NON-DIABETIC AND NON-OCULOTRAUMATIC VITREOUS HAEMORRHAGE TREATED BY PARS PLANA VITRECTOMY

VERBRAEKEN H.[*], *VAN EGMOND J.*[*]

ABSTRACT

Background: Until the advent of pars plana vitrectomy, no efficient treatment for non-resorbing vitreous haemorrhage was at hand. Especially if the cause of the vitreous haemorrhage was not known, such as in most cases of non-diabetic and non-oculotraumatic vitreous haemorrhage, a lot of time often was lost by waiting for the resorption, because of the lack of any effective treatment modality.

Methods: All the cases (126) of non-diabetic and non-oculotraumatic vitreous haemorrhage treated with a pars plana vitrectomy for non-resorbing vitreous bleeding during a 15-year period were studied.

Both the aetiology of the haemorrhage as well as the functional results have been tabulated. Except for the cases with a retinal detachment or a suspected retinal tear that were operated on immediately, 6 months were waited upon for spontaneous clearing.

Results: One third of these haemorrhages was due to vascular lesions (32,5%), one third to "rhegmatogenous" disordes [retinal tears with (25,5%) or without (8%) retinal detachment and one third to a group of various diseases (13,5%)]. In this last group Terson syndrome (5,5%), age-related macular degeneration (13,5%) and presumed posterior vitreous detachment (12%) were most numerous. Functional results mainly depend upon the underlying cause of the vitreous haemorrhage. Visual acuity ranged from 20/40-20/20 in 100% of cases of Terson syndrome and posterior vitreous detachment, 80% of retinal tears, 27% of vascular disorders and 25% of retinal detachments. Vision below 20/400 was obtained in 76% of age-related macular degenerations, 51% of vascular lesions, 50% of retinal detachments and 10% of retinal tears.

Conclusion: Non-oculotraumatic and non-diabetic vitreous haemorrhages can be caused by a wide variety of diseases. If there is no tendency to spontaneous clearing a pars plana vitrectomy can be helpful by restoring visual function and by allowing treatment of the underlying disease in some cases. Most indications for vitrectomy are not urgent and one can wait for spontaneous clearing of the vitreous for about 6 months but with respect to retinal tears with or without retinal detachment no time should be lost. In these cases the vitrectomy should be done at once.

SAMENVATTING

Tot voor het ontstaan van de pars plana-vitrectomie, bestond er geen efficiënte behandeling voor niet-resorberende vitreumbloedingen. Dikwijls werd kostbare tijd verloren met het wachten op een spontane opklaring.

Honderdzesentwintig opeenvolgende gevallen van niet diabetische en niet oftalmotraumatische gevallen van niet resorberende vitreumbloeding, behandeld met pars plana vitrectomie, werden bestudeerd.

Eén derde van de vitreumbloedingen waren te wijten aan vasculaire letsels, één derde aan een retinascheur en één derde aan diverse oorzaken. In deze laatste groep waren gevallen van een Terson syndroom, leeftijdsgebonden maculadegeneratie en achterste vitreumloslating het meest talrijk.

Een niet-resorberende vitreumbloeding kan vele oorzaken hebben. Indien geen spontane neiging tot opklaren bestaat, kan een pars plana-vitrectomie helpen om de visus te herstellen.

.....

[*] *Department of Ophthalmology*
University Hospital Ghent
De Pintelaan 185
9000 Gent
Belgium
Tel.: 32/9/240.23.19
Fax: 32/9/240.49.63

received 22.01.99
accepted 30.03.99

RESUME

Jusqu'au moment de l'introduction de la vitrectomie à travers la pars plana, aucun traitement n'existait pour une hémorragie vitréenne non-résorbante.
Nous avons étudié 126 cas consécutifs d'hémorragie du vitré, non liée au diabète ni à un traumatisme oculaire, traités par une vitrectomie sur une période de 15 ans.
Un tiers des cas était dû à des lésions vasculaires, un tiers à des déchirures rétiniennes (avec ou sans décollement de rétine) et un tiers à des causes diverses. Dans ce dernier groupe on retrouvait surtout des cas de syndrome de Terson, de dégénérescence maculaire liée à l'âge et de décollement postérieur du vitré.
Si une hémorragie vitréenne n'a pas tendance à s'éclaircir spontanément, une vitrectomie peut être utile pour récupérer la vision et pour traiter la cause de l'hémorragie dans certains cas.

