



RESEARCH ARTICLE

MANAGEMENT OF MEDICALLY COMPROMISED PROSTHODONTIC PATIENTS

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Abstract

An essential part of treatment planning is the medical evaluation of individuals who are receiving prosthodontic therapy. When treating patients with systemic disorders, the prosthodontist must be able to evaluate the inherent risks involved. Evaluating a patient's health state and risk entails a number of factors, such as the patient's medical and dental history, medication use in the past and present, type of treatment, the duration of treatment, degree of invasiveness, and urgency of treatment. Prosthodontically, no treatments should be performed before the patient's general systemic wellness has been fully assessed. This is because the existence of an underlying systemic disorder could influence the oral cavity, which may have an impact on prosthetic procedures and treatment planning.

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Introduction:-

The systemic health of dental patients varies, and there seems to be a significant prevalence of disorders within the body could impact dental treatment. Systemic health and oral health are linked. While some systemic disorders only show symptoms locally, others show signs of both local and systemic reactions. As a result, evaluating medical risks and how they relate to dental health becomes a crucial issue.¹ It is necessary for prosthetic professionals to be aware of the various systemic problems and to take them into account within the treatment plan because some systemic disorders might have a detrimental effect on oral health. When a patient seeks dental care and has a systemic condition, this is much more evident. Due to direct or indirect effects on oral tissues, bacteremia, immune system compromise, drug interactions, sensory and motor disturbances, along with shifts in the patients psychological status, the presence of medical illnesses might impact dental treatment. This article will address prosthodontic concerns that need to be made while treating individuals who have certain systemic diseases.

Prosthodontic Management Of Patients With Systemic Disorders

Bone And Joint Disorders

Osteoarthritis.

Osteoarthritis is the most prevalent chronic illness affecting the aged. It is defined by a pathologically changing hyaline cartilage coupled with bony joints, which eventually causes cartilage or bone to degrade. The hands, knees, hips, and spinal joints are all impacted. In addition, the temporomandibular joints (TMJs) are also affected.²

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Prosthodontic Implications in Osteoarthritis of TMJs

Special impression trays are frequently required to make an impression since opening the mouth might be challenging. Although the mandibular movements hurt, there are difficulties with the fabrication of complete dentures (CDs). Recording and reproducing jaw relation is challenging. Occlusal correction is frequently required due to alterations in the joint. Shorter consultations should be made while teeth are being prepared for fixed dental prostheses (FDP) since it is difficult to open the mouth for extended periods of time, longer appointments might be divided into shorter ones. During the active stage of the illness, only reversible and stabilizing procedures can be carried out; full mouth rehabilitation and fixed dental prosthesis should be avoided.^{2,3} Regarding the use of implants, there have been no articles published reporting on implant survival in patients with osteoarthritis⁴

Rheumatoid Arthritis.

Rheumatoid arthritis (RA) is a persistent inflammatory illness characterized by synovial inflammation leading to joint tissue damage. The immune system is attacking itself, resulting in bilateral synovitis that usually affects the hands and feet^{2,5} The TMJs could also be affected.

Prosthodontic Implications in Rheumatoid Arthritis

1. Dentists should be educated about the medications being prescribed, including the adverse reactions and possible interactions with other prescriptions.
2. Patients are unable to insert or remove partial dentures due to poor manual dexterity. Thus, fixed denture therapy might be appropriate.
3. Before undergoing surgical operations like the placement of dental implants, patients with prosthetic joints may need to take preventative antibiotics.
4. A number of concerns with prosthetic rehabilitation, including as altered occlusion and challenges in recording jaw relationship, in patients with rheumatoid arthritis of the TMJ. Thus, it is advantageous for patients to remove appliances or build temporary structures prior to receiving final treatment.
5. Definitive treatment should be postponed until the disease is treated because it manifests as a temporary state between the acute and chronic phases.
6. Mandibular pain is a common complaint among TMD patients, which makes it challenging to design removable prostheses. Because of the restricted access resulting from the reduced capacity to open the jaws, special impression trays are needed. Sectional impressions, collapsible/sectional dentures, and hinged complete denture prosthesis with swing lock are among the options available.¹

