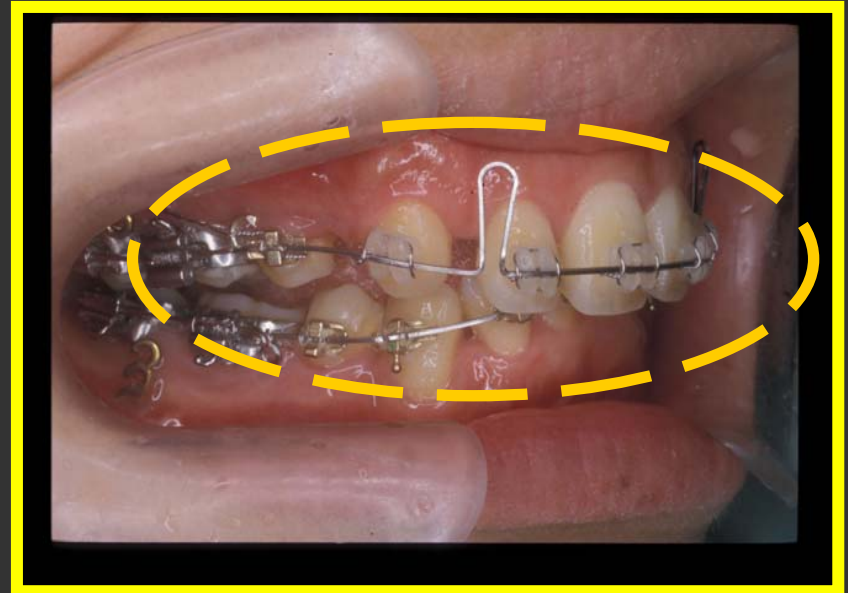
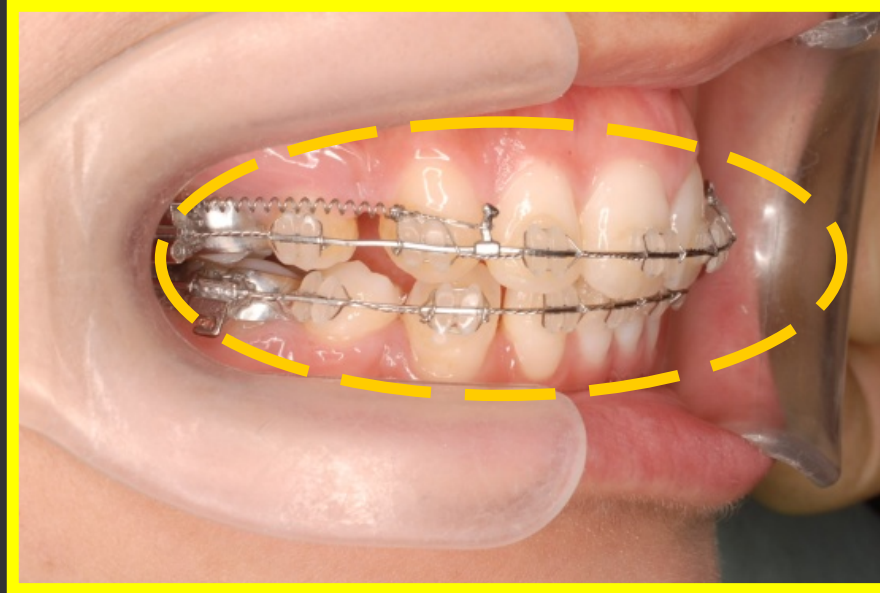
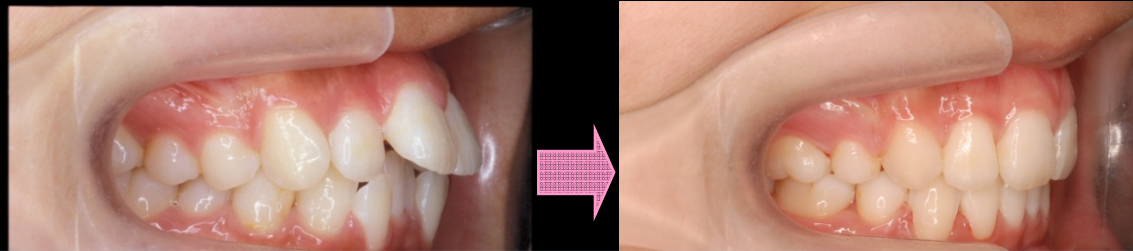


トルクロス  
+  
ボーイングエフェクト

空隙閉鎖中に前歯部の被蓋が深くなる

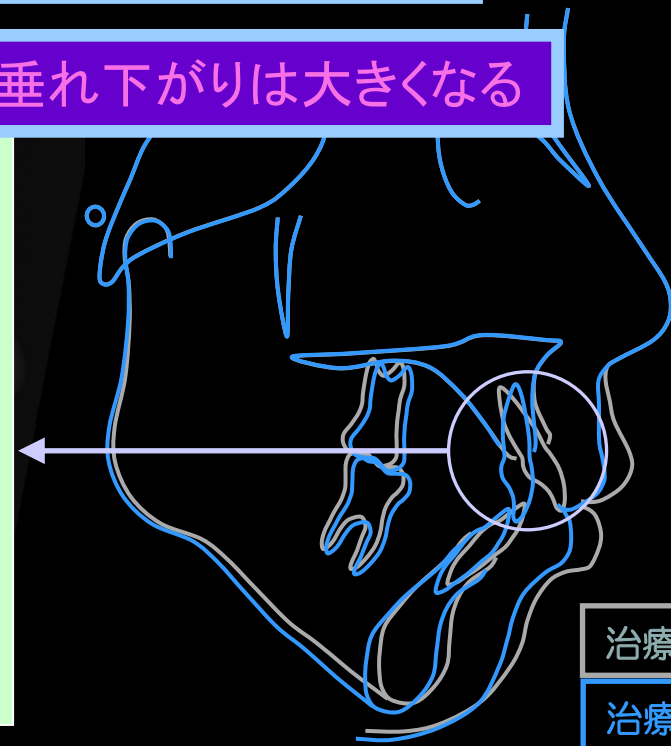
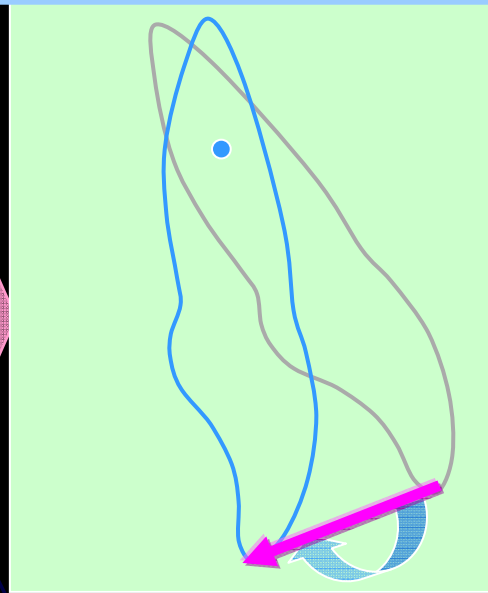


