

## CHAPTER 2

### CORNEAL TRANSPLANTATION

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## 2.0 INTRODUCTION

Corneal transplantation surgery allows restoration of vision in patients with corneal blindness. Corneal transplantation in Malaysia dates back to the 1970's. Today it is widely performed by ophthalmologists throughout the country both in the government and private sectors with each centre maintaining its own data.

The National Transplant Registry (NTR) was established in December 2003. The corneal transplant section of the NTR is a systematic centralised data collection of all corneal transplantation performed in the country.

A total of 46 centres registered and agreed to provide information on retrospective and prospective corneal transplant activities. A total of 46 contributing surgeons participated in the NTR – Corneal Transplant section. Participation was on a voluntary basis.

***Retrospective data*** (from 1998 to 2003) on corneal transplant activities were collected to identify the trend of corneal transplant surgery in the recent past. ***Prospective data*** (from the year 2004) on corneal transplant activities involved gathering information on all cornea transplants performed in Malaysia on two forms. The first form is the i) **Corneal Transplant Notification Form (Form N-cds)** which is completed at the time of surgery and gathers information on the recipient, operative procedure and the donor. The second form is the ii) **Corneal Transplant Outcome Form (Form O-cds)** which is completed at the end of 12 months and annually thereafter. Follow-up only ceases upon failure of graft, death or loss to follow-up of the patient.

The Corneal section of the NTR will be discussed under 5 sections.

*Section 2.1* and *Section 2.2* covers notification data on corneal transplantation over 9 years from 1998 to 2007. Effort was made to ensure that all cases of corneal transplantation were reported. To the best of our knowledge, this report provides information on all corneal transplants performed in the country.

*Section 2.3* covers prospective notification data on corneal transplantation performed (*from 2004 onwards*)

*Section 2.4* covers prospective outcome data on corneal transplantation performed (*from 2004 onwards*).

*Section 2.5* covers prospective outcome data on corneal transplantation complications (*from 2004 onwards*).

**2.1 CORNEAL TRANSPLANT ACTIVITIES AND TRENDS (1998 – 2007)**

The number of corneal transplants performed between the years 1998 to 2007 varied annually, 1998 had the least number of cases (119 cases) and 2001 had the highest number of cases (221 cases). (Table 2.1.1)

Penetrating keratoplasty was the most frequent type of corneal transplant surgery and was performed in 92% of cases (Table 2.1.2).

Table 2.1.1: Number of Corneal Transplantation and Transplant Rate per million population (pmp), 1998-2007

<b>Year</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
No. of new transplants	119	122	126	221	203	165	184	192	177	189
New transplant rate pmp	5	5	5	9	8	7	7	7	7	7

Table 2.1.2: Types of Corneal Transplant, 1998-2007

Year	1998 (N=119)		1999 (N=122)		2000 (N=126)		2001 (N=221)		2002 (N=203)		2003 (N=165)		2004 (N=184)		2005 (N=192)		2006 (N=177)		2007 (N=189)		TOTAL (N=1698)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Penetrating Keratoplasty	114	96	116	95	120	95	207	94	196	97	156	95	165	90	173	90	153	86	168	88	1568	92
Lamellar Keratoplasty	1	1	5	4	5	4	14	6	5	2	8	5	10	5	13	7	16	9	5	3	82	5
Patch Graft for Corneal	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	5	3	10	5	20	1
Patch Graft for Sclera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	2	5	0
Cornea Scleral Keratoplasty	0	0	1	1	0	0	0	0	0	0	1	0	7	4	2	1	2	1	3	2	16	1
No data	4	3	0	0	1	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	7	1

## 2.2 RECIPIENTS' CHARACTERISTICS

There was a preponderance of male recipients each year and this ranged from 59% to 69% (Table 2.2.1). Ethnic Chinese (38%) were the predominant race undergoing corneal transplant surgery followed by Malays (32%) and Indians (22%) (Table 2.2.2) The mean age was 46 years (SD 21) with a range from as young as 2 months of age to as old as 102 years (Table 2.2.3)

The commonest primary indication for surgery was keratoconus (17%) followed by cornea scar (15%), pseudophakic bullous keratopathy (13%) and other (non-pseudophakic) bullous keratopathy (11%) (Table 2.2.4). There may be one or more indications for corneal transplant surgery. The most frequent indication was optical (69%). (Table 2.2.5)

Table 2.2.1: Gender Distribution, 1998-2007

Year	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	78	66	80	66	81	64	142	64	122	60	114	69	112	61	115	60	118	67	124	66	1086	64
Female	41	34	42	34	45	36	79	36	81	40	51	31	72	39	77	40	59	33	65	34	612	36

Table 2.2.2: Ethnic Distribution, 1998-2007

Year	1998 (N=1119)		1999 (N=122)		2000 (N=126)		2001 (N=221)		2002 (N=203)		2003 (N=165)		2004 (N=184)		2005 (N=192)		2006 (N=177)		2007 (N=189)		TOTAL (N=1698)		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
<b>Ethnic group</b>																							
Malay	28	24	34	28	41	33	70	32	74	36	52	32	66	36	62	32	60	34	62	33	549	32	
Chinese	47	39	46	38	50	40	92	42	83	41	67	41	58	32	73	38	59	33	65	35	641	38	
Indian	36	30	35	29	28	22	49	22	35	17	34	20	43	23	41	21	40	23	38	19	378	22	
Bumiputra Sabah	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	2	2	1	7	0	
Bumiputra Sarawak	0	0	0	0	0	0	1	0	0	0	0	0	4	2	5	3	4	2	4	2	18	1	
Others	8	7	7	5	6	5	5	2	9	5	11	7	10	5	10	5	11	6	18	10	95	6	
No Data	0	0	0	0	1	0	4	2	2	1	1	0	2	1	0	0	0	0	0	0	10	1	

Table 2.2.3: Age Distribution of Corneal Transplant Recipient Patients, 1998-2007

