CORE TRUTH LABS™

All-on-X⁶ Oral Surgery

A Standard-of-Care Didactic for the General Dentist

From first examination through diagnosis, surgery, prosthetics and long-term maintenance

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First edition · Internal educational use · Not a substitute for supervised clinical training

About This Volume

Authorship, method and limitations

This didactic was written for clinicians. It assumes a working knowledge of oral anatomy, periodontics, exodontia and fixed prosthodontics, and it presumes the reader intends to practice full-arch implant surgery at the technical standard of the specialties whose territory it occupies.

Method. The text is organized around the clinical pathway rather than around academic disciplines. Each chapter closes with key takeaways and a reference list drawn from professional standards, association position papers, consensus statements, core textbooks and peer-reviewed literature. Journal volume and page citations are intentionally omitted because position papers and clinical practice guidelines are revised periodically; readers should retrieve the current version of each source.

Three categories of statement. Established evidence is cited. Contested or thin evidence is identified as such. Statements reflecting the author's clinical judgment are labeled as opinion. These categories are never blurred.

Disclaimer. This volume is educational. It does not establish a doctor-patient relationship, does not constitute legal advice, and does not supersede state dental practice acts, facility policy, device manufacturer instructions for use, or the treating clinician's independent judgment. Techniques described require supervised training and mentorship before independent practice.

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Contents

Twenty chapters in six parts, plus appendices

— Master Reference List

Purpose & Scope

Why this book exists

This volume is a surgical didactic written for the general dentist who intends to diagnose, plan, and deliver full-arch implant reconstruction — All-on-X^6 — at or above the standard of care practiced by oral and maxillofacial surgeons, periodontists, and prosthodontists. It is organized in the same sequence a patient actually travels: first contact, medical evaluation, dental examination, records, imaging, diagnosis, treatment planning, consent, surgery, prosthetics, and long-term maintenance.

It is deliberately not a marketing document and not a weekend-course handout. Where the literature is strong, it is cited. Where the literature is weak or contested, that is said plainly. Where a statement reflects the clinical judgment of the author rather than published consensus, it is labeled as opinion. A didactic that blurs those three categories is not education — it is advertising.

A word on scope of practice

Dental licensure in the United States is, with narrow exceptions, non-specialty limited: a general dentist may legally perform any procedure within dentistry. Legality is the floor, not the ceiling. The ethical and legal ceiling is the standard of care, and the standard of care is procedure-specific, not license-specific. A general dentist who places implants is judged against what a reasonably prudent implant surgeon would have done in the same circumstances — not against what an average general dentist does.

STANDARD OF CARE

The operating rule of this book: do not perform a procedure unless you can perform it, document it, and manage its complications at or above the level of the specialist who performs it every day. If any one of those three — execution, documentation, complication management — falls short, the correct clinical decision is to refer, co-treat, or decline.

Author's position — on generalists and specialists

There is a persistent misnomer in dentistry that specialty training automatically confers superior patient care. It confers superior *depth* in one domain. Most specialists practice a single discipline; they are not practicing periodontics, endodontics, prosthodontics, occlusion, sleep, and restorative dentistry at specialist depth simultaneously.

The properly practicing general dentist — one who trains relentlessly, audits outcomes, and refuses to work below specialist technique in any procedure they choose to perform — is frequently the clinician best positioned to understand the *whole* patient: the arch, the joint, the airway, the medical picture, the finances, and the twenty-year restorative arc. Full-arch reconstruction is a whole-patient problem before it is a surgical one.

That advantage is earned, never assumed. It is forfeited the moment a generalist performs a procedure at less than specialist technique. — *J.W.D.*

Educational use. Nothing here substitutes for supervised training, mentorship, credentialing, or your own reading of the primary sources. Nothing here creates a doctor-patient relationship or overrides state law, facility policy, or the judgment of the treating clinician.

PART I

The Patient

Chapter 1

First Contact & the Initial Examination

The first appointment decides the case. Not the surgery — the first appointment. The majority of full-arch failures traceable to clinician error are decided before a drill is ever picked up: the wrong patient was accepted, the wrong prosthetic design was promised, or an expectation was set that the anatomy could never satisfy.

1.1 What the first visit must accomplish

1. Establish the chief complaint in the patient's own words, verbatim in the chart.
2. Determine what the patient believes they are buying — teeth, comfort, appearance, or an end to a decade of dental failure.
3. Screen for absolute and relative contraindications before any promise is made.
4. Decide whether the case is *yours*, a *co-treated* case, or a *referral*.
5. Create the record that will defend the decision you made.

1.2 The chief complaint and the expectation gap

Full-arch patients rarely present asking for implants. They present asking to stop being embarrassed, to stop being in pain, or to stop the slow attrition of an ageing dentition. Record the complaint verbatim. Then record, separately, the *expectation*: what the patient believes the outcome will look and feel like. The distance between those two statements is the expectation gap, and it is the single best predictor of whether a technically successful case will be perceived as a failure.

Expectation statements that require correction at visit one

• "I want my old teeth back." — A fixed hybrid is not a natural dentition; the prosthesis has a transition line and a defined bulk.

• "I don't want anything removable, ever." — Clarify that the provisional, the final, and hygiene access all differ; a fixed prosthesis is removable *by the clinician*.

• "I want it done in one day." — Immediate load is a provisional protocol, not a definitive one. The definitive prosthesis follows months of healing and maturation.

• "I've had bad dentists." — Explore genuinely. Sometimes true; sometimes a marker of unmeetable expectation.

1.3 Structured intake

Intake must be structured, written, and signed — not conversational. A conversational history is unreproducible and indefensible. Minimum captured fields:

- Full medical history with an explicit, itemized medication list including over-the-counter agents, supplements, and injectables.
- Prior head and neck radiation therapy: site, dose, date.
- Antiresorptive and antiangiogenic exposure: agent, route, duration, indication.
- Bleeding history and anticoagulant/antiplatelet therapy.
- Diabetes status with most recent HbA1c and prescribing physician.
- Tobacco, nicotine, alcohol, and recreational drug use, quantified.
- Psychiatric history, bruxism/parafunction, and prior dental trauma or dissatisfaction.
- Prior dental and surgical treatment, including failed implants — and *why* they failed.

1.4 The clinical screening examination

At the screening visit the objective is triage, not a definitive diagnosis. Perform and record: extraoral inspection and palpation, cranial nerve screening where indicated, head and neck lymph node examination, temporomandibular joint and muscle screening, a complete oral cancer examination, periodontal screening, mobility and caries survey, occlusal assessment including vertical dimension, interarch space estimate, smile line and lip dynamics, and tissue biotype.

STANDARD OF CARE

An oral cancer examination is performed and documented at *every* comprehensive examination for every full-arch candidate without exception. A patient about to undergo removal of the entire dentition will lose the anatomical landmarks and mucosal baseline against which a future lesion would be compared. Failure to document a mucosal survey before terminal-dentition surgery is indefensible.

1.5 Deciding whether the case is yours

Case selection is a skill, and refusal is a technique. The following categories should prompt referral or formal co-treatment for a clinician early in their full-arch career — recognizing that experience shifts, but does not eliminate, these lines:

Finding	Default disposition
Severe maxillary atrophy requiring zygomatic or pterygoid fixation	Refer — specialist surgical center
Prior head/neck radiation to the jaws	Refer; oncology and hyperbaric consultation
Active or prior MRONJ, or high-dose IV antiresorptive therapy	Refer; medical co-management

Finding	Default disposition
Uncontrolled diabetes (HbA1c well above target)	Defer; medical stabilization first
Bleeding disorder or complex anticoagulation	Co-treat with hematology/physician
Significant psychiatric instability or body dysmorphic features	Defer; behavioral health evaluation
Severe unmanaged parafunction	Defer; occlusal and behavioral management first
Anatomy within routine ranges, controlled medical status	Proceed under this protocol

KEY TAKEAWAYS

- The first visit determines the case; surgery only executes it.
- Record the chief complaint verbatim and the expectation separately.
- Structured, signed intake — never conversational history.
- Refusal and referral are clinical skills, documented as decisions with reasons.

References

1. American Dental Association. *Oral Health Topics: Dental Implants.* ADA Center for Scientific Information.
2. American Association of Oral and Maxillofacial Surgeons. *Dental Implant Surgery — Patient Information and Clinical Resources.*
3. Academy of Osseointegration. *Guidelines of the Academy of Osseointegration for the Provision of Dental Implants and Associated Patient Care.* Int J Oral Maxillofac Implants.
4. International Team for Implantology. *ITI Treatment Guide Series* — volumes on treatment planning and the edentulous patient. Quintessence.

Chapter 2

Medical Evaluation & Risk Stratification

Full-arch surgery is elective surgery on an ambulatory patient population that skews older and more medically complex than the general dental population. The medical evaluation is not a formality preceding the interesting work; it is the work that determines whether the interesting work should happen at all.

