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NAVIGATING SYSTEMIC HEALTH CHALLENGE IN PROSTHODONTIC TREATMENT PLANNING – A NARRATIVE REVIEW

SABAH S¹, MOHAMMED ABBAS M S¹, SHAFATH AHMED A^{2*} AND
VIDYASHREE NANDINI V²

- 1: C.R.I, Undergraduate Student, SRM Kattankulathur Dental College and Hospital, Faculty of Medicine and Health Sciences, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu - 603203, Tamil Nadu, India
- 2: Department of Prosthodontics and Implantology, SRM Kattankulathur Dental College and Hospital, Faculty of Medicine and Health Sciences, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu - 603203, Tamil Nadu, India

*Corresponding Author: Dr. Shafath Ahmed A: E Mail: shafatha@srmist.edu.in

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ABSTRACT

Medically compromised patients increasingly seek prosthodontic care due to longer lifespan, improved medical management of systemic diseases, and growing awareness of oral rehabilitation. Systemic diseases influence salivary gland function, mucosal tolerance, bone metabolism, osseointegration, neuromuscular control, bleeding tendency, and healing capacity — all of which impact prosthodontic prognosis. This narrative review examines prosthodontic considerations and treatment modifications for cardiovascular diseases, anticoagulant therapy, diabetes mellitus, thyroid and adrenal disorders, chronic obstructive pulmonary disease (COPD), asthma, tuberculosis, Parkinson's disease, osteoporosis, Paget's disease, fibrous dysplasia, cancer undergoing chemotherapy and radiotherapy, osteoradionecrosis, and implants in irradiated bone. Evidence-based clinical recommendations encompass modifications to impression techniques, the utilisation of soft liners, saliva substitutes, stress-reduction protocols, recall scheduling, and interprofessional communication. Safe prosthodontic rehabilitation is possible with the right evaluation and changes.

Keywords: Prosthodontic management, medically compromised patients, dental management, systemic disease, and prosthodontic considerations

INTRODUCTION:

A "medically compromised patient" is someone whose overall health has been changed by a disease, medication, or medical treatment. Prosthodontics is a major branch of dentistry that focusses on restoring and replacing missing teeth and other oral structures to improve function, appearance, comfort, and oral health [1]. In contemporary dental practice, prosthodontists are increasingly faced with patients whose systemic health has been adversely affected by chronic conditions, including diabetes mellitus, cardiovascular diseases, renal and hepatic dysfunction, bleeding disorders, or conditions necessitating immunosuppressive therapy [2]. Prosthodontic rehabilitation encompasses various clinical and laboratory stages, including examination, impression fabrication, jaw relation documentation, try-in, insertion, and subsequent monitoring [3]. The oral cavity often shows signs of systemic diseases through changes in the mucosa, saliva, and underlying tissues. These changes can affect how well and how long prosthodontic therapy works [4]. Systemic conditions can affect the body's ability to heal, make it more likely to get oral infections, slow down the flow of saliva, and make gum disease worse [5]. Research shows that about 25% of people between the ages of 35 and 74 are missing teeth.

This shows how important it is for medically compromised patients to get prosthodontic rehabilitation [6]. This review concentrates on prosthodontic issues, clinical difficulties, and evidence-based management approaches for treating medically compromised patients. The aim is to furnish clinicians with a thorough comprehension of the impact of systemic health on prosthodontic outcomes and to offer clinical recommendations that foster safe, effective, and patient-centred care.

REVIEW METHODOLOGY:

Review protocol and Literature search strategy:

This narrative review was performed to gather, analyse, and synthesise contemporary evidence concerning prosthodontic management considerations in medically compromised patients. The search utilised the PubMed, Scopus, Google Scholar, and ResearchGate search engines.

Inclusion Criteria: English-language articles, Books and articles from 1960 to 2025, Study types include clinical trials, meta-analyses, retrospective studies, cross-sectional studies, case reports, peer-reviewed journals, clinical guidelines, and standard textbooks.

