

Rethinking Finger Torque: Influence of Implant Driver Diameter and Provider Factors

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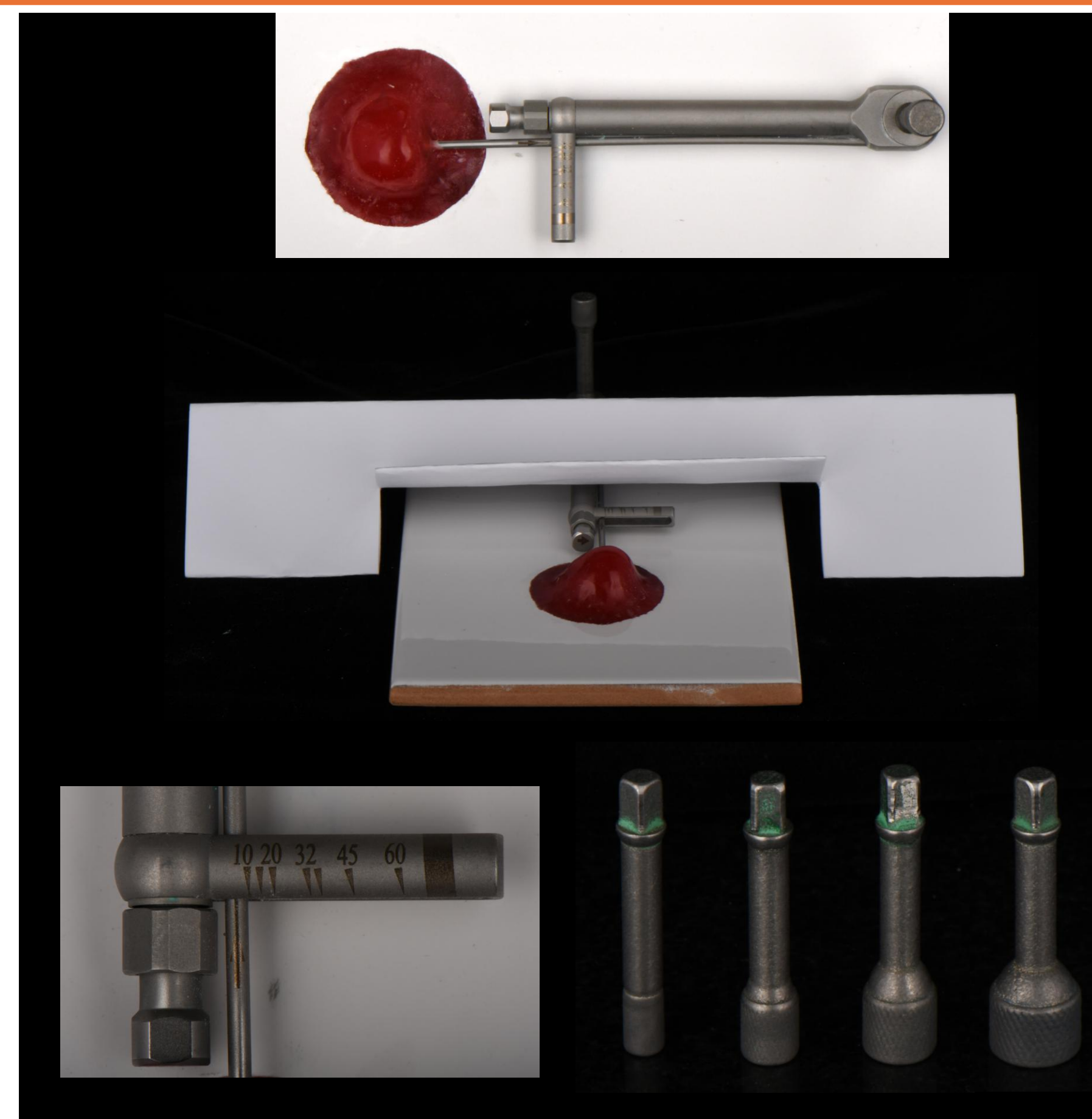
Problem

Implant drivers differ in shape, size, and surface characteristics across manufacturers. For example, Straumann's driver measures 7.0 mm in diameter, whereas Nobel, Zimmer, and Astra provide drivers of approximately 7.8 mm. This variability, combined with provider-related differences, calls into question the reliability of the commonly recommended practice of "finger torquing."