# Uncontrolled tipping



1・上顎切歯の後退に伴いオーバースタイルは増加する

Tippingが大きければ、大きいほど前歯の垂れ下がりは大きくなる



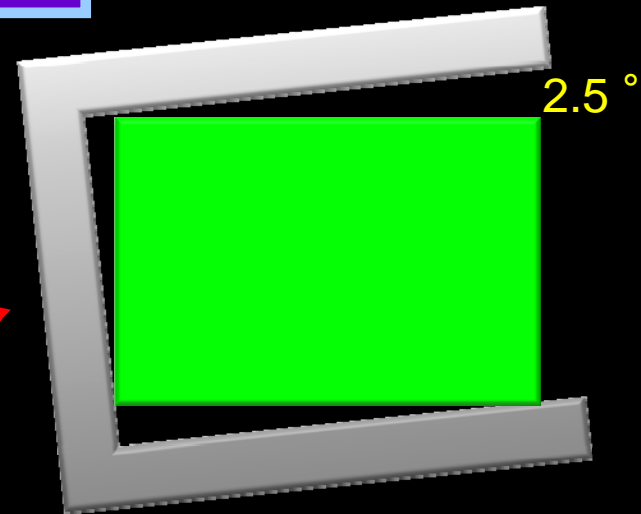
治療前

治療後

# *Torque loss due to play between wire and bracket*

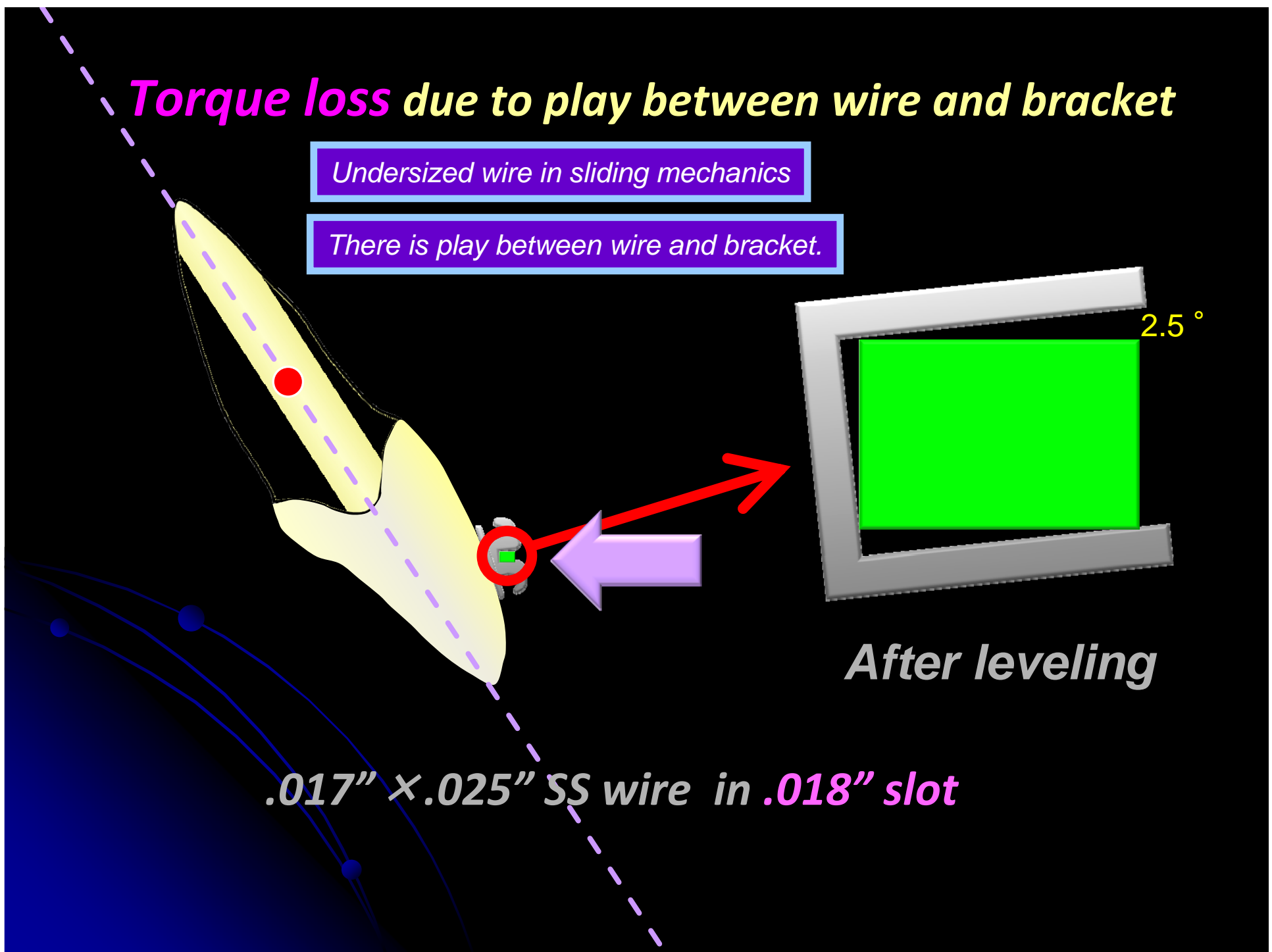
*Undersized wire in sliding mechanics*

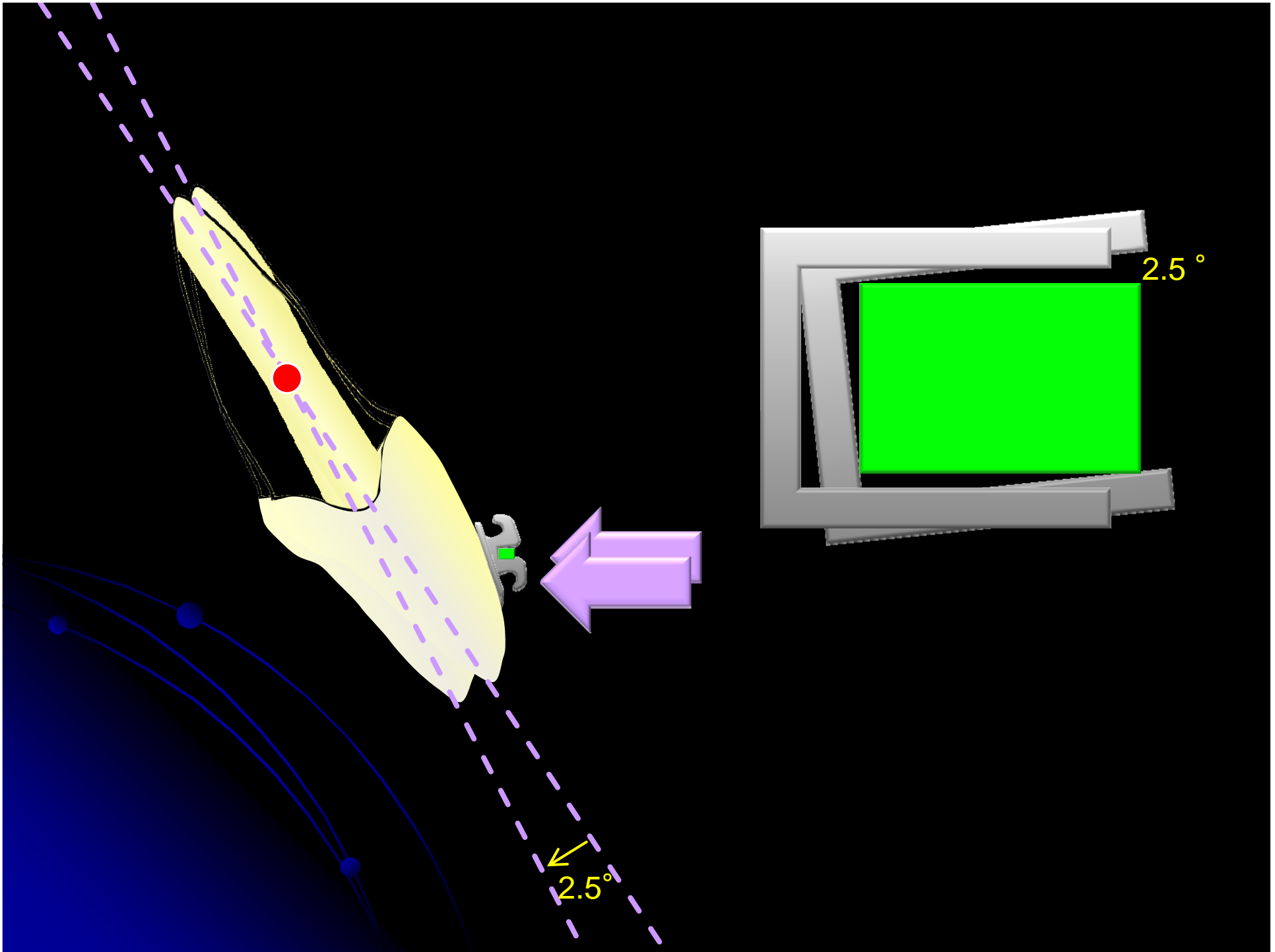
*There is play between wire and bracket.*

