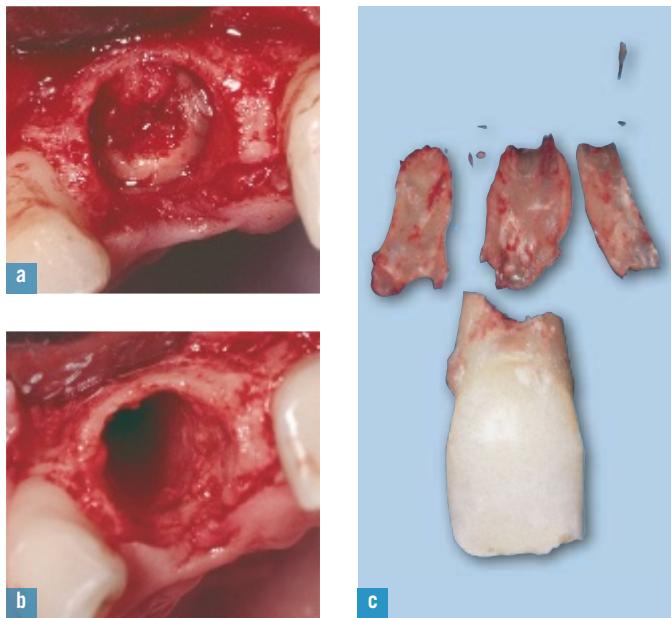


Fig 4-5 Extraction of an ankylosed tooth root. In such cases, small dentin remnants can be left in the bone to avoid extensive bone loss (a to c).

minimum space of 3 mm between two adjacent implants is advisable for multiple extractions of neighboring teeth and immediate implantation. In molars, the maximum gap for replacing a tooth with a single implant is 12 mm.

Buccolingual position

A minimum 5-mm width of alveolar residual bone between the facial and palatal/lingual plates is necessary at the area of the implant and apical to the extracted root. Otherwise, immediate implantation is not recommended and an augmentation procedure is needed before implantation (Fig 4-7).

Implants should be placed palatal/lingual to the apex of the extracted root for a better emergence profile of the future crown. Facial bone fenestrations can be corrected by bone substitutes augmented through a subperiosteal tunnel or via the socket. It is advisable during osteotomy to palpate the buccal area with the index finger to detect small fenestrations.

Apicocoronal position

Stabilization of the immediate implant is achieved mostly by the portion of the implant apical to the root apex. A minimum of 3 to 4 mm of bone is recommended at the area apical to the extracted root. Nevertheless, the maximum available implant length should be inserted for maximum primary stability.

The correct distance of the implant neck from the alveolar crest is controversial. It is recommended that the implant is placed 2 to 3 mm apically to the bone crest for the most esthetic emergence profile. However, pocket formation can result if the implant neck is placed too apically in direction. New implant designs are now available that enable implant placement almost at bone level, but there are not yet any long-term follow-up studies. In nondefect sockets, the buccal plate height should be the important reference point, not the palatal, mesial, or distal levels.

Implant angulation

The implant head should emerge in the direction of the palate/lingual cusp, or, at the most, the incisal tip/central fossa. Tipping the implant too buccally or palatally will result in marginal recession or the need for a ridge-lap crown, respectively.

Multirooted teeth

Anchorage is essential in multirooted tooth implants as the socket dimensions are larger than the implant diameter and stability is achieved mostly through the apical bone. Additionally, the anatomy of the posterior areas might limit the use of long implants. The anatomic situation should be considered before implant placement. The use of two implants to replace a single molar has a significant disadvantage: the sizes of the implants and their associated prosthetic components are limited. The use of a single wide-diameter implant is recommended unless the mesiodistal distance between the adjacent teeth exceeds 12 mm (Fig 4-6g to k).

Implant selection

Currently, there is a wide variety of implant designs, including different dimensions (diameter and length), coatings, and shapes. It is important to select carefully the appropriate implant for the site and the clinical and anatomic situation when planning immediate implantation.

