

Introduction

The purpose of the study is to compare the stress distribution pattern in maxilla and mandible during maxillary protraction with different miniplate diameters (1.5 mm, 2 mm, 2.5mm) of different miniimplant thread pitches (0.5 mm, 1mm, 1.5mm) using different intermaxillary elastics (2 N, 4 N, 6 N, 8 N).

Materials and methods

A 3D finite element model of maxilla with miniplate at infrazygomatic buttress and mandible with miniplate at mandibular parasymphysis was prepared using Autocad software along with the plate geometry. The stress distributions and displacement were analyzed using Ansys software, in the form of Von Mises stress.

Results

In implant study, the Von Mises stress in bone (Mpa) of 2mm diameter implant with 1 mm pitch is 142 Mpa which was least compared to 0.5mm pitch is 170 Mpa and 1.5mm pitch is 233 Mpa. In skull study, when different forces of 2 N, 4N, 6N and 8N were applied, the maximum Von Mises stress of the skull of 2 mm implant diameter with 0.5mm, 1mm and 1.5mm pitch was (18.454 Mpa, 18.47 Mpa and 18.344 Mpa), (18.465 Mpa, 18.492 Mpa and 18.244 Mpa), (18.388 Mpa, 18.43 Mpa and 18.086 Mpa), (18.272 Mpa, 18.324 Mpa and 17.883 Mpa) respectively which was similar compared to other two diameters.

Conclusion

In implant study, when 1.5mm,2mm and 2.5mm diameter implant of 0.5mm,1mm and1.5mm pitch were compared,**2mm diameter of 1 mm pitch** shows the least stress in bone. In skull study, **2 mm diameter minimplants showed similar stress distribution pattern in the maxilla and mandible regardless of pitch variants and different force application.**

Keywords

Class III malocclusion, Finite Element Method, Miniplates.