Literature

Studies show that finger-applied torque varies widely. Kanawati et al. measured 11–28 Ncm¹. Alikhasi et al. reported a maximum of 44 Ncm, with higher forces applied to anterior implants². Parnia et al. found males generally exerted more torque than females³. This variation highlights the need for caution with delicate prosthetic components.

Design

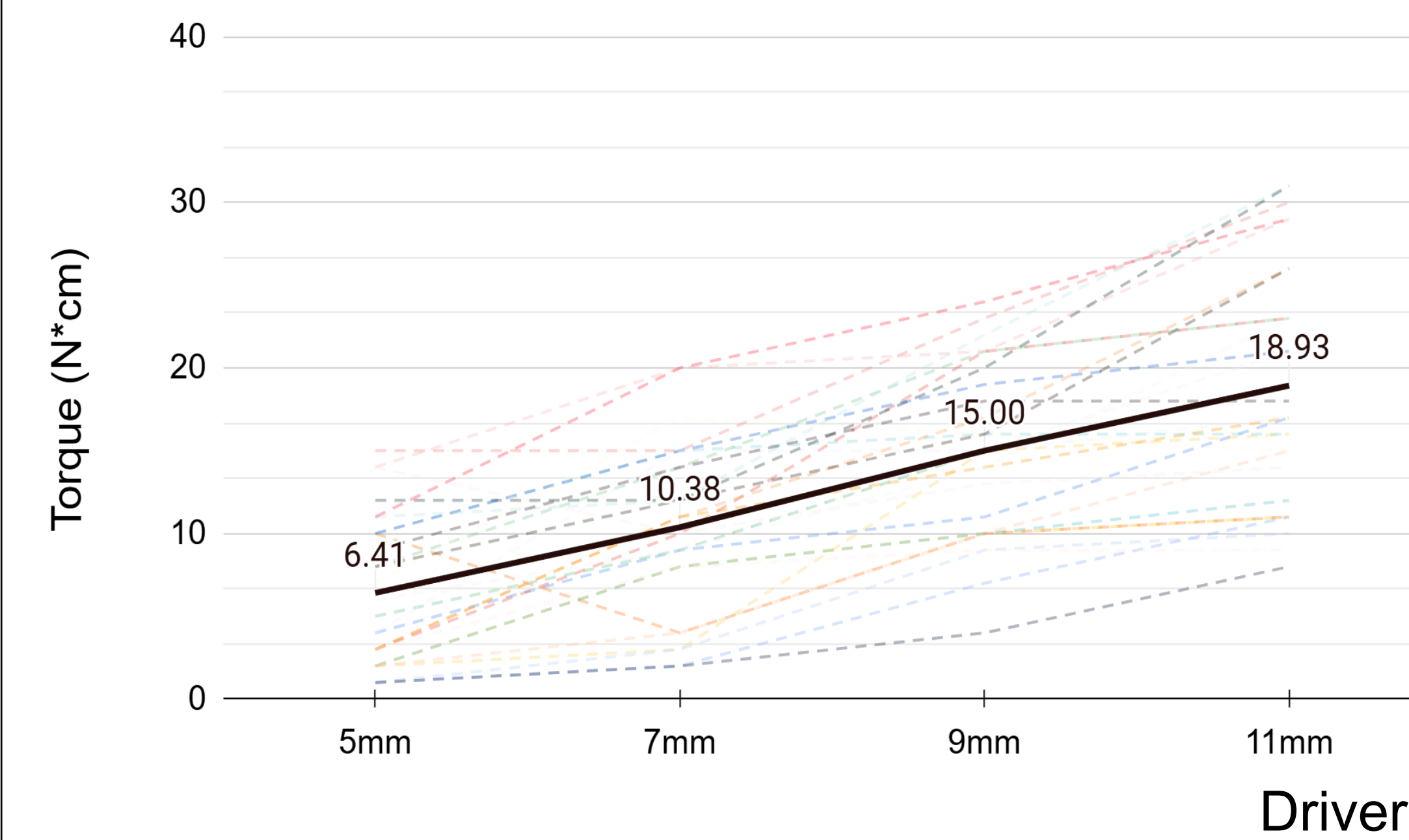


A torque wrench was modified to record applied force and fixated to a ceramic tile. Custom drivers with 5, 7, 9, and 11 mm handles were SLM-printed. A blinder was placed over the wrench and providers applied clockwise torque first as if securing a healing abutment, then at maximum effort. Torque values were recorded along with forearm circumference, sex, specialty, and years of experience.

