DIFFERENTIAL FLOW RATE OF TRIAMCINOLONE AND PRESERVATIVE-FREE TRIAMCINOLONE THROUGH SMALL GAUGE NEEDLES

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PURPOSE

• The most commonly used commercially available steroid preparations used for intravitreal injections are triamcinolone acetonide (TA) (Kenalog 40, Bristol-Myers Squibb, Princeton, NJ) and the preservative-free triamcinolone acetonide (PFTA) (TRIESENCE, Alcon, Inc., Fort Worth, TX) both in the 40-mg/mL formulation.

• The most commonly used needle for the injection of TA is a 27-gauge needle. Smaller gauge needles are avoided because of the possibility of clogging, presumably caused by obstructive accumulation of triamcinolone aggregates in these narrow needles.

• PFTA has been shown to form more aggregates of smaller size than TA.

• We evaluated the differential flow of TA and PFTA through small gauge needles.

MATERIALS AND METHODS

• A hydraulic piston mechanism was utilized to transfer a constant vertical 1kg gravitational force to the horizontally positioned 1cc syringe plunger.

• The 1 kg force was measured during experimental intravitreal injections given by three clinicians (JAF, AAM, TAA).

• A piezo electric pressure transducer was placed between the syringe and needle.

• Specialized software developed with Labview, National Instrument platform, was used to digitize and record the pressure signal over time during an injection of 1cc of TA or PFTA through a 27, 30 or 32 gauge needle.

• All needles were commercially available and 0.5 inches in length. Measurements were performed in triplicate.

• From each set of measurements we deduced the injection rate (ml/sec).

• Injections during which flow stopped prior to complete injection of 1cc, were recorded as having a flow rate of 0.

RESULTS

• Using a 27-gauge needle the mean flow rate of TA was found to be 0.513 cc/sec (+0.064 95% Confidence interval [CI]) and of PFTA 0.620 cc/sec (+0.055 95% CI).

• Using a 30-gauge needle the mean flow rate of TA was found to be 0.06 cc/sec (+0.1 95% CI) and of PFTA 0.180 cc/sec (+0.017 95% CI).

• Using a 32-gauge needle no flow was sustained by TA on any of three attempts and the mean flow rate of PFTA was 0.117 cc/sec (+0.020 95% CI).

CONCLUSION

• PFTA can be injected through a 32 gauge needle but TA cannot.

• The flow rate of PFTA through a 32-gauge is adequate for intravitreal injection, i.e. about 0.1 cc/sec.

• This is consistent with the finding of smaller trimacinolone aggregates in PFTA than TA.

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