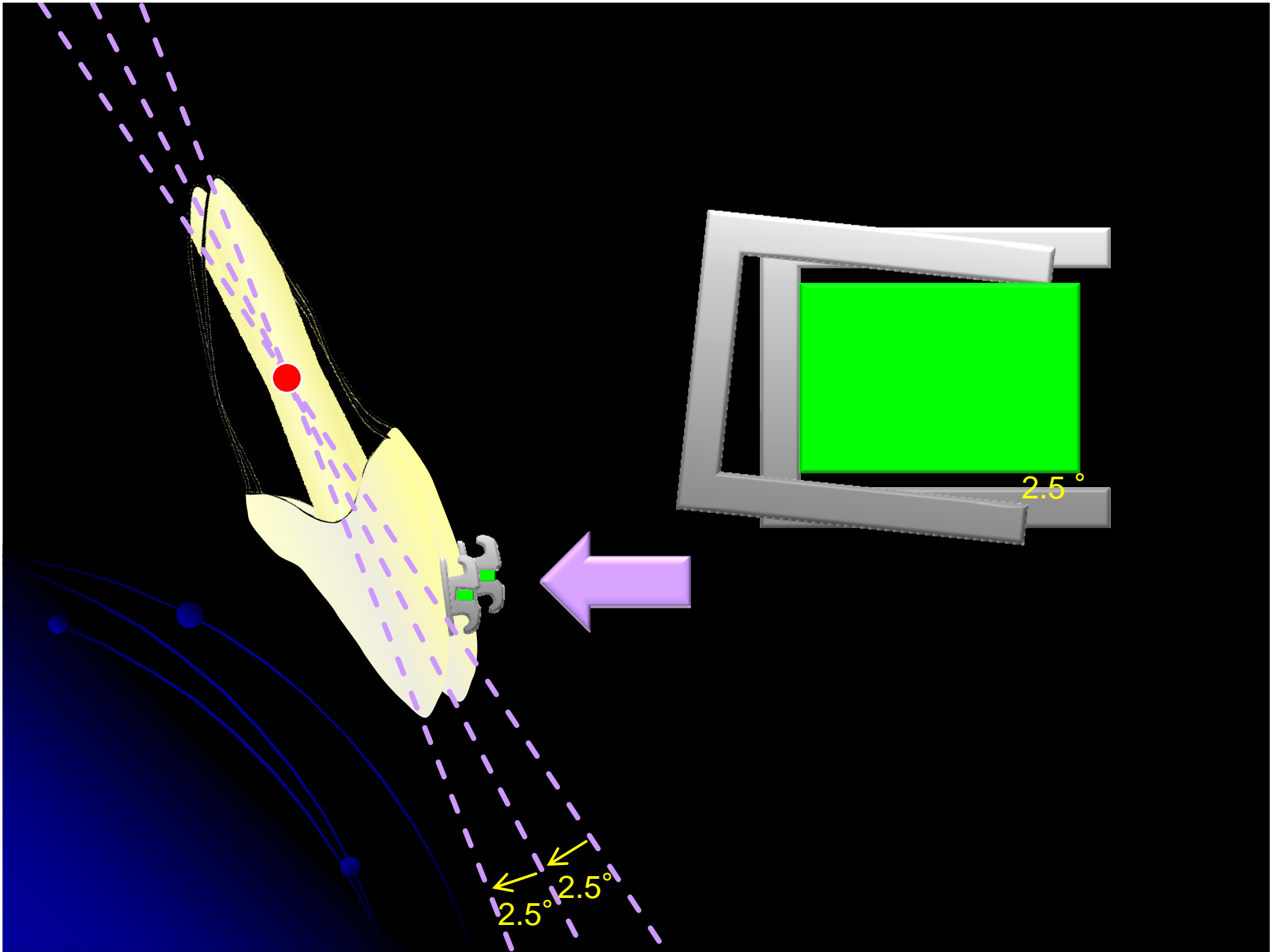


*After leveling*

*.017" x .025" SS wire in .018" slot*



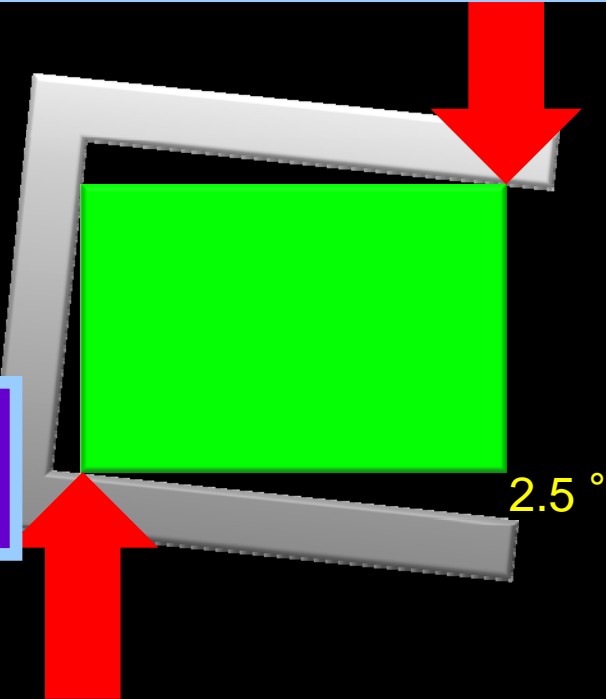




In the early phase of space closure, incisor tends to be simply tipped caused by torque loss even if the power arm is used

