Effect of sequential drilling and bone expansion on the trabecular pattern of the bone

Sangeetha Lakshmi*
Chandrasekharan Nair**
Jayakar Shetty***

Abstract

Objective: To evaluate the histomorphological changes of the bone after drilling and bone expansion.

Methodology: Two MIS implants were placed in a harvested cow femur. One implant was placed after sequential drilling and the second implant was placed after expansion followed by sequential drilling. Specimens were sectioned and subjected to histomorphological analysis.

Results: There was no significant difference in trabecular pattern of bone when sequential drilling and bone expansion were employed. (TPDI July 2012; 3: 53-55)

Key words: sequential drilling, bone expansion, trabecular pattern of bone

Introduction

Bone expansion is carried out to increase the bone width and to condense the bone and which improves the primary stability in low density bone 1. But some authors have observed that expansion has reduced the primary stability of the implant 2. Condensation of the trabecular bone achieved by the expansion is less when compared to that obtained with the sequential drilling. Literature on the relationship between bone expansion and the changes in the trabecular pattern of the bone is not available and hence this study was designed.

Methodology

Two MIS implant analogs with the dimensions of 11.5mm × 4mm were used in this study. Osteotomy sites were prepared in recently harvested cow bone femur. On the bone implant bed was prepared by flattening and reducing the thickness of the cortical bone using a straight fissure bur under copious irrigation. To place the first implant, osteotomy was done by sequential drilling. Initially a hole was made by round bur (fig 3), this was enlarged by a pilot drill and sequential drills of 2.5mm, 3mm and 3.5 mm. Osteotomy site was undersized by 0.5mm when compared to the implant diameter and the implant was placed using a torque wrench. To place the second implant, first the bone was expanded with straight chisel and mallet (fig 5) and then sequential drilling was carried out (fig 7). The specimens were stored in formalin(10%) for 24 hours. Each specimens were cut longitudinally through the centre of the implant using a diamond disk(fig 9), then the implant was removed from the cut section. The bone was further sectioned further using a hard tissue microtome (leica RM 2245) to the thickness of 50µm. Specimens were fixed and observed under light microscope (fig 13,14&15).
Results

Light microscopic examination revealed that there was no significant difference in the trabecular pattern of the bone with either expansion or sequential drilling.

Discussion

Condensation of bone was comparatively a recent addition to the dental implant surgery. Limitation in the width of available bone is effectively counteracted by the condensation. The force applied through the condenser is expected to damage the architecture of the cancellous bone, but the observed success with the technique has prompted to explore into the effect of expansion on the bone architecture. The conventional drilling process was also used for comparative purpose. Histological sections revealed that the bone architecture did not undergo any drastic changes with both drilling and expansion process. Freshly harvested bovine bone served as a good study material for this experiment.
The success obtained with expansion may be attributed to the preservation of the architecture observed after the expansion as well as drilling process.

**Conclusion:**

Based on this histomorphological analysis it could be concluded that bone expansion will not reduce the primary stability as there is no significant change in the trabecular pattern of the bone. Both drilling and condensation can be employed in implant surgery.

**References**


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**Research work published**

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