



Comprehensive Overview of Management of Medically Compromised Prosthodontic Patients: A Review

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ABSTRACT:

Evaluating the medical condition of patients seeking prosthodontic treatment is a crucial aspect of treatment planning. Prosthodontists must assess the potential risks involved in treating individuals with systemic health issues. Several factors contribute to this assessment, including the patient's current and past medical and dental history, their medication use (past and present), as well as the type, duration, invasiveness, and urgency of the proposed treatment. This article reviews common systemic conditions affecting older adults, such as arthritis, cardiovascular diseases, endocrine disorders, hematologic and oncologic diseases, neurologic disorders, bone disorders, pulmonary diseases, liver conditions, and chronic kidney disease. Additionally, it highlights key prosthodontic considerations essential for managing patients with these systemic conditions.

Introduction

The number of older adults with chronic medical conditions seeking dental care is steadily increasing. Consequently, dentists must possess extensive knowledge of these medical conditions and their associated drug considerations. Managing various chronic disorders and their treatments often necessitates modifications to standard dental procedures. Failure to make appropriate adjustments can lead to significant clinical complications. A comprehensive evaluation and risk assessment are essential to determine whether a planned procedure can be safely performed for effective dental management of medically compromised patients. It is important to weigh the risks and benefits of dental treatments, ensuring that the benefits outweigh the potential risks of medical complications. In this article, some of the systemic diseases (arthritis, cardiovascular diseases, endocrine disorders, hematologic and oncologic diseases, neurologic disorders, bone disorders, pulmonary diseases, liver diseases, and

chronic kidney disease) that commonly affect the aged individuals are reviewed. General considerations of these systemic disorders along with the prosthodontic management modifications needed for providing adequate oral health care will also be discussed.

Medical Considerations of Patients

Arthritis

Osteoarthritis, a noninflammatory condition, is the most prevalent type of arthritis, while rheumatoid arthritis is the most common form of inflammatory arthritis [2–4].

Osteoarthritis

Osteoarthritis is the most common chronic condition among the elderly, marked by progressive pathological changes in hyaline cartilage and bony joints, ultimately leading to cartilage and bone degradation [5]. It commonly affects the joints of the hands, knees, hips, and spine, as well as the temporomandibular joints (TMJs) [6].



Prosthetic Considerations for Osteoarthritis of TMJs

Due to restricted mouth opening, specialized impression trays are often required to take impressions. Constructing complete dentures (CD) presents challenges, as mandibular movements can be painful. Recording and reproducing jaw relation records can be difficult, and frequent occlusal corrections may be necessary due to ongoing joint changes. When preparing teeth for fixed dental prostheses (FDP), appointments should be kept short, or longer sessions should be divided into shorter segments to accommodate the limited ability to keep the mouth open for extended periods. During the active phase of osteoarthritis, full-mouth rehabilitation and fixed dental prosthesis procedures should be avoided. Instead, only reversible or stabilizing treatments should be undertaken [6]. Currently, no studies have been published evaluating implant survival in patients with osteoarthritis [7].

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a chronic inflammatory condition characterized by synovial inflammation that leads to the destruction of joint tissues. It involves an autoimmune response, manifesting as bilateral synovitis that typically affects the joints of the hands and feet [8], and may also impact the temporomandibular joints (TMJs) [9, 10].

Prosthetic Considerations in Rheumatoid Arthritis

- Dentists must stay informed about the medications used in RA treatment, along with their potential side effects and interactions with other drugs.
- Due to reduced manual dexterity, patients may find it difficult to insert or remove partial dentures, making fixed denture therapy a more appropriate option.

- Patients with prosthetic joints may require prophylactic antibiotics before undergoing surgical procedures such as dental implant placement.
- Prosthetic rehabilitation for patients with rheumatoid arthritis affecting the TMJs presents challenges, including occlusal changes and difficulty in recording jaw relations. The use of unloading appliances or provisional restorations prior to definitive treatment can be helpful.
- As the disease fluctuates between acute and chronic phases, definitive treatment should be postponed until the disease is under control.

Cardiovascular Diseases

The primary cardiovascular conditions relevant to prosthetic care include hypertension, angina, myocardial infarction, infective endocarditis, congestive heart failure, and issues related to anticoagulant therapy [10]. For all patients with cardiovascular diseases, a stress reduction protocol should be implemented [11]

- Provide thorough counseling to address the patient's fears and anxieties.
- Schedule shorter appointments, preferably in the morning.
- Administer preoperative sedation using a short-acting benzodiazepine either one hour before the procedure or the night prior.
- Consider intraoperative sedation with nitrous oxide and oxygen (N₂O-O₂) if necessary.
- Ensure effective local anesthesia is achieved.
- Provide appropriate postoperative pain management with analgesics.
- Communicate with the patient on the evening of the procedure to reassure them about the positive outcome of the treatment.

Hypertension

Hypertension (HTN) is an abnormal increase in arterial pressure that may be fatal if sustained and untreated [1]. The ACC/AHA in 2017 gave the classification of blood pressure (Table 1) [12].