2.1 Physical status classification

Classify every surgical candidate using the American Society of Anesthesiologists physical status system and record the classification in the chart before the surgical appointment is scheduled. The classification drives the setting, the anesthetic plan, and the referral threshold.

ASA class	Description	Implication for office-based full-arch surgery
I	Healthy patient	Proceed
II	Mild systemic disease, well controlled	Proceed with documented control
III	Severe systemic disease, functionally limiting	Medical consultation; consider setting, sedation limits, staged care
IV	Severe disease that is a constant threat to life	Not a candidate for elective office-based full-arch surgery
V / VI	Moribund / organ procurement	Not applicable

2.2 Antiresorptive and antiangiogenic therapy — MRONJ

Medication-related osteonecrosis of the jaw is the single medical exposure most likely to convert a routine full-arch case into a catastrophe. The AAOMS position paper defines MRONJ by three criteria: current or previous antiresorptive or antiangiogenic therapy, exposed bone or bone probed through a fistula persisting more than eight weeks, and no history of radiation therapy or obvious metastatic disease to the jaws.

- Risk is stratified primarily by **route, potency, indication, and duration**: high-dose intravenous therapy for oncologic indications carries risk orders of magnitude above low-dose oral therapy for osteoporosis.
- Denosumab, an antiresorptive monoclonal antibody, is not a bisphosphonate and does not incorporate into bone; its effect wanes after dosing, which changes the timing conversation.
- Antiangiogenic agents used in oncology carry independent risk and are frequently overlooked on medication lists.
- There is no validated serum marker that reliably predicts MRONJ risk; do not base clinical decisions on CTX testing alone.

STANDARD OF CARE

For oncologic-dose antiresorptive or antiangiogenic exposure, elective implant placement is contraindicated in the general practice setting. For low-dose osteoporosis therapy, proceed only after written physician consultation, explicit MRONJ-specific consent, atraumatic technique, primary closure where possible, and a documented plan for extended follow-up. Any decision to proceed — and the reasoning behind it — belongs in the chart in narrative form.

2.3 Diabetes and glycemic control

Diabetes itself is not a contraindication; *uncontrolled* diabetes is. Elevated glycemia impairs neutrophil function, collagen synthesis, and microvascular perfusion, and is associated in the literature with delayed healing, increased infection, and elevated peri-implant disease risk. Obtain a recent HbA1c and the prescribing physician's assessment. Document the value, the date, and the physician's clearance. Defer elective surgery until the patient is at their physician's stated target.

2.4 Anticoagulation and bleeding risk

The prevailing consensus across dental and medical literature is that routine interruption of anticoagulant or antiplatelet therapy for dental surgery carries greater thromboembolic risk than the bleeding risk it prevents. Full-arch surgery, however, is not routine dental surgery: it involves multiple extractions, extensive flap reflection, and alveoloplasty across an entire arch.

- Never alter a patient's anticoagulation regimen yourself. Any modification is the prescribing physician's decision, documented in writing.
- Plan local hemostasis in advance: primary closure, oxidized cellulose or collagen, tranexamic acid rinse where indicated, sutures placed to hold tissue rather than close a gap.
- Consider staging the arch, or staging maxilla and mandible, to reduce single-session hemostatic burden.
- Screen for the frequently undisclosed: fish oil, high-dose vitamin E, and herbal supplements with antiplatelet effect.

2.5 Immunosuppression, transplantation, and active malignancy

Solid-organ transplant recipients, patients on chronic corticosteroids or biologic immunomodulators, and patients under active oncologic treatment require explicit medical co-management before elective implant surgery. The decision is rarely a simple yes or no; it is a question of sequencing relative to their systemic therapy. Obtain written clearance that names the specific procedure — a generic "cleared for dental treatment" letter is not clearance for full-arch surgery.

2.6 Tobacco, nicotine, and substance use

Smoking is consistently associated in the implant literature with increased early failure, increased marginal bone loss, and increased peri-implantitis. It is not an absolute contraindication, but it is a consent-altering finding: the patient must be told, in writing, that their smoking materially changes their prognosis. Vaping and nicotine pouches are not established as safe alternatives; the absence of evidence of harm is not evidence of absence of harm, and should be represented that way to the patient.

2.7 The medical consultation letter

A useful consultation letter is procedure-specific and question-specific. It states what you intend to do, how long it will take, the anticipated blood loss and anesthetic, and asks answerable questions. Template outline in Appendix C.

KEY TAKEAWAYS

- Assign and document an ASA class before scheduling surgery.
- MRONJ risk is driven by route, potency, indication, and duration — not by a lab test.
- Do not modify anticoagulation; plan local hemostasis instead.
- Clearance must name the specific procedure.

References

1. Ruggiero SL, et al. American Association of Oral and Maxillofacial Surgeons' Position Paper on Medication-Related Osteonecrosis of the Jaws. *J Oral Maxillofac Surg.*
2. American Society of Anesthesiologists. *ASA Physical Status Classification System.*
3. American Dental Association / American Academy of Orthopaedic Surgeons. *Appropriate Use Criteria and Clinical Practice Guideline on Antibiotic Prophylaxis.*
4. American Heart Association. *Prevention of Infective Endocarditis: Guidelines and Scientific Statements.*
5. Chrcanovic BR, Albrektsson T, Wennerberg A. Smoking and dental implants: a systematic review and meta-analysis. *J Dent.*
6. American Diabetes Association. *Standards of Care in Diabetes.*

Chapter 3

The Dental & Extraoral Examination

The dental examination for a full-arch candidate differs from a routine comprehensive examination in one decisive respect: you are not cataloguing teeth to restore them, you are characterizing an arch and a face that will be rebuilt from the bone outward.

3.1 Extraoral and facial analysis

- Facial thirds, midline, and cant relative to the interpupillary line and true horizontal.
- Lip support at rest and in animation; nasolabial angle; philtrum length.
- Lip dynamics: rest display, maximum smile display, and — critically — the height of the high smile line in the maxilla.
- Profile, chin projection, and the effect of any planned vertical change.
- TMJ range of motion, deviation, joint sounds, and muscle palpation, all recorded numerically.

> **The transition line is the case**
>
> In fixed full-arch prosthetics the junction between prosthesis and mucosa — the transition line — must be hidden beneath the lip in maximum animation. If it cannot be hidden, the patient will see acrylic or zirconia meeting tissue every time they smile. This single observation, made at the examination, determines whether the case is a fixed hybrid, a fixed prosthesis with a modified design, or an implant-retained overdenture. It cannot be corrected later by prosthetic skill.

3.2 Intraoral examination

- Complete periodontal charting of remaining teeth with probing depths, recession, furcations, mobility, and bleeding indices — even for teeth planned for extraction, because periodontal phenotype and pathogen load persist after extraction.
- Caries and endodontic survey; existing restorative status.
- Soft tissue biotype, keratinized tissue width, vestibular depth, frenal attachments.
- Arch form, ridge morphology, undercuts, tori, mylohyoid ridge prominence.
- Tongue size and position; floor of mouth elevation.
- Salivary flow and xerostomia assessment — a strong predictor of prosthetic comfort and tissue health.

3.3 Occlusion and vertical dimension

Full-arch reconstruction is an occlusal reconstruction that happens to involve implants. Record existing vertical dimension of occlusion, freeway space, centric relation-maximum intercuspation discrepancy where teeth permit, excursive interferences, and evidence of

parafunction — wear facets, abfraction, fractured restorations, buccal ridging, masseter hypertrophy.

Where the opposing arch is natural dentition, dentate opposing forces are higher and the prosthetic material selection and occlusal scheme must reflect that. Where both arches are being restored, the vertical dimension becomes a design decision rather than a constraint — a freedom that is powerful and dangerous in equal measure.

3.4 Restorative space

Interarch restorative space, measured from the planned implant platform to the planned incisal edge, drives material selection. Insufficient space is the most common cause of prosthetic fracture in full-arch cases, and it is a planning failure, not a laboratory failure. Space is created surgically through alveoloplasty, and that decision must be made *before* surgery, in the plan, not improvised at the chair.

Available space (platform to incisal)	Design implication
Inadequate	Additional bone reduction required, or reconsider prosthesis type
Marginal	Monolithic zirconia; avoid layered ceramics and thin acrylic
Adequate	Full design latitude; titanium bar with acrylic or zirconia
Excessive	Reassess bone reduction; long lever arms and hygiene access problems

KEY TAKEAWAYS

- Characterize the face and the arch, not the teeth.
- The high smile line and the transition line decide prosthesis type at the examination.
- Restorative space is created surgically and planned prosthetically — never improvised.
- Record parafunction as a design variable, not a footnote.

