

SURGICAL OUTCOME OF TRIPLE PROCEDURE AS PENETRATING KERATOPLASTY WITH EXTRACAPSULAR CATARACT EXTRACTION WITH POSTERIOR CHAMBER INTRAOCULAR LENS IMPLANTATION IN PATIENTS WITH BOTH CENTRAL CORNEAL OPACITY AND ADVANCED CATARACT AT RURAL SET UP

Shubhangi Nigwekar¹, Kishor Badhe¹, Neeta Misra¹, Surekha Bangal¹.

ARTICLE INFO

Received: 16th Jun 2015

Revised: 28th Jun 2015

Accepted: 8th July 2015

Authors details: ¹Professor,
Department of Ophthalmology, Rural
Medical College of PIMS (DU), Loni,
Maharashtra, India

Corresponding author: Shubhangi
Nigwekar
Professor, Department of
Ophthalmology, Rural Medical College
of PIMS (DU), Loni, Maharashtra, India
Email: shubhangi2501@yahoo.in

Keywords: *Triple procedure, Cataract
with corneal opacity, Triple surgery.*

ABSTRACT

Purpose: To study the surgical outcome of triple procedure as penetrating keratoplasty (PKP) with conventional extra capsular cataract extraction (ECCE) with posterior chamber intraocular lens (PCIOL) implantation in patients with both central corneal opacity and advanced cataract at rural set up. **Introduction:** When corneal opacity and cataract present together then well-established and effective triple procedure is indicated. Prognosis for a clear graft is good in triple, as graft endothelium does not touch the hard nucleus which may occur in two steps or sequential surgery. It provides faster visual rehabilitation. Being single step procedure it reduces patient's hospital stay, postoperative care and follows up visits. **Methodology:** In this hospital based observational, three years longitudinal study, we studied the surgical outcome of relatively rare one step triple procedure as PKP with conventional ECCE with PCIOL implantation in sulcus or in bag, in patients with both central corneal opacity and advanced cataract at rural set up. The outcome measures included graft clarity on slit lamp, postoperative unaided visual acuity with Snellen's chart and the occurrence of postoperative complications after taking IEC permission and informed written consent in local language from study patients. **Results:** Out of 13 study patients mean age was 61.15yrs (Range50-80yrs). Follow up range was 9-34 months. At final follow up 9 patients (69.23%) had clear grafts and 61.52% patients gained visual acuity >6/24. Graft failure was the most common post operative complication in 30.76% followed by Posterior capsular opacification (PCO) in 15.38% patients which was treated well with YAG laser capsulotomy. **Conclusion:** Triple procedure gives good results in respect to graft clarity, unaided vision, and faster rehabilitation.

INTRODUCTION

Status of the cornea is crucial to achieve good outcome after cataract extraction with intraocular lens implantation. Pre-existing corneal disease must be managed appropriately to get good results of cataract surgery. Many times the corneal opacity and cataract present together. In such cases, performing only penetrating keratoplasty or only cataract surgery does not give good visual outcome. Actually corneal pathologies needing keratoplasty are often associated with cataract and therefore combined surgery is mandatory. Triple procedure with penetrating keratoplasty and simultaneous cataract extraction with intra ocular lens (IOL) implantation is usually preferred as single step surgery because theoretically visual rehabilitation is more rapid and patients require less post operative follow ups. [1, 2]

Rural patients loose follow up for second step IOL implantation and prefer very poor or no vision even with clear corneal graft. Prognosis for a clear corneal graft is good in triple, as graft endothelium never touches the hard nucleus which may occur in two step or sequential surgery.^[3] So in our rural set up we studied the surgical

outcome of triple procedure in patients presenting with both corneal opacity & cataract.

Aims and objectives: To study the surgical outcome in relation to graft clarity on slit lamp examination (SLE), postoperative uncorrected visual acuity (UCVA) and postoperative complications of rare triple procedure at rural set up.

MATERIAL AND METHODS:

Study design: Descriptive longitudinal, hospital based study.

Ethical approval: The present study was approved by the Institutional Ethical committee and written informed consent was obtained prior to the study from all patients.

Inclusion criteria: Patients of 50 years and above with significant senile cataract and central corneal opacity with normal posterior segment on B-scan and who were fit for General anaesthesia have been included. We used clinically good, fresh donor corneas.

Exclusion criteria: All patients suffering with corneal vascularisation, raised intra ocular pressure (IOP), anterior staphyloma, and posterior segment problems on

B-scan and previous ocular surgery except PKP were excluded.

Sample size: Thirteen cases of triple procedure performed all under general anaesthesia.

