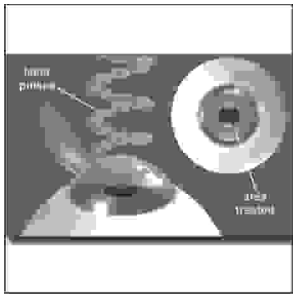
ORIGINAL **PROF-1200**

EXCIMER LASER;

PHOTOREFRACTIVE KERATECTOMY FOR 1.50 TO 3.50 DIOPTERS OF MYOPIA (SIX MONTHS FOLLOW UP)



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ABSTRACT... info@alshifa-eye.org.pk. **Objectives:** To evaluate the efficacy and safety of excimer laser photorefractive keratectomy for myopia in Pakistani people. **Design:** Prospective study. **Setting:** At Al-Shifa Trust Eye Hospital Rawalpindi. **Period:** October, 1995 and Febrauray, 1996. **Material & Methods:** The study group of thirteen patients, comprises of 25 eyes, with refractive error ranging from -1.50 to -3.50 D.S (diopters sphere) and less than -1.50 D.C (diopters cylinder). **Results:** Thirteen eyes (52%) lost to follow up after three months. Only twelve eyes (48%) could be reviewed at six months after photorefractive keratectomy. At one month, eleven eyes (44%) and at three months, eight eyes (32%) were hypermetropic within +0.25 to +1.00 diopters of spherical equivalent .At six months only three eyes (25%) had hypermetropia within +0.25 to +1.00 diopters spherical equivalent. None of the eyes had any kind of astigmatism more than 1.00 diopter. No over correction of more than +1.00 diopter of spherical equivalent was observed in any case. At one month, three months and six months after photo-refractive keratectomy, 88%, 80% and 100% eyes had 6/6 visual acuity respectively, without any optical aid. Hundred percent of the eyes showed complete healing of the epithelium on third post operative day. Moderate to severe postoperative pain was experienced by every one for three days with gradual reduction in intensity. Only one eye (8.33%) had grade 1 haze at six months. Rests of the eyes were clear .No vision threatening complications occurred. Despite the short term follow up, photorefractive keratectomy appears to be an effective and safe procedure with good predictability for the correction of low myopia. **Conclusion:** Despite relatively short term follow up of the study; photo refractive keratectomy (PRK) appears to be safe and quite predictable procedure for correction of low myopia.

INTRODUCTION

Munnerlysm used the term photorefractive keratectomy for the first time in one of his papers, describing the results of early studies in favor of his calculations relating to the removal of tissue and optical zone sizes to get particular optical results[1]. Alteration of the corneal curvatures for the correction of the refractive errors is not new in ophthalmology. Since 1970, field of refractive surgery has undergone dramatic growth. In-fact refractive surgery has become an ophthalmic sub-specialty[2]. The 193 nm argon fluoride excimer laser photo refractive keratectomy for myopia, has been performed on human sighted eyes since 1989 .By ablating more tissue centrally than peripherally in the

treatment zone, a flattening of corneal curvature is achieved, resulting in reduced corneal power[3] .By now the procedure has been established in many countries for the treatment of low to moderate myopia. The procedure is also made available to Pakistani population in private sector and needs close follow up and analysis. This article presents results of 25 eyes which underwent photorefractive keratectomy for correction of low myopia.

MATERIAL AND METHODS

It is a prospective study done at Al-Shifa Trust Eye Hospital Rawalpindi. Only low myopic (-1.50 to -3.50 D.S), operated between October, 1995 and February, 1996 were included in this study. All the candidates for photorefractive keratectomy showed willingness to participate after being fully informed about the effects, course and the risks of the procedure. Candidates below the age of eighteen years or with unstable myopia during the last one year or having astigmatism more than -1.50 diopters were not included in this study. Similarly any ocular or systemic disease was considered as exclusion criteria.

