



2001 7



가

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가 가 가 , 가 가 ,  
가 가 , 가 가 .  
loosening 가 .  
가 .  
가 . 2mm  
가 .  
가 가 6mm , 4mm  
8 200g .  
8 ,  
가 .

---

: , , ,

# I.

<sup>1)</sup> 가  
<sup>2)</sup> ,  
<sup>1)</sup> 가  
가  
<sup>1)</sup> ,  
Aronson <sup>3)</sup> , Asikanine <sup>4)</sup> , Majzoub <sup>5)</sup> ,  
Pauw <sup>6)</sup> , Roberts <sup>7)</sup> , Saito <sup>8)</sup> , Smalley <sup>9)</sup> , Wehrbeine <sup>10)</sup>  
가 . Higuchi  
<sup>11)</sup> , Odmann <sup>12)</sup> , Wehrbein <sup>13),14)</sup> 가  
 , , ,  
가 <sup>15)</sup>  
 , ,  
가 , 가 ,  
가 , 가  
<sup>16)</sup> . 1997 Kanomi<sup>17)</sup>가 1.2mm, 6mm  
 , 1998 Costa <sup>16)</sup> 2.0 mm,  
9mm  
1999 2000 <sup>18),19)</sup>



loosening 가 .

가 .

가 .

## II.

가.

15kg                      10  
6~8mg/kg    ketamine(Ketalar, 44mg/kg)

xylazine(Rompun,

8, 10mm                      (Osteomed, U.S.A.)

2mm,                      6,

(Fig

1).



Fig. 1. Intraoral radiographs taken before placing miniscrews.

(flap)

1.6mm

6, 8,

10mm

(periodontal probe)

가 4mm가

2, 4, 6mm가

(Fig 2).

가

가

가

6, 8, 10mm 1

10 , 30 , 30 60  
 (button)  
 (power chain) 200g  
 8 , 1

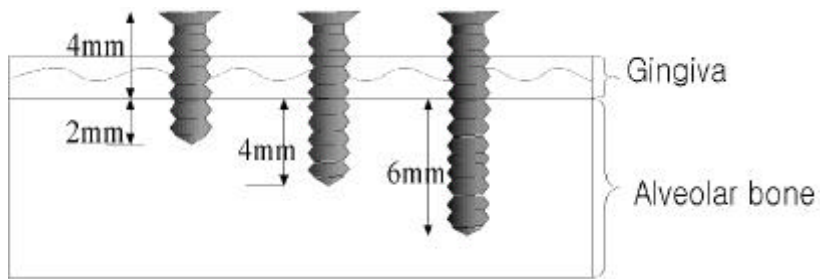


Fig. 2. Schematic figure of placing miniscrews into the bone.

가  
 8  
 가  
 Majzoub<sup>5)</sup> two instruments grips 가  
 가 grade I , 1mm 가  
 grade II , 1mm 가 grade III  
 가  
 ± 0.1mm 8  
 , , 8 , 8  
 가



(a)



(b)

Fig. 3. Intraoral photographs showing miniscrews, button and power chain applied (a: anterior region, b: posterior region).

### III.

6mm 10 10 8 loosening  
 , 8mm 10 5 가 loosening 8  
 8mm 5 10mm 10 8  
 6mm 10  
 7 가 8 loosening , 6mm 3 8,  
 10mm 10 8 (Table 1)  
 가  
 6mm  
 0%, 8mm 50%, 10mm 100% ,  
 6mm 30%, 8mm 10mm 100%  
 (Table 2).

Table 1. Number of miniscrews retained or lost

Screw length	6mm		8mm		10mm	
	lost	retained	lost	retained	lost	retained
Maxilla	10	0	5	5	0	10
Mandible	7	3	0	10	0	10

Table 2. Success rate following 8 weeks orthodontic force application

Screw length	Success rate (%)		
	6mm	8mm	10mm
Maxilla	0	50	100
Mandible	30	100	100

가  
가

(Fig. 4).

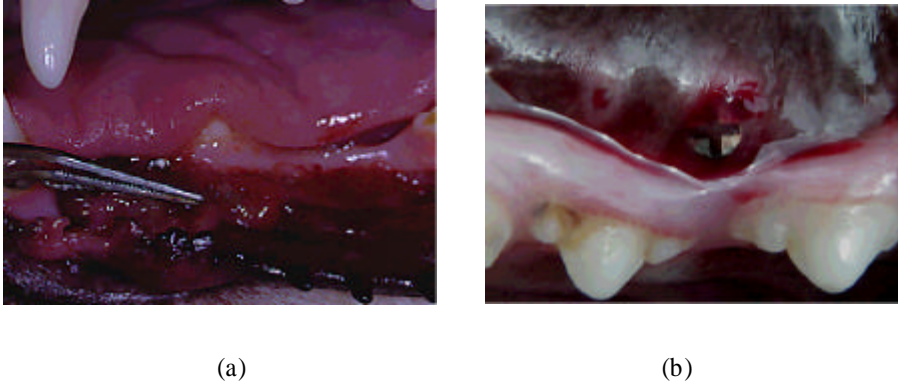
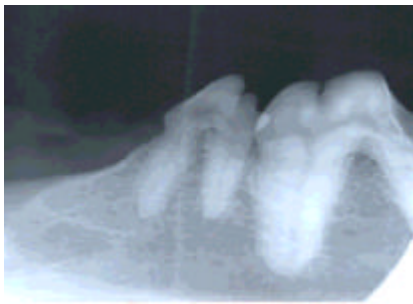


Fig. 4. Intraoral photographs showing overgrowth(a) and redness(b) of the gingiva.