Exclusion Criteria: Articles in languages other than English, full text not available,

Studies done in vitro, Articles that do not pertain to prosthodontic management.

For the study selection initial screening was performed by evaluating titles and abstracts. Full-text articles were obtained for potentially pertinent publications. The data extraction focused on systemic medical conditions, oral manifestations, prosthodontic challenges, and modifications in treatment. Due to the heterogeneity of study designs, findings were summarized qualitatively rather than statistically. Ethical clearance was unnecessary due to the absence of patient data or clinical intervention.

SYSTEMIC DISEASES AND PROSTHODONTIC IMPLICATIONS: Osteoarthritis (Temporomandibular Joint Osteoarthritis):

Osteoarthritis (OA) is a long-term joint disease that gets worse over time. It causes the cartilage in the joints to break down, osteophytes to form, inflammation of the synovial fluid, and hardening of the bone under the cartilage [7]. Osteoarthritis (OA) causes pain, crepitus, limited movement of the jaw, and deviation when opening the mouth in the temporomandibular joint (TMJ) [8], leading to long-term occlusal disharmony, a smaller vertical dimension, and tooth loss [9]. An evaluation of joint tenderness, deviation patterns, and mandibular movement should be part of a clinical exam. Imaging techniques like

CBCT, OPG, and MRI are helpful for finding changes in bones and soft tissues [10]. Making impressions can be hard if the mouth doesn't open very wide. Sectional trays or elastomeric materials are best [11]. Forced closure should not be used when recording centric relation. Instead, interim splints can be used to help the patient adjust to changes in vertical dimension [12]. For complete dentures, bilateral balanced occlusion is the best choice [1], Cuspless or monoplane teeth help lower lateral stresses [13], Shallow cuspal inclines and narrow occlusal tables lessen the load on joints [14]. Adjunct therapy consists of NSAIDs, physical therapy, and stabilising splints [15]. Implant-supported overdentures enhance functionality but necessitate meticulous planning in individuals with restricted oral aperture or diminished bone density [16]. Regular follow-ups help find problems with discomfort or adjustment early on [17].

Hypertension:

Hypertension is a persistent elevation of arterial blood pressure and represents one of the most common systemic conditions encountered in prosthodontic patients [18]. Dental appointments can trigger stress and anxiety, leading to catecholamine release and potentially dangerous blood pressure spikes. Many antihypertensive drugs cause xerostomia, gingival enlargement, or taste

alterations [19], which negatively affect prosthesis comfort and retention. Obtain complete medical history (type of hypertension, control status, medications), Defer elective treatment if systolic BP > 180 mmHg or diastolic BP > 110 mmHg, Short, stress-free morning appointments are preferred [20], Limit epinephrine in local anesthetic to ≤ 0.04 mg (≈ 2 cartridges of 1:100,000) [21], Avoid epinephrine-impregnated retraction cords; can cause hypertensive crisis [22], NSAIDs may reduce the effectiveness of antihypertensive medications; paracetamol is preferred [23], Xerostomia management improves prosthesis adaptation: salivary substitutes, hydration, tissue conditioners [24].

Angina Pectoris:

Angina pectoris refers to chest pain or discomfort caused by myocardial ischemia due to reduced coronary blood flow [25]. Anxiety or prolonged chair time may trigger angina during dental procedures, obtain physician consultation in recurrent angina cases [26]. Short morning appointments minimize catecholamine load [5]. Epinephrine in LA should be limited to 0.04 mg maximum [21]. Nitroglycerin may be administered prophylactically 5–10 minutes before procedures (if medically advised) [15]. If an anginal episode occurs dental treatment should be stopped immediately, Position patient upright (semi-Fowler's), Administer

0.4 mg sublingual nitroglycerin; repeat every 5 minutes up to 3 doses [27], Provide oxygen. If the symptoms exceed for more than 10 minutes, assume myocardial infarction and activate emergency medical services. Medication-induced xerostomia and altered taste perception may affect prosthesis retention; frequent recalls and mucosal care are recommended [28].