Year	1998 (N=1119)		1999 (N=122)		2000 (N=126)		2001 (N=221)		2002 (N=203)		2003 (N=165)		2004 (N=184)		2005 (N=192)		2006 (N=177)		2007 (N=189)		TOTAL (N=1698)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	4	3	5	4	6	5	8	4	9	4	6	4	6	3	8	4	7	4	4	2	63	4
10-19	13	11	17	14	9	7	29	13	16	8	21	13	15	8	14	7	23	13	13	7	170	10
20-39	28	24	34	28	34	27	49	22	53	26	36	22	55	30	59	31	53	30	48	26	449	26
40-59	38	32	32	26	40	32	61	28	57	28	51	31	52	28	45	23	41	23	63	33	480	28
>=60	36	30	34	28	37	29	74	33	68	33	51	31	56	30	66	34	53	30	61	32	536	32
Mean	45		43		44		45		46		45		45		46		44		47		45	
SD	21		22		20		21		21		21		21		21		22		21		21	
Median	45		43		45		50		46		46		44		49		43		49		46	
Minimum	4 months		5		2 months		5 months		1		5 months		2 months		2 months		2 months		3		2 months	
Maximum	82		92		86		85		86		84		86		84		96		102		102	



Table 2.2.4: Primary Diagnosis, 1998-2007

Year	1998 (N=119)		1999 (N=122)		2000 (N=126)		2001 (N=221)		2002 (N=203)		2003 (N=165)		2004 (N=184)		2005 (N=192)		2006 (N=177)		2007 (N=189)		TOTAL (N=1698)		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
<b>Primary Diagnosis</b>																							
Keratoconus	24	20	24	20	15	12	38	17	32	16	18	11	34	18	34	18	33	19	29	15	281	17	
Corneal scar	33	28	25	20	21	17	34	15	28	14	21	13	26	14	20	10	18	10	25	13	251	15	
Microbial keratitis	11	9	11	9	19	15	30	14	31	15	21	13	18	10	13	7	11	6	13	7	178	10	
Microbial keratitis+Cornea perforation	1	1	6	5	1	1	6	3	4	2	4	2	17	9	20	10	7	4					
Corneal perforation (non microbial)	6	5	7	6	8	6	12	5	12	6	27	16	13	7	18	9	20	11			21	11	
Pseudophakic Bullous keratopathy	10	8	16	13	17	13	23	10	15	7	19	12	19	10	35	18	30	17			32	17	
Other (non pseudophakic) bullous keratopathy	14	12	4	3	19	15	37	17	47	23	25	15	16	9	14	7	11	6			8	4	
Failed previous graft	14	12	12	10	13	10	17	8	15	7	14	8	12	7	14	7	10	6	23	12	144	8	
Corneal dystrophy	5	4	6	5	5	4	12	5	9	4	7	4	8	4	6	3	10	6	13	7	81	5	
Congenital opacity	1	1	1	1	1	1	1	0	0	0	1	1	8	4	4	2	1	1			1	1	
Others	3	3	8	7	7	6	15	7	14	7	10	6	34	18	34	18	36	20	38	20	199	12	
No data	0	0	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	

\*1650 patients have 1 primary diagnosis, 168 have 2 primary diagnoses, 11 patients had 3 diagnoses, and 1 patient had 4 diagnoses

Table 2.2.5: Indications of Corneal Transplant, 2004-2007

Indication of transplant	2004 (N=184)		2005 (N=192)		2006 (N=177)		2007 (N=189)		TOTAL (N=742)	
	%	No.	%	No.	No.	%	No.	%	No.	%
Optical	120	65	135	70	124	70	132	69	511	69
Tectonic	26	14	23	12	20	11	17	9	86	12
Therapeutic	27	14	19	10	17	9	24	13	87	12
Tectonic + Therapeutic	9	5	9	5	4	2	8	4	30	4
Optical + Tectonic	1	1	1	1	1	1	0	0	3	0
Optical + Tectonic + Therapeutic	0	0	1	1	0	0	1	1	2	0
Optical + Therapeutic	0	0	0	0	5	3	6	3	11	2
Optical + Others	0	0	0	0	1	1	0	0	1	0
Others	1	1	4	2	4	2	1	1	10	1
No data	0	0	0	0	1	1	0	0	1	0

## 2.3 TRANSPLANT DATA, 2004-2007

### 2.3.1 Recipient data

Re-grafts were performed in 12% of cases (Table 2.3.1.1). Corneal vascularisation was the most frequently encountered pre-operative ocular co-morbidity, followed by ocular inflammation and glaucoma (raised intraocular pressure) (Table 2.3.1.2)

Sixty four percent of cases were legally blind (vision 3/60 or worse) prior to corneal transplantation (Table 2.3.1.3).

Table 2.3.1.1: No of Previous Grafts in Grafted Eye, 2004-2007

Graft Number	2004 * (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
0	123	89	171	89	160	90	156	83	610	88
1	11	8	15	8	15	8	28	15	69	10
2	3	2	2	1	1	1	4	2	10	1
3	0	0	4	2	1	1	0	0	5	1
4	1	1	0	0	0	0	1	0	2	0

\* In the year 2004 there were a total of 184 corneal transplants performed but complete data set was only received for 138 patients.

Table 2.3.1.2: Ocular Co-morbidity, 2004-2007

Ocular co-morbidity	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Any ocular co-morbidity (a to d below)	88	64	103	54	81	46	83	44	355	51
a) Superficial corneal vascularisation	44	57	48	61	43	73	49	74	184	65
b) Deep corneal vascularisation	42	55	39	49	22	37	26	39	129	46
c) History of glaucoma	29	33	36	35	35	43	36	43	136	38
d) Current ocular inflammation	41	47	50	49	41	51	39	47	171	48

\*Patient might have multiple ocular co-morbidities.

Table 2.3.1.3: Pre-operative Vision, 2004-2007

Unaided VA	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
6/6	3	2	0	0	1	1	1	1	5	1
6/9	1	1	1	1	1	1	2	1	5	1
6/12	0	0	2	1	3	2	0	0	5	1
6/18	0	0	1	1	0	0	2	1	3	0
6/24	3	2	5	3	4	2	2	1	14	2
6/36	4	3	6	3	5	3	3	1	18	3
6/60	7	5	16	8	17	9	11	6	51	8
5/60	1	1	0	0	0	0	0	0	1	0
4/60	3	2	1	1	2	1	2	1	8	1
3/60	2	1	1	1	2	1	3	1	8	1
2/60	1	1	2	1	4	2	1	1	8	1
1/60	4	3	9	5	7	4	1	1	21	3
CF	47	34	47	24	44	25	42	22	180	26
HM	47	34	46	24	37	21	46	24	176	25
PL	13	9	15	8	12	7	16	8	56	8
NPL	2	1	1	1	0	0	0	0	3	0
Others	0	0	1	1	0	0	1	1	2	0
No data	0	0	38	20	38	21	56	30	132	19