Osteoporosis

Bone mineral density (BMD) is generally lost due to osteoporosis, damaging the mandible and maxilla. The trabeculae's microarchitecture deteriorates, and the cortical thickness decreases, causing the jaw bones to become porous. Mucostatic and open mouth impression procedures are advised for the removable prosthesis. Moreover, soft reline material should be used to line the denture bases in order to cushion the jaw bones.⁶ However, the implant placement is not contraindicated in this clinical scenario. Prosthodontists should exercise greater caution while performing surgery; appropriate case selection, accurate assessment of the implant surgery site's bone health, appropriate bone augmentation, and the requirement for post-operative care can all help these patients have a more convenient implant rehabilitation.

Because the reduction in bone density influences the bone-implant contact, an extended osseointegration period should be given. Implant placement in the maxilla requires careful consideration, particularly in the maxillary tuberosity where cortical bone fractures may result in implant locking. The fact that implants placed in patients with osteoporosis typically exhibit a larger marginal bone loss than those in individuals with good overall good health in order to improve implant placement outcomes, individuals with low bone density may need to undergo step osteotomy or bone condensation^{1, 2, 7}.

Endocrinal Disorders

Thyroid disorders can cause the thyroid glands to either overfunction (hyperthyroidism) or underfunction (hypothyroidism). Complications can arise in patients with poorly treated thyroid diseases.^{1, 2, 8} Disorders related to thyroid hormones have also been shown to impact cortical bone repair surrounding titanium implants. Consequently, implant therapy is hindered in patients with a history of hyperthyroidism. However, all restorative operations, including dental implants, may proceed according to standard protocol in medically managed instances of

hypothyroidism and hyperthyroidism with normal thyroid function and no signs of illness during the last six months. It is important to understand that the placement of dental implants may cause congestive heart failure or may cause a cardio-respiratory depression in patients with thyroid diseases. Appropriate precautions should be taken to prevent such emergency complications⁹

Thyroid Disorders

Dental Implant Management in thyroid Disorders

(i) Patients identified and treated thyroid disorders are the most frequently seen in implant dentistry; those without symptoms are deemed low risk and can have implant surgery without risk.
(ii) Individuals with thyroid disorders at moderate risk are those who do not exhibit any symptoms. Both standard procedure and stress-reduction protocol are applied to the management of these individuals. When performing intermediate to advanced implant operations, epinephrine use should be restricted.
(iii) Those who exhibit symptoms are regarded as high risk. Only examination procedures should be carried out on such patients; all other forms of therapy should be discontinued until the condition is under control and sufficient medical or laboratory confirmation has been obtained.

Diabetes Mellitus.

A class of metabolic illnesses known as diabetes mellitus (DM) is typified by elevated blood glucose levels and an inability to make or use insulin. According to the American Diabetic Association, diabetes is defined as blood sugar levels of 126 mg/dl or higher during fasting and 200 mg/dl or higher after eating.¹⁰ One type of metabolic disease is diabetes mellitus. The illness causes a number of symptoms in the mouth, including xerostomia, candidiasis, denture stomatitis, aggressive periodontal disease, loss of alveolar bone, and an increased risk of periodontal abscesses.

Diabetes mellitus patients exhibit increased residual ridge resorption. Therefore, limited pressure recording should be employed when developing complete denture for these individuals. It is advised to use a mucostatic impression technique. Regular follow-up appointments should be accompanied by instructions on proper dental hygiene². Neutral zone approach, lingualized occlusion, or the neutrocentric idea of occlusion are recommended to improve the stability of the complete denture prosthesis and to significantly reduce ridge resorption. Severe xerostomia, which is frequent in diabetics, should be treated with a salivary denture reservoir.