Length of implant

Because the anchorage of the immediate implant is achieved mostly from its apical portion, the longest possible implant should be used (Fig 4-8). In the maxilla, it is occasionally necessary to combine the implantation with augmentation procedures, such as subnasal or sinus augmentation. In the posterior mandible, a two-stage procedure might be warranted if there is no sufficient available bone above the mandibular canal for apical encirclement of the implant.

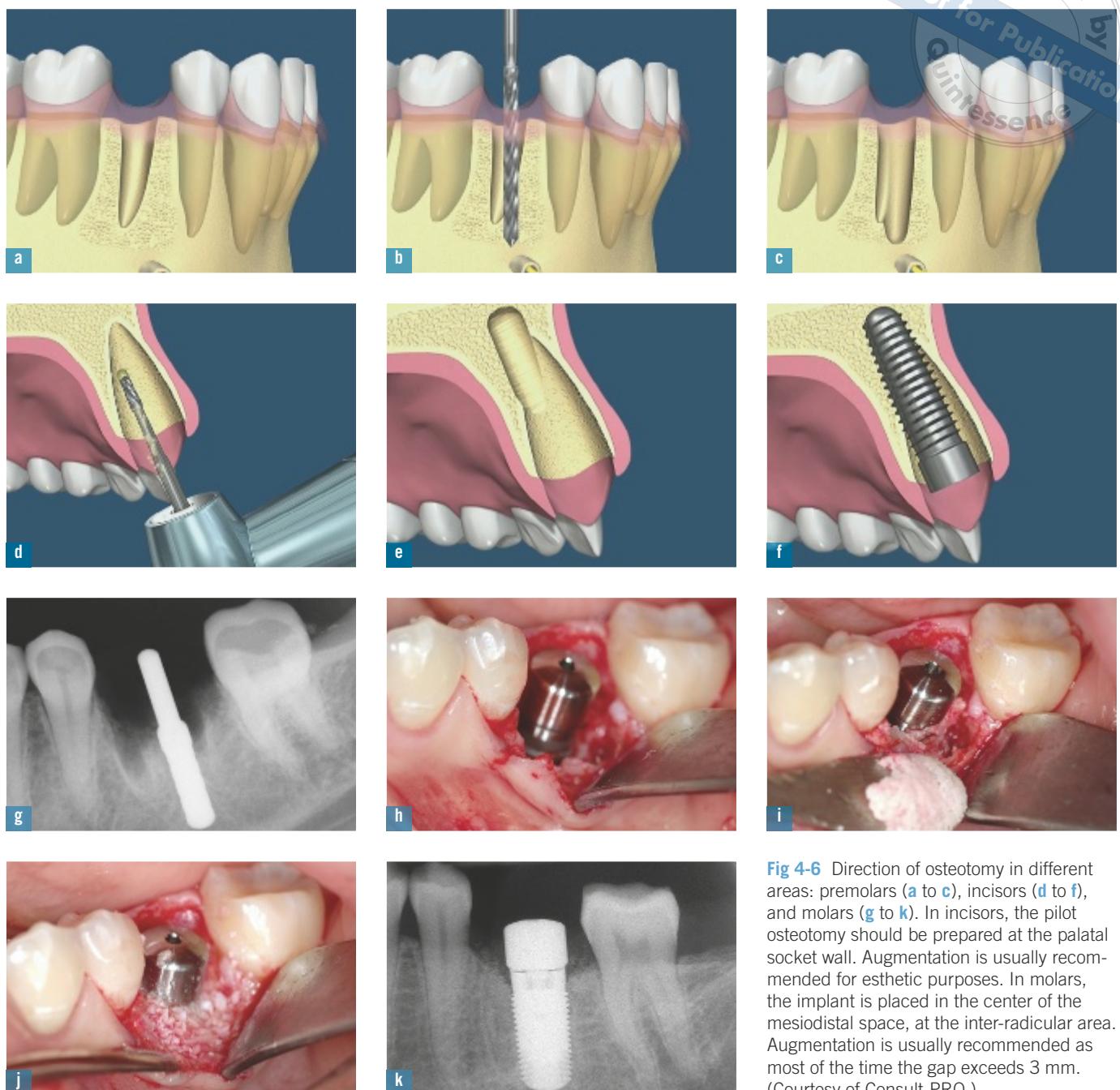
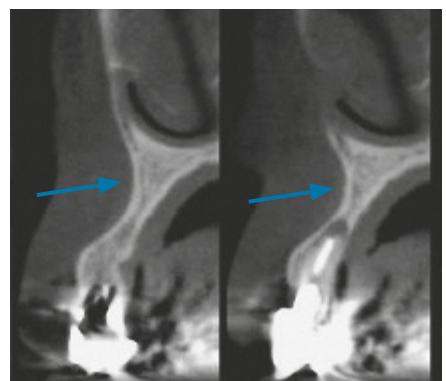