### 2.3.2: Donor details

The most frequent of source of the cornea tissues were from Eye Banks in the United States of America. (Table 2.3.2.1). The majority of donors were elderly patients with a median age of 58 years (Table 2.3.2.2). Optisol GS was the commonest corneal tissue storage medium used at 74% (Table 2.3.2.3). The major cause of death of the donors were related to the cardiac or circulatory system (33%) followed by malignancy (14%) (Table 2.3.2.4)

Table 2.3.2.1: Source of Donor Cornea Tissue, 2004-2007

Source of donor	2004* (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Local	20	14	19	10	36	20	31	16	106	15
USA	95	69	133	69	98	56	107	57	433	62
Sri Lanka	22	16	38	20	41	23	51	27	152	22
Others	0	0	0	0	2	1	0	0	2	0
No data	1	1	2	1	0	0	0	0	3	1
If Local, ethnic group:										
• Malay	0	0	4	21	1	3	5	16	10	9
• Chinese	14	70	8	42	12	33	18	58	52	49
• Indian	5	25	7	37	23	64	4	13	39	37
• Others	0	0	0	0	0	0	4	13	4	4
• No data	1	5	0	0	0	0	0	0	1	1

\* In the year 2004 there were a total of 184 corneal transplants performed but complete data set was only received for 138 patients.

Figure 2.3.2.1: Source of Donor Corneal Tissue, 2004-2007

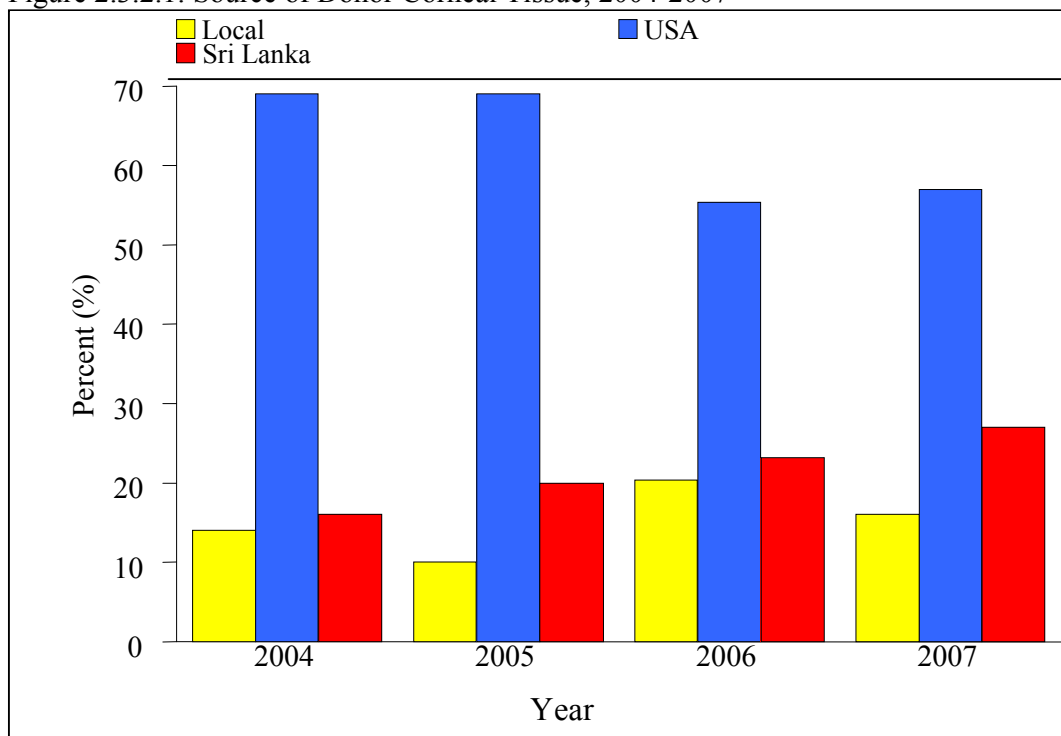


Table 2.3.2.2: Donor Age Distribution, 2004-2007

Age, years	2004 (N=138)		2005 (N=192)		2006 (N=174)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	No.	%	No.	%	No.
0-9	2	1	3	2	2	1	2	1	9	1
10-19	6	4	4	2	9	5	5	3	24	4
20-39	11	8	7	4	11	6	13	7	42	6
40-59	52	38	89	46	81	46	79	41	301	43
≥60	67	49	89	46	74	42	90	48	320	46
Mean	56		58		56		57		57	
SD	15		14		16		14		15	
Median	59		58		56		59		58	
Minimum	8		3		6		4		3	
Maximum	78		79		78		78		79	

Table 2.3.2.3: Preservation Media, 2004-2007

Preservation media	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Optisol GS	110	80	147	77	129	73	127	67	513	74
MK Medium	22	16	37	19	40	23	51	27	150	21
Moist Chamber	4	3	3	2	7	4	8	4	22	3
Others*	0	0	1*	0	0	0	3	2	4	1
No data	2	1	4	2	1	0	0	0	7	1

