October 21, Saturday

1st session

Chair I. Urtane (Latvia), U. Welander (Sweden)

9.45

Radiodensity of alveolar bone and floor of maxilary sinus after sinus lift with granules of synthetic hydroxypatite

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Since 1997, granules of porous synthetic hydroxyapatite in size 0.2 – 0.4 mm manufactured in Riga Technical University, checked for chemical composition (Ca / P molar ratio and amount of impurities, presence of crystallyne phases and stoichiometrical purity) used in experimental implantation with histological evaluation of tissue response and allowed for clinical investigation by ethical committee of Riga Stradins University were used in 218 cases of maxillary sinus floor elevation in the first stage with insertion of 416 SEMADOS (BEGO, Bremen) dental implants and in the second stage procedure in 25 cases (1st stage – sinus floor elevation by HAp granules; 2nd stage – insertion of dental implants average after six months) – 59 implants).

Radiographic evaluation was performed by CT scans (SOMATOM balance), panoramic radiographs and dental X-rays. Radiodensitometric study was performed using system including: 1) 10 capture and digitalisation of the image by Hewlett Pacard Scan Jet 4c/T and RDC – 4300 (RICOH) camera. After obtaining complete image of radiograph, a 1000 x 1000 pixel image was selected. The luminous intensity of pixel was transformed into 250 gray levels. 2) Processing of the digitalized image by means of the Pentium 3 – 700 mHz computer equipped with Image – Pro Plus software. For statistical analysis the programm SPSS 7.5 for Windows was used.

Mean optical density corresponding to more black color and anatomically to soft tissue of alveolar ridges and oral cavity was 2.190567 – 2.255075 units but corresponding to white area of titanium implants was 0.282580 – 0.000280. Between these marginal values was optical density of Hap, teeth, and alveolar bone. As more logical framework we supposed the conversion of units of absolute optical density to percentage rate assuming the density of titanium implant as 100% and density of oral cavity as 0%.

The optical density of Hap granules on maxillary sinus floor decreased from 97.13 – 98.01% immediately after implantation to 81.79 – 96.34% after 5 months, to 89.13 – 91.19 % after 18 month and to 74.81 – 81.84% after three years being significantly decreased only after three years. There was an increase in optical density of residual alveolar bone surrounding implants from 17.07 – 54.87% immediately after implantation to 53.30 – 70.49% after 6 months, to 82.95 – 88.04 after 18 months and to 69.17 – 74.43% after three years being significantly increased after 18 months and three years.

The system of computer-based radiodensitometry has advantages of conventional radiography for evaluation of implant/bone structure united with the ability to measure quantitatively changes up to limitations of human eye and subjectivity. Increase of density of residual alveolar bone is important to provide long time implant stability. Decrease of density in elevated sinus floor corresponds to biodegradation of HAp granules and replacement by living tissue.