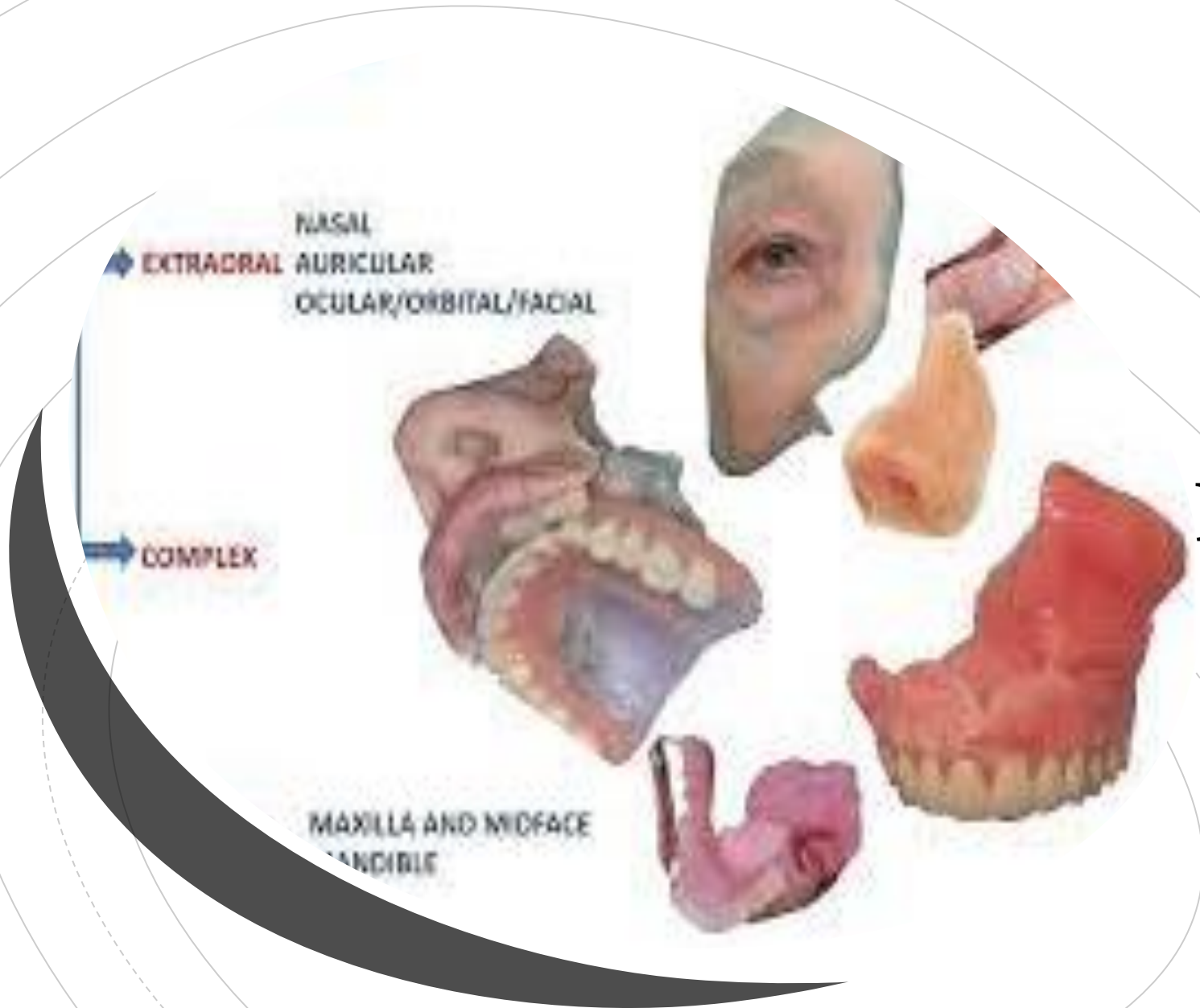


IMPLANT APPLICATIONS FOR MAXILLOFACIAL PROSTHESES



- many large tissue defects occur with surgery treatments of tumors in the maxillofacial region.
- Maxillofacial prosthesis application can be used as an alternative treatment for cases where plastic surgery reconstructions cannot be applied.
- While the retention of maxillofacial prostheses used to be provided generally via adhesive bands, adhesives in liquid or spray form, and tissue undercuts, the current treatment of an intra-oral edentulous condition is frequently conducted via osseointegrated implants.