When preparing patients for fixed partial dentures (FPD), the finish line should be positioned supragingivally. For periodontally compromised teeth, which are common in diabetics, a mutually protected occlusal scheme, group function, or thin occlusal table is a better option. Avert causing harm to delicate tissues while preparing teeth. Because hygienic pontic is easier to clean, it is recommended.

Removable prostheses typically have a lower masticatory efficiency than fixed or implant-supported prostheses. Therefore, when diabetes is adequately managed, implant placement can be completed in a stress-free setting with the least amount of trauma, improving the patients' general health.¹¹ Peri-implant inflammation appears to be higher in diabetes individuals over the long term, but there is comparatively little increased risk of peri-implantitis in the first few years following implant placement. Consequently, regular dental recall appointments may be beneficial in identifying early indications of gingivitis, which is easily treated with oral prophylaxis and reduces the risk of developing a serious peri-implant infection. Implant insertion is not recommended in individuals with uncontrolled diabetes mellitus, as wound healing is typically hampered by severe hyperglycaemia, microangiopathies, impaired leucocyte function, poor cellular immunity, and reduced collagen formation. Monitoring glucose levels is necessary even after implant implantation.

Neurological Disorders

Alzheimer's disease (AD)

AD patients primarily struggle with behavioral issues. Most of the time, people forget their dental visits and instructions. These patients typically have a history of gradually neglecting their oral health, which often results in poor oral and denture hygiene due to forgetting how important it is to brush their teeth or clean their dentures. As a result, behavior modification and preventative oral hygiene practices should be used by dental practitioners and caregivers. Dentures are often broken or misplaced as a result of severe dementia. When making a detachable prosthesis, high strength acrylic resin can be utilized to prevent the denture from breaking from repeated falls. Because of their weakened ability to adapt, these patients frequently experience disruptions from even small changes

in their oral environment, such as trouble adjusting to new prosthesis. Thus, treatment regimens ought to be designed with minimal changes to the oral cavity and should not involve complete rehabilitation.¹²

Parkinson's Disease. (P.D)

Parkinson's disease is a neurological condition that manifests as bradykinesia, postural instability, stiffness, and tremors. Dopamine deficiency in neurotransmitters is the root cause of it¹³. Patients with PD frequently develop edentulism as a result of severe periodontal disease. To reduce the chance of choking and excessive saliva pooling, impression making should be performed in a semi-reclined 45-degree position. Using quick-setting impression materials is recommended while taking impressions. For patients with weak muscle control, it is recommended to reduce the vertical dimension of the dentures and employ monoplane artificial acrylic teeth to stabilize the occlusion and tolerate irregular mandibular movement. For improved masticatory efficiency and to reduce lateral denture motions, a lingualized occlusal design should be adopted. In order to improve denture stability and retention, neutral zone approach should be used. It is recommended to use implant- or tooth-supported overdentures to improve masticatory efficiency, regulated jaw motions, and proprioception.

Dentures can also be placed more easily with the assistance of magnets. Food stagnates in the sulcus region due to altered feeding dynamics caused by weak buccinator muscles. The denture's exterior is altered to enhance retention (in the lower portion) and reduce food accumulation between the prosthetic alteration and the buccinator muscle.². Patients with Parkinson's disease, diabetes mellitus, and chronic renal diseases frequently experience xerostomia. It is recommended that patients drink a lot of water and use artificial saliva substitutes to make up for oral dryness. Silicone impression materials are the least distressing and most well-tolerated when it comes to impression making on xerostomic patients. It is best to avoid using zinc oxide eugenol paste since it may burn the oral mucosa. Metal-base dentures are recommended because of their superior fit precision and efficient wetting, which enhance retention. To increase comfort, soft relining can be applied to denture bases made of resin. It may be suggested to patients to moisten or spray artificial saliva into their prosthesis before to mealtimes and denture placement. Water-based denture adhesives can be utilized to help xerostomic patients retain more of their teeth while also hydrating, cushioning, and lubricating them. When complete partial dentures are fitted, full coverage retainers and readily cleaned pontics should be included. Retainer margins ought to be supragingival. The prepared teeth's borders should be retained supragingival or equigingival for the fixed partial denture. To get the highest level of resistance and retention, full coverage design should be used. The pontic and retainer contacts and shapes promote to be self-cleaning. Since resin cement lowers microleakage, it is recommended for use in the cementation of metal copings and fixed partial dentures. There are 14 suggested supragingival or equigingival borders. Using an implant-supported prosthesis has been shown to significantly enhance oral and general health, and it has been linked to improved masticatory function in Parkinson's disease patients.

