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Modified microneedle for suprachoroidal injection of triamcinolone acetonide combined with intravitreal injection of ranibizumab in branch retinal vein occlusion patients

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1

Purpose

The present study evaluated the efficacy of combined suprachoroidal injection of triamcinolone acetonide (TA) using a modified microneedle with intravitreal injection of ranibizumab in branch retinal vein occlusion (BRVO) patients.

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2

Patients and methods

- This is a prospective randomised interventional study that was conducted on 60 eyes of 60 patients with non ischemic BRVO.

- Patients were divided in two groups:

Group (1) included 30 patients who received intravitreal injection of 0.05 mL (0.5 mg) of ranibizumab

Group (2) included 30 patients who received baseline combined intravitreal injection of 0.05 mL (0.5 mg) of ranibizumab and suprachoroidal injection of triamcinolone acetonide (4mg/0.1mL), both groups received monthly injection of ranibizumab on pro- re-nata (PRN) regimen for 1 year duration of the study.

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3

Surgical technique and fashioning of the microneedle

Prior to injection, the patients were prepared by topical fluoroquinolone eye drops (Moxifloxacin hydrochloride 0.5% Vigamox, Alcon, USA) 4 times daily for three days. Pupillary dilatation using Mydriacyl eye drops (Tropicamide 1%, Alcon) was performed first.

Topical anesthetic drop of (Benoxinate hydrochloride 0.4%, Benox, Epico, Egypt) was applied to the ocular surface followed by topical instillation of 10%povidone iodine (Betadine) for lids, eye lashes and periocular area and 5%povidone iodine into the conjunctival sac for three minutes before injection.

In the operating theatre, intravitreal injection of 0.05 mL (0.5 mg) of ranibizumab was done in the inferotemporal quadrant of the conjunctiva 3.5 mm from the limbus.

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4

For suprachoroidal injection, 24 gauge intravenous branula and 30 gauge 1cc insulin syringe (SUNGSHIM MEDICAL CO., LTD, Korea) were used.

Needle was removed from branula and the branula was cut in a way that allows only 1000um of insulin syringe to protrude from the branula edge. Suprachoroidal injection of 0.1 mL (4mg) of Triamcinolone Acetonide (Kenakort) was performed in the superotemporal quadrant 3.5mm from the limbus with bevel pointing backwards.

Slight pressure was done after entry to produce slight scleral dimple, if there was no resistance, the plunger was pushed and injection was done followed by use of cotton tipped applicator to minimize drug reflux.

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5

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6

- Immediate fundus examination was performed following injection and light perception was assured to exclude central retinal artery occlusion. Topical antibiotic drop (Moxifloxacin hydrochloride 0.5% Vigamox) was applied after injection and the eye was patched for several hours.
- The patient was examined the next day after injection to exclude major complications as uveitis, endophthalmitis, elevated IOP, retinal break, retinal detachment and vitreous hemorrhage

7

- PRN Injection of ranibizumab was repeated monthly in case of persistence of intraretinal fluid, intraretinal cysts or subretinal fluid in OCT with central macular thickness more than 250 um or visual loss more than two lines of Snellen chart.
- Primary outcomes were improvement of BCVA and reduction of CMT after 12 months of injection while secondary outcomes were to evaluate the safety of suprachoroidal injection of TA and its ability in reducing the number of injections of anti-VEGF and decreasing patient's injection burden.

8

Results

- The mean±SD of age in group 1 is 52.5 ± 7.5 years while that of group 2 is 54.7 ± 9.02 year, no significant difference as regarding the gender between the two groups, all patients of group 1 needed retreatment, however, 9 patients of group 2 did not need further retreatment after the first injection,
- group 2 with baseline combined injection needed less number of PRN injections (2.47 ± 1.2) compared to group 1 (4.4 ± 1.5) with reported statistical significance (p value <0.001).