Preliminary examination was done in general OPD (out patient department) and further scrutiny was done after complete systemic and ocular history and examination. Stability of the refraction was ascertained. Any associated ocular or systemic problems such as diabetes, hypertension and allergies were inquired. Use of contact lens was stopped at least two weeks prior to surgery.

A detailed ocular examination was performed, which included record of unaided and the best-corrected visual acuity. Refraction was done with auto- refractor and was verified with retinoscopy later on. IOP (Intraocular pressure) was recorded in each patient with applanation tonometer. All procedures were performed with Omni Med U.V 270300 (Summit Technology Inc; Watham MA) excimer laser, approved for therapeutic use by Food and Drug Administration of America.

Alcain eye drops (proparacain 0.50 %) or Novosine 0.4 %(oxybuprocain HCl) eye drops were used for local anesthesia. Chloramphenicol 0.50 % eye drops were used as prophylactic antibiotic .One drop of 2% Pilocarpine was instilled to constrict the pupil.

Energy density for each pulse was set at 180 mj/cm^2, whereas repetition rate was set at 10 Hz. Wire speculum was used to keep the eye open during the laser delivery.

Each patient was directed to fixate on a flashing green fixation target inside the red fixation ring. Patient was relied upon self-fixation throughout. Laser was programmed entering spherical equivalent refraction to correct myopia with multi-zone technique.

Mechanical debridement (of about 7 mm zone) with Beaver 64 blade was done in each eye. Methylcellulose on weck sponge was utilized to smooth any corneal irregularities and to clean the corneal surface after epithelial removal. Surface was dried with a weck sponge prior to laser application. Epithelium was removed within a minute in most cases. One drop of 2% homatropine sulphate, one drop of 0.5 % Chloramphenicol and one drop of Ocufen (flurbiprofen sodium 0.04%) was instilled in each eye at the completion of the laser delivery. Chloramphenicol eye ointment was put in each eye before applying occlusive bandage. Each eye was patched for 48 hours.

Patients were reviewed on 2nd and 3rd postoperative day for corneal epithelialization, thereafter at 1 week, 2 weeks, 1 month, 3 months and 6 months after PRK. Each patient was given Tobrex (tobramycin 0.3%) and Maxidex (dexamethasone sodium phosphate 0.1%) eye drops to be used four times a day for two weeks after the raw area was covered with epithelium. Maxidex eye drops were replaced with FML eye drops (fluoromethalon 0.1%) after two weeks. On subsequent visits, unaided visual acuity was recorded in each eye separately. Retiniscopy was done and best corrected visual acuity was recorded for each eye. Intraocular pressure was recorded with applanation tonometer. Slit lamp examination was done on each patient and corneal haze was subjectively assessed during clinical examination as under:

Grade1haze= perceptible only by careful slit lamp

examination, Grade 2= mild, easily detectable by slit lamp examination, Grade 3=moderate, opacity that partially impairs the view of anterior chamber and iris details, Grade 4=marked opacity.

RESULTS

This study group comprises of 25 eyes with refractive error ranging from -1.50 D.S to -3.50 D.S and less than -1.50 diopters of cylinder. Only one eye had astigmatism of 1.50 dioptes. All the rest were less than 1 diopter cylinder, giving an average of 0.77. The whole group could be followed up to three months, as thirteen eyes (52%) lost to follow up after three months. Only 12 eyes (48%) could be reviewed at six months after photorefractive keratectomy.

At one month: Twenty two eyes (88%) were 6/6 and 3 eyes (12%) were 6/9 unaided (Table. I). A total of twenty four (96%) eyes could read 6/6 after correction with glasses.. (Table. II). Hypermetropia between +0.25 to +1.00 diopters was found in 11 eyes (44%) and 14 eyes (56%) were emmetropic. (Table. III). None of the eyes had astigmatism of any type more than 1.00 diopter .No one was under corrected or over corrected by more than +1.00 diopter spherical equivalent. Five eyes (20%) had grade 1 corneal haze and 4 eyes (16%) had grade 2 corneal haze at one month postoperatively. Sixteen (64%) corneas had no corneal haze. (Table. IV).