Table 1: Classification of blood pressure (BP) as per ACC/AHA 2017 [12]

BP Classification	Systolic BP	Diastolic BP
Normal	<120 mm Hg	<80 mm Hg
Elevated	120–129 mm Hg	<80 mm Hg
Stage 1 hypertension	130–139 mm Hg	80–89 mm Hg



BP Classification	Systolic BP	Diastolic BP
Stage 2 hypertension	≥140 mm Hg	≥90 mm Hg

The oral manifestations associated with hypertension are not directly caused by the condition itself but are often side effects of antihypertensive medications. These effects include xerostomia (due to diuretics), lichenoid mucosal lesions, burning mouth syndrome, loss of taste sensation (associated with angiotensin-converting enzyme inhibitors), and gingival hyperplasia (linked to calcium channel blockers). Additionally, extra-oral manifestations such as sialadenosis may also be observed [1].

Prosthetic Considerations in HTN:

1. A stress reduction protocol is essential for managing anxious patients.
2. During treatment, sudden changes in body position should be avoided to reduce the risk of orthostatic hypotension.
3. While morning appointments with minimal waiting times are often recommended, blood pressure tends to be lower during the afternoon, making it a safer time for appointments.
4. For patients with uncontrolled hypertension, local anesthesia containing vasoconstrictors should be avoided or used in minimal doses. However, administering 1–2 cartridges of 2% lidocaine with 1:100,000 epinephrine may be beneficial and poses minimal clinical risk.
5. Nonsteroidal anti-inflammatory drugs (NSAIDs) should be prescribed only for short-term use.
6. Denture fabrication should involve careful trimming and polishing of sharp edges to prevent trauma. Extra care must be taken to avoid soft tissue abrasions during the process.
7. To address xerostomia, artificial salivary lubricants can be recommended for improved post-treatment outcomes.

8. To minimize gingival bleeding, supragingival margins should be preferred.
9. The use of epinephrine for gingival retraction must be cautious, and topical vasoconstrictors should not be used for achieving local hemostasis.
10. Elective procedures should be postponed if the resting systolic pressure exceeds 180 mmHg or diastolic pressure is above 110 mmHg until blood pressure is controlled to safer levels.

Angina Pectoris

Angina pectoris refers to chest pain caused by reduced blood flow to the heart muscle [1].

Typical symptoms include retrosternal pain triggered by stress or physical activity, radiating to the shoulders, arms (left or right), neck, or jaw. The pain usually lasts less than five minutes and is quickly relieved by rest or sublingual nitroglycerin tablets [1].

If an angina attack occurs during dental treatment, it can be managed as follows [1]:

1. Immediately stop the procedure.
2. Position the patient in a semi-upright or upright posture.
3. Administer oxygen.
4. Place one nitroglycerin tablet (0.3–0.6 mg) under the patient's tongue.
5. If symptoms persist after 2–3 minutes, administer a second dose of nitroglycerin and prepare to assist the patient to an emergency facility if needed.
6. A third dose of nitroglycerin may be given three minutes after the second dose.

Persistent chest pain after three doses of nitroglycerin may indicate a potential myocardial infarction. In such cases, the patient should be immediately transferred to a higher care facility. Canadian Cardiovascular Society has given the classification of angina (Table 2) [13].

Table 2: Canadian Cardiovascular Society's classification of angina [13]

Class	Characteristics
Class I	No angina with ordinary activity. Angina with strenuous activity.
Class II	Angina during normal activity (walking up hills, walking rapidly upstairs), with mild limitation of activities.



Class	Characteristics
Class III	Angina with low levels of activity (walking 50–100 yards on the flat, walking up one flight of stairs), with marked restriction of activities.
Class IV	Angina at rest or with any level of exercise.

Prosthetic Management of Angina Pectoris [4]

- Mild Angina (up to one attack per month)**
 Patients can typically undergo most nonsurgical dental procedures following standard protocols, with regular monitoring of vital signs during treatment. Nitroglycerin should be prescribed to these patients. Extensive treatments, such as implant placement, should either be postponed or performed with nitrous oxide sedation, using only minimal doses of adrenaline (0.004–0.005 mg).
- Moderate Angina (up to one attack per week)**
 For extensive treatments like implant surgery, patients should take a sublingual dose of nitroglycerin beforehand. Adequate anxiety management and oxygen supplementation are recommended to ensure patient safety.
- Unstable Angina (daily episodes)**
 These patients should be limited to examination and diagnostic procedures. Elective dental surgeries, including dental implant placement, are strictly contraindicated.

Myocardial Infarction

Myocardial infarction (MI) refers to prolonged ischemia or oxygen deprivation caused by inadequate blood supply to the coronary artery, resulting in damage to the heart muscle [4].

Dental Management of MI

The management approach for patients with MI is similar to that for angina pectoris. Additional precautions include assessing the patient's International Normalized Ratio (INR) on the day of treatment if they are on anticoagulant therapy. Dental procedures should be performed only if the INR is within the safe range, typically below 3.5, with appropriate measures to control bleeding during surgery. For patients on antiplatelet medications, additional hemostatic precautions are essential. Implant considerations in patients with MI based on the duration of last MI attack are shown in Table 3 [4].

Table 3: Implant considerations in patients with MI based on the duration of last MI attack [4]

Risk	Duration	Implant procedures
Mild	>12 months	Hospitalization if general anesthesia required
Moderate	6–12 months	Postponement of procedure
Severe	<6 months	Postponement of procedure

Infective Endocarditis

Infective Endocarditis (IE) refers to an infection affecting the heart valves or the endothelial surfaces of the heart [4].