For maxillofacial defects, defect size and location, existing bone volume and quality, soft tissue, and mobility differ widely between individuals. So the number and locations of implants to be applied thereby differ



The regions where extra-oral implants may be placed can be classified in terms of volume as follows:

1. **Regions with 6mm or more bone thickness:** 6mm dental implants and longer zygomatic implants can be used in these regions. These bone regions of the facial skull include the **anterior maxilla, zygoma, and/or zygomatic arc**. The **lateral peri-orbital** bone generally has a volume of 6-7mm thickness.
2. **Regions with 4-5mm bone thickness:** a 4mm extra-oral implant or 5mm dental implants can be used in these regions. Those bone regions include the **superior orbital edge, lateral orbital edge, inferolateral orbital edge, mastoid bump of temporal bone, and zygoma**.
3. **Bones with 3mm or less thickness:** the **temporal bone, piriform bump, inferior orbital edge, nasal bone, and zygomatic bump** are included in this group. Usage of 3mm extra-oral implants in those regions is indicated.

Implants Used in Maxillofacial Prosthetic Treatments

1. Intra-oral Implants

2. Extra-oral Implants

3. Zygomatic Implants

Relative situations are as follows:

- Inadequate bone volume and bad bone quality,

- Hard and soft tissue pathologies,

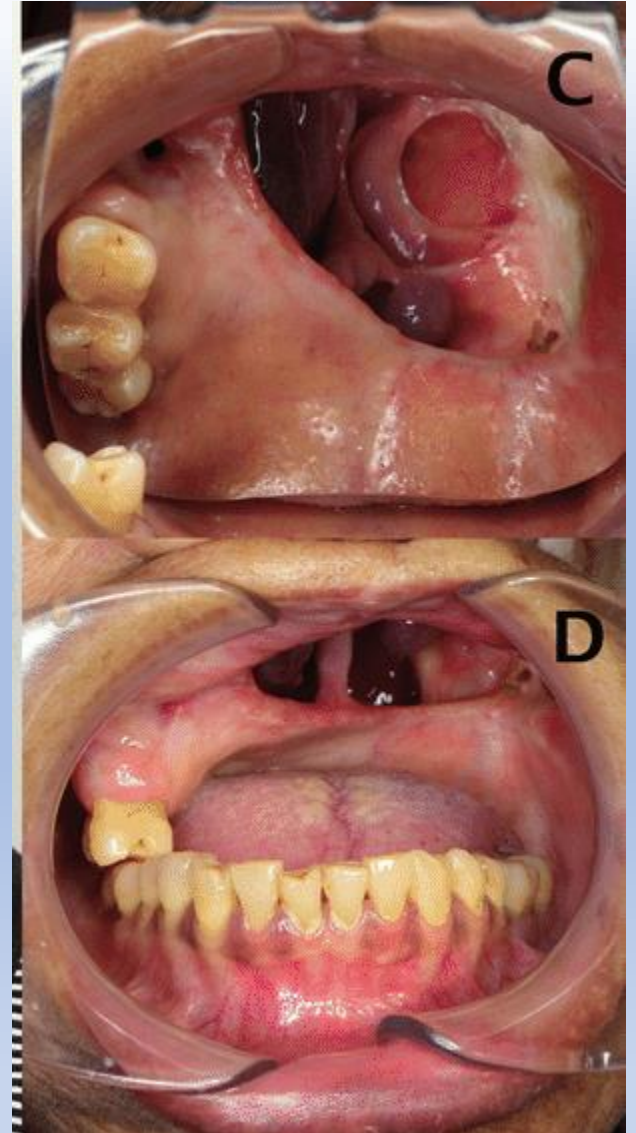
Implant systems used in the maxillofacial area provide reinforcement in two ways:

- 1. Bar systems:** are systems which function by locking on a bar attaching metal or plastic retentive clips over implants. Although retentive clips provide more retention than magnets, they have a greater tendency to corrode.
- 2. Magnet systems** do not require upper structure preparation and which are not attached to each other. This technique is a method which only a maxillofacial prosthesis expert experienced in dental technology can handle. It was seen that detached reinforcement structures can be cleaned more efficiently by patients than patients can clean the more complicated upper structures



INTRA-ORAL IMPLANTS

- A classic prosthesis applies excessive pressure on auxiliary teeth in these kinds of defects, which causes periodontal damages. Especially for large and one-sided defects, cross arch stabilization and resistance against vertical movement of prostheses are lost.



EXTRA- ORAL IMPLANTS

Implant abutments must be as **optimal as the covering skin** can provide,

- For preventing destructive forces, **subcutaneous** skin layers should be **thinned** surgically, and this process must be performed 10mm away from abutments,
- Implants should be **1cm** away from each other for hygienic purposes,
- Bars fixed between abutments must be in accordance **with natural contours of the face** and they must be designed in order to provide required hygiene needs,
- Implants must be placed at **least 7mm away from hairy skin**. If that is not possible, a skin graft must be applied.

Auricular Prostheses



Auricular defects constitute 70% of all maxillofacial defects.

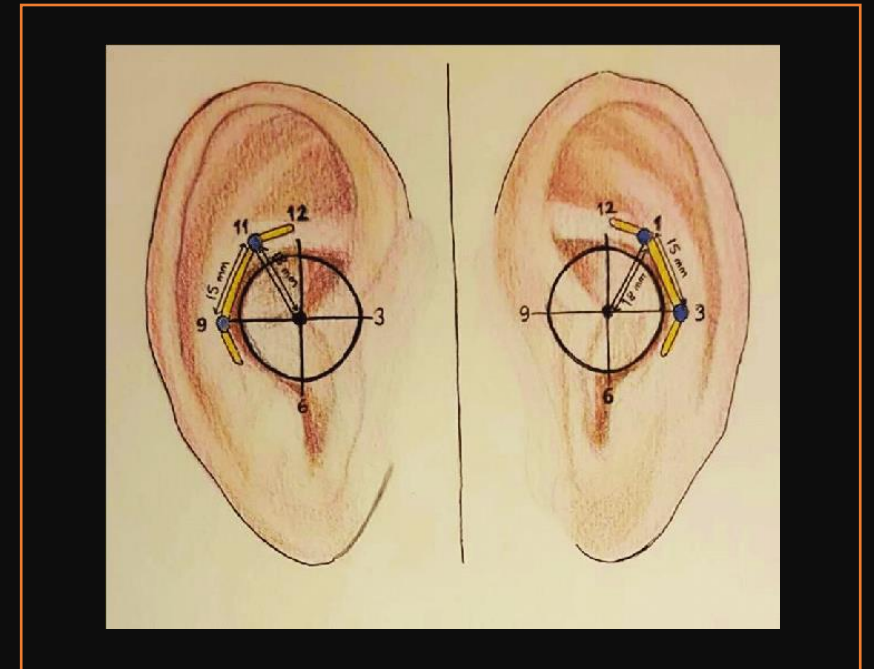
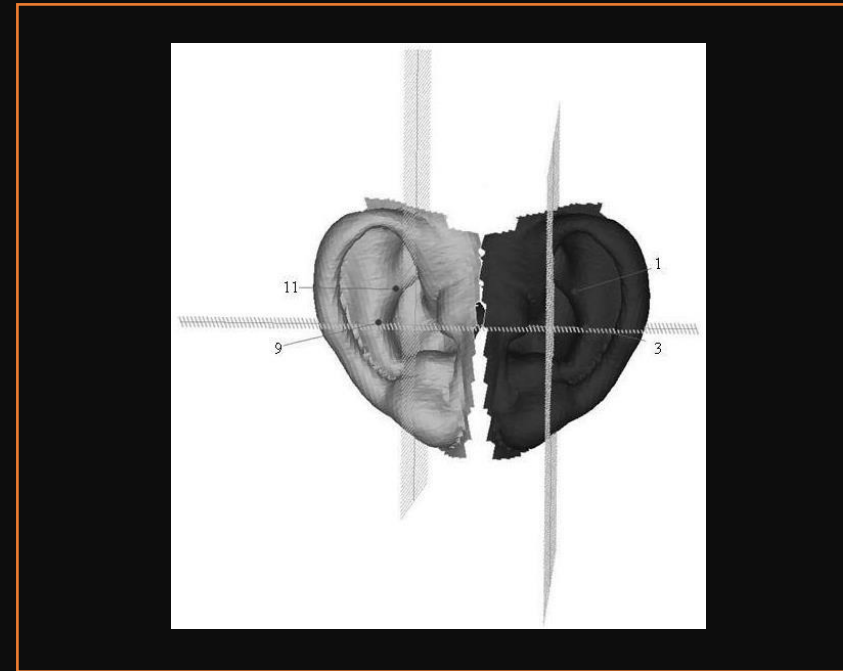
Surgical reconstruction of the auricular helix requires a surgery series taking a couple of years.