Duration: 3 years (from January 11-December 13, and followed for 12 - 36 months)

Methodology:

Operation procedure: The uniformity of surgical procedure was maintained as follows:

Preparation of donor corneal button, removal of corneal opacity with trephine, release of iris adhesions at angle and posterior synechiae, continuous curvilinear capsulorrhexis (CCC) or can opener capsulotomy, removal of nucleus with cystitome and vectis, removal of cortex, implantation of polymethylmethacrylate (PMMA) rigid one piece PCIOL in bag or in sulcus depending on type of capsulotomy, 2 peripheral buttonhole iridectomies (PBI)s, intermittent 16- equidistant- radial 10-0 nylon sutures, anterior chamber (AC) reformation with air and saline, application of bandage contact lens (BCL), subconjunctival (S/C) injection of antibiotic-steroid and postoperative eye patch and bandage was given to all patients for 18-24 hours. Topical antibiotic steroid drops and lubricating drops were prescribed post operatively. Systemic antibiotics, anti-inflammatory, analgesics, IOP lowering agents, and steroids were used as per

need. Follow up examinations were carried out on 1st to 7th day in indoor rural patients. We recorded findings from Slit lamp examination, Ophthalmoscopy, Snellen's visual acuity chart and Non contact tonometry (NCT).

Parameters studied: We recorded postoperative uncorrected visual acuity (UCVA), slit lamp examination (SLE) and Intra Ocular Pressure with NCT at 1 month, 3 months follow up. Epithelial and endothelial graft rejections were treated medically as far possible. Further interventions like repeat PKP or YAG laser capsulotomy and their results were observed.

RESULTS

Table 1: showing Age & Sex distribution of 13 study cases

Age (Years)	Male	Female	Total
41-50		2	2
51-60	5	1	6
61-70	2	2	4
71-80		1	1
TOTAL	7	6	13

There were 7 males and 6 females. Maximum patients were in 6th decade and the mean age group was 61.15yrs (Range 50-80yrs).

Table 2: showing all study cases data: indication, pre and postop vision, complications and management

INDICATION/OPK/ EYE	Pre OP V/A	Early P.OP.V/A	Last follow up in months	Etiology of less V/A	Intervention	Graft clarity at last follow up	final V/A
Failed Graft / LE	CF 1F	6/18	36	PCO	YAG Laser Capsulotomy	Clear	6/12*
Failed Graft/LE	HM	CF 2M	36	Endothelial Graft Rejection	Refused PKP	Hazy	HM
Corneal Scar/RE	CF 2M	6/24	30	-----	----	Clear	6/24
Corneal Scar/LE	CF 1M	6/18	30	-----	----	Clear	6/18
Corneal Scar/RE	CF 2M	6/24	24	-----	----	Clear	6/24
Corneal Scar/LE	CF 5M	6/12	24	-----	----	Clear	6/12
Healed Herpes simplex keratitis /RE	CF 1F	6/18	20	Graft Ulcer	CA-larynx death	Hazy	CF 1M
Uveitis & Scar / RE	PL+	CF 5M	18	Graft Failure	Refused PKP	Hazy	HM
Corneal Scar /LE	CF 1M	6/18	18	-----	----	Clear	6/18
Uveitis & Scar /LE	PL+	CF 4M	16	Graft Failure	Repeat PKP	Clear	CF 4M
Corneal Scar /RE	CF 1M	6/24	14	-----	----	Clear	6/24
Corneal Scar /RE	HM	CF 5M	14	-----	----	Clear	6/60
Failed Graft /RE	CF 1M	CF 4M	12	PCO	YAG	Clear	6/18*

RE- Right Eye, **LE-** Left Eye, **CF-** Counting Finger, **HM-** Hand Movements, **PL-** Perception of Light.

Study showed all triple procedures were unilateral out of which 7 were performed in right eye. All patients had preoperative visual acuity in the range of Perception of light (PL) + to counting finger (CF2) Meters. Most common indication for the PKP was corneal scars and failed grafts. Out of 13 study patients (69.23%) 9 patients had clear grafts and four (30.77%) graft failures

Table 3: showing graft failure complication in 4 patients and management outcome.

Indication Of PKP	Early Post operative V/A	Etiology Of Less V/A	Intervention	Graft Clarity At Last Follow Up	Final V/A
Failed Graft	CF 2M	Endothelial graft rejection	Refused Re PKP	Hazy	HM
Be Old HSV	6/18	Graft Ulcer	Ca-Larynx Death	Hazy	CF 1M
Uveitis & Scar	CF 5M	Graft Failure	Refused Re PKP	Hazy	HM
Uveitis & Scar	CF 4M	Graft Failure	Repeat PKP	Clear	CF 4M

Out of these 4 graft failure patients, the indication for PKP was due to corneal scars either due to old uveitis or HSV or previous failed grafts. 1 patient had immune related sterile keratitis that died of ca-larynx, 2 patients refused regrant and 1 patient who was one eyed, underwent regrant.

