IMPLANTOLOGY

OS SHEET #1

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This lecture will be about implantology for dental students.

Implantology has many levels:-

-Implantology for dental students "topic of today's lecture"

-Implantology for maxillofacial residents.

-Implantology for surgeons.

Today we will start with the first level which is IMPLANTOLOGY FOR DENTAL SYUDENTS. -

Aims and objective of this lecture :

-introduction to dental implant.

- osseointegration "osseointegration is the basic of the success for any implant".

-historical aspect of the dental implant.

NOTE:-

Osseointegration is the basic of the success of the dental implant as well as MF implant and ophthalmological implant..etc.

History of the dental implant: -

The true revolution of implants and implantology started at 1965. #

 At 1965, Branemark explained the osseointegration and the revolution of implants started.#

#actually, before 1965 in hundred years they found jaws contain shells of implants to replace a missing loweranterior in Honduras.

 #they used to think that pharaohs were used the dental implant fist, but they discovered mandible older than that, and this mandible go back to Mayan in India.

-Dental implant:

Titanium screws which analog to the dental root "root like structure".



Titanium screw attach with abutment.

Abutment attach with crown.

-Why titanium is the metal of choice for dental implant?

 1.Titanium is a precious metal and biocompatible.

2.titanium inert "but not the actual meaning of inert ;don't interact adversely with tissue" : Titanium has a perfect characteristic to interact with bone and surrounding tissue and form a relationship between titanium and bone which is called osseointegration.

Note: titanium not an inert material, it interact with the bone and surrounding tissue "in a good way" to form a strong relationship.

3. Mechanical strength:

Titanium has an enough mechanical strength to withstand the occlusal load.

 4. Biological acceptance in bone.

5.High corrosion resistance.

6.Produce no hypersensitivity or immunological rxn.

Titanium is an expensive and precious metal, so the cost of implant is high.

Our aim is Osseointegration , to achieve this Osseo integration we should know the factors that enhance Osseointegration.

Types of implants according to its surface structure :

1. Machined 🡪 smoothed surfaces
2. Titanium sprayed surfaces ( TPS)
3. Sand blasted surface , to create a very rough surface and increase the surface are and by that we are creating more bond between the bond and the implant (more osseointegration )
4. Inched surface and Coted surface.

Recently Japanese are applying the concept of active surfaces.

Active surfaces are : titanium surfaces that are being activated by increasing the hydrophilicity of the surface . hydrophilicity Is achieved by certain process and machines before inserting the implant to increase osseointigration.

Surface irregularities are now achieved by :

1 – grit blasting : roughenning of the surface by ceramic or metalic particles.

2- acid itching : to increase the biomechanical interlocking between the bone and the implant

up to this momnt we prefer the rough surface implant over the smooth surface implant .

 before 50 years people were afraid of having implants because of :

-cancer phobia, although cancer has nothing to do with implants , besides you cant guarantee that the patient wont get cancer through out his / her life.

-Note:

Deformation of titanium dioxide film enhance the relation between titanium and bone or surrounding tissue .

Osseointegration:

It is a direct structural and functional connection between living bone cells\tissue and load carrying implant.

Osseointegration "clinically":

It is a process whereby clinically asymptomatic rigid fixation of alloplastic material "titanium" is achieved and maintained in the bone during functional load.

-Most common implant used right now is Endosteal dental implant "root like structure", inside the bone ;it is a device inserted inside the jaw bone to support dental prosthesis "crown, bridge , overdenture"

Note:

Ideally we should use crown as a prosthesis, but we can use tow implants supporting a bridge, also we can use tow implants supporting other prosthesis like an overdenture.

 what are the components of a dental implant ?

1. fexutre : it’s the root like structure that is insered into the endossous.

 2-Abutmant : the device that supports the prosthitic tooth and connect it to the fexture

3- Screw : that attaches the abutment to the fexture

Implant abutment:

 It is a component that attaches to the dental implant and supports the prosthesis by using screw. "Screw retained abutment", so this abutment finally will retained the prosthesis, which is ideally crown.

Types of abutments:

-Transmucosal abutment :the one that passes through te mucosa overlying the implant.

-Temporary healing abutment :used for the anterior regeone,use until definite abutment use.

Implant surgery:

Implant surgery either:

-Single stage implants surgery.