\*Others : Eusol-C

Figure 2.3.2.3: Preservation Media, 2004-2007

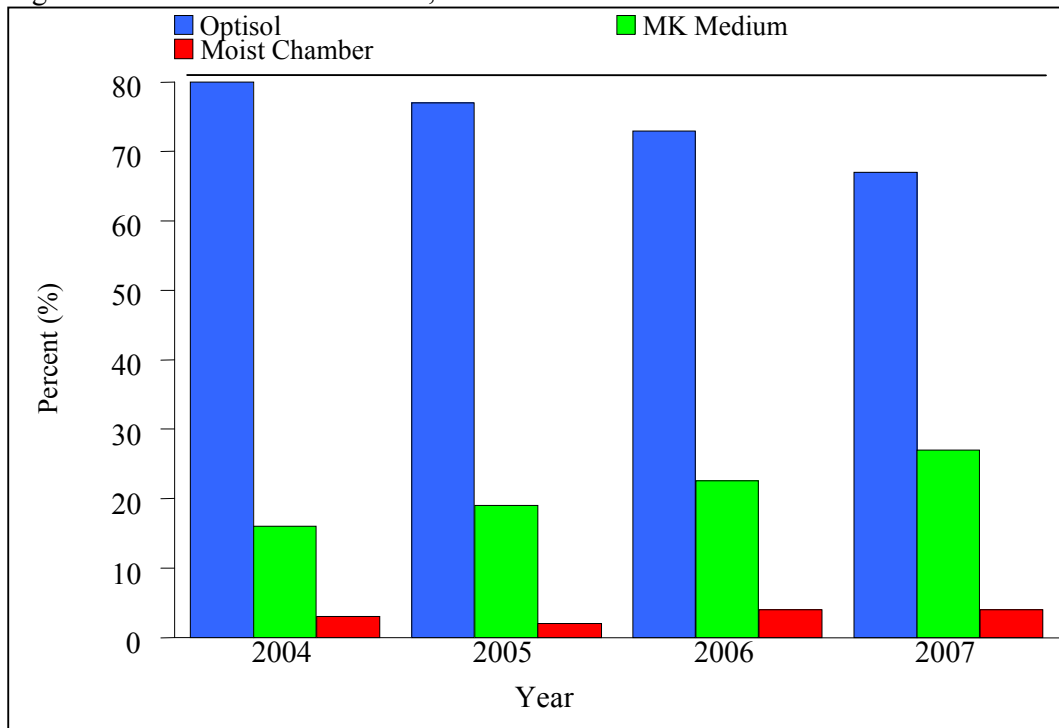


Table 2.3.2.4: Cause of Death in Corneal Donors, 2004-2007

Cause of death	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Cardiac / Circulatory System	47	34	49	26	59	33	74	39	229	33
Cerebrovascular System	17	12	25	13	11	6	23	12	76	11
Malignancy	19	14	31	16	25	14	23	12	98	14
Trauma / Accident	20	14	13	7	19	11	24	13	76	11
Respiratory System	15	11	8	4	8	5	13	7	44	6
Others	17	12	21	11	27	15	31	16	96	14
No data	3	2	45	23	28	16	1	1	77	11



**2.3.3: Transplant Practices**

Penetrating Keratoplasty (PK) was the commonest type of surgery performed (88%)\* (Table 2.3.3.1). Cornea transplantation was performed in combination with other surgical procedures in 19% of cases. Cataract extraction with or without intraocular lens implantation were the commonest combined procedures performed with corneal transplant surgery. (Table 2.3.3.2).

The recipient graft size ranged from 2 mm to 10 mm, with the median recipient cornea graft size being 7.5 mm.(Table 2.3.3.3). The majority of cases had the donor tissue over-sized by 0.5 mm (Table 2.3.3.4). The commonest suture technique was interrupted suturing. (Table 2.3.3.5).

Table 2.3.3.1: Types of Surgeries, 2004-2007

Type of surgery	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Penetrating Keratoplasty	120	88	173	90	153	86	168	89	614	88
Lamellar Keratoplasty	10	7	13	7	16	9	5	2	44	6
Patch graft for corneal	2	1	3	2	5	3	10	5	20	3
Patch graft for scleral	0	0	1	0	1	1	3	2	5	1
Cornea Scleral Lamellar Keratoplasty	6	4	2	1	2	1	3	2	13	2

\* In the year 2004 there were a total of 184 corneal transplants performed but complete data set was only received for 138 patients.

Table 2.3.3.2: Types of Combined Surgeries, 2004-2007

Combined surgeries	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
No. of patients with corneal transplant surgery combined with another surgical procedure	31	22	27	14	42	24	33	17	133	19
(a) Glaucoma surgery	2	6	3	11	2	5	0	0	7	5
(b) Cataract Extraction	16	52	13	48	22	52	13	39	64	48
(c) IOL	14	45	10	37	24	57	17	52	65	49
(d) Cataract extraction and IOL	10	32	8	30	16	38	10	30	44	33
(e) Retinal Surgery ± Internal Tamponade	1	3	1	4	2	5	4	12	8	6
(f) Anterior vitrectomy	9	29	3	11	5	12	10	30	27	20
(g) Others	5	16	8	30	8	19	16	48	37	28

\*Patients may have more than one combined surgery.

Table 2.3.3.3: Recipient Cornea Trephine Size, 2005-2007

Graft size, mm	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
2	1	1	1	1	2	1	1	1	5	1
3	0	0	1	1	2	1	1	1	4	1
4	1	1	2	1	1	1	5	3	9	1
5	0	0	0	0	0	0	1	1	1	0
5.5	1	1	0	0	0	0	0	0	1	0
6	3	2	0	0	5	3	4	2	12	2
6.25	0	0	1	1	0	0	0	0	1	0
6.50	2	1	5	2	4	2	8	4	19	3
6.75	1	1	3	2	2	1	1	1	7	1
7	25	18	36	18	25	14	28	15	114	16
7.25	10	7	10	5	14	8	5	3	39	6
7.50	36	26	18	9	26	15	35	18	115	17
7.75	10	7	11	5	6	3	10	5	37	5
8	19	14	7	4	13	7	17	9	56	8
8.25	4	3	4	2	5	3	4	2	17	2
8.50	6	4	6	3	2	1	11	5	25	4
8.75	0	0	1	1	0	0	0	0	1	0
9	8	6	3	2	1	1	4	2	16	2
9.25	0	0	0	0	0	0	0	0	0	0
9.50	0	0	2	1	0	0	0	0	2	0
9.75	0	0	0	0	0	0	0	0	0	0
10	1	1	0	0	0	0	0	0	1	0
No data	10	7	81	42	69	39	54	28	214	31
Mean	7.5		7.3		7.2		7.3		7.3	
SD	0.9		1		1.1		1.1		1	
Median	7.5		7.3		7.3		7.5		7.5	
Minimum	2		2		2		2		2	
Maximum	10		9.5		9		9		10	

Table 2.3.3.4: Difference in Trephined Sizes of Recipient and Donor Corneas, 2004-2007

Difference in Graft size, mm	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Same size	9	7	8	4	8	5	12	6	37	5
0.25	29	21	19	10	30	17	25	13	103	15
0.5	87	63	84	44	67	38	90	48	328	47
0.75	1	1	0	0	1	0	1	1	3	1
1	1	1	0	0	1	0	4	2	6	1
2	1	1	0	0	0	0	0	0	1	0
Not available	10	7	81	42	70	40	57	30	218	31

