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Dentistry

AGE-RELATED CHANGES IN THE MASTICATORY APPARATUS -A REVIEW

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ABSTRACT The paper focuses on age-related changes in masticatory apparatus. Local and/or general diseases such as tooth loss, salivary defect, or motor impairment are indistinguishably superimposed on the effects of very old age. Masticatory function can be representatively expressed in terms of masticatory performance and masticatory ability. Ageing impacts, to varying degrees, on aspects of oral physiology that play a key role in chewing behavior.

KEYWORDS : Dentures , Saliva, Residual Ridge Resorption

INTRODUCTION

The masticatory apparatus comprises the teeth, periodontal tissues, oral mucosa, salivary glands, neuromuscular system, jaw bones, and temporomandibular joints.A number of age-related changes that affect these orofacial structures may have important implications for the prosthodontic treatment of older patients .Some of the changes are normal and not a part of a disease process, however, it is often difficult or impossible to differentiate between physiologic changes due to aging and pathologic changes that affect the oral tissues[1].

AGE CHANGES IN DENTAL TISSUES

Enamel

Apart from occlusal, incisal, and inter- proximal wear, there is also wear and loss of the structural details on the enamel surface, over time giving the surface a flat appearance and a different pattern of light reflection[2].Furthermore, cracks and fissures in the enamel take up corrosive products, which also may cause discoloration.

Dentin

Dead Tracts:

Odontoblast degeneration is often observed in the area of narrow pulpal horns because of crowding of odontoblasts .Dead tracts are probably the initial step in the formation of sclerotic dentin.

Sclerotic Or Transparent Dentin:

In cases of caries, attrition ,abrasion ,erosion, or cavity preparation ,sufficient stimuli are generated to cause collagen fibers and apatite crystals to begin appearing in the dentinal tubules. This condition is prevalent in older individuals. **Reparative dentin:** If by extensive abrasion, erosion, caries, or operative procedures the odontoblast processes are exposed or cut, the odontoblasts die or survive, depending on the intensity of the injury. If they survive the dentin that is produced is known as reactionary or regenerative dentin. Those odontoblasts that are killed are replaced by the migration of undifferentiated cells arising in deeper regions of the pulp to the dentin -reparative dentin.

Pulp

Pulp stones (denticles) and fibrosis occers in aging patients. Atherosclerotic plaques may appear in pulpal vessels.Blood flow decreases with age.In addition to the appearance of fewer cells in the aging pulp, the cells are characterized by a decrease in size and number of cytoplasmic organelles.The fibroblasts in the aging pulp exhibit less perinuclear cytoplasm and possess long, thin cytoplasmic processes[2].

Cementum

Hypercementosis (may be generalised or localised, diffused or limited)and cementicles (ovoid or round calcified structure that are formed as a result of calcification of the degenerated periodontal tissue or the epithelial rests of Malssez)appears. The permeability of cementum decreases gradually by age.Cementum resorption can occur after trauma or excessive occlusal forces. After the resorption ceases the damage is usually repaired.

PERIODONTAL TISSUES

There is no evidence of age-associated alterations within the gingival epithelium or the underlying connective tissue[3]. In prosthodontics the main function of the periodontium in to absorb mechamcal forces applied to the abutment teeth by a fixed or removable partial denture Periodontitis is slow progressing. This sequence is not a result of age but of a chronic disease state within the supportive structure of the tooth .The etiology of periodontal disease is complex, but it is essentially due to bacterial products, especially from bacteria that lie in the crevice around the neck of the tooth between the gingiva and the tooth [4].It seems that the host response to plaque microorganisms changes with age, resulting in a more pronounced inflammatory response of the gingival tissues.

The adult elderly may have an increased risk of periodontal problems due to progressive loss of manual dexterity and eyesight, changes in salivary flow, tooth migration, and extensive gingival recession[6]. In the elderly, severe periodontal disease can result from defective neutrophil function or leukemias. There also are indications that diabetes mellitus is associated with an increased risk of progression of periodontal disease[5].Osteoporosis is a systemic skeletal disease, characterized by low bone mass and microarchitectural deterioration of the bone tissue. which is associated with an increase in bone fragility and susceptibility to fracture[7].

