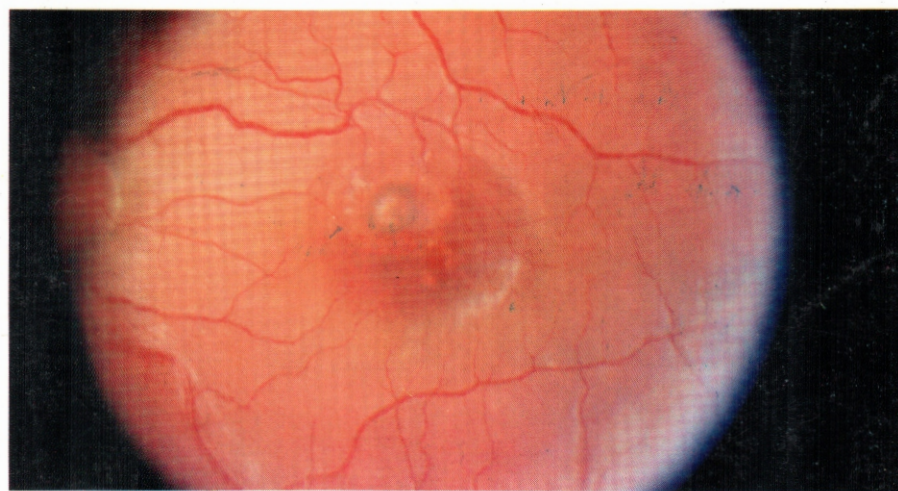


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THE OFFICIAL JOURNAL OF THE OPHTHALMOLOGICAL SOCIETY OF PAKISTAN
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At Page 136 Figure 1: Benign Concentric Annular Maculopathy

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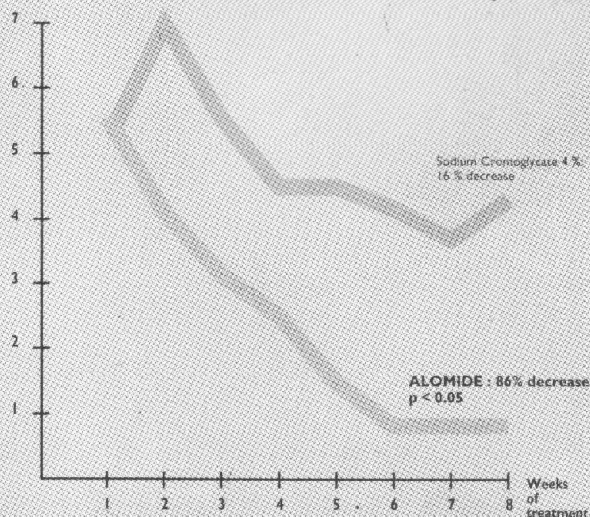
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Editorial

Occupational Ocular Hazards

See also pp.....119-128

Occupational hazards related to the eyes range from minor nuisances to major disasters. Constant and extensive use of eyes without adequate rest periods leads to asthenopia in accountants, bank tellers, proof readers, librarians, teachers and others in similar professions. The symptoms are worse if astigmatic errors of refraction are not adequately corrected. Those working on video display terminals (VDTs) or cathode ray tubes (CRTs) are also prone to have asthenopic symptoms from flickering screens.

Professionals coming in contact with electromagnetic radiation and radio frequencies, such as electricians, radar operators and workers in industries manufacturing microwave equipment, are prone to develop cataracts from undue exposures or accidents. Glass-blower's cataracts of yore are not so common nowadays but do point to the fact that prolonged heat exposure can denature lens proteins leading to cataract formation¹. As a matter of fact, infrared, ultraviolet, ionizing radiation and microwaves, all can produce cataracts; hence the ocular hazards in related professions and industries. Welding-arc workers may also get debilitating and excruciatingly painful corneal burns from inadvertent exposure to ultraviolet radiation.

Medical and paramedical personnel are prone to acquire eye infections from the patients or materials they handle. Outbreaks of ocular viral infections, like epidemic keratoconjunctivitis (EKC) every few years in certain populations, lead to such spread from patients to medical and paramedical staff. AIDS virus, similarly, is a potential hazard through tear secretion or other body fluids. Bacterial infections may also spread to the eyes of medical and nursing staff.

Farmers and others working in the fields may get sand, grains or husk into their eyes leading to conjunctival or corneal injuries or infections. In fact,

many eyes are lost from inadequate or wanting facilities in rural settings.

Workers in bottling plants and others in beverage industry are exposed to accidental explosions with shards of glass hitting the eyes at high velocities when the glass bottles burst under high pressure. Those engaged in the manufacture of fireworks and ammunition, as well as those working in mines and quarries, blasting with dynamite, are specially prone to receive severe ocular injuries, again because of the explosive nature of the blast. Many end up with lacerated globes with or without intraocular foreign bodies (IOFBs).

Soldiers face a special hazard in their occupation in that they are exposed to firearm injuries as well as to explosive blasts from bombs, land mines or booby traps. Ocular injuries from such hazards are devastating at times. Of course, once in a while such situations can fortuitously prove to be a boon to humanity, like the development of intraocular lens implants from the plastic material similar to that found embedded in the eyes of Royal Air Force pilots from shattered plastic canopies of their fighter bomber planes, when it was seen to be tolerated well by the eye².

Lathe workers, auto mechanics and those working on grinding wheels or with hammers and chisels or picks and axes, have forever been getting flying metal or stone foreign bodies or wood chips into their eyes. Some of these are mere annoyances, like conjunctival or corneal foreign bodies, while others can be more serious causing lacerations of cornea, sclera, iris, lens and even the retina, choroid, posterior sclera or optic nerve.

Mine workers and others working for prolonged periods of time under conditions of inadequate illumination have long been known to develop ocular

disorders. As a matter of fact, a special syndrome, "Miners' Nystagmus", has been described to highlight their plight³.

Professional sportsmen are also subject to ocular trauma. High velocity balls from squash or tennis rackets, cricket balls, hockey pucks or the like, are notorious in causing black eyes, hyphemas, cataracts, retinal edema or retinal detachments. Pugilists and prize fighters, similarly, and even more commonly, are prone to receive ocular trauma, since they get more direct hits on the head and the face than elsewhere.

We, as ophthalmologists, deal with the end results of ocular trauma a lot, be it related to accidents at home or at work. But we have done precious little in the field of prevention of such sight-threatening ocular trauma. True, that the brunt of responsibility to safeguard the interests of industrial workers and those in organized professions rests on the shoulders of the government, but we can not shirk our own duty to lobby the government, pressurize the industry and to educate the public regarding the safety precautions and common sense measures to be adopted at home and at work.

Regular eye examinations to correct refractive errors can eliminate asthenopia to a great extent.

Wearing of gloves and adoption of common hygienic measures can prevent cross-infections amongst the public and the medical personnel. Public education regarding general and ocular hygiene and emphasis on seeking early professional help can go a long way in preventing unnecessary visual disasters. We need to convince the government in enacting and enforcing Occupational Safety and Health Acts in various at-risk occupations and industries. Banning of unlicensed manufacture of fireworks and of its general use by the public, use of plastic bottles, rather than glass, by the beverage industry, use of protective eye wear by workers in various industries especially prone to ocular damage, are only some of the suggestions that the Ophthalmological Society of Pakistan should bring to bear its weight on for the government to implement.

