Re: Clark et al: Magnetic Resonance Imaging of the Globe-Tendon Interface for Extraocular Muscles: Is there an "Arc of Contact"?

To the Editor -

Each EOM normally leaves its *insertion,* wraps around the globe along a *contact arc,* and departs, tangent to the globe (perpendicular to its radius, *departure angle* = 0) at a *departure point,* en route to its connective tissue pulley or trochlea. Recessed muscles, muscles with posterior sutures, and muscles in extreme ipsiversive gaze can unwrap from the globe, lose tangency (departure angle >0), and suffer their oculorotary force reduced by the cosine of the departure angle.

Clark and Demer [1] mean to cast doubt on the contact arc notion. Accordingly, they looked for departure angles >0, but only with eyes in extreme ipsiversive gaze where muscles were unwrapped from the globe, and in abnormal and operated eyes, all cases for which contact arc models would also predict loss of tangency [2]. Their study therefore does not bear on the existence of contact arcs.

Instead of simply measuring departure angles relative to globe tangents, the authors wrongly assert that contact arcs require muscles to take straight paths to their anatomic origins, as though pulleys did not exist, and compare their "actual" departure angles to "predicted" departure angles, determined by globe center (their white pixel "1"), insertion ("2"), and anatomic origin ("4"). Their MRI analysis is consequently spurious.

Looking away from these conceptual errors, one can ask how large the claimed effects were. The largest deviation from tangency reported for normal eyes is 6.2°. The cosine of 6.2° is 0.995, which means that the reduction in oculorotary torque due to loss of tangency is 0.5%. Far from "fundamentally alter[ing] the globe-tendon interface", effects of this size would best be described as "negligible".

Nothing in this paper in any way discredits existing modeling.

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Bibliography

1. Clark RA, Demer JL. Magnetic Resonance Imaging of the Globe-Tendon Interface for Extraocular Muscles: Is There an "Arc of Contact"? Am J Ophthalmol 2018.
2. Miller JM, Pavlovski DS, Shamaeva I. Orbit™ 1.8 Gaze Mechanics Simulation. San Francisco: Eidactics, 1999.