Fig 4-6 Direction of osteotomy in different areas: premolars (a to c), incisors (d to f), and molars (g to k). In incisors, the pilot osteotomy should be prepared at the palatal socket wall. Augmentation is usually recommended for esthetic purposes. In molars, the implant is placed in the center of the mesiodistal space, at the inter-radicular area. Augmentation is usually recommended as most of the time the gap exceeds 3 mm. (Courtesy of Consult-PRO.)

Fig 4-7 Preoperative CT scan showing supra-apical bone deficiency (arrow). There should be a minimum of 5 mm of alveolar residual bone between the facial and palatal/lingual plates at the area of the implant and apical to the extracted root. If there is insufficient bone, an augmentation procedure will be necessary prior to immediate implantation.



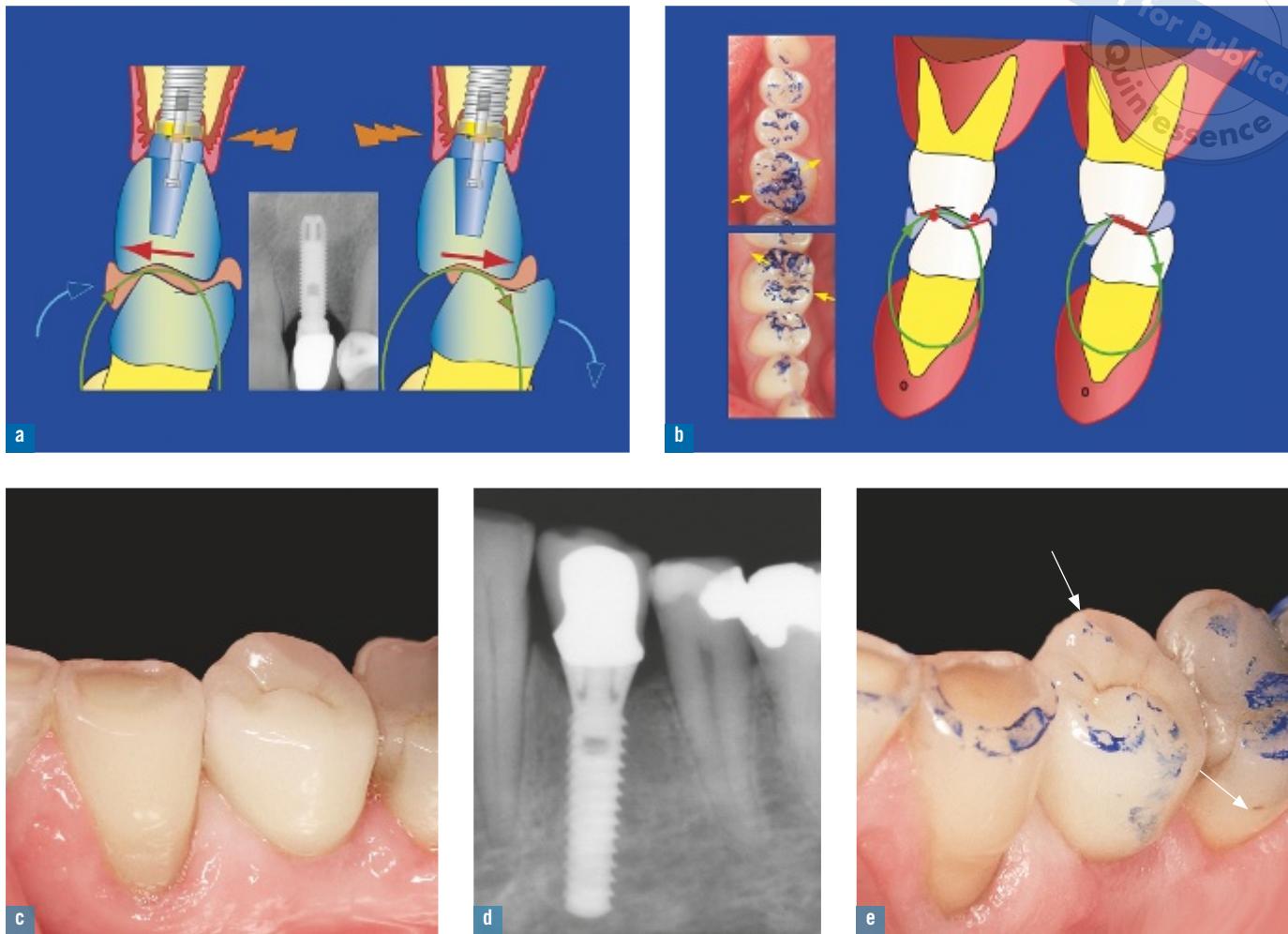


Fig 7-25 (a) Stress and micromovements on the implant–abutment junction and implant collar will liberate bacterial toxins, induce bone loss, and may accelerate fracturing of the screw. (b) Cycle-in and cycle-out phases of the chewing cycle on the right side. (c) Buccal view of an implant restoration on the left first premolar. (d) Radiograph of the SwissPlus implant supporting the restoration, showing the correct cervical bone level. (e) Occlusal view of the functional masticatory guidance adjustment, with light contact on the implant. (Courtesy of Dr. M. Le Gall, Lorient, France.)

implants is similar; only the zone of stress concentration is different. Excessive occlusal loading during function can cause peri-implant bone loss^{69,87} (Figs 7-25a and 7-25b).

Another factor that can have a major impact is the shear stress force that can appear at the bone/implant interface upon occlusal loading. Marginal bone remodeling will occur after placing the final restoration in zones where no effective tridimensional interlocking between bone and the implant abutment surface exists, while the chances of preserving the intact bone level will increase with the presence of retention elements up to the top of the implant.¹⁶

The use of a tapered implant also decreases the stress on the implant, moving it away from the collar, and allows a better distribution of forces along the body of the implant, which will indirectly minimize cervical bone resorption and

soft tissue recession. The control of horizontal occlusal forces during the first months of function is a determining factor in reducing stress in the crestal zone, enabling bone adaptation, and minimizing crestal bone loss. Therefore, a functional occlusal adjustment of the implant restoration should be performed⁸⁸ (Fig 25c to 7-25f).

Conclusions

Although esthetics represent an essential part of the actual oral treatment, the value of the results, the predictability of the different therapeutic modalities, and the long-term prognosis all require a scientific approach to clinical procedures. The final objective in implantology is to achieve an optimal esthetic implant restoration, surrounded by a natural gingival

