

Maribel Seré
Jan Paul Ouwens
Wim van der Bij
Peter L. L. J. Hardus

The value of routine ophthalmological tests in the screening for lung transplantation

Received: 15 April 2003
Revised: 12 August 2003
Accepted: 12 August 2003
Published online: 23 April 2005
© Springer-Verlag 2005

M. Seré · P. L. L. J. Hardus (✉)
Department of Ophthalmology,
University Hospital of Groningen,
P.O. Box 30.001, 9700 RB
Groningen, The Netherlands
E-mail: phardus@knmg.nl
Tel.: +31-50-3612510
Fax: +31-50-3611709

J. P. Ouwens
Lung Transplantation Group,
University Hospital of Groningen,
Groningen, The Netherlands

W. van der Bij
Department of Pulmonology,
University Hospital of Groningen,
Groningen, The Netherlands

Abstract We aimed to analyse the results of ophthalmological examinations in the screening before and in the follow-up after lung transplantation. Altogether, 295 consecutive patients who had undergone ophthalmological examination in the screening before lung transplantation were analysed. Preoperatively 27% ocular abnormalities were found; none of them formed a contraindication for the transplantation. Of the 122 patients who underwent transplantation, 24 (20%) had postoperative ocular complaints. We can conclude that, because of the absence of contraindications in all of these patients, routine ophthalmological screening before transplantation is not recommended. Routine postoperative screening is not required, either.

Keywords Lung transplantation · Ophthalmologic screening

Introduction

The first lung transplantation was performed in the University Hospital of Groningen in November 1990. As lung transplantation was still relatively new at that time, an extensive screening protocol was used. In 1998, the Minister of Health Affairs in the Netherlands decided to include lung transplantation in the Dutch benefits package, because of its proven effectiveness. However, the cost effectiveness of lung transplantation was unfavourable in comparison with that of liver and heart transplantations. The Ministry, therefore, encouraged further research into the possibility of decreasing the costs without lowering the effectiveness. This resulted in

an effectiveness study that took place in the period 1999–2000 [1, 2].

One of the purposes of this study was to evaluate the clinical screening process. This should lead to a more limited, but equally effective, screening procedure [3]. In this present study, we investigate the benefit of an ophthalmological examination in the screening and follow-up.

Patients and methods

Patients

Candidates for lung transplantation were patients with irreversible, progressively disabling, terminal

pulmonary disease, whose life expectancy was considered to be a maximum of 12–18 months. The patient flow of the lung transplantation programme of the University Hospital of Groningen is divided into phases. The numbers of patients in the various phases of the programme for the period 1 July 1990 to 1 April 1999 are shown in a flowchart (Fig. 1). After passing the final screening, patients were registered on the waiting list. Patients were unlisted, after undergoing transplantation, if they died on the waiting list or if they could not have a transplant due to new contraindications. For all patients, length of stay in all phases was registered. During the study period, 610 patients were referred to the programme. Contraindications to lung transplantation included evident and irreversible involvement of other vital organs, active extra-pulmonary infection, severe effects of systemic corticosteroids, ventilator-dependent respiratory failure, non-compliance with medical treatment, addiction to alcohol, drugs or tobacco, and prior major surgery. Adipositas and malnourishment, if severe and not correctable, were also contraindications.

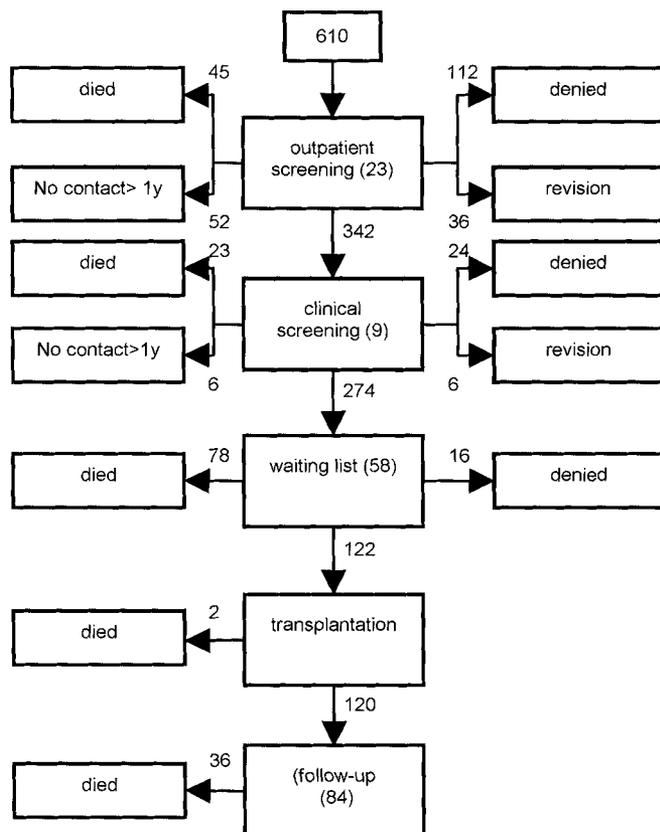


Fig. 1 Flowchart of lung transplantation patients

Clinical screening

Besides evaluation of the lungs, evaluation of the kidneys, heart, liver and bone density were carried out. Examination by an ear, nose and throat specialist, a dentist and an ophthalmologist were included. Microbiological, haematological and immunological examinations were also performed.

