Arch. Soc. Oftal. Optom. (1984)-18-277

Forum Ophtalmologicum Centenarii
marzo/84

PARS PLANA VITRECTOMY - TREATMENT OF DIABETIC RETINOPATHY COMPLICATIONS

GEORGE W. BLANKENSHIP, M. D.
Miami, Florida

Before Dr. Machemer developed pars plana vitrectomy[1], diabetic patients who were blinded with vitreous hemorrhages or retinal detachments were untreatable and without hope of regaining sight. During the past few years numerous improvements have resulted in pars plana vitrectomy becoming a frequently performed operation with a reasonably good chance of successful restoration of sight for these individuals[2].

MATERIALS AND METHODS

Since Dr. Machemer's initial case in 1970, there have been 1,462 diabetic vitrectomies performed at the Bascom Palmer Eye Institute before 1983, with six month follow-up information available on 81% of these cases (Table I).

Information regarding the patients' general characteristics, past ophthalmic and medical histories, best-corrected visual acuities, and ophthalmic findings with slit-lamp microscopy, gonioscopy, fundus contact lens, indirect ophthalmoscopy, echography, and bright-flash electroretinography was recorded at the preoperative and the six-month follow-up examinations. Data regarding the operative procedures, complications, and findings were also recorded. All of the information was computerized.

An attempt was made to observe all patients six months following surgery, but some patients were observed at five months due to scheduling difficulties. Occasionally the follow-up data were incomplete due to inadequencies of the examinations performed elsewhere, or because opacities in the optic media made visualization of the posterior fundus impossible.

TABLE 1

DIABETIC VITRECTOMY 1462 CASES

6 MONTH FOLLOW-UP	
Examined	1190 (81%)
Died	52 (4%)
Enucleated	20 (1%)
Vitrectomy revision	72 (5%)
Lost to follow-up	128 (9%)

The two major indications for pars plana vitrectomy have been dense, nonclearing vitreous hemorrhages and traction detachments involving the maculas (Table 2.

TABLE 2

DIABETIC VITREC-TOMY 1190 CASES

INDICATION	
Vitreous Heme	539 (45%)
Traction macular detach	243 (21%)
Combination heme & mac det	129 (11%)
Rheg retinal detach	132 (11%)
Other	147 (12%)

RESULTS

Diabetic vitreous hemorrhage

Initially, most of the vitrectomies were performed to remove dense, nonclearing vitreous hemorrhages[3,4]. The technique consists of inserting a vitrectomy instrument through the pars plana into the vitreous cavity (Figure 1) where the opaque vitreous is excised and aspirated from the eye while the globe is being reformed with clear infusion fluid (Figure 2). Large volumes of preretinal blood are often aspirated from behind the opaque vitreous, and the vitreous connections to the proliferative tissue are excised (Figure 3).

The visual results of vitrectomies for hemorrhages are good with about 70% having substantial visual improvement six months after surgery.

Preoperatively, the vast majority of cases have vision limited to hand movements or light perception, but six months after surgery the majority have acuities of 6/60 or better with 20% having very good vision (Table 3).