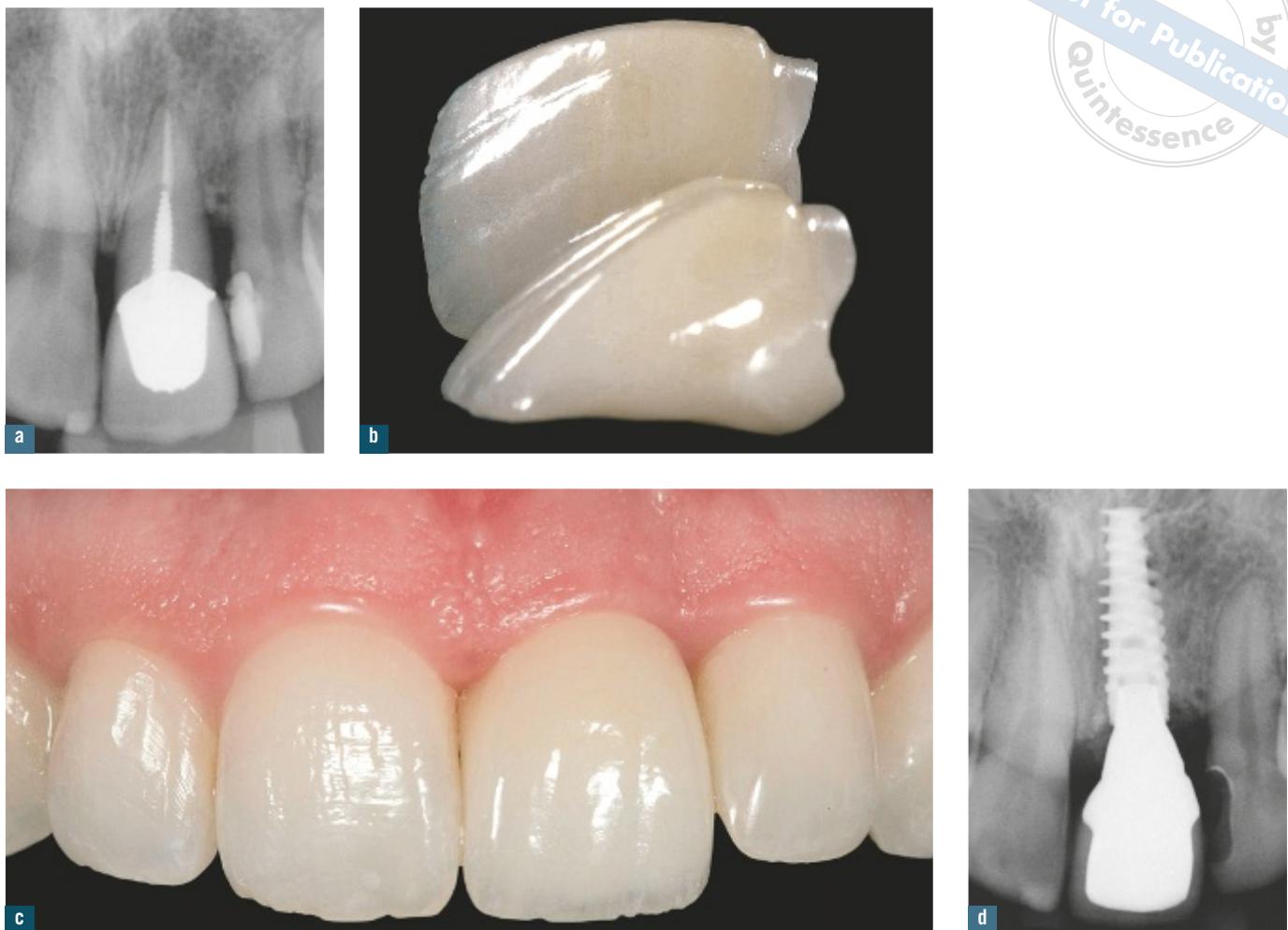


Fig 7-26 (a) Retroalveolar radiograph of a left central incisor with a poor prognosis. (b) Procera restoration with subgingival concavity and a convexity at the gingival level. (c) Final ceramic restoration with optimal gingival contour and tonicity. (d) Retroalveolar radiograph of the implant restoration, showing maintenance of the cervical bone level. (Courtesy of Dr. N. Bichacho, Tel Aviv, Israel.)

contour and in harmony with the adjacent teeth, by using delicate osseous and/or mucogingival plastic surgery (Fig 7-26).

Advances in surgical techniques and in the design and surfaces of implants have moved implant treatment beyond purely functional integration and towards a restoratively driven approach, with a heightened awareness that favorable esthetic results will also depend on biologically driven therapy.^{89,90} Several changes need to be implemented in procedures to reduce or prevent tissue remodeling, as well as in hardware, such as a tapered implant design with microthreads on the coronal portion, a rough surface to the collar, and new prosthetic options, including using new abutment designs and biomaterials for prosthetic components with screwtype one-piece abutment restorations. These are some

of the parameters that prevent or reduce crestal bone remodeling, induce crestal bone preservation, and increase and stabilize the volume of the soft tissues.

