Results in the group of surgical trauma

15 cases with vitreous hemorrhage occured after I.C.C.E. (only one case was combined with subscleral trabeculectomy) were followed for 3 to 8 months. In 14 cases - representing (93%) - that were treated conservatively, vitreous hemorrhage was nearly completely cleared table (38). One case - representing (7%) - needed vitrectomy for a dense persistant hemorrhage that caused a secondary glucoma after 2 months of vitreous hemorrhage onset.

In the 14 cases that cleared spontaneously, 10 cases representing (67%) were completely cleared in 1 - 3 weeks (average 1.8 weeks), and 4 cases representing (26%) were cleared between 8 - 20 weeks (average 14 weeks).

Most of the cases with delayed clearance had a dense intravitreal hemorrhage (+3) degree.

The final visual improvment in this group is shown in table 39.

It is noted that 67% of cases had a final visual acuity between 6/6 - 6/60 (good vision), and 33% of cases had final visual acuity between 6/60 - 1/6 (moderate degree). No patients were in the poor vision degree (H.M. - P.L.).

Cases that had a moderate visual improvment (5 cases) were:

- 2 cases with glucomatous cupping (previous gluacoma)
- 2 cases with very thin posterior vitreous opacity (veils).
- one case with senile macular degeneration.

Table (38) : Incidence of vitreous hemorrhage clearing in 15 cases with surgical trauma (ICCE)

Methods of treatment	Cases cleared in 1-3 weeks No.	%	Cases cleared after 3 weeks No.	%	Total No.	%
Conservative Treatment	10	67%	4	26%	14	93%
Vitrectomy	1	7%			1	7%
Total					15	100%

Table (39) : Incidence of visual improvement in 15 cases with vitreous hemorrhage after surgical trauma (ICCE)

Good		Moderate		Poor		Total	
6/6 - 6/60		6/60 - 1/60		H.M. - P.L.			
No.	%	No.	%	No.	%	No.	%
10	67%	5	33%	------		15	100%

Fig (72a) Ultrasonogram of case (No. 19) 2 weeks after ICCE surgery showing sheats of vitreous hemorrhage located in the posterior cortical vitreous with PVD.

Fig (72b) The same case after 6 weeks showing decreased density of hemorrhage. The thick posterior cortical vitreous caused delayed and incomplete absorption of hemorrhage up to 16 weeks.

Results in diabetic group

23 Cases (with 26 eyes) of diabetic vitreous hemorrhage due to proliferative diabetic retinopathy (PDR), were followed up for 6 to 30 months (average of 13 months). Their personal and clinical data were:

- The age ranged from 21 - 66 years, with average (49.7) years.
- Duration of diabetes ranged from 9 - 26 years, with average (16.3) years.
- The type of therapy at the time of the study was insulin dependant in 20 patients (87%), and non-insulin dependant in (13%).
- The treatment was regular and/or the blood glucose level was controled in (61%), and the treatment was irregular and/or the blood glucose level was not controled in (39%) of cases.

As for retinal photocoagulation before the onset of vitreous hemorrhage, 3 of 26 eyes representing (12%) received 3 sessions (complete PRP), 6 of 26 eyes representing (23%) received one or two sessions (incomplete PRP), and 17 of 26 eyes representing (65%) were never treated before.

As for the incidence of proliferative diabetic retinopathy (PDR) in the fellow eye, 22 cases representing (98%) has a PDR in the fellow eye, 3 of them developed vitreous hemorrhage during the time of the follow up.

Hemorrhage more than one time (reccurent) occured in 17 eyes representing 65%.

Time of onset of vitreous hemorrhage was on awakening of sleep or during rest in 19 eyes representing 73%.

Results of treatment :

All cases were initially treated conservatively. Then according to microsurgical equipment availability in the first place, and according to indication in the second place cases were classified into:

- 14 eyes representing (54%) were operated upon by vitrectomy.
- 7 eyes representing (27%) were treated by anterior retinal cryotherapy (2 cases developed tractional R.D. had been shifted to vitrectomy).
- 7 eyes were followed up under conventional methods of treatment.

