Abstract

Nowadays, miniscrew implants are widely used for the treatment of complicated orthodontic cases with satisfactory outcomes. However, currently available products are imported, which cause high expenses in clinical practices. Therefore, the author has domestically produced custom-made miniscrew implants from medical-grade titanium alloy and stainless steel. The purpose of this study was to test the torsional properties of these miniscrews and to compare them to imported miniscrew implants in vitro. Custom-made titanium alloy miniscrew implants, custom-made stainless steel miniscrew implants, titanium alloy miniscrew implants...
imported from Republic of Korea and stainless steel miniscrew implants imported from Republic of China were compared. Torsion force was measured by an Instron universal testing machine until the implants broke and the twist angle of the miniscrew with maximum force was measured. The results showed that the torsional properties of the custom-made titanium alloy and stainless steel miniscrew implants were not statistically significantly different from those of the imported miniscrew implants (p>.05). Also, the comparison between custom-made titanium alloy and custom-made stainless steel miniscrew implants showed no significant difference (p>.05). In conclusion, the torsional properties of the custom-made titanium alloy and stainless steel miniscrew implants were similar to those of the imported products.

Keywords : Miniscrew, Titanium alloy, Stainless steel, Torsional properties
Figure 1  SEM photomicrographs of the 4 mini-screw implants (original magnification, 15 times).

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Figure 2 A. Custom-fabricated device for torsional test.
B. miniscrew holding jaws.

Figure 3 Graph shows elasticity of cable during torquing tests

Table 1 Means and standard deviations for torque values and twist angle at maximum torque values of the 4 miniscrew implants. Identical letters indicate that the mean values are not significantly different (P>0.05)

<table>
<thead>
<tr>
<th>Miniscrew Implant</th>
<th>MaximumTorque (N.cm)</th>
<th>MaximumTwist Angle (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAJ</td>
<td>65.60 ± 2.51 (a)</td>
<td>142.64 ± 15.51 (a)</td>
</tr>
<tr>
<td>TACM</td>
<td>71.42 ± 4.56 (a,b)</td>
<td>163.72 ± 40.27 (a)</td>
</tr>
<tr>
<td>SSCM</td>
<td>69.76 ± 3.00 (a,b)</td>
<td>63.27 ± 36.95 (b)</td>
</tr>
<tr>
<td>SSB</td>
<td>77.47 ± 13.04 (b)</td>
<td>51.87 ± 12.24 (b)</td>
</tr>
</tbody>
</table>
Figure 4 Graph demonstrate mean twist angles and mean torque values for fracture of the 4 miniscrews


