·Letter to the Editor·

Penetrating keratoplasty in monocular patients

Baran Kandemir [1], Baki Kartal [2], Leyla Yavuz Saricay [3], Sadullah Keleş [4]

[1]Ophthalmology Department , Dr. Lütfi Kirdar Kartal Research and Training Hospital, Istanbul 34000, Turkey
[2]Ophthalmology Department , Buhara Hospital, Erzurum 25000, Turkey
[3]Ophthalmology Department , Kanuni Sultan Süleyman Training and Research Hospital, Istanbul 34000, Turkey
[4]Department of Family Medicine, Faculty of Medicine, Atatürk University, Erzurum 25000, Turkey
Correspondence to: Leyla Yavuz Saricay. Department of Ophthalmology, Kanuni Sultan Süleyman Training and Research Hospital, Istanbul 34000, Turkey. drleylayavuz@gmail.com
Received: 2014-05-20 Accepted: 2015-04-09

DOI:10.18240/ijo.2016.02.27

Kandemir B, Kartal B, Yavuz Saricay L, Keleş S. Penetrating keratoplasty in monocular patients. *Int J Ophthalmol* 2016;9(2):318–320

Dear Sir,

I am Dr. Baran Kandemir, from Opthalmology Department of Dr. Lütfi Kirdar Kartal Research and Training Hospital, Istanbul, Turkey. I write to present outcomes of penetrating keratoplasty (PK) in monocular patients.

Bilateral visual impairment has important impacts on health-related quality of life and its physical and psychological consequences are proposed to be comparable to other important chronic medical illnesses [1]. Therefore in monocular patients, an unsuccessful surgical intervention that might lead to permanent visual loss would have some negative reflections on life quality of the patient.

In case of PK necessity of lifelong follow up and various complications that can occur during postoperative period is not only confined to monocular patients and share similar diagnostic and therapeutic features with others. However, complications, which can develop during or after surgery in the eye in monocular patients more challenging. Expulsive hemorrhage during open sky surgery and traumatic wound dehiscence at postoperative period are rare but serious happenings, which might lead to permanent visual loss. In monocular patients, surgeon and the patient must be more cautious against these complications.

This study was performed by retrospectively reviewing records of 102 monocular patients, whose visual acuity was at the level of light perception or worse with no expectancy of visual improvement in the other eye, whom had PK between 2000 and 2012. Patients' records were evaluated with respect to demographic data, reason to be monocular, indication of PK, clinical data, type of surgery and anaesthesia, complications that occurred during and after the surgery and related risk factors. We accepted the ambulatory vision as >0.02.

There were 62 males (60.7%) and 40 females (39.3%) with a mean age of 61.25±19.17y (range 2-90y). Most common PK indications were aphakic / pseudophakic bullous keratopathy (28.4%) and reason to be monocular was mostly related with phthisis bulbi (47%) in the other eye.

Local anesthesia (retrobulbar and periocular) was used in 88 cases and general anesthesia in the remaining 14 cases. In 59 cases, PK was done as a single surgical intervention while it was combined with other surgeries in 43 of patients. PK was combined with cataract surgery (51.1%), anterior vitrectomy (34.8%) and others (39.5%). Patients were followed up for mean 25.1±25.3mo (range 3-120mo).

Visual acuity was from light perception to 0.4 (mean 0.013±0.050) before the operation and was changing from no perception to 1.00 (mean 0.16±0.23) at final follow up. Visual acuity was increased in 65 (63.7%) cases, remained same in 32 (31.4%) cases and decreased in 5 (4.9%) cases. Visual acuity was found to be significantly increased when all cases were considered (P<0.001). Percentage of patients with visual acuity ⩾1/10 was increased from 2.9 to 25.5 before the operation and at final visit respectively. Patients with ambulatory vision was 11.8% at preoperatively and 57.9% at final follow up. In 23 eyes (71.8%) out of 32 with no visual improvement; reason was graft rejection/insufficiency while in the remaining 9 cases graft was clear and low vision was associated with other pathologies. The most common pathology responsible for decreased vision was graft rejection/insufficiency.

Graft remained clear in 69 eyes (67.6%), developed insufficiency in 19 eyes (18.7%) and rejected in 14 (13.7%) during follow up period. In terms of graft insufficiency most important risk factor was uncompleted drainage of silicone during combined procedures in silicon keratopathy. All of 5 cases (100%) with residual silicon oil left in the eye developed graft insufficiency at final visit. Mean graft survival was 6.5±5.3mo (range 1-16mo) in this group. Graft remained clear in 2 monocular patients during follow up period whose silicone oil was removed before PK.

