

Original Research Article

Fashioned 25G Cannula for Injection of Heavy Liquid during 23G

Vitreotomy for Primary Simple Rhegmatogenous Retinal Detachment

ABSTRACT

Purpose: To evaluate ease of fashioning of 25G cannula, safety and efficacy of injection of heavy liquid using this fashioned cannula during Vitrectomy for simple Rhegmatogenous Retinal Detachment.

Methods: this is a prospective **non-comparative** case series including 28 cases of simple Rhegmatogenous Retinal Detachment (without PVR, with PVR A, B, and C1). A 25G cannula was fashioned by unbending of a 25G Healon cannula. This cannula was applied on the nozzle of a 5 cc syringe filled with perfluorocarbon liquid, and then the heavy liquid was injected inside the vitreous cavity to reattach a detached retina. The outcome measures were: ease of fashioning of the cannula (no cutting off of the shaft), ease of injection (no resistance), need to replace by a back flush needle, iatrogenic retinal breaks / hemorrhage, retinal reattachment.

Results: the cannula was fashioned easily without cutting off of the shaft in all cases (100%). There was no resistance or interruption of the stream of heavy liquid through the cannula during injection in all cases, and thus no need to replace by an industrialized back flush needle in any case (100%). No iatrogenic retinal breaks or hemorrhages in any case. Complete intraoperative retinal reattachment in all cases (100%).

Conclusion: fashioned 25G cannula is safe and effective for injection of heavy liquids for reattachment of the retina during Vitrectomy for Rhegmatogenous Retinal Detachment. However, further studies are required to evaluate suction function using this fashioned cannula.

Key words: RRD, PVR, Perfluorodecalin, Healon, 23G & 25G cannula.

Heavy liquids are used during Vitrectomy for several purposes. For reattachment of detached retina from posterior to anterior, thus allowing for peripheral laser Retinopexy, and avoiding the hazards of a posterior drainage retinotomy.¹⁻⁶ They are also used for stabilizing the posterior retina to allow for peripheral shaving of vitreous base and addressing peripheral proliferative vitreoretinopathy (PVR). They are used to protect the macula during retrieval of dropped nuclear fragments and in intraocular foreign bodies. They may also be used as hemostatic agents in diabetic Vitrectomy.⁵⁻¹⁰

Heavy liquids are usually injected during 23G Vitrectomy using a manufactured 23G back flush needle. It is a homogenous straight blunt tipped metal cannula 22.2 mm long, with 0.75 mm diameter. It is fitted to the nozzle of a 5cc syringe, which is filled with heavy liquid. Then it is introduced through the trocar cannula to the mid-vitreous. The injection process is always safe on retina. it is smooth and sustained enough to reattach the retina during Rhegmatogenous Retinal Detachment.¹⁻¹⁰

Heavy liquids include: Perfluorodecalin (C₁₀F₁₈), perfluorooctane (C₈F₁₈), perfluorotributylamine, and perfluoroethylcyclohexane. The most commonly used is Perfluorodecalin.

In this study, we are looking for a credible, cheap, safe, and efficient alternative to the back flush needle, which can help whenever the back flush needle is not available for use. This alternative is achieved by fashioning a 25G cannula from Healon cannula used in cataract surgery.

Material and Methods

This is a prospective non-comparative study that was done for 28 eyes of 28 patients with simple Rhegmatogenous Retinal Detachment (RRD). It was carried out at the period from April 2012 to December 2012 at Kasr El Ainy Hospital, Cairo University.

The study and data collection conformed to all local laws and were compliant with the principles of the Declaration of Helsinki. Detailed informed consent was taken from all patients.

Inclusion criteria included: RRD without proliferative vitreoretinopathy (PVR), RRD with PVR A, B, and C1.

Exclusion criteria included: RRD with PVR C2-12, RRD due to Trauma or intraocular foreign body (IOFB), Hypotony (intraocular pressure (IOP) < 6 mmHg), Tractional Retinal Detachment (Diabetic or other causes), Exudative Retinal Detachment.

65 All patients underwent slit lamp examination, IOP measurement using an
66 Applanation Tonometer. Fundus examination was performed using a +90.0 D
67 non-contact lens, and a 3-mirror contact lens.

68 All patients underwent a 4-port 23G pars plana Vitrectomy. The 4th port was used
69 for chandelier illumination. Additional phacoemulsification was performed for
70 phakic eyes. The 25G cannula was fashioned from a Healon cannula
71 (BIOCORNEAL II, 0.5 mm diameter, 22.2 mm long shaft with a bending angle
72 35°, CROMA, Leobendorf, Austria). A 10/0 suture needle holder was used to
73 fashion the cannula by straightening (unbending) of the shaft. This was done at
74 the bending angle point then at the distal part of the shaft (figure 1). This was
75 done gently to avoid cutting - off of the shaft. Then the cannula was fitted to the
76 nozzle of a 5cc syringe filled with heavy liquid. The heavy liquid, which was used,
77 was Perfluorodecalin (Eftiar Decalin, 5 ml vial, DORC, Netherlands). It was
78 injected into the vitreous cavity to reattach the detached retina in all cases. The
79 infusion cannula was closed during the perfluorodecalin injection, and the optic
80 nerve head was observed for pallor and pulsations. All surgeries were done by
81 the same surgeon. They were done in the period between April 2012 and
82 December 2012.