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Jehangir Durrani

Pars Plana Vitrectomy in Complicated Retinal Detachment with Proliferative Vitreoretinopathy

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ABSTRACT

We performed three-port pars plana vitrectomy in 68 eyes of 66 patients for retinal detachment complicated by proliferative vitreoretinopathy (PVR). Fifteen (22.72%) patients were only-eyed. In 38 (55.88%) eyes the surgery was performed as a primary procedure, while 30 (44.11%) eyes had vitrectomy as a secondary procedure. Forty-nine (74.24%) patients were male and 17 (25.75%) were female. Thirty-six (54.54%) patients were below forty years of age. Thirty-nine eyes were phakic, 24 aphakic and 5 eyes were pseudophakic. Nineteen patients did not know about the duration of retinal detachment. In 50 (73.52%) eyes retina was totally detached on presentation. Forty-eight (70.58%) eyes had grade C and D PVR. Retinal break could not be identified in 30 (44.11%) eyes prior to surgery. Silicone oil was used as internal tamponade in 45 eyes. Perfluorocarbon liquid (PFCL) was used during the surgery in 12 eyes. Lensectomy was performed as part of the procedure in 15 eyes. In 3 eyes corneal epithelium had to be denuded. Retinotomy and retinectomy were performed in 8 eyes. Silicone explants were used in all eyes operated on. Intraoperative retinal incarceration in scleral ports was the commonest complication. A single case of globe rupture was managed successfully. Follow-up ranged from one month to thirty-six months. Overall anatomical success was achieved in 46 eyes (67.64%). The visual status of 3/60 and better was achieved in 37 eyes (54.41%).

INTRODUCTION

Proliferative vitreoretinopathy (PVR) is a clinical condition characterized by proliferation and contraction of nonvascular cellular membranes on periretinal surface, vitreous base, and vitreous gel after a rhegmatogenous retinal detachment. Majority of cases occur postoperatively or in long-standing retinal detachments¹.

The terminology used in the past to describe this entity includes massive retinal fibroplasia, massive vitreous retraction, massive periretinal retraction and massive periretinal proliferation¹. Risk factors for PVR include preoperative choroidal detachment, excessive cryopexy, hypotony, presence of cells and flare in the anterior chamber, incomplete vitreous detachment, horseshoe tears, aphakia, vitreous hemorrhage, giant retinal tears, retinal detachments of long duration (longer than one month) and retinal breaks larger than 3 disc diameter. The risk of PVR is minimal in eyes with macular holes with retinal detachments, in highly myopic eyes, in eyes with atrophic holes in lattice degeneration and in eyes with disinsertion at ora²⁻⁴.

PVR is the most common cause of failure of rhegmatogenous retinal detachment surgery, occurring

in approximately 7% to 10% of eyes⁵. Anterior PVR occurs anterior to the posterior insertion of the vitreous base. It is present in 22% of eyes with primary PVR and 86% of eye with recurrent PVR. Posterior PVR occurs posterior to the posterior insertion of the vitreous base. It occurs alone in 78% of eyes with initial PVR and in 14% of eyes with recurrent PVR⁶.

Machemer and colleagues pioneered the development of pars plana vitrectomy by using specialized instruments through watertight incisions². Although the procedure is reserved for cases in which conventional buckling or simple techniques have failed, pars plana vitrectomy has been performed as primary procedure to treat some primary retinal detachments¹.

We report our experience of pars plana vitrectomy in 68 eyes of 66 patients with retinal detachments complicated by PVR.

PATIENTS AND METHODS

Between January 1993 and December 1995, at the Department of Ophthalmology, Civil Hospital, Karachi, Pakistan, 68 eyes of 66 patients with rhegmatogenous retinal detachment and PVR underwent vitreoretinal surgery performed by one of us

(M.I.A). We excluded the eyes which underwent pars plana vitrectomy for giant retinal tears, macular breaks, penetrating eye injuries with or without intraocular foreign body, Eales' disease and diabetic retinopathy.

These patients included referrals for primary vitreous surgery from other centers, our own failures in buckling procedures and failed buckling procedures from other centers. All surgeries were performed as inpatient procedures, under general anesthesia. Each patient was examined preoperatively, intra-operatively and postoperatively, with recording of findings on standard proformas. Fundus photography was done both pre and postoperatively.

Best-corrected visual acuity and intraocular pressure were determined in each patient before and after surgery. Anterior segment, media, retina and vitreous were studied in both eyes with slit-lamp biomicroscopy. Goldmann 3-mirror contact lens, indirect ophthalmoscopic and, where required, B-scan ultrasonic examination were done. The findings of the vitreoretinal examination were graded and recorded according to the Retina Society Classification of 1983 and 1991⁷⁻⁸.

After anesthetic evaluation and baseline investigations, pars plana vitrectomy was done through standard three-port (20 gauge) microsurgical technique. Three hundred and sixty degrees peritomy and rectus muscles isolation was followed by scleral buckling with tyre or plomb and band which was tied with Watzke's sleeve.

In cases where buckling had already been done, revision, or adjustment was only made when felt necessary. In the initial stages of our experience cryotherapy was done under visualization with indirect ophthalmoscope while in the latter part of this series cryotherapy was performed under visualization through microscope. The subretinal fluid (SRF) was drained externally in the initial period but later on endodrainage was done using flute needle through the existing retinal breaks. The breaks which could not be identified preoperatively, were identified during surgery.

Lensectomy was performed in 15 eyes. This procedure was performed in the initial stages of surgery prior to vitrectomy. Complete vitrectomy was then performed using scleral indentation for basal vitrectomy. An iridectomy was performed in eyes where silicone oil was planned to be used as internal tamponade. Posterior membranes were peeled while the anterior membranes were cut with scissors or cutters. After the availability of perfluorocarbon liquids (PFCL) the mobile retina was stabilized intra-operatively using PFCL as an operative tool. Corneal epithelium was denuded in three eyes for better

visualization. Retinal breaks were relieved of any traction and were marked with coagulator for identification under air.

Once the retina was felt to be mobile and visibly free of membranes further procedures were planned. Retinotomy and retinectomy were performed in 8 eyes, in cases where retina was incarcerated or was felt to be stiff. Two rows of endocoagulation were applied to the area to prevent haemorrhage. The scissors and cutters were used to cut the retina.

In the initial period of our experience fluid-oil exchange was performed but later on fluid-air and air-silicone oil exchange were done. With the availability of PFCL, the fluid-PFCL exchange, where required, was followed by PFCL-air exchange and air-silicone oil exchange was done at the end. 1000 centistokes (c.s) or 1300 c.s. silicone was used in 45 eyes. The quantity used varied from 3.50 cc to 7.0 cc with the average being 4.50 c.c. In one eye we used 20% mixture of SF6 and air. In the rest of the cases we stopped the procedure at fluid-air exchange.

All procedures were carried out under operating microscope (ZEISS OPM-6). The Premier Storz vitrectomy unit was used, employing disposable cutters. Central and peripheral fundus viewing contact lenses were used with methylcellulose as coupling fluid. Scleral buckles were tied with 5/0 ethibond while scleral ports and peritomy were closed with 6/0 vicryl.

Subconjunctival injection of gentamicin 20 mg and betamethasone 2 mg were given to all cases at the end of the procedure. The eye was atropinized, and antibiotic drops and ointment were instilled. Systemic antibiotics and steroids were given for 5 days. The first dressing was done after 24 hours. Visual acuity, IOP and the state of the retina were noted during the patient's stay in the hospital for 4 to 5 days. The fundus was photographed before discharge and the patient was followed-up in the out-patient department after 2 weeks, 1 month, 3 months and later on at 6-month intervals.