An obtained auricular helix may not appear original and may not create a symmetrical face appearance.

Transcutaneous implant usage is seen as an effective treatment option for auricular prostheses.

Implant position

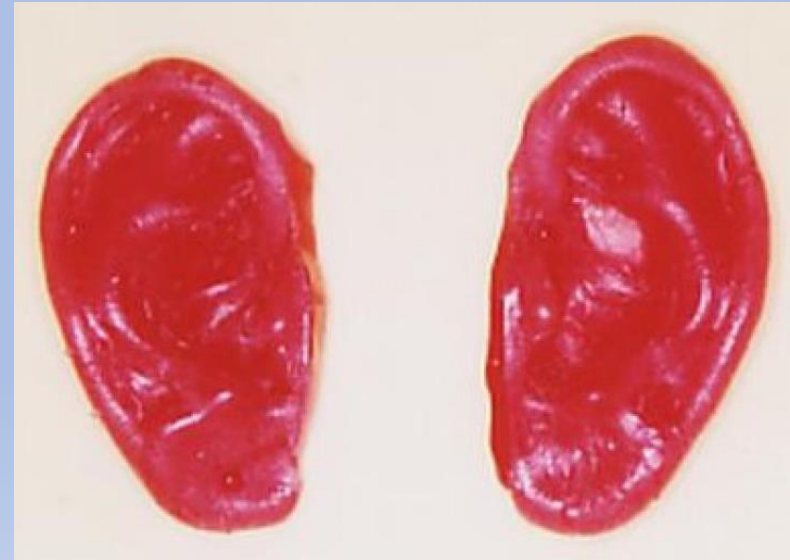
- The position of implants on the temporal region is very important for the aesthetic of auricular prostheses. Implants should be placed at the anti-helix level because retention systems need to be placed inside of the borders of auricular prostheses.
- Two pieces of implants placed in the temporal region can provide the retention of auricular prostheses.
- two implants must be placed within 15mm away from each other and each of them must be 18mm away from the center of the auricular canal. One implant must be placed in the 9 o'clock position and the other in the 11 o'clock position for the right auricular, and one in the 1 o'clock position and the other in the 3 o'clock position for the left auricular



Bilateral auricular defect following severe burns



Wax patterns of ear prosthesis



Finished and polished silicone ear prostheses



Bilateral auricular prosthesis (mechanically retained)



For the first system, a gold base alloy bar is used in 2mm diameter form. This bar is soldered on a gold cylinder and then attached to implant abutments.

The retention clips attaching the prosthesis to the bar are included in the prosthesis.

