

Effect of the parotid salivary gland on calcium and amylase enzyme levels in blood and its influence on bone healing in albino rats (Histological and radiographic study)

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Abstract

The healing potential of bone is influenced by a variety of biochemical, cellular, hormonal and pathological mechanisms. As previous studies stated that parotid salivary glands may have endocrinal role, the aim of this study was to evaluate the effect of parotidectomy on bone healing and on calcium and amylase enzyme levels in blood. The rats were divided into two groups; control and experimental group. The control group was subjected to unilateral surgical mandibular defects, while the experimental group was subjected to the same procedure in addition to bilateral surgical removal of the parotid glands. Each of the control and experimental groups was further subdivided into 3 subgroups, A, B and C according to the time of termination corresponding to 4, 8 and 12 weeks respectively. Blood samples were obtained in order to determine calcium and amylase levels in blood. The surgically defected mandibles of each subgroup were analyzed postoperative to determine the radiographic bone density of the surgical defect throughout the healing process, then processed and examined histologically. Examination of the H & E stained sections of the mandibles at 4 weeks showed minimal bone formation from the defect margin of the experimental group in comparison with the control group. At 8 weeks, the experimental group showed increase of bone formation from the defect margin. At 12 weeks, the center of the defect was filled by a considerable amount of spongy bone and a definite reversal line between new and old bone. The Masson trichrome stained sections of the experimental group at 12 weeks presented a considerable amount of green collagen fibers. The average (mean) percentage of radiographic bone densities of the surgical defect of the experimental group slightly raised to 82.06 at 12 weeks. The serum amylase level at 4 weeks was less than the normal value then was slightly increased at 8 weeks and finally at 12 weeks increased more than the normal value. However, the serum calcium level was within the normal value in all experimental and control subgroups. It was concluded that bilateral parotidectomy in albino rats resulted in delayed bone healing and was associated with an initial drop in serum amylase level at 4 weeks, however serum amylase level was self-compensated at 8 and 12 weeks postoperatively, while it didn't significantly influence serum calcium level.

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