Table 2.3.3.5: Suture Technique, 2004-2007

Suture Technique	2004 (N=138)		2005 (N=192)		2006 (N=177)		2007 (N=189)		Total (N=696)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Interrupted only	132	96	139	73	123	69	132	70	526	75
Continuous only	0	0	0	0	5	3	1	0	6	1
Combined	6	4	18	9	19	11	11	6	54	8
No data	0	0	35	18	30	17	45	24	110	16

**2.4 CORNEAL TRANSPLANT OUTCOME 2004-2007**

Table 2.4.1: Stock and Flow - Graft status (whole database)

		<b>Optical</b>		<b>Non optical</b>		<b>Total</b>	
		<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>
<b>Number registered</b>		528	71	214	29	742	100
<b>Number followed</b>		<b>Total</b>	<b>258</b>	<b>120</b>		<b>378</b>	
	1 year	174	67	101	84	275	73
	2 year	58	23	14	12	72	19
	3 year	23	9	3	2	26	7
	4 year	3	1	2	2	5	1
<b>Graft status</b>		<b>Total</b>	<b>258</b>	<b>120</b>		<b>378</b>	
	-Surviving graft	215	83	69	58	284	75
	-Failed graft	43	17	51	42	94	25
<b>Recipient status</b>		<b>Total</b>	<b>528</b>	<b>214</b>		<b>742</b>	
	-Recipient with complete follow up	70	13	56	26	126	17
	-Recipient deaths	3	1	1	1	4	1
	-Recipient loss – followed	185	35	63	29	248	33
	-Recipient loss – not followed	145	27	47	22	192	26
	-Graft not yet followed (Transplant duration less than 1 year)	125	24	47	22	172	23

**2.4.2 Outcome – Graft Survival 2004-2007**

Graft survival for both optical and non-optical indications at 12 months was 80% but this declined to 65% at 36 months. (Table 2.4.2.1) The cases were grouped into two groups based on the indication for surgery – i) Optical and ii) Non-Optical. Graft survival was 89% after 12 months in the optical group and 60% in the non-optical group. This declined to 72% after 36 months in the optical group and 53% in the non-optical group. (Table 2.4.2.2) Graft survival was similar between the men and women. (Table 2.4.2.3) Poorer graft survival was observed in children less than 10 years of age. (Table 2.4.2.4) Rejection was the commonest cause of graft failure. (Table 2.4.2.6)

Table 2.4.2.1: Graft Survival, 2004-2007\*

Interval (months)	No.	% success	SE
0	378	100	-
12	303	80	2
24	103	72	3
36	31	65	4
48	5	55	11

\* Outcome data were not submitted for 192 corneal transplant patients in year 2004-2006, while outcome data at 1 year for 172 corneal transplant patients with notification in year 2007 is still on going.

Figure 2.4.2.1: Graft Survival, 2004-2007

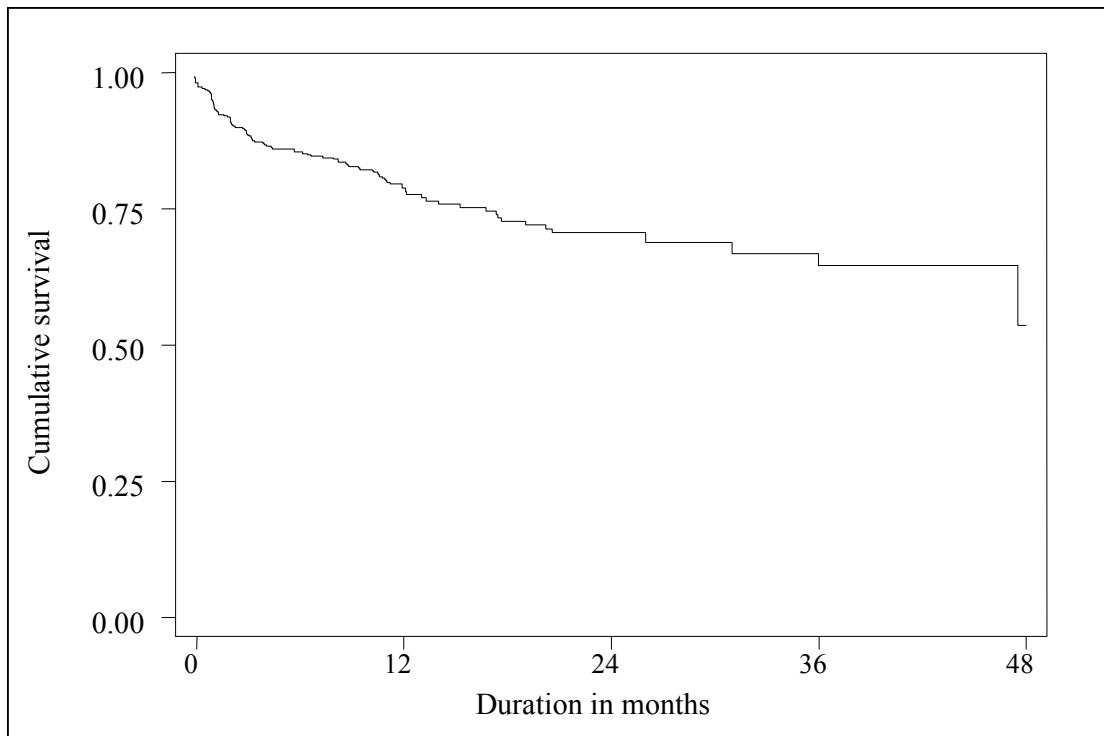


Table 2.4.2.2: Graft Survival by Optical and Non-optical Indication, 2004-2007

Interval (months)	Optical			Non-Optical		
	No.	% success	SE	No.	% success	SE
0	258	100	-	120	100	-
12	229	89	2	74	60	4
24	84	80	3	19	53	6
36	26	72	5	5	53	6
48	3	54	16	2	53	6

\* Outcome data were not submitted for 192 corneal transplant patients in year 2004-2006, while outcome data at 1 year for 172 corneal transplant patients with notification in year 2007 is still on going.