RESULTS

Sixty-eight eyes of 66 patients operated on were analyzed in this retrospective study. Fifteen (22.72%) patients were only-eyed. Forty-nine (74.24%) patients were male and 17 (25.75%) were female. Thirty-six patients (54.54%) were 40 years of age or below while 30 (45.45%) were above 40 years. Thirty-four (51.52%) patients were from Karachi and suburbs while 32 (48.48%) patients were from interior Sindh and other provinces. In 51 eyes (75%) the duration of retinal detachment was more than 6 weeks. Thirty-eight eyes (55.88%) had the procedure performed as primary

surgery while 30 (44.11%) eyes had failed scleral buckling surgery prior to undergoing vitrectomy.

Thirty-nine eyes (57.35%) were phakic and 29 (42.64%) aphakic (of these 5 eyes were pseudophakic). Fifty eyes (73.52%) had total retinal detachment. Eighteen eyes (26.47%) were graded "C" and 30 eyes (44.11%) were in grade "D" of PVR classification (Table 1). The extent of retinal detachment, hazy media and extensive folding and fibrosis were the reasons for inability to localize retinal breaks in 30 (44.11%) eyes preoperatively. In these eyes breaks were identified during surgery.

Table 1: Grading of PVR (68 eyes).

Grade	Number	Percentage
A	2	2.94
B	18	26.47
C	18	26.47
D	30	44.11
Total	68	100.00

Intraoperative complications are shown in Table 2. The retinal incarceration in scleral ports occurred in 4 eyes. PFCL was very useful in relieving the incarceration along with other measures. A single case of globe rupture occurred in a patient with previous scleral buckling. The eye was saved after scleral suturing, cryotherapy, vitrectomy using PFCL and exchanging it with air and then with silicone oil.

Table 2: Intraoperative complications (68 eyes).

Complication	Number
Choroidal effusion	5
Incarceration of retina	4
Iatrogenic break	3
Retinal hemorrhage	4
Vitreous hemorrhage	2
Hyphema	2
Oil in subretinal space	1
Choroidal hemorrhage	2
Lens injury	2
Corneal abrasion	2
Scleral cut	1
Globe rupture	1
Oil in AC	2

The procedure was abandoned on the table in 3 eyes. Follow-up ranged from 1 month to 36 months. The postoperative complications are shown in Table 3.

Most of the complications were related to silicone oil. Anatomical success (Table 4) in the form of totally flat retina was achieved in 30 (44.11%) eyes. In 16 eyes (23.53%) the retina was partially attached with the macula on. Overall anatomical success was achieved in 46 (67.64%) eyes.

Visual status and physiological success was mostly of navigational vision (Table 5). Large group of patients preoperatively had visual acuity of perception of light. The extensive and very expensive surgical procedure enabled 37 eyes (54.41%) to achieve 3/60 and better vision. Out of these, 29 eyes (42.64%) enjoyed a visual status of 3/60 to 6/60. Only eight eyes (11.76%) enjoyed visual acuity of 6/24 to 6/36.

Table 3: Postoperative complications (68 eyes).

Complication	Number
Initial rise of IOP	1
Uncontrolled rise of IOP	2
Uveitis	4
Cataract	10
Endophthalmitis	2
Exposure of explant	1
Bullous keratopathy	1
Oil leak from sclerotomy	1
Vicryl tag in vitreous	1
Emulsification of oil	2

Table 4: Anatomical success (68 eyes).

Grade	Number	Percentage
Central retina flat (macula on)	16	23.53
Retina totally flat	30	44.11
Total	46	67.64

Table 5: Visual status (Physiological success) (68 eyes).

Visual acuity	Preoperative		Postoperative	
	No.	%	No.	%
6/6	0	0	0	0
6/12 - 6/18	1	1.47	1	1.47
6/24 - 6/36	1	1.47	8	11.76
6/60 - 3/60	13	19.11	29	42.64
1/60 - HM	17	25.00	17	25.00
PL - PR	36	52.94	13	19.11
Total	68	100.00	68	100.00

DISCUSSION

PVR is the most common cause of failure of rhegmatogenous retinal detachment surgery, occurring in approximately 7% to 10% of eyes⁵. Anterior PVR occurs anterior to the posterior insertion of the vitreous base. It is present in 22% of eyes with primary PVR and 86% of eyes with recurrent PVR. Posterior PVR occurs posterior to the posterior insertion of the vitreous base. It occurs alone in 78% in eyes with initial PVR and in 14% of eyes with recurrent PVR⁶. Anterior PVR is the most common cause of anatomic failure after vitreoretinal surgery for severe PVR⁹. If the retina remains attached, hypotony with loss of ocular integrity is the main cause of functional failure after vitreoretinal surgery for severe PVR¹⁰.

Surgical goals in the management of PVR include closure of retinal breaks, and complete release of periretinal traction. Mild cases of PVR should be treated with scleral buckling alone. However, severe cases require vitreoretinal surgery in addition to scleral buckling¹. Timing of vitrectomy is controversial. It has been advocated to delay vitreous surgery until periretinal membranes have matured (approximately 6 weeks)¹¹. The delay in surgery is likely to be associated with a worse visual result¹. Patients with severe PVR may need additional surgery. In a series of patients operated on for PVR, 15% of eyes underwent two vitreoretinal procedures, 2.5% of eyes underwent three and 1% of eyes four vitreoretinal procedures for recurrent retinal detachment⁶.

Relaxing retinotomy and retinectomy are indicated when retina is too short to be reattached to the wall of the eyeball by other means. 2% of patients with initial PVR and 27% of patients with anterior PVR or recurrent PVR require relaxing retinotomies and retinectomies¹². Subretinal membranes are present in approximately 47% of eyes with PVR but in only 28% of cases do they prevent retinal reattachment, and need to be removed¹³.

The unique physical properties of low-viscosity PFCL assist in hydrokinetic manipulation of the retina during vitreous surgery for complicated retinal detachments. The specific gravity, almost twice that of saline, flattens the retina with greater force than an equivalent amount of sodium hyaluronate or fluorosilicone oil. A posterior retinotomy for drainage of SRF is not necessary. Pooled subretinal blood can also be displaced peripherally and is accessible to internal drainage through existing peripheral breaks. When the retinal detachment is highly bullous or complicated by severe PVR, the higher specific gravity

of PFCL aids by stabilizing the posterior retina so that anterior peripheral blood or traction can be managed with less risk of retinal damage¹⁴.

During the last decade the anatomic success of vitreous surgery in the management of PVR has dramatically increased from 14% to 80%¹². In a series that included both primary and reoperative procedures, Lewis and Aaberg demonstrated that eyes with anterior component of PVR had a worse prognosis when compared to eyes with only posterior component. Total retinal reattachment was achieved in 59% of eyes with anterior PVR and in 72% of eyes with only a posterior component. Final visual acuity of 5/200 or better was attained in 43% of eyes with anterior PVR compared to 57% of eyes with only posterior PVR¹⁵.

We attempted to use the principles and surgical techniques that would allow us to treat all the components of PVR. The goal was to remove all periretinal traction and to close and seal all retinal breaks, while avoiding intraoperative complications and minimizing the risk for postoperative re-proliferation. Our series involved more extensive approach with the passage of time and the availability of accessory tools. The techniques improved and so did the anatomical results, specially in the latter part of the series when PFCL became available. In 8 cases retinotomy and retinectomy were performed. Retinal incarceration in 6 eyes and stiff and fibrosed retina in 2 eyes were our indications for these procedures. In all these 8 eyes and in 4 other eyes we used PFCL as an operative tool.

There is great controversy as to the preferred agent for internal tamponade in eyes with PVR^{4,5}. In general, the European vitreoretinal surgeons prefer the use of silicone oil, while vitreoretinal surgeons in the United States prefer the use of perfluoropropane gas¹. The Silicone Study Group reported silicone oil to be superior to sulfur hexafluoride (SF₆), with little difference between the use of 14% perfluoropropane gas and 1000-centistoke silicone oil^{4,5}.