The usage of the bar and clips system provides efficient prosthesis retention and force distribution.

However, because the prosthesis includes a base part covering the bar, it is very difficult to reach the region beneath the bar and to clean it.

Because retention is provided too effectively, insertion and extraction of the prosthesis may be difficult for patients who cannot use their hands effectively.

In such cases, magnet auricular prostheses would be a better choice.

The second retention method is the magnet technique.

The first method of this technique is to use a bar and magnets together.

A bar structure attached to implant abutments is designed to create a seat for magnets.

Magnets are placed into those seats by using acrylic resin. The other pair of magnets is placed into the silicone prosthesis.

The magnets used in that system generally have a 6mm diameter and 2mm thickness.

The bar-magnet system may create hygiene and aesthetic problems because they increase the volume of the structure which provides the retention

The third alternative is to use a magnet system without using bars .

In this technique, magnets are directly attached to implant abutments.

The main advantage of this technique is that it easily hides implant abutments inside of the borders of the prosthesis.

The previous periods of implant placement in auricular prosthesis has included the usage of four implants as reinforcement. Currently, it is accepted that two implants are enough to provide retention and reinforcement or auricular prostheses.

Nasal Prostheses

- Nasal defects constitute 6% of all maxillofacial defect cases.
- The anterior nasal spine region beneath the nasal cavity has enough thickness to accommodate 3-6mm implants.
- The wax nasal model shaped before surgery may help in the determination of locations where implants will be placed and planning such that the holders will not affect the prosthetic contours.
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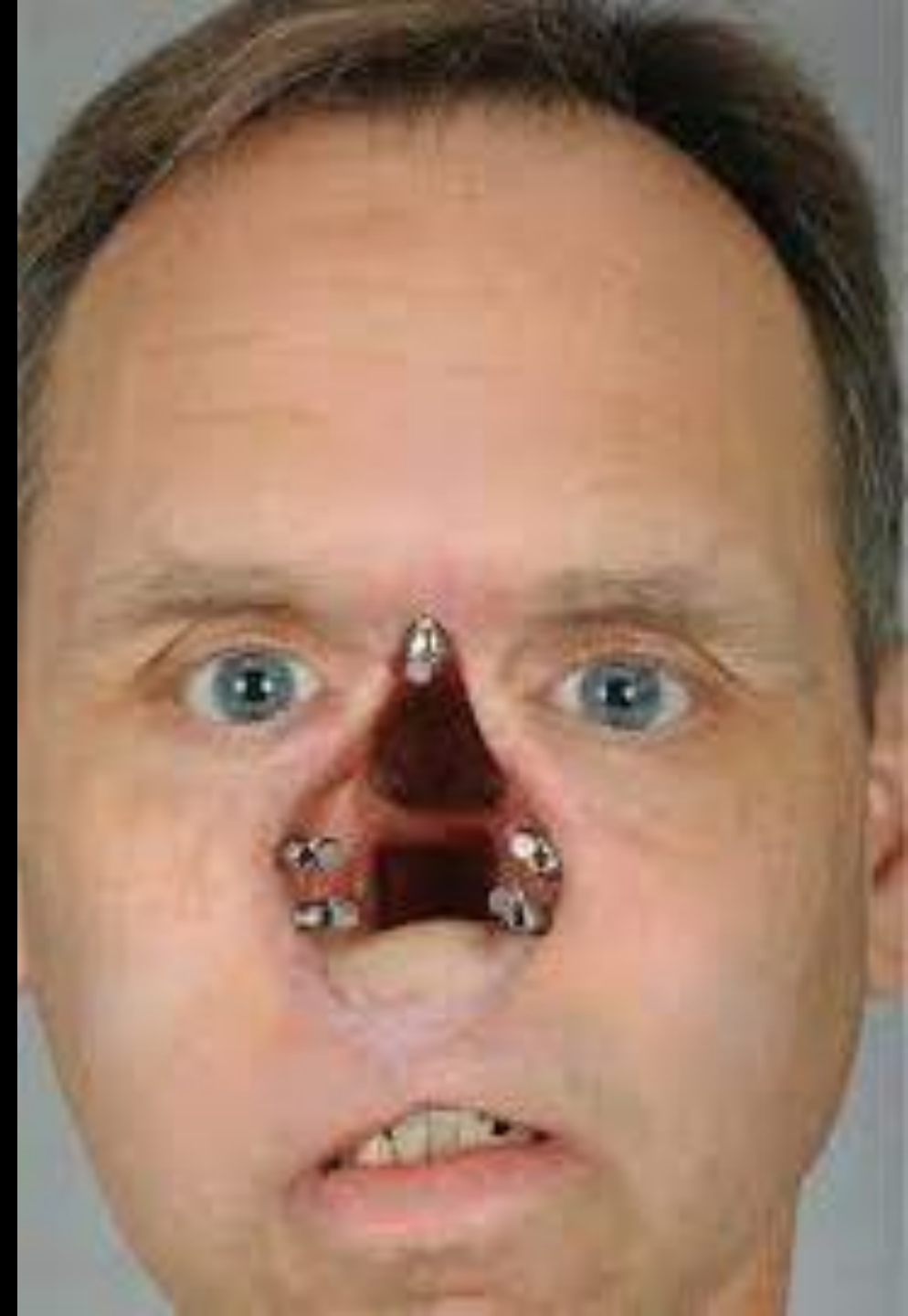