# トルクロス

ワイヤーがスロット内で回転する分、トルクコントロールを失う



Anti-tipping torque becomes effective

.017" x .025" SS wire in .018" slot

5.0°

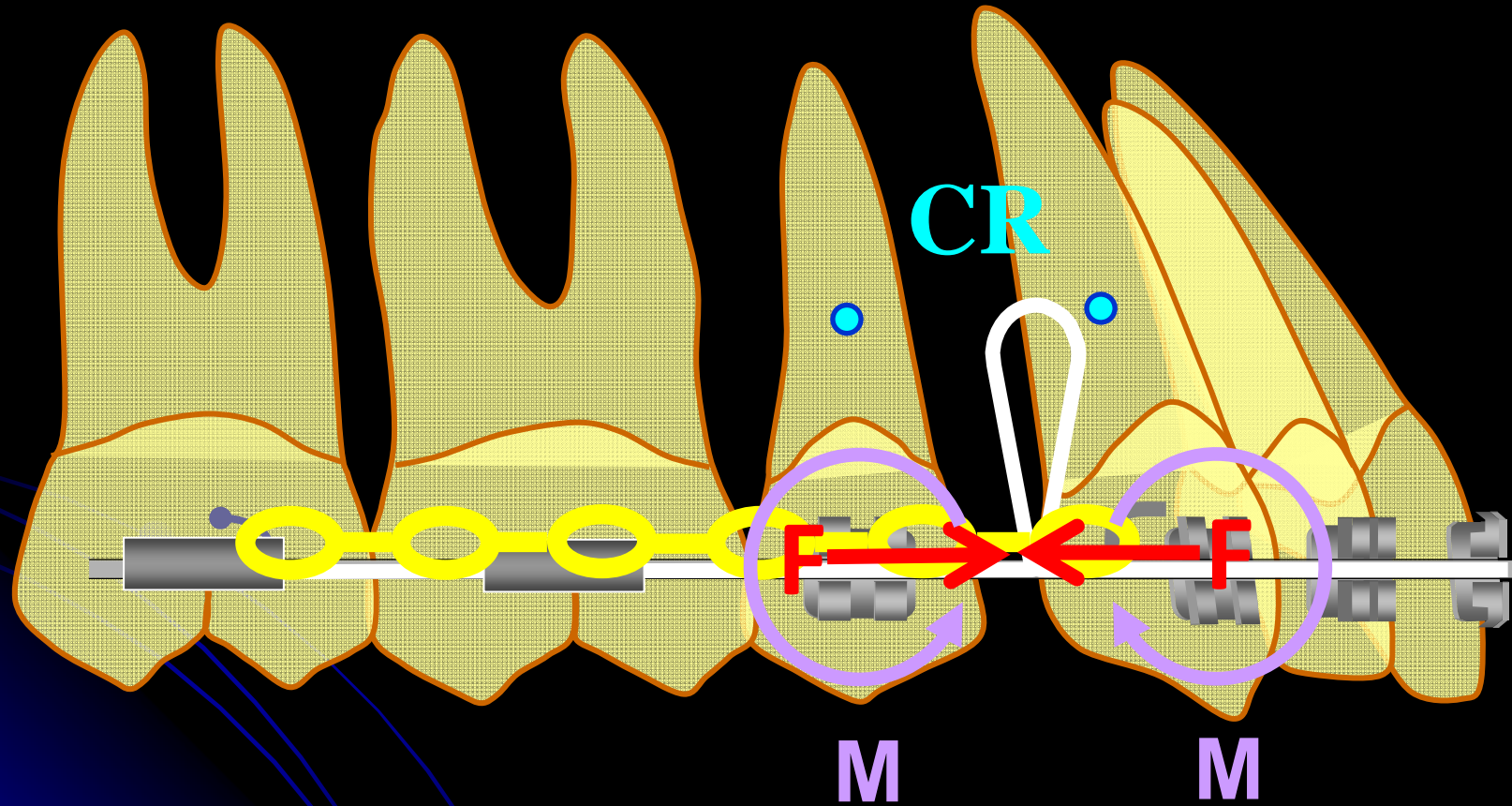
2.5° 2.5°

.019" x .025" SS wire in .022" slot

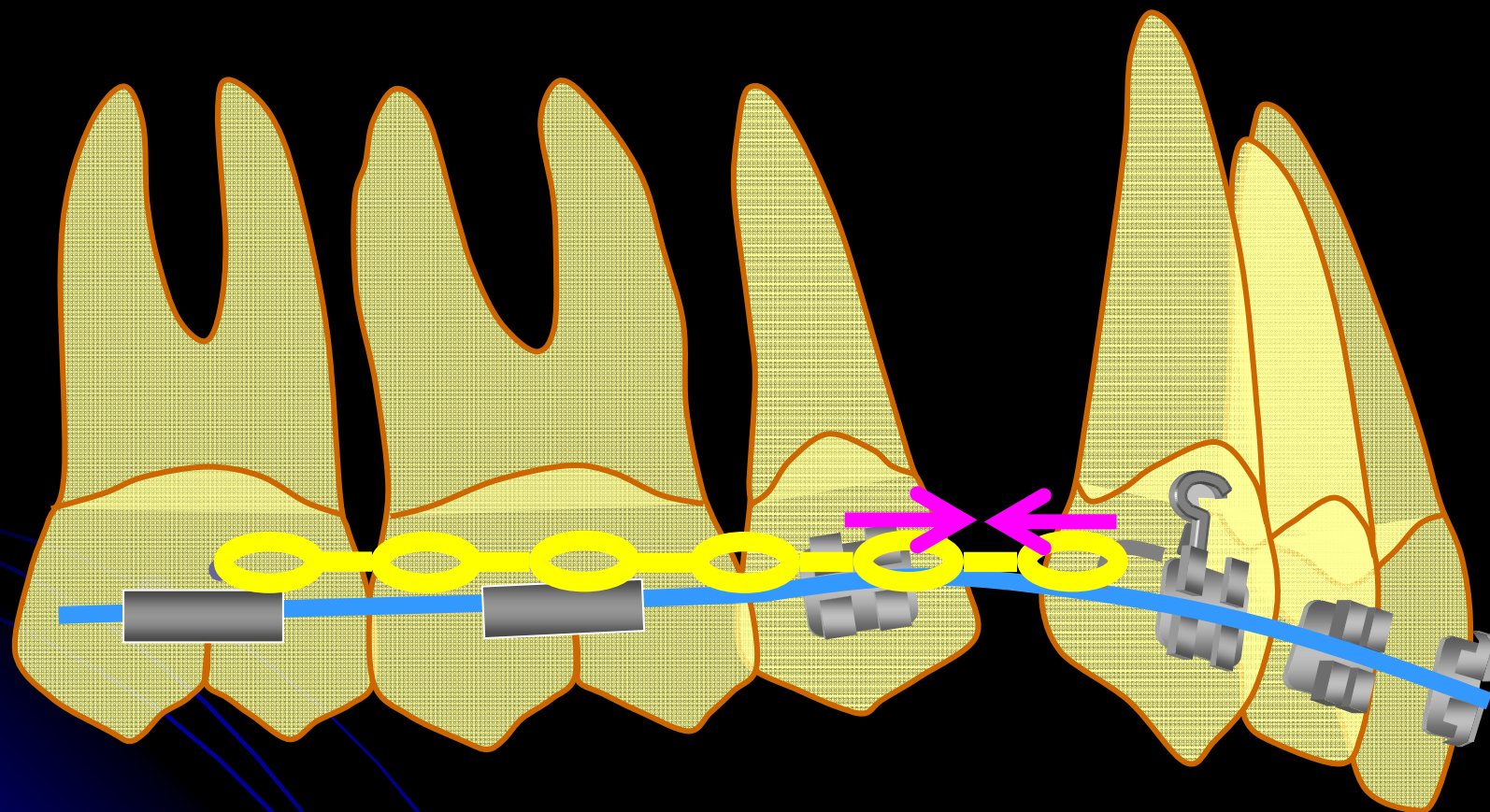
15°

Torque loss

# ボーイングエフェクト

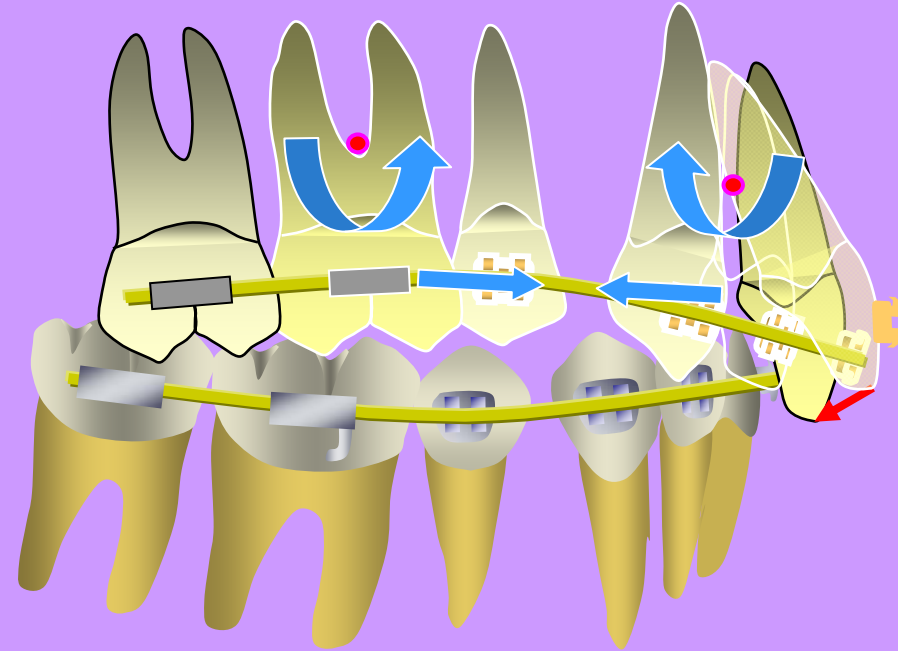
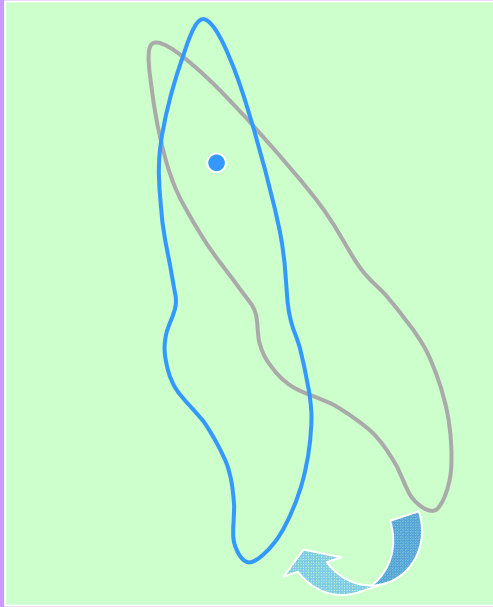


# ボーイングエフェクト





## 空隙閉鎖中にオーバーバイトが増加する原因

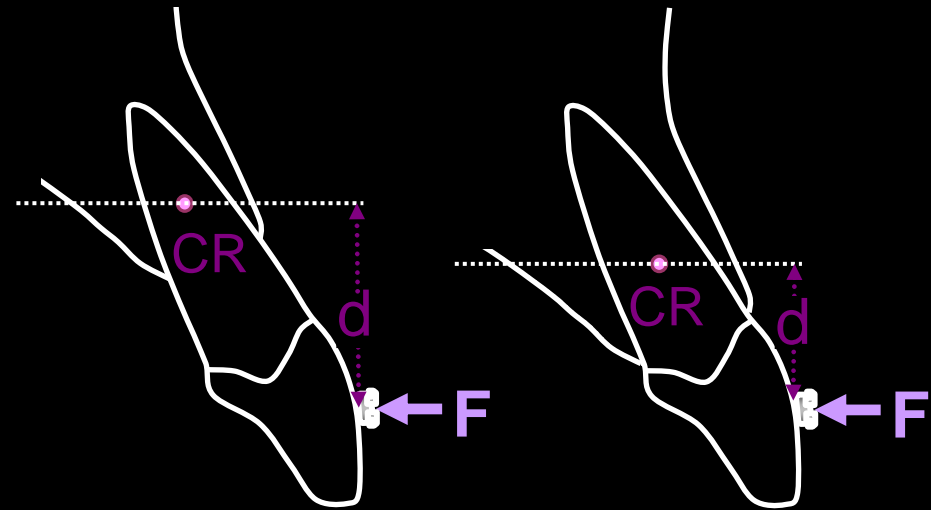
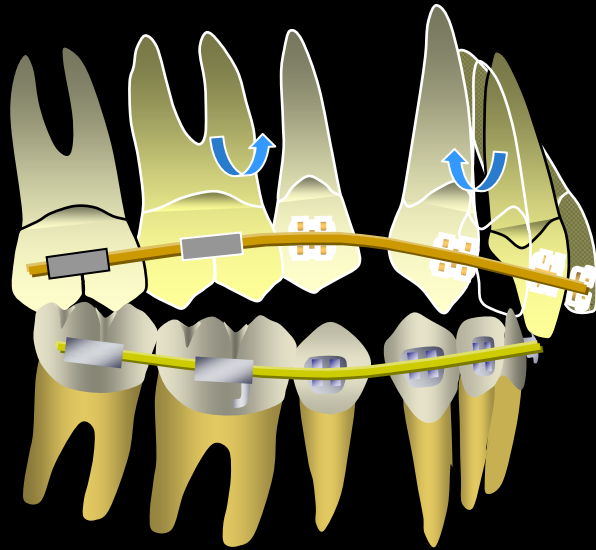


