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Sutural expansion using rigidly integrated endosseous implants: An experimental study in rabbits

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ABSTRACT

Rigidly integrated implants offer great promise for orthodontic and orthopedic anchorage in the oral and midfacial regions. Rigid anchorage can be used to control unwanted tooth movement, provide abutments in edentulous arches, and open the vertical dimension of occlusion. To evaluate the use of endosseous implants in the midface region, two flanged titanium implants were placed on either side of the midnasal suture of 18 New Zealand White rabbits. The rabbits were divided into an unloaded control and two experimental groups. One experimental group was loaded at 1 Newton (N) and the other at 3 N. All rabbits were euthanized after 12 weeks of loading. Stereologic point-hit and line-intercept methods were used to analyze microradiographic and multiple fluorochrome histology of the suture. All implants remained stable during the loading period. The distance between the implants increased significantly in the loaded groups compared with the control, and was significantly higher in the 3 N group than in the 1 N group. Percent bone volume was significantly decreased, while the percent suture volume tended to be increased in the loaded groups. Mineral apposition and bone formation rates at the sutural surfaces were increased in the loaded groups ($P < 0.05$), but did not differ between loaded groups. These results indicate that relatively low loads (1 or 3 N) applied to rigidly integrated endosseous implants across an unfused suture are satisfactory for achieving expansion under the conditions of this study. The 3 N load resulted in slightly more expansion, but did not affect the rate of bone formation at the suture.

KEY WORDS: Rigid endosseous implants, Anchorage, Expansion.

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