Table-I. Un Aided; Postoperative visual acuity

Visual Acuity	1 Month (n=25) No. of eyes (%)	3 Months (n=25) No. of eyes (%)	6 Months (n=12) No. of eyes (%)
6/12	00	01(04%)	00
6/9	03 (12%)	04(16%)	00
6/6	22(88%)	20(80%)	09 (75%)
6/5	00	00	03(25%)

Table-II. Best sectacle corrected visual acuity

Visual Acuity	1 Month (n=25) No. of eyes (%)	3 Months (n=25) No. of eyes (%)	6 Months (n=12) No. of eyes (%)
6/9	01(04%)	00	00
6/6	24(96%)	23 (92%)	09 (75%)
6/5	00 (00%)	02 (08%)	03 (25%)

Table-III. Post-operative; spherical equivalent refraction

Refraction (DSE)	1 Month (n=25) No. of eyes (%)	3 Months (n=25) No. of eyes (%)	6 Months (n=12) No. of eyes (%)
+0.25_+ 1.0	11(44%)	08(32%)	03(25%)
0.00	14(56%)	17(68%)	09(75%)

At three months: Twenty eyes (80%) achieved 6/6, 4 eyes (16 %) achieved 6/9 and only one eye (4%) achieved 6/12 unaided visual acuity. (Table. I) A total of twenty three eyes (92%) achieved 6/6 and 2 eyes (8%)

achieved 6/5 visual acuity after correction with glasses. (Table. II). No under correction or over-correction of more than +1.00 D.S.E (diopter spherical equivalent) was found. (Table. III). Six eyes (24%) developed grade 1 corneal haze at three months. (Table IV).

At six months: Only 12 eyes turned up for final scheduled visit at six months postoperatively. Nine eyes (75%) were 6/6 and 3 eyes (25%) were 6/5 unaided. (Table. I). Three eyes (25%) presented with hypermetropia between +0.25 to +1.00 diopter spherical equivalent and 9 (75%) were emmetropic. (Table. III). Neither any kind of astigmatism of more than 1.00 diopter cylinder nor over correction of more than +1.00 diopter spherical equivalent was found in any case. Only one eye (8.33%) had grade 1 corneal haze at six months, rests of the corneas were clear. (Table. IV).

Table-IV. Distribution of Corneal Haze after PRK

Grade	1 Month (n=25) No. Of eyes (%)	3 Months (n=25) No. Of eyes (%)	6 Months (n=12) No. Of eyes (%)
0	16(64%)	19(76%)	11(91.66%)
1	05(20%)	06(24%)	01(08.33%)
2	04(16%)	00	00
3	00	00	00
4	00	00	00

Hundred percent of the eyes showed complete healing of the epithelium on third postoperative day. Almost every person experienced moderate to severe pain during the first three days. Intensity of the pain was maximum at first postoperative night, which gradually subsided on 2nd and 3rd day.

Only one patient (4%) developed significant elevation (28 mm of Hg) of intraocular pressure in one eye. The patient did not stop strong steroids (Maxidex eye drops), to be replaced by mild steroids (FML- eye drops) after two weeks. IOP was controlled, simply by replacing potent steroid eye drops with mild one, which continued till next follow up on third month without any substantial rise in IOP.

DISCUSSION

Excimer laser photorefractive keratectomy for myopia has been performed on human sighted eyes since 1989[3]. This procedure has been established in many countries worldwide and Pakistan is no exception. Excimer laser photorefractive keratectomy has been shown to be relatively safe, predictable, stable and effective for myopia up to -6.00 diopters by many studies in U.S.A. and many other countries[4]. Several authors have presented data of their results after follow up for various durations. This article presents results of PRK for low myopia after six months follow up. The multi-zone photorefractive keratectomy has been proposed as a method of using large ablation zones with a lower central depth and decreased postoperative corneal haze[5].