-Two stages dental surgery.

Two stages implant surgery:

Most commonly used for surgical placement of dental implants

Buried beneath the mucosa" totally covered"

So, it called submerge implant system.

Steps of two stages implant surgery:

 1. Inserted the implant beneath the mucosa.

2. Leave it for 3-4 months until osseointegration occur.

Note: mandible 3 moths , maxilla 4 months.

 3. Then we will start with the second surgery and reopen it and remove the internal screw and place a gingival former instead of internal screw, gingival former will form a good adaptation of tissue around the implant.

4. Finally, take an impression post and place the prosthesis.

Note: gingival former is similar to internal screw, but the difference that gingival former has a mucosal part to adapt the mucosa and form a healthy periodontium between implant and abutment. "gingival former look like a big screw"

Single stage implants surgery:

Less commonly used.

Non submerged implant system.

 Surgical placement of dental implant which is left exposed to the oral cavity

" transmucosal part"; part of the implant is intrabony and other part is extrabony.

 The extrabony part is emerging through the mucosa, so we can take an impression and make a temporary abutment or permanent abutment according to the case.

Note:

None of the procedure is better than the other; each procedure is selected according to the case and the clinical experience of the DR.

Branemark is Swedish scientists who explain the osseointegration and lead to true revolution of implantology.

The scientist still do a experiments on the bone of rabbits; they do different treatment for implant surface then implant it in the rabbits and see the success rate of it.

Implants actually, improve the quality of life for ptwho lose their teeth for any reason:

-It has functional value "prevent bone resorption "

 -It has a high esthetic value.

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Success rate of implants is 97%; but this rate decrease by factors:

-Smoking.

-Some medical condition like diabetes.

-this rate differs between maxilla and mandible, and differs according to regions; but in general the success rate is 95-97%.

The overall success rate of dental implant is more than 95%,while the overall failure in smokers is about twice than then non-smokers.

-the first patient with a missing external ear was treated in 1977.the first clinical reports on extraoral.craniofacial implants were published in 1981.

success criteria of an implant ?

1. Primary Stability and rigidity
2. Adequate radiographic bone level around the implant "radiolucency of bone around the implant is bad".
3. Lack of symptoms ; no infection "infection around the implant may cause peri-implant lesion , peri-implantitis
4. Maintain normal probing depth around the implant.
* We can classify the dental implants to:
1. Immediate placement : the implant is inserted immediately after tooth extraction (in the same socket).

immediate placement is divided into:

1- immediate placement : at the same time

2- delayed immediate placement : after two weeks from the time of extraction.

3-delayed placement : after months or years from the time of extraction.

1. Immediate loading : attaching the prosthesis in the same time of implant insertion.(its considered provisional prostheses and u can't put heavy loads on it ,used for actors or singers or pts those very sensitive to loss of teeth)

Note:

-Immediately placed implants have much much higher success rates than delayed implants ,but the problem is they are much harder to deal with and needs more clinical experience. Because in delayed placement all u have to do is to drill in the bone for a certain depth and diameter, but in a case of immediate placement u have to deal with the socket actual depth and diameter and sometimes you’ll end up doing bone grafts to fix the implant in a very wide socket.

-In case of a maxillary implant , you have to be very careful not to hit the maxillary sinus, as u know the maxilla is cancellous bone so if u hit it, negative pressure will be produced inside the sinus and this pressure can suck the implant into the sinus.

Failure rate of implant is 3-5%, so we look for factors to enhance more and more success rate of dental implant; quality control system will be used in all hospitals "in future" to make sure a good results and exclude the poor results.

How do implant bond to bone ?

1. Bioactiveimplants: its future is targeting the concept of bone regeneration for bonding more than just bone integration by using BONE MORPHOGENETIC PRITEINS "BMPS" on the surface of implants to enhance bone formation; other implants will improve to release gradual BMPS leading to gradual bone formation.
2. Chemical bonding :not only mechanical bonding ,the good thing about it is that its rapid bonding "in the future"

3-biomechanicla bonding: gradual bone regeneration against mechanical surface, (the one that we are using nowadays).

Invevo tissue engineer for stem cells and human genetics will make possible to stimulate ectomesenchymal structure to produce new teeth and replace the missing teeth! This will be possible by the next 50 years.