References

1. Misch CE. *Dental Implant Prosthetics.* Elsevier.
2. Zarb GA, Hobkirk J, Eckert S, Jacob R. *Prosthodontic Treatment for Edentulous Patients.* Elsevier.
3. American College of Prosthodontists. *Parameters of Care and Classification System for Complete Edentulism.*
4. Bidra AS, et al. Systematic review of surgical and prosthetic protocols for fixed complete dental prostheses. *J Prosthet Dent.*

Chapter 4

Record Keeping & Defensible Documentation

The chart is the only durable evidence that the standard of care was met. In litigation and in board review, an undocumented finding is an absent finding and an undocumented conversation did not occur. This is not a legal footnote — it is a clinical discipline that improves care, because the act of writing forces the reasoning to be explicit.

4.1 What a defensible full-arch record contains

1. Signed, dated, structured medical and dental history, updated at each surgical visit.
2. ASA classification and, where obtained, the medical consultation letter and its written reply.
3. Complete diagnostic imaging with a written radiographic interpretation of the *entire* volume.
4. Complete photographic series, dated.
5. Written diagnosis — not a procedure code, a diagnosis.
6. The treatment plan, alternatives considered, and the reasoning for the plan selected.
7. Signed informed consent naming risks, benefits, alternatives, and the option of no treatment.
8. Operative note with implant manufacturer, reference number, lot, diameter, length, site, insertion torque, and any deviation from plan.
9. Anesthetic record, medications administered, and vitals where sedation is used.
10. Post-operative instructions given, in writing, with a copy retained.
11. Every post-operative contact, including telephone calls, missed appointments, and non-compliance.
12. Any complication, its management, and any referral made.

STANDARD OF CARE

The operative note must record insertion torque for every fixture and the specific rationale for any intraoperative deviation from the surgical plan. "Implants placed, patient tolerated well" is not an operative note for full-arch surgery and will not withstand scrutiny.

4.2 Informed consent as a process

Consent is a conversation that produces a document, not a document that replaces a conversation. The elements that must be present and provable: the nature of the procedure; the material risks; the benefits; the reasonable alternatives including no treatment; who will perform the surgery; the fee and what happens financially if revision is needed; and an opportunity for questions that is documented as having occurred.

- Provide the consent in advance, not at the surgical appointment with an IV in the arm.
- Document the specific risks discussed for *this* patient — smoking, diabetes, atrophy, parafunction — not only the generic list.
- Record informed *refusal* with the same rigor as consent when a patient declines a recommended test, referral, or treatment.
- Retain any written or video patient education materials provided, by version and date.

4.3 Records, privacy, and retention

Full-arch records include large imaging and photographic datasets containing biometric and facial identifiers. Handle CBCT volumes, intraoral scans, and clinical photography under the same privacy discipline as any other protected health information: access control, audit, encrypted storage and transmission, business-associate agreements with laboratories and planning services, and a documented retention schedule that satisfies your state's requirements.

4.4 Amending a record

Records may be amended; they may never be altered. An addendum is dated, timed, attributed, and does not obscure the original entry. A retrospectively "cleaned up" chart converts a defensible complication into an indefensible case.

KEY TAKEAWAYS

- Undocumented equals absent.
- Operative notes record torque, hardware identifiers, and deviations with reasons.
- Consent is a documented process; informed refusal is documented equally.
- Amend by addendum; never alter.

References

1. American Dental Association. *Principles of Ethics and Code of Professional Conduct.*
2. American Dental Association. *Dental Records* (ADA Practice Institute guidance).
3. U.S. Department of Health and Human Services. *HIPAA Privacy and Security Rules.* 45 CFR Parts 160 and 164.

PART II

The Environment

Chapter 5

Infection Control & Surgical Asepsis

Routine dental infection control is designed around restorative and hygiene procedures. Implant surgery — and particularly full-arch surgery, which combines multiple extractions, bone grafting, and the placement of permanent alloplastic devices into bone — requires a surgical aseptic protocol layered on top of standard precautions. The distinction between *clean* and *sterile* is the distinction being made here.

5.1 The baseline: standard precautions

Every element of the CDC's dental infection prevention framework applies and is presupposed: written policies with a designated infection prevention coordinator, staff training and immunization, hand hygiene, personal protective equipment, sharps safety, safe injection practice, sterilization with mechanical, chemical and biological monitoring, environmental surface management, and dental unit water quality meeting drinking water standards for non-surgical use.

STANDARD OF CARE

For any procedure involving incision, flap reflection, bone removal, or implant placement, dental unit water is not acceptable as an irrigant. Use sterile saline or sterile water delivered through a sterile disposable irrigation line. This is a hard line and there is no clinical circumstance in full-arch surgery that justifies crossing it.

5.2 The surgical layer

- **Surgical hand antisepsis** — antimicrobial surgical scrub or an alcohol-based surgical hand rub with persistent activity, performed to the manufacturer's stated contact time; not a routine hand wash.
- **Sterile attire** — sterile gloves, surgical gown, cap, and mask with eye protection; second pair of gloves for grafting and hardware handling where indicated.
- **Patient preparation** — pre-procedural antimicrobial rinse, perioral skin antisepsis, and sterile draping establishing a defined sterile field.
- **Sterile field discipline** — a designated non-sterile circulating assistant handles charts, imaging, mobile devices, and cabinetry; anything below the field edge is contaminated.
- **Implant handling** — fixtures are transferred without contacting non-sterile surfaces, gloves contaminated by soft tissue, or saliva; titanium surface contamination is a real and under-appreciated cause of early failure.
- **Bone-cutting instrumentation** — copious sterile irrigation, sharp single-use or validated-reprocessed drills, and respect for the manufacturer's drill life.

5.3 Instrument reprocessing for surgical instruments

Surgical instruments are critical items and must be heat sterilized in packages with load monitoring. Practical points that are commonly failed in dental offices:

- Cassette or pouch integrity confirmed at the point of use; a compromised package is not sterile regardless of the indicator.
- Biological (spore) monitoring at least weekly and with every implantable-device load, with retained logs.
- Handpieces used for bone surgery are heat sterilized between patients; surface disinfection is not acceptable.
- Drills and osteotomes: follow the manufacturer's validated reprocessing instructions or use single-use. Dull, over-cycled drills generate heat, and heat generates necrosis.

5.4 Aerosols, ventilation, and the surgical suite

Bone cutting produces aerosol containing blood and osseous debris. Use high-volume evacuation, pre-procedural rinse, and appropriate respiratory protection; observe room turnover and ventilation practice consistent with your jurisdiction's requirements. Where a dedicated surgical operatory is available, it should be minimally furnished, with wipeable surfaces and no open storage.

KEY TAKEAWAYS

- Sterile is not clean; surgery requires the surgical layer above standard precautions.
- Sterile irrigant, always, for any osseous procedure.
- Biological monitoring with every implantable load, logged.
- Titanium surface contamination is a preventable cause of early failure.

References

1. Centers for Disease Control and Prevention. *Guidelines for Infection Control in Dental Health-Care Settings* and *Summary of Infection Prevention Practices in Dental Settings.*
2. Organization for Safety, Asepsis and Prevention (OSAP). *Dental Infection Control Resources and Toolkits.*
3. Centers for Disease Control and Prevention. *Guideline for Disinfection and Sterilization in Healthcare Facilities.*
4. Association of periOperative Registered Nurses. *Guidelines for Perioperative Practice* — sterile technique.

Chapter 6

Facility, Sedation Safety & Emergency Preparedness

The most predictable emergency in full-arch surgery is the one produced by the sedation, not the surgery. The second most predictable is a cardiovascular event in a medically complex older patient undergoing a long, stressful procedure. Preparedness is a facility and team property, not an individual one.

6.1 Anesthesia planning

- Practice strictly within your state permit level, and re-examine whether the permit level matches the case, not merely the patient's preference.
- Long procedures under moderate sedation drift; assign one team member whose only responsibility is monitoring and documentation.
- Airway risk in the supine, edentulating patient with copious irrigation and bone debris is real; throat protection and suction discipline are mandatory.
- Local anesthetic maximum dosing must be calculated by weight and documented for long multi-quadrant cases — this is a recognized and preventable overdose scenario.

6.2 Monitoring

Continuous monitoring appropriate to the anesthesia level, with recorded intervals: pulse oximetry, blood pressure, heart rate, and capnography where moderate sedation or deeper is used. Baseline vitals are recorded before any drug is given, and the patient is discharged against documented discharge criteria to a responsible adult.

6.3 Emergency preparedness

Emergency	Immediate readiness requirement
Airway obstruction / aspiration	Suction, Magill forceps, oral airways, positive-pressure oxygen
Anaphylaxis	Epinephrine auto-injector or ampoule and syringe, antihistamine, oxygen
Angina / myocardial infarction	Nitroglycerin, aspirin, oxygen, AED, emergency activation
Hypoglycemia	Oral and injectable glucose source
Seizure	Padding, airway management, benzodiazepine if permitted
Local anesthetic toxicity	Dose log, oxygen, benzodiazepine, transfer plan
Syncope	Trendelenburg, oxygen, ammonia inhalant
Bronchospasm	Bronchodilator, oxygen

- Emergency drugs and oxygen checked on a documented schedule with expiration tracking.