Cardiovascular Disorders (CVD)

The most frequent cardiovascular conditions that are of concern to prosthodontists include angina, myocardial infarction, congestive heart failure, infectious endocarditis, and hypertension¹⁵. It is recommended that all patients with cardiovascular illnesses can be generalized for stress reduction:

- (i) Sufficient counseling regarding patients' anxieties or anxiety
- (ii) morning appointments
- (iii) preoperative sedation, utilizing short-acting benzodiazepines one hour prior to surgery or the night before.
- (iv) The use of intraoperative sedation (N₂O-O₂) is an additional option.
- (v) Deep local anesthesia
- (vi) Sufficient postoperative pain relief (vii) On the evening of the procedure, we ought to notify the patient about the treatment's successful outcome.

Hypertension.

If left untreated, hypertension (HTN), an uncontrolled rise in blood pressure, can be fatal. Oral signs of hypertension are a side effect of antihypertensive medications rather than a primary outcome of HTN. These include burning mouth, lichenoid mucosal ulcers, angiotensin-converting enzyme inhibitor-induced taste loss, gingival hyperplasia, and xerostomia brought on by diuretics (calcium channel blockers). There may also be extraoral manifestations, such as sialadenosis.

Considerations for Prosthodontics in Hypertension.

- (i) Patients who experience anxiety should adhere to the stress reduction strategy.
- (ii) To reduce the risk of orthostatic hypotension, sudden changes in body posture should be prevented during

treatment. Nonsteroidal anti-inflammatory drugs (NSAIDs) are used only for short therapy. (iii) To prevent traumasharp edges should be properly filed and polished. (iv) While fabricating dentures, extreme caution should be used to prevent soft tissue damage. Artificial salivary lubricants may be recommended to counteract the effects of xerostomia and improve post-therapy outcomes (vi). Supragingival margins are recommended to minimize gingival bleeding (vii). Administering epinephrine for gingival retraction should be done with caution. Topical vasoconstrictor should not be used to achieve local hemostasis. (xi) Any elective treatments should be postponed until blood pressure can be lowered to a safe level if the resting systolic or diastolic pressures are greater than 180 or 110 mmhg respectively.¹⁶

Angina Pectoris.

Angina pectoris is defined as the chest pain that is a result due to reduced blood flow to cardiac tissue.

Prosthodontic Management in Angina Pectoris.

Most nonsurgical dental treatments can be performed by patients with mild angina (up to one attack per month) according to standard practice. Vital signs should be kept an eye on during the process. The patient is prescribed nitroglycerine. Administering implants or other extensive treatments is either put off or done under nitrous gas anesthesia, with only 0.004–0.005 mg of adrenaline being administered. Before undergoing significant therapy, like implant surgery, patients with moderate angina (up to one attack per week) are instructed to take a sublingual dose of nitroglycerine. It is advised to provide adequate anxiolytic therapy along with oxygen replenishment. Individuals who experience daily episodes of unstable angina are restricted to examination procedures and are informed that elective dental surgery, such as implant surgery is absolutely contraindicated¹⁷.

Myocardial Infarction.

A myocardial infarction (MI) is characterized by a prolonged state of ischemia or hypoxia brought on by a coronary artery blood supply shortage that damages the myocardium. In the event that the patient is taking anticoagulants, the international normalized ratio (INR) should be calculated the day of therapy and administered within the suggested range (i.e., <3.5) to ensure appropriate bleeding management during surgery. Additional hemostasis is required when using antiplatelet medicine.¹⁷

Infective Endocarditis.