Results of vitrectomy:

On the view of previous studies about timing of vitrectomy in cases of diabetic vitreous hemorrhage, 14 eyes were classified into:

- Early vitrectomy group (5 eyes) were operated at 1 - 3 months after the onset of vitreous hemorrhage.
- Deffered vitrectomy group (9 eyes) were operated at 7 - 24 months after onset of the first attack of vitreous hemorrhage

Table (40) shows the result in 5 eyes with diabetic vitreous hemorrhage managed by early vitrectomy.

Table (41) shows the result in 9 eyes with diabetic vitreous hemorrhage managed by deffered vitrectomy.

Table (42) shows the incidence of final visual outcome in the early and deffered vitrectomy groups.

It is noted that the incidence of intraoperative difficulties and complications and also the postoperative complications were greater in the differed group.

The incidence of Intraoperative accidental retinal tears and the incidence of postoperative R.D. occured with the same frequency (44%) in the deffered vitrectomy group, while postoperative RD was found in 20% of cases in the early vitrectomy group.

Postoperative reccurent vitreous hemorrhage occured in 33% in the deffered vitrectomy group, while it occured in 20% in early vitrectomy group.

Postoperative discovery of maculopathy (diabetic maculopathy, surface wrinkling maculopathy or macular distortion) was found in 55% (5 out of 9 eyes) in the deffered vitrectomy group and in 20% (one out of 5 eyes) in the early vitrectomy group.

The final visual recovery was better in the early vitrectomy group; Where 80% of eyes were in the range of good vision (6/6 - 6/60) and 20% were in the range of moderate vision (6/60 - 1/60).

- In the deffered vitrectomy group, 22% of eyes were in the range of good vision, 67% were in the range of moderate vision and 11% were in the range of poor vision (H.M. - P.L.).

Incidence of previous receiving of laser therapy (retinal photocoagulation) was in 60% of eyes in the early vitrectomy group and in 22% of eyes in the deffered vitrectomy group.

Table (42) : Incidence of final visual outcome in the early and deffered vitrectomy in cases with diabetic vitreous hemorrhage

Timing of vitrectomy	No. of cases	Good 6/6 - 6/60		Moderate 6/60 - 1/60		Poor H.M. - P.L.	
		No.	%	No.	%	No.	%
Early	5	4	80	1	20	-	-
Deffered	9	2	22	6	67	1	11

Fig (73a) Ultrasonogram of a diabetic case with PDR and mild vitreous hemorrhage, showing ERM formation and post pole traction RD. The case was operated on by early vitrectomy (2 months after onset of hemorrhage).

Fig (73b) Postoperative fundus photography of the same case. The remaining fibrous stalk is seen infront and nasal to the optic disk as a white spot (upper Fig.). Postoperative photocoagulation was applied (lower Fig.).

Fig (74a) Ultrasonogram of an eye with PDR showing posterior central traction RD (X shaped) and cone shaped PVD lined with mild vitreous hemorrhage. Early vitrectomy one month after hemorrhaging was carried out.

Fig (74b) Postoperative fundus photography of the same eye. The white area is the cryopexy mark for iatrogenic retinal break.

Fig (75a): Preoperative fundus photography of a case with PDR (case No. 38) photographed between attacks of vitreous hemorrhage. Fibrous proliferation covering the area between macula and optic disk is evident. Central traction RD developed later. The case was operated on by deffered vitrectomy (after 8 months).

Fig (75b) Postoperative fundus photography of the same case showing that ERM has been excised (delaminated) and the remaining fibrous stalk is covering the optic cup. Postoperative laser marks are evident under the encircling band.

Fig (75c) Fundus photography of the same case 3 months later. ERM formation and traction RD developed. The fibrous stalk was then moved temporal to the optic disk by traction.

