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Original Research Article

How useful is antireflux surgery in lung transplant patients with gastroesophageal reflux?

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ABSTRACT

Background and objective: Respiratory function deteriorates over time after lung transplant. Reflux disease with pulmonary complications is a possible cause of this decline. This case series we aim to assess whether respiratory function improves after Nissen fundoplication in lung transplant patients and if surgery reduces gastroesophageal reflux disease (GERD) symptoms and use of proton pump inhibitors (PPIs).

Materials and methods: A retrospective case series of lung transplant patients with reflux disease and Nissen fundoplication. Clinical symptoms, pH-metry data, use of PPIs were recorded before the procedure and up to 18 months postoperatively. The FEV_1 values before and after Nissen fundoplication were recorded at 3 monthly intervals. Patients' satisfaction scores were recorded before operation and postoperatively.

Results: A total of 64 lung transplant patients were selected. After Nissen fundoplication, the pH studies were done on 26 patients. The mean overall acid exposure fraction was 1.03% ($P < 0.05$). FEV_1 declined for 6 months postoperatively and then gradually improved. The comparison of FEV_1 at 3 months preoperatively to 3 months postoperatively showed no significant difference ($P = 0.067$) as well as at 6 months. A significant improvement in clinical GERD symptoms was achieved after antireflux surgery; however, the patients remained receiving PPIs.

Conclusions: NF has been established as a safe operation for lung transplant patients. Late Nissen fundoplication did not improve lung function significantly amongst lung transplanted patients; however, patients with symptomatic GERD may have benefited from Nissen fundoplication in terms of symptom relief. A multicenter randomized control trial is needed to assess the effect of early unselected reflux control on respiratory function and graft survival.

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1. Introduction

Over the past 25 years lung transplantation has been an important option for patients with end stage lung disease. The survival rate has improved; however, despite the development of immunosuppressive agents, the mean survival for single lung transplant is still 5 years and for double lung transplant about 5.9 years [1].

The causes of death include graft failure, diffuse alveolar damage, chronic allograft rejection or chronic graft dysfunction, which manifests as bronchiolitis obliterans syndrome (BOS). BOS is the leading cause of mortality within the first year accounting for over 40% of deaths [2]. The incidences of BOS approaches 50% within five years of transplantation.

Many factors have been reported as risk factors for BOS. Microaspiration secondary to gastro-esophageal reflux disease has been suggested to be a potential contributor to lung allograft dysfunction and development of bronchiolitis obliterans [1]. The microaspiration can be controlled by antireflux surgery.

Gastroesophageal reflux disease (GERD) is common in post-transplant patients firstly because the vagus nerve transection during transplant surgery. Injuries to the vagal nerves are common due to direct trauma and electrocoagulation. This leads to delayed gastric emptying and distal esophageal dysmotility, promoting reflux posttransplant [3,4]. A study had shown as many as 90% of the post lung transplant patients have experienced delayed gastric emptying [4,5].

Although proton pump inhibitors (PPIs) can reduce the acid production, other gastric content such as bile salts from microaspiration can also result in aspiration pneumonia. The study by D'Ovidio et al. found that patients with a presence of bile in bronchoalveolar lavage fluid developed BOS more quickly [4]. Davis et al. also found that the survival of lung transplanted patient was significantly better in patients who had either normal pH studies or who had fundoplication particularly if performed before the late stages of bronchiolitis obliterans syndrome [5].

Therefore, the aim of this study was to assess whether respiratory function improved after Nissen fundoplication in lung transplant patients and if surgery reduced GERD symptoms and use of (PPIs).

2. Materials and methods

A retrospective case series including lung transplanted patients with reflux disease who had undergone antireflux surgery between 2004 and 2010 at St Vincent's Public and Private Hospital, Sydney, Australia was analyzed. The indications for Nissen fundoplication were either symptoms of reflux disease or a positive pH study. Demographic data, clinical symptoms of reflux disease, pH study results, complications, whether the surgery performed reduced the use of PPIs, patients' satisfaction scores and safety of this procedure were analyzed. Satisfaction scores were analyzed by discussing pre and postoperative symptoms in clinic with the patients, and then recording whether they were satisfied or not with the outcome.

All the operations were performed by the same surgeon or under his supervision. Laparoscopic Nissen fundoplication was performed in all cases. Patients were all taking immunosuppressive medications. Postoperatively they were managed in ICU or HDU and under supervision of the transplant team. A single person was responsible of collecting and tabulating the raw data by reviewing the hospital medical records and the correspondents from the specialist consultation rooms.

Forced expiratory volume in 1 s (