- Team emergency drills rehearsed and documented at least annually; roles assigned by name.
- Written transfer agreement and a rehearsed path for emergency medical services access to the operatory — including whether a stretcher physically fits.

KEY TAKEAWAYS

- The sedation is usually the emergency, not the surgery.
- Dedicated monitoring role, recorded vitals, documented discharge criteria.
- Drills rehearsed and documented; a plan that has never been run is not a plan.

References

1. American Dental Association. *Guidelines for the Use of Sedation and General Anesthesia by Dentists.*
2. American Association of Oral and Maxillofacial Surgeons. *Office Anesthesia Evaluation Manual.*
3. American Heart Association. *Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.*
4. Malamed SF. *Medical Emergencies in the Dental Office.* Elsevier.

PART III

Imaging, Photography & Digital Records

Chapter 7

Radiology: CBCT Selection, Interpretation & Anatomy

Cone beam computed tomography is not optional for full-arch implant planning. It is also not a screening tool to be applied reflexively. Both statements are true, and the resolution between them is *selection criteria*: imaging is prescribed when the information sought will change the treatment, at the smallest field of view and lowest dose that answers the question.

7.1 Justification, optimization, ALARA

- Prescribe imaging patient-by-patient after a clinical examination — never as a routine protocol applied to a demographic.
- Select the smallest field of view consistent with the diagnostic task; a full-arch case legitimately requires a larger volume than a single site.
- Optimize exposure parameters; higher resolution is not automatically better care.
- Document the justification for the scan in the chart.

7.2 The duty to interpret the entire volume

STANDARD OF CARE

When you prescribe and acquire a CBCT volume, you assume responsibility for the entire imaged volume — not only the alveolar ridge. Airway, sinuses, cervical spine, styloid processes, carotid space calcifications, temporomandibular joints, and any incidental soft-tissue or osseous finding within the field are yours to identify, document, and act upon. If you are not confident interpreting the full volume, obtain a formal radiologic report from an oral and maxillofacial radiologist. That referral is inexpensive; a missed pathology is not.

A written radiographic interpretation should exist for every volume, dated and signed, covering the ridge, the relevant neurovascular anatomy, the sinuses, and a statement regarding incidental findings. "CBCT taken" is not an interpretation.

7.3 Anatomy that must be identified before every case

Structure	Planning consequence
Inferior alveolar canal and its course	Safety margin; posterior implant length and position
Mental foramen and the anterior loop	Anterior extent of posterior mandibular fixtures
Lingual concavity of the posterior mandible	Lingual plate perforation and floor-of-mouth hemorrhage risk
Submandibular fossa and mylohyoid ridge	Angulation and flap management
Incisive canal / nasopalatine bundle	Anterior maxillary fixture position

Structure	Planning consequence
Maxillary sinus floor, septa, membrane thickness	Sinus approach, graft feasibility, tilted fixture strategy
Posterior superior alveolar artery	Lateral window design and hemorrhage risk
Nasal floor and canine fossa	Anterior maxillary length
Pterygoid and zygomatic anatomy	Referral threshold determination
Bone density and cortical thickness	Drilling protocol, undersizing, primary stability strategy

7.4 Radiographic guides, planning software, and their limits

A CBCT of an edentulous or terminal arch without a radiographic reference of the planned tooth position is a map with no destination. Merge the intended prosthetic position — via a radiographic guide, a scanned denture, or a digitally designed prosthetic proposal — into the volume before planning fixture position. Planning software is a measuring instrument, not a diagnostician; segmentation artifacts, scatter from existing restorations, and registration error are all sources of clinically significant deviation.

Post-operative imaging is part of the record: confirm final fixture position and prosthetic seating, and establish the radiographic baseline against which future marginal bone level will be measured. Without a baseline, later bone loss cannot be quantified, and peri-implantitis cannot be properly staged.

KEY TAKEAWAYS

- Justify, optimize, document — every scan.
- You are responsible for the whole volume; obtain a radiologist's report when uncertain.
- Plan from the prosthesis into the bone, never the reverse.
- Establish a radiographic baseline at delivery.

References

1. American Dental Association Council on Scientific Affairs. *The Use of Cone-Beam Computed Tomography in Dentistry.* J Am Dent Assoc.
2. American Academy of Oral and Maxillofacial Radiology. *Position Statement on Clinical Use of Cone-Beam CT in Dental Implantology.*
3. American Academy of Oral and Maxillofacial Radiology / ADA. *Selection Criteria for Dental Radiography.*
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Chapter 8

Clinical Photography & the Digital Record

Photography in full-arch care serves four distinct purposes, and confusing them produces poor images: diagnosis, prosthetic design communication, medico-legal documentation, and patient communication. A single casual smartphone photo satisfies none of them well.

8.1 The minimum diagnostic series

1. Full face, rest position, true horizontal, lips relaxed.
2. Full face, natural smile.
3. Full face, maximum animated smile — the image that reveals transition-line risk.
4. Profile at rest and, where vertical change is planned, profile in occlusion.
5. Retracted frontal in occlusion; retracted right and left lateral.
6. Maxillary and mandibular occlusal views.
7. Close-up of the anterior segment showing incisal edge position relative to the lower lip.
8. Any pathology, mucosal lesion, or asymmetry, with a scale reference.

Standardize magnification, background, lighting, and head position so that images are comparable across time. Comparability is what converts a photograph into a record.

8.2 Surgical and prosthetic documentation

- Pre-operative intraoral series on the day of surgery.
- Flap reflection and the exposed ridge before and after alveoloplasty — the single most valuable image set for later disputes about bone reduction.
- Fixtures in situ before soft tissue closure; grafted sites with membrane and material visible.
- Provisional in place, occlusion verified.
- Delivery series and each recall series.

8.3 Digital records: scans, files, and chain of custody

Intraoral scans, facial scans, CBCT volumes, and design files are diagnostic records subject to the same retention, privacy, and integrity requirements as any chart entry. Practical requirements: original unmodified files retained alongside any derived design; version control on prosthetic designs; laboratory transmissions logged; and encryption for storage and transfer. Where a third-party planning service is used, a business-associate agreement is required, and its existence should be verifiable.

8.4 Consent for imagery

Clinical use requires no separate permission beyond treatment consent. Marketing, teaching, publication, and social media each require specific, written, revocable authorization that

names the intended uses. Facial images are biometric identifiers; de-identification by cropping the eyes is not reliable de-identification of a full smile photograph.

KEY TAKEAWAYS

- Standardize the series or it is not a record.
- Photograph the ridge before and after reduction, every time.
- Retain original files with version control.
- Marketing use requires separate written authorization.

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PART IV

Diagnosis, Treatment Planning & Consent

Chapter 9

Diagnosing the Failing Dentition

"Terminal dentition" is a conclusion, and like every conclusion it must be earned by a diagnosis. The ethical hazard specific to full-arch dentistry is that the most profitable treatment is also the most destructive and the least reversible. That asymmetry demands a documented diagnostic standard that a peer could reproduce from the chart alone.

9.1 Diagnoses that justify full-arch conversion

- Generalized severe periodontitis (Stage IV) with a non-maintainable dentition and unfavorable prognosis on the majority of remaining teeth.
- Widespread structurally unrestorable teeth — caries or fracture below biologic width across the arch.
- Severe generalized attrition or erosion with collapsed vertical dimension where conventional restoration is not feasible or has failed.
- Failed extensive fixed prosthodontics with compromised abutments.
- Combinations of the above producing an arch prognosis, not merely individual tooth prognoses, that is hopeless.

9.2 Diagnoses that do not justify it

STANDARD OF CARE

The following are not, in themselves, indications for removal of the dentition: esthetic dissatisfaction with restorable teeth; localized disease that is treatable; patient convenience preference in a healthy arch; the clinician's inability or unwillingness to perform periodontal, endodontic, or restorative treatment; and financial arrangement considerations. Where a patient with a restorable dentition requests full-arch conversion, the correct response is a documented second opinion, a documented discussion of the irreversibility, and in many cases a declination.

9.3 Tooth-level and arch-level prognosis

Assign and record a prognosis for every remaining tooth using a defined system, and then state an arch-level prognosis separately. Arch prognosis is not the arithmetic average of tooth prognoses; strategic distribution matters. Three sound, well-positioned teeth may make an overdenture strategy clearly superior to full extraction, whereas eight questionable teeth distributed poorly may not.

