**Implant dentistry (2)**

Today we are going to talk about the second part of dento-implat surgeries and the advanced techniques to treat those difficult patients .

As we discussed last lecture not all patients can be treated in straight forward techniques , sometimes you can treat nice cases which have good thickness and height of bone , so we treat them in conventional implat way , and sometimes you can find some difficulties like : proximity to the anatomical structures , proximity to the sinus , pocketing , resorped bone and other difficulties , so we need special advanced techniques to treat such these cases .

**Advanced surgical techniques:**

1. **Immediate implant placement.(** we can place implant immediately after extraction so the socket will be larger than the implant in diameter but there is a special technique.)
2. **Mandibular atrophy**.(ex. resorbed ridge of the mandible which lead to very small thickness ,and the ID canal is very close to the surface.)
3. **Sinus lifting** .(use it when we have collapse of the sinus which makes the floor of sinus very low and close to the surface )
4. **Nerve repositioning.**
5. **Implants in growing patients.**
6. **Patients in radiating bone .**
7. **Guided tissue regeneration .**

**\*Guided tissue regeneration(GTR) :**

The concept is trying to guide a new bone formation in deficient areas of bone without allowing the re-epithelization to occur , which will weaken the bone.

If we have bone defect and we just close the gum , naturally what will happen is we will have bone with no good quality to fill the defect , because **the junctional epithelium** will grow in , and will not allow the bone to grow .

so what we do basically , we put the bone graft and isolate it from the mucosal bi-membrane , this membrane will prevent the re-epithelization and will allow the ossification of the bone , therefore allowing formation of new bone . this is called **GTR** which we are **guiding tissue to form bone in that area.**

\*these Membranes can be **resorbable** like (vicryl) and **non-resorbable** ( titanium ) which is a mesh membrane , we use pills with it for fixation and trying to fix it away from the adjacent teeth.

In the slides (61-64) , here we have very thin ridge and as we said it must be 6mm . so what will do is putting the dental implant and fix it, but actually because there is no enough bone so the implant will show buccally , so we have to put synthetic bone graft from ***hydroxyapetite*** and cover it with membrane .

Unfortunately that doesn’t always work in GTR because the gold standard in bone grafting we depend on ***Autogensous bone grafts*** which have superior features in comparison with synthetic bone grafts.

**These features are :**

**1-ossteoconductive** : it has bony and collagen frameworks that will act as scaffold or network for conduction , which forms the new bone above it .

**2- ossteoinductive** : the material that we use has the ability to induce new bone ( cell tissue mediators , natural osteaoblast and all the natural contents that stimulate new bone formation ) .

**3- ossteogenic** : has bone cells that will form bone .

**\*while synthetic bone grafts have only ostseoconductive feature act as scaffold or network to form bone , they don’t induce bone and don’t have vital cells** .

**Therefore they are biologically different** .

How do we get bone in general :

1. **Local manipulation** :we can take bone or soft tissues from the adjacent area,as an example if we are working on the mandible we can take bone from the external oblique ridge .if maxilla we can take from the anterior nasal spine or cortical bone of chin.
2. **Extensive grafting**: like in huge bone defects or atrophic jaw, but its not common .
3. **Distraction osteogenesis** : its relatively new concept that can produce new natural bone from the body, by doing osteotomy in the alveolar ridge , then connect the two egdes by an appliance . then after 5-7 days the appliance will be activated and stimulate new bone formation within the callus, by this it induces new bone and elongation of bony segments , it will produce vasculrized natural bone . we can apply it in cases of : hemifacial microsomia , small mandible and short ramus .
4. **Tissue engineering** : the concept of producing new natural tissues from bone by stimulating cytokines like morphogenetic proteins and plasma rich proteins to apply it in the surgical site and they stimulate bone formation.

**\*Ridge expansion** : we can use it in small ridges(less than 6mm) especially in maxilla to allow the insertion of implants without bone graft . what we do?? is inserting small osteotomes in the ridge to expand it so we will end with microcracks on the labial and lingual surfaces which facilitate the implant insertion .

**\*Sinus lifting :** . After long time of extraction of the upper molars the sinus will pneumatize downward with just 2-3 mm away from the crest. And the minimum length of the implant is 6mm, so if we put implant here it goes in the sinus and there is no primary stability. So what we do is elevation of the sinus up to allow the insertion of the bone underneath the floor of the sinus which allow to form good quality bone after 4-6 months .(placing graft material inside the sinus cavity ).

We have two techniques in sinus lefting :

1. **Direct sinus lifting(external ):**slide 67 on the buccal side we do small opening by small round bur then we elevate the sinus membrane, and inserting synthetic bone ,then we wait 6 months for bone healing and generation then take radiograph to make sure of bone height or we can insert the implant directly .
2. **Indirect sinus lifting(internal)**: here we use it when there is **resenable**  height and good bone but we **need few mms** to be enough. so from the socket and after extraction we insert blunt instrument (blunt that doesn’t injure the lining membrane) slide 68 the left pic .this Blunt instrument can pushthe membrane up then we insert bone graft t. So we use it when we need less bone than the indirect techniques and we can use it in less difficult cases .