In 18 (81.8%) patients out of 22, who had PK combined with cataract surgery, maintained clear grafts during follow up and the remaining 4 (18.2%) developed graft rejection or insufficiency. When compared to patients who had PK alone, there was no statistically significant difference between groups in terms of graft clarity (P>0.05). It was assessed that 2 (50%) of 4 patients who developed graft insufficiency/ rejection had traumatic wound dehiscence and resuturation of graft in this group. Other combined procedures were found to have no statistically significant effect on graft clarity in patients without risk factors for graft rejection/insufficiency. Whereas when evaluated together with other risk factors; graft remained clear in patients who had combined PK with other surgeries, was significantly lower (P<0.05).

Forty-five years old woman, whose other eye was eviscerated for phthisis bulbi, developed expulsive hemorrhage during open sky stage of PK while she was under general anesthesia. Indication of PK was vascularized leukoma. There were no known systemic/ocular risk factor and history of previous ocular surgery. Surgery was completed with loss of intraocular integrity and the graft remained clear during follow up but unfortunately light perception was lost.

After surgery 8 (7.8%) patients developed traumatic wound dehiscence. The mean time interval between surgery and trauma was 25±20.3mo (range 2-72mo). Some or all sutures were in place in 5 (62.5%) eyes and were removed totally in 3 eyes (37.5%) and none of the patients were wearing protective goggles at the time trauma. All grafts were edematous at presentation and extent of wound dehiscence was mean 152.5° (range 90°-200°). In all cases re-suturation of original graft was performed and combined with anterior vitrectomy (n=2), iris excision (n=2), iris repositioning (n=1). During follow up after resuturation 1 patient had repeated PK for graft rejection and graft remained clear. At last follow up 4 (50%) grafts were clear, 2 developed insufficiency and 2 were rejected. Compared to pretraumatic level, visual acuity decreased in 4 (50%) eyes, remained same in 3 (37.5%) and increased in 1 (12.5%). Twenty-five patients who had been operated at the same time period developed traumatic wound dehiscence. Among these patients, 8 (32%) monocular (Group 1) and 17 were binocular (Group 2). When 2 groups were compared in a total of 1460 PK cases operated during same time interval; including 102 monocular patients in the present study; risk of traumatic wound dehiscence in monocular patients were found significantly higher (P<0.01).

At least an ambulatory vision in one eye is one of the prerequisite to perform fundamental daily activities for most of the people. It was reported that patients with permanent visual loss secondary to age related macular degeneration have less functional capacity and more common cognitive disorders compared to their age group [2-3]. These factors make the decision of surgery more complicated in a monocular patient who has potential of better vision with surgery. In PK, other than tectonic and therapeutic indications, surgical decision is challenging due to risk of permanent visual loss. Many complication that can follow PK like graft rejection/insufficiency, recurrence of primary diseases and many others is not unique to monocular patients and share same diagnostic and therapeutic characteristics with other patients. But expulsive hemorrhage and other complications that might occur during lifelong follow up are major concerns both for the patient and for the surgeon and must be discussed meticulously with patient before the decision of surgery. For this reason, although not specific to monocular patients, relationship between combined surgical procedures and graft survival, traumatic wound dehiscence, silicon keratopathy and explosive hemorrhage, were evaluated in our study.

In current study, percentage of patient with visual acuity ≥0.1 was increased from 2.9 to 25.5 and percentage of patient with an ambulatory vision increased from 11.8 to 57.9; before the surgery and at final visit respectively. Functional results, although should be enhanced; were accepted as satisfactory. Anatomically, 67.4% of grafts remained clear and 32.6% developed insufficiency or rejection at final visit.

Difference between study designs, cornea preserving methodology, patient profile, facility of medical attendance/ supply and socioeconomic factors makes present studies difficult to compare [4]. Our results for bilateral or combined PK with respect to graft survival were found to be comparable with other studies with similar patient profile [5]. There are different opinions about combined versus sequential surgeries. While some studies highlights advantages of combined procedures, another recommends sequential surgery for different reasons [6-8]. When other risk factors like traumatic wound dehiscence (n=2), graft abscess (n=1) and repeated keratoplasty (n=1) related graft failures are excluded; we observed no significant effect of combined procedures on graft survival when compared to PK alone. On contrary presence of other risk factors effects graft survival negatively for combined surgery. So if possible PK should be postponed until these risk factors had been managed properly.

The most feared complication during open sky surgery is expulsive hemorrhage. Reported incidence of expulsive hemorrhage is 0.1%-3% with poor visual outcomes [9-11]. As to PK, risk factors are older age, arteriosclerosis and hypertension, asthma, previous intraocular surgery, presence of anterior chamber lens and glaucoma [9-15]. In present study incidence of expulsive hemorrhage was 0.9% and is consistent with literature. Owing to low incidence, possibility of explosive hemorrhage should not elect decision for PK.