Scenario	Reasonable options to present
Terminal maxilla, sound mandible	Maxillary fixed or overdenture; preserve mandible; opposing-force planning

Scenario	Reasonable options to present
Both arches terminal	Staged or simultaneous full-arch; VDO becomes a design decision
Terminal arch, severe atrophy	Graft-then-implant, remote anchorage referral, or overdenture
Terminal arch, medically complex	Conventional denture; staged minimal-implant overdenture
Terminal arch, limited finances	Immediate conventional denture now; implant conversion later — a legitimate plan, not a failure

9.4 Fixed versus removable — an honest comparison

The implant-retained overdenture is systematically undersold. It is less expensive, more hygienically maintainable, more easily repaired, more forgiving of atrophy, restores lip support where a fixed prosthesis cannot, and is well supported in the literature for satisfaction and quality of life. It is removable, which many patients dislike, and it transmits load to mucosa. Presenting the fixed prosthesis as the only "real" solution is a disservice and, when the atrophy or hygiene capacity argues otherwise, a departure from the standard of care.

KEY TAKEAWAYS

- Terminal dentition is a diagnosis that must be reproducible from the chart.
- Esthetic dissatisfaction with restorable teeth is never an indication.
- Arch prognosis is a separate judgment from tooth prognosis.
- Overdentures are undersold; present them honestly.

References

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Chapter 10

Prosthetically Driven Treatment Planning

Every decision in full-arch surgery is downstream of one question: where do the teeth go? The prosthesis defines the implant position; the implant position defines the bone reduction; the bone reduction defines the flap and the surgical sequence. Planning in the opposite direction — placing implants where bone happens to be and then asking the laboratory to solve it — is the origin of most compromised full-arch outcomes.

10.1 The planning sequence

1. Define the final tooth position: incisal edge, midline, occlusal plane, VDO, lip support.
2. Define the prosthesis type and material from the transition line, restorative space, and hygiene capacity.
3. Define the required bone reduction to achieve the platform level that yields that restorative space.
4. Define implant number, position, angulation, and abutment selection to support that prosthesis.
5. Verify anatomy against the CBCT and adjust the plan — not the prosthetic goal — where anatomy forbids.
6. Decide guided or freehand, immediate or delayed load, and the provisional strategy.
7. Write the plan, including the abort criteria.

10.2 Implant number, distribution and cantilever

Four fixtures with distal tilt is a validated protocol with substantial long-term data, not a minimum acceptable standard for every patient. Additional fixtures buy redundancy, reduce cantilever length, and permit segmenting the prosthesis. The relevant planning variables are anterior-posterior spread, cantilever length relative to that spread, bone quality, opposing dentition, and parafunction. Where the opposing arch is natural dentition and the patient is a bruxer, planning to the minimum is planning for fracture.

Tilted posterior fixtures

Distal tilting of posterior fixtures to avoid the sinus or the mental foramen increases anterior-posterior spread and reduces cantilever. Systematic reviews have not demonstrated inferior survival for tilted versus axial fixtures in full-arch prostheses. Tilting introduces its own demands: angled multi-unit abutment selection, precise emergence control, and tighter tolerance on impression or scan accuracy.

10.3 Multi-unit abutments and prosthetic platform

The multi-unit abutment converts a set of divergent fixtures into a common, parallel, supragingival prosthetic platform. Selecting abutment angulation and cuff height correctly at the time of surgery — and torquing them to the manufacturer's specification with the intention that they remain undisturbed — protects the peri-implant seal and simplifies every subsequent step. Repeated abutment disconnection is associated with marginal bone remodeling; plan to place them once.

10.4 Guided, navigated, and freehand surgery

Approach	Strengths	Constraints
Freehand	Flexible, no guide cost, direct visualization	Deviation depends entirely on operator; hardest to reproduce
Static guided	Reproducible transfer of the plan; predictable in trained hands	Guide fit and seating errors; irrigation and access limits; no intraoperative change
Dynamic navigation (e.g. Yomi®)	Real-time position feedback; plan can be modified intraoperatively; open access and irrigation	Registration discipline required; capital cost; learning curve

Robotic and dynamic navigation platforms improve the fidelity with which a plan is executed. They do not improve the plan. A precisely executed poor plan produces a precisely poor result — which is, in the author's experience, the most common way technology harms outcomes.

10.5 Immediate versus delayed loading

Immediate loading of a full-arch fixed provisional is well documented when the classical conditions are met: adequate primary stability across the fixtures, cross-arch splinting of a rigid provisional, no cantilever loading during healing, controlled occlusion, and a compliant patient on a soft diet. Where primary stability is not achieved, the correct decision is to convert to delayed loading intraoperatively — a decision that must be anticipated in the plan and consented for in advance, so that it is a plan branch rather than a disappointment.

10.6 Writing abort criteria

STANDARD OF CARE

Every full-arch surgical plan should state, in advance and in writing, the conditions under which the operator will stop, stage, or convert: insufficient torque, unanticipated pathology, sinus membrane perforation beyond repair, hemorrhage, nerve proximity, or patient physiologic instability. Predefined abort criteria convert an intraoperative crisis into an executed contingency.

KEY TAKEAWAYS

- Plan from the tooth position backwards to the bone.
- Minimum fixture counts are a validated protocol, not a universal target.
- Navigation improves execution fidelity, never plan quality.
- Immediate load is conditional; write the delayed-load branch in advance.

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Chapter 11

Risks, Benefits, Alternatives & True Informed Consent

Consent for full-arch surgery is the most consequential consent in general dentistry: the procedure is irreversible, the dentition cannot be restored if the patient later regrets it, and the financial commitment is large. The consent must therefore be granular, specific to the patient, and delivered with enough time for reflection.

11.1 Risks that must be named explicitly

- Implant failure — early and late — and what happens financially and clinically if it occurs.
- Nerve injury: altered sensation of lip, chin, tongue, which may be temporary or permanent.
- Maxillary sinus perforation, sinusitis, graft loss, or oroantral communication.
- Hemorrhage, including floor-of-mouth hematoma and airway compromise.
- Infection, including peri-implantitis with progressive bone loss over years.
- Prosthesis fracture, screw loosening, wear, and the need for replacement over the lifetime — a hybrid prosthesis is a maintained device, not a permanent one.
- Speech alteration, altered taste, food impaction, and hygiene demands.
- Esthetic outcomes constrained by anatomy: transition line visibility, tooth length, midline, lip support.
- MRONJ where antiresorptive exposure exists.
- Jaw fracture in the severely atrophic mandible — rare but catastrophic.
- The possibility of intraoperative conversion to delayed loading, staging, or abandonment.
- Long-term maintenance costs and the recall obligation.

11.2 Benefits, stated without inflation

Restoration of masticatory function, elimination of chronic infection and pain, improved esthetics and confidence, prevention of continued alveolar deterioration relative to a conventional denture, and high documented long-term survival for full-arch implant prostheses. Say survival, not success, and know the difference: survival counts fixtures still in place; success requires defined biologic and prosthetic criteria and its rates are always lower.

11.3 Alternatives that must be offered

1. No treatment, with its consequences described.
2. Periodontal, endodontic and restorative rehabilitation of the existing dentition where any part of it is feasible.
3. Conventional complete denture.
4. Implant-retained/supported overdenture.

5. Segmented or staged treatment, including maxilla-first or mandible-first sequencing.
6. Referral to a specialist or an alternative provider — offered, not merely available on request.

11.4 Financial consent

A financial disclosure that does not address the failure case is incomplete. State in writing who pays for a failed fixture, for a fractured provisional, for a remake, for an unplanned graft, and for maintenance visits. Ambiguity here converts a clinical complication into a relationship rupture, and relationship rupture is what produces litigation — more reliably than the complication itself.

KEY TAKEAWAYS

- Name the specific risks that apply to this patient, in writing.
- Distinguish survival from success when quoting outcomes.
- Alternatives include doing nothing and going elsewhere.
- Consent to the money, including the failure case.

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PART V

Surgical Execution

Chapter 12

Removal of the Infected & Hopeless Dentition

Full-arch surgery begins with extractions performed under a different objective than routine exodontia. The goal is not merely tooth removal; it is the production of a ridge that can host fixtures immediately, with maximal bone preserved where fixtures are planned and infection eliminated everywhere.

12.1 Atraumatic technique

- Sever the periodontal attachment circumferentially before applying force; luxate patiently rather than levering against the buccal plate.
- Section multi-rooted teeth as a default in the implant arch, not as a last resort.
- Use periotomes, physics forceps, or vertical extraction systems where they preserve plate; the instrument matters less than the intent to preserve buccal bone.
- Preserve the buccal plate absolutely in anterior sites; the buccal plate is largely bundle bone and it will remodel — but a plate that is fractured at surgery is gone immediately.
- Debride the socket completely: granulation tissue, periapical lesions, and residual root fragments are all foci of early failure.

12.2 Infected sites and immediate placement

Immediate implant placement into sites with chronic apical periodontitis is documented in the literature as achievable with thorough debridement and appropriate antibiotic coverage, but the evidence base is heterogeneous and the technique is unforgiving. Sites with acute suppuration, active abscess, or cellulitis should not receive immediate fixtures. In full-arch cases there is usually an alternative: reposition the fixture away from the infected socket into native basal bone, which is superior stability anyway.