Fig (76a) Fundus photography of a case with PDR (case No. 35 right) between attacks of reccurent hemorrhages showing the advanced fibrovascular proliferation that later resulted in traction RD.

Fig (76b) Postoperative photography of the same case operated by deffered vitrectomy (12 months) showing the segmented ERMs. Macular distortion affected the postoperative visual acuity.

Results of cryotherapy :

7 Cases with reccurent and persistant diabetic vitreous hemorrhage were treated by transscleral peripheral retinal cryotherapy. They were followed up for 6 - 30 months with average of 13.8 months duration.

Table (43) shows the result of treatment with anterior retinal cryotherapy in 7 cases with diabetic vitreous hemorrhage.

Fig. (77) shows the incidence of hemorrhage clearance and the incidence of postoperative reccurrence in the treated cases.

It is noted that 6 out of 7 cases representing 86% had complete or partial vitreous clearing. 3 cases showed complete clearing and 3 cases showed partial clearing with incidence of 43% in each. one case representing 14% remained unchanged.

In cases showed complete clearing, one case cleared after (6 weeks) and the other 2 cases cleared after (9 weeks).

In the postoperative follow up period, 2 cases showed reccurence of vitreous hemorrhage, 2 cases developed tractional R.D. with incidence of 28% in each, one case showed macular oedema and one case showed superficial punctate keratopathy with corneal oedema.

2 cases with rubeosis iridis showed postoperative regression of the iris neovessels.

Fig. (77) : Incidence of vitreous clearing in diabetic vitreous hemorrhage treated by peripheral retinal cryotherapy