Figure 1: 25G Healon cannula before and after unbending.

The analyzed variables were intraoperative, and they included: ease of fashioning (No cut off), resistance to injection, need to replace by back flush needle, iatrogenic retinal breaks/ hemorrhages, and retinal reattachment.

Statistical analysis was done mainly for the baseline characteristics for the mean, range, and standard deviation, and also paired t-test was done to correlate age and baseline IOP to sex. SPSS package 20 was used.

Results

The study was done on 28 eyes of 28 cases (Table 1), of which 13 eyes were right (46.4%), and 15 eyes were left (53.6%). Fourteen cases (14) were females, and 14 cases were males (F: M = 1:1). The mean age of patients was 35 (range, 17-65 years, standard deviation: 15.17). The lens status was as follows: 15 phakic eyes (53.6%), 10 pseudophakic eyes (35.7%), and 3 aphakic eyes

(10.7%). The mean preoperative intraocular pressure was 12 (range, 8-16 mmHg, SD: 1.97). All the cases were simple RRD, of which 8 cases had no PVR (28.6%), 14 cases had PVR A-B (50%) and 6 cases had PVR C1 (21.4%).

Fashioning of 25G cannula was easy and not time consuming (mean 23 seconds, range 15-27 seconds), the shaft of the cannula wasn't cut off in all cases (100%), however, the shaft was not perfectly straight, and there was a minimal residual bending angle in all cases (100%). The residual bending impeded entry via the trocar at 1 case, and it was further straightened and introduced easily.

The injection of perfluorodecalin went on smooth, and non-pulsatile in all cases (100%). There was no undue gush of perfluorodecalin during the injection, no iatrogenic retinal breaks or retinal hemorrhage in any case (100%). There was no need to replace the cannula by a manufactured back flush needle in any case. Retina was smoothly and properly reattached, from posterior pole to periphery, with the perfluorodecalin in all cases (100%). There was no optic nerve head pulsation or pallor in any case. (Figure 2)



Figure 2: Perfluorodecalin injection using fashioned 25G cannula

Discussion

Although scleral buckle was the standard treatment for most of Rhegmatogenous retinal detachment without significant PVR,^[11,12] primary pars plana Vitrectomy became more commonly used.^[1-6] Heavy liquids are now a substantial tool for 23G Vitrectomy in cases of Rhegmatogenous retinal detachment. They are injected to flatten the posterior pole, allow for proper shaving of vitreous base, prevent retinal incarceration, and thus retina can be flattened and lasered accurately. The instrument, that is usually adopted for heavy liquid injection, is a manufactured back flush needle.^[5-10]

In our study, we fashioned a blunt cannula for the injection of the heavy liquid. We used a 25G healon cannula, not a 23G cannula (Hydroxy propyl methyl cellulose). This is because the unbending of the Healon cannula is never 100% perfect, and thus the straight shaft of the fashioned cannula is never homogenously straight. There is always a residual bending angle. This makes

the overall diameter of the cannula 0.75 mm (23G) rather than the 0.5 mm (25G).

This prevents getting locked at entry or exit through the 23G trocar cannula

system.

The fashioning of 25G cannula was easy without cutting off in any case, because

it was done very gently, using a blunt 10/0 needle holder, it was done on a

relatively resilient cannula (Healon), and the unbending process was mainly at

the distal part of the shaft, and not on the point of bending which may be the

weakest point of the shaft (figure 3).

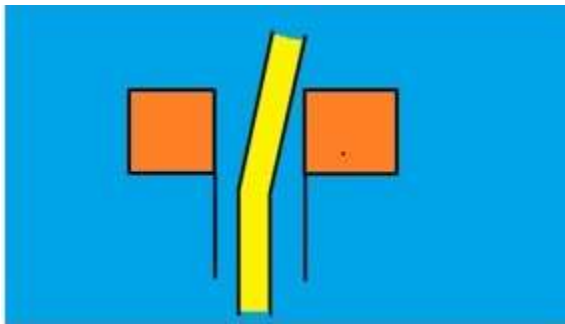


Figure 3: Residual bending of 25G cannula

The injection process went on smoothly because it was an active step, and in the

direction of gravity. Despite the residual bending, the injection was non-pulsatile.

This is because the residual bending didn't occlude the lumen of the shaft.

Retina was properly and smoothly reattached from posterior to peripheral

because of the smooth heavy liquid injection, proper removal of peripheral

vitreous, in addition to the absence of significant PVR C2-5.

147 However, the fashioned 25 cannula was not efficient for passive aspiration of PFC. we had to
148 use the 23G back flush needle (passive aspiration) or the 23G vitreous cutter (active
149 aspiration) for PFC aspiration.

150 Conclusion:

151 The fashioned 25-gauge cannula is safe and efficient for injection of heavy liquid during
152 vitrectomy for retinal detachment. On the other hand, it isn't efficient for suction purpose.
153 Further studies are needed for proper evaluation of all possible use of this
154 fashioned cannula. Further studies are also needed for cheap efficient manufactured instruments (like
155 the Dual Bore cannula) for proper comparison.

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