Our experience has been that our patients would not follow the instructions to maintain the posture that is essential with the use of gases. Between 21% to 39% of patients operated on for severe PVR require an outpatient fluid-gas exchange in postoperative period⁶. This just seems impossible in our setup. Lewis recommends that in eyes with intraocular gas, IOP should be checked six hours after surgery and measures ranging from timolol to I/V acetazolamide to surgical intervention by paracentesis should be performed if IOP is too high in immediate postoperative period¹. This again seems impractical in our system. SF₆ is

available here, but The Silicone Study Group shows silicone oil to be a better choice than SF₆⁵. Perfluorocarbon gases are still not available in Karachi at least, and even if they were, these gases are too expensive and would increase the cost of an already too expensive a procedure.

Although silicone oil has its own problems and recognized complications¹, it has been our choice as internal tamponade. Our indications for removal of silicone oil have been uncontrolled glaucoma, emulsification and oil in the anterior chamber. Silicone oil had to be removed from eight eyes in our series. The longest period for retained oil in our series has been three years. Follow-up in surgical vitreoretinal problems has been surprisingly good, compared to other problems reported in the country. It will be interesting to see how these eyes behave where silicone oil has been retained for longer durations, especially in all those 15 "only eyes" included in our series. Our series achieved overall anatomical success in 46 eyes (67.64%) and visual status of 3/60 and better in 37 eyes (54.41%) out of which only 8 eyes (11.76%) could achieve visual acuity of 6/36 to 6/24. Majority of the eyes had long-standing vitreoretinal problems. Financial aspects, illiteracy, lack of awareness of the concerned authorities about the problem, the unwillingness on their part to help the needy patients, and multiple technical problems faced at the public hospitals in carrying out these time-consuming expensive procedures are a few of the factors which contribute to further delays in surgery after the patients are hospitalized.

Re-proliferations and anterior PVR and perisilicone proliferations were common causes of anatomical failure while localized PVR in the form of macular pucker¹⁶, was the cause of less than desired physiological outcome.

On the one hand a lot is needed to make patients understand and realize the nature and outcome of these complicated vitreoretinal problems in our country, while on the other hand more and more vitreoretinal surgeons are required to take up this, at times, back-breaking subspecialty.

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Ophthalmic "Pastpourri"

Aspiration of Cataract A Millennium Ago

Ammar, an Arabian Ophthalmologist of Egypt in 1000 A.D., a native of Mosul, Iraq, was considered "the most clever eye surgeon" of his time. The most important thing in Ammar's work is the radical operation of the soft cataract by suction through the hollow needle constructed by him.

The origin of this method is really dramatic—just as (dramatic) as 730 years later was the origin of Daviel's extraction. For catching the real point you must understand, that in the common couching of cataract, as performed by the Arabs after Greek model, the principal danger consisted in reascending of the cataract. To avoid this failure, it was considered necessary, without any exception, to lay the patient on his back for seven days after the operation. Once, at Diarbekr in Iraq, Ammar operated on a man of 30 years for congenital cataract, which could not be couched at all, but ought to be cut into small pieces entirely and to be removed from the pupil. The man recovered fair vision, contrary to expectation.

Ammar adds:

He swore that he never rested on his back, not a single day, and he took no precautions at all. Then I constructed the hollow needle, but I did not operate with it on anybody at all, before I came to Tiberias. There came a man for operation who told me: Do as you like with me, only I can not lie on my back. Then I operated on him with the hollow needle and extracted the cataract; and he saw immediately, and did not need to lie, but slept as he liked. Only I bandaged his eye for seven days. With this needle nobody preceded me. I have done many operations with it in Egypt.

That, without the slightest doubt, is a real progress, and the first step to Daviel's extraction, the greatest progress in our branch made after the Greeks.

Excerpted from "Arabian Ophthalmology", By Hirschberg J. Address by special invitation before the Section on Ophthalmology of the American Medical Association at the Portland session, July 11-14, 1905. Reprinted from the Journal of the American Medical Association, Vol. XLV, Oct. 14, 1905, pp 1127-31.

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Management of Intraocular Foreign Bodies

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ABSTRACT

Seven patients presented with a history of intraocular foreign body (IOFB). Four sustained injury while metal was being hammered, two due to blast and one due to flying particle from a pair of scissors on a grinding wheel. The time interval between the injury and presentation varied from two days to four weeks. The wound of entry was self-sealing in four patients while three required anterior segment repair and reconstruction. There were two patients with a double perforation and five had the IOFB lodged in the posterior segment. Amongst the latter, pars plana vitrectomy was carried out to remove IOFB in four patients and external magnet was used in one. The postoperative visual acuity was 6/9 in two, 6/12 in one, 6/36 in one, light perception in one and two patients were lost to follow-up. IOFB is a complicated problem due to uncontrolled nature of the initial trauma and requires planned intervention but the nature of outcome is variable.

INTRODUCTION

Ocular trauma associated with intraocular foreign body (IOFB) is a complicated problem because of the size, nature and mode of entry of the foreign body and every case requires individual consideration. The associated anterior and posterior segment trauma needs additional surgical procedures to be performed to aid the removal of the foreign body and restore useful vision. With the advent of better methods of localization, like CT Scans, refined microsurgical repair and modern vitreoretinal surgery, the prognosis for these patients is much better than before. But inspite of all these advances, the complicated nature of trauma and its sequelae leads to guarded visual prognosis.

PATIENTS AND METHODS

Seven patients presenting to the Eye Department, Allama Iqbal Medical College, Lahore, with history of eye injury and IOFB were studied.

Complete ocular examination was carried out including assessment of visual acuity, ocular muscle balance and movements. Slit-lamp biomicroscopy was done to record details of wound of entry and associated anterior segment trauma. Applanation tonometry was carried out in appropriate cases. Dilated pupil ophthalmoscopy was done to locate the IOFB and document any associated posterior segment trauma. Fundus visualization with indirect ophthalmoscope allowed localization of IOFB in three patients with adequate view and one patient inspite of vitreous haze due to diffuse hemorrhage. It could not be localized ophthalmoscopically in three patients, one with a dense

cataract and the other two with only partial view because of vitreous hemorrhage. These latter turned out to be double perforations on CT-Scan. So we could localize IOFB in four out of five of our patients who had a definite IOFB barring the one who had a dense cataract at the time of injury precluding any fundus visualization. Radiological investigations including orbital X ray were requested to document the presence of the foreign bodies together with their number and associated orbital bony trauma (Fig-1). CT Scan was carried out in a majority of our patients as a means of accurate localization of IOFB (Fig-2 & 3).

