AGE CHANGES IN ORAL TISSUE WITH DISORDERS

OUTLINE –

Aging can have significant effects on the oral mucosa, which is the soft tissue lining the mouth and oral cavity. With age, various changes occur in the oral mucosa that can impact its function and appearance.

Introduction

- Definition: Ageing is defined as a process of morphological and physiological disintegration as distinguished from infant, childhood and adolescence which are typified by processes of integration and co- ordination.
- A disintegration of the balanced control and organization that characterizes the young adult.

General effects of ageing

Tissue desiccation

Decreased elasticity.

Diminished reparative capacity

Altered cell permeability

General effects of ageing

Ageing leads to limitations in the adaptive capacity of the organism

Reduced adaptive capacity

Development of age-related pathological conditions…death.

Age changes in oral tissues

Tissue changes

1.Teeth

2.Periodontium

- Bone

- periodontal ligament

- Oral mucous membrane

Age changes in teeth

Regressive alterations

Attrition

Abrasion

Erosion

Age changes in Enamel

Macroscopic

-becomes darker

-attrition, abrasion, erosion

-longitudinal cracks

* Microscopic

- decreased enamel rod ends

- perikymata

- permeability to fluids

- increase in nitrogen and fluorine

* Increased resistance to decay

Age changes in Dentin

Dentin is laid down throughout life.

Dentin laid down after birth is Secondary Dentin.

Pathologic effect of dental caries, abrasion, attrition or other operative procedures cause variable changes in dentin

- Reparative Dentin

- Dead Tract

- Sclerotic Dentin

Reparative Dentin

Also called as Irregular Dentin/ Tertiary Dentin/ Irritation Dentin.

Localized close to the irritated zone of the tooth.

Clinically: - decreased sensitivity in tooth.

- incidence in anteriors is higher

Histopathologically: dentinal tubules lesser in number, irregular, tortuous

Radiologically: decreased size of pulp chambers and root canals

Dead Tracts

Empty tubules filled with air, where odontoblasts have degenerated.

In ground sections, they entrap air, so appear black in transmitted light and white in reflected light.

Decreased sensitivity in these areas.

Probably the initial step to form sclerotic dentin.

Sclerotic Dentin

Protective changes in response to any injury in primary dentin itself.

Collagen fibrils and apatite crystals appear in dentinal tubules.

Therefore, their lumen is obliterated.

With the obliteration of dentinal tubules, the refractive indices of the dentin are equalized, thus called TRANSPARENT DENTIN.

Transparent in transmitted light and dark in reflected light.

Age changes in Dental Pulp

Reduction in size and volume of pulp:

Reduction in pulpal area in coronal pulp because of continual apposition of dentin occlusally and in furcation area

* Reduction in cell number: -

Fewer cells with reduced number of organelles like RER, mitochondria, etc. - odontoblasts, fibroblasts degenerate.

Age changes in Dental Pulp

- Changes in collagenous elements:

-increase in collagen fibers.

-von Korf's fibers are accentuated.

-pulpal fibrosis in old teeth is not because of continual formation of collagen fibers, instead it can be attributed to persistence of connective tissue sheath.

- Changes in blood vessels:

-narrowing of circumference of vessels.

-atherosclerotic changes in small arteries.

–intimal layer of the vessel is thickened which results in a small lumen.

Age changes in Dental Pulp

Changes in nerve distribution:

-Nerves aggregating at the core appear prominent.

-Degeneration and loss of pulpal nerve fibers affect transmission from pulpal structures and results in increase in threshold for pain stimulus.

-Axonal and perineural changes are also seen.

-Myelin sheath changes and terminal axon remolding due to age related axon injury could be sources of abnormal pain in the oral region.

Age changes in Dental Pulp

- Pulp calcifications:

- Calcified masses appearing in coronal and root portions of pulp.

- seen in functional as well as embedded teeth.

- two types:

1. Pulp Stones/Denticles
2. Diffuse calcifications.

Age changes in cementum

Thickness of cementum is one of the criteria to assess age of an individual.

Increase in thickness at the root by 5 to 10 times with age.

Greater apically and lingually and in the bifurcation in molars.

Permeability decreases with age.

Hypercementosis

It is the abnormal thickening of cementum.

Occlusal stress

Spike like projections formed

Increase surface area for Periodontal ligament attachment

Age changes in Bone

Adapts to meet the functional demands.