Prosthetic Management in IE [4, 14]:

(i) Endocarditis Prophylaxis

Prophylactic antibiotic treatment is recommended for certain dental procedures, such as implant placement or subgingival cord insertion, particularly

in patients with conditions like prosthetic heart valves, a history of infective endocarditis, or cyanotic congenital heart disease. The updated prophylactic protocol includes:

- 2 g of amoxicillin taken orally (PO) 60 minutes before the procedure.
- For patients unable to take oral medications, 2 g of ampicillin administered intramuscularly (IM) or intravenously (IV) 30 minutes prior.



- For penicillin-allergic patients, 600 mg of clindamycin or 2 g of cefalexin taken PO 60 minutes before the procedure.
- If the patient is allergic to penicillin and cannot take oral medications, 600 mg of clindamycin IV or 1 g of cefazolin IM or IV, given 30 minutes before the procedure.

(ii) **No Prophylaxis Required**

Endocarditis prophylaxis is not needed for procedures like prosthesis insertion or impression-making.

(iii) **Implant Suitability**

Patients with poor oral hygiene or a history of multiple episodes of infective endocarditis may not be suitable candidates for implant therapy.

(iv) **Preferred Implants**

When implants are necessary, the use of endosseous implants with sufficient attached gingiva width is recommended.

Congestive Heart Failure

Congestive Heart Failure (CHF) is a condition where the heart is unable to pump enough blood to meet the body's needs due to dysfunction in its cardiac function [1]. Several medications used to treat heart failure can lead to dry mouth and oral lesions. Digitalis toxicity, in particular, can cause an increased gag reflex and hypersalivation. As dentists, it is important to recognize these signs and symptoms. New York Heart Association has classified CHF (Table 4) based on which prosthodontic management is done [15].

Table 4: New York Heart Association's classification of CHF [15]

Class I	No symptoms and no limitation in ordinary physical activity.
Class II	Mild symptoms and slight limitation during ordinary activity. Comfortable at rest.
ClassIII	Marked limitation in activity caused by symptoms, even during less than ordinary activity. Comfortable only at rest.
ClassIV	Severe limitations. Experiences symptoms even during rest.

Prosthodontic Considerations in CHF [4]

A stress reduction protocol should be followed for all patients with congestive heart failure (CHF). Patients classified as NYHA class I and II can receive standard outpatient dental care without the need for medical consultation, unless there are other systemic conditions present. For patients in NYHA class III and IV, medical consultation is recommended before performing complex implant procedures such as ridge augmentations, sinus grafting, subperiosteal implants requiring extensive periosteal reflection, full-arch

implant therapy, and autogenous block bone augmentations.

Endocrine Disorders

Diabetes Mellitus

Diabetes mellitus (DM) is a group of metabolic diseases characterized by increased blood glucose level and inability to produce and/or use insulin. Diabetes is classified broadly as type 1 and 2 (Table 5) [1].

Table 5: Classification of diabetes [1]

Type 1 (insulin-dependent DM)	(i) β cell destruction with lack of insulin
Type 2 (non-insulin-dependent DM)	(i) Insulin resistance and relative insulin deficiency
Gestational	(i) Abnormal glucose tolerance during pregnancy diabetes
Others	(i) Impaired fasting glucose (impaired glucose tolerance)
	(ii) Abnormalities of fasting glucose (abnormal glucose tolerance)
	(iii) Genetic defects of beta cell function, endocrinopathies, drug-



	induced, etc.
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A fasting blood sugar level ≥ 126 mg/dl and postprandial blood sugar ≥ 200 mg/dl are considered indicative of diabetes, according to the American Diabetes Association [16]. Symptoms of diabetes include polyuria, polydipsia, polyphagia, weight loss, and visual disturbances. Short-term complications can include hypoglycemia and diabetic ketoacidosis, while long-term complications may involve diabetic retinopathy, neuropathy, nephropathy, and periodontitis, which is recognized as the sixth complication of diabetes. Uncontrolled diabetes can lead to oral manifestations such as xerostomia, periodontitis, burning mouth syndrome, delayed wound healing, alveolar bone loss, and candidiasis [16]. Dental treatment is often deferred for uncontrolled diabetes, and if diabetes is suspected, consultation with a physician is recommended. Hypoglycemia should be prevented by checking blood sugar levels using a glucometer before treatment. If hypoglycemia occurs during dental treatment, immediate emergency management is necessary [1, 4, 17]:

- Blood glucose should be checked using a glucometer.
- If the patient is conscious, provide 15 grams of carbohydrates orally (3–4 teaspoons of sugar, 4–6 ounces of fruit juice or soda, a piece of hard candy, or a small amount of honey/sweet syrup).
- If the patient is unconscious, administer 50 ml of 50% dextrose solution IV or 1 mg of glucagon IV/IM.
- Symptoms usually resolve in 10-15 minutes, but the patient should be monitored for 30-60 minutes after recovery, ensuring normal blood sugar is confirmed before leaving.

Postoperative care for diabetic patients should include a well-planned diet, coordinated with a physician and dietician, to maintain proper nutrition. Diabetic ketoacidosis (DKA) can occasionally occur in diabetic patients, presenting symptoms such as increased thirst, dehydration, fruity breath odor, and severe shortness of breath. If these symptoms appear, emergency management with hydration, insulin, and electrolyte replacement is essential [17].