Table 4: showing % of all postoperative complications

Post Operative Complication	No Of Patients & %
Epithelial Defect	3 (23.07%) Treated Medically
Glaucoma	1 (7.69%) Treated Medically
Graft Failure	4 (30.76%)
Uveitis	2 (15.38%)
IOL Decentration	0 (0%)
Suture Vascularization	1 (7.69%)
PCO	2(15.4%)Treated – YAG Laser

Postoperatively 30.76% patients had graft failure and 23.07% patients had epithelial defects, 7.69% patients had glaucoma and vascularization while 15.38% patients had Uveitis and PCO. All cases had well centered PCIOLs and thus there was 0% decentration of IOLs.

Table 5: showing final visual outcome at last visit

Final visual acuity	No. of Cases - and (%)
6/12	2 (15.38%)
6/18	3 (23.07%)
6/24	3 (23.07%)
6/60	1 (7.69%)
CF- HM	4 (30.77%)
TOTAL	13 (100%)

In this study 38.46% i.e. 5 cases had postoperative UCVA 6/18 or better and 61.52% had V/A >6/24. Most cases had better postoperative V/A than preoperative V/A. Early postoperative V/A ranged from 6/12 to 6/60. In 2 patients there was PCO, who underwent YAG capsulotomy and regained good vision.

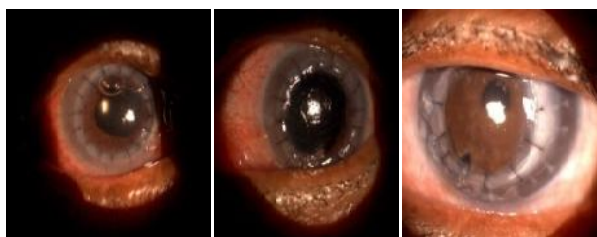


Fig 1: Photos of various study patients at their follow ups: A: 1st Post operative day showing clear graft with air bubble in AC, B: 1 week Post operative photo - clear graft , C: 1 year Post operative photo.

DISCUSSION

Triple procedure which was first described by Taylor in 1976, has now become a well-established and effective surgical treatment for patients with both corneal and lenticular opacities and indicated in whom corneal surgery may accelerate the cataract formation^[4] Single step triple procedure, reduces the patient's hospital stay, postoperative care and follows up visits especially in elderly patients who usually have geriatric health

problems. Triple procedure gives faster visual rehabilitation and is more preferred than sequential or 2 step surgery i.e. first PKP and after suture removal ECCE with PCIOL implantation. However surgeons have to be aware of surgical conditions during open-sky surgery, because vitreous pressure is not counterbalanced by anterior chamber pressure^[5]

Performing only PKP in patients with corneal opacity in a rural senile patient reduces the patient's ultimate visual outcome as these patients loose follow up for second step IOL implantation and prefers very poor vision or no vision even with clear corneal graft.

In early periods there was a challenge of IOL power calculation for triple procedure due to corneal scars however now it is answered by use of standard constant keratometry value of 44 D and fellow eye keratometry is also an option.^[6, 7]

In two step or sequential surgeries we get more accurate IOL power after removal of sutures of PKP.^[8] However early removal of sutures in elderly patients lead weak unhealed grafts which may lead slippage of transplants. Even a minor trauma may lead globe rupture up to 5 years postoperatively.^[9] Actually PKP hastens cataract formation, particularly in eyes with moderate pre-existing cataracts due to surgical trauma and inflammation as well as the postoperative topical steroid therapy. In sequential or two step surgery there may be endothelial cell loss from the precious survived clear corneal graft during cataract surgery and with borderline endothelial cell count, corneal decompensation can occur. Thus simultaneous or one step triple surgery may remain a justified option for good visual outcome in such patients. Advantages of classic triple procedure are quick visual rehabilitation, fewer induced refractive errors, minimal postoperative discomfort and corneal integrity.^[10]

In this triple procedure study, 69.23% (9 cases) patients had clear grafts and rest 4 patients had hazy grafts due to graft failure. Clear corneal graft after the triple procedure has been found to range from 60% to 100% in the literature. Similar results were seen by Mohammad AJ et al.^[11]

Out of these 4 graft failure patients, the indication for PKP was due to corneal scars either due to old uveitis or HSV or previous failed grafts. Indications for corneal transplantation have a significant effect on graft survival.^[12, 13]