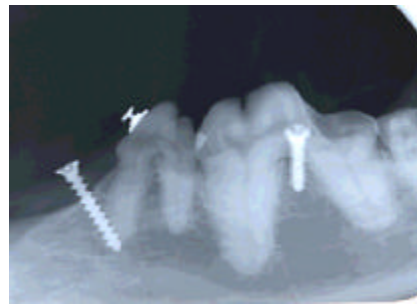


Fig. 5. Intraoral photographs showing good condition of the gingiva.

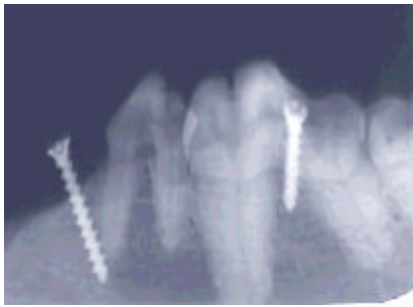
(Fig. 6).



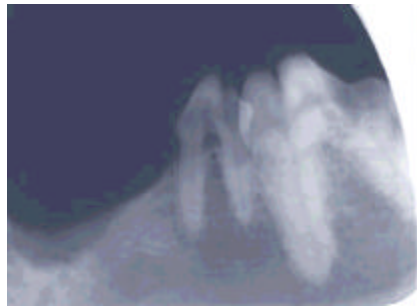
(a)



(b)



(c)



(d)

Fig. 6. Intraoral radiograph:

- (a) before inserting miniscrews, (b) immediately after inserting miniscrews,
- (c) 8 weeks after insertion, (d) 8 weeks after removing miniscrews.

#### IV.

가 6mm , 4mm  
8 200g  
가  
Costa<sup>16)</sup> 9mm 5~7mm  
16 2 가 loosening  
2 5mm  
가 loosening  
가 가 ,  
Misch<sup>20)</sup>가  
가  
Kanomi<sup>17)</sup> 가  
Costa<sup>16)</sup> 가  
가  
Meredith<sup>21)</sup>  
self tapping 가 nonself tapping



<sup>22)</sup> self tapping

10mm

self tapping

가

nonself tapping

,

10mm

self

tapping

가

가

,  
<sup>16),17)</sup>

가

2mm 가

가

가

가

가

가

가

가

가

가

가

가

가

200g

8

가

가 . 8

가

200g

20)

가

가

가

18)

150~200g

Proffit<sup>1)</sup>

10~120g

200g

Aronson <sup>3)</sup>, Pauw <sup>6)</sup>, Majzoub <sup>5)</sup>

8

8

. Majzoub <sup>5)</sup>

8

가

8

8

8

가

8

가

가

가

가

V.

가 8 200g 2mm 가  
가 6mm , 4mm  
가

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- Abstract -

## **A Study on Titanium Miniscrew as Orthodontic Anchorage; An experimental investigation in dogs**

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Titanium miniscrews are being used increasingly as an anchorage for tooth movement, because they are easy to place and to remove, increase the number of sites available, give minimum strain to patients regarding surgical procedures, and offer uneventful healing after removal. The use of titanium miniscrews as an orthodontic anchorage has been reported in clinical case reports, but clinicians have experienced screw loosening when using such screws. To our knowledge, there are no published reports evaluating the stability of miniscrews. Information about the length of miniscrews used in relation to the location is of some importance, as stability will vary depending on bone quality. The purpose of this study was to evaluate a variety of lengths of miniscrews (diameter: 2mm) which were inserted in the maxilla or the mandible and to demonstrate in a dog model which miniscrew provides fundamental stability in the jaws.

Ten mm long miniscrews in the maxilla and 8mm long miniscrews in the mandible showed no clinical mobility and retained their position throughout an 8 weeks force (200g) application. The mucosal condition around the screws was healthy in cases in which miniscrews were inserted in the alveolar bone between the roots and the head of the screws emerged into the attached gingiva. When the force application was terminated, radiographic analysis revealed neither root resorption nor periodontal pathology around the miniscrews that remained stable during the entire treatment period. This study suggests that if titanium miniscrews with adequate length are properly used depending on the location, they can provide sufficient stability for orthodontic anchorage.

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**Keywords** : orthodontic anchorage, miniscrew, titanium, implant