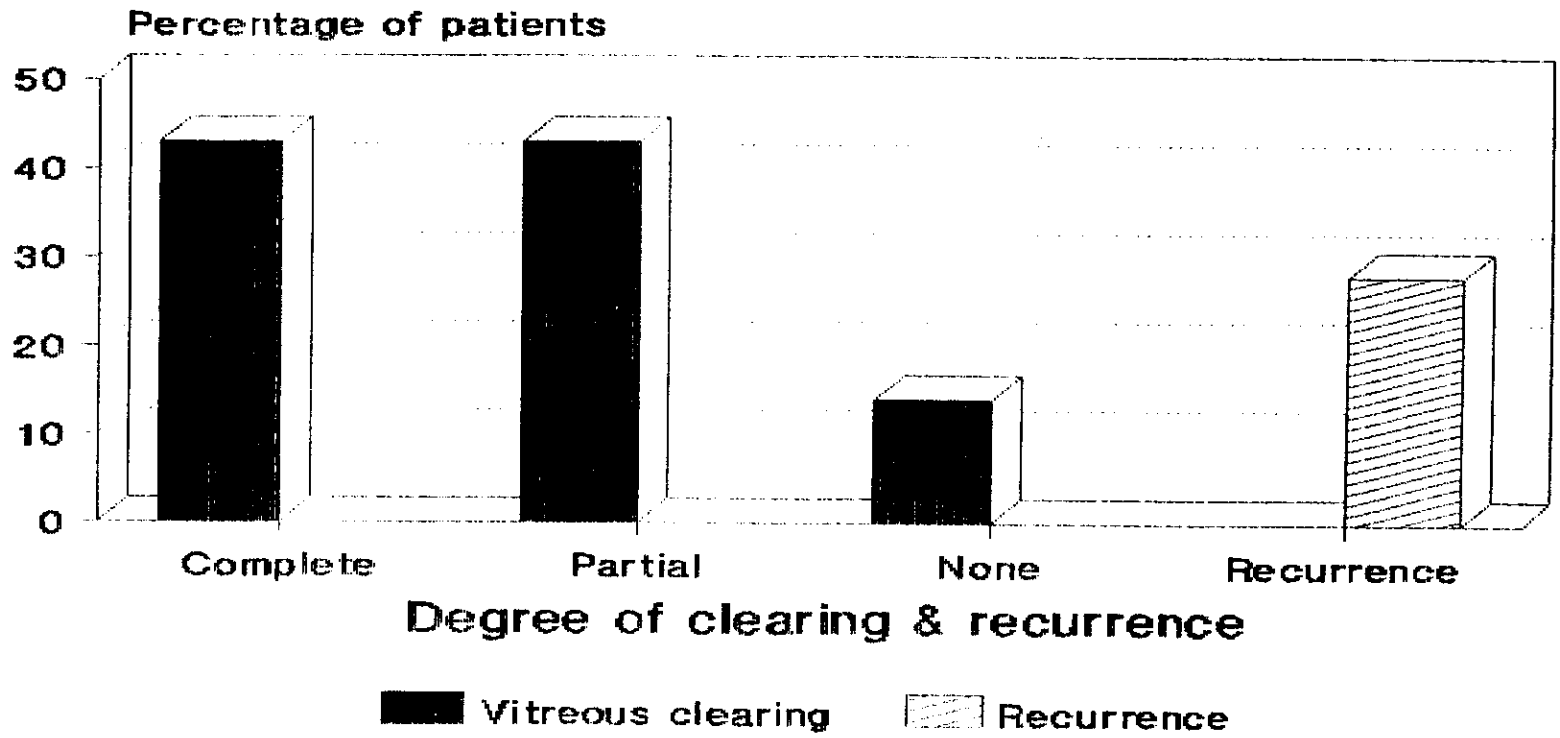


Fig. (78) shows the incidence of visual improvment in 7 cases of persistant diabetic vitreous hemorrhage treated by peripheral retinal cryotherapy.

It is noted that the best corrected visual acuity was improved in 58% of cases (4 out of 7 cases), remain unchanged in 14% and worsen in 28%.

75% of cases that showed improved visual acuity were previously treated with variable degree of retinal photocoagulation.

Fig. (78) : Incidence of visual improvment in cases of diabetic vitreous hemorrhage treated by cryotherapy

