

Original Research Article

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

Vitrectomy 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 injecting 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, and thus allows for performing 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 sclerotomy to the mid-vitreous. The injection process is always safe on retina, and smooth sustained enough to achieve the target of retinal reattachment during Rhegmatogenous Retinal Detachment.¹⁻¹⁰

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

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

51 **Material and Methods**

52 This is a prospective non comparative study done for 28 eyes of 28 patients with
53 simple Rhegmatogenous Retinal Detachment (RRD). It was carried out from the
54 period of June 2013 to October 2013 at Kasr El Ainy Hospital, Cairo University.

55 The study and data collection conformed to all local laws and were compliant
56 with the principles of the Declaration of Helsinki.

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

59 Exclusion criteria included: RRD with PVR C2-5, RRD due to Trauma or
60 intraocular foreign body (IOFB), Hypotony (intraocular pressure (IOP) < 6
61 mmHg), Tractional Retinal Detachment (Diabetic or other causes), Exudative
62 Retinal Detachment.

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

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



78

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

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

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

86

87 Results

88 The study was performed for 28 eyes of 28 cases (Table 1), of which 13 eyes
89 were right (46.4%), and 15 eyes were left (53.6%). Fourteen cases (14) were
90 females, and 14 cases were males (F: M = 1:1). The mean age of patients was
91 35 (range, 17-65 years, standard deviation: 15.17). The lens status was as
92 follows: 15 phakic eyes (53.6%), 10 pseudophakic eyes (35.7%), and 3 aphakic
93 eyes (10.7%). The mean preoperative intraocular pressure was 12 (range, 8-16
94 mmHg, SD: 1.97). All the cases were simple RRD, of which 8 cases had no PVR
95 (28.6%), 14 cases had PVR A-B (50%) and 6 cases had PVR C1 (21.4%). (Table
96 1)

case	sex	Age	Eye	lens	IOP	No PVR	PVR A,B	PVR C1
1	F	34	R	Phakic	12	*		

2	F	25	R	Phakic	12		*	
3	F	21	R	Phakic	10	*		
4	F	18	L	Pseudophakic	9	*		
5	F	56	R	Aphakic	8			*
6	F	52	R	Pseudophakic	12			*
7	F	41	L	Phakic	14		*	
8	F	40	L	Phakic	14		*	
9	F	24	L	Phakic	16	*		
10	F	29	R	Phakic	12		*	
11	F	60	L	Pseudophakic	10		*	
12	F	29	R	Pseudophakic	12	*		
13	F	23	L	Phakic	12		*	
14	F	18	R	Pseudophakic	14	*		
15	M	65	R	Aphakic	12			*
16	M	62	L	Aphakic	10			*
17	M	54	L	Pseudophakic	14		*	
18	M	42	L	Phakic	12		*	
19	M	18	L	Phakic	10		*	
20	M	21	R	Pseudophakic	16	*		
21	M	20	R	Phakic	12		*	
22	M	17	L	Phakic	10		*	
23	M	24	R	Pseudophakic	10	*		
24	M	27	L	Pseudophakic	12	*		
25	M	34	L	Phakic	12		*	
26	M	39	L	Phakic	14		*	
27	M	52	L	Pseudophakic	14			*
28	M	40	R	Phakic	12			*

Table 1: baseline characteristics

Fashioning of 25G cannula was easy and not time consuming, 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 injection of perfluorodecalin went on smooth, and non-pulsatile in all cases (100%). There was no undue gush of perfluorodecalin during the injection, and thus no iatrogenic retinal breaks or retinal hemorrhage in any case (100%).

There was also 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%). (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 of 23G Vitrectomy in cases of Rhegmatogenous retinal detachment. They are

114 injected to flatten the posterior pole, allow for proper shaving of vitreous base,
115 prevents retinal incarceration, and retinal breaks can be flattened and lased
116 accurately. The instrument that is usually adopted for heavy liquid injection is a
117 manufactured back flush needle.^[5-10]

118 In our study, we are fashioning a blunt cannula for injecting the heavy liquid. We
119 used a 25G healon cannula, not a 23G cannula (Hydroxy propyl methyl
120 cellulose). This is because the unbending of the Healon cannula is never 100%
121 perfect, and thus the straight shaft of the fashioned cannula is never
122 homogenously straight. There is always a residual bending angle. This makes
123 the overall diameter of the cannula 0.75 mm rather than the 0.5 mm diameter of
124 the healon cannula. This prevents getting locked at entry or exit through the 23G
125 trocar cannula system.

126 The fashioning of 25G cannula was easy without cutting off in all cases, because
127 it was done very gently, using a blunt 10/0 needle holder, it was done on a
128 relatively resilient cannula (Healon), and the unbending process was mainly at
129 the distal part of the shaft, and not on the point of bending which may be the
130 weakest point of the shaft (figure 3).

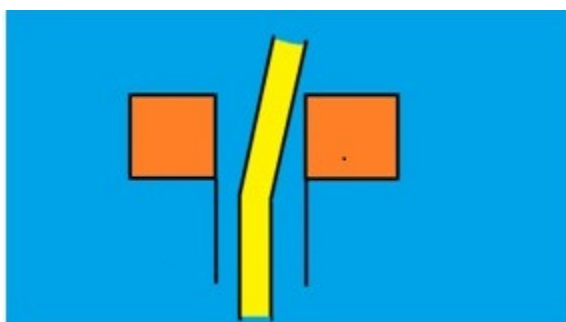


Figure 3: Residual bending of 25G cannula

The injection process went on smoothly because it was an active step, and in the direction of gravity. Despite the residual bending, injection was non-pulsatile 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.

However, when this cannula was used for passive aspiration of perfluorodecalin during fluid air exchange it wasn't efficient. Further studies are needed for a proper evaluation of all possible use of this fashioned cannula.

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