Figure 2.4.2.2: Graft Survival by Optical and Non-optical Indication, 2004-2007

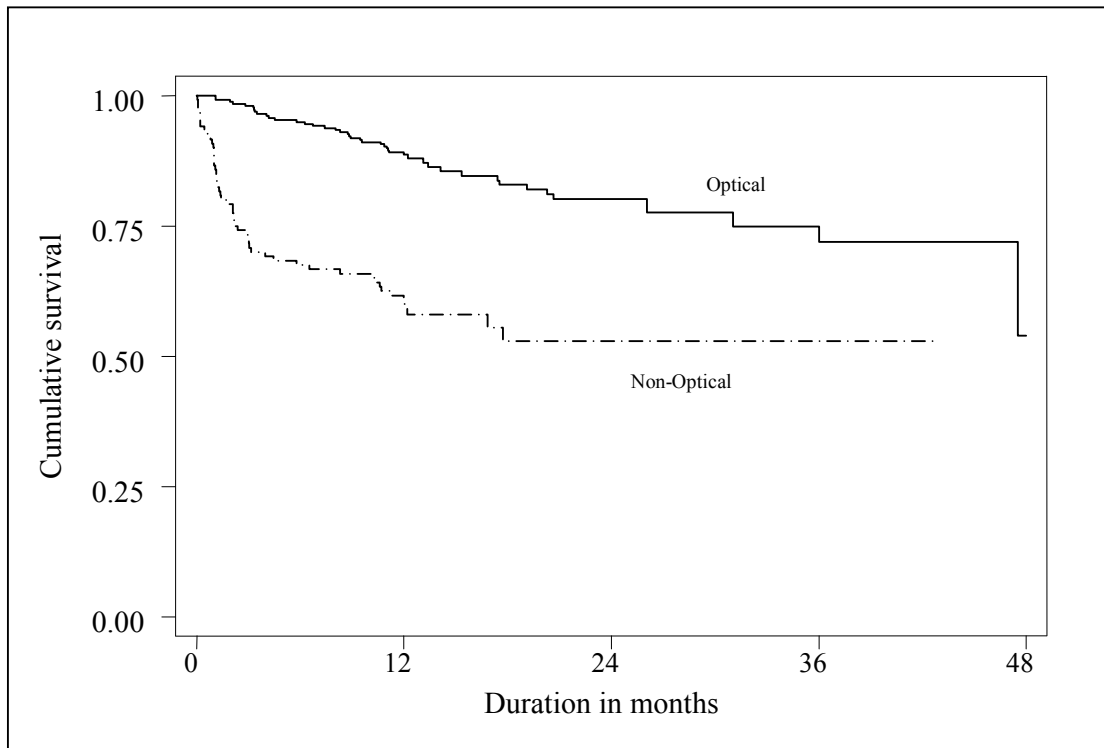


Table 2.4.2.3 Graft Success by Gender, 2004-2007

Interval (months)	Male			Female		
	No.	% success	SE	No.	% success	SE
0	237	100	-	141	100	-
12	189	79	3	114	80	3
24	56	71	4	47	73	4
36	20	65	5	11	66	7
48	5	65	5	-	-	-

\* Outcome data were not submitted for 192 corneal transplant patients in year 2004-2006, while outcome data at 1 year for 172 corneal transplant patients with notification in year 2007 is still on going.

Figure 2.4.2.3 Graft Success by Gender, 2004-2007

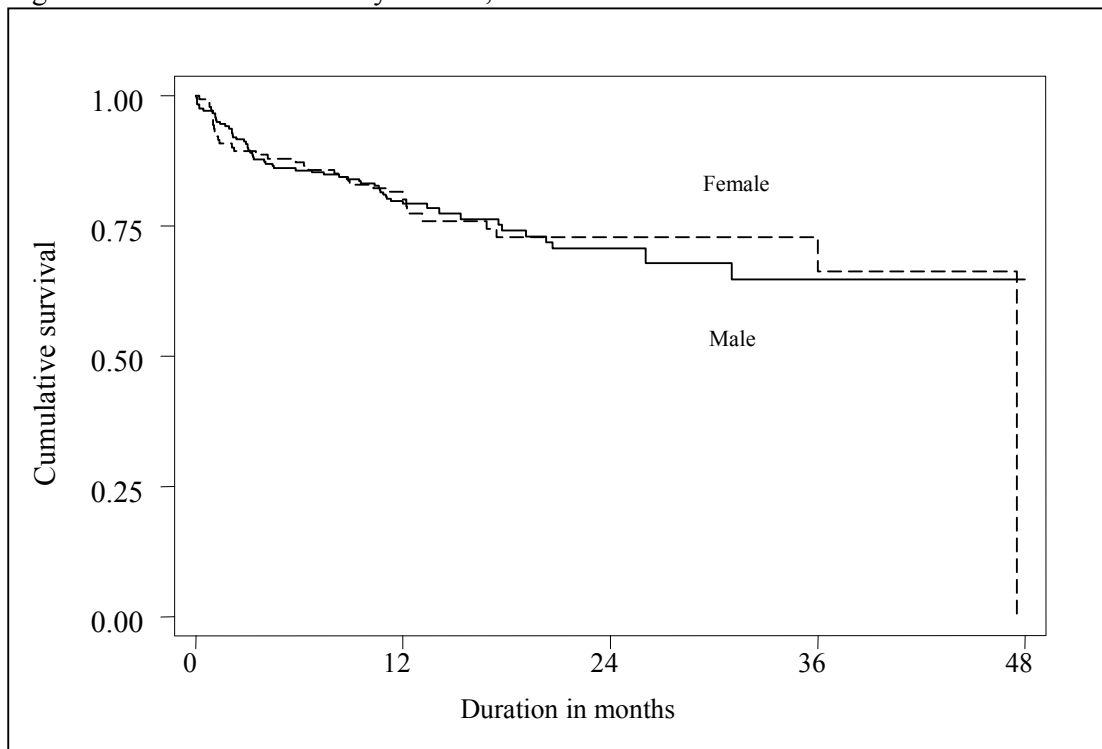


Table 2.4.2.4 Graft Survival by Age, 2004-2007

Interval (months)	0-9			10-19		
	No.	% success	SE	No.	% success	SE
0	7	100	-	16	100	-
12	6	86	13	13	81	10
24	1	43	31	8	81	10
36	-	-	-	5	81	10
48	-	-	-	-	-	-

Interval (months)	20-39			≥40		
	No.	% success	SE	No.	% success	SE
0	19	100	-	336	100	-
12	16	84	8	268	79	2
24	5	84	8	89	71	3
36	3	84	8	23	63	5
48	1	84	8	4	50	12

\* Outcome data were not submitted for 192 corneal transplant patients in year 2004-2006, while outcome data at 1 year for 172 corneal transplant patients with notification in year 2007 is still on going.

