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STEER A SHIP KNOWING THE DESTINATION-'VALUE OF REGENERATION IN PROSTHODONTICS'-A REVIEW.

Prosthodontics

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KEYWORDS

INTRODUCTION:

We have entered a new era in orofacial bone regeneration, where molecular enhancement of osteoinductive material and stem cell therapies can be used to improve and accelerate clinical outcomes. Restorative prosthodontics is a specialty of dentistry that focuses on restoring and replacing damaged or missing teeth, gums and oral structures using regenerative techniques. The purpose of these techniques is not only to replace lost or damaged tissues, but also to promote the regeneration and restoration of the natural structures of the oral cavity. This can include various procedures such as dental implants, bone grafting, tissue engineering and other restorative treatments to restore and restore oral function and aesthetics. The ultimate goal is to improve the oral health, function, and aesthetics of people with dental problems. [1] This review article aimed to discuss various regenerative techniques used in the different prosthodontic treatments.

Prosthodontics Regenerative techniques include various procedures aimed at restoring and restoring damaged or lost oral tissues such as teeth, gums, and bones. Some of the more commonly used regenerative techniques in prosthetics are:

Dental implants: Dental implants are titanium posts that are surgically inserted into the jaw to replace missing teeth. They create a stable base for dental prostheses such as crowns, bridges or dentures. [2]

2. Bone grafting: Bone grafting involves the transfer of bone tissue to areas of the jaw where bone loss has occurred. This procedure helps restore bone volume and density by supporting dental implants or improving the fit of dentures. [3]
3. Guided Bone Regeneration (GBR): GBR is a surgical technique used to restore bone in cases of bone failure. A barrier membrane is placed over the bone damage to protect the site and encourage new bone growth. [4]
4. Soft tissue transplantation: soft tissue transplantation involves transplanting gum tissue into areas of receding or deficient gingiva. This procedure helps to improve the aesthetics of the smile, improve the health of the gums and support dentures.[5]
5. Platelet-Rich Plasma (PRP) Therapy: PRP therapy involves the use of the patient's own blood plasma, enriched with platelets, to promote tissue regeneration and healing. PRP can be used in conjunction with other regenerative procedures to increase their effectiveness. [6]
6. Tissue engineering: tissue engineering involves the use of biomaterials, growth factors, and cells to regenerate oral tissues such as teeth, bones, and gums. This field is promising for the development of new regenerative therapies for prosthetic applications.[7]

I. Regenerative techniques used in **dental implants** aim to optimize the conditions for successful implant placement and integration into the jawbone. These techniques are particularly important in cases where the volume or quality of bone is insufficient to support dental implants. Here are some important regenerative techniques used in dental implants:

a. Bone grafting: Bone grafting involves the transfer of bone tissue to areas of the jaw that do not have enough space or density to support dental implants. There are several sources of bone grafts, including autogenous (from the patient's own body), allogeneic (from a donor), xenogeneic (from another species), and synthetic materials. Bone grafting helps increase bone volume and density, which creates a stable base for implant placement.[8]
b. Sinus lift: A sinus lift, also known as sinus augmentation, is a surgical procedure used to increase the amount of bone in the posterior maxilla (jawbone) where the natural bone is insufficient due to sinus enlargement. During a sinus lift, the sinus membrane is raised and bone graft material is placed between the jawbone and the floor of the sinus. This procedure increases bone height, enabling successful placement of the implant in the posterior jaw.[9]
c. Ridge augmentation: Ridge augmentation is performed to increase the width or height of the alveolar ridge (the bone that supports the teeth) in areas where it is resorbed or missing. This procedure involves the placement of bone graft material or bone substitutes to augment the ridge, providing adequate support for the dental implants.[10]
d. Guided Bone Regeneration (GBR): GBR is a surgical technique used to regenerate bone with bone defects around dental implants. A barrier membrane is placed over the defect, which prevents the penetration of soft tissues and promotes the growth of new bone tissue. Bone graft material is then placed under the membrane to fill the defect and stimulate bone regeneration.[11]
e. Preservation of a socket: preservation of a socket is done immediately after the extraction of the tooth to prevent the thinning of bone and to preserve the dimensions of the alveolar ridge. This technique involves filling the extraction socket with bone graft material or bone substitutes to preserve the ridge volume of the future implant.[12]
f. Platelet-Rich Plasma (PRP) Therapy: PRP therapy involves the use of the patient's own blood plasma, enriched with platelets, to promote tissue regeneration and healing. PRP can be used in conjunction with bone grafting and other regenerative procedures to improve bone formation and implant success.[13]