Keratopathy secondary to silicone oil use following complicated vitreoretinal surgeries is a frequent long-term

complication, incidence increases in aphakic eyes and longstanding cases [15-16]. Previous studies [17-19] reports 50% graft failure in sum, in 4 different case series. In these studies, reported percentage of graft remained clear in 67% (28%-100%) of eyes in silicone oil removed group and in 39% (0-58%) of the eyes in which silicon oil were not removed. Hence presence of silicone oil in eye after PK is an important risk factor for graft insufficiency. In our study group all eyes with residual silicone oil developed graft failure. Consequently incomplete removal of silicone is found to be a significant risk factor for graft survival ($P<0.05$). Unless there are relative indications like risk of recurrent retinal detachment or phthisis-bulbi, silicon oil must be removed completely before or during PK.

The most striking result of our study is the high incidence of traumatic graft rupture following KP in monocular patients.

ACKNOWLEDGEMENTS

Conflicts of Interest: Kandemir B, None; **Kartal B,** None; **Yavuz Saricay L,** None; **Keleş S,** None.

REFERENCES

1 Langelaan M, de Boer MR, van Nispen RM, Wouters B, Moll AC, van Rens GH. Impact of visual impairment on quality of life: a comparison with quality of life in the general population and with other chronic conditions. *Ophthalmic Epidemiol* 2007;14(3):119-126.

2 Whitson HE, Ansah D, Sanders LL, Whitaker D, Potter GG, Cousins SW, Steffens DC, Landerman LR, Pieper CF, Cohen HJ. Comorbid cognitive impairment and functional trajectories in low vision rehabilitation for macular disease. *Aging Clin Exp Res* 2011;23(5-6):343-350.

3 Joshi SA, Jagdale SS, More PD, Deshpande M. Outcome of optical penetrating keratoplasties at a tertiary care eye institute in Western India. *Indian J Ophthalmol* 2012;60(1):15-21.

4 Zare M, Javadi MA, Einollahi B, Karimian F, Rafie AR, Feizi S, Azimzadeh A. Changing indications and surgical techniques for corneal transplantation between 2004 and 2009 at a tertiary referral center. *Middle East Afr J Ophthalmol* 2012;19(3):323-329.

5 Nguyen DQ, Mumford LL, Jones MN, Armitage WJ, Cook SD, Kaye SB, Tole DM. The visual and refractive outcomes of combined and sequential PK, cataract extraction, and intraocular lens insertion. *Eye (Lond)* 2009;23 (6):1295-1301.

6 Cazabon S, Quah SA, Jones MN, Batterbury M, Kaye SB. Sequential versus combined penetrating keratoplasty and cataract surgery. *Optom Vis Sci* 2010;87(7):482-486.

7 Javadi MA, Feizi S, Moein HR. Simultaneous penetrating keratoplasty and cataract surgery. *J Ophthalmic Vis Res* 2013;8(1):39-46.

8 Groh MJ, Seitz B, Händel A, Naumann GO. Expulsive hemorrhage in perforating keratoplasty-incidence and risk factors. *Klin Monbl Augenheilkd* 1999;215(3):152-157.

9 Taylor DM, Stern AL, McDonald P. The triple procedure: 2 to 10 year follow-up. *Trans Am Ophthalmol Soc* 1986;84:221-249.

10 Lavinsky F, Moisseiev J, Levkovitch-Verbin H. The surgical management of massive intraoperative and postoperative suprachoroidal hemorrhage: anatomic and functional outcomes. *Arq Bras Oftalmol* 2013; 76(4):212-214.

11 Gloor B, Kalman A. Choroidal effusion and expulsive hemorrhage in penetrating interventions-lesson from 26 patients. *Klin Monbl Augenheilkd* 1993;202(3):224-237.

12 Ingraham HJ, Donnenfeld ED, Perry HD. Massive suprachoroidal hemorrhage in penetrating keratoplasty. *Am J Ophthalmol* 1989;108 (6): 670-675.

13 Price FW Jr, Whitson WE, Ahad KA, Tavakkoli H. Suprachoroidal hemorrhage in penetrating keratoplasty. *Ophthalmic Surg* 1994;25 (8): 521-525.

14 Gentile RC, Eliott D. Silicone oil retention sutures in aphakic eyes with iris loss. *Arch Ophthalmol* 2010;128(12):1596-1599.

15 Baillif S, Gastaud P. Complications of silicone oil tamponade. *J Fr Ophtalmol* 2014;37(3):259-265.

16 Beekhuis WH, van Rij G, Zivojnovic R. Silicone oil keratopathy: indications for keratoplasty. *Br J Ophthalmol* 1785;69(4):247-253.

17 Noorily SW, Foulks GN, McCuen BW. Results of penetrating keratoplasty associated with silicone oil retinal tamponade. *Ophthalmology* 1991;98(8):1186-1189.

18 Karel I, Kalvodová B, Kuthan P. Results of penetrating keratoplasty in bullous silicone oil keratopathy. *Graefes Arch Clin Exp Ophthalmol* 1998; 236(4):255-258.

19 Lee GA, Shah P, Cooling RJ, Dart JK, Bunce C. Penetrating keratoplasty for silicone oil keratopathy. *Clin Experiment Ophthalmol* 2001;29 (5): 303-306.