Long-term Results Following Pars Plana Vitrectomy With Platelet Concentrate in Pediatric Patients With Traumatic Macular Hole

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PURPOSE: To describe the long-term clinical course in children with a traumatic macular hole after vitrectomy with platelet concentrate.
DESIGN: Interventional case series.
METHODS: Four pediatric patients with a mean age of 13.2 years (range, 10–15 years) underwent pars plana vitrectomy with platelet concentrate, internal limiting membrane peeling, and SF6 gas tamponade for stage 3 traumatic macular hole repair.
RESULTS: Primary closure was achieved by a single intervention in all patients with a marked visual improvement of three to seven lines after surgery. The surgically achieved visual improvement remained stable and no vision-threatening complications occurred during the mean follow up of 35.2 months (range, 27–51 months).
CONCLUSION: We regard pars plana vitrectomy with platelet concentrate and SF6 gas instillation as safe and effective and, therefore, as the therapy of choice for traumatic macular holes particularly in children after a period of observation no longer than 3 to 4 months. (Am J Ophthalmol 2003;136:197–199.

FAVORABLE RESULTS WITH PRIMARY CLOSURE RATES OF 67% to 85% were achieved in adults with traumatic macular hole (MH) by pars plana vitrectomy and gas instillation with or without adjuvants.[1–4] Some reports[5] have described spontaneous closure of traumatic macular holes in children and young adults.

The purpose of this report is to describe the long-term clinical course in children following treatment of traumatic macular hole with pars plana vitrectomy and platelet concentrate.

Four male pediatric patients underwent pars plana vitrectomy with platelet concentrate and SF6 gas tamponade for traumatic macular hole repair after a blunt trauma.

The boys had a mean age of 13.2 years (range, 10–15 years). A stage 3 macular hole according to Gass with a diameter of at least 300 μm was diagnosed in all patients.

FIGURE 1. (Top) A 10-year-old boy who was hit in the right eye by a stone developed a traumatic macular hole with raised edges and subretinal fluid. Vision was 20/40 initially but then dropped to 20/63. The pars plana vitrectomy was performed at this time (4.5 months after the trauma) and vision had increased to 20/25. (Bottom) The illustration depicts the closed macular hole 34 months after surgery.

The mean follow-up was 35.2 months (range, 27–51 months).

The surgical technique included a standard three-port pars plana vitrectomy, peeling of the epiretinal membrane including the internal limiting membrane (ILM), injecting a drop of freshly obtained autologous platelet concentrate (4×10^9 thrombocytes/ml) into the macular hole, and instilling 25% SF6 gas (Figure 1). [6]

The individual patients are presented in Table 1. The mean interval between the diagnosis and the operation was 3 months (range, 1–5 months).

Primary closure was achieved by a single intervention in all patients and all patients had a marked visual improvement of ≥ three lines (three to seven lines) after surgery. The surgically achieved visual improvement remained stable during follow-up.

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TABLE 1. Data of Four Pediatric Patients Who Underwent Pars Plana Vitrectomy With Platelet Concentrate and SF6 Gas Tamponade

Patient Data	M.T.	B.R.	B.F.	L.S.
Age (years)	13	15	10	15
Eye	RE	RE	RE	RE
Surgery for MH repair	yes	yes	yes	yes
Trauma	soccer ball	elastic rubber expander	hit by a stone	gun injury
Interval between trauma and surgery	1 month	5 months	5 months	1 month
Concomitant findings	Retinal break, Berlin edema, retinal bleeding, hyphema	M. pucker, eyelid injury	Berlin edema, M. pucker, retinal bleeding, retinal break	Choroidal rupture, subretinal and vitreous bleeding, Berlin edema
Follow-up (months)	28	27	34	51
Primary MH closure	yes	yes	yes	yes
Visual acuity before surgery	20/200	20/200	20/63	20/200
Visual acuity after surgery	20/63	20/32	20/25	20/100

MH = macular hole; RE = right eye.

The head-down position associated with gas instillation was well tolerated by all children and no vision-threatening complications such as permanent cataract, intraocular infection, retinal detachment, macular hole reopening, or intraocular pressure elevation occurred.

In our series the surgical intervention by pars plana vitrectomy and platelet concentrate ensured good results with respect to anatomic hole closure and visual improvement in all patients. These results were sustained over a long follow-up period. It has been described that traumatic MH can be closed without platelet concentrate,[4] but patients with poor prognoses like the described ones could be prime candidates for the use of adjuvants.

Despite the good results, it is not easy to decide on surgery and choose the appropriate time. To the best of our knowledge 21 individual patients with spontaneous closure of a traumatic MH have been described in the literature. These were mostly patients with a small macular hole in adults and children. In 18 of 20 of these patients the spontaneous closures were observed not later than 4 months after trauma.