Surgically noninvasive procedures, such as flapless procedures, are recommended. When a flap elevation that creates a pouch without vertical incision is necessary, soft tissue grafting is recommended to improve the biotype and create a certain level of long-term soft tissue stability. Immediate implant placement in a slightly palatal position after extraction, combined with bone graft and connective tissue graft, will preserve the levels of hard and soft tissues, to obtain a favorable esthetic outcome.

Prosthetic procedures should avoid multiple connections/disconnections of prosthetic components, use a concave or switch platform submergence profile, and involve biocompat-

Case 2 – Two single immediate implants with screw retained provisional crowns

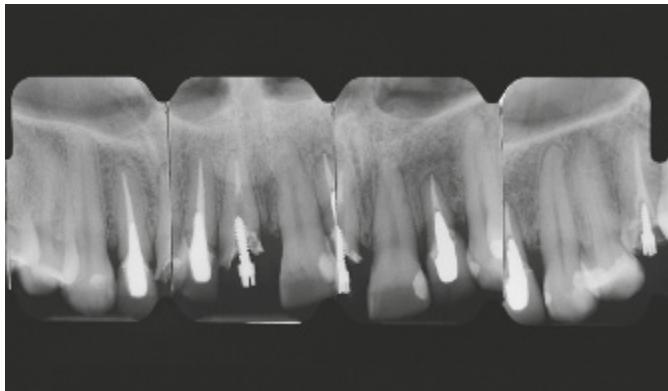


Fig 8-13 The preoperative radiographs for this case show, in the right central incisor, a significant reduction of tooth structure and an inappropriate post into the root. There is also a substantial reduction of the periodontal support around the left lateral incisor.



Fig 8-14 The preoperative clinical edge-to-edge view shows the presence of the two provisional restorations on the right central incisor and the left lateral incisor. The gingival outline shows the lateral incisors in a more apical position than the central incisors and canines.



Fig 8-15 After removal of the provisional restorations and post, the margin of the right central incisor appears located deeply in the subgingival area.



Fig 8-16 After atraumatic extraction and 3D socket evaluation, connective tissue grafts were harvested from the palatal region. Placement of the graft in a buccal split-thickness pouch, combined with the use of a filler material (Bio-Oss), will partially compensate for the bone resorption that will occur after extraction.



Fig 8-17 A Nobel Active RP (Nobel Biocare) implant was placed in the right central incisor position and a Nobel Active NP implant (Nobel Biocare) in the left lateral incisor position. Care was taken to engage with the palatal wall of the extraction sockets, in order to obtain primary implant stability.



Fig 8-18 (a, b) After implant placement, the provisional pillar titanium abutments were positioned and cut buccally before inserting the acrylic shells.



Fig 8-19 Once the pillars have been cut the shells can be placed in position.



Fig 8-20 The shells are placed over the titanium pillars prior to being fixed in the proper position.

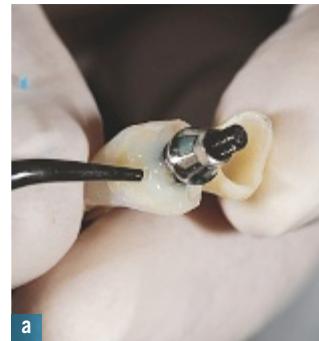


Fig 8-21 (a, b) A flowable composite resin is then applied to fill the gap and create an ideal submergence profile. The light-curing resin composite enables an easy and very quick procedure for construction of provisional crowns.



Fig 8-22 The two provisionals in place after suturing. The two incisal openings highlight the slight oblique orientation of the two implants. Note the gingival level of the right central incisor, which is more coronal than for the contralateral tooth.



Fig 8-23 The final shape of the two provisionals was achieved by the application of the resin composite material. The two restorations were shortened incisally to avoid any contact during excursive movements – this is a fundamental requisite for immediate function.



Fig 8-24 (a, b) After initial healing and osseointegration of the implants, a connective tissue graft was placed on the buccal aspect of the right lateral incisor. The combination of coronal relocation of the tooth preparation and reshaping of the root surface by creating a moderate buccal concavity apically to the preparation (in the dentogingival sulcus) resulted in an increase of connective tissue thickness and coronal relocation of the gingival margin. The soft tissue thickness also concealed the discoloration of the root and created a stable gingival position.