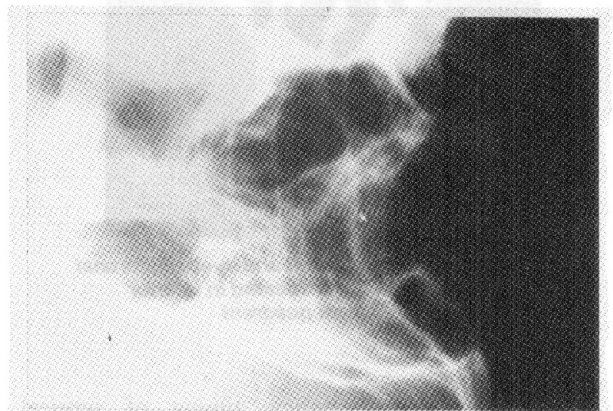


Fig-1: Lateral view X-ray of the orbit showing a foreign body which is difficult to localize in terms of the eyeball

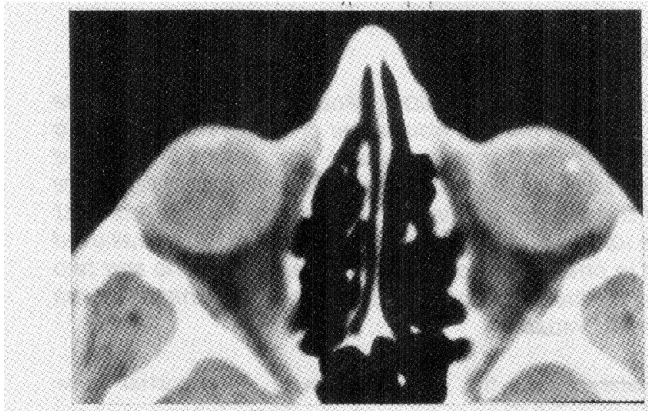


Fig-2: CT Scan of the orbit and eyeball (axial section) with accurate localization of IOFB on the temporal half and located inside the scleral ring, in front of the equator

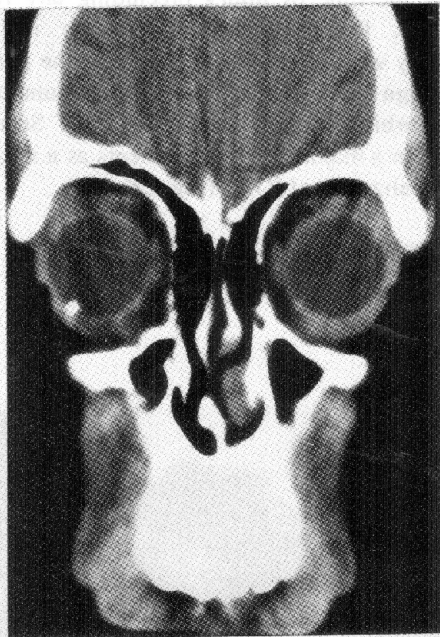


Fig-3: CT Scan of the orbit and eyeball (coronal section) with IOFB located in inferior temporal quadrant

As a matter of policy, timing of surgical intervention was kept in the morning following the day of presentation as it was felt that the best operative

team and conditions were available during normal working hours. All patients had general anaesthesia. After cleaning and draping, the eyelids were opened using a thin wire speculum. The wound of entry was examined and primary wound repair was carried out using 10/0 monofilament nylon for the cornea and 8/0 virgin silk for the sclera. Anterior segment reconstruction in terms of iris prolapse reposition was carried out where necessary. Traumatic cataract was removed in one patient to allow fundus visualization while pars plana lensectomy was done in another as the IOFB was located in the nasal pars plana and ciliary body.

Conjunctiva was incised at the limbus and retracted back in a sectoral or circumferential manner depending on the need for scleral buckle or otherwise. The sclerotomies were placed at 3mm or 4mm from the limbus depending on the plan to remove or preserve the lens, respectively. In four cases IOFB's were located in the posterior segment and all of these required pars plana vitrectomy and use of IOFB forceps. The sclerotomy for foreign body forceps entry and IOFB removal was enlarged in a limbus-parallel or circumferential manner to ease the removal when the size of IOFB required so. Prophylactic circumferential scleral buckling was done in all five patients who underwent pars plana vitrectomy. Additional procedures to achieve retinal integrity were tailored to the individual case, e.g. one case required internal air tamponade due to iatrogenic peripheral retinal tears which were successfully repaired.

RESULTS

Seven patients who had histories of injuries and retained intraocular foreign body were retrospectively reviewed. All were males with ages ranging from 12 years to 35 years, with a mean of 25 years (Table-1). Three had histories of being actively involved, two were innocent bystanders, while two sustained injury due to blasts. Time interval between injury and presentation varied from two days to one month with most presenting within the first week. The entrance wound was corneal in two, corneoscleral in three and scleral in two patients. There was associated anterior segment trauma in terms of iris prolapse in two patients, both having corneoscleral wound of entry and another having traumatic cataract with loose cortical matter in the anterior chamber; iritis and hyphema were also seen in one patient. Entrance wound repair was carried out in three patients, two having corneoscleral (case 4 & 7) and one having scleral wound (case 6).

Table-1:

Age/Sex	Time between injury & presentation	Entrance wound	Assoc. ant. seg. trauma	Assoc. post. seg. trauma	IOFB location	VA before	VA after	Management	Comments (Nature of IOFB)
25/M	1 month steel mill blast	Scleral	-	PVR VH	Vitreous upper temporal	HM	PL+	PPV, IOFB removal (forceps) SO SBP 7/2/93	PVR (iron)
11/M	3 weeks sharpening scissors on grinding wheel	Corneo- scleral	-	VH RD	Inferior orbit (double perforation)	HM	6/36 uncorr- ected	PPV, RD repair SBP, air tamponade 10/2/93	
35/M	5 days Hammer on wheel by mechanic	Corneal	Cataract	No view	Vitreous upper temporal	CF		PPL, PPV, IOFB removal (forceps) 7/3/93	(iron)
25/M	5 days Hammer & chisel	Corneo- scleral	Iris prolapse	Normal	Vitreous upper temporal	CF		Wound repair PPV, IOFB removal (forceps) SBP 11/12/94	(Iron)
35/M	2 weeks Hammering (workshop)	Corneal	Iris/lens injury	Band across vitreous	Inferior retina with minimum encapsulation	CF	6/12	(Iron) IOFB removal (ext. magnet) cryopexy, SBP May 94	1. Band removal Aug. 94 2. ECCE, PCL Nov. 95
12/M	1 week Blast Injury	Scleral nasal 3'O Clock	Iritis & Hyphema	Vitritis	Nasal ciliary body	6/6	6/9	Wound repair, PPL, PPV, IOFB removal (forceps) SBP, intravitreal antibiotic 6/11/95	Monocular aphakia (Stone)
33/M	2 days Hammering while welding	Corneo- scleral	Iris prolapse	VH	Posterior orbit (Double perforation)	6/9	6/9	Wound repair	Conservative because of location and sparing of macula and minimum VH and traction band.

VH = Vitreous hemorrhage RD = Retinal Detachment PVR = Proliferative vitreoretinopathy
 PPV = Pars plana vitrectomy PPL = Pars plana lensectomy IOFB = Intraocular foreign body
 SBP = Scleral buckling procedure SO = Silicone Oil

Table 2: Postoperative complications.

Cataract, air-induced	1
Band-related infection	1
Proliferative vitreoretinopathy	1
Epiretinal membrane	1

Preoperative visual status varied from hand movement in 2 patients (28%), finger counting in 3 (43%), 6/9 in 1 (14%) and 6/6 in 1 (14%) (Table-1). The IOFB was successfully removed in five patients; four were removed by pars plana vitrectomy and use of foreign body forceps while one was removed using an external magnet. Four IOFBs were of metallic nature, most likely iron, while one was a small stone particle. Foreign bodies were absent in two patients who had double perforations.

Visual rehabilitation varied from 6/9 in two, 6/12 in another, 6/36 in one, light perception in one, while two were lost to follow-up (Table-1). One patient having a double perforation had a visual acuity of 6/9, therefore, surgical intervention was not planned in the early phase because of the proximity of the wound of exit to the posterior pole and minimum structural alteration in terms of vitreous hemorrhage, although future proliferative activity is to be watched.