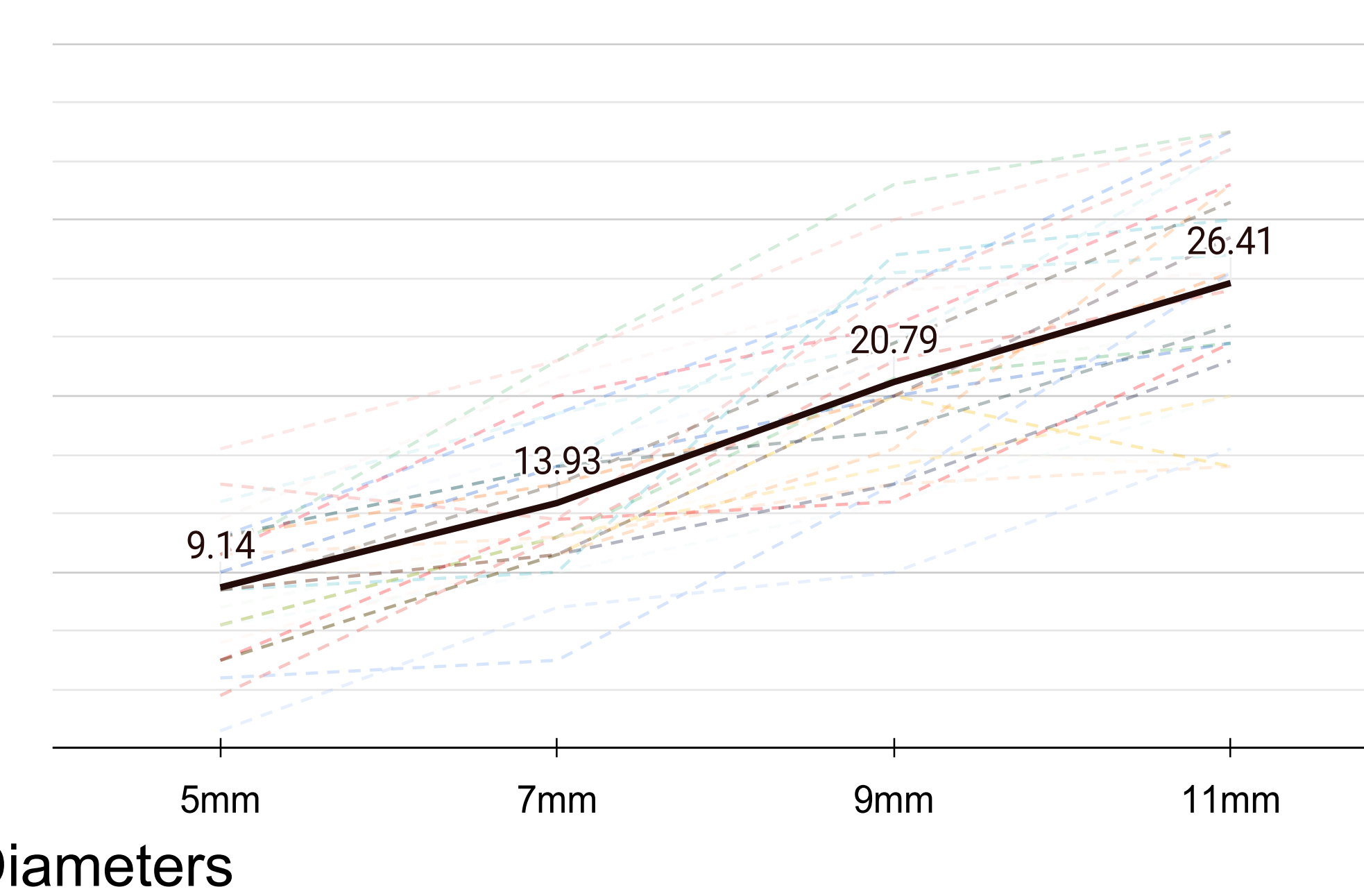
Provider distribution

Prosthodontics: 11
Periodontics: 5
Dental Students: 6
Oral & Maxillofacial Surgery: 7