Prosthodontic Considerations in Diabetes [4, 18–20]

- Take a comprehensive medical history and assess the patient's glycemic control early in treatment, including dietary habits.
- Schedule appointments in the morning if possible.
- Follow a stress reduction protocol.
- Provide oral hygiene instructions, regular prophylaxis, and monitor periodontal health.
- Prescribe antibiotics in case of infection.
- Avoid NSAIDs if the patient is on sulfonylureas.

For Removable Partial Dentures (RPD)

- Ensure good oral hygiene is maintained first.
- All RPD components should fit well with the underlying tissues.
- Provide thorough oral and prosthesis care instructions.

For Complete Dentures (CD)

- Use tissue-friendly materials.
- Employ a mucostatic impression technique.
- The neutral zone technique is recommended.
- Ensure denture flanges are smooth and polished.
- Provide proper oral hygiene instructions and schedule regular follow-ups.
- For patients with dry mouth, recommend therapies to maintain a moist environment (e.g., water sipping or sugarless gum).
- Regular denture evaluations are needed.

For Fixed Dental Prostheses (FDP)

- Avoid soft tissue trauma during tooth preparation.
- A supragingival finish line is preferable.
- A chamfer margin on the facial aspect is ideal for minimal impact.
- A group function or mutually protected occlusal scheme is best for periodontally compromised teeth.
- Advise proper flossing to maintain oral hygiene.
- Use hygienic pontics for easy cleaning.

For Implants or Implant-Supported Dentures

- Surgery should only begin once the diabetic state is adequately controlled.
- Prescribe antimicrobial coverage before and after implant surgery.



- Advise smoking cessation, proper oral hygiene, and antiseptic mouth rinses.
- Continue monitoring blood glucose levels even after implant placement.
- Implant dentistry is generally not contraindicated for most diabetic patients, provided their medical condition is well-controlled. According to the level of postprandial blood glucose, plan for implant procedures is presented in Table 6 [4].

Table 6: Implant procedure plan according to postprandial blood glucose level [4]

Risk	Blood sugar level	Implant procedures
Low	<140 mg/dl	Stress reduction protocol, maintain glucose level
Low/medium	140–180 mg/dl	Stress reduction protocol, maintain glucose level Patients with neuropathy, nephropathy, peripheral vascular disease, history of coronary disease, or may be at higher risk. Medical consultation may be appropriate (relative contraindication)
Medium high	180–215 mg/dl	Patients without any secondary manifestations, medical consult may be obtained (relative) Patients with coronary disease or other diabetic-related conditions require medical consult (relative/absolute)
High risk	>215 mg/dl	Medical referral and better glycemic control (absolute contraindication)

Thyroid Disorders

Thyroid disorders can cause either overactivity (hyperthyroidism) or underactivity (hypothyroidism) of the thyroid glands. Patients with poorly controlled thyroid conditions may face complications [1].

In patients with hyperthyroidism, the risks include [1]:

- Negative interactions with epinephrine
- Life-threatening cardiac arrhythmias
- Congestive heart failure (CHF)
- Thyrotoxic crisis (thyroid storm), which can be triggered by infections or surgeries

Complications in patients with hypothyroidism include [1]:

- Increased sensitivity to central nervous system depressants, such as sedatives and narcotics
- Myxedematous coma, which can be triggered by CNS depressants, infections procedures.

For well-controlled patients with thyroid disease, normal concentrations of vasoconstrictors can be used, though the use of epinephrine should be avoided in untreated or poorly managed hyperthyroid patients [1].

Dental Implant Management in Thyroid Disorders [10]

The most common thyroid disorder patients seen in implant dentistry are those with known and treated thyroid disease, who show no symptoms and are considered low risk. Implant surgery can typically be performed safely on these patients. Patients with thyroid disorders who are symptom-free are classified as moderate risk. These patients can be treated with the standard protocol, along with stress reduction strategies. The use of epinephrine should be limited in moderate to advanced implant procedures. Patients with active symptoms are considered high risk. For these patients, only examination procedures should be performed, and all other treatments should be postponed until the condition is controlled, confirmed by appropriate medical or laboratory evaluations.

Hematologic Disorders

Hematologic conditions that are relevant to prosthodontics include the following [4]:

- Red blood cell disorders, such as polycythemia and anemia



- White blood cell disorders, such as leukocytosis and leukopenia
- Platelet disorders, such as thrombocytopenia

General Prosthodontic Considerations in Hematologic Disorders

Removable prosthodontic treatments carry no significant risks, but it is important to minimize trauma to the tissues during post-insertion adjustments. Careful handling of oral tissues throughout all stages of treatment is crucial to reduce the likelihood of ecchymosis.

Polycythemia

Dental implants are not recommended for patients with polycythemia [4].

Dental Implant Considerations in Anemia

In long-term anemic patients, bone maturation and development are often hindered, with a 25%–40% reduction in trabecular bone pattern [4]. This significantly affects the bone's ability to support implants, and the time required for proper interface formation is extended. Anemia also increases the risk of abnormal bleeding, complicating subperiosteal implant placement. The risk of postoperative infection is higher due to increased edema, which can negatively impact the long-term success of implants or abutment teeth. While implant procedures can generally be performed safely in most anemic patients, the recommended minimum hemoglobin level for implant surgery is 10 mg/dl. Antibiotic coverage before and after surgery is advised [4].

Dental Implant Considerations in Leukopenia and Leukocytosis

The most common complications that can affect the success of dental implants in these conditions are infections and delayed healing. These issues can increase the risk of secondary infections [4].

