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**Name Define and explain the concept of Guided tissue regeneration.**

Guided bone regeneration is the medical process with the help of membrane direct the development of new bone or any tissue which has lost its previous structures. In the reformation of all the lost tissues, various methods such as polytetrafluoroethylene, polyglactin, polylactic acid, calcium sulfate, and collagen are used.

Regeneration of tissues is a complex phenomenon. For example, before the regeneration has taken place, the control of misplaced tissues such as cementum, periodontal tendon, and bone needs thorough study. Typically restoration happens as a fractional display, and it leaves most of the accomplished curing in amended condition. According to the Glossary of Periodontal Terms, repairing can be defined as "The healing of a wound by tissue that does not fully restore the architecture or the function of the part."(Katz, n.p) There are two forms of repair. One is reattachment, and the other is a new attachment. Reattachment is when some tissues damage by shock or scratch and are then reattached to heal with the gathering of epithelial and connective tissue. In contrast to this, "the union of epithelium or connective tissue with a root surface that has been deprived of its original attachment apparatus. This new attachment may be epithelial adhesion and connective tissue adaptation or attachment and may include new cementum." (Katz, n.p)

**Explain the major studies which proved the concept associated with Guided Tissue Regeneration (GTR)**

In the world of surgical treatment of bone is a massive challenge. There are various concepts and studies to help guide in bone reformation. For example, distraction ontogenesis and bone transport, or bone grafting, including autologous bone grafts, bone marrow aspirate, allografts, bone substitutes or growth factors" (Dimitriou et al., 1) Another of such studies is the use of a device called membrane for restoring bone deficiencies. There are two types of membranes non-resorbable and bioresorbable. Due to their characteristic to maintain their structure during implantation non-resorbable membrane are considered ideal for clinical applications when dealing with bone regeneration. Likewise, the bioresorbable membrane having the capacity to enhance bone healing and reconstruction of broken bones are useful for clinical purposes.

Gingival wound healing includes a sequence of reactions that permit the termination of cracks in the masticatory mucosa. The first phase of wound healing is inflammation followed by epithelium cell migration leading to the formation of granulation tissue. Then there comes the tissue remolding phase where connective tissues are formed fixing the wound.

**Explain the different types of bone grafting materials available for use, the advantages and disadvantages of each.**

1. **Allograft:** Allograft bone is a useful material in patients who are at risk of a severe fracture of a harsh type but have insufficient bone in their own body This type of bone grafting has more risks involved in disease transmission and immune and the good thing about this bone grafting is highly useful for rebuilding of bone tumors with no chance of implant rejection.
2. **Synthetic bone grafting material**: This is made up of a natural mineral called hydroxyapatite. The benefit of artificial bone grafting is obtaining the right amount whenever needed, and the disadvantage is it could deteriorate by the surgical procedure, and it has a low risk of implant dismissal.

**Explain the concept of guided bone regeneration, and how it differs from guided tissue regeneration**

Guided bone regeneration and guided tissue regeneration are remedial measures that use a device called barrier membranes to help grow new bones with inadequate bone for correct functioning. Both guided bone regeneration and guided tissue regeneration are the same things, but they differ in the development of soft tissues and hard tissues respectively. Bone regeneration refers to the techniques of bone renewal while tissue regeneration deals with infections such as the gums, ligament, and teeth.

**Give examples of when GBR would be indicated**

GBR focuses the growth of hard tissues in addition to the soft tissues of structures around the teeth. For instance, at the current moment, guided bone regeneration is mainly functional to help replace firm tissue development of the dental transplants. GBR is a reliable and authenticated process to generate fractured bones and tissues newly.

**List possible complications associated with GTR/GBR and the remedy or treatment for them**

1. **Surgical complication**. In GBR procedure liberating the lingual coverings is a critical step while dealing with soft tissues. Damage such as the potential for bacterial infection is visible during surgical operations. Clinical practices need to make sure to use all the proper methods otherwise neuro-vascular are prone to flap damage and difficulties.
2. **Flap Damage**: Inappropriate dealing with soft tissue in the process of wound healing and the subsequent tissue disclosure can be the reason for the regenerative process to miscarry. Therefore, two to three months of uninterrupted healing is vital before scheduling for another bone regeneration process.

**Explain the types of regenerative barriers commonly commercially used, advantages and disadvantages of each**

1. **Bone Substitutes**. It is the method of replacing missing bones to mend bond cracks. It has both advantage and disadvantage. One of the benefits is to regain the lost bone due to a certain disease or any other infection. The tendency for the membrane towards imperfection causing redness and swelling of the wound. The surgery for bone substitute involves the risk of pain. Sometimes increasing the clinical risk for the patient.
2. **Collagen Membrane**; It is a type of guided bone regeneration which uses some intertwined fibers to form an active membrane. Like bone substitutes, it too has both negative and positive effects. It is practically complex and can have an inflammatory reaction from tissues that can delay the wound healing. Its benefit is tissue friendly response to the exposure of membrane.

**Describe and compare Growth factors, Platelet Rich Plasma, Enamel Matrix derivative, and bone morphogenic proteins, the role each potentially plays in GTR/GBR and advantages and disadvantages for their use.**

**The growth factor** can be defined as the stimulating substance which helps in the growth of an active cell. They contribute in the bone regeneration process by interacting between other growth factors and receptors of the target cell. These target cells then help the process of bone regeneration run fast. It is helpful in healing and fracture bone repair and have no removable effect on the minerals of the bone itself. The possibility of pathogen diffusion is one of the possible adverse outcomes of growth factors.

**Platelet Rich Plasma:** It is a protein derived from blood which is rich in growth factors. It has the potential to heal tissues at the cellular level. During bone regeneration Platelet Rich plasma influence chemical response to a stimulus, and help the artificial movement of bone cells to control fracture healing, bone renewal. PRP is useful in healing with reduced infection with no risk of allergic reaction.

**Enamel Matrix derivative: I**n dentistry, enamel matrix derivative is removing of tooth material with hard tissues resulting tissue damage. “It is derived from the developing tooth germ of fetal pigs and has recently been introduced as a treatment option for the regenerative therapy of periodontal defects." (Chambrone, 242). It is responsible for delivering an early and vital stage in the establishment of cellular cementum and deposit protein on the dentin surface. Surgical therapy can have a potential risk of disease transmission.

**Bone morphogenic proteins** are a group of growth factors which helps in the regulation of bone repair. It is beneficial in developing fraction repair with the help of cartilage and bones. BMP can fix constituent of the extracellular matrix. The matrix helps as storage letting an unhurried relief of the ligand for a more extended period.

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