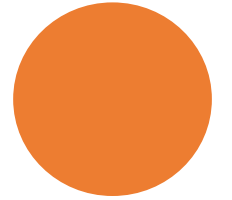
Figure 2 Implant disposition prosthesis.

Nasal Prostheses

- In order to provide a stable surface for nasal prostheses, the defect region should be **covered with a semi-thick skin graft**. This process eliminates the destructive effects by decreasing the mobility of auxiliary tissues beneath the prosthesis.
- In order to increase stability, nasal prostheses should be extended through the lateral wall of the defect.
- For this purpose, anterior septal cartilage should be surgically lifted. To place one implant on each of two nasal eminence regions would provide enough retention. It is also recommended that abutments should be attached to each other with a bar and that bar must pass 15-20mm over the abutments

Orbital Prostheses

- Orbital defects constitute 20% of all cases. The problems which adhesives create in the temporal region are seen more frequently in the orbital region.
- Due to the adhesive coverage of orbital defect edges, consistency moisture causes inflammation in the soft tissues and it may therefore decrease the quality of life of the patient



Orbital Prostheses

- For the retention of an orbital prosthesis, bar and magnet systems are used.
- Generally, the bone, which has enough volume to place the implant in the orbita, exists in the lateral edge of the orbita. However, 3-4mm implants can be placed on bones at inferior, superior, and lateral regions of the orbita.
- Generally, three or four implants are required



There are several specifications which an ideal orbital implant must have:

1. The implant must be embedded totally,

2. It should be implemented easily,

3. It should be light-weight,

4. It should be smaller than a real glob and it should have enough volume for the prosthesis,

5. It should be able to be placed in muscle conus,

6. It should be inert and should not lead to any reaction,

7. Its structure should not allow any migration and exposition development,

8. It should not be resorbed over time,

9. Extra-ocular muscles must attach to the implant easily,

10. The prosthesis integration must be done completely for a complete transfer of movement.



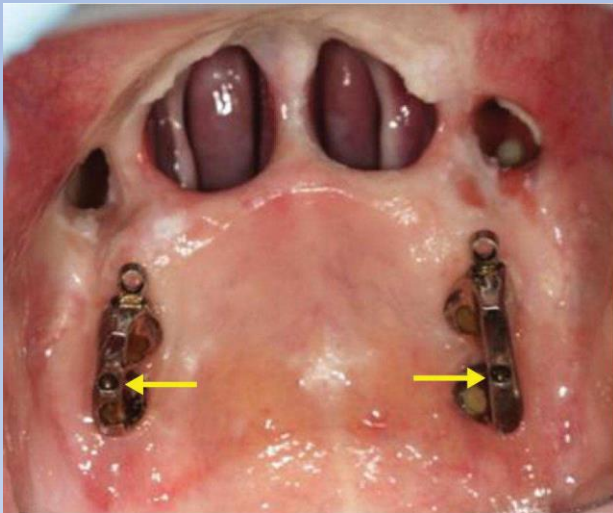
Combined Defect Prosthesis

- Combined defects constitute 2% of all defects.
- For a determination of appropriate implantation areas in the maxilla, nasal, and orbital regions, a guide wax prosthesis model should be created.
- By using panoramic radiography and computerized tomography, the thickness and density of bone structures should be determined.
- It is possible to place implants in the glabella region of the frontal bone, beneath zygomatic arc, on pterygoid bone, at upper and lower orbital edges, and in alveolar processes



ZYGOMATIC IMPLANTS

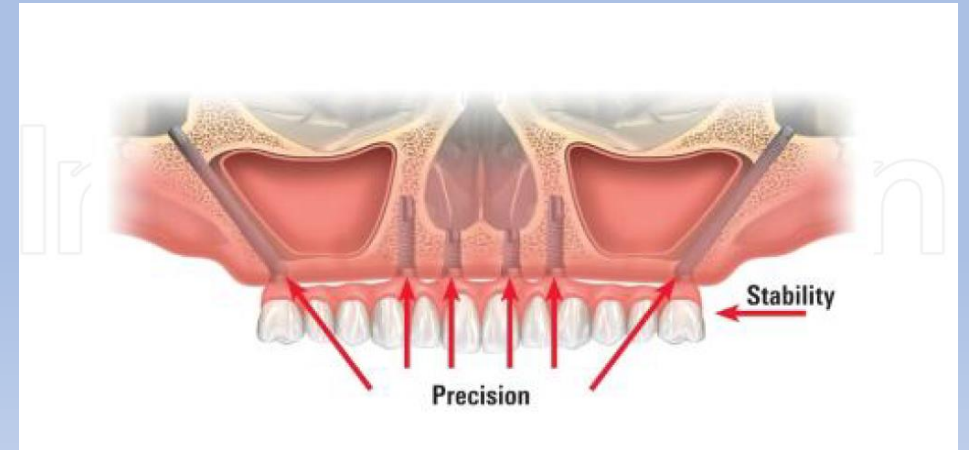
- In order to reinforce implants in maxillofacial region defects, zygomatic bones are used as well. Zygomatic implants are designed to be placed in those regions.
- Zygomatic implants have been developed in order to provide reinforcement for regions farthest from defect areas, and they have been used where general health conditions are not appropriate for surgery



(a)



(b)



can summarize the factors which affect the success or failure of maxillofacial implants:

a. Bone volume and quality:

this relationship is directly proportional. The dimensions of implants to be placed in bones must be determined in accordance with existing bone volume. When bone volume increases, longer and wider implants can be placed. As a result studies, it is recommended that 3mm length implants should not be used.

The inadequacy of compact bone may cause failure of implants by causing lack of primer stability. The mastoid process is a bone region of the facial skull where the bone quality and volume is good and adequate. There are dense compact bones in the edges of orbita and it affects stability in positive way. However, the volume of orbital edges is limited. Because most of the bones consist of compact bone, the lack of blood build-up and nutrition negatively affect implant success.

Because the nasal bottom consists of loose trabecular bone, it negatively affects primer stability.

b. Hygiene:

the tissue fluids in defect regions may accumulate and create dermatitis. That accumulation is seen most frequently in eye prostheses because there is a low possibility of a patient seeing the region with his single eye and to provide hygiene. The accessibility of the region is important and necessary for a patient's motivation and hygiene. Dermatitis may cause implant losses in upcoming periods.

c. Radiation therapy

The dose of radiation, the implementation of hyperbaric oxygen treatment, the duration between radiotherapy and implant surgery, prosthetic design, and soft tissue status are important

Thank
you!