One patient developed advanced proliferative vitreoretinopathy where retinal status could not be restored. Another patient developed band-related infection which was successfully controlled after removal of the band. Later he had progression of air-bubble-contact-induced cataract and had a successful extracapsular extraction and posterior chamber lens implant with 6/12 visual acuity (Table-2).

DISCUSSION

Intraocular foreign body is a major challenge for the ophthalmic surgeon as the extent of associated trauma could be extensive, like in a road traffic accident, where the priority is saving the patient's life and ocular repair is part of a multidisciplinary approach; on the other extreme it could be a small metallic particle penetrating the eye while hammering, with traumatic sequelae entirely confined to the eyeball^{1,2}.

Total ocular structural damage and disorganization will require a primary enucleation although an attempt must be made to reconstruct the structure of the globe.

Conversely, a small penetrating foreign body will cause minimal architectural alteration and lodge itself inside the eyeball especially if the wound of entry is scleral and masked by a subconjunctival hemorrhage and localized chemosis.

The extent of ocular trauma varies according to the size, nature, location of wound of entry and the time interval between the injury and presentation. The value of a thorough and comprehensive history and evaluation of the events preceding the injury cannot be overemphasized. The exact nature of the materials involved, most important being the magnetic properties, has a profound bearing on the surgical plan, like the use of magnetic devices to remove the IOFB. Certain metals, like copper, cause intense chemical inflammation³ and should be removed as early as possible and any confusion with infective endophthalmitis must be avoided, although it is difficult to be excluded altogether⁴. Besides copper, retained iron foreign bodies can also lead to chemical inflammation and retinal toxicity due to release of free radicals^{5,6}. The person examining the patients at the initial presentation has the responsibility to assess the situation according to the varying spectrum of initial trauma. If the globe is ruptured, with prolapsed iris and hyphema, little is to be gained from conventional clinical examination and it is better that detailed assessment be part of the final surgical plan. Quite frequently it is possible that the IOFB with self-sealing wound of entry may allow adequate fundus visualization when ocular media are minimally compromised by a traumatic cataract or vitreous hemorrhage which has still not diffusely spread into the vitreous cavity. This was the case in four of our patients. At times the picture is similar to that on slit-lamp biomicroscopy. You notice a corneal self-sealing entrance wound, iris defect and a localized lens opacity with a tract in the vitreous cavity visible on indirect ophthalmoscopy and IOFB lying in the vitreous, on the retina or as a hemorrhagic spot representing the possible intraretinal location or a double perforation.

Radiological investigations like X-ray and CT scan of the orbit are done in order to document the presence of the IOFB where visualization is difficult because of media opacities. Accurate localization of IOFB has been greatly aided by the advent of CT Scan^{7,8}; MRI has also proved useful, although it has its limitations when a metallic and magnetic IOFB is suspected⁹⁻¹². Ultrasound of orbit is also helpful, but to a limited extent, being more valuable in detecting associated ocular trauma, like vitreous hemorrhage, or retinal detachment¹³.

The surgical plan to manage the IOFB is dependent on the extent of associated trauma and its location. General anaesthesia is to be employed in all patients avoiding depolarizing agents during induction. A small self-sealing wound of entry requires little attention and one can concentrate on management of the IOFB; otherwise any necessary anterior segment repair and reconstruction is carried out. Depending on the situation the procedure can be staged or it can be done in one go. Anterior segment foreign bodies, like those in the anterior chamber or lodged in the lens, are easy to remove. Posterior segment foreign bodies are different, as frequently the media are also compromised due to traumatic cataract or vitreous hemorrhage. Size and location of the IOFB in the posterior segment with accompanying posterior segment trauma needs individual planning. IOFB in vitreous cavity can be removed after standard three-port pars plana vitrectomy and using IOFB forceps to grasp and remove the IOFB either from the corneal section or by enlarging the sclerotomy in a limbus-parallel or circumferential manner. The latter method was employed in four of our patients where the IOFB was removed after pars plana vitrectomy. IOFB lying on the retinal surface and encapsulated in a fibrotic capsule needs careful dissection and after mobilization it can be held in the IOFB forceps and removed, as was done in four of our patients. Various techniques have been mentioned for removal of retinal, subretinal and vitreous foreign bodies¹⁴⁻²⁰.

CT scan is very helpful and reasonably precise in helping to determine the location of the IOFB in relation to the scleral rim shadow on the scan. An intramural IOFB can be managed by external magnetic removal by making a scleral trap door overlying the area of IOFB after careful external localization using the indirect ophthalmoscope, as was done in our case No.5 (Table-1), Figs 2 & 3). The IOFB cuts through the choroid and presents itself on energizing the magnet, or a nick can be given in the choroidal knuckle after bipolar cautery to facilitate its delivery and subsequent removal. Use of intraocular magnet for magnetic IOFB is also advocated where appropriate. Posterior segment trauma has to be managed by conventional procedures, like cryopexy and local scleral buckle, or combined with vitrectomy and internal tamponade by air, gas or silicone oil. Prophylactic circumferential scleral buckle was done in all of our patients who underwent pars plana vitrectomy.

A retained IOFB can cause long-term complications²¹⁻²⁷. In view of the above mentioned facts the elements of safety and prophylaxis need no further emphasis. Unfortunately safety precautions²⁸, like using safety goggles in potentially hazardous

professions, remain largely an unheeded public awareness concern.

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Miners' Nystagmus

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ABSTRACT

Miners' nystagmus is an acquired occupational disease of nervous system with special manifestations in the ocular motor apparatus occurring in coal miners. We examined 141 mine workers at Dandot Coal Mines. All had been underground workers for a long time. We diagnosed 4 mine workers with characteristic features of miners' nystagmus (an incidence of 2.85%). Poor illumination and cramped postural conditions were the most important underlying factors.

INTRODUCTION

Occupational eye health is an important branch of Preventive Ophthalmology. Industrial and medical video display terminal users and a few other professionals entail some occupational risks to the eyes¹.

Occupational or miners' nystagmus, once common in the mining industry, still remains as a work-related disease in other types of jobs². The condition is caused by difficulty in maintaining foveal fixation under poor light, although postural abnormalities resulting from cramped working conditions are also contributing factors. It generally becomes manifest in middle age following many years of underground work. Today, because of adequate lighting and mechanised mining, the condition is virtually unknown in most parts of the world.

Typically, the syndrome commences with headache and vertigo, followed by pendular or jerk type of nystagmus, blepharospasm and poor fixation under reduced ambient lighting. The condition is not confined to coal miners but can occur in any occupation which requires visual concentration under poor lighting.

METHODS AND MATERIALS

Dandot, situated about 30 kilometers from Choa Saiden Shah - the land of Peacocks-is considered the gateway to coal mining in Punjab. Our team visited this place and examined 141 mine workers in different mines of the area assembled at a central place. All of them were colliers working underground at coalface for considerable length of time. Detailed occupational history and complete ophthalmological examination

were carried out for all 141 mine workers. The important points noted in occupational history were, daily duration of underground work, type of work and type of illumination. The examination was carried out both under normal luminance level and in semidark set up.

The working conditions were also examined in three different mines. Only one member of the team could make it to the coalface (500 feet). The rest returned after a half-way trip (300 feet) because of claustrophobia, dyspnoea and cramped quarters.

RESULTS

a. Workers

All 141 workers were males with ages varying from 35 to 50 years. The average age was 52 years. The duration of underground work varied from 10 to 20 years (average 14 years). All of them worked at coalface for a minimum of 8 hours daily. General physical examination did not reveal any significant abnormality, except for clinical anemia which was seen in 5% of the workers.