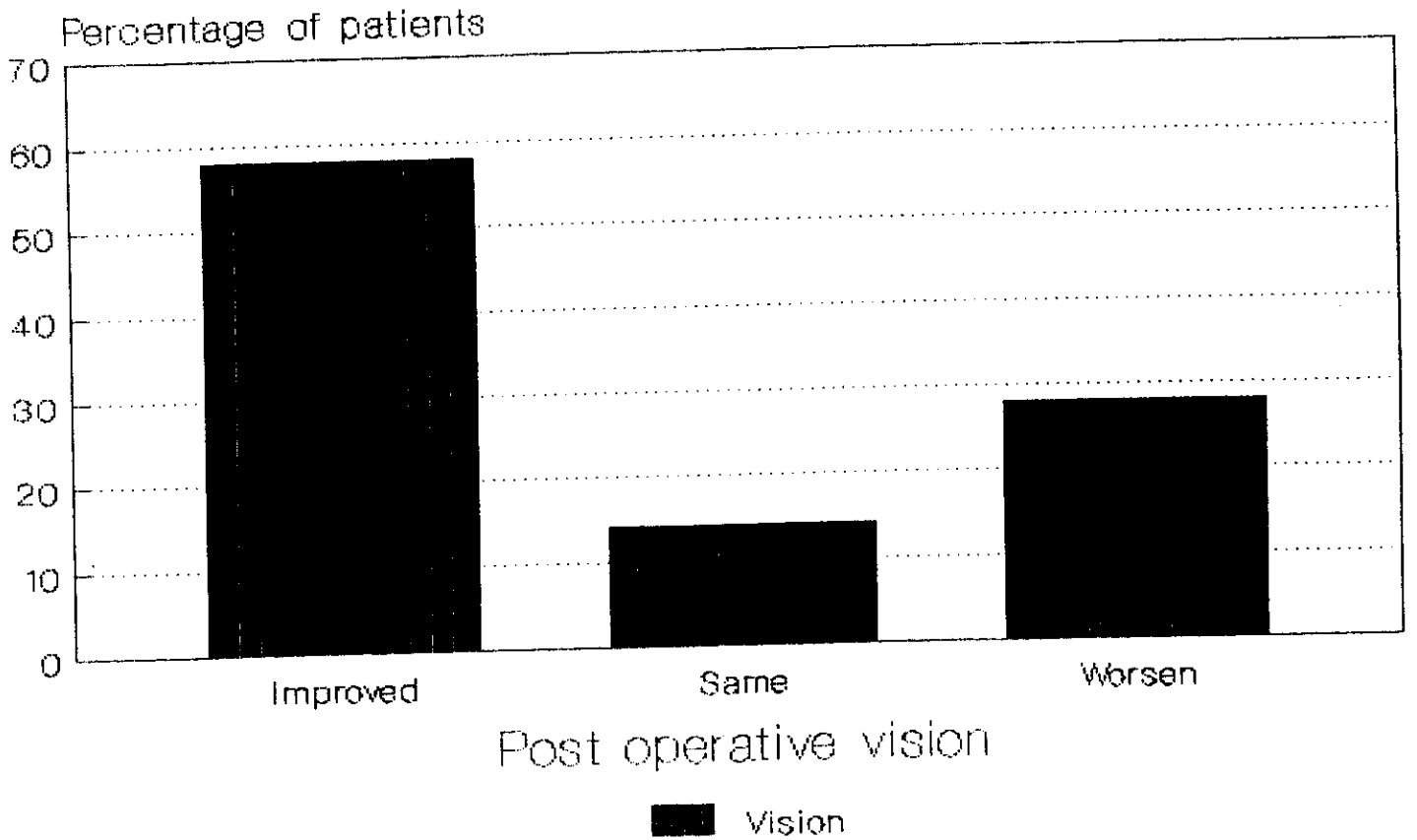


Fig (79a) Fundus photography in a diabetic case with reccurent non clearing vitreous hemorrhage showing a subhyaloid (fluid level) and an intravitreal hemorrhage. The case was treated by anterior retinal cryopexy.

Fig (79b) Ultrasonogram of the same case few weeks after retinal cryotherapy where no fundus details were yet cleard showing central traction RD. Fundus photography was taken after partial clearing. The case was later operated on by vitrectomy.

Results of conventional treatmemt:

6 cases (with 7 eyes) with different grades of diabetic vitreous hemorrhage were followed up for (6-18) months, average (14.5) months. The duration of diabetes ranged from 11-20 years, (average 14 years).

- 83% of cases were insulin dependant and 17% were non insulin depandant. Their age ranged from (25-56 years) with average of 48 years
- 50% of cases gave history of irregular theraputic regimen or irregular control of blood sugar level.

Table (44) shows the results of conventional methods of treatment in 7 eyes with diabetic vitreous hemorrhage.

Table (45) shows incidence of visual improvement in conventionally treated eyes with diabetic vitreous hemorrhage.

It is noted that 57% (4 of 7 eyes) showed a variable degree of hemorrhage absorption, and 43% (3 eyes) showed a reccurent and persistant hemorrhage.

Rubeosis iridis and neovascular glaucoma developed in 57% of cases (4 cases), none of them was previously treated by laser photocoagulation. Neovascular glaucoma was intractable in most of the cases.

Tractional R.D. developed in 3 cases, and tangential contraction of epiretinal membrane (ERM) occured in one case (4 cases representing 57%). Systemic hypertension was associated in case (48) with bilateral vitreous hemorrhage. The hemorrhage was very recurrent and persistant in the left eye. The right eye previously treated by PRP showed no recurrence.

Case (49) had associated chronic myaloid leukaemia, it showed severe rubeosis iridis with neovascular glaucoma.

- In 71.5% of eyes (5 eyes) there was no history of previous retinal photocoagulation before the onset of hemorrhage. In the other 2 eyes, case No. (47) had incomplete PRP, and case No. 48 (right) had a complete PRP 3-4 days before the onset of hemorrhage (photocoagulation could be a precipitating trauma).