Figure 2.4.2.4 Graft Survival by Age, 2004-2007

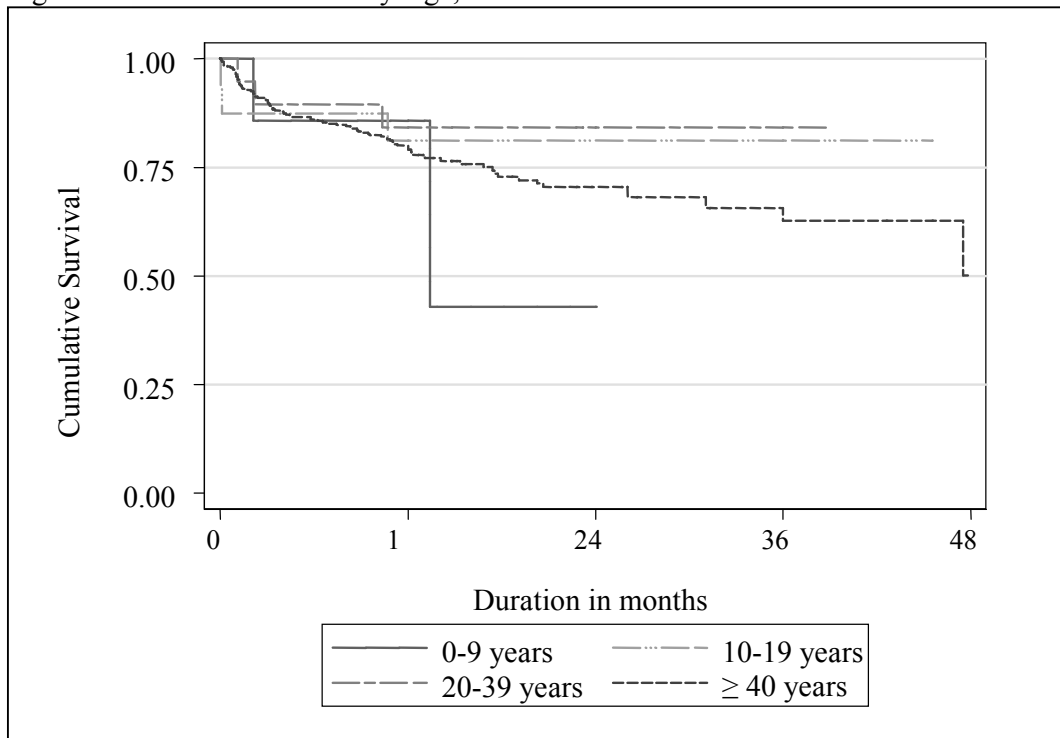


Table 2.4.2.5: Causes of Graft Failure

		<b>Total (N=94)</b>	
		<b>No.</b>	<b>%</b>
Graft Failure		94	25
Cause of Failure	Primary graft failure or Primary Endothelial decompensation	16	17
	Recurrence of primary disease	6	6
	Late Endothelial decompensation	19	20
	Glaucoma	13	14
	Infection	18	19
	Graft rejection	22	23
	Others	25	27
	No data	8	9

\*Each Patient may have more than one cause of graft failure.

56 patients have 1 cause  
28 patients have 2 causes  
1 patient has 3 causes  
1 patient has 4 causes



### 2.4.3 Visual Outcome

Visual outcome of corneal transplants was analysed in cases where post cornea transplant unaided vision was available as data on post corneal transplant best corrected vision was only available in a limited number of the cases. (Table 2.4.3.1) Forty seven percent of both optical and non-optical cases had improved unaided vision after surgery. (Table 2.4.3.2) Majority of surviving optical grafts had an unaided vision of 6/24-6/60, whereas the majority in the non optical group had an unaided vision of less than 6/60. (Table 2.4.3.3) (Figure 2.4.3.3)

Table 2.4.3.1: Availability of Data on Post Corneal Transplant Unaided Vision

	Unaided Vision (N =742)	
	No.	%
Data available	326	44
Lost to follow up	306	41
No data	110	15

Table 2.4.3.2 Unaided Visual Outcome After Cornea Transplant Surgery

Reason for graft	Optical (228)		Non-optical (98)	
	n	%	n	%
Vision better	107	47	46	47
Vision same	40	17	25	26
Vision worse	27	12	20	20
Not known*	54	24	7	7