9

- In respect to CMT, both groups showed a significant reduction after 12 months of injection with p value<0.001. CMT decreased from 465 ± 99.5 um at the baseline to 213.5 ±15.1 um after 12 months in group 1, and from 542.6 ± 133.3 at the baseline to 211.9 ±10.7 after 12 months in group 2. Patients of group 2 showed more significant reduction of CMT than group 1 after 1 month of injection with p value 0.008, after 12 months, the CMT was quite similar in both groups. Recurrent macular edema was reported to be higher in group 1 compared to group 2

10

- Regarding BCVA, both groups showed significant improvement after 12 months with p value <0.001, the BCVA improved from 1.2 ±0.2 to 0.4±0.1 and from 1.2 ± 0.2 to 0.3±0.09 in groups 1, 2 respectively, group 2 showed more significant improvement in BCVA as compared to group 1 after 6 and 12 months with p values 0.01 and 0.02 respectively.
- 19 patients in group 1 and 25 patients of group 2 gained two or more lines of Snellen chart after 12 months,

11

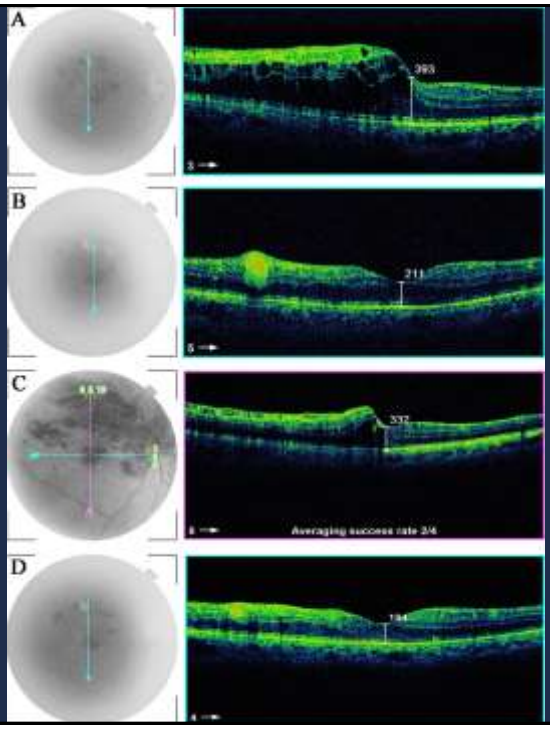
- Concerning changes in IOP after injection, IOP reached its highest level after injection in both groups after 1 month of injection and returned gradually to the normal level at the end of the study duration, the IOP was slightly higher in group 2 (12.7± 0.6) after 12 months with p value 0.03
- Regarding the independent predictors of the final BCVA in both groups, it was detected that the baseline CMT and the number of injections were the main predictors of the final BCVA in group 1 with p values 0.01 and 0.001 respectively, in group 2 the baseline BCVA was the only predictor of the final BCVA with p value 0.01

12

- No cases were transformed into ischemic BRVO during the follow-up period of the study. No cases of cataract progression, endophthalmitis, retinal detachment or serious systemic adverse effects were reported throughout the study period.

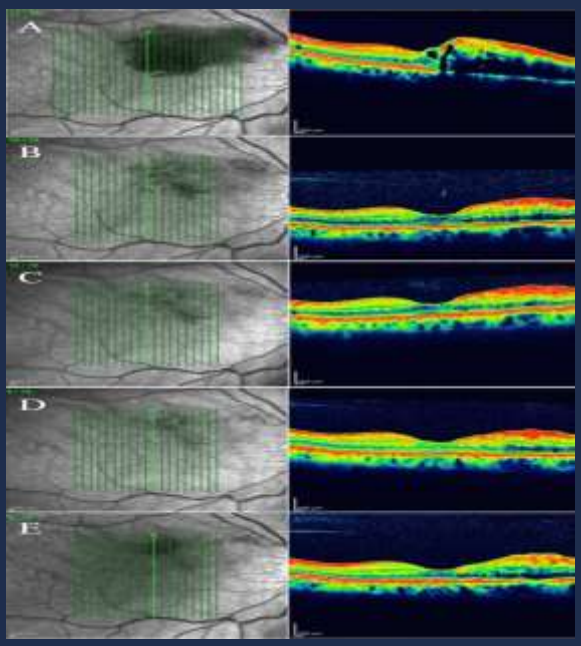
13

Case 1



14

Case 2



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15

Conclusion

- Combined suprachoroidal injection of TA with intravitreal injection of ranibizumab resulted in significant improvement of BCVA and reduction of CMT in BRVO patients after 12 months of injection with less number of PRN injections if compared to intravitreal injection of ranibizumab alone with no recorded ocular or systemic side effects.
- I recommend the use of this inexpensive microneedle designed for suprachoroidal injection of TA in these cases to reduce the financial burden of anti-VEGF injection.

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16

- Nawar, A. E. (2022). Modified microneedle for suprachoroidal injection of triamcinolone acetonide combined with intravitreal injection of ranibizumab in branch retinal vein occlusion patients. *Clinical Ophthalmology*, 1139-1151.

17

Thank you

18