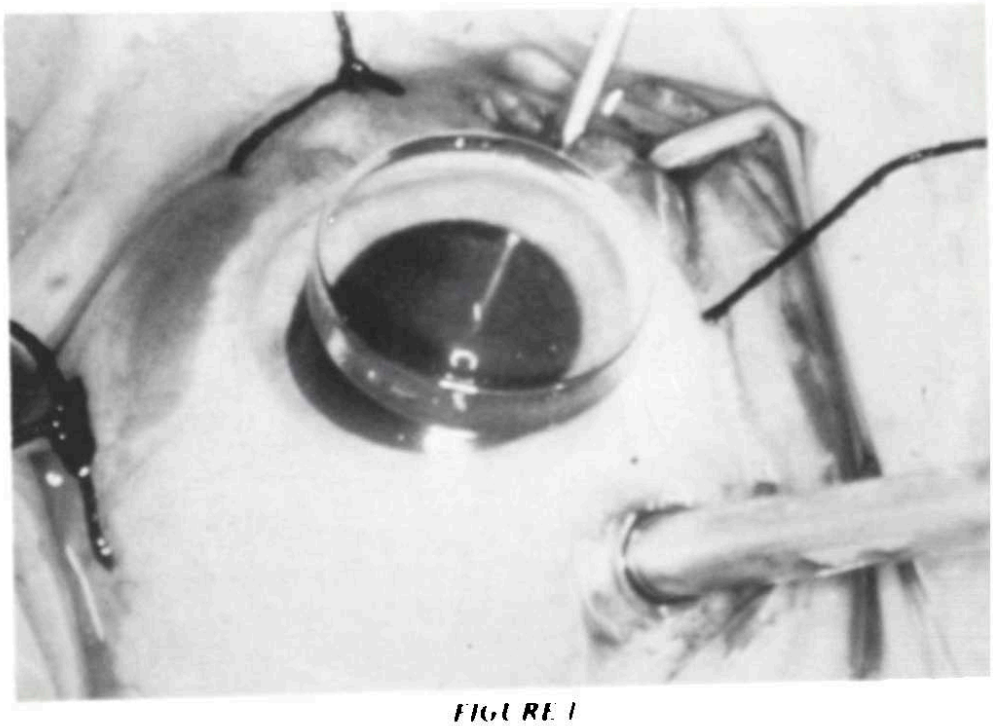

FIGURE 1

The vitreous infusion suction cutter (VISC) is inserted through the pars plana, and used to remove the opaque vitreous under microscopic control.

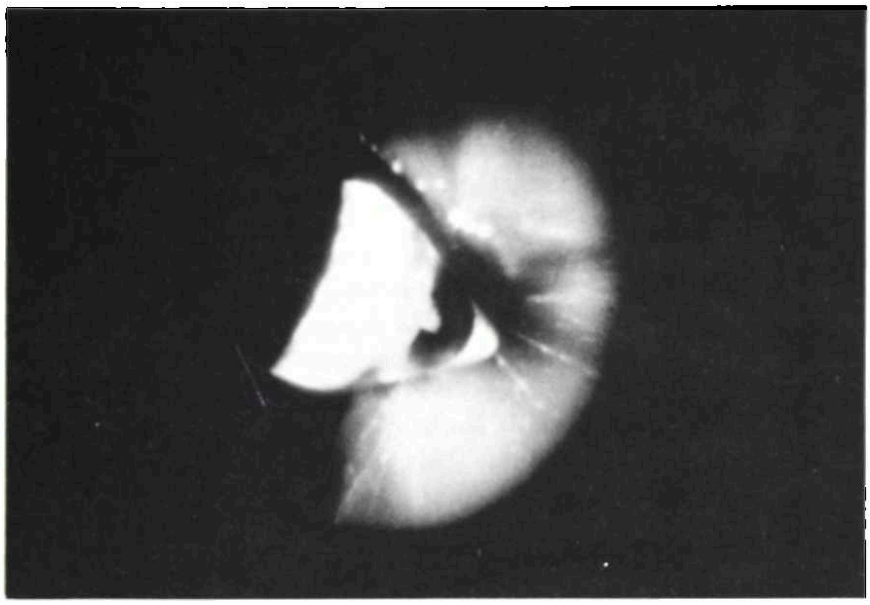

FIGURE 2

Opaque vitreous is excised and aspirated into the VISC cutting port while the globe is being reformed with clear infusion fluid

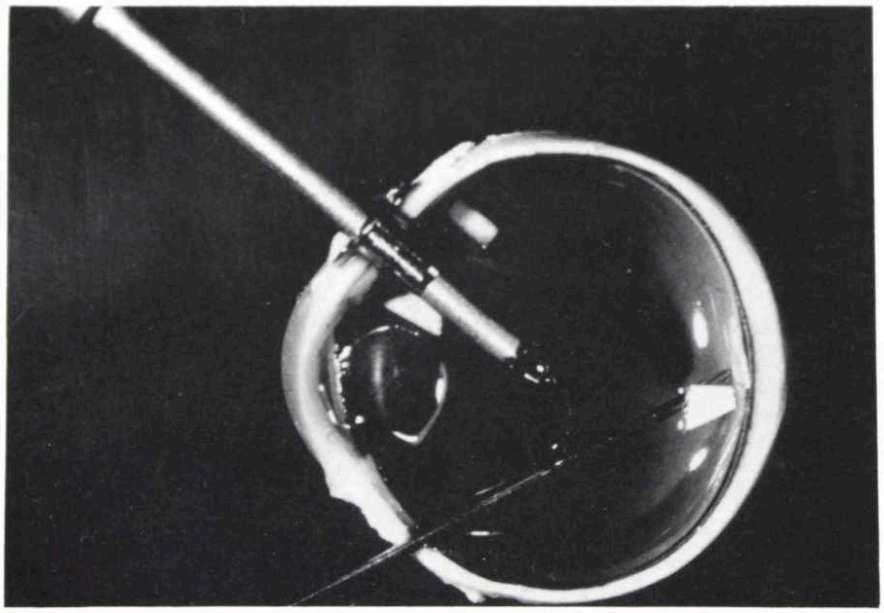

FIGURE 3

The vitreous connections to the proliferative tissue overlying the retina and the posterior fundus are excised.