The infection of the heart's endothelium or heart valves is known as infectious endocarditis (IE).

Prosthodontic

Management.

(i) In many situations, endocarditis prophylaxis is advised for a variety of dental procedures, including subgingival cord placements and dental implants. This includes prosthetic heart valves, prior infective endocarditis, cyanotic congenital cardiac illness, etc. recently updated prophylactic regimen are the following:

Two grams of amoxicillin taken orally (PO) 60 minutes beforehand, or two grams of ampicillin administered intramuscularly (IM) or intravenously (IV) 30 minutes beforehand for patients who are unable to take oral medicine. If the patient is allergic to penicillin, (c) give them 600 mg of clindamycin or 2 gm of cefalexin PO one hour prior to the surgery; (d) give them 600 mg of clindamycin IV or 1.0 gm of cefazolin IM or IV 30 minutes beforehand if they are allergic to penicillin and cannot take oral medication.

ii) Merely placing a prosthesis or taking impressions does not require the prophylactic treatment for endocarditis. (iii) Implant therapy may not be appropriate for patients who have a history of numerous endocarditis episodes or poor oral hygiene. (i) When implants are required, endosseous implants with a sufficient amount of connected gingiva are the recommended option.¹⁸

Congestive Heart Failure.

A pathophysiologic condition known as congestive heart failure (CHF) is defined by faulty cardiac activity, which makes it difficult for the heart to pump enough blood to the tissues. Oral sores and dry mouth are common side effects of many medications used to treat heart failure. Hypersalivation and an exacerbated gag reflex are symptoms of digitalis poisoning. Thus, it is imperative that dentists be able to identify these symptoms. stress reduction is recommended for every CHF patient. All difficult implant therapies, including autogenous block bone augmentations, sinus grafting, subperiosteal implants with substantial periosteal reflection, and full-arch implant therapy, are advised to have a medical consultation.

Renal Disorders

They may result in oral abnormalities such xerostomia, edentulism, or early tooth loss, necessitating prosthetic maintenance. Prior to transplantation, all dental issues should be resolved in a patient with chronic renal failure. This is because immunosuppressive drugs suppress the immune system, making it difficult for the body to accept a transplant while also making it more vulnerable to systemic infections and the stress that dental procedures typically cause. If implants are to be inserted before transplantation, enough time should be allowed for the implants to osteointegration. Dental procedures must be delayed until the patient's condition has stabilized and the transplant has been accepted in its whole if implants are to be placed following transplantation. Since the majority of these patients have high blood pressure, it is best to use local anaesthetic free of vasoconstrictors. Patients with chronic kidney disease frequently have osteodystrophy, which can cause bone demineralization, decreased cancellous bone trabeculation, decreased thickness of the cortical bone in the jaws, and even spontaneous jaw fractures following dental procedures. For these reasons, implant placement needs to be closely monitored¹⁸.

The first day following hemodialysis is when implant surgery should be done on patients receiving it. Patients who undergo hemodialysis three times a week have a two-day gap between treatments; in these circumstances, the implant procedure can also be planned for the day following hemodialysis¹⁹. Individuals with renal failure who take calcium channel blockers frequently experience gingival enlargement around their natural teeth and dental implants. You can switch from a calcium channel blocker to another antihypertensive drug by consulting a nephrologist. In order to prevent gingival expansion, peri-implant mucositis, and peri-implantitis, proper periodontal maintenance is required. Nonsurgical methods including medication therapy, laser therapy, and photodynamic therapy are the primary forms of treatment for this. After that, removable prostheses may be suggested. For ease of maintenance, screw-retained implant prostheses are advised in light of these potential risk factors.¹⁹

Hematological Disorders

Leukemia

A malignant tumor known as leukemia develops when the hematopoietic system's immature blood cells proliferate and leak out of control. If the patient practices proper oral hygiene, they can replace their lost teeth with removable partial or complete dentures that don't irritate the soft tissue. To avoid any gingival tissue damage, fixed partial dentures with supra-gingival finish lines and digital impression procedures are advised. Implant placement in these patients is contraindicated due to severe bleeding, delayed healing, higher risk of secondary infection, and post-operative pain.