\*the lining membrane ( sinus membrane ) is differ between people . some have it thin which can tear easily and some have it thick , Main principle is to elevate the membrane without tearing which is the **common problem of sinus lifting.** What we can do when the membrane tears??

Putting GTR membrane and cover the perforated area then proceed as usual. Another solution is to use piezo-syrgery ,which is ultrasonic cutting device that can cut bone without affecting the soft tissue so it doesn’t cut the sinus lining membrane. we can use it in mandible so it doesn’t injure the ID nerve.

\*. Direct sinus lifting is very predictable procedure almost the success is100%.

**Materials used for bone graft:**

1. Synthetic bone: it’s osteocondutive. Minerals like( hydroxyapitate, Tricalium phosphate). And it’s also Biocompatible.
2. Natural bone (best):it’s osteoconductive, osteogenetic and osteoinductive. (Autogenous grafts )

**Alterative implant techniques in posterior maxilla:**

1. Sinus lift : long term success.
2. Rib graft :use it in extensive resorption of maxilla. Not common.

\*we use small bone grafts in reconstructing the maxilla because the large ones may get resorbed .

1. Pterygoid & maxillary tuberosity implants.
2. Zygomatic implants :in cases of complete resorption of alveolus , they are very long implants up to **3 cm** can get inserted in the alveolus through the sulcus reaching the zygoma and they get fixated there , then u can construct an overdenture or any prosthesis above them . they work in cases when we have very resorbed maxilla (no bone at all ).

**Special consideration in atrophic mandible:**

**Interforaminal area:** between mental foramina is safe usually we have good bone height but the problem is in the thickness of bone , the ridge is very thin. So we use *short wide implants or lingually positioned implants* .

**Severely atrophic mandible:**

1. **nerve repositioning** , because these patient came with complaining of parasthesia by wearing there dentures so we Dissect out nerve from the crest. But the problem here that we might injure the nerve during this manipulation, so Piezosurgery is one of option.
2. **Onlay grafting** : we can put direct bone in the mandible but also , the resorption is high .

**\*Complications that we can face in implants surgeries :**

1. **Sinus perforation**: you can prevent it by good treatment plan .
2. **Perforation of ID canal** You might injure the nerve and induce parasthsia or anesthesia. If this happen you should remove implant or replace it by short one.
3. **Perforation of buccal or lingual plates:** due to imprecise treatment plan , or the surgeon didn’t notice the lingual undercut in mandible.
4. **Wound dehiscence:** due to the tension of suture.
5. **Implant failure :** due to overheating bone during preparation,or **contamination which the most common cause of failure** .

**\*Immediate implant placement:**  we can place implant immediately after extraction, so the socket will be larger than the implant in diameter , but there is special technique. Now we have anterior zone and posterior one.

**Problems in posterior zone:**

* **multirooted teeth**: we have to examine the sockets we to choose the good implant that run with long axis of future prosthesis because the implant cant come in multirooted shapes . so we have to choose the good inclination of the implant .
* **Bone resorption ( vertically or horizontally)**: Usually vertical bone loss is worse than horizontal, so it is not easy to place bone graft . If there is vertical bone loss , we can do bone graft. In horizontal bone resorption we should have more than 3mm resorption to place bone graft .
* **Primary stability**:we depend on the apical portion of implant in primary stability , so we prepare apically with twist drills and place the implant, to get the primary stability from apical portion not coronal.

So after extraction of mutirooted tooth the Coronal part of the socket will be wider than implant , so if the pocket is just around 2-3mm which is not indicated for bone grafting . Usually for bone graft we need to be more than 3mm defect and this again to minimize buccal bone resorption.

* *So after extraction we have to check that there is no infection in the area , good insertion of implant and no destruction of the walls after extraction (the buccal and the lingual walls must be intact after extraction ).*

**Problems In anterior zone(esthetic zone )**:

1. **Labial plate** : that covers the incisors especially in the upper incisors.

The problem is that after extraction we will find resorption which prevent the placement of immediate implants because it leads to exposure of implant and very bad esthetic results .

1. **Tissue biotype** : thick gum that overlying the labial plate over the upper incisors .

*\*so the ideal case that when we have at least* ***2 mm*** *of the labial plates* ***+*** *good tissue biotype to make sure that the resorption will be reasonable or less (resorption always will happen in the labial side but we want to minimize it).so some people* ***do bone graft immediately*** *after extraction of anterior teeth* ***to minimize*** *the degree of resorption .some do* ***keratinized soft tissue graft with bone graft*** *to make sure and they can see the results after* ***6 months*** *.*

\*Sites of conventional bone grafts :

1- Intra-oral sites : which we use it in dental implants like external oblique ridge , ramus, coronoid , tubersities and chin.

2-Extra-oral sites: ribs and iliac crest .

Best wishes ☺

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