Securing Torque vs. Driver Handle Diameter

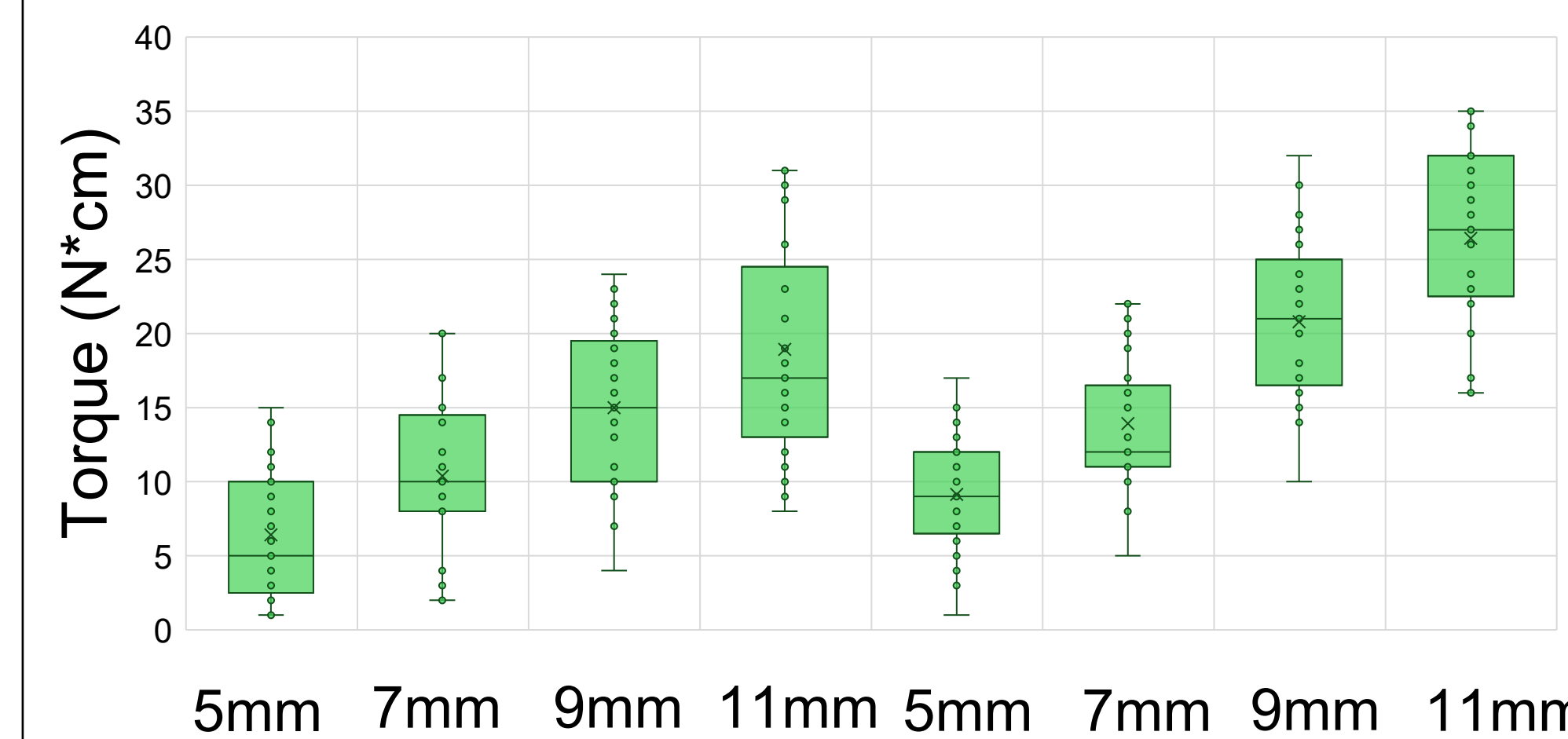


Max Torque vs. Driver Handle Diameter

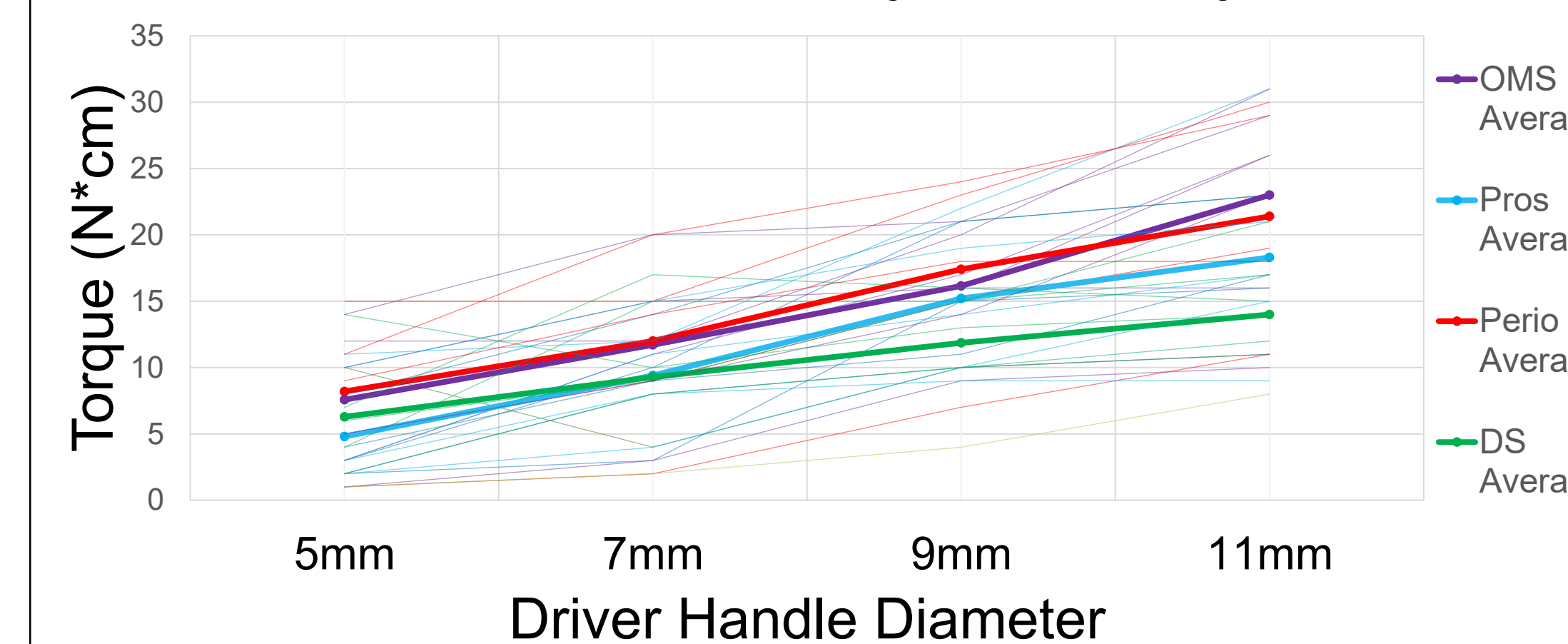


Securing torque and maximum torque across driver diameters. Each line represents one provider; thick lines shows the mean. For both datasets, torque differed significantly across diameters. (Securing: Friedman $\chi^2 = 79.66$, $df = 3$, $p < 0.00001$; Max: Friedman $\chi^2 = 83.6069$, $df = 3$, $p < 0.00001$).