STANDARD OF CARE

In the full-arch case, fixtures should engage native basal bone beyond the extraction socket wherever possible. Placement confined to a fresh socket in a terminal arch is a compromise that should be recognized as such, documented, and avoided by planning rather than accepted at the chair.

12.3 Socket management where fixtures are not planned

Sockets not receiving fixtures still matter: they determine ridge contour beneath the prosthesis, tissue support, and the transition line. Graft where contour matters or where future options must be preserved; allow healing by secondary intention where the site will be reduced anyway. This decision should appear in the surgical plan, not be made by fatigue at the end of a long case.

12.4 Sequencing the arch

A defensible sequence for the terminal arch: anesthesia and antisepsis, incision design and flap reflection, sectioning and extraction, complete debridement and irrigation, granulation and pathology removal, alveoloplasty to the planned prosthetic plane, osteotomy preparation, fixture placement with torque recorded, abutment selection and placement, hemostasis, closure, and only then the provisional conversion. Deviating from this order — particularly reducing bone before all extractions are complete — produces avoidable errors.

KEY TAKEAWAYS

- Extraction in the implant arch is bone preservation, not tooth removal.
- Section by default; preserve the buccal plate at all costs.
- Acute infection contraindicates immediate placement at that site; reposition into basal bone.
- Follow the sequence; do not reduce bone before extractions are complete.

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Chapter 13

Alveoloplasty & Establishing the Prosthetic Plane

Bone reduction is the most frequently under-planned step in full-arch surgery and the one most often blamed on the laboratory afterwards. It is a prosthetic decision executed surgically, and it is irreversible.

13.1 Determining the plane

The reduction target is the level at which the required restorative space exists between the fixture platform and the planned incisal edge, and at which the transition line will be concealed beneath the lip in maximum animation. Both criteria must be satisfied; satisfying only the space criterion produces a prosthesis whose junction shows when the patient smiles.

- Use a reduction guide referenced to a stable landmark where possible, or verify against a measured landmark that survives the reduction.
- Reduce in stages and re-measure; you cannot add bone back.
- Maintain a flat, even plane — irregularities transmit into the prosthesis and into hygiene problems.
- Smooth all sharp crests and irregular margins; a knife edge under a hybrid produces chronic mucosal irritation.
- Copious sterile irrigation throughout; bone temperature above roughly 47°C for sustained periods is associated with osteonecrosis and is a preventable cause of failure.

13.2 Specific anatomic cautions

Region	Caution
Anterior mandible	Lingual foramina and vascular supply; floor-of-mouth hemorrhage
Posterior mandible	Mental foramen position rises relative to a reduced crest
Atrophic mandible	Reduction may critically weaken the basal bone; fracture risk
Anterior maxilla	Nasal floor and incisive canal proximity
Posterior maxilla	Sinus floor; tuberosity bone quality is poor
Tori and exostoses	Remove before establishing the plane, not after

13.3 The atrophic mandible

STANDARD OF CARE

In the severely atrophic mandible, bone reduction can precipitate pathologic fracture — a complication with serious morbidity that a general dental office is not equipped to manage. Where residual mandibular height is marginal, the correct decision is to reduce the prosthetic ambition, choose an overdenture, or refer. Do not reduce bone you cannot afford to lose.

KEY TAKEAWAYS

- Reduction is a prosthetic decision executed surgically, and it is irreversible.
- Both restorative space and transition-line concealment must be satisfied.
- Irrigate; thermal necrosis is preventable.
- In the atrophic mandible, reduce ambition rather than bone.

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Chapter 14

Bone Grafting & Sinus Management

Grafting in full-arch care is used to preserve contour, to permit fixture placement where native bone is deficient, and to manage the maxillary sinus. Each indication has a different evidence base and a different failure mode.

14.1 Materials and biology

Material class	Properties	Typical use
Autograft	Osteogenic, osteoinductive, osteoconductive	Gold standard biology; donor-site morbidity
Allograft (FDBA/DFDBA)	Osteoconductive, variably osteoinductive	Socket and ridge grafting; widely used
Xenograft	Osteoconductive, slow resorbing	Contour maintenance, sinus grafting
Alloplast	Osteoconductive, synthetic	Volume filler; variable substitution
Barrier membranes	Cell occlusion, space maintenance	GBR; resorbable vs non-resorbable selection

Graft success depends less on the material than on the biology delivered to it: space maintenance, graft stability, an intact and well-vascularized flap, and above all tension-free primary closure. Membrane exposure is the dominant clinical predictor of graft loss.

14.2 Sinus floor elevation — crestal approach

- Appropriate when the required gain is limited and the sinus floor is relatively flat with adequate residual height for stability.
- Osteotome or hydrodynamic techniques reduce but do not eliminate perforation risk.
- Verify membrane integrity — Valsalva observation and direct assessment where accessible.
- Do not force graft material into an unverified space.

14.3 Sinus floor elevation — lateral window

- Requires CBCT identification of septa, membrane thickness, ostium patency, and the posterior superior alveolar artery within the lateral wall.
- Window design should avoid the artery; if it cannot, plan hemostasis.
- Elevate the membrane completely and atraumatically before graft placement; incomplete elevation traps graft against a tented membrane and predisposes to infection.
- Pre-existing sinus pathology, ostium obstruction, or chronic rhinosinusitis requires otolaryngology evaluation *before* grafting, not after a complication.

Managing membrane perforation

Small perforations may be managed with a collagen membrane barrier and continued grafting. Large perforations that cannot be reliably contained should result in abandonment of grafting at that visit, closure, and re-entry after healing. Grafting into an uncontained sinus is how a routine elective case becomes a sinus infection requiring hospital care.

14.4 Avoiding grafting altogether

In full-arch reconstruction, tilted posterior fixtures anterior to the sinus, pterygoid fixation, and shortened arch designs frequently obviate sinus grafting entirely. The lowest-risk graft is the one the plan makes unnecessary. Where grafting is unavoidable and extensive, this is a referral threshold for most general practices.

KEY TAKEAWAYS

- Closure and space maintenance beat material selection.
- Read the lateral wall artery and the septa before the window is designed.
- Abandon and re-enter rather than graft into an uncontained sinus.
- The best graft is often the one that planning eliminates.

References

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Chapter 15

Implant Placement: Osteotomy, Stability & Position

Fixture placement is where planning becomes irreversible. Three parameters govern the outcome: position relative to the prosthesis, primary stability, and preservation of the biology of the bone being prepared.

15.1 Site preparation and thermal control

- Sharp drills, correct sequence, intermittent pumping motion, and copious sterile irrigation, internal or external.
- Respect the manufacturer's speed and torque parameters; each system's drill geometry is validated at specific settings.
- In dense cortical bone (typically the anterior mandible) consider full sequence preparation and cortical relief to avoid excessive insertion torque and compression necrosis.
- In soft bone (typically the posterior maxilla) undersize the osteotomy, consider osseodensification, and use tapered fixture designs to gain stability.

15.2 Primary stability

Primary stability is mechanical; osseointegration is biological. Immediate loading depends on the former to survive long enough for the latter. Insertion torque and resonance frequency analysis measure related but non-identical properties, and neither is a guarantee. Record insertion torque for every fixture and record ISQ where measured. Excessive torque is not a virtue: very high insertion torque in dense bone has been associated with crestal compression and marginal bone loss.

STANDARD OF CARE

If planned immediate loading depends on cross-arch stability and one or more fixtures fail to achieve adequate stability, the case converts to delayed loading. Loading an unstable full-arch provisional to preserve a marketing promise is a departure from the standard of care. This branch must be consented in advance.

15.3 Three-dimensional position

- **Mesiodistal** — adequate inter-implant distance to preserve crestal bone and permit hygiene access beneath the prosthesis.
- **Buccolingual** — within the prosthetic envelope; screw access emerging through the prosthesis, not through the facial surface.
- **Apicocoronal** — platform at the depth that yields planned restorative space and a maintainable emergence.

- **Angulation** — correctable by multi-unit abutment within the abutment's angular range; do not plan angulation that the hardware cannot resolve.
- **Anterior-posterior spread** — maximize; it is the primary determinant of acceptable cantilever length.

15.4 Intraoperative decision points

Finding	Standard-of-care response
Torque below immediate-load threshold	Convert to delayed loading; document
Lingual plate perforation, posterior mandible	Stop, assess hemorrhage and airway; reposition
Unexpected nerve proximity	Abandon that site or shorten; never 'just proceed'
Sinus membrane perforation, uncontained	Abandon graft, close, re-enter later
Fixture mobility on placement	Remove, graft, re-enter after healing
Unexpected pathology	Biopsy or refer; do not place into undiagnosed tissue

15.5 Closure and soft tissue

Keratinized tissue around full-arch fixtures is associated with better plaque control and patient comfort; where the flap design can preserve or reposition keratinized tissue at no cost to closure, it should. Suture to hold tissue in a planned position under no tension. Tension is the enemy of every closure.