Fig 8-25 After a few months the provisional restoration of the central incisor was removed to idealize the final gingival contour.



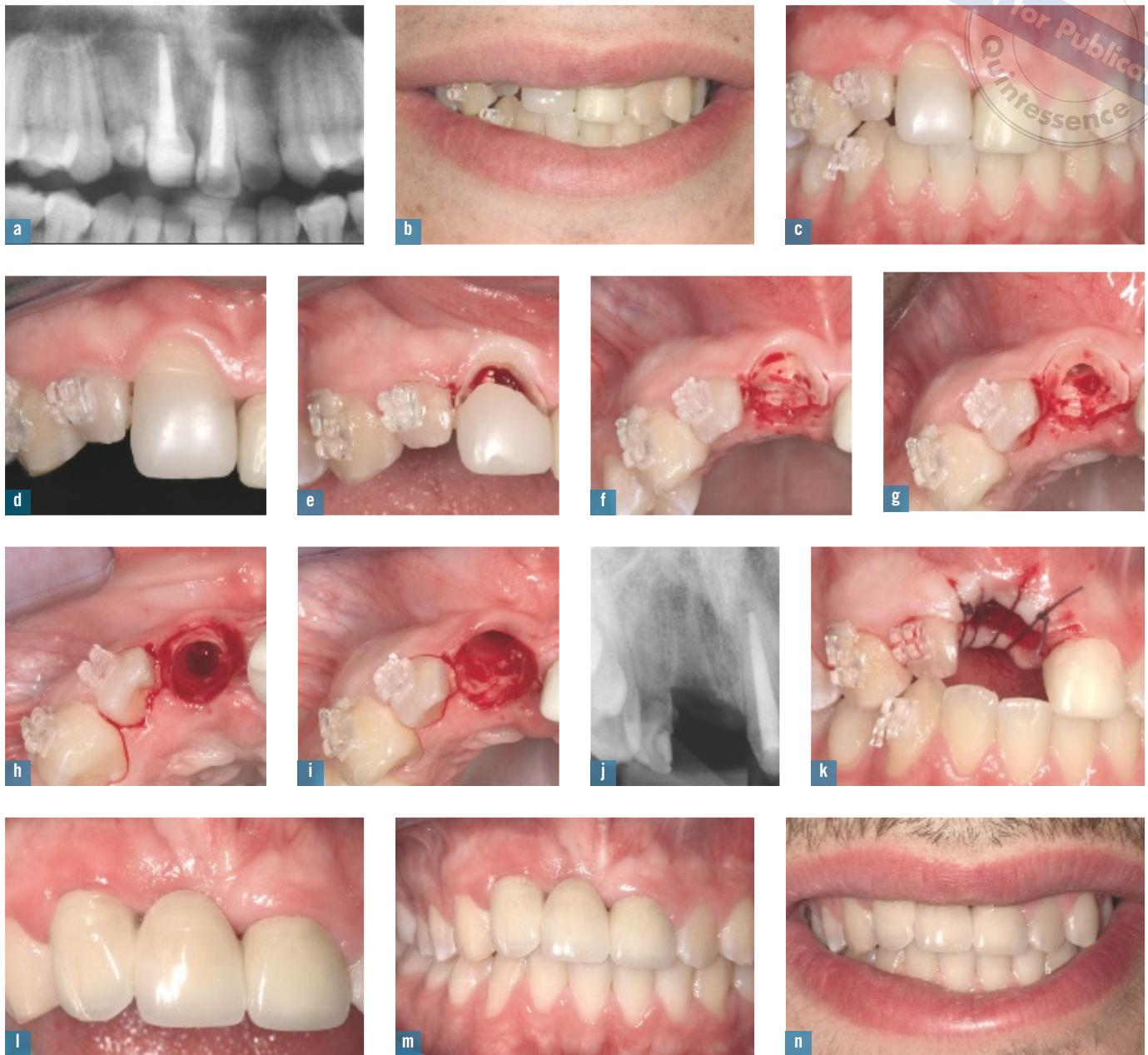
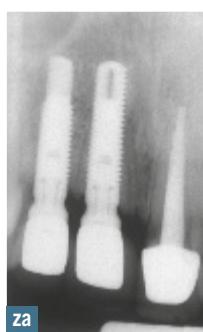
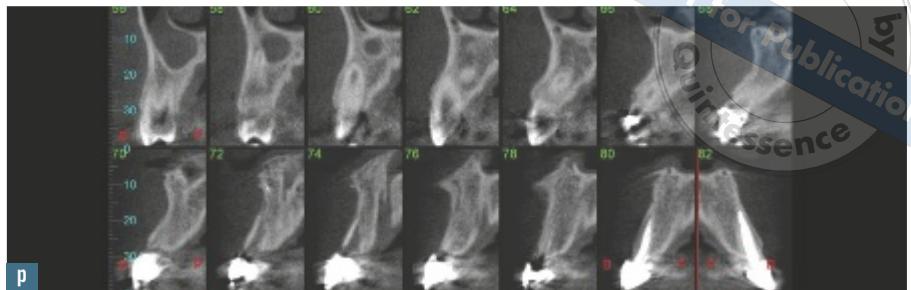
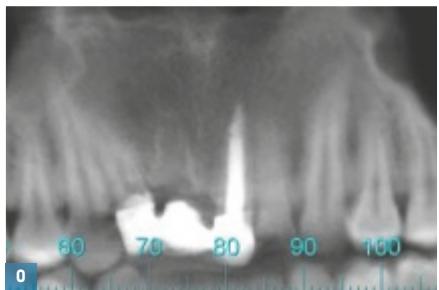