Follow-up

Immunosuppression

All patients received immunosuppression induction, usually comprising three courses of rabbit-anti-thymocyte globulins (thymoglobulin (Merieux), 3 mg/kg). Cyclosporine was administered in order for whole blood trough levels of 400 µg to be reached, which were tapered in 3 weeks after transplantation, to 150 µg (measured by high-pressure liquid chromatography); azathioprine (1–3 mg/kg) and prednisolone 15 mg were administered daily. Herpes and *Pneumocystis carinii* prophylaxis was given.

Ophthalmological examination

This comprised ophthalmological history, visual acuity, biomicroscopy, ophthalmoscopy after pupil dilatation and applanation tonometry.

Following transplantation, only symptomatic patients were seen and recorded.

Results

Preoperatively: lung transplantation was requested for 616 patients. An ophthalmological examination was carried out in 295 cases. In 81 patients (27%) ocular abnormalities were found. The most common finding was cataract (61.7%). Other abnormalities were: refractive errors, hypertensive retinopathy and tear-film problems. Only one patient was noted as having raised intraocular pressure (between 20 and 28 mmHg) (Table 1).

Postoperatively: in 122 patients, the transplantation was performed. Approximately 20% had postoperative ocular complaints (Table 2). Complaints were: loss of visual acuity, pain or a red eye. Patients who had elevated blood sugars, due to their immunosuppressive medication, were checked for diabetic retinopathy. Again, cataract was the commonest finding.

CMV infection was found in three patients. Other complications included herpetic keratitis and conjunctivitis. One patient developed a progressive multifocal leucoencephalopathy (PML). In four cases, the

Table 1 Patients with preoperative abnormalities. *n* = 81 (27%). IOP intraocular pressure

Abnormality	Number (%)
Cataract	50 (61.7)
Hypertensive retinopathy	10 (12.3)
Refraction anomalies	10 (12.3)
Tear-film instability	4 (4.9)
Elevated IOP	2 (2.5)
Macular degeneration	2 (2.5)
Eyelid retraction	2 (2.5)
Retinitis pigmentosa	1 (1.2)

Table 2 Reason for postoperative ophthalmic examination. *n* = 24 (20%)

Reason	Number (%)
Cataract	11 (46)
CMV infection	3 (13)
Herpetic keratitis	1 (4)
PML	1 (4)
Conjunctivitis	3 (13)
Hypertensive retinopathy	1 (4)
No abnormalities	1 (4)
Diabetic screening	3 (13)

intraocular pressure was marginally elevated (between 20 and 28 mm Hg) Further perimetric investigation showed no evidence of glaucoma at that time.

Discussion

In the 295 patients who were given an eye examination before transplantation, the most common ocular abnormality was cataract. In no case was a contraindication for the lung transplantation found. Postoperatively, the patients did not frequently have complaints. The main problem was cataract (46%). Posterior subcapsular cataract is a well-documented eye complication after transplantation, which is due to systemic steroid therapy [4, 5, 6, 7, 8]. Its incidence in our study was found to be 46%, which is comparable with the 43% found in the study by Quinlan and Salmon [7]. The patients who developed opportunistic infections all complained of blurred vision and/or a painful eye. High intraocular tension can be caused by steroids. Glaucoma, however, is more often associated with topical ocular or periocular steroids than with systemic steroids [9].

In our opinion, glaucoma screening is not necessary, unless other factors such as diabetes mellitus, a family

history of glaucoma or severe myopia are present. In addition, glaucoma is a chronic disease, and the chance that it will be detected in time by routine screening, for instance when a person is being tested for spectacles, is high.

Possibly, these complications are underestimated, as only patients who reported complaints were identified and included in the study. On the other hand, this group of patients is well coached and complaints are easily uttered. The selection process for patients is unique to each transplant centre, but it has several tests in common. A preoperative ophthalmological examination is also performed in other transplant centres [10]. But, because of the above results, an ophthalmological examination is no longer part of the in-patient screening of the Dutch lung transplantation programme. There is no reason for one to expect a different outcome in other organ transplantations.

We can conclude that it is important that each patient be well instructed about the possibility of eye complications. Visual complaints in transplant patients need careful examination because of the increased risk for opportunistic infections. However, routine postoperative screening does not appear to be necessary.

References

1. van Enckevort PJ, TenVergert EM, Bonsel GJ, et al. Technology assessment of the Dutch Lung Transplantation Program. *Int J Technol Assess Health Care* 1998; 14:344
2. Ouwens JP, van Enckevort PJ, TenVergert EM, et al. The cost effectiveness of lung transplantation compared with that of heart and liver transplantation in the Netherlands. *Transpl Int* 2003; 16:123
3. Al MJ, Koopmanschap MA, van Enckevort PJ, et al. Cost-effectiveness of lung transplantation in The Netherlands: a scenario analysis. *Chest* 1998; 113:124
4. Skalka HW, Prchal JT. Effect of corticosteroids on cataract formation. *Arch Ophthalmol* 1980; 98:1773
5. Ng P, McCluskey P, McCaughan G, et al. Ocular complications of heart, lung, and liver transplantation. *Br J Ophthalmol* 1998; 82:423
6. Matsunami C, Hilton AF, Dyer JA, et al. Ocular complications in renal transplant patients. *Aust N Z J Ophthalmol* 1994; 22:53
7. Quinlan MF, Salmon JF. Ophthalmic complications after heart transplantation. *J Heart Lung Transplant* 1993; 12:252
8. Astle JN, Ellis PP. Ocular complications in renal transplant patients. *Ann Ophthalmol* 1974; 6:1269
9. Renfro L, Snow JS. Ocular effects of topical and systemic steroids. *Dermatol Clin* 1992; 10:505
10. Smith CM. Patient selection, evaluation, and preoperative management for lung transplant candidates. *Clin Chest Med* 1997; 18:183