Torque Distribution by Driver Diameter and Task

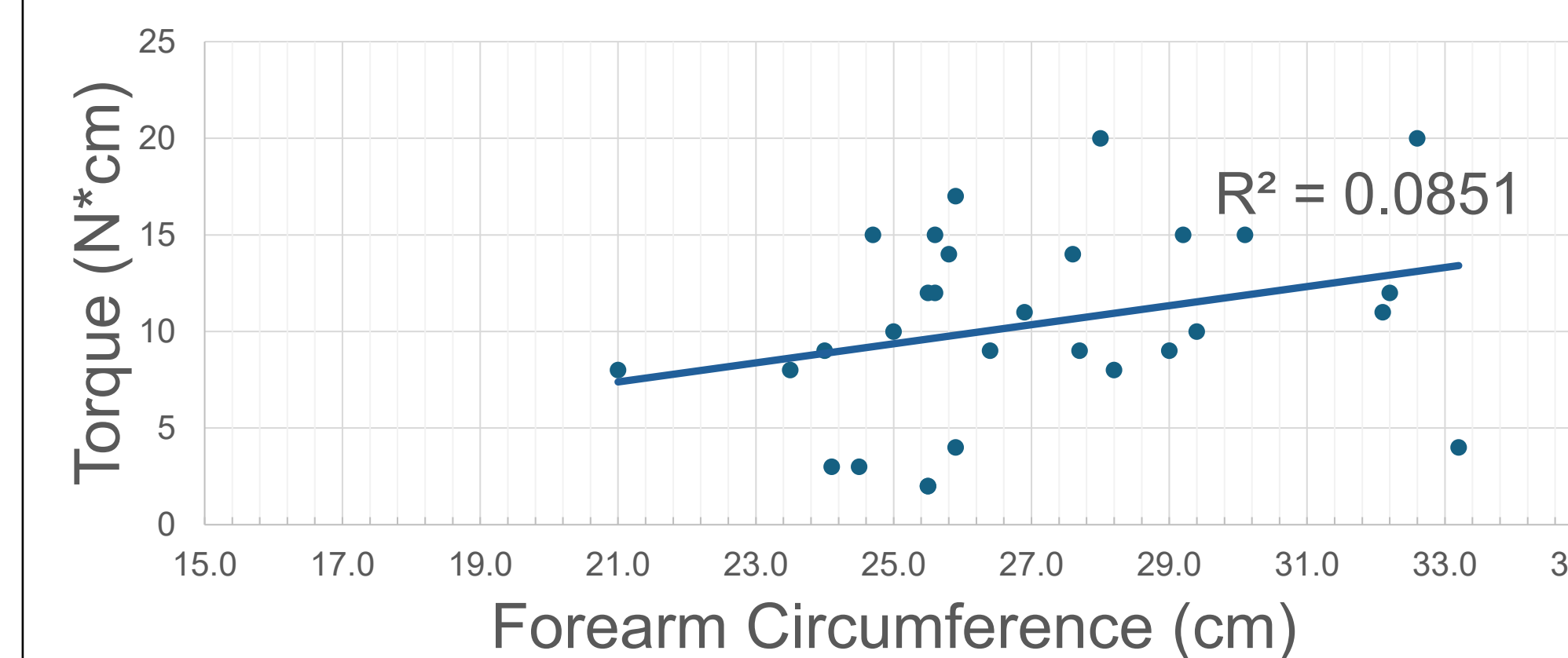


Securing Torque Across Driver Diameters by Specialty



Above: Line graph of torque values across specialties. Although variability was observed, the Kruskal–Wallis test showed no significant differences ($p > 0.05$), indicating that provider specialty did not substantially influence torque performance. (Kruskal–Wallis $H = 2.23$, $p = 0.527$).