ORAL MUCOSA

Effects of aging and denture wearer;

Placement of a removable prosthesis in the oral cavity produces profound changes in the oral environment which may have an adverse effect on the integrity of the oral tissues[3].Mucosal reactions may result from mechanical irritation by the dentures, accumulation of microbial plaque on the dentures, or occasionally a toxic or allergic reaction to constituents of the denture material[8].

Habituation To Dentures:

When new dentures are placed in the mouth, the mechanoreceptors of the oral mucosa are stimulated. These stimuli are transmitted to the sensory cortex with the result that the patient feels the presence of the dentures. However, the receptors gradually adapt to the new environment and the patient begins to lose conscious awareness (habituation) of the new objects in the oral cavity[9]. The more replacement dentures differ from existing ones, the longer and more difficult the process of habituation will be .

TONGUE

The tongue is important during respiration, mastication, swallowing and speech.Speech production is a motor activity in which the tongue plays an important role, it is not affected by physiological ageing to any appreciable extent, suggesting the maintenance of tongue motility with age[12]. The blood supply to the tongue appears to remain constant, irrespective of age .Tongue strength decreases with age in dentate subjects .

TASTE AND GUSTATORY PERCEPTION

Age-related taste changes, are much less dramatic than those commonly occurring with other senses, such as sight and hearing.Like taste perception, odor perception also plays an important role in food

in- take.Age-related changes in odor and taste perception are not very important, changes of food texture and consistency may influence the enjoyment of food[9]. A reduced salivary flow rate also may have a negative effect on taste perception.

SALIVA

A sufficient amount of saliva is necessary for the maintenance of oral health and comfort. Saliva is particularly important in wearers of removable dentures to protect the oral mucosa from mechanical irritation and infections, and to achieve retention of complete dentures..Histologic studies have shown that with age, the parenchyma of the saliva glands is gradually replaced by fatty connective tissue[10].

Neuromuscular System

Advanced age brings a loss of muscle strength.It was found that, in the masseter and medial pterygoid, there was a loss in density and muscle mass of about 40% between the ages of 20 and 90. In addition, the radiographic density of the muscle declined with age, indicating a reduction of the fiber muscle mass[11].

MAXILLA

At birth: Transverse and antero-posterior diameters is greater than the vertical diameter .Frontal process is well marked .Tooth socket-close to floor of orbit .Maxillary sinus presents the appearance of a furrow on lateral wall of nose

Adult life and old age: The vertical diameter is the greatest due to developed alveolar process. Increase in the size of sinus. Its height is reduced as a result of absorption of alveolar process in old age[13].

MANDIBLE

At birth: The body of the bone is a mere shell, containing the sockets of the two incisor, the canine, and the two deciduous molar teeth, imperfectly partitioned off from one another.

Childhood: The two segments of the bone become joined at the symphysis. The body becomes elongated in its whole length.The depth of the body increases owing to increased growth of the alveolar part.

Adulthood: The alveolar and subdental portions of the body are usually of equal depth.The mental foramen opens midway between the upper and lower borders of the bone, and the mandibular canal runs nearly parallel with the mylohyoid line[14].

Oldage: The bone becomes greatly reduced in size, for with the loss of the teeth the alveolar process is absorbed, and, consequently, the chief part of the bone is below the oblique line. The mandibular canal, with the mental foramen opening from it, is close to the alveolar border. The ramus is oblique in direction, the angle measures about 140°.

RESIDUAL RIDGE RESORPTION

Residual ridge resorption after tooth extraction is a chronic, progressive, and in- curable disease of bone remodeling which leads to progressive loss of the residual ridge .Thus, masticatory and non-masticatory forces are transmitted to the alveolar bone, not through the periodontal ligament, but through pressure on the mucosa covering the alveolar ridge. The course of resorption is irreversible, but the rate of resorption is influenced by many factors and often leads to severe impairment of prosthetic restoration and oral function The activity of both osteoclasts and osteoblasts probably decreases with age[15]. Thus, the rate of residual ridge resorption depends on the time of edentulousness rather than on age.

CONCLUSION

Relatively little is known about the age related changes of the masticatory apparatus, but the changes that do occur and are recognized seem to have relatively limited consequences.Thus, there is little evidence that the masticatory apparatus will lose functionality due to aging processes.The main risk factors are irreversibility of caries and periodontal diseases which, if not controlled, lead to tooth loss, resorption of the residual ridge, destabilized occlusal conditions, and impaired masticatory ability[12]. Following prosthetic treatment, acceptable function of the masticatory apparatus can often be maintained.

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