Alveolar ridge resorption & physiology of the bone
“Lecture notes”

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Alveolar bone resorption is an inevitable progressive condition process.

It occurred after tooth lost or extraction, in the edentulous area and it is a continuing process with anatomical change.
The degree of ridge reduction is most prominent during the first year after tooth extraction.

It is (3-4) times more in mandible than in maxilla.

After some years resorption will an average rate 0.2mm per year for the mandible but much less rate in maxilla.
What is the explanation?

There is not an exact explanation for that process but the following may be considered as etiology factors:

1. anatomical factors
2. bone turnover factors
3. systemic factors
4. biological factors
5. time may be considered
Patterns of Resorption

- The resorption of maxillary ridge occur mainly labially and buccally, in the anterior region, (therefore we can see the incisive papillae appear more prominent to be situated on the crest of the ridge).

- In natural incisors the midpoint of the incisive papillae being on the average of 10mm posterior to the labial aspect of the central incisors.
The resorption pattern of the mandibular residual ridge occurs mainly labially and buccally towards the anterior part of the mouth, and tend to retain in its width or wider in the posterior segments.
The Consequences of Residual Ridge Resorption

1) Clear loss of sulcus width and depth.
2) Loss of vertical dimension of occlusion.
3) Change in the jaw relationship which is centripetal in maxilla and centrifugal in mandible. (that finally we mostly show the edentulous patient their crest of the mandibular ridge outer or external to that of maxilla.)
4) Different patterns of resorption will result in the morphology of the ridge e.g.;

- sharp.
- spiny.
- uneven.
- sharp with mentalis eminence and prominent mylohyoid or oblique ridge.
5) Also in general speech we can see the ridge in different shapes:

a) Broad rounded ridge with adequate height and width.

b) Knife edge ridge with sufficient height but insufficient width.

c) Flat ridge with sufficient height and width.

d) depressed ridge (cup-shape surface)
Effect on Retention and Stability of dentures

- The different pattern of residual ridge seem to be of great importance in providing retention and support to the denture.

- So we should consider the variations during treatment planning.

- Some atrophic ridge of mandible need for surgical treatment to provide a better and more satisfy denture to the patient.
Although implant supported dentures seem to be a method of treatment to provide more retain and stable denture, but also it may be lead to loss of fixtures of implant treatment in case of poor jaw bone quality.

Implant supported mandibular over-denture seem to be cause less bone resorption in compare with the conventional complete denture.
**Flabby Ridge**

It means movable and more extreme soft residual ridge, it is due to replacement of bone by fibrous tissues, it is particularly found in the anterior part of maxilla.
Flabby ridges may complicate making an impression and lead to poor supported dentures.

Some cases of extreme atrophic ridge with extreme flabby ridge surgery will be the choice of treatment.

But flabby ridge should not be totally removed in order to provide a retention mean for the denture.
Physiology in relation to denture

Dental practitioners should be familiar with the requirements for providing a successful denture which are including the following:

- The denture should be compatible with the oral tissues.
- It should restore the masticatory efficiency.
- It should be in harmony during the functions of the mastication, speech, respiration, and deglutition.
- It should provide an acceptable esthetic.
- It should preserve the remaining structures.

In order to reach the above requirements, it is necessary for any practitioner has an interest in prosthodontics treatment to have a knowledge about the physiology of the related factors.
Physiology of the Bone

Studying this subject is not empty from difficulties due to:

1. Bone is one of the most unstable tissues in the body.
2. Bone responses have variation among individuals.
Alveolar process

Alveolar process are the most affected bony supported tissues, by the dentures or dental implants.

It provides most of the vertical support for the teeth before extraction, which are occupied the space of the sockets.
When the teeth have been extracted, the healing of bony socket seem to be similar to that for bone fracture, that it will occur in steps as follow:
- Primary clot formation in the socket.
- Organization and formation of young connective tissue.
- Gradual replacement of connective tissue by formation of bone (immature bone).
- Replacing of the immature bone by mature bone.
- Healing and reparative of the surface.
So it is clearly noticed by the histological investigation that the reconstructive process leads to quantitative loss of alveolar bone during healing period (resorption and replacing of new immature bone).

Therefore we might be waiting for 2 months before placing the denture.

Remodeling of the bone tissues is a continuous process throughout life due to destruction of old bone (osteoclast --- osteoblast), or regenerative reconstruction.

In adults, both processes are normally balanced, and the rate of resorption will exceed that of formation due to age or local or systemic disease. The formation and destruction have variation in balance contributing to different age groups.
That is one of many reasons make some dentures appear to be physiologically tolerated for a period of time and then may be fail.

The bone resorption or loss is inevitable process and loss will be rapid immediately after extraction.

The trabecular will arrange in a manner that it will indicate resistance to the stress of such appliance.

Age, sex, race and systemic diseases seem to be affected the rate of edentulous bone loss.
Reaction to Pressure

- Pressure applied to the bone for a long time is one of the main factors in bone resorption.
- The denture is potentially can exert steady pressure that can interrupt the blood supply,
- Therefore should be removed at least 8h of every 24h.
Orthodontic treatment is an example for that types of activities.

So that weighted denture is un-preferable due to damage of blood vessels.
Metabolic changes

It seems to be that there are variants conditions may produce bone changes:

- Nutritional disorder.
- Endocrine disturbances.
- Changes in functions.
These conditions produce bone changes in quality or quantity and the following ways can help the patient and the dentist to make better tolerated denture by bony support:

- Record the impression when the tissue at rest condition.
- Decrease the number of the teeth.
- Decrease the size of the food table.
- Establish an occlusion without producing torque.
- Extend the denture base of maximum coverage in relation to tissue limits.
- Eat of food should be started by placing small masses.
- Remove the denture for at least 8h of every 24h for tissue rest.
Thank you
Thank you