Ophthalmic examination did not reveal any significant abnormality both in the anterior or the posterior segment. The unaided distant visual acuity of all the mine workers was 6/12 or better. The only significant finding was the presence of nystagmus in four patients. In three patients the nystagmus was jerky and manifest only in left lateral gaze. In the fourth patient, nystagmus was pendular and present in all positions of gaze. In all of these four patients nystagmus was enhanced in darkness (Table-I).

b. Working Conditions

Of the three mines examined, only one was mechanized. The average distance from entrance to coalface was 812 feet while the average depth was 219 feet. The general illumination maintained inside the

Table-1: Clinical data of 4 mine workers with occupational nystagmus.

Age/Sex	Systemic symptoms	Corrected visual acuity	NYSTAGMUS			
			Type	Field	Intensity*	Amplitude
55/M	Heartburn	6/6	Jerky	Left lateral gaze	Grade-I	Medium
52/M	Nausea (Occasionally)	6/6	Jerky	"	Grade-I	Medium
55/M	Giddiness	6/9	Jerky	"	Grade-I	Medium
35/M	Nil	6/12	Pendular	All positions	Grade-III	Medium

*Grade I: When a jerky nystagmus is evident only in the direction of rapid phase, that is on conjugate deviation to one side.

*Grade II: When in addition it is evident in primary position.

*Grade III: When evident in all positions of gaze.

mine was equivalent to that of 60 watts electric bulb at 50 feet which was further reduced at the coalface. The average dimensions at the entry of mine were 6' X 6' which gradually diminished to about 3' X 2' at coalface. The sole worker at the coalface had to crouch, with his neck extended, while mining the coal at an odd angle with a hammer and a chisel. Only one of us could make it to the coalface, because of extreme "claustrophobia" and exertional dyspnoea.

DISCUSSION

Miners' nystagmus is an acquired occupational disease of the nervous system with special manifestations in the ocular motor apparatus, occurring in workers in coal mines. It is a recognized industrial disease of considerable economic importance owing to the disability it causes, and although the symptomatology is diverse and the aetiology not completely clear, nystagmus is the most important diagnostic sign.

Incidence

In recent times when modern excavating machinery has altered the conditions at work and the type of illumination, the disease has almost disappeared, in most parts of the world. However, in our country, mining industry, especially where privately owned, is

still following the old methodology. In the current study, the incidence of miners' nystagmus was found to be 2.85%. Llewellyn³ calculated in 1925 that 20% of all men employed underground in Britain showed some signs of miners' nystagmus although many of the cases were latent. Dransart⁴ in 1877, found that 1.5% of the miners in Northern France showed oscillations of the eyes but 99% were unaware of the condition. These observations are consistent with those of our own. All of our 4 cases with latent nystagmus were unaware of the condition (Table-2).

Table 2: Comparative study of incidence of miners' nystagmus.

Year	Author	Study Area	Incidence
1877	Dransart ⁴	North France	1.5%
1925	Llewellyn ³	Britain	20.0%
1995	Afghani	Pakistan	2.85%

Aetiology

Although many theories have been advanced, most authorities agree that there are at least three contributing factors :

1. Lack of illumination. It results in difficulty in maintaining foveal fixation.
2. Posture: Crouched and strained attitude of a miner at the coalface with his constant upwards gaze at work may disturb the vestibular apparatus and also bring about physical and ocular fatigue.
3. Noxious gases. The inhalation of noxious gases over a long period, for example carbon monoxide, hydrogen sulphide etc.

All these factors were certainly operative in the present instance as was apparent from actual inspection of the mining conditions.

In Pakistan the standard illumination for coal mining is calculated to be one candela per three to four feet (3.50 lux per sq. metre). However, most of the mines do not provide an illumination level of even one-third of it. Moreover, workers above 50 years of age, who comprise over 25% of workforce, prefer more than 50% higher indoor levels of illumination. In addition, the level of illumination is also dependent upon the colour and type of coal. During inspection of the working conditions, the level of illumination was found to be considerably insufficient for working at the coalface.

Fully mechanised coal mining is almost nonexistent in Pakistan. Only partially mechanised mining is practicable because of very small coal seam thickness (one foot or more) and as excavating machinery needs a larger seam thickness at the coalface for maneuverability. That is why manual mining becomes almost an essential precipitating factor in the aetiology of this disease.

The problem of noxious gases is further augmented due to these traditional mining methods. The noxious gases are not only present inside the mine due to coal itself, but also due to the traditional lamps used for illumination.

These factors, apart from years of hard work in an uncongenial environment, where constant discomfort and occasional danger are too often evident, put a lot of mental stress on the workman himself. Indeed the term miners' neurosis has been suggested for the condition.

Course of the Disease

It is fairly typical. It does not appear until after a considerable time has been spent underground, the average period before a complete breakdown being 25 years. During the initial stages, the patient complains of transient headaches and giddiness. At this stage latent

nystagmus appears, but the patient remains unaware of it. These symptoms may become accentuated and permanent, but frequently these remain indefinitely of a subacute type without incapacitating the miner. All of our 4 patients had no difficulty in performing their task.

The nystagmus may be pendular or jerky and oscillations may be in any direction. In three of our patients, the nystagmus was jerky and was elicited by looking upwards and laterally. In the fourth the nystagmus was pendular and present in all directions. Darkness always increases the nystagmus. Similarly visual inattention and placing a fogging lens may also precipitate this type of nystagmus.

This subacute stage with latent nystagmus rarely passes on to an acute stage and finally to a frankly psychopathic stage completely incapacitating the worker. Fortunately, such a stage is very rarely seen nowadays.

The prevention of miners' nystagmus depends essentially on the provision of an illumination greater than 0.4 lumen per sq. foot⁵, the avoidance, when possible, of cramped galleries for working and shorter working hours, along with mechanised mining. Once the condition is fully developed the only treatment is not to give prolonged rest, but provision of surface work, since prolonged idleness subsidized by financial compensation frequently results in permanent physical and mental invalidity.

CONCLUSION

This is probably the first study of its kind in Pakistan. Our experience is limited but very significant. Miners' nystagmus does exist with an incidence of 2.85%. Cramped posture and poor illumination are the two main aetiological factors. However, under the present circumstances it does not impair the working capability of a mine worker.

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Ophthalmic "Pastpourri"

Pediatric Ophthalmology What's The Need?

Contributed by Khalid J.Awan, F.P.A.M.S.

In 1947, Pakistan won her freedom from the British Raj. The same year a perceptive American ophthalmologist thought up a plan to put in one book all the available ophthalmic information about the eye diseases as they occurred and were managed in children. He claimed no special knowledge of this specific aspect of ophthalmological practice; he didn't even have a large clinic on which to draw for material to write, but he was convinced that accomplishing his plan by getting all the relevant material from other texts would be useful. A reputable publisher, The C.V. Mosby Company of St. Louis agreed to publish his effort. And that's how James Hamilton Doggart's *Diseases of Children's Eyes*, the first book on pediatric ophthalmology, came into being—and with it this now solidly established subspecialty of ophthalmology.

Today, nearly half a century after the publication of Doggart's book, the subspecialty of pediatric ophthalmology boasts separate departments at all major medical centers, numerous textbooks, some running into tomes of nearly a thousand pages, devoted entirely to it, flourishing societies around the world, and well-established and respected periodicals, leader among which is the *Journal of Pediatric Ophthalmology & Strabismus*, established by Samuel V. Abraham, M.D., nearly 30 years ago. It is amazing, considering the comments Lawrence T. Post, a leader of American ophthalmology and an editor of the *American Journal of Ophthalmology* made about Doggart's book on its publication:

"It is hard to understand the need for a book devoted exclusively to the eyes of children"¹.