Dental Implant Considerations in Thrombocytopenia

Dental implants are contraindicated for patients with thrombocytopenia if the platelet count is below 50,000 U/L [21].

Oncologic Disease

More than 90% cases of oral cancer are squamous cell carcinoma, which is most commonly managed medically by surgery and radiation therapy [1].

Prosthodontic Considerations in Cancer

Before Cancer Treatment

An oral cavity evaluation is recommended prior to beginning cancer therapy for all patients [1]. This includes assessing edentulous areas, taking impressions for surgical obturators, and ensuring the maintenance of oral health during therapy.

If Head and Neck Radiation Therapy (RT) is Planned

It is advised that [22, 23]

- Adequate healing time be allowed before starting radiation therapy following any oral surgical procedures.
- Temporary restorations may be placed, while cosmetic and prosthodontic treatments should be postponed if time is limited.
- Radiation therapy can cause complications such as mucositis, taste changes, xerostomia, trismus, opportunistic infections, radiation-induced caries, and osteoradionecrosis.

During Cancer Treatment

Other surgical procedures such as tooth extractions, maxillary prosthetic obturators, primary implant placements, and preprosthetic treatments can be performed.

Post-Cancer Treatment Management

Post-cancer care includes [22, 24, 25]:

- Avoid wearing dentures during the first six months after completing radiotherapy.
- Patients should report to the dentist if they experience any sore spots.
- Ill-fitting dentures should be replaced with new ones.
- For severe chronic xerostomia, applying petrolatum to the mucosal surface of the denture can help with adhesion.
- Implants can be placed 12–18 months after radiation therapy, but this requires careful consideration of tissue irradiation fields, healing status, and vascularity of the area. Implants in the posterior mandible carry a higher risk than those in the maxilla or anterior mandible.



- A five-year survival rate of 90% for oral implants has been reported in patients who underwent surgery and radiotherapy for oral cancer [26].

Osteoradionecrosis

Osteoradionecrosis of the jaw occurs when there is a failure to heal after high doses of radiation, resulting from reduced cellular activity, poor blood supply, and low oxygen levels in the bone tissue. Soft tissue necrosis often appears before bone involvement is detected. The mandible is at a higher risk for osteoradionecrosis compared to the maxilla [22, 24, 25]. To reduce the risk of osteoradionecrosis, the following protocols are recommended [22, 24, 25]:

- Prioritize endodontic treatment over tooth extraction.
- Use local anesthesia with minimal or no epinephrine.
- Employ atraumatic surgical techniques.
- Administer prophylactic antibiotics and continue antibiotic use during the healing period.
- Consider hyperbaric oxygen therapy before any invasive procedures.

If osteoradionecrosis is already present, the initial treatment should be conservative [22, 24, 27], including:

- Irrigating exposed bone with saline or an antibiotic solution.
- Removing any bony sequestrum.
- Prescribing broad-spectrum antibiotics if there is swelling or suppuration.

If conservative treatment does not succeed, surgical resection of the affected bone may be necessary.

Bone Disorders

Osteoporosis

Osteoporosis is defined by low bone mass, increased microstructural deterioration, and bone fragility [4].

Prosthetic Management in Osteoporosis [28]

- Proper design of complete dentures is essential to preserve the underlying tissue structure.
- Mucostatic or open-mouth impression techniques are recommended.
- Non-anatomic or semi-anatomic acrylic teeth with a narrow buccolingual width are suggested.
- It is recommended to give extended rest periods from dentures, at least 10 hours per day.
- Optimal use of soft liners may be considered.
- Regular denture relining is often required.

Dental Implant Management in Osteoporosis [4]

- Osteoporosis can affect bone volume and density, but it does not contraindicate implant placement. Implants should be designed to maximize bone contact and density (e.g., larger width, longer length, hydroxyapatite coating).
- Patients should also be encouraged to maintain adequate calcium intake and adopt a healthy lifestyle.

Osteitis Deformans (Paget's Disease)

It is a metabolic condition characterized by slow, progressive, uncontrolled bone resorption and deposition [4]. Both the maxilla and mandible can be affected, with the maxilla being affected twice as much as the mandible [4].

Oral Manifestations of Osteitis Deformans [29, 30]:

- Bilateral bone swelling.
- Symptoms such as headaches, blindness, and deafness.
- Difficulty in wearing old dentures.
- Formation of gaps between teeth (diastema), tooth mobility, and malocclusion.
- Pathological fractures.
- Leontiasis ossea when facial bones are affected.

Prosthetic Management of Osteitis Deformans

- Continuous enlargement of supporting areas, like the maxillary tuberosities, may require frequent denture adjustments [10, 31].
- Oral implants are contraindicated in the affected regions [4].

Fibrous Dysplasia

Involves the replacement of normal bone tissue with unorganized fibrous connective tissue [4]

Oral Manifestations of Fibrous Dysplasia [4]

- The maxilla is affected twice as frequently as the mandible.
- Monostotic fibrous dysplasia presents as a painless, progressive lesion.
- Tooth mobility occurs as the disease progresses.
- Bone may be prone to fractures.
- Delayed healing and a higher incidence of infection are common.



Implant Considerations in Fibrous Dysplasia [4]

- Implants are absolutely contraindicated in active lesion areas.
- In non-lesion areas, implant placement is relatively contraindicated.