II. Regeneration plays an important role in **fixed prosthodontics**, which involves restoring and replacing missing or damaged teeth using fixed prosthetic devices such as crowns, bridges and implant-supported restorations. Regenerative techniques of fixed prosthodontics aim to restore not only oral function, but also aesthetics and structural integrity. The following are some of the key roles of regeneration in fixed prostheses:

1. Periodontal regeneration: Regenerative techniques are used to restore and regenerate periodontal tissues, including the gingiva(s) and periodontal ligament, which provide support and stability to the fixed prosthesis devices Procedures such as guided tissue regeneration (GTR) and soft tissue grafting help improve periodontal health and integrity and ensure the long-term success of fixed dental restorations.[14]
2. Regeneration of alveolar bone: sufficient bone support is

necessary to ensure the stability and longevity of fixed prostheses. Regenerative techniques such as bone grafting, sinus augmentation, and ridge preservation are used to strengthen and restore alveoli in bone-deficient areas, which provide a stable base for implant-supported prostheses or fixed bridges.[15]

3. Bony integration of the implant: Dental implants play a crucial role in fixed dentures, as they act as artificial tooth roots to support fixed dental prostheses. Regenerative techniques are used to promote osseointegration, the process by which the implant fuses with the surrounding bone tissue, ensuring stability and longevity. Procedures such as bone grafting, guided bone regeneration (GBR), and platelet-rich plasma (PRP) improve bone formation and facilitate successful implant integration.[16]
4. Soft tissue maintenance: Soft tissue regeneration is essential to achieve optimal aesthetic appearance and gingival contour around fixed prostheses. Soft tissue grafting techniques are used to grow and regenerate gingival tissue in areas of degeneration or deficiency, improving the aesthetic outcome of fixed dental restorations and improving patient satisfaction. [17]
5. Biomechanical stability: Regenerative techniques contribute to the biomechanical stability of fixed prosthetic restorations by providing adequate support and reinforcement to the underlying structures. An increase in alveolar bone and periodontal tissue improves load capacity and resistance to functional forces, which ensures durability and longevity of fixed prosthetic restorations.[18]

III. Regeneration plays an important role in **maxillofacial prostheses**, which focus on the restoration and rehabilitation of patients with congenital or acquired defects of the head, neck and face. The goal of maxillofacial rehabilitation is to restore function, aesthetics and quality of life to people who have experienced facial deformities or loss of facial structures due to trauma, surgery or disease. Here are some of the main roles of regeneration in maxillofacial prostheses:

A. Tissue reconstruction: regenerative techniques are used to reconstruct and restore the soft and hard tissues of the maxillofacial region, including the face, jaws, palate and oral cavity. Methods such as bone grafting, soft tissue grafting and tissue engineering are used to restore lost or damaged tissue and create a stable base for the jaw prosthesis. [19]
B. Osseous integration of implants: Dental implants play a vital role in anchoring and supporting maxillofacial prostheses such as facial, orbital and ear prostheses. Regenerative techniques are used to promote bone integration and ensure the stability and longevity of implant-supported prostheses. Bone augmentation, guided bone regeneration (GBR), and platelet-rich plasma (PRP) therapy promote bone formation and facilitate successful integration of implants in the maxillofacial region.[20]
C. Facial aesthetics: Regeneration helps restore facial aesthetics by restoring the natural contours, proportions and symmetry of the upper jaw of the face. Soft tissue grafting techniques are used to augment and restore the soft tissues of the face, such as the lips, cheeks and jaws, to achieve optimal aesthetic results and improve patient satisfaction.[21]
D. Functional Rehabilitation: Regenerative techniques play a key role in restoring and improving the functional capacity of patients with maxillofacial injuries. Bone grafting and tissue engineering procedures improve the structural integrity and load-bearing capacity of reconstructed facial structures, allowing patients to speak, chew, and swallow more effectively.[22]
E. Psychosocial Well-Being: Regenerative techniques have a profound effect on the psychosocial well-being and quality of life of patients undergoing maxillofacial rehabilitation. By restoring facial appearance and function, regenerative procedures help relieve psychological distress, improve self-confidence, and enhance social interaction, thereby improving patients' overall quality of life.[23]

IV. Fixed partial denture (FPD) procedures often require **gingival retraction** to expose the prepared tooth margins for impression-taking and subsequent restoration. Regenerative techniques for receding gums aim to gently move gum tissue away from the edges of teeth promoting tissue health and minimizing trauma. Here are some regenerative techniques commonly used for gingival recession in FPD procedures:

* Chemical Retraction Agents: Chemical agents such as astringent solutions or hemostatic agents are commonly used to achieve temporary gingival recession. These agents are applied topically to the gingival tissues to stimulate vasoconstriction and tissue migration. Examples are aluminum chloride, ferrous sulfate, and solutions containing epinephrine. These agents help create space for impression-taking while controlling bleeding.[24]
* String packing techniques: Gingival retraction strings are often used to mechanically move the gingival tissue away from the tooth margins. Traditional ropes are usually made of braided or twisted cotton or silk impregnated with astringent solutions. However, newer cord materials such as knitted cords or cords coated with hemostatic agents offer better tissue transfer and hemostasis. Wireless techniques are also available for gingival retraction, such as the use of specially designed retraction caps or rings.[25]
* Electrosurgery: Electrosurgical techniques involve the use of high-frequency electrical currents to achieve hemostasis and tissue retraction. Using electrosurgery, the gum tissue can be gently removed or modified, creating space around the prepared teeth to take impressions. Care should be taken to avoid thermal damage to surrounding tissues and to ensure optimal tissue healing. [26]
* Laser-assisted gum recession: Laser technology offers an alternative to traditional gum recession techniques. Laser devices emit focused light energy that can be used to precisely remove or coagulate gum tissue, achieving hemostasis and tissue migration. Laser-assisted gingival recession is associated with minimal discomfort, reduced bleeding, and improved healing compared to traditional techniques. [27]
* Tissue processing agents: tissue processing agents, such as soft tissue expanders or retraction pastes, are used to chemically treat gingival tissues and facilitate their migration. These agents are usually applied topically to the gum tissues and left in place for a period of time to promote tissue expansion and mobility. Tissue conditioners can be especially helpful for thick or fibrotic gum tissue. [28]
* Plasma Rich Plasma (PRP) Therapy: PRP therapy involves the use of the patient's own blood plasma enriched with platelets and growth factors to promote tissue regeneration and healing. PRP can be applied topically to gum tissue or incorporated into retractor tape materials to improve tissue health and speed healing after gum recession procedures. [29]

V. Regenerative techniques for **complete dentures** focus on promoting tissue healing, improving stability, and improving patient comfort and function. Although in the case of complete denture prostheses, the term "regeneration" may not include tissue regeneration in the same way as in other areas of dentistry, the goal of regenerative methods is to optimize the adaptation of the prosthesis to the underlying tissues of the oral cavity. and improve overall treatment outcomes. Here are some commonly used regenerative techniques and methods for complete dentures:

1. Soft tissue therapy: Soft tissue therapy involves the use of tissue conditioners or soft coatings to improve the fit and comfort of complete dentures. These materials are applied to the tissue surface of the prosthesis and provide a cushion, reducing pressure on the underlying mucosa and minimizing tissue irritation. Soft coatings can help improve tissue health and promote healing in pressure points or tissue damage. [30]
2. Mucosal retention: Regenerative methods such as tissue therapy and oral hygiene guidelines are necessary to maintain healthy oral tissues and promote tissue regeneration in edentulous patients. Proper oral hygiene practices, including regular cleaning and maintenance of dentures, help prevent tissue infections, fungal infections, and other oral diseases that can compromise tissue health and retain dentures.[31]
3. Dentures with implants: Dentures with implants offer a more stable and durable alternative to traditional full dentures. Dental implants are placed in an edentulous arch that provides support and retention for the prosthesis. Implant-supported dentures improve bite, speech and patient satisfaction compared to traditional dentures. In addition, implants help maintain bone volume and prevent resorption, which promotes long-term tissue health and stability.[32]
4. Tissue regeneration and bone resorption: Bone resorption of edentulous ribs occurs over time, causing changes in ridge morphology and loss of prosthesis stability. Tissue preservation techniques such as restringing and retraction help maintain optimal dentition and adapt to the changing contours of the edentulous ridge. These procedures improve retention and stability of prostheses, increase patient comfort, and minimize

tissue damage associated with ill-fitting prostheses.[33]

5. Nutritional Supplements to Promote Tissue Regeneration: Although not strictly regenerative in nature, complementary therapies such as platelet-rich fibrin (PRF) or growth factors can be used as part of a total prosthetic treatment to improve tissue healing and regeneration. PRF contains growth factors that promote tissue regeneration and wound healing, potentially improving the adaptation of the prosthesis to underlying tissues and improving treatment outcomes.[34]

CONCLUSION:

The excellent regenerative capacity of oral epithelial and mesenchymal stem cells can be applied in dentistry. Dentists need to understand the promise of the emerging field of regenerative dentistry and the possibility of obtaining stem cells during traditional dental procedures that can be stored for autologous treatment in the future. Current active areas of research in the field of dental stem cell-based therapy focus on tissue engineering and cell transplantation methods that may lead to more predictable regenerative outcomes in the future.

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