1. Post L.T: Diseases of Children's Eyes by James Hamilton Doggart, M.D. Amer J Ophthalmol 1948; 31:109.

Dacryocystorhinostomy: Importance of Anastomosis Between Anterior and Posterior Flaps

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ABSTRACT

A prospective study was designed at Jinnah Postgraduate Medical Centre (JPMC) to compare the success rate in dacryocystorhinostomy (DCR) done by two different surgical techniques. We operated upon 94 patients suffering from chronic dacryocystitis presenting to our OPD in years 1994 and 1995. In the first group, which consisted of 42 patients, both anterior and posterior flaps of lacrimal sac and nasal mucosa were anastomosed and a silicon stent was placed. In the second group of 52 patients, silicon stent was placed but no care was taken of the posterior flaps. Only anterior flaps were sutured. Success rate was 97.6% in the first series and 94.2% in the second series of patients in six months to two years of follow-up, average being eight months.

INTRODUCTION

Chronic dacryocystitis is a disease more commonly encountered in adult females of child-bearing age-group of low socioeconomic class. One of the predisposing factors could be narrower bony conduit for nasolacrimal duct (Trevor-Roper, 1974), the commonest site of obstruction in females¹, whereas the class-related cause points towards an obstructive factor caused by the injudicious use of cheap and adulterated eye cosmetics used on the wrong side of the eyelashes. Whatever the causes the main line of treatment has been dacryocystorhinostomy (DCR) carried out with a few variations depending upon the site of obstruction (Leone, 1982)².

The operations carried out in adults are:

1. Dacryocystorhinostomy.
2. Canaliculodacryocystorhinostomy.
3. Conjunctivodacryocystorhinostomy.

The canaliculodacryocystorhinostomy is usually done with a silicon stent passed through both the puncta, canaliculi, anastomosis site and the nasal cavity. Dacryocystorhinostomy is the anastomosis of lacrimal sac and nasal mucosa. Anterior and posterior flaps are made of the lacrimal sac and the nasal mucosa, respectively. Ideally, both of these flaps are anastomosed correspondingly. During surgery posterior flaps are generally ignored due to intraoperative complications, like excessive bleeding or mucosal damage. Older (1982) believed that silicon canalicular stent should be used routinely in DCR surgery to attain

better results³. A study was designed to compare the results of the operation carried out with two different techniques.

PATIENTS AND METHODS

All the patients were collected from the Eye OPD of Jinnah Postgraduate Medical Centre, Karachi. These patients of chronic dacryocystitis were evaluated and selected for surgery on the basis of the following tests:

- a. Schirmer test
- b. Dye test
- c. Syringing
- d. Probing
- e. Dacryocystography

The technique used for dacryocystography was as under: After taking plain films and applying local anaesthetic drops, lower punctum was dilated and 24-gauge silicon cannula passed. Injection urograffin (380 mg%) 1-1.50 ml was injected and films were taken in PA, AP and lateral position centering at the lacrimal sac.

In one technique both anterior and posterior flaps of the lacrimal sac and nasal mucosa were anastomosed and silicone stent was placed. The patients belonging to this group were labelled as group A. In group B no particular care was taken of the posterior flap. The stent was placed followed by repair of anterior flaps of both mucosae.

For the success of dacryocystorhinostomy we observed a few basic rules (Roper-Hall, 1989)⁴:

1. Hole in the bone should not be less than 1.0 cm in diameter.
2. Lower part of the sac not involved in anastomosis was excised in order to avoid sump syndrome.
3. Good haemostasis was obtained to avoid excessive mopping which leads to tissue trauma.
4. Silicon stent was placed in both canaliculi, anastomosis site and nasal passage (Older, 1982)³.

Intranasal endoscopic visualization (Linberg et al., 1982)⁵ of osteum site could not be done due to the limited resources. Therefore, patients having persistent epiphora were postoperatively evaluated with the following tests:

- a. Dye test
- b. Syringing
- c. Diagnostic Probing
- d. Dacryocystography

RESULTS AND DISCUSSION

Sixty-five of the 94 patients operated on in this study were females while the rest (29) were males. This was an almost 2:1 female to male ratio. A female to male 3:1 ratio is quoted by Font, 1986. Most of our patients (52%) (59 out of 94) were between 30-60 years of age. This is almost the same as described in literature (Font, 1986)⁶.

In group A, which included 42 patients, only one patient had postoperative symptoms of epiphora (Table-1). This patient was subjected to syringing from the upper punctum. The anastomosis was found to be patent. Epiphora in this patient was due to lower punctal stenosis.

Table 1: Comparative study between two groups of patients with chronic dacryocystitis.

Group A	Group B	
Both anterior and posterior flaps of nasal mucosa and lacrimal sac sutured together	Only anterior flaps sutured	
Number of patients	42	52
Number of failures	01	03
Success rate	97.6%	94.2%

In group B, which included 52 patients, three had symptoms after surgery (Table-2). These patients were

reoperated. In two of them the osteum had closed because of fibrosis. Orcutt et al. (1990) examined and treated patients with intranasal endoscopy and found fibrosis at osteum site an important cause of DCR failure⁷. In the third patient the osteum had not closed but its lumen was so narrow that its walls had apposed to each other reducing the flow of fluid through it to a minimum (Table-2).

Table 2: Causes of failure established in our study.

Total	No. of Patients	Percentage
Fibrous closure of osteum as posterior flap was unsutured	2	50
Small osteum	1	25
Punctal occlusion	1	25
Total	4	100

Various causes of failure of dacryocystorhinostomy described in literature are given in Table-3 (Wulc and Welham, 1987, cited by Roper-Hall, 1989)⁴.

Table 3: Causes of failure given in international literature.

- Osteum opening into anterior ethmoidal cells (Wulc and Welham, 1987, cited by Roper-Hall, 1989)⁴.
- Common canalicular obstruction (Wulc and Welham, 1987, cited by Roper-Hall, 1989)⁴.
- Fibrous closure of osteum (Wulc and Welham, 1987, cited by Roper-Hall, 1989⁴, Orcutt et al., 1990)⁷.
- Sump syndrome will result when residual lacrimal sac forms and collects fluids (Wulc and Welham, 1987, cited by Roper-Hall, 1989; Jordan, McDonald, 1993)⁸.
- Error in size or position of osteum (posteriorly placed osteum) (Glatt et al., 1991)⁹.
- Obstructive nasal pathology such as adhesion from previous dacryocystorhinostomy, enlarged middle turbinate, ethmoidal sinus disease (Metson, 1991)¹⁰.

In evaluating the success rates of this series, group A was more successful producing a result of 97.6%; in

group B it was 94.2%. That is to say that there was no significant difference in the results of both the series. The main factor which is important in the success of surgery is the silicon stent that has been placed in the anastomosis (Older, 1982). Beside that, the surgery with both flap anastomoses has an edge and, therefore, is the surgery of choice. Ideally, that is what is to be aimed at. In cases where the posterior flaps can not be sutured because of excessive bleeding or any surgical damage to mucosa, these mucosal flaps should be excised to avoid any unwanted postoperative inflammatory reaction which could later on lead to plugging of the osteum.

CONCLUSION

This study has helped in arriving at the following conclusions:

1. Ideally, while performing DCR both anterior and posterior flaps of nasal mucosa and lacrimal sac should be anastomosed and a silicon stent should be placed through the newly created passages.
2. High success rate in both of the groups in this series is attributed to the placement of silicon stent in the anastomosis.
3. In cases where posterior flaps can not be sutured because of surgical damage to mucosae or peroperative bleeding, the remnants of the flaps should be excised lest they incite fibrosis later on.

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