\* Either pre op vision and/or post op vision is not available

Figure 2.4.3.2 Unaided Visual Outcome After Corneal Transplant Surgery

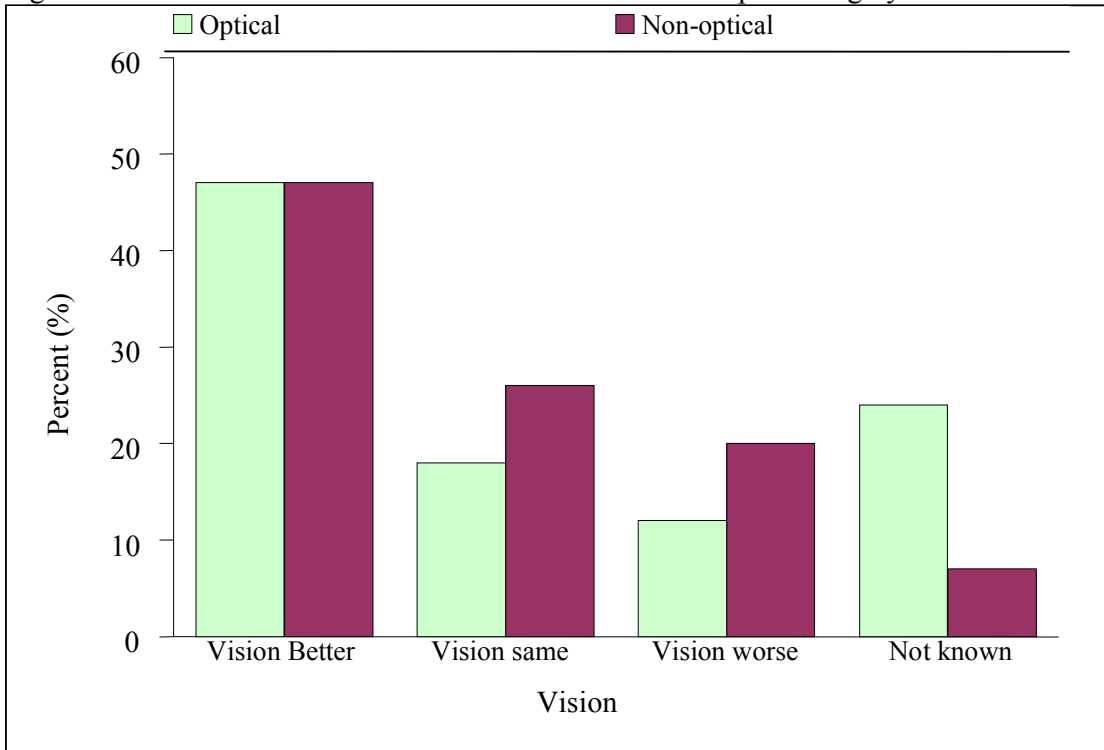
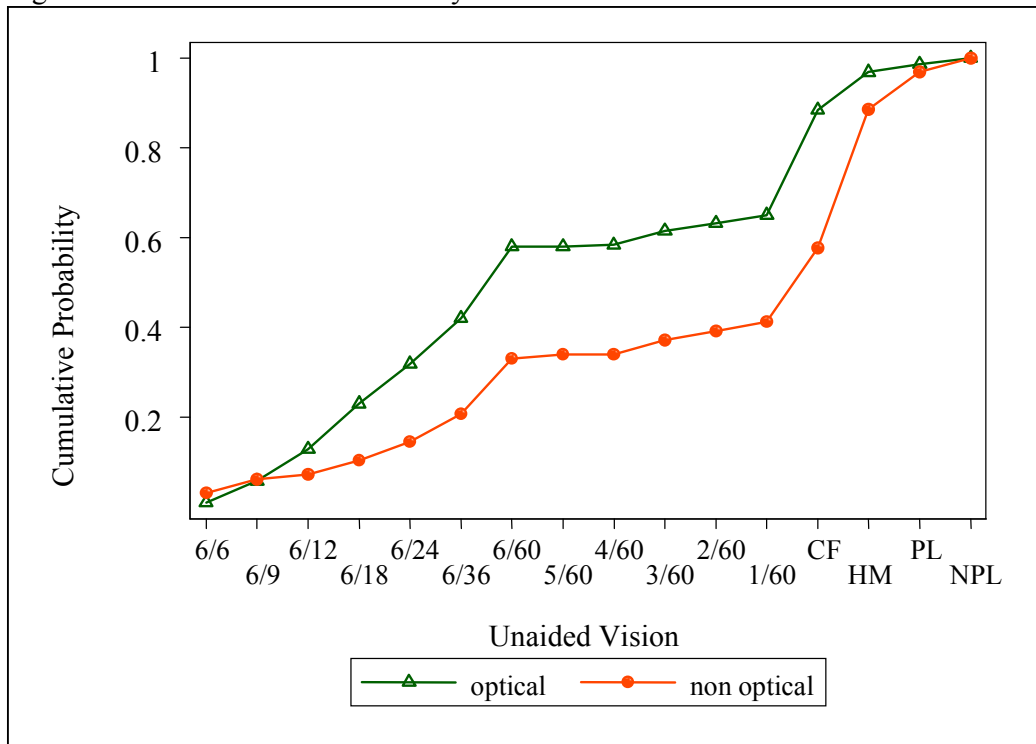


Table 2.4.3.3 Unaided Vision for Optical and Non Optical Cases

Vision	Optical				Non Optical			
	Graft Survival (192)		Graft Failure (36)		Graft Survival (58)		Graft Failure (40)	
	n	%	n	%	n	%	n	%
6/18 or Better	52	27	0	0	9	15	1	3
6/24 – 6/60	79	41	0	0	21	36	1	3
Less than 6/60	59	31	36	100	27	47	38	94
Data not available	2	1	0	0	1	2	0	0

Figure 2.4.3.3 Cumulative Probability for Unaided Vision in Grafts



**2.5 POST CORNEA TRANSPLANT COMPLICATIONS**

The commonest complications observed at one year were post-keratoplasty glaucoma, graft vascularisation, epithelial problems and graft rejection. Rejection was seen in 15%. (Table 2.5.1) Endothelial rejection is the commonest graft rejection. (Table 2.5.2)

Table 2.5.1: Post Transplant Complications

		One year outcome (N=275)		2 <sup>nd</sup> year outcome (N=72)		3 <sup>rd</sup> year outcome (N=26)		4 <sup>th</sup> year outcome (N=5)		Total (N=378)	
		No.	%	No.	%	No.	%	No.	%	No.	%
Any complications		157		54		24		8		243	
Complication	Epithelial Problem	28	18	4	7	2	8	1	13	35	14
	Wound Dehiscence	2	1	0	0	0	0	0	0	2	1
	Suture infiltration / abscess	15	10	3	6	2	8	0	0	20	8
	Endophthalmitis	1	1	1	2	0	0	0	0	2	1
	Microbial keratitis	17	11	2	4	0	0	0	0	19	8
	Vascularisation	28	18	4	7	0	0	0	0	32	13
	Post-keratoplasty glaucoma	28	18	9	17	3	13	1	13	41	17
	Graft Rejection	26	17	5	9	0	0	0	0	31	13
No data	62	39	32	59	17	71	6	75	117	48	

\* Each patient may have more than one complication

Table 2.5.2: Post Transplant Graft Rejection Types

		One year outcome (N=275)		2 <sup>nd</sup> year outcome (N=72)		3 <sup>rd</sup> year outcome (N=26)		4 <sup>th</sup> year outcome (N=5)		Total (N = 378)	
		No.	%	No.	%	No.	%	No.	%	No.	%
Graft Rejection		26		5		0		0		31	
Types	Epithelial	10	38	2	40	0	0	0	0	12	39
	Stromal	6	23	0	0	0	0	0	0	6	19
	Endothelial	11	42	3	60	0	0	0	0	14	45
	No data	4	15	0	0	0	0	0	0	4	13

\* Each patient may have more than one type of rejection