Fifty two percent of the patients did not come up for follow up after three months; most probably they did not face any problem and were busy in enjoying life without glasses.

Moderate to severe postoperative pain was reported by every patient, which was very severe at first night and significantly reduced on second and third day. Patients used the conventional methods to reduce the pain and bring on sleep, with oral analgesics and sedatives, especially at first postoperative night. Nonetheless pain was quickly forgotten after third day. This study is in agreement with other investigators, that simple analgesics and tranquilizers cannot control post laser

pain effectively. Pain induced by photorefractive keratectomy is greater than induced by radial keratotomy (RK) and may exceed that induced by corneal abrasions[6]. Now it is accepted that combination of bandage contact lens and NSAIDS has dramatically reduced post laser pain[7]. Topical NSAIDS offer several potential benefits over traditional systemic agents for ocular pain relief[6]. Steroids must be used with this combination to reduce inflammation and white blood cells infiltrate[8]. Utmost care is required to avoid increased risk of infection associated with use of contact lens and steroids.

After PRK corneal wound heals after 48 to 72 hours[9]. In this study group reepithelialization occurred in 100% of the cases within 72 hours. Ragendran and Janakeraman found good epithelial healing within 72 hours in 124 eyes after photorefractive keratectomy (PRK)[10]. Probably there exists some relationship between depth of ablation and rate of reepithelialization, which is not significant in case of low myopia. Similarly any damage to the anterior keratocytes by mechanical scraping done in this study may be largely inconsequential due to subsequent laser treatment which ablates the anterior stroma[11]. Steroid induced rise in intraocular pressure (IOP) was not encountered as a problem and potent steroids such as Maxidex eye drop, four times a day, may be used safely for the first two weeks after photorefractive keratectomy. (PRK). Any use beyond should be closely observed for any rise in IOP.

Mild topical steroids like FML- eye drops may be instilled four times a day for three months without any significant rise in IOP. But it is always desirable to check IOP after regular intervals while any potency of steroids is in use. A recently published survey reported Pred Forte (prednisolone acetate 1.0%) and FML as the most commonly used postoperative anti-inflammatory agents in refractive surgery[12]. None of the eyes in this study group lost best-corrected visual acuity. Same was reported by Amano and Shimizu, for myopia from –2.00 to -14.00 diopters, after 2 years follow up on 60 eyes in Japanese people[5]. As data indicates that postoperative spherical equivalent refraction was within +1.00 diopters in 3 eyes (25 %) and 9 eyes (75%) were emmetropic at six months. Amano and Shamizu from Japan reported that all eyes in low myopia group were corrected to within +/- 1.0 diopter of the attempted correction at two years[5]. Similar to previous international reports, this study also found good predictability for low myopia.

Postoperative corneal haze is another appropriate area for discussion. Corneal haze usually develops after 1or 2 weeks just as patients note that their vision is improving, although the patient will often state that the haze is clearing[7]. It persists for one to six months[9]. Sub epithelial haze (with exception of grade 4 haze) never convincingly has been shown to cause impairment of visual acuity in PRK eyes. In the vast majority of eyes, PRK does not cause dense scarring, and haze gradually clears over time in myopia ranging from -1.25 to -7.50 diopters[3]. Same was observed in this study that corneal haze decreased over the time. Only one eye (8.33%) of 12 eyes was left with grade 1 corneal haze at six months, rests of the corneas were clear. Corneal haze has been described variously in different international studies. Siedal et al reported that 3.1% of 255 eyes developed sub epithelial haze greater than grade 2. Salz, et al, reported that 2.50 % of 160 eyes were graded as having more than grade 1 corneal haze at any postoperative interval[5]. No vision threatening complication was reported in this study.

Despite relatively short term follow up of the study; photo refractive keratectomy (PRK) appears to be safe and quite predictable procedure for correction of low myopia.

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