Yamashita and coworkers[5] analyzed a series of 18 traumatic macular holes and found a spontaneous closure in 8 of these patients within 4 months after trauma. In analyzing the literature he described that surgical treatment of traumatic macular holes leads to a higher rate of hole closure, but no significant difference in the proportion of final visual acuity of $\geq$ 0.5 (20/40) or better was noticeable between the spontaneous closure group and the surgical closure group. Therefore, he suggests an observation period of several months before surgery. In his literature analysis, however, only patients with a spontaneous closure have been considered to determine the improvement of visual acuity. If the patients who did not manifest a spontaneous closure would have been taken into account as well, the rate of patients with a final visual acuity of 0.5 (20/40) or better would be much lower in the observation group compared with the surgical group.

The spontaneous closures reported in the literature mostly involved small macular holes with a size of approximately 100 to 200 μm. The data on the incidence of spontaneous closure of traumatic MH are limited and, therefore, we do not consider them a justifiable reason for waiting longer than 3 to 4 months in view of the good postoperative results and low complication rate after pars plana vitrectomy.

Based on the literature and our long-term results, we regard pars plana vitrectomy with platelet concentrate and SF6 gas instillation as safe and effective and, therefore, as the therapy of choice for traumatic macular holes, particularly in children after a period of observation no longer than 3 to 4 months.

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A New, Non-contact Wide Field Viewing System for Vitreous Surgery

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PURPOSE: To report a new, noncontact wide field viewing system for vitreoretinal surgery.

DESIGN: Device description: A noncontact wide field viewing system consisting of adjustable hinged arm and a combined condensing lens and reinverting prism has been developed. The arm clamps onto the operating table or wrist rest and holds the lens system in the air above the eye.

METHODS: For vitreoretinal surgery, a new, relatively inexpensive noncontact wide field viewing system consisting of an adjustable hinged arm and a combined condensing lens and reinverting prism has been developed. The combination condensing lens and reinverting prism is used without a microscope–mounted inverter. The optical component may be sterilized with ethylene oxide, peracetic acid, or glutaraldehyde. Other components may be steam autoclaved.

RESULTS: The new, noncontact wide field viewing system has been used satisfactorily in more than 200 vitrectomies at seven medical centers. It provides an excellent view of the vitreous and retina.

CONCLUSION: A new, noncontact wide field viewing system for vitreoretinal surgery has been developed with satisfactory image quality and a field of view comparable to contemporary noncontact panoramic viewing systems. (Am J Ophthalmol 2003;136:199–201. © 2003 by Elsevier Inc. All rights reserved.)

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VITREORETINAL SURGERY MAY BE ENHANCED BY AN indirect viewing system that provides the surgeon with a wide field of view.[1] The image, although of sufficiently wide field, is inverted, which makes manipulation of instruments inside the eye hazardous. Reinverting the image has been achieved by incorporating a prism system into the microscope[2] that has undergone refinement and modification. Wide field viewing systems have proven to be of value, especially in complex cases such as eyes with small pupils or with partially opaque media. Many vitreoretinal surgeons now employ such devices. We have developed and field tested a novel, simple, and relatively inexpensive system that should permit greater availability of wide field viewing systems in vitreoretinal surgery.

The system consists of two separate devices. The first is a supporting arm that may be attached to the wrist rest or surgical table to support the optical device immediately over the patient's eye (Figure 1). The second device is a 132-diopter condensing lens combined with a reinverting prism (Peyman, Wessels, Landers lens) which is approximately 2 cm wide by 5 cm long × 4.5 cm high (Figure 2). The optimal working distance for this combined reinverting prism condensing lens is approximately 0.6 cm from the cornea; any closer risks touching the eye and depositing secretions or irrigating fluids on the undersurface of the lens degrading the optical performance. If the lens is placed further away from the eye, the field of view will be constricted. The condensing lens–reinverting prism combination is used without any inverting system in the operating microscope. A clear image can be maintained by using the fine focus system of the operating microscope.

The devices are manufactured from stainless steel, plastic, and glass. Sterilization is optimally achieved with ethylene oxide, peracetic acid, or by soaking in glutaraldehyde. All the nonoptical components may be steam sterilized, but the sealed condensing lens–reinverting prism combination should not be subjected to steam sterilization.

The system has been used satisfactorily in seven different vitreoretinal centers on a total of over 200 cases.

The new system remains in better position than microscope–mounted systems when the eye or the microscope is moved, as when changing the focus, zoom, or X-Y position, because it attaches to the table or the wrist rest rather than to the operating microscope. The 4-mm to 8-mm working distance permits intermittently irrigating the cornea during the operation with 2.5% methylcellulose using a 20-gauge cannula without displacing the optical component.

Noncontact viewing systems have an advantage over contact wide field viewing systems in that they avoid wicking or trapping blood between the lens and the cornea. They also avoid any corneal deformation that might produce optical aberrations. This minimizes lost operating time from clearing the visual path.

The optical component of the wide field viewing system can be readily moved out of the surgical field for cleaning