Neurologic Disorders

Parkinson's Disease

Parkinson's disease is a neurodegenerative condition characterized by symptoms such as tremors, rigidity, bradykinesia, and postural instability, caused by a depletion of the neurotransmitter dopamine [1, 32].

Prosthetic Considerations in Parkinson's Disease [1, 10]

- **Patient Movement:** Tremors and rigidity can affect the patient's movement during dental procedures.
- **Pharmacological Effect:** Ensure that the medications have a maximal effect when working with the patient.
- **Patient Positioning:** A semi-reclined position is ideal for patients who have difficulty controlling salivation.
- **Adjusting the Dental Chair:** The chair should be adjusted slowly, giving the patient enough time to sit upright before rising slowly.
- **Orthostatic Hypotension:** Patients may experience orthostatic hypotension, so extra care should be taken.

Complete Denture (CD) Considerations [33–36]

- For first-time denture wearers, implants or implant-supported overdentures may be considered.
- Impressions should be made using fast-setting materials.
- Tremors, rigidity, and drooling may compromise denture retention, stability, and support.
- A neutral zone technique and flange technique are recommended for making final impressions.
- Selective grinding can help eliminate interferences and improve denture stability and retention.
- Monoplane teeth are preferred for stable occlusion.
- When replacing old dentures, duplicating the previous one helps the patient maintain muscular control.

- Old dentures may act as an impression tray if replaced due to bone resorption from prolonged denture use.
- Low-viscosity polyvinyl siloxane is the preferred material.
- Modifying the outer surface of the denture improves retention and reduces food accumulation in the buccinator muscle area.

Removable Partial Denture (RPD) Considerations [33–35]

- Major connectors should have a larger dimension.
- Retainers must be sufficiently retentive.
- Avoid precision attachments.
- Flexible dentures are a good option.

Fixed Dental Prosthesis (FDP) Considerations [35, 37, 38]

- Supragingival or equigingival margins are recommended.
- Expanding vinyl polysiloxane can be used for gingival retraction.
- Full-coverage restorations are preferred.
- Resin cements are recommended.

Implant Surgery Considerations [23, 32, 33]

- Local anesthetics containing epinephrine should be used cautiously, as they may interact with levodopa or entacapone, leading to elevated blood pressure and heart rate.
- Epinephrine doses <0.05 mg are considered safe.
- Implant-supported prostheses can significantly improve both oral and general health, enhancing masticatory ability in Parkinson's patients [37].

Pulmonary Diseases

General precautions to follow when managing patients with pulmonary diseases include [1, 4, 39]:

- Obtain a thorough medical history of the patient.
- Consult the patient's physician regarding their medications and the status of their condition.
- Ensure a stress-free environment during each visit.
- Position the patient upright for comfort and safety.



- Avoid administering drugs that may cause respiratory depression, such as narcotics and sedatives.
- Refrain from using bilateral mandibular block anesthesia.
- Avoid using ultrasonic instruments.
- Prosthodontic procedures should be postponed unless there is an emergency, such as an active fungal or bacterial respiratory infection.
- The use of vasoconstrictors and gingival retraction cords should be avoided.

Additional Considerations for COPD

In addition to the general precautions, specific considerations for patients with chronic obstructive pulmonary disease (COPD) include [1, 4]:

- If the patient is on systemic corticosteroids, a supplemental dose is necessary for major surgical procedures due to adrenal suppression.
- Avoid using macrolide antibiotics in patients who are taking theophylline.

Considerations for Asthma

In addition to the general precautions, specific considerations for asthma management include [1, 4, 18]:

- Schedule appointments for late morning.
- Ensure the patient's inhaler is accessible during each visit.
- Avoid the use of aspirin, NSAIDs, and barbiturates.
- For moderate to severe asthma, local anesthesia without epinephrine or levonordefrin is recommended.
- Prophylactic inhalation of bronchodilators should be administered at the start of the appointment to prevent an asthma attack.
- Proper curing of acrylic prostheses is essential, and materials free of methyl methacrylate are preferred.
- In case of an acute asthma attack, a short-acting β_2 adrenergic agonist inhaler should be used.

Liver Diseases

In patients with liver disease, the production of clotting factors and the liver's ability to detoxify drugs are typically compromised. Therefore, it is crucial to focus on maintaining proper hemostasis during their management [4].

Dental Implant Management in Case of Liver Diseases

Patients with normal laboratory results for complete blood count, partial thromboplastin time (PTT), and prothrombin time (PT) are considered low risk, and standard protocols can be followed for all nonsurgical and simple surgical procedures. Patients with a prothrombin time (PT) elevated to less than 1.5 times the control value or mildly elevated bilirubin levels are categorized as moderate risk. In such cases, physician consultation is recommended, and adequate measures should be taken to manage bleeding. For patients with a PT elevated more than 1.5 times the control value, they are classified as high risk, and elective dental procedures are contraindicated [4].

Chronic Kidney Disease

Patients with symptomatic kidney conditions that lack a definitive diagnosis should be referred to a physician. Before any invasive procedures, an assessment for potential bleeding disorders is essential. Elective dental treatments should be delayed for patients with a glomerular filtration rate (GFR) below 50 ml/min until their medical condition is stabilized and a physician's consultation has been obtained [1].