Fig 13-2 Ankylosis of two maxillary right incisors several years after trauma to the anterior area (**a, b**). The right central incisor was remarkably underoccluded and was temporarily restored using composite resin. Notice the uneven free gingival margin of that tooth compared with that of the left incisor (**c, d**). Although the right lateral incisor was also diagnosed as ankylosis, the free gingival margin was acceptable; decoronation was performed only for the central incisor and the lateral tooth was maintained until growth completion (**e** to **k**). A provisional fixed partial denture was fabricated (**l** to **n**). At age 19, the soft tissue and vertical bone growth can be observed at the area of decoronation, while the free gingival margin of the lateral incisor is apically poisoned. A computerized tomography (CT) scan showed external root resorption of the lateral incisor and remnants of dentin of the central decoronated incisor (**o, p**). The ankylosic lateral incisor was extracted and two dental implants immediately inserted. The gap was filled with bovine bone, and connective tissue from the right palate was grafted to correct the free gingival margin of the lateral incisor (**q** to **t**). Temporary abutments were connected and the implants were nonfunctionally immediately provisionalized (**u** to **x**). Histologic examination of the right lateral incisor demonstrated wide areas of dentin, showing resorption and replacement by compact lamellar bone. Note the pronounced resorption lacunae and direct bone-to-dentin contact (**y, z**). A follow up periapical view after a year of post-implant placement demonstrates dentin remnant of central incisor in contact with implant two years after implantation (**za**). Clinical view a year following implantation (**zb**). (Surgeon: Dr. D. Schwartz-Arad, Ramat Hasharon, Israel; prosthodontist: Dr. Z. Ormianer, Ramat Gan, Israel; histologic examination: Dr. Ilana Kaplan, Israel.)

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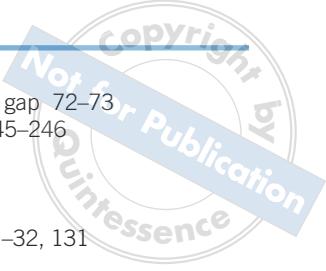
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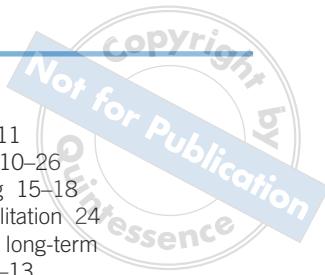
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