1・トルクロスによる uncontrolled tipping  
→ オーバーバイトの自然増加

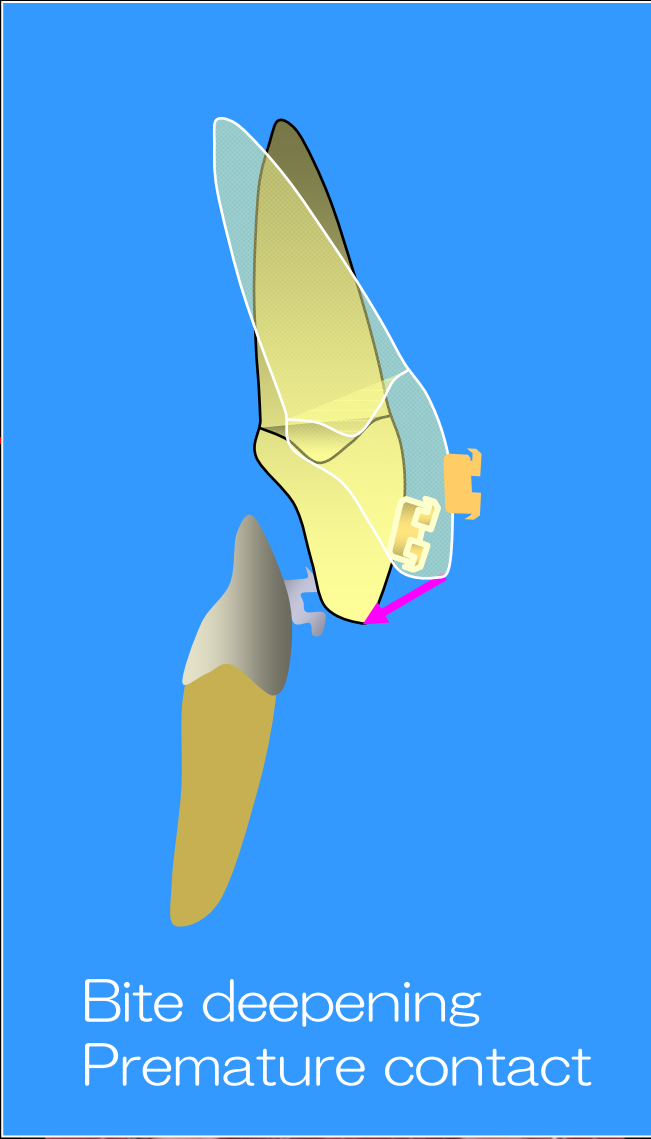
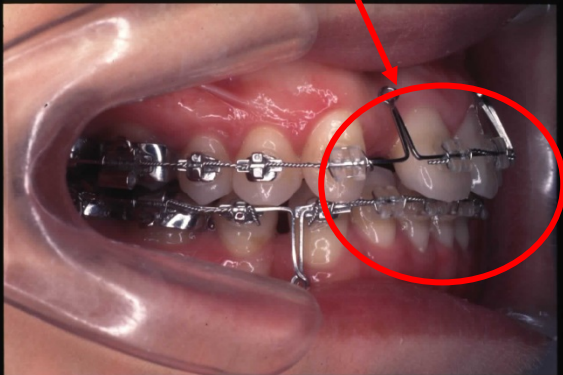
2・ボーイングエフェクトによるワイヤー(歯列)の折れ  
→ 前歯の挺出

# Bowing effect

## Bite deepening during space closure



Ceramic brackets  
for incisors



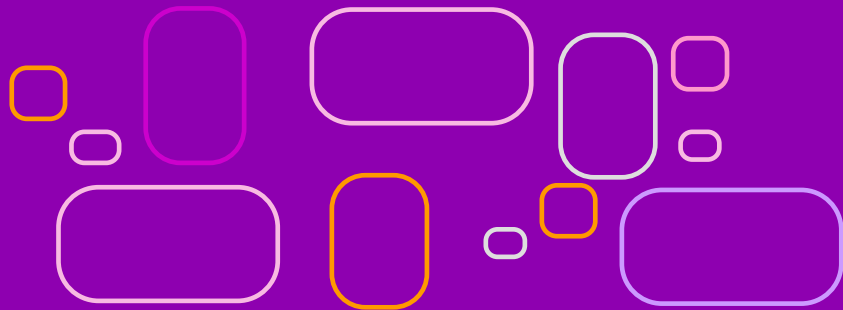
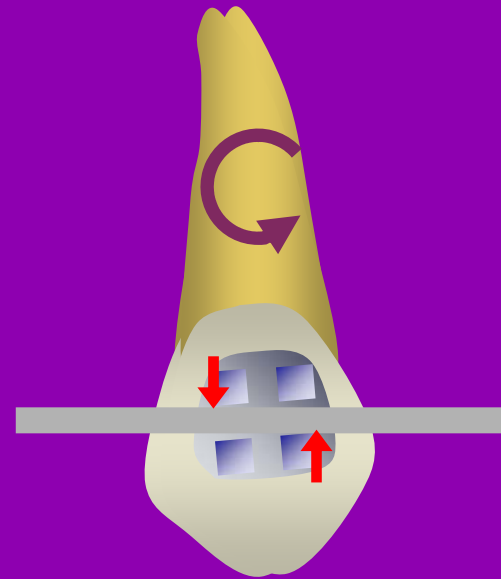
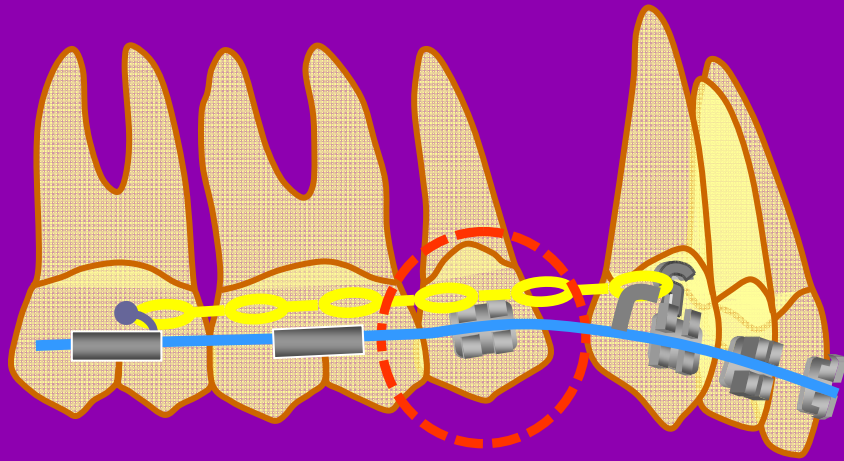
# スライディング・メカニクス vs ループ・メカニクス