TABLE 3

DIABETIC VITRECTOMY-HEME
539 CASES

VISUAL ACUITES		
	Pre-op	6M. Postop
6/6 - 6/12		20%
6/15 - 6/60	2%	36%
6/120 - 1/60	29%	14%
HM - Lp	69%	21%
N.L.P.		9%

Postoperatively 14% have anterior segment opacities which prevent visualization of the fundus, but most have clear vitreous cavities and attached retinas (Table 4).

TABLE 4

DIABETIC VITRECTOMY-HEME
539 CASES

POSTERIOR SEGMENT		
	Pre-op	6M. Postop.
Obscurred		14%
Vitreous		
Clear		75%
Opaque	100%	11%
Retina		
Attached	100%	68%
Detached		
Paramacula		4%
Macula		2%
Total		1%

As of yet, there is no good scientific data that indicates when vitrectomy should be performed for a hemorrhage is the macula is attached. Patients are encouraged to defer vitreous surgery for at least six months keeping their diabetes under good control and their head elevated during this time, and many of them will have a gradual spontaneous clearing of the vitreous cavity sufficient that they can be successfully treat with panretinal photocoagulation[5]. It is important that the patients be examined periodically to determine that the macula is attached, and this may necessitate periodic ultrasound examinations.

Diabetic traction macular detachment

The second major indication form vitrectomy is the development of a macular detachment from traction of the proliferative tissue[3,6]. The operation is essentially identical to that described for hemorrhage, but is often much more extensive with necessary excision of the proliferative tissue from the retinal surface to successfully release the traction allowing the retina to reattach (Figure 4). Obviously, this extensive dissection of the proliferative tissue increases the risks of complications such as hemorrhaging and posterior retinal holes which often cause the operation to fail[7].

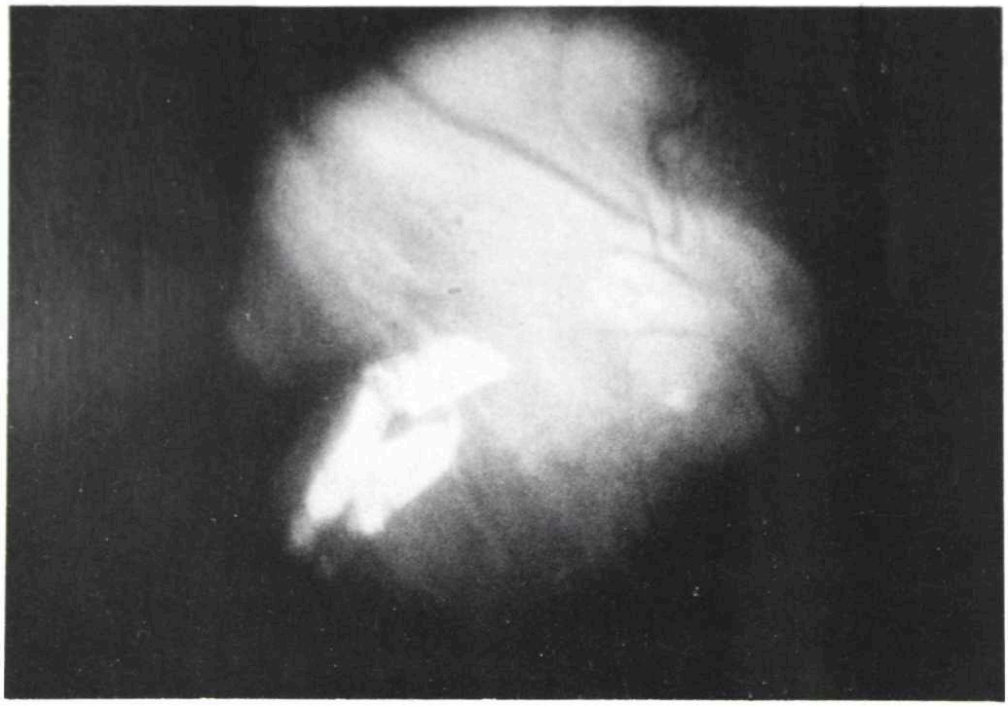

FIGURE 4

Transvitreal scissors are used to excise traction producing proliferative tissue from the retinal surface.

The visual results of vitrectomy for traction macular detachments are not as good as those for vitreous hemorrhage because of the frequent coexistence of irrepairable macular damage and the development of complications during the operation. Preoperatively most of the eyes had vision in the finger counting or hand movements range, and six months later about one third of the patients had significant visual improvement. Unfortunately, a significant number of these eyes became blind following vitrectomy usually due to operative complications (Table 5).

Anatomically, anterior segment opacities in many cases prevented fundus examinations, but the majority of the vitreous cavities were clear, and the retinas had been successfully reattached (Table 6).

Unlike the vitreous hemorrhage cases it is important that surgery be performed soon after the macula has detached[7]. The longer the macula remains detached the poorer the prognosis for a successful result. However, vitreous surgery is not recommended for traction detachments that do not involve the macula, because it is very difficult to accurately predict if and when diabetic traction detachments will extend to involve the macula[8], and the incidence of operative complications is quite high in this type surgery.

TABLE 5

DIABETIC VITRECTOMY-DETACH
243 CASES

VISUAL ACUITES		
	Pre-op	6M. Postop
6/6 - 6/12	1%	3%
6/15 - 6/60	12%	27%
6/120 - 1/60	57%	24%
HM - Lp	30%	29%
N.L.P.		17%

TABLE 6

DIABETIC VITRECTOMY - DETACH
243 CASES

POSTERIOR SEGMENT		
	Pre-op	6M. Postop
Obscurred		22%
Vitreous		
Clear	100%	70%
Opaque		8%
Retina		
Attached		35%
Detached		
Paramacula		18%
Macula	100%	11%
Total		6%

Preoperative evaluation of diabetic vitrectomy cases

Various findings at the preoperative evaluation can be helpful in predicting what results might be obtained with vitrectomy. The importance of the duration of macular detachment has previously been mentioned. Many of the other findings are related to whether or not the macula is attached or detached. It is also important to determine how actively the eye is forming neovascular proliferation which is indicated by the extent of new vessels within the proliferative tissue. Best results are obtained in eyes with a minimal amount of new vessels within the proliferative tissue, and successful results are uncommon with extensive neovascularization.

The single most important factor for the success of vitrectomy for diabetic complications is the occurrence of a major complication during the operation. The incidence of complications is related to the difficulty of surgery, occurring much more frequently with preoperative traction retinal detachments than with vitreous hemorrhage. When the vitrectomy is performed without complications there is a good success rate, but the occurrence of retinal holes during the operation reduces the chance of a successful operation by about 50%. The poor results following operative complications is due both from the poor preoperative prognosis of eyes which are vulnerable to having operative complications, and in the frequent inability to repair the complications which develop[7].

Stability of diabetic vitrectomy results

Even after vitrectomy, the potential for subsequent bleeding, retinal detachments, and neovascular glaucoma make prediction of the results difficult for the first few months. However, a comparison of the visual results five years after vitrectomy with the results six months after vitrectomy find that the results are very stable after the first six months[10].

CONCLUSION

It is important for us to remember that good diabetic control will often prevent and minimize the development of diabetic retinopathy. Good periodic fundus examinations will detect the presence of diabetic retinopathy findings for which panretinal photocoagulation will successfully control and preserve good functioning vision. However, if diabetic complications result in a severe loss of vision from dense, non-clearing vitreous hemorrhages or traction detachments involving the maculas, then pars plana vitrectomy should be performed with a reasonable chance of regaining functioning vision.

REFERENCES

1. MACHEMER, R.: *A new concept for vitreous surgery. 2. Surgical techniques and complications.* Am. J. Ophthalmol. 74: 1022-3, 1972.

2. MACHEMER, R., AABERT, T.M.: *Vitrectomy*, ed. 2. New York, Grune and Stratton, Inc., 1979.

3. MANDELCORN, M.S., BLANKENSHIP, G., MACHEMER, R.: *Pars plana vitrectomy for the management of severe diabetic retinopathy.* Am. J. Ophthalmol. 81: 561-70, 1976.

4. MACHEMER, R., BLANKENSHIP, G.: *Vitrectomy for proliferative diabetic retinopathy associated with vitreous hemorrhage.* Ophthalmology. 88: 643-6, 1981.

5. The Diabetic Retinopathy Study Research Group: *Photocoagulation treatment of proliferative diabetic retinopathy.* Ophthalmol. 85: 82-106, 1978.

6. AABERG, T.M.: *Pars plana vitrectomy for diabetic traction retinal detachment.* Ophthalmology. 88: 639-42, 1981.

7. BLANKENSHIP, G.W.: *Preoperative prognostic factors in diabetic pars plana vitrectomy.* Ophthalmol. 89: 1246-49, 1982.

8. OYAKAWA, RT., SCHACHAT AP., MICHELS RG., RICE, TA. *Complications of vitreous surgery for diabetic retinopathy.* I. intraoperative complications. Ophthalmology. 90: 517-21. 1983.

9. CHARLES, S., FLINN CE. *The natural history of diabetic extramacular traction retinal detachment.* Arch. Ophthalmol. 99: 66-68. 1981.

10. BLANKENSHIP, GW.: *Stability of pars plana vitrectomy results for diabetic retinopathy complications.* A comparison of 5 year and 6 month postvitrectomy results. Arch. Ophthalmol. 99: 1009-1012. 1981.