Histologically there is decrease in bone forming cells.

Blood capillary walls supplying the bone, thickened with age.

In old age, bone derives its nutrition mainly from periosteal blood supply.

Increased resorption which is not balanced by adequate formation of bone.

Increase in the porosity of bone

Osteoporosis

It is a disorder that adversely affects the collagen metabolism with concomitant decrease in bone mass.

May be due to negative calcium balance.

Common in females.

Reduces the bone mineral content of jaws and associated with periodontal attachment loss and tooth loss.

One of the reason for increased residual ridge resorption.

Residual ridge resorption

With age, number of teeth present in the oral cavity decreases. So the force acting on the remaining teeth is more.

The changes in the alveolar processes of edentulous persons are more marked.

In the first year after tooth extraction reduction of height in the mid sagittal plane is about 2 to 3 mm for maxilla and 4 to 5 mm for mandible.

Decrease in vertical dimension at occlusion.

Decrease in lower facial height

Residual ridge resorption

Annual rate of reduction in height is 0.1 to 0.2mm and in general four times less in edentulous maxilla.

Etiology:

Anatomic factors

-short square face related to elevated masticatory forces

-alveoloplasty prosthodontic factors

-intensive denture wearing

-unstable occlusal conditions

Metabolic and systemic factors

-osteoporosis

-calcium and vitamin D supplements

Changes in Maxilla

Maxillary teeth are directed downward and outward thus bone reduction is upward and inward.

Resorption on outer cortex is greater and more rapid because outer cortical plate is thinner than the inner cortical plate

Thus, the maxilla becomes smaller in all dimensions and the denture bearing area (basal seat) decreases.

Maxillary bone resorbs on the crest and labial and buccal cortices.

Thus, maxillary ridge loses height and becomes narrower in transverse and Antero posterior direction.

Resorption towards center.

Changes in Mandible

The mandibular ridge resorbs primarily on the crest of the ridge.

Because the mandible is wider at its inferior border than at the residual alveolar ridge in the posterior part of the mouth, resorption, in effect, moves the opposite sides of the ridges farther apart.

Mental foramen:

With the resorption of the alveolar process the mental foramen lies at or near the level of the upper border of ridge.

Genial tubercles:

The genial tubercles project above the upper border of the mandible in the symphyseal region.

The residual alveolar ridge becomes wider with resorption.

Resorption away from center.

Changes in Mandible

Density of mandibular bone decreases from 1.9 to 1.5% between 45 and 90yrs,value being 8% less in females.

Lamina dura is often lost and cortical bone at angle of mandible becomes thinner.

Age changes in periodontal ligament

- Increase in number of fibroblasts.

- Greater collagen and elastic fiber content.
- Decrease in organic matrix production.
- Width of periodontal space increases with occlusal loading.
- Age may be a probable risk factor for periodontitis.

Periodontitis

It reflects the age-related change and accumulation of previous dental experiences.

Gingival recession.

Loss of periodontal attachment and alveolar bone.

Age Changes in Oral Mucous Membrane

Surface of oral cavity is mucous membrane and its structure varies in apparent adaptation to function.

Clinically:

-dry

-friable

-thin smooth mucosal surfaces

-loss of elasticity and stippling.

-predisposed to trauma and infection.

Age Changes in Oral Mucous Membrane

According to Massler- tissue friability arises from three sources

1. A shift in water balance from the intracellular to the extracellular compartment and diminished kidney function results in dehydration of the oral mucosa.

2. Progressive thinning of the epithelial layers which increases tissue vulnerability to mild stress.

3. Nutritionally deficient cell.

Age Changes in Oral Mucous Membrane

Histologically:

-thinning of epithelium

-loss of cohesiveness of epithelial cells

-vitamin A deficiency

-decreased prominence of rete pegs

-loss of submucosal elastin and fat

-increased fibrous connective tissue

-degenerative alteration of collagen

-vitamin C deficiency.

Result in a mucosa which is more prone for traumatic injuries and delayed wound healing.

Migration of Junctional Epithelium

Migration of junctional epithelium from its normal position to a position more apical is called gingival recession.

Conclusion

A thorough understanding of the morphological alterations that occur during ageing is important, for, such knowledge will help in understanding of the functional changes that may lead to decreased activity and in assessing the health of the subjects and identify reasons for departures from the normal.