Infective Endocarditis (IE):

Infective endocarditis is the microbial infection of the endocardial surface of the heart and valves [29]. Oral procedures causing tissue trauma can lead to bacteremia, which may seed cardiac valves. American Heart Association (AHA) (2021) recommends antibiotic prophylaxis for patients with prosthetic cardiac valves, previous infective endocarditis, certain congenital heart diseases, cardiac transplant recipients with valvular disease [30]. For adults requiring antibiotic prophylaxis, amoxicillin 2 g orally should be administered 30–60 minutes before the procedure; for patients allergic to penicillin, clindamycin 600 mg orally should be given 30–60 minutes prior instead. Avoid traumatic gingival manipulation; avoid subgingival margins; ensure smoothness of the prostheses [31].

Congestive Heart Failure (CHF):

CHF is a clinical syndrome caused by cardiac dysfunction that results in reduced cardiac output [32]. Patients

commonly present with fatigue, dyspnea, orthopnea, and edema. CHF medications can cause Xerostomia (diuretics), Gingival enlargement (calcium channel blockers) [33]. Consideration during prosthodontic procedures is: Semi-reclined position during treatment; avoid supine position [34], avoid excessive use of vasoconstrictors in local anesthesia [15], Removable prostheses should be lightweight and well-adapted [5], Occlusion must minimize excessive masticatory load [1], Monitor vital signs throughout treatment; avoid Non – steroidal anti-inflammatory drugs in CHF patients.

Anticoagulant / Antiplatelet therapy:

Most prosthodontic procedures do not require stopping anticoagulant or antiplatelet agents [35], International Normalised Ratio (INR) therapeutic range for procedures is 2.0 – 3.5 for warfarin users [39], For Direct Oral Anticoagulants (DOACs), schedule procedures 12 hours after last dose [37], Discontinuation of dual antiplatelet therapy (DAPT) can cause life-threatening stent thrombosis [38]. Local haemostatic aids used for patient undergoing anticoagulant/antiplatelet therapy are suturing, gelatine sponge, oxidized cellulose, tranexamic acid mouthwash significantly reduces postoperative bleeding [39][40].

Diabetes Mellitus:

Diabetes mellitus is characterized by hyperglycaemia due to impaired insulin secretion or action [41]. Oral manifestations include xerostomia, burning mouth, candidiasis, periodontal disease, delayed wound healing [42]. Reduced salivary flow and altered salivary composition can compromise denture retention, increase mucosal irritation and promote fungal infections under removable prosthesis [43]. Treat diabetic patients when their Fasting glucose < 180 mg/dL and HbA1c is < 7% [44]. Prefer morning appointments to avoid hypoglycaemia [15], avoid traumatic border moulding or overextended flanges [45]. Diabetes negatively affects osseointegration and implant success in poorly controlled patients [46].

Thyroid Disorders:

Hyperthyroidism increases metabolic rate, causing bone resorption, increased tooth mobility, premature loss of teeth and decreased prosthesis stability. Periodic relining or rebasing may be necessary in these patients [47]. Hypothyroidism leads to macroglossia, oedematous mucosa, delayed tooth eruption and poor denture adaptation [48]. Avoid epinephrine in uncontrolled hyperthyroidism patients (risk of arrhythmia) [21]. Soft liners or tissue conditioning may help fragile mucosa in hypothyroidism [49]. Implant success

depends on stable thyroid hormone levels as thyroid hormones negatively impact osseointegration [50].

