



A Comparison of Morse Taper and Sloped Shoulder Implant Abutment Geometries Using Torque Angle Analysis

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Research Aim

To compare morse taper and sloped shoulder connections, using torque-angle signature analysis on tightening and releasing processes

Introduction

Preload is the predominant clamping for maintaining the implant-abutment connection

It remains unclear how the geometry of the implant-abutment interface affects preload due to varied displacement between components

Torque-angle signature analysis is needed to evaluate the dynamics of the clamping system process within the implant-abutment screw assembly.

Figure 1: 22.5° sloped shoulder implant geometry providing an abutment seating surface



Materials and Methods

- Three implants were embedded into custom dies using Type V Dental stone.
- Each die was secured onto a custom measuring device where three morse taper and three sloped shoulder abutments were connected, a driver was lowered with a torque and angle meter attached and torqued to manufacturer specification (35 Ncm)
- Insertion and removal torque-angle signatures were obtained using a digital torque gauge with an AMK-360 angle transducer
- Torque and angle values for each specimen were measured, plotted and slopes of each group compared.

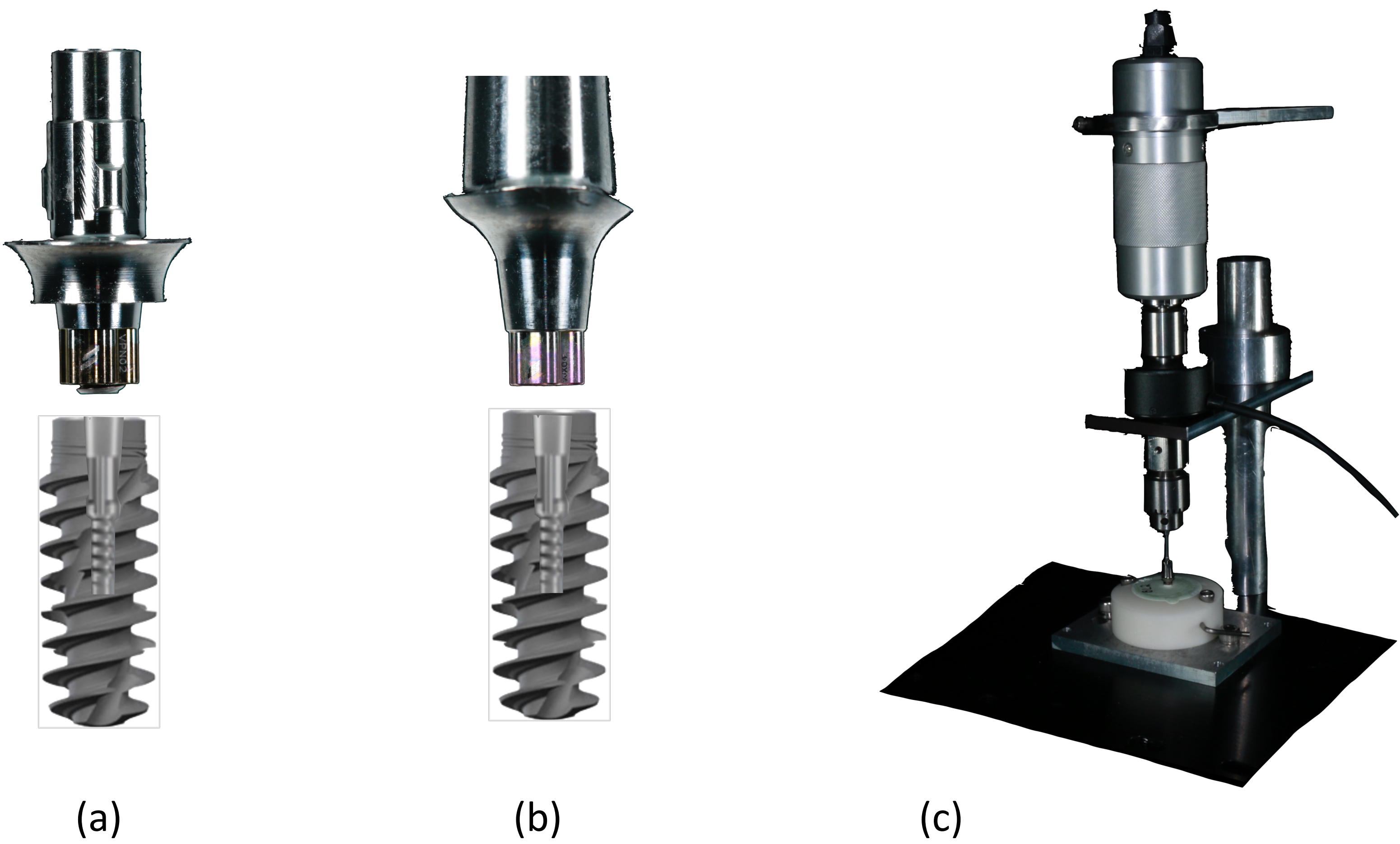
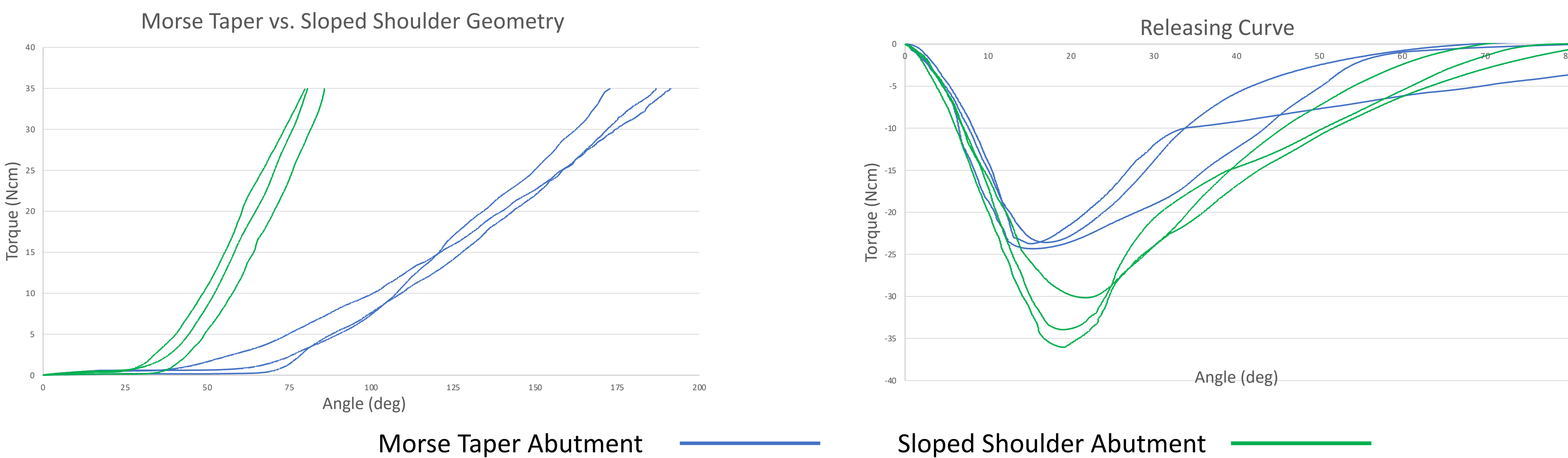


Figure 2: (a) Sloped shoulder abutment (b) Morse taper abutment (c) custom holding device with torque and angle meter attached

Results



		Mean	Std. Deviation	p-value	t-test
Slope	Sloped Shoulder	0.71	0.102	0.05	0.003996109
	Morse Taper	0.3	0.048		
Torque Angle	Sloped Shoulder	41.4	3.176	0.05	0.010522221
	Morse Taper	109	16.88		

Discussion

- Slope shoulder abutment geometry showed a higher curve slope and lower torque angle meaning less degrees of rotation were needed to torque the abutment screw to (35Ncm) compared to the morse taper abutment
- Because of the sloped shoulder abutment geometry, a vertical stop is created, preventing energy loss due to friction between components as seen in the morse taper samples

Clinical Implication

With respect to multiple implant splinted prostheses, these factors can greatly impact the clinical outcome, longevity of the prosthesis, its various components and underlying implants