歯の移動速度はスライディングの方が速いですか？

それともループの方が速いですか？

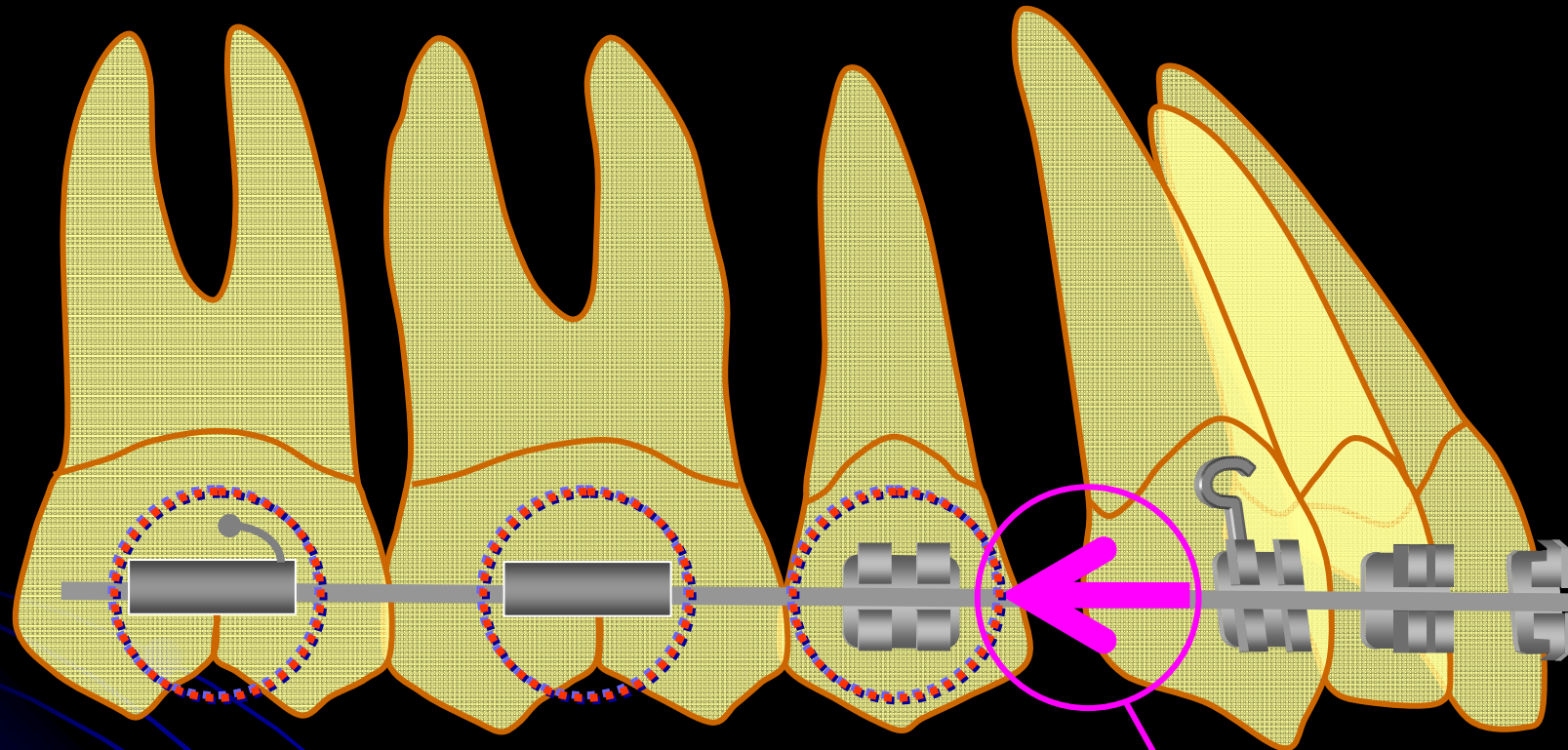


# スライディング・メカニクスにおいて空隙閉鎖を妨げる要因



星陵矯正研究会  
Sendai 2016

# スライディング・メカニクスにおける摩擦の問題



Friction

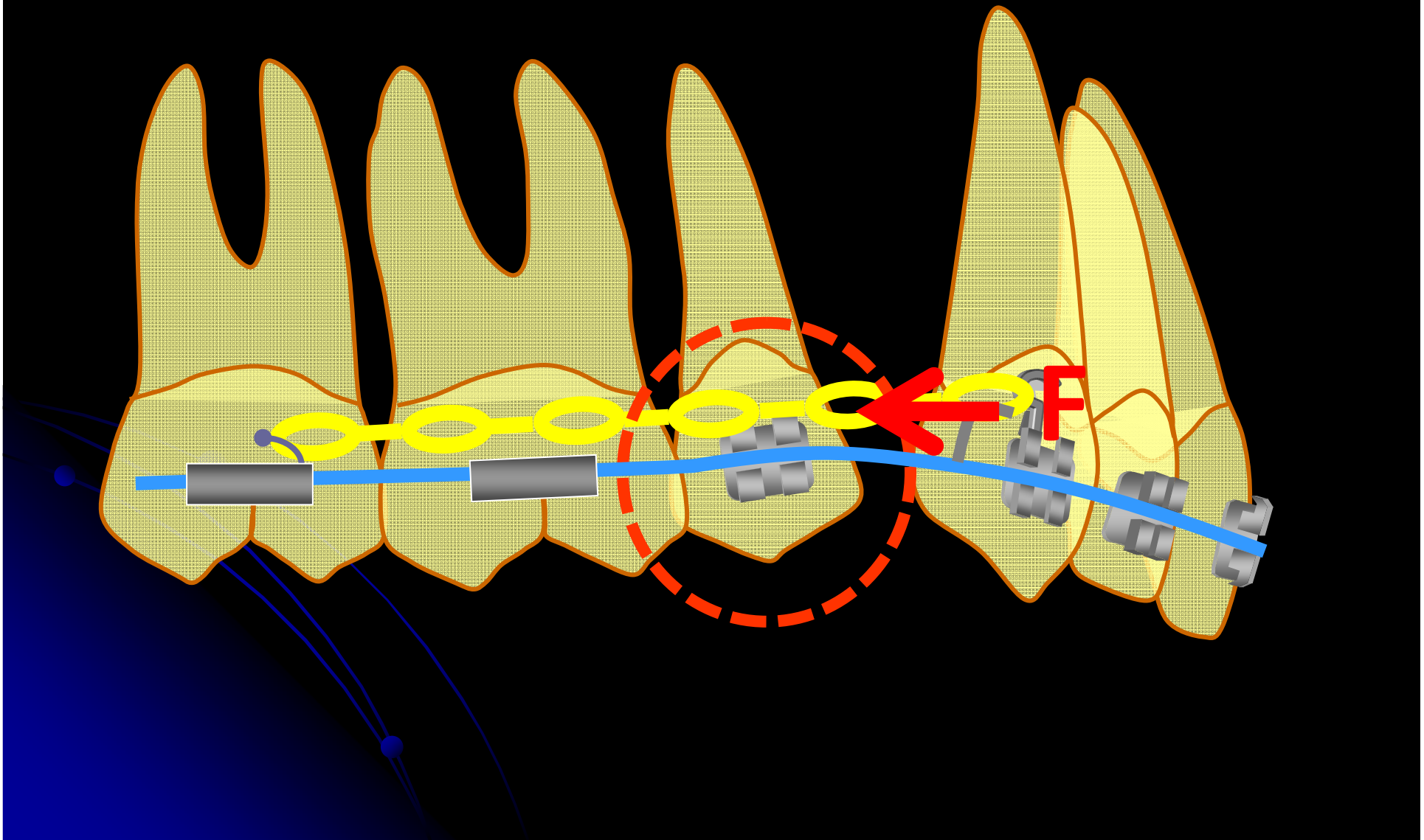
Friction

Friction

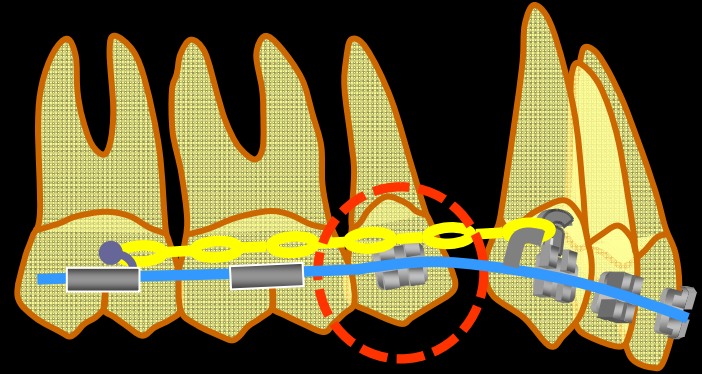
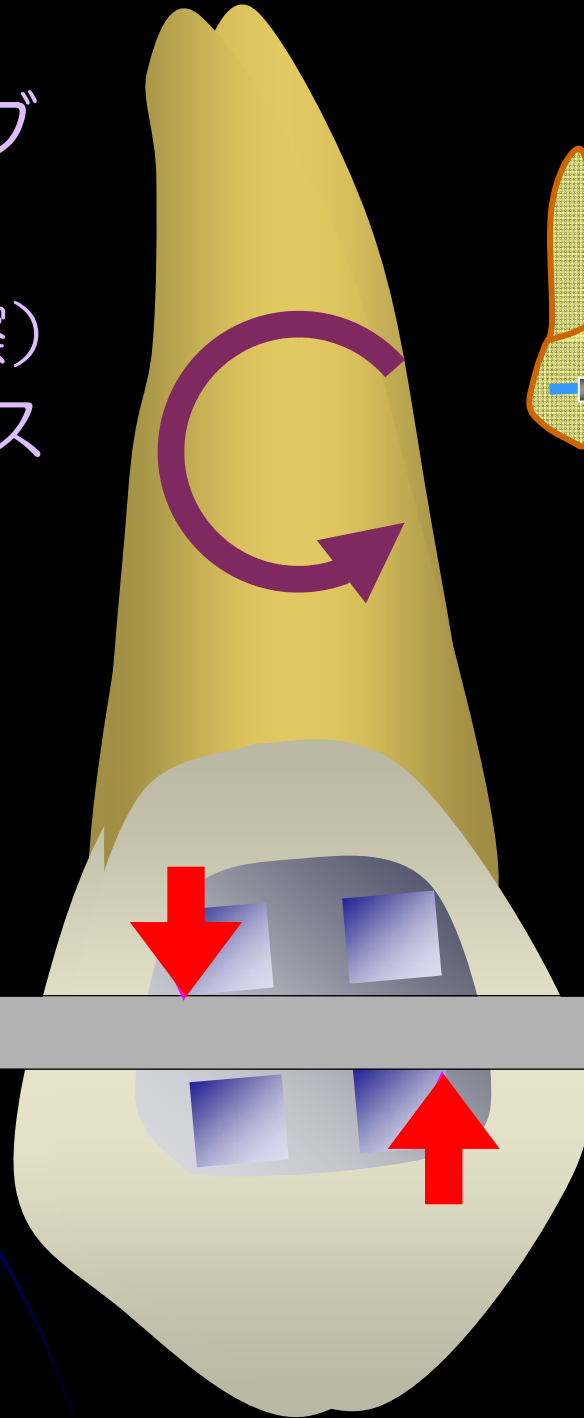
Friction prevents the archwire from sliding and thereby teeth from moving efficiently.