Max Torque vs Forearm Circumference for 7 mm Driver

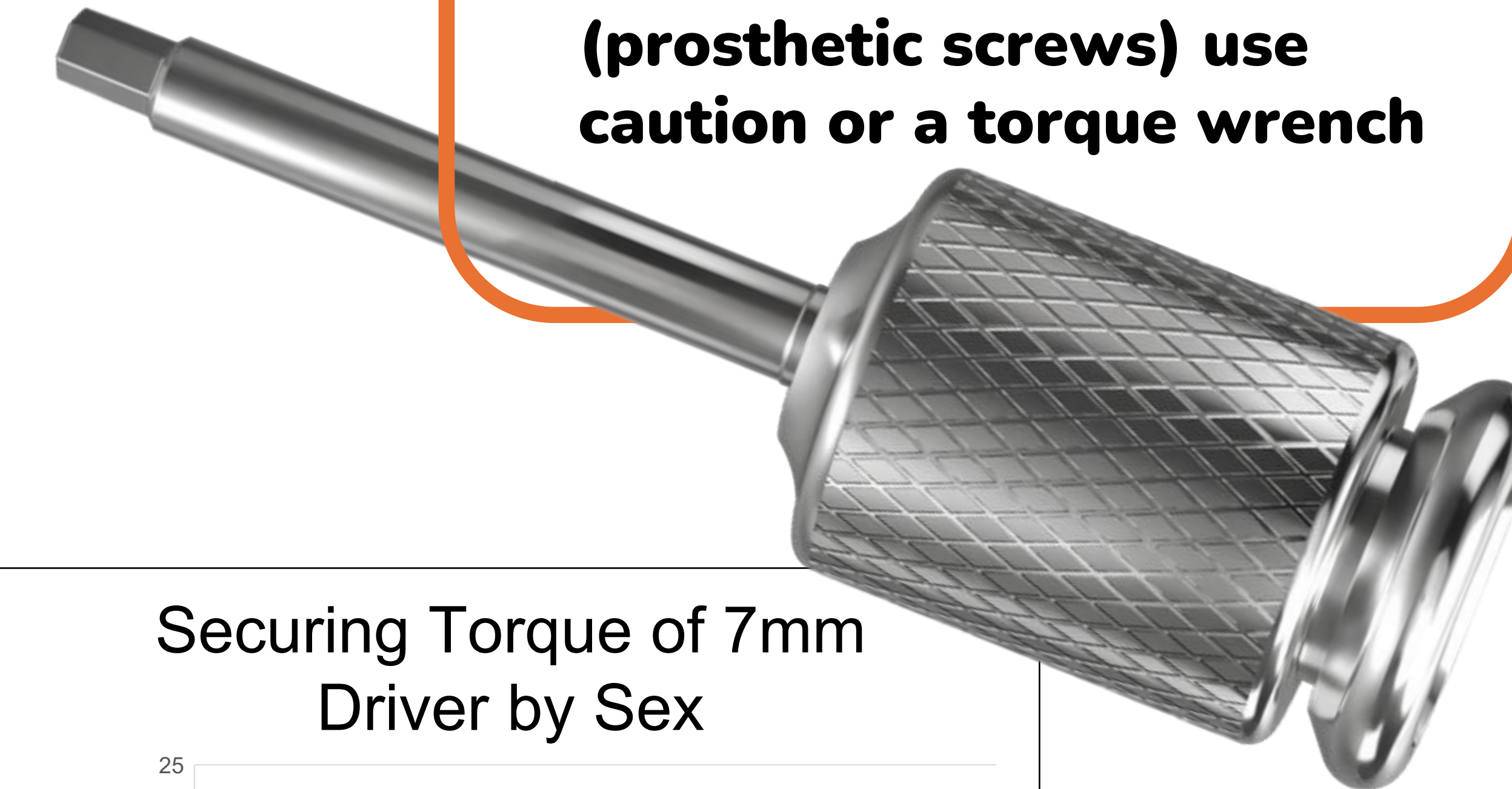


Left: Max torque applied to the 7mm driver versus forearm circumference. Best fit line overlaid. No statistically significant correlation found ($r_s = 0.34895$, p (2-tailed) = 0.06355.).