Adrenal Gland Disorders:

The two most common adrenal gland disorder encountered in dental settings are adrenal insufficiency (Addison's disease) and Cushing's syndrome (Hyper adrenalism) [51]. Adrenal insufficiency, characterised by diminished cortisol levels, results in stress intolerance, hypotension, and hyperpigmented oral mucosa. Conversely, Cushing syndrome, stemming from elevated cortisol levels, leads to impaired healing, delicate mucosa, and an augmented susceptibility to infection [52]. Corticosteroid supplementation might be necessary for significant prosthodontic procedures such as extensive implant surgery or full mouth rehabilitation under local anaesthesia [53].

Haematological Disorders:

Haematological illnesses include problems with red blood cells, white blood cells, platelets, and other things that help blood clot [54]. They have a big impact on prosthodontic treatment because they can cause wounds to bleed, get infected, heal slowly, and osseointegrate more slowly. Anaemia, thrombocytopenia, haemophilia, von Willebrand disease, leukaemia and lymphomas, neutropenia, and sickle cell disease are some common conditions that

can make healing harder, raise the risk of bleeding and infection, and change how a patient responds to dental treatment [55]. Get a full medical history, including any bleeding problems, current blood levels, platelet levels, and coagulation profile [56]. Elective treatment should be postponed during active bleeding or severe immunosuppression. Neutropenic patients are highly infection-prone and require steroid prophylaxis and strict asepsis [57]. In sickle cell patients, stress, hypoxia, and dehydration may trigger Vaso-occlusive crisis; avoid long appointments [58]. In patients with fragile mucosa, soft liners should be used, denture borders should be kept smooth, and trauma during impression making should be minimised [59]. Implant or invasive prosthodontic procedures should only be performed on medically stable patients following a multidisciplinary consultation [60].

Oncological Disorders:

Head and neck cancers that are treated with surgery, radiation, or chemotherapy need complicated prosthodontic rehabilitation [61]. Cancer treatment can have a big impact on prosthodontic care. Surgery can cause tooth loss, defects in the maxilla or mandible, and changes in occlusion. Radiation therapy can cause dry mouth, mucositis, trismus, and osteoradionecrosis [62]. Chemotherapy can cause neutropenia,

mucositis, and a higher risk of bleeding. Prosthodontic rehabilitation occurs in three phases: the surgical obturator phase, in which an obturator is inserted immediately after tumour resection to aid speech and swallowing [63], the interim obturator phase, introduced after initial healing to restore function, and the definitive prosthesis phase, provided after 3–6 months once the tissues have stabilised [64,65]. Implants improve prosthesis stability, but failure is higher in irradiated bone. Delayed placement (6–12 months) improves prognosis. Soft liners, sectional trays, and frequent recalls are necessary in patients with xerostomia and trismus [66].

Osteoradionecrosis (ORN):

ORN is defined as irradiated bone that fails to heal for more than 3 months without residual tumour [67]. Radiation causes reduced vascularity, tissue ischaemia, and impaired bone remodelling. Radiation most commonly affects the posterior mandible due to its limited blood supply, leading to symptoms such as exposed bone, pain, trismus, and the formation of fistulas with pus discharge [68]. Radiographic features: sequestration, cortical destruction. Management entails conservative treatment utilising antibiotics, analgesics, and the enhancement of oral hygiene; hyperbaric oxygen therapy (HBOT) enhances angiogenesis and tissue healing; and surgical resection with

vascularised bone grafts in severe or unresponsive instances [69]. The prosthodontic approach following radiation therapy entails postponing denture fabrication for a minimum of six months post-radiation, employing soft liners to mitigate mucosal trauma [70], and being very careful when putting in implants, especially when the radiation dose is more than 60 Gy, because there is a high chance that the implant will fail [71,72].

