Effect of intravitreal injections and volume changes on intraocular pressure: clinical results and biomechanical model.

Abstract:

PURPOSE: Intravitreal injections are used extensively to treat retinal diseases. Performing an intravitreal injection increases intraocular volume by the amount of fluid brought into the eye. Whether this influences intraocular pressure (IOP) was investigated here. METHODS: A biomechanical model relying on 3-dimensional elasticity theory was developed to determine the short-term effect of volume changes on IOP. We calculated the effect for intravitreal injections of 0.1 ml in myopic, emmetropic and hyperopic eyes. Our calculations were compared with IOP measurements obtained immediately after intravitreal injection of 4 mg triamcinolone in 0.1 ml solution (IVTA) in 22 patients. Shortly after the measurement had been taken, IOP was reduced by paracentesis. RESULTS: Immediately after IVTA, measured IOP was elevated by a mean of 40.6 +/- 12.1 mmHg compared with initial pressure (p<0.001). Measured and calculated IOP were comparable. Eyes with shorter axial length had higher IOP immediately after the injection (p<0.05). CONCLUSIONS: The effect of injected volumes on IOP can be calculated with a biomechanical model. Our results show that paracentesis might be recommended when injecting 0.1 ml of a substance to avoid a short-term increase in IOP. As intravitreal injections are mostly applied in diseases that are due to vascular compromise, it might be
prudent not to impair perfusion in those eyes, even for short periods of time.