Anemia

Implant operations are generally not inappropriate for the majority of anaemic patients; nevertheless, cautious administration of preoperative and postoperative antibiotics is necessary. Anaemia patients typically exhibit a delayed and interrupted healing pattern, necessitating a longer period of time for the implants to Osseo integrate. Therefore, it is important to load the implants gradually. Long-term anaemic individuals frequently have poor bone formation and maturation. 25% to 40% of the trabecular pattern is reduced. As a result, it takes longer for the correct contact to form and the early characteristics of the bone required to support the implant are greatly impacted. Abnormal bleeding in anaemic people makes it harder to insert subperiosteal implants. Increased oedema raises the likelihood of surgical infection, which can impair implant maintenance over the long term or teeth abutting. Implant procedures can be successfully performed in most anaemic patients; nevertheless, a minimal baseline of 10 mg/dl is advised, particularly for implant surgery. Antibiotic coverage is advised both before and after the procedure, nevertheless.²

Pulmonary disease

It doesn't seem that respiratory conditions have any direct consequences on dental health. The drugs provided to these patients have the potential to induce oropharyngeal candidiasis, gingivitis, xerostomia, and an increased risk of caries. Many precautions are advised because dental treatment may exacerbate respiratory function in patients with chronic obstructive pulmonary disease (COPD). Treating the patient while they are vertical is advised. In certain situations, if the patient reports feeling as though they are being suffocated, the rubber dam placement may need to be altered. Dental professionals treating asthmatic patients should be cognizant of the patient's degree of illness management. When working with dental materials that contain powder, such as alginate and allergens it may precipitate asthma²¹

Asthma

It is a medical disorder that causes the respiratory system's airways to constrict and swell, making breathing difficult. The condition's clinical signs include coughing or wheezing. The most frequent triggers for asthma flare-ups are smoke, viruses that infect the respiratory system, pollens, spores, home dust, and insects. Medicinal treatments for asthma include bronchodilators, anti-mucolytics, anticholinergics, and corticosteroids, depending on the severity of the condition (mild, moderate, or severe). Supplemental oxygen, preservation of hydration and electrolyte balance, anxiety reduction, endotracheal intubation, and, in severe cases, mechanical ventilation are all part of the supportive treatment for acute severe asthma.⁵ Patients with asthma who are asymptomatic or under control can undergo dental operations. A patient who is wheezing or has poor control has to be seen again later. The meetings ought to be brief. Less time should be spent sitting in supine positions and as little time as feasible should be spent in an upright position during the sittings. In the dentist office, the following actions should be followed to treat an acute asthmatic attack:

1. Stop the dental work and give the patient a comfortable spot to sit or lie down.
2. Use a nebulizer or inhaler to deliver β_2 -agonists while maintaining an open airway.
3. Use a face mask, nasal hood, or cannula to administer oxygen.
4. Administer subcutaneous epinephrine (1:1000 solution, 0.01 mg/kg of body weight to a maximum dose of 0.3 mg) and call for medical aid if the patient shows no improvement and is getting worse.²²

Conclusion:-

Dentists and other healthcare professionals have an obligation to understand the connections between systemic and oral health. Before beginning prosthodontic treatment and throughout it, patients' systemic conditions should be carefully assessed, and all essential safety measures should be implemented to prevent complications. In cooperation with the patient and his physician, prosthodontists play a significant part in the entire management of these patients' health by preventing and treating oral and, to some extent, systemic disorders. Since every person is unique in their anatomy and physiology, the ultimate diagnosis and treatment plan for such complex situations including prosthetic rehabilitation should be based on a combination of data from various sources and clinical experience.

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