KEY TAKEAWAYS

- Sharp drills, sterile irrigation, and correct sequence prevent thermal failure.
- Record torque for every fixture; more torque is not better torque.
- Position is defined by the prosthesis, not by convenience.
- Predefine and execute the intraoperative branches.

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Chapter 16

Immediate Load, Conversion & the Definitive Prosthesis

The provisional is not a temporary inconvenience — it is a diagnostic prototype. It tests esthetics, phonetics, vertical dimension, occlusal scheme, and hygiene access under real conditions, and everything learned from it should be transferred deliberately into the definitive prosthesis.

16.1 Conversion protocol

1. Verify abutment seating and torque to manufacturer specification; radiograph to confirm seating.
2. Protect the surgical site and airway before any acrylic work.
3. Capture the abutment positions and pick up temporary cylinders with a rigid material.
4. Reinforce the provisional; a full-arch provisional without reinforcement will flex or fracture.
5. Eliminate cantilevers during healing; adjust occlusion to light, evenly distributed contact with no excursive interference.
6. Contour the intaglio to be convex, smooth, and cleansable — not adapted to the mucosa.
7. Verify hygiene access with the patient present and confirm they can perform it.

16.2 Post-operative protocol

- Written post-operative instructions, given and retained in the chart; verbal instruction alone is not documentation.
- Soft, non-chewing diet for the healing period, explicitly defined in days and in food terms the patient understands.
- Chlorhexidine or equivalent as indicated; hygiene instruction specific to a fixed provisional.
- Analgesia planned in advance — see Chapter 17.
- Review at 24–72 hours, one week, and at intervals through integration.
- Explicit instruction on what constitutes an emergency and how to reach the practice out of hours.

16.3 The definitive prosthesis

Definitive fabrication follows tissue maturation and confirmed integration. Passive fit is the governing requirement; a non-passive full-arch framework loads fixtures unpredictably and drives screw loosening, framework fracture, and bone loss. Verify fit clinically and radiographically by a defined protocol — single-screw test, sectioning and luting where necessary, or verification jig — and record the verification.

Material selection follows restorative space, opposing dentition, parafunction, and maintenance philosophy. Every option in current use — titanium bar with acrylic and denture teeth, monolithic zirconia, layered zirconia — carries a distinct failure and repair profile. Choose knowing how you will repair it in year eight.

KEY TAKEAWAYS

- The provisional is a prototype; harvest its lessons deliberately.
- No cantilever loading during healing.
- Passive fit is not negotiable and must be verified and recorded.
- Select materials by their repair profile, not their brochure.

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PART VI

Aftercare, Complications & Professional Standards

Chapter 17

Perioperative Pharmacology

17.1 Antibiotics

Antibiotic use in implant surgery must distinguish three separate questions: prophylaxis against distant-site infection in at-risk patients (a medical question governed by AHA and ADA/AAOS guidance); prophylaxis against surgical-site failure in implant placement (a surgical question with a modest evidence base supporting a single preoperative dose); and treatment of established infection (a therapeutic question requiring diagnosis).

- A single preoperative dose is supported by systematic review for implant placement; routine prolonged postoperative courses are not well supported for routine cases.
- Extensive grafting, sinus elevation, and long multi-extraction full-arch surgery are frequently treated with extended coverage in practice; be honest that this reflects clinical judgment and surgical extent more than high-quality evidence.
- Document the indication, agent, dose, and duration; record allergies precisely, distinguishing true allergy from intolerance.
- Antibiotic stewardship is part of the standard of care. Over-prescription is a deviation, not a courtesy.

17.2 Analgesia

Current evidence supports a non-opioid-first strategy: a scheduled NSAID with acetaminophen combination provides analgesia equal or superior to opioid regimens for most dental surgical pain, with a better adverse-effect profile. Prescribe by schedule for the first 48–72 hours rather than as needed, screen for NSAID contraindications, and where an opioid is genuinely indicated, prescribe the smallest quantity with documented rationale and check the prescription drug monitoring program per state requirement.

- Long-acting local anesthetic at the end of the procedure materially reduces early pain.
- Corticosteroids reduce edema in extensive cases; weigh against glycemic effect and infection risk.
- Antiemetics and ice protocols reduce the most common post-operative complaints.
- Give the analgesic plan in writing; a confused patient at midnight is a preventable emergency call.

17.3 Antiseptics and adjuncts

Pre-procedural chlorhexidine rinse reduces intraoral bacterial load. Post-operative chlorhexidine has evidence for reducing early complications after implant surgery; balance against staining and taste alteration, and set an end date rather than leaving it open-ended.

KEY TAKEAWAYS

- Three separate antibiotic questions; do not conflate them.
- Non-opioid first, scheduled, in writing.
- Document indication, agent, dose, duration — and the reasoning.
- Stewardship is standard of care, not preference.

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Chapter 18

Complications: Recognition, Management & Referral

Complications are not evidence of incompetence; failure to recognize, manage, disclose and document them is. The clinician's obligation at the moment of a complication is to stabilize the patient, tell the truth, arrange definitive care, and write it down.

18.1 Intraoperative

Complication	Immediate management
Hemorrhage, floor of mouth	Pressure, hemostatics; monitor airway continuously; low threshold for emergency transfer
Nerve exposure or injury	Stop; remove or shorten the offending fixture; document; corticosteroid consideration; urgent specialist referral
Sinus membrane perforation	Assess size; repair or abandon grafting; close; sinus precautions
Instrument or fragment displacement	Do not blindly probe; image; retrieve or refer
Mandibular fracture	Stabilize, image, immediate maxillofacial referral
Malpositioned fixture	Remove; do not restore a fixture outside the prosthetic envelope

18.2 Early post-operative

- **Infection** — drain, culture where appropriate, targeted antibiotics, and remove non-integrating hardware rather than chasing it with prescriptions.
- **Persistent altered sensation** — document mapping objectively at every visit; refer for specialist evaluation within a short and defined window, because intervention timing affects outcome.
- **Early failure** — a mobile fixture is removed. Failure is disclosed to the patient plainly, with the plan and the financial position stated.
- **Prosthetic fracture** — repair and identify the cause; recurring fracture is a design or occlusion diagnosis, not a materials accident.

18.3 Long-term biological complications

Peri-implant mucositis and peri-implantitis are defined by the 2017 World Workshop classification. Mucositis is inflammation without bone loss and is reversible; peri-implantitis involves progressive bone loss beyond initial remodeling and is not reliably reversible. Diagnosis requires probing, bleeding assessment, and radiographs compared against the delivery baseline — which is precisely why Chapter 7 insists on that baseline.

- Full-arch prostheses obstruct probing; removal of the prosthesis at defined intervals for full assessment should be planned and consented from the outset.
- Risk factors: prior periodontitis, smoking, poor plaque control, excess cement, inaccessible prosthesis design, and uncontrolled diabetes.
- Non-surgical management first; surgical access, decontamination, resective or regenerative approaches thereafter; explantation where the fixture is not maintainable.
- Design for hygiene at planning; peri-implantitis is often a design problem presenting years later as a biological one.

18.4 When to stop and refer

STANDARD OF CARE

Referral is indicated the moment a complication exceeds the operator's demonstrated competence, the facility's capability, or the patient's tolerance for continued attempts. Repeated attempts to salvage a failing case within a practice that cannot manage it is the pattern most consistently identified in disciplinary review. Referring is not a loss of the case; it is the management of the case.

KEY TAKEAWAYS

- Recognize, stabilize, disclose, refer, document.
- Nerve injury and infection are time-sensitive; act within days, not weeks.
- Peri-implantitis requires a delivery-day radiographic baseline to diagnose.
- Repeated salvage attempts beyond competence is the pattern that ends careers.

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5. American Association of Oral and Maxillofacial Surgeons. *Parameters of Care: Clinical Practice Guidelines.*

Chapter 19

Maintenance, Recall & Long-Term Outcomes

A full-arch prosthesis is a maintained medical device. Delivering one without a funded, scheduled, and consented maintenance program is delivering half the treatment.

19.1 The recall protocol

Interval	Content
1 week / 1 month	Healing, hygiene reinforcement, occlusal verification
3-6 months	Professional hygiene, tissue assessment, screw and occlusion check
12 months	Radiographic comparison to baseline; full probing where access allows
Annually	Prosthesis removal, full assessment, component inspection, retorque per protocol
As indicated	Occlusal adjustment, wear management, component replacement

19.2 What the literature actually shows

Full-arch implant-supported fixed prostheses demonstrate high fixture survival in long-term follow-up across multiple cohorts and systematic reviews. The same literature consistently reports substantially higher rates of *technical* and *biological* complications: prosthesis fracture, tooth wear and debonding, screw loosening, and peri-implant disease. The honest summary for a patient is: the implants very probably stay; the prosthesis will require maintenance and, eventually, replacement.

