

CLINICAL EVALUATION OF FUNCTIONAL LTI PYROLITE CARBON BLADE IMPLANTS IN PRIMATES WITH DESIGN CONSIDERATIONS

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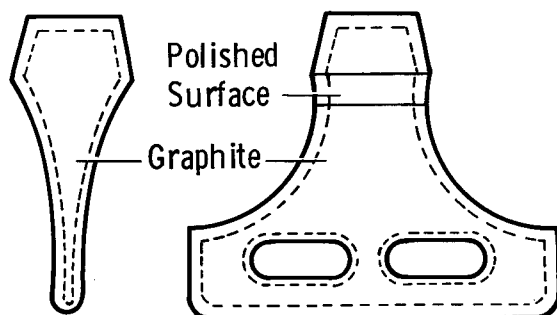
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Low temperature isotropic-silicon alloyed pyrolite carbon dental implants (endosseous blade type) (Figure 1) were placed in eight baboons (papio cynocephalus) for a period of 24 months to

dentition. (Figure 3) All implants on the left side were restored with a three unit cast gold prosthesis utilizing the natural first molar as a single abutment two months postoperatively. (Figure 4) Centric vertical occlusion without lateral interference was established and maintained.



Silicon-alloyed LTI carbon
on graphite substrate

Figure 1



Figure 2

determine the clinical response. Mandibular second and third molar teeth were removed bilaterally and the tooth sockets allowed to heal for eight weeks. Conventional surgical techniques using Numbers 4 and 700 air driven high speed carbide burs with saline coolant were used for placement of the carbon blade. The shoulder of the implants were seated bilaterally to a depth of 7 mm placing the polished margin of the implant neck at the alveolar crest. (Figure 2) Insertion was completed with finger pressure. Tight mucosal closure around the neck of the implant was accomplished with polyglycolic acid sutures. An inter-occlusal distance of 2 mm was established with reduction of the opposing maxillary teeth and if necessary up to 1 mm reduction of the head of the implant. Bimonthly dental prophylaxis was accomplished along with clinical observation recording mobility, gingival sulcus depth, tissue texture, and contour. Periapical radiographs were taken at 6 month intervals. The animals were anesthetized with Phencyclidine hydrochloride and maintained on parenteral penicillin 12 post-operative days. All implants on the right side were free standing opposing the natural maxillary

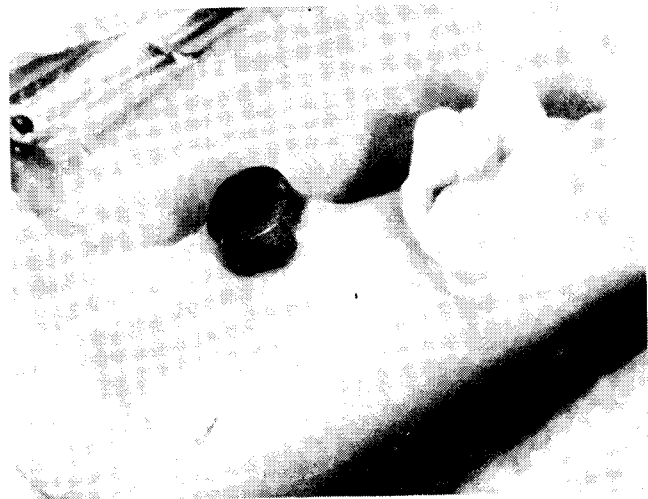


Figure 3



Figure 4

Results

Mobility of the endosseous implant was utilized as chief criteria in the determination of a successful implant. The following mobility scale was utilized; 0 - no mobility, 1/2 - clinically perceptible mobility, 1 - 1/2 mm movement in buccal or lingual direction, 2 - 1 mm movement in buccal or lingual direction. Seven of eight right side free standing implants had a mobility of 0. One of eight right sided free standing implants had a mobility of 1. Seven of eight left side restored implants had a mobility of 0 and 1 of eight restored implants had a mobility of 1. The mobility of 1 in both the freestanding and restored implants were recorded in the same animal.

Gingival sulcus depth was measured at buccal, lingual, mesial and distal sites using a standard calibrated periodontal probe. Sulcus depth is a reflection of oral hygiene status. Satisfactory maintenance of oral hygiene is determined by proper implant design, fixed prosthesis construction and contour, and professional care. Increased sulcus depth may be due to either gingival inflammation and hypertrophy secondary to impaired oral hygiene or to apical epithelial migration. Increased sulcus depth recordings secondary to gingival hypertrophy are usually short term if local etiologic factors are corrected. Increased depth due to apical epithelial migration is usually associated with implant mobility and loss of supporting bone due to improper implant-bridge designs or abnormal occlusal forces. Gingival sulcus depth was recorded as less than 3 mm for seven of eight free standing implant and six of eight restored implants and greater than 3 mm in one of eight free standing and restored implants. The greater sulcus depth recordings were found in the same animal with mobility of 1.

Periapical radiographs demonstrated the formation of a sclerotic line along the neck of the implant along the alveolar crest to the shoulder of the blade at 3-6 months post insertion. This sclerotic line was quite distinct at 12 months. (Figure 5) There appeared to be an increased

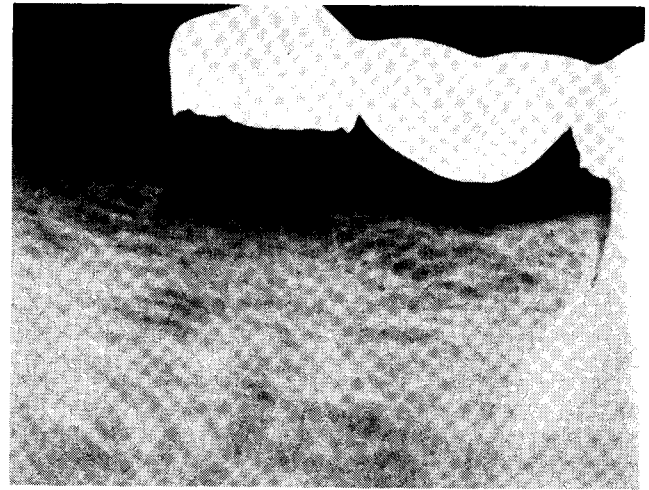


Figure 5

density of bone at the neck of the free standing implant when compared to the restored implants. (Figure 6) Only two of 16 implant sites showed any



Figure 6

evidence of saucerization or vertical bone loss. This bone loss was observed in both the free standing and restored implant in the same animal with increased sulcus depth of mobility of 1.

Gingival texture and contour was essentially normal at all implant sites except two in which free mucosa rather than attached gingiva was present at the implant neck of the baboon with increased sulcus depth, mobility of 1, and vertical loss.

Clinical observations made during this study substantiate the impression that excellent results were obtained with properly designed prostheses, sanitary "high water" pontics, implants designed utilizing a flared neck (crown support), placement so that attached gingiva surrounds the implant neck, and maintenance of satisfactory hygiene with professional care.