In this study, 30.76% patients had graft failure and 23.07% patients had epithelial defects, 7.69% patients had glaucoma and vascularization while 15.38% patients had Uveitis and PCO. These results were similar to Meyer RF et al.^[14]

There was no decentration of PCIOL in any patient though we used both capsulotomy techniques i.e. Capsulorrhesis or Can opener capsulotomy. Borderie VM et al found better visual acuity, controlled IOP and clear grafts without oedema in his study when the triple procedure included capsulorrhesis and phacoemulsification with PK.^[15]

In present study, 38.46% cases had postoperative UCVA 6/18 or better and 61.52% had UCVA > 6/24. Clauoué C

et al and Crawford GJ et al reported comparable outcomes and showed postoperative UCVA > 6/9 ranging from 38% to 64% of eyes.^[16, 17]

Success rate in our study may be due to patients selection, minimal surgical intervention, use of good donor cornea, viscoelastic material, good IOL placement, proper estimation of IOL power, 2 PBIs, indoor patients for 7 days and regular follow ups with slit lamp examination which allowed proper and timely postoperative intervention like YAG laser capsulotomy and use of systemic steroids to prevent or treat early graft failure.

CONCLUSIONS

Triple procedure gives good results in respect to graft clarity, unaided vision, and faster rehabilitation. However patient's selection should be proper to reduce problems of graft failure.

Limitations of study: As our sample size and follow up period is small, further study with more sample and longer follow ups will be needed.

REFERENCES:

1. Muraine M. Keratoplasty combined with cataract surgery. *J Fr Ophthalmol.* 2012; 35(7):546-54.
2. Busin M, Arffa RC, McDonald MB, Kaufman HE. Combined penetrating keratoplasty, extracapsular cataract extraction, and posterior chamber intraocular lens implantation. *Ophthalmic Surg.* 1987;18:272- 5
3. Muraine M et al. Keratoplasty combined with cataract surgery. *J Fr Ophthalmol.* 2012; 35(7):546-54.
4. Shimmura S, Ohashi Y, Shiroma H, Shimazaki J, Tsubota K. Corneal opacity and cataract: triple procedure versus Secondary approach. *Cornea.* 2003; 22:234–238.
5. Flowers CW, McLeod SD, McDonnell PJ, Irvine JA, Smith RE. Evaluation of intraocular lens power calculation formulas in the triple procedure. *J Cataract Refract Surg.* 1996; 22:116–122.
6. Crawford GJ, Stulting RD, Waring GO, Van Meter WS, Wilson LA. The triple procedure. Analysis of outcome, refraction, and intraocular lens power calculation. *Ophthalmology.* 1986; 93:817–824.
7. Katz HR, Forster RK. Intraocular lens calculation in combined PKP, cataract extraction and intraocular lens implantation. *Ophthalmology* 1985; 92:1203–7.
8. Davis EA, Azar DT, Jakobs FM, Stark WJ. Refractive and keratometric results after the triple procedure: experience with early and late suture removal. *Ophthalmology.*1998; 105:624–630.
9. Mader TH, Yuan R, Lynn MJ, Stulting RD, Wilson A, Waring GO. Changes in keratometric astigmatism after suture removal >1yr after penetrating keratoplasty. *Ophthalmology.* 1993; 100: 119–126.
10. Pineros OE, Cohen EJ, Rapuano CJ, Laibson PR. Triple vs nonsimultaneous procedures in Fuchs' dystrophy and cataract. *Arch Ophthalmol.* 1996; 114:525–528.
11. Preschel N, Hardten DR. Management of coincidental corneal disease and cataract. *Curr Opin Ophthalmol.* 1998 Feb; 9(1):39-45.
12. Mohammad AJ, Sepehr F, Hamid RM Simultaneous Penetrating Keratoplasty and Cataract Surgery *J Ophthalmic &Vis Res.* Jan 2013; 8(1): 39–46.
13. Coster DJ. Some factors which affect the visual outcome of corneal transplantation. *Eye* 1991; 5:265–78.
14. Meyer RF, Musch DC. Assessment of success and complications of triple procedure surgery. *Am J Ophthalmol.* 1987; 104:233–240.
15. Borderie VM, Touzeau O, Bourcier T, Carvajal-Gonzalez S, Laroche L. The triple procedure: in the bag placement versus ciliary sulcus placement of the intraocular lens. *Br J Ophthalmol.* 1999; 83:458–462.
16. Claoué C, Ficker L, Kirkness C, and Steele A. Refractive results after corneal triple procedures (PK+ECCE+IOL). *Eye (Lond)* 1993; 7:446–451.
17. Jonas JB. Factors influencing visual outcome after penetrating keratoplasty combined with intraocular lens implantation. *Eur J Ophthalmol.* 2003; 13:134-8.