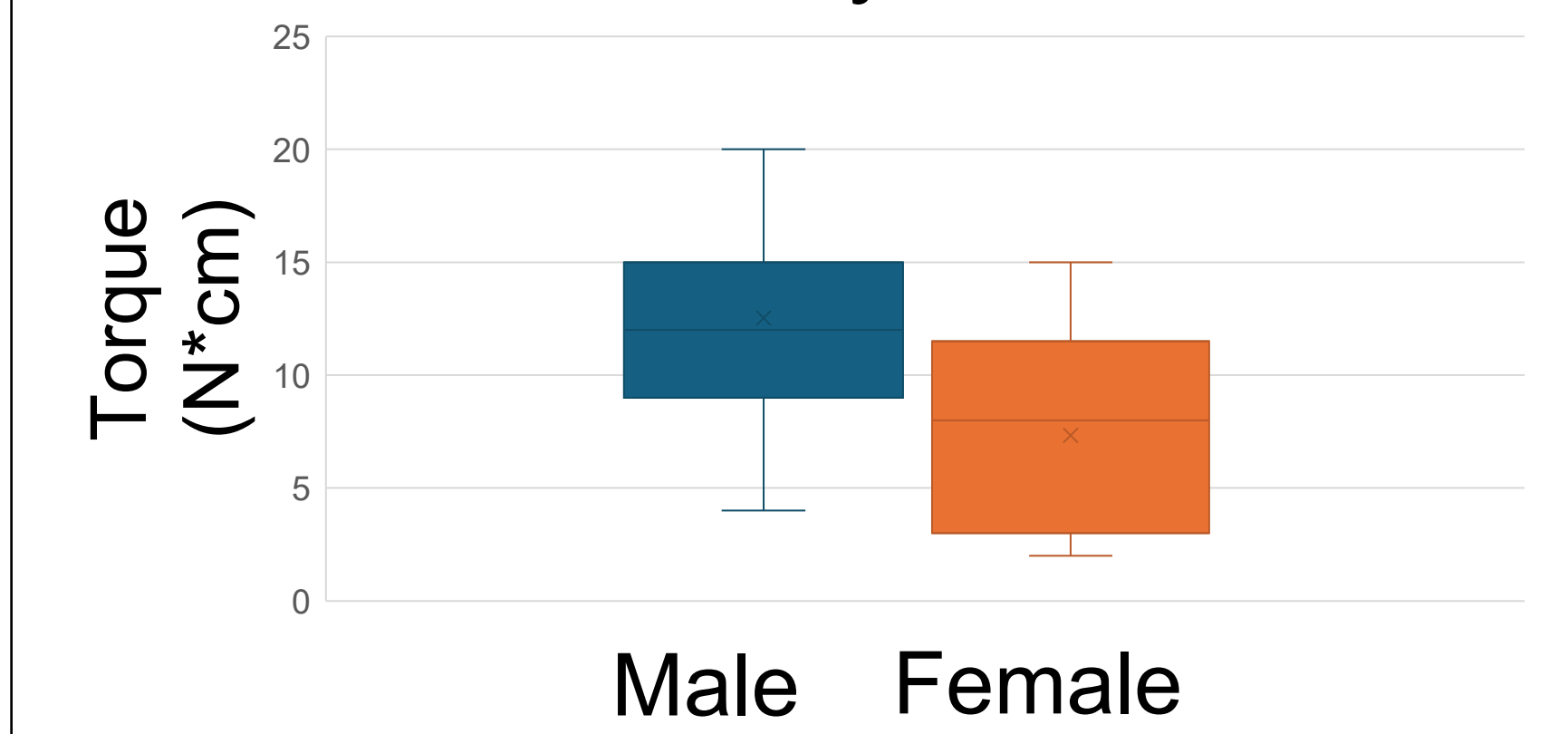


★ Takeaway

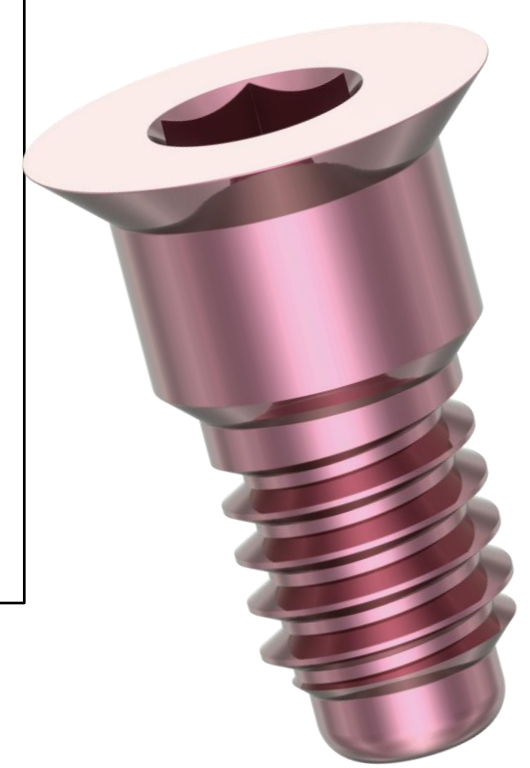
- **Finger strength alone is usually safe**
- **With larger drivers or delicate components (prosthetic screws) use caution or a torque wrench**



Securing Torque of 7mm Driver by Sex



Securing torque with the 7mm driver was higher in males than females (Mann–Whitney $U = 7.5$, $p < 0.05$). Female sample was small ($n = 6$), so results should be interpreted with caution.



Key Findings

1. Torque ranged from 1-35Ncm
2. Greater diameter driver = greater torque
3. No correlation with forearm size
4. No correlation with specialty, nor years of experience
5. Males apply greater force than females

References

1. Kanawati, A.; Richards, M.W.; Becker, J.J.; Monaco, N.E. Measurement of clinicians' ability to hand torque dental implant components. *J. Oral. Implantol.* 2009, 35, 185–188.
2. Alikhasi, M.; Kazemi, M.; Jalali, H.; Hashemzadeh, S.; Dodangeh, H.; Yilmaz, B. Clinician-generated torque on abutment screws using different hand screwdrivers. *J. Prosthet. Dent.* 2017, 118, 488–492.
3. Parnia, F.; Yazdani, J.; Fakour, P.; Mahboub, F.; Vahid Paakdel, S.M. Comparison of the maximum hand-generated torque by professors and postgraduate dental students for tightening the abutment screws of dental implants. *J. Dent. Res. Dent. Clin. Dent. Prospect.* 2018, 12, 190–195.