Force loss from friction

# Friction in Sliding Mechanics



バイディング  
Binding  
(角で生じる摩擦)  
が生じるプロセス





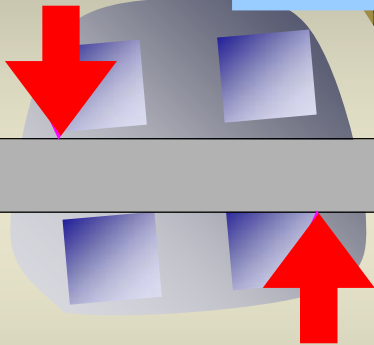
*In the course of space closure  
As the tooth tips*

*The more substantially the tooth is tipped,  
the heavier the friction is produced.*



*Friction  
increased*

*Velocity of tooth movement  
decreased*

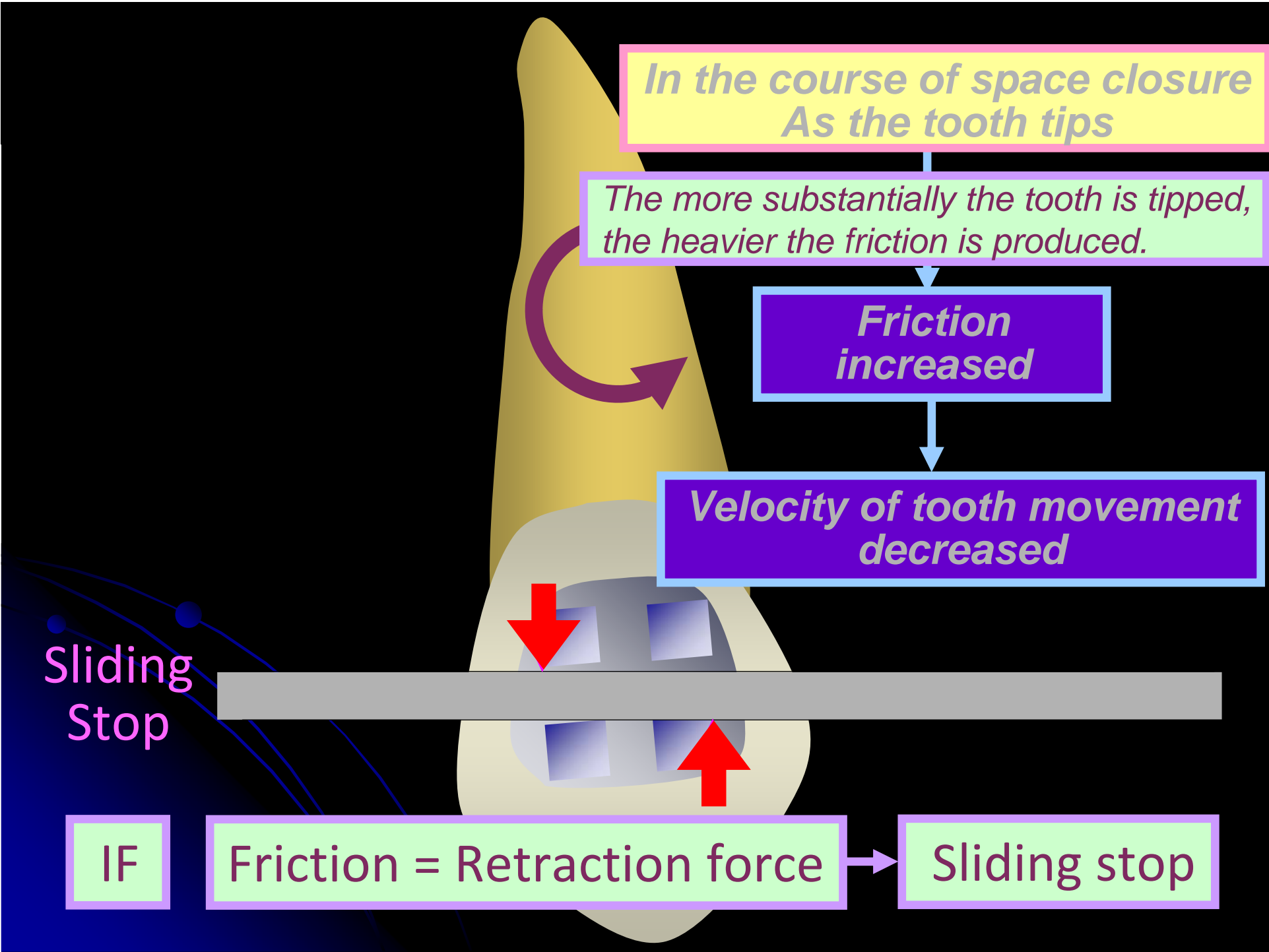