Osteoporosis:

Osteoporosis makes bones thinner, weaker, and more likely to break [73]. Oral effects include a decrease in the height and width of the alveolar ridge, which makes dentures less stable and less likely to stay in place [74]. To protect delicate mucosa, it is best to use mucostatic or selective-pressure impression procedures [75]. Bisphosphonates can increase bone density, but taking them can cause medication-related osteonecrosis of the jaw (MRONJ) [76]. Prosthodontic considerations for patients with osteoporosis encompass frequent relining and rebasing of dentures due to accelerated ridge resorption, as well as the application of soft liners to enhance denture adaptation and comfort [75].

Paget's Disease:

Paget's disease is characterised by excessive bone turnover, resulting in the development of weak, enlarged, and

hypervascular woven bone [77]. Common oral manifestations include maxillary enlargement, malocclusion, increased spacing between teeth, and a characteristic “cotton wool” appearance on radiographs [78]. Prosthodontic issues in Paget’s disease include the frequent need for denture relining or remaking due to continuous bone remodelling, the avoidance of overextended denture borders to prevent mucosal tenderness [79], and the contraindication of dental implants during the active phase of the disease because of poor osseointegration potential [80].

Fibrous Dysplasia:

Fibro-osseous lesions are benign conditions in which normal bone is replaced by fibrous connective tissue [81], most commonly affecting the maxilla and presenting a characteristic “ground-glass” appearance radiographically [82]. Because of the irregular bony anatomy, custom impression trays are often necessary, and implant survival rates are lower due to poor bone mineralisation [83,84]. Prosthodontic treatment should ideally be postponed until the disease has stabilised [85]. Denture instability is common in this condition due to irregular bone surface and soft tissue undercuts, to overcome this conventional complete or partial denture can be fabricated if residual ridges allow or reasonable support and retention [86].

Parkinson’s Disease:

Degeneration of dopaminergic neurones in Parkinson’s disease leads to tremors, rigidity, and bradykinesia [87]. Oral symptoms include dry mouth (often caused by medication), drooling (sialorrhea), and trouble putting in or taking care of dentures [88]. Prosthodontic modifications involve the use of fast-setting impression materials, simplified prosthesis designs, magnetic retention, and lightweight dentures, with fixed prostheses preferred whenever possible [89,90]. Dental appointments should be scheduled shortly after the patient’s medication dose, during the “on” period, to optimise motor control and cooperation.

Chronic Obstructive Pulmonary Disease (COPD):

Chronic obstructive pulmonary disease (COPD) is a long-term respiratory disease that gets worse over time. It is caused by breathing in harmful particles over a long period of time, most often from tobacco smoke [91]. Prosthodontic problems include xerostomia caused by using an inhaler, oral candidiasis, and a decrease in saliva flow that makes dentures uncomfortable [92,93]. During impression appointments, sessions should be kept short, and the reclining position should be avoided to minimise dyspnoea and ensure patient comfort [94].

Asthma:

Asthma is a chronic inflammatory airway disease characterised by reversible airway obstruction [95]. Prosthodontic considerations include managing xerostomia and candidiasis resulting from inhaled corticosteroids, avoiding local anaesthetics containing sulphite preservatives in sulphite-sensitive asthmatics [96,97], and avoiding non-steroidal anti-inflammatory drugs in aspirin-sensitive patients as they may precipitate bronchospasm; therefore, paracetamol is the analgesic of choice [98]. It is best to use soft liners to protect delicate oral mucosa and make dentures more comfortable.

Tuberculosis:

Mycobacterium tuberculosis causes tuberculosis, a long-lasting granulomatous infection [99]. The tongue, gums, and roof of the mouth are common places for TB to grow inside the mouth. Oral manifestations may appear as chronic oral ulcers, swelling, nodules or bone involvement [100]. TB osteomyelitis of the maxilla or mandible can cause alveolar bone loss, sequestration or sinus tract formation compromising prosthodontic rehabilitation [101]. Prosthodontists can play an important role in identifying early lesions during routine examinations. TB patients are potential infection sources, therefore dental impressions, jaw relation records and prostheses should be

disinfected thoroughly [102]. Elective prosthodontic procedures should be deferred until the patient is confirmed to be non-infectious.