- 43% of eyes (3 eyes) showed visual improvment up to the last visit (16-18 months), 28.5% (2 eyes) remained unchanged and 28.5% (2 eyes) worsened.

- The range of final visual improvment was;
  - 14% of eyes were in the good range (6/6 - 6/60)
  - 28% of eyes were in the moderate range (6/60 - 1/60)
  - 57.5% of eyes were in the poor range (H.M. - P.L.)

Table (45) : Shows the incidence of visual recovery in eyes with diabetic vitreous hemorrhage treated with conventional methods.

Cases total No.	Good (6/6 - 6/60) No.	%	Moderate (6/60 -1/60) No.	%	Poor (H.M. - P.L.) No.	%
7	1	14	2	28.5%	4	57.5%

Fig (80) Anterior segment photography in a case with PDR and vitreous hemorrhage that was treated by conventional methods for more than 12 months (case No. 35 left) severe neovascular glucoma had developed. Excessive fibrovascular proliferation had pulled the pupillary margin and nearly one half of width of iris inwards.

Fig (81) Fundus photography of a diabetic case that was treated conventionally for PDR and mild vitreous hemorrhage. Subhyaloid hemorrhage (upper) and limited areas of fibrovascular proliferation (lower) are evident. Laser therapy (PRP) was later applied and the case was stabilized. Post laser contraction of ERMs affected the central vision (case 45).

Table (46) and figure (82) shows the incidence of of visual recovery in 23 cases with diabetic vitreous hemorrhage treated with different methods.

It is noted that the best visual recovery was in the vitrectomized eye group (Total of 14 eyes) where 93% of eyes were in the good to moderate range of vision (6/6 - 6/60) & (6/60 -1/60) and only 7% of eyes were in the poor range (H.M. - P.L.).

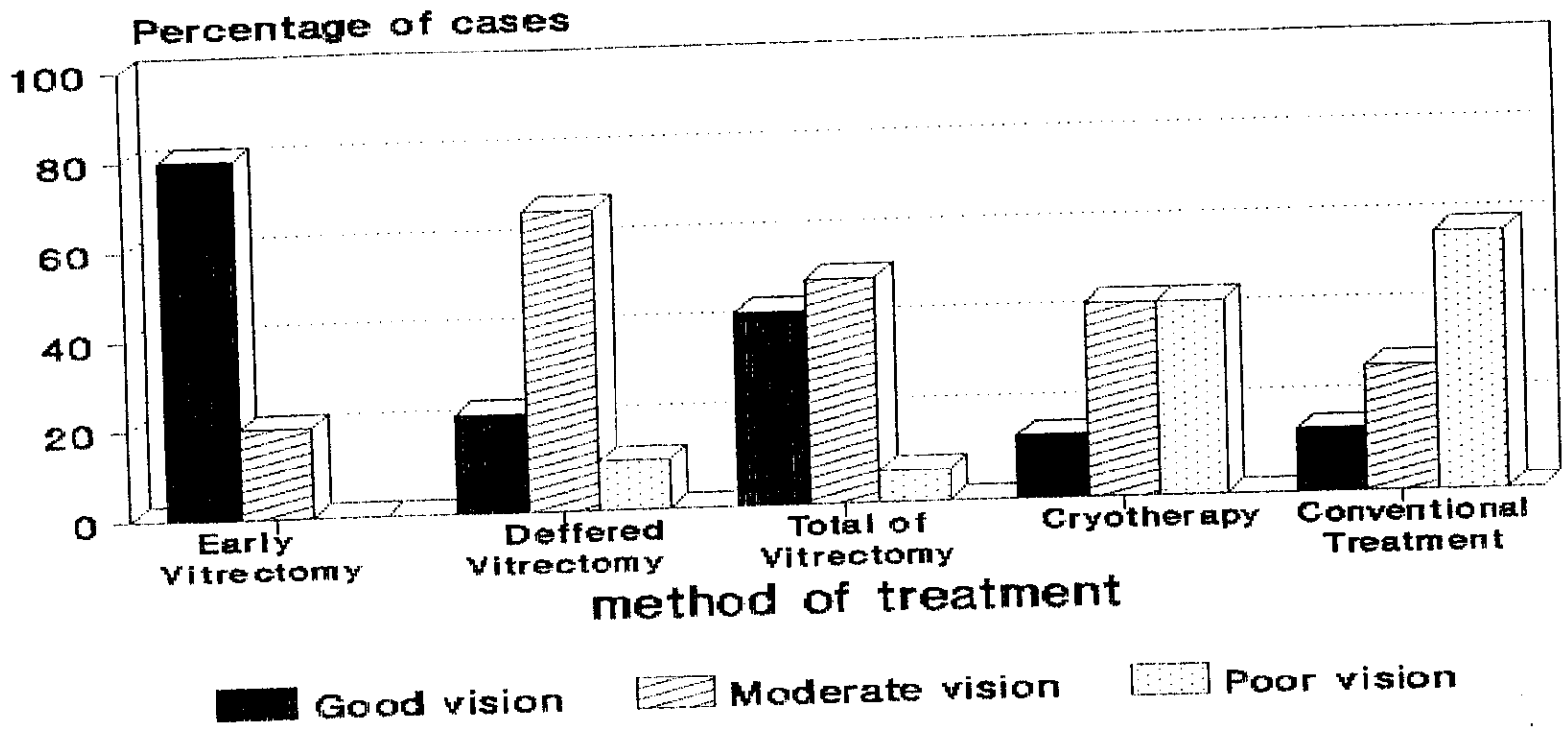
The next was the group of eyes treated by peripheral retinal cryotherapy, where 57% of eyes were in the good to moderate range, and 43% of eyes were in the poor range.