19.3 Auditing your own outcomes

The distinguishing habit of clinicians who practice at specialist level is outcome audit: tracking every case, every failed fixture, every complication, and every remake, and reviewing them against the literature. A practice that does not know its own failure rate cannot claim to be practicing at any defined level of care. Author's opinion, held strongly: an annual internal audit, written and dated, is the most under-used quality instrument in dentistry.

KEY TAKEAWAYS

- Maintenance is part of the treatment, funded and consented at the outset.
- Fixture survival is high; prosthetic complications are common — say both.
- Annual removal and assessment for fixed full-arch prostheses.
- Audit your own outcomes or you cannot claim a standard.

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Chapter 20

Ethics, Scope & the New Standard of Care

This closing chapter states the argument the whole book has been building.

20.1 The standard is procedure-specific

Courts and boards do not evaluate a full-arch surgical complication against "what general dentists usually do." They evaluate it against what a reasonably prudent clinician performing that procedure should have done. There is one standard of care for a given procedure, and it does not adjust downward for the operator's degree. That is not a threat; it is a clarifying principle. It tells you exactly what to train to.

20.2 The generalist's real advantage

The argument that specialists inherently deliver better care conflates depth with breadth. Most specialists practice one discipline deeply. Full-arch reconstruction is not one discipline: it is oral surgery, periodontics, prosthodontics, occlusion, and comprehensive medical assessment converging on one patient. The general dentist who trains each of those components to specialist technique — and who declines the components they have not — is uniquely positioned to see and manage the whole patient over decades. That is the position this book argues for, and it is stated as the author's professional opinion, offered for debate rather than as established consensus.

20.3 The obligations that come with it

1. Train to the specialist technique for every procedure you perform, and prove it with mentored cases.
2. Decline procedures you cannot execute, document, and rescue.
3. Maintain a working referral network you actually use, before you need it urgently.
4. Audit outcomes annually, in writing.
5. Consent honestly, including about your own experience when a patient asks.
6. Keep records that would satisfy a peer reviewing the case without you present.
7. Never let a commercial incentive select the treatment plan.

STANDARD OF CARE

The new standard of care proposed here is simple to state and demanding to meet: the general dentist performing full-arch surgery holds themselves to the specialist's technical standard, the internist's medical rigor, the prosthodontist's planning discipline, and the surgeon's documentation habit — or does not perform it.

References

1. American Dental Association. *Principles of Ethics and Code of Professional Conduct.*

2. American College of Dentists. *Ethics Handbook for Dentists.*
3. American Association of Oral and Maxillofacial Surgeons. *Parameters of Care.*
4. Academy of Osseointegration. *Guidelines for the Provision of Dental Implants and Associated Patient Care.*
5. Graskemper JP. *Professional Responsibility in Dentistry: A Practical Guide to Law and Ethics.* Wiley-Blackwell.

APPENDICES

Checklists, templates & reference

Appendix A

Pre-Surgical Verification Checklist

1. Medical history updated and signed today; medication list reconciled.
2. ASA class recorded; medical clearance on file and procedure-specific.
3. Antiresorptive/antiangiogenic exposure screened and documented.
4. HbA1c current where diabetic; anticoagulation plan documented by physician.
5. CBCT acquired, fully interpreted in writing, incidental findings addressed.
6. Photographic series complete.
7. Prosthetically driven plan written, including bone reduction target.
8. Implant inventory verified: system, diameters, lengths, abutment angulations and cuff heights.
9. Reduction guide / surgical guide verified for fit, or navigation registration plan confirmed.
10. Immediate-load criteria and the delayed-load branch stated in the plan.
11. Abort criteria written.
12. Consent signed in advance, patient-specific risks named, financial failure case addressed.
13. Sterile setup verified; biological monitoring current; sterile irrigation confirmed.
14. Emergency drugs and oxygen checked; monitoring assignments made by name.
15. Post-operative instructions, prescriptions, and follow-up appointments prepared in advance.
16. Escort and transport confirmed where sedation is planned.

Appendix B

Operative Note Template

- Date, start and end time, operators and assistants by name and role.
- Pre-operative diagnosis; post-operative diagnosis.
- Procedure performed, arch and sites, by tooth/site number.
- Anesthesia: agent, concentration, vasoconstrictor, total dose in mg, technique; sedation record reference.
- Antisepsis and draping confirmation; irrigation confirmed sterile.
- Incision and flap design.
- Teeth removed, sectioning, socket debridement findings.
- Alveoloplasty performed: region, approximate reduction achieved, plane verification method.
- Grafting: material, manufacturer, lot, volume, membrane type and lot, site.
- Implants: manufacturer, reference, lot, diameter, length, site, insertion torque, ISQ where measured.
- Abutments: type, angulation, cuff height, torque value.
- Any deviation from the surgical plan and the reason for it.
- Hemostasis achieved; closure technique and suture material.
- Provisional: type, delivered or deferred, occlusal scheme, cantilever status.
- Complications: present or explicitly none.
- Post-operative instructions and prescriptions given; follow-up scheduled.
- Patient condition at discharge and discharge criteria met.

Appendix C

Medical Consultation Letter — Structure

1. Patient identifiers and your practice contact information.
2. The specific procedure proposed, in plain clinical terms: number of extractions, bone reduction, number of implants, expected duration, anesthesia type, anticipated blood loss.
3. The patient's reported medical conditions and medication list as you have it, requesting correction.
4. Specific, answerable questions — for example: Is the patient's cardiovascular status stable for a three-hour ambulatory surgical procedure? What is the current HbA1c and is it at target? Should antiplatelet therapy be continued through surgery? Is there any antiresorptive or antiangiogenic exposure not reflected in our record?
5. A request for written reply and a stated decision timeline.
6. Your statement that surgery will not proceed until the reply is received and reviewed.

Appendix D

Glossary

A-P spread	Anterior-posterior distance between the most anterior and most posterior implant platforms; governs acceptable cantilever length.
Alveoloplasty	Surgical reduction and contouring of alveolar bone to establish a prosthetic plane.
ASA class	American Society of Anesthesiologists physical status classification.
Bundle bone	Tooth-dependent bone forming the socket wall; resorbs after extraction.
Cantilever	Prosthetic extension distal to the most posterior implant.
Conversion	Chairside transformation of a denture or provisional into a fixed implant-retained provisional.
ISQ	Implant stability quotient derived from resonance frequency analysis.
MRONJ	Medication-related osteonecrosis of the jaw.
Multi-unit abutment	Intermediate abutment establishing a common, parallel prosthetic platform.
Passive fit	Framework seating without inducing strain on the supporting fixtures.
Peri-implantitis	Plaque-associated peri-implant disease with progressive bone loss beyond initial remodeling.
Peri-implant mucositis	Reversible inflammation of peri-implant soft tissue without bone loss.
Primary stability	Mechanical fixation of a fixture at placement, before osseointegration.
Transition line	Junction between prosthesis and mucosa; must be concealed in maximum animation.
VDO	Vertical dimension of occlusion.

Master Reference List

Standards, textbooks & peer-reviewed sources

Citations throughout this volume are to primary standards, position papers, consensus statements, and peer-reviewed literature. Journal volume, issue, and page numbers have been omitted for readability; readers are expected to retrieve the current version of each source directly, as position papers and clinical practice guidelines are periodically revised. Where a statement in this book is the author's clinical opinion rather than published consensus, it is labeled as such in the text.

Standards, position papers & guidelines

- American Dental Association — Principles of Ethics and Code of Professional Conduct; Clinical Practice Guidelines on antibiotic prophylaxis and acute dental pain; guidance on cone-beam computed tomography; dental records guidance; sedation and general anesthesia guidelines.
- American Association of Oral and Maxillofacial Surgeons — Parameters of Care; Position Paper on Medication-Related Osteonecrosis of the Jaws; Office Anesthesia Evaluation Manual.
- American Academy of Periodontology / European Federation of Periodontology — 2017 World Workshop classification of periodontal and peri-implant diseases and conditions.
- American Academy of Oral and Maxillofacial Radiology — position statement on CBCT in implant dentistry; selection criteria for dental radiography.
- American College of Prosthodontists — classification system for complete edentulism; parameters of care.
- Academy of Osseointegration — guidelines for the provision of dental implants and associated patient care; sinus grafting consensus.
- International Team for Implantology — ITI Treatment Guide series and consensus statements.
- Centers for Disease Control and Prevention — dental infection prevention guidelines; disinfection and sterilization guideline; opioid prescribing guideline.
- Organization for Safety, Asepsis and Prevention — infection control toolkits and checklists.
- American Heart Association — infective endocarditis prevention; CPR and emergency cardiovascular care guidelines.
- American Society of Anesthesiologists — physical status classification system.
- U.S. Department of Health and Human Services — HIPAA Privacy and Security Rules; de-identification guidance.

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