Chronic Kidney Disease:

Chronic kidney disease is defined as a progressive and irreversible loss of renal function. Oral manifestations commonly include xerostomia, uremic stomatitis, altered taste, petechiae, delayed wound healing and increased susceptibility to infections [103]. Renal osteodystrophy, a metabolic bone disorder secondary to chronic kidney disease causes demineralisation and decreased bone density in the maxilla and mandible, which results in altered ridge morphology, poor bone support for removable or fixed prosthesis and increased fracture risk during implant placement [104,105]. Impression material with minimal tissue displacement and relief in high stress areas are preferred.

DISCUSSION:

Systemic disease significantly influences oral tissues, bone metabolism, neuromuscular coordination, salivary function and healing potential, thereby requiring modification in prosthodontic treatment planning and execution. For all systemic conditions, the main ideas are still the same: a full medical evaluation, communication between doctors, personalised treatment planning, minimally

invasive methods, and follow-up after treatment [16]. To plan and carry out treatment, you need to know how systemic diseases work and how they affect the mouth. Patients with lower tissue tolerance and muscle weakness may require modifications to the design of their prostheses, including lighter appliances, simplified occlusal schemes, and flanges that alleviate discomfort [1]. Patients with systemic compromise often demonstrate an increased susceptibility to mucosal injury, xerostomia, and diminished salivary flow, highlighting the imperative for preventive strategies, salivary substitutes, fluoride treatment, and consistent follow-up consultations [26]. Psychosocial factors are important for more than just medical reasons. Patients with long-term health problems may have mental stress, less effective prosthetics, less dexterity, and less motivation to take care of their mouths. In the end, patients who are medically compromised need a full evaluation, decisions based on evidence, and a treatment plan that is made just for them. By keeping up with new guidelines and continuing their education, clinicians can provide safe functional and aesthetic rehabilitation that improves quality of life. They can also use preventive and conservative prosthodontic strategies.

CONCLUSION:

Patients with medical issues pose distinctive challenges in prosthodontic practice. This review underscores that systemic disorders profoundly affect prosthodontic planning, treatment sequencing, material selection, and maintenance protocols to guarantee safe and effective rehabilitation. Some diseases that change how the body and jaw move are osteoarthritis, Parkinson's disease, and neuromuscular disorder. The design needs to be simpler and the occlusal schemes need to be changed to make sure the prosthesis works right. Hypertension, angina pectoris, infective endocarditis, and congestive heart failure are cardiovascular diseases that require thorough medical assessment, stress management strategies, and prophylactic pharmacotherapy. Diabetes mellitus, thyroid dysfunction, and adrenal gland disorder are all metabolic and endocrine disorders that can make it harder for wounds to heal, infections to be controlled, and the body to handle stress. This needs a full evaluation, morning appointments, stress-reduction techniques, and, if necessary, antibiotics to keep infections from happening. People with blood disorders need blood tests and atraumatic procedures to stop bleeding and infection. People with cancer or bone metabolic disorders like osteoradionecrosis, osteoporosis, Paget's disease, and fibrous dysplasia have bones that don't work right,

their bodies are different, and they are more likely to get bone necrosis. For these patients, prosthodontic rehabilitation requires pre-treatment optimisation and atraumatic surgical techniques. People with respiratory problems like asthma, COPD, and tuberculosis need to reduce stress, stay away from drugs that make breathing harder, change the way they are positioned, and take steps to prevent infections. Not getting enough vitamins and minerals makes your oral mucosa, your ability to integrate bones, and your tissue's ability to heal even worse. Dentists need to stay up to date on new rules, drugs, and ways of doing things. By combining personalised treatment planning, minimally invasive techniques, and preventive measures. Prosthodontists can significantly improve oral function, comfort, aesthetics and overall quality of life in medically compromised patients.

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