The worst group was the conventionally treated eyes, where 42.5% of eyes were in the good to moderate range, while the rest of eyes (57.5%) were in the poor range.

Table (46) incidence of visual recovery in 23 cases of diabetic vitreous hemorrhage treated with different methods

Methods of treatment	No. of eyes	Good (6/6 - 6/60)		Moderate (6/60 - 1/60)		Poor (P.M - P.L.)	
		No.	%	No.	%	No.	%
Early vitrect.	5	4	80	1	20	-----	
Deffered vitrect.	9	2	22	6	67	1	11
Total vitrect.	14	6	43	7	50	1	7
Retinal cryothera.	7	1	14	3	43	3	43
Conventional ttt.	7	1	14	2	28.5	4	57.5

Fig. (82) : Histogram representing the incidence of different grades of visual recovery in diabetic cases



Results of the group of spontaneous non diabetic hemorrha

18 cases (19 eyes) their ages ranging from 27 to 70 years with average of 44 years. 9 out of 18 (50%) of the cases developed vitreous hemorrhage as a result of retinal tear formation (posterior vitreous detachment with collapse).

90% of the cases with retinal tear were below the age of 45 years with average of 42.5 years.

Table (47) shows the results in 9 cases of vitreous hemorrhage due to retinal tear (PVD with collapse).

It is noted that mycpia was present in 55% of cases (5 out of 9).

PVD was evident either clinically (biomicroscopically) or with aid of ultrasonography in about 90% of cases (8 out of 9 cases).

There was a postive history of vitreous hemorrhage and RD surgery in the fellow eye in one case (11%) case No. 60.

Retinal tear could be visible and properly managed in about 78% of cases (7 out of 9 cases) in a period of 1-3 weeks of onset of hemorrhage (average 2.3 weeks). The majority of cases had a mild and a moderate grade (+1) (+2) of hemorrhage. Fundus details could be visualized within 2 to 6 weeks enough to perform a retinal reattachment procedures in cases that developed RD.