Dialysis

Patients undergoing peritoneal dialysis generally do not face issues with dental care; however, those receiving hemodialysis are at an increased risk of infection. Dental procedures should ideally be scheduled the day after a hemodialysis session. Major surgical treatments should be planned for the day following the conclusion of a hemodialysis week. If dental treatment is required on the same day as hemodialysis, the physician should administer protamine sulfate to counteract the anticoagulant effects of heparin [1].

Conclusion

Effective management of a patient begins with obtaining a thorough medical history and developing an appropriate treatment plan. Many elderly patients already have diagnosed medical conditions when they seek prosthodontic care. Prosthodontic procedures should be postponed until these medical conditions have been properly assessed. It is essential to understand the medications the patient is taking for their systemic condition, as these can influence treatment outcomes and may lead to drug interactions. Consulting with a



medical professional is crucial to make necessary treatment adjustments. A comprehensive systemic evaluation and coordination with the patient's physician should be integral components of the prosthodontic treatment plan.

References

1. Little J., Miller C., Nelson R. Little and Falace's Dental Management of the Medically Compromised Patient . 9th. St. Louis, MI, USA: Elsevier; 2018. [Google Scholar]
2. Arden N., Nevitt M. Osteoarthritis: epidemiology. *Best Practice & Research Clinical Rheumatology* . 2006;20(1):3–25. doi: 10.1016/j.berh.2005.09.007. [DOI] [PubMed] [Google Scholar]
3. Scott D. L., Shipley M., Dawson A., Edwards S., Symmons D. P., Woolf A. D. The clinical management of rheumatoid arthritis and osteoarthritis: strategies for improving clinical effectiveness. *Rheumatology*. 1998;37(5):546–554. doi: 10.1093/rheumatology/37.5.546. [DOI] [PubMed] [Google Scholar]
4. Resnik R. Misch's Contemporary Implant Dentistry . 4th. St Louis, MI, USA: Elsevier; 2020. [Google Scholar]
5. Poole A. R. Osteoarthritis as a whole joint disease. *HSS Journal*. 2012;8(1):4–6. doi: 10.1007/s11420-011-9248-6. [DOI] [PMC free article] [PubMed] [Google Scholar]
6. Kalladka M., Quek S., Heir G., Eliav E., Mupparapu M., Viswanath A. Temporomandibular joint osteoarthritis: diagnosis and long-term conservative management: a topic review. *Journal of Indian Prosthodontic Society*. 2014;14(1):6–15. doi: 10.1007/s13191-013-0321-3. [DOI] [PMC free article] [PubMed] [Google Scholar]
7. Schimmel M., Srinivasan M., McKenna G., Müller F. Effect of advanced age and/or systemic medical conditions on dental implant survival: a systematic review and meta-analysis. *Clinical Oral Implants Research*. 2018;29(S16):311–330. doi: 10.1111/clr.13288. [DOI] [PubMed] [Google Scholar]
8. Aletaha D., Smolen J. S. Diagnosis and management of rheumatoid arthritis. *JAMA* . 2018;320(13):1360–1372. doi: 10.1001/jama.2018.13103. [DOI] [PubMed] [Google Scholar]
9. Grover H. S., Gaba N., Gupta A., Marya C. M. Rheumatoid arthritis: a review and dental care considerations. *Nepal Medical College Journal: NMCJ* . 2011;13:74–76. [PubMed] [Google Scholar]
10. Singh N. Systemic diseases of concern to prosthodontist. *International Journal of Oral Health and Medical Research* . 2015;2:89–93. [Google Scholar]
11. Malamed S. F. Handbook of Local Anesthesia . 6th. St. Louis, MI, USA: Elsevier; 2004. [Google Scholar]
12. Whelton P. K., Carey R. M., Aronow W. S. ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the american college of cardiology/american heart association task force on clinical practice guidelines. *Journal of the American College of Cardiology* . 2018;71:e127–248. doi: 10.1016/j.jacc.2017.11.006. [DOI] [PubMed] [Google Scholar]
13. Letter C. L. Grading of angina pectoris. *Circulation* . 1976;54:522–523. [PubMed] [Google Scholar]
14. Wilson W., Taubert K. A., Gewitz M., et al. Prevention of infective endocarditis. *Circulation* . 2007;116(15):1736–1754. doi: 10.1161/circulationaha.106.183095. [DOI] [PubMed] [Google Scholar]
15. Yancy C. W., Jessup M., Bozkurt B., et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the american college of cardiology foundation/american heart association task force on practice guidelines. *Circulation* . 2013;128:e240–327. doi: 10.1161/cir.0b013e31829e8776. [DOI] [PubMed] [Google Scholar]
16. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care* . 2011;34(1):S62–S69. doi: 10.2337/dc11-S062. [DOI] [PMC free article] [PubMed] [Google Scholar]
17. Madjova C. Management of complications and emergencies in patients with diabetes mellitus in dental practices. *Recommendations for Dentists* . 2017;5:183–187. [Google Scholar]