*Sliding  
Stop*

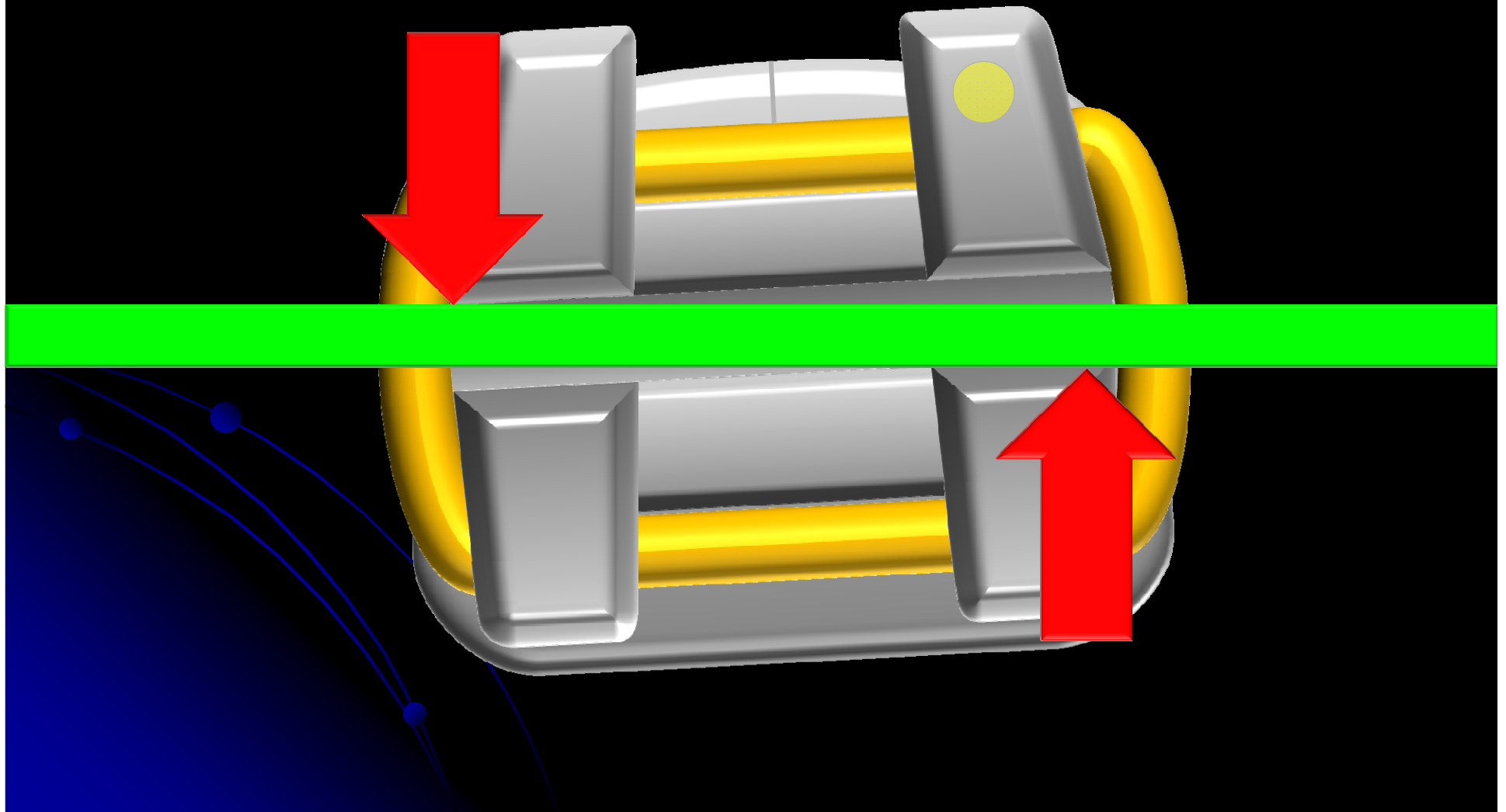
*IF*

*Friction = Retraction force*

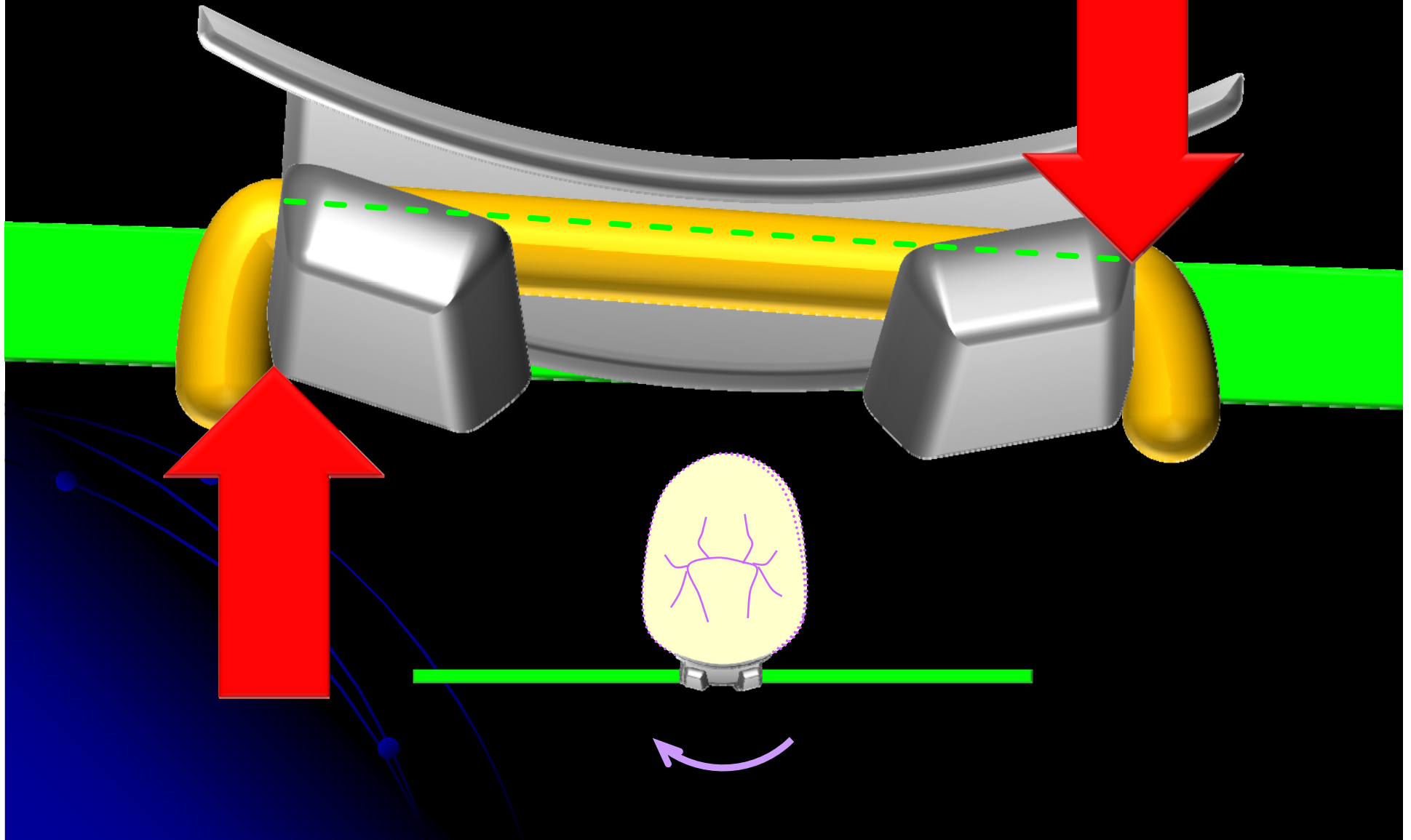
*Sliding stop*



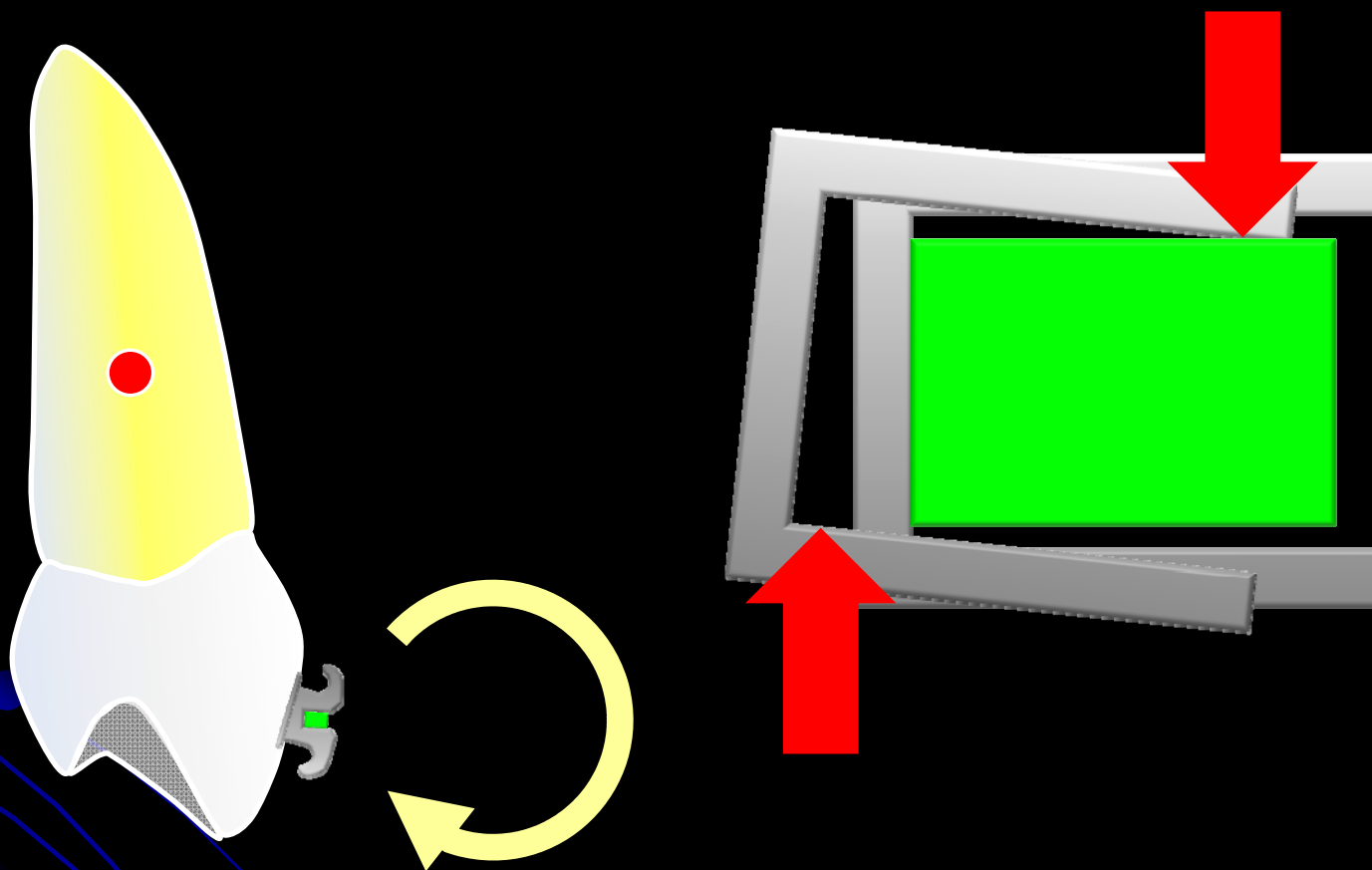
# Second order binding



# First order binding



# Third order binding



スライディングメカニクスでは、ワイヤーベンディングが推奨されない

空隙閉鎖と咬合挙上を同時にできない (Compensating /accentuated curve of Spee)