Vitrectomy was needed in 22% of cases (2 out of 9) because of non visibility of tear up to 4 weeks.

All cases had postoperative improved visual acuity. 8 cases were found to have a final visual acuity between (6/9-6/60). One case (No. 74) had 5/60 visual acuity because of postoperative macular pucker and fine remnants of vitreous opacity.

Table (48) shows the results in 9 cases (10 eyes) with spontaneous non diabetic vitreous hemorrhage due to different etiological entities.

9 out of 10 eyes had a moderate to dense grades of vitreous hemorrhage (+2) and (+3).

70% of eyes (7 out of 10) showed hemorrhage organization and non absorption up to very long periods (4-24 months), 2 eyes absorbed in 7-12 weeks, and one eye (aphakic) absorbed in 2 weeks.

The only associated finding in 2 eyes with idiopathic vitreous hemorrhage was PVD, one eye was aphakic and the other sowed arteriosclerotic changes with marked A-V crossing signs.

Eyes with retinal vasculitis (3 eyes in 2 cases) showed severe vitreous hemorrhage. Case No. (69) showed bilateral reccurent attacks of hemorhage which became dense and persistant. Signs of ocular hemosederosis were evident on the anterior lens capsule. The case was tuberculin (+ve) with high suspicion of being Eale's disease.

3 out of the 7 eyes with organized vitreous hemorrhage underwent vitreous surgery after 8-14 months duration. One of these cases had a postoperative poor visual acuity (C.F.)

because of extensive retinal ischemia that developed after ischemic retinal vein occlusion (case No. 66). The other two cases; case No. (65) had a good visual recovery (6/18) and case No. (71) had a limited improvment (4/60) due to presence of disciform macular scar.

4 eyes did not find a chance for vitrectomy and they were either lost follow up or became relatively inoperable after such long periods with associated tractional RD.

The final visual acuity of this group was far more less than the group of spontaneous vitreous hemorrhage due to retinal tear.

Fig (83) Postvitrectomy anterior segment photography and fundus photography of case (55), vitreous hemorrhage had occured after a sudden rise of blood pressure, and remained unabsorbed for 14 months. The incomplete red reflex because of the residual anterioperipheral opacified vitreous.

Fig (84) Postvitrectomy fundus photography of case (71). The cause of hemorrhage was clinically and sonographically uncertain untill postoperative appearance of disciform macular scarring that confirmed the diagnosis of age related macular degeneration as a cause of vitreous hemorrhage.

Fig (85a) Photo slitlamp of case (69) with bilateral old-standing massive vitreous hemorrhage due to retinal vasculitis. Dots on the anterior capsule demonstrating ocular hemosedirosis.

Fig (85b) Slitlamp photography of the same case demonstrating the organized vitreous hemorrhage and fibrous proliferation extending anteriorly to the retrolental space.

Fig (85c) Ultrasonogram of the same case showing dense vitreal membrane formation and the funnel shaped total RD.

Fig (85d) Non-recordable bright flash ERG of the same case confirming the presence of total RD.

Fig (86a) Fundus photography of case (72). Spontaneous delayed absorption of vitreous hemorrhage occured after 7 months. There was a history of CRVO 4 months before vitreous hemorrhage.

Fig (86b) FFA of the same eye demonstrating cystoid macular oedema and dialated leaking capillaries causing focla retinal oedema and papilloedema.

Fig (87) Ultrasonogram of a case with idiopathic vitreous hemorrhage in an aphakic eye (case No. 63). Hemorrhage was nearly completely cleared within 2 months. The only abnormal finding in this case was the PVD seen in the sonogram lined with sheats of moderate amplitude echo vitreous hemorrhage.

Fig (88) Fundus photography of the fellow eye in case No. (70) with idiopathic vitreous hemorrhage in a senile phakic patient demonstrating atherosclerotic changes . Fundus photography in the affected eye was difficult to get due to the incomplete spontaneous resolution up to 12 months follow up.