18. Phoenix R. D., Cagna D. R., DeFreest C. F., Stewart K. L. *Stewart's Clinical Removable Partial Prosthodontics* . 4th. Chicago, IL, USA: Quintessence; 2008. [Google Scholar]
19. Zarb G., Hobkirk J. A., Eckert S. E., Jacob R. F. *Prosthodontic Treatment for Edentulous Patients* . 13th. St. Louis, MI, USA: Elsevier; 2013. [Google Scholar]
20. Shilligburg H. T., Sather D. A., Wilson E. L., et al. *Fundamentals of Fixed Prosthodontics* . 4th. Chicago, IL, USA: Quintessence; 2012. [Google Scholar]
21. Marder M. Z. Medical conditions affecting the success of dental implants. *Compendium of Continuing Education in Dentistry (Jamesburg, N.J.: 1995)* . 2004;25:739–795. [PubMed] [Google Scholar]
22. Rhodus N. L. Management of oral complications from radiation and chemotherapy. *Northwest Dentistry* . 2010;89:39–42. [PubMed] [Google Scholar]
23. Scully C., Ettinger R. L. The influence of systemic diseases on oral health care in older adults. *The Journal of the American Dental Association* . 2007;138:S7–S14. doi: 10.14219/jada.archive.2007.0359. [DOI] [PubMed] [Google Scholar]
24. Epstein J., van der Meij E., McKenzie M., Wong F., Lepawsky M., Stevenson-Moore P. Prostradiation osteonecrosis of the mandible: a long-term follow-up study. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* . 1997;83(6):657–662. doi: 10.1016/s1079-2104(97)90314-0. [DOI] [PubMed] [Google Scholar]
25. Freymiller E. G., Sung E. C., Friedlander A. H. Detection of radiation-induced cervical atheromas by panoramic radiography. *Oral Oncology* . 2000;36(2):175–179. doi: 10.1016/s1368-8375(99)00072-x. [DOI] [PubMed] [Google Scholar]
26. Mericske-Stern R., Perren R., Raveh J. Life table analysis and clinical evaluation of oral implants supporting prostheses after resection of malignant tumors. *The International Journal of Oral & Maxillofacial Implants* . 1999;14:673–680. [PubMed] [Google Scholar]
27. McKenzie M. R., Wong F. L. W., Epstein J. B., Lepawsky M. Hyperbaric oxygen and postradiation osteonecrosis of the mandible. *European Journal of Cancer: Part B—Oral Oncology* . 1993;29(3):201–207. doi: 10.1016/0964-1955(93)90023-8. [DOI] [PubMed] [Google Scholar]
28. Bandela V., Munagapati B., Karnati R. K., Venkata G. R., Nidudhur S. R. Osteoporosis: its prosthodontic considerations—a review. *Journal of Clinical and Diagnostic Research: Journal of Clinical and Diagnostic Research* . 2015;9 doi: 10.7860/JCDR/2015/14275.6874. [DOI] [PMC free article] [PubMed] [Google Scholar]
29. Takata S. Paget's disease of bone. *Nihon rinsho. Japan Journal of Clinical & Medical Research* . 2005;63(10):S219–S225. [PubMed] [Google Scholar]
30. McGowan D. A. Clinical problems in Paget's disease affecting the jaws. *British Journal of Oral Surgery* . 1974;11(3):230–235. doi: 10.1016/0007-117x(74)90106-1. [DOI] [PubMed] [Google Scholar]
31. Marks J. M., Dunkelberger F. B. Paget's disease. *The Journal of the American Dental Association* . 1980;101(1):49–52. doi: 10.14219/jada.archive.1980.0348. [DOI] [PubMed] [Google Scholar]
32. Friedlander A. H., Mahler M., Norman K. M., Ettinger R. L. Parkinson disease: systemic and orofacial manifestations, medical and dental management. *The Journal of the American Dental Association* . 2009;140(6):658–669. doi: 10.14219/jada.archive.2009.0251. [DOI] [PubMed] [Google Scholar]
33. Mootha A., Jaiswal S. S., Dugal R. Prosthodontic treatment in Parkinson's disease patients: literature review. *Journal of the California Dental Association* . 2018;46:691–700. [Google Scholar]
34. Al-Omari F. A., Al Moaleem M. M., Al-Qahtani S. S., Al Garni A. S., Sadatullah S., Luqman M. Oral rehabilitation of Parkinson's disease patient: a review and case report. *Case Reports in Dentistry* . 2014;2014:4. doi: 10.1155/2014/432475.432475 [DOI] [PMC free article] [PubMed] [Google Scholar]
35. Rajeswari C. L. Prosthodontic considerations in Parkinson's disease. *People's Journal of Scientific Research* . 2010;3:45–47. [Google Scholar]



36. Bashir U., Bathala L., Naidu N. R. Prosthodontic management in Parkinson's disease-a review. *International Journal of Scientific Research in Science and Technology* . 2016;2:51–53. [Google Scholar]
37. Heckmann S. M., Heckmann J. G., Weber H.-P. Clinical outcomes of three Parkinson's disease patients treated with mandibular implant overdentures. *Clinical Oral Implants Research* . 2000;11(6):566–571. doi: 10.1034/j.1600-0501.2000.011006566.x. [DOI] [PubMed] [Google Scholar]
38. Al Hamad K. Q., Azar W. Z., Alwaeli H. A., Said K. N. A clinical study on the effects of cordless and conventional retraction techniques on the gingival and periodontal health. *Journal of Clinical Periodontology* . 2008;35(12):1053–1058. doi: 10.1111/j.1600-051x.2008.01335.x. [DOI] [PubMed] [Google Scholar]
39. Trehan K. Prosthetic considerations in medically compromised patients. 2018. <https://www.slideshare.net/trehankriti/prosthetic-considerations-in-medically-compromised-patients>.