KEY WORDS

Pars plana vitrectomy, vitreous haemorrhage, age-related macular degeneration, Terson syndrome, retinal tear, retinal detachment, retinal vein thrombosis, posterior vitreous detachment.

MOTS CLES

Vitrectomie, hémorragie vitréenne, dégénérescence maculaire liée à l'âge, syndrome de Terson, déchirure rétinienne, décollement de la rétine, thrombose veineuse rétinienne, décollement posterieur du vitré.

INTRODUCTION

Until 1971 there was no efficient treatment for a vitreous haemorrhage. The only existing technique of open-sky vitrectomy was rather hazardous with much complications (11). With the development of pars plana surgery in the beginning of the years 1970 (12,14-16,19), the ophthalmological world came into the possession of a new technique, permitting the cure of many patients, blinded by vitreous haemorrhage.
In this article we review the results over a 15 year period of the pars plana vitrectomy and the aetiology of vitreous haemorrhage in non-diabetic and non-oculotraumatic cases.

MATERIAL AND METHODS

All consecutive cases of non-oculotraumatic and non-diabetic vitreous haemorrhage, treated with pars plana vitrectomy between 1976 and 1991, are included in this retrospective study. These were all vitreous haemorrhages, preventing detailed fundoscopic examination. Cases where a retinal tear or a retinal detachment could be found upon binocular ophthalmoscopic examination were not included. These were treated by a buckling procedure. All patients had an echographic examination. The follow-up period varied from 6 months to 16 years.
In a case of vitreous haemorrhage normally 6 months are waited upon spontaneous resorption, while the patient is followed by echography (4,8,9,22,24). If there was no echographic evidence of retinal detachment or a retinal tear, the echography was repeated once a month. However in cases with either symptoms or either a familial or a personal history of possible retinal tears or retinal detachment, the vitrectomy was done immediately.
A two or three port pars plana vitrectomy was used. The diagnosis was made intraoperatively and if necessary a treatment was performed during the surgery. In the case of a retinal tear or a retinal detachment the treatment consisted of cryo- or endolaser coagulations of the retinal tears and a buckle. Until 1986 vascular lesions were treated by external laser coagulations a few days after surgery. From 1986 on endolaser coagulations were performed during

the surgery. If necessary a fluoangiography was done during the first postoperative week of clarify the diagnosis or to rule out exceptional causes of vitreous haemorrhage (2). The different aetiologies of vitreous haemorrhage were studied. The vascular lesions were studied as a group and also separately.
All patients were seen 10 days after discharge of the hospital and six months after the operation.

RESULTS

One hundred twenty six cases of non-diabetic and non-oculotraumatic vitreous haemorrhage have been treated with pars plana vitrectomy between 1976 and 1991. The different diagnoses are shown in table I.

Tab. I: *Aetiology of non-diabetic and non-oculotraumatic vitreous haemorrhage in 126 eyes*

	Number	Percentage
I. Vascular disease	41	32,5%
II. Rhegmatogenous disorders	42	33,5%
III. Miscellaneous disorders	43	34%
	126	

One third of the cases was due to vascular lesions, one third to rhegmatogenous retinal pathology complicated by vitreous haemorrhage (25% retinal detachment, 8% retinal tear) (table III) and one third to different pathologies. This last third was, except some sporadic diseases, made up by disciform macular lesions (13,5%), Terson syndrome (5,5%) and a rather large group of cases (12%) where no clear aetiology could be found, neither intraoperatively, neiter postoperatively with fluoangiography and three mirror examination (table IV).

The group of retinal vascular lesions could be subdivided into venous thromboses (70%) and a group (30%) of cases with 6 different diseases (Table II).

Functional results are given in tables V and VI.

The following complications have been seen:

Rebleeding: none of the cases needed a reoperation because of a new vitreous haemorrhage.

Iatrogenic retinal tears: there were no cases of iatrogenic retinal tears.

Endophthalmitis: one case of postoperative endophthalmitis occured in this subgroup of vitrectomies (23), caused by Staphylococcus epidermidis. The end result of this case was no light perception.

Cataract: Further follow-up was done by the refering ophthalmologists. We have not been able to draw any conclusion about the cataract inducing effect of pars plana vitrectomy at long term.

Tab. III: *Rhegmatogenous disorder in 42 eyes.*

	Number	Percentage rhegmatogenous group	Percentage of whole group
Retinal detachment with tear(s)	32	76%	25,5%
Retinal tear(s)	10	24%	8%
	42	100%	33,5%

Tab. II: *Repartition of vascular disease in 41 eyes*

	Number	Percentage vascular group	Percentage whole group
Vein occlusions	28	68%	22,2%
Periphlebitis retinae	3	7%	2,4%
Hypertensive retinopathy	3	7%	2,4%
Coats' disease	2	5%	1,6%
Central artery occlusion	2	5%	1,6%
Prepapillary neovascularization	2	5%	1,6%
Macro-aneurysm	1	2,5%	0,8%
	41	100%	32,5%

Tab. IV: *Repartition of miscellaneous disorders in 43 eyes*

	Number	% mixed group	% whole group
Age-related macular degeneration	17	39,5%	13,5%
Terson syndrome	7	16%	5,5%
Spontaneous choroidal detachment	2	4,5%	1,5%
Malignant melanoma of choroid	1	2%	1%
"Unknown"	16	37%	12%
	43	100%	33,5%

Tab. V: *Visual results after vitrectomy in non-oculotraumatic and non-diabetic vitreous haemorrhage*

	Number	20/40 - 20/20	20/50 - 20/200	20/400	< 20/400
Vascular lesions	41	11 (27%)	4 (10%)	5 (12%)	21 (51%)
Rhegmatogenous:					
Retinal tear(s)	10	8 (80%)	1 (10%)		1 (10%)
Retinal detachment	32	8 (25%)	5 (16%)	3 (9%)	16 (50%)
Miscellaneous:					
Age-related macular degeneration	17	– (0%)	2 (12%)	2 (12%)	13 (76%)
Terson syndrome	7	7 (100%)	– (0%)	– (0%)	– (0%)
"Unknown"	16	16 (100%)	– (0%)	– (0%)	– (0%)

Proliferative vitreoretinopathy: five cases of vitreous bleeding with retinal detachment developed proliferative vitreoretinopathy.
Macular pucker: one of the cases with vitreous haemorrhage associated with a retinal tear developed a severe macular pucker. The patient refused reoperation.

DISCUSSION

The repartition of the different causes of non-diabetic and non-oculotraumatic vitreous haemorrhage in this study over 15 years is very similar to the one we reported after 5 years pars plana vitrectomy (6). It is also comparable with the literature on the subject (10,18,22). One third (32,5%) of our non-oculotraumatic and non-diabetic vitreous haemorrhages are due to vascular lesions. The most frequent cause was venous occlusion (68%), that had been insufficiently or not at all treated by laser photocoagulation. Other vascular pathologies were sporadic with cases of periphlebitis, hypertensive retinopathy, Coats' disease, central artery occlusion, prepapillary neovascularization of non-diabetic origin and macroaneurysms (Table 2). Neovascularization of the iris or the retina can be the reason not to wait 6 months for spontaneous clearing of the vitreous haemorrhage (9,10).
A second third was due to rhegmatogenous retinal pathology with or without associated retinal detachment. This group is without any doubt the one giving most problems. It is clear that it is from utmost importance for the patient, that surgery should be performed before the appearance of a retinal detachment: once a detachment has developed, functional and anatomical results drop seriously with often a proliferative vitreoretinopathy (10,22). If this kind of pathology is suspected either on personal or familial history, either on symptomatology or on echography, the operation should be done immediately (9,10,18). Even without any of these facts, a tear can never be absolutely excluded.
The last third is made up by various pathologic entities. Some are exceptional such as a malignant melanoma of the choroid. In our case a diagnosis of rhegmatogenous retinal detachment had been made by echography. It was during the surgery after removal of the intravitreal blood that the situation became clear and was proven by a biopsy. We operated upon 7 cases of Terson syndrome. Normally we only operate one eye in bilateral cases as soon as the general condition of the patients allows so.

Tab. VI: *Comparison of visual results in non-oculotraumatic and non-diabetic vitreous haemorrhage before vitrectomy and at the end of the observation period*
Improvement (↑) or down (↓)= minimum 2 lines on Snellen optotypes.

Results		↑	=	↓
Vascular lesions	41	23 (56%)	7 (17%)	11(27%)
Rhegmatogenous:				
Retinal tear(s)	10	9 (90%)	– (0%)	1(10%)
Retinal detachment	32	18 (56%)	7 (22%)	7(22%)
Miscellaneous				
Age-related macular degeneration	17	4 (24%)	6 (35%)	7 (41%)
Terson syndrome	7	7 (100%)	– (0%)	– (0%)
"Unknown"	16	16 (100%)	– (0%)	– (0%)

Monocular cases or the second eye in binocular cases are operated on when there is no tendency to spontaneous resorption after a waiting period of 6 months (4,8,9,13,20,21). Anyway we think that vitrectomy is only justified in those patients that are no longer a neurosurgical problem after their cerebral haemorrhage, although some authors advise vitrectomy before neurosurgery in some cases (20).
As far as age-related macular degeneration is concerned, it should be clear that the majority of these cases need no vitrectomy at all (1,5). Sometimes however they go together with a total vitreous haemorrhage, making these already visually handicaped patients totally blind (17). Patients can recover some visual field after vitrectomy.
An other rather important group (12%) is the one for whom no clear diagnosis could be made neither during the operation, neither in the postoperative period notwithstanding a fluoangiographic examination. We assume that most of these cases are due to an acute posterior vitreous detachment with a bleeding from the peripapillary capillaries. Posterior vitreous detachment is a normal physiologic aging event of the vitreous. In most cases it has no consequences, except the initially sometimes "anoying" vitreous haze. In some patients however it can be the cause of a retinal tear with or without vitreous haemorrhage or of a pure but extended vitreous haemorrhage. Also in other series this event takes an important place in the statistics (3,9,10,18,22).
The functional results in this group of patients clearly depend upon the underlying aetiology. In the group of the vascular lesions best results were seen in the macro-aneurysms and the venous occlusions. The extent of the lesions plays of course a major role in the prognosis. A branch vein occlusion gives better results than a central vein occlusion (18,22). The results were a lot worse in arterial occlusion, Coats' disease and periphlebitis retinae group.
The functional and anatomic results in the group of the rhegmatogenous retina pathology depend strongly upon the timing of the surgery. If there is only a retinal tear without retinal detachment the prognosis is excellent. Once a retinal detachment is associated the results drop (10). They also are worse than in cases of retinal detachment without or with only a small haemorrhage. In many cases one has to deal with total retinal detachments with the macula included, which seriously limits functional recovery. Moreover the incidence of proliferative vitreoretinopathy is higher in those eyes with the vitreous cavity filled with blood. In this group it is very important to intervene on time. If the possibility of a retinal detachment can be suspected, such as in patients that already had had a retinal detachment in the fellow eye or in the same eye, or with lattice degeneration in the fellow eye or operated once for cataract, one should not hesitate. Associated symptoms such as flashes can be an important indication.
Although in many cases of syndrome of Terson a vitrectomy is not needed, some of them have no tendency at all to spontaneous resorption of the blood. Futhermore some publications report the functional loss of those eyes by proliferative vitreoretinopathy (4,7,8,13). In bilateral cases an early vitrectomy in one eye can be indicated in order to permit the patient to

function normally (13,21). The functional results in our group were excellent just as in other publications (8,13,21). In none of our cases we have found epiretinal membranes or PVR, although several reports caution for this (4,7,13,20,21).

A total vitreous haemorrhage in cases of disciform macular degeneration can be a very good indication for vitrectomy. Although the central visual acuity of these patients will not improve dramatically, they often are very happy with the result of the surgery because they recover their peripheral visual field. This of course is very important in these already severely disabled patients. Nearly all our patients in this group were satisfied with the recuperation of their peripheral visual field (17). In no case have we seen adverse reactions after the vitreous surgery as described by some (1).

The group of patients where no clear aetiology was found and whom we attribute merely to an acute posterior vitreous detachment, gives very good results as can be expected. This of course is due to the fact that there is no retinal or vascular pathology in those eyes. After removal of the blood, they can function normally. The symptomatology can strongly resemble the one of the patients with rhegmatogenous pathology.

In conclusion we can state that non-oculotraumatic and non-diabetic vitreous haemorrhages can be caused by a broad spectrum of disease entities. If no spontaneous resorption occurs, a pars plana vitrectomy can be helpful in different ways. First of all the vitreous haze is removed, allowing a significant visual recuperation of the patient according to the underlying aetiology. Secondly a diagnosis can be made during the surgery in those cases where nothing is known about the preexisting pathology. In third place pars plana surgery allows an intraoperative treatment in certain diseases. This is the case for retinal tears and retinal detachment and in vascular disorders.

In most cases of vitreous haemorrhage there is no emergency at all for vitrectomy and one can wait some time for spontaneous resorption. There is however one important exception and that is rhegmatogenous pathology. In this instance a prompt intervention is clearly needed, if possible before the advent of the retinal detachment. Retinal ischaemic pathology is another indication to avoid deferral. Furthermore there is a general tendency in literature to change the waiting time for spontaneous clearing of 6 months of the first decade of vitrectomy to 2 or 3 months.

BIBLIOGRAPHY

(1) AZZOLINI, C., MENCHINI, V., PECE, A., CAMESASCA, F., GIULIANI, V. – Age-related macular degeneration and vitreous haemorrhage. Eur. J. Ophthalmol., 1991: 1, 142-147.

(2) CHEN,T., YARNG, S. – Vitreous haemorrhage from a persistent hyaloid artery. Retina, 1993: 13, 148-151.

(3) DANA, M.R., WERNER, M., VIANA, M., SHAPIRO, M. – Spontaneous and traumatic vitreous haemorrhage. Ophthalmology, 1993: 100, 1377-1383.

(4) DAUS, W., KASMAN, B., ALEXANDRIDIS, E. – Terson-Syndrom. Komplizierte klinische Verlaufe. Ophthalmologie, 1992: 89, 77-81.

(5) DIEDLER, J., SOUBRANE, G., COSCAS, G. – Hémorragie intravitréenne compliquant la dégénérescence maculaire liée à l'âge. A propos de 18 cas. J. Fr. Ophtalmol., 1989: 12, 343-352.

(6) FRANCOIS, J., VERBRAEKEN, H., VANHULST, L. – Five years pars plana vitrectomy. Ophthalmologica, 1983: 187, 148-151.

(7) GARCIA-ARUMI, J., CORCOSTEQUI, B., TALLADA, N., SALVADOR, F. – Epiretinal membranes in Terson's syndrome. A clinicopathologic Study. Retina, 1994: 14, 351-355.

(8) GARFINKLE, A., DANYS, I., NICOLLE, D., COLOHAN, A., BREM, S. – Terson syndrome: a reversible cause of blindness following subarachnoid haemorrhage. J. Neurosurg., 1992: 76, 766-771.

(9) HASENFRATZ, G. – Akute Glaskörpereinblutung. Möglichkeiten der differential diagnostischen, echographischen Abklärung. Fortschr. Ophthalmol., 1990: 87, 641-645.

(10) ISERNHAGEN, R., SMIDDY, W., MICHELS, R., GLASER, B., DE BUSTROS, S. – Vitrectomy for non-diabetic vitreous haemorrhage. Not associated with vascular disease. Retina, 1988: 8, 81-87.

(11) KASNER, D., MILLER, G., TAYLOR, W., SEVER, R., NORTON, E. – Surgical treatment of amyloidosis of the vitreous. Trans Am. Acad. Ophthalmol. Otolaryngol., 1968: 72, 410-418.

(12) KLÖTI, R. – Vitrektomie I. Ein Neues Instrument für hintere Vitrektomie. Graefe's Arch. Clin. Exp. Ophthalmol., 1973: 187, 161-170.
(13) KORNER, F., MEIER-GIBBONS, F. – Vitrectomie bei Terson Syndrom. Bericht über 18 Fälle. Klin. Mbl. Augenheilk., 1992: 200, 468-471.
(14) MACHEMER, R., BUETTNER, H., NORTON, E.W.D., PAREL, J.M. – Vitrectomy: a pars plana approach. Trans Am. Acad. Ophthalmol. Otolaryngol., 1971: 75, 813-820.
(15) MACHEMER, R., BUETTNER, H., PAREL, J.M. – A new concept for vitreous surgery. I. Instrumentation. Am. J. Ophthalmol., 1972: 73, 1-7.
(16) MACHEMER, R., PAREL, J.M., NORTON, E.W.D. – Vitrectomy: a pars plana approach. Technical improvements and further results. Trans Am. Acad. Ophthalmol. Otolaryngol., 1972: 76, 462-466.
(17) MET, J., MABERLEY, A., RICHARDS, G. – Pars plana vitrectomy for macular degenerative disorders. Can. J. Ophthalmol., 1991: 26, 374-376.
(18) OYAKOWA, R., MICHELS, R., BLASE, W. – Vitrectomy for nondiabetic vitreous haemorrhage. Am. J. Ophthalmol., 1983: 96, 517-525.
(19) PEYMAN, G., DODICH, N. – Experimental vitrectomy: instrumentation and surgical technique. Arch. Ophthalmol., 1971: 86, 548-551.
(20) ROUX, F., PANTHIER, J., TANGHE, Y., GALLINA, P., OSWALD, A., MERIENNE, L., CIOCOLA, C. – Syndrome de Terson et complications intraoculaires dans les hémorragies méningées (26 cas). Neurochirurgie, 1991: 37, 106-110.
(21) SCHULTZ, P., GOBOL, W., WEINGEIST, T. – Long-term visual outcome in Terson Syndrome. Ophthalmology, 1991: 98, 1814-1819.
(22) SMIDDY, W., ISERNHAGEN, R., MICHELS, R., GLASER, B., De BUSTROS, S. – Vitrectomy for non-diabetic vitreous haemorrhage. I. Retinal and choroidal vascular disorders. Retina, 1988: 8, 88-95.
(23) VERBRAEKEN, H. – Treatment of postoperative endophthalmitis. Ophthalmologica, 1994: 209, 165-171.
(24) WILLIAMS, D., MIELER, W., WILLIAMS, G. – Posterior segment manifestations of ocular trauma. Retina, 1990: 10 sup., 35-44.

.....

Request for reprints:
H. VERBRAEKEN
Dept. of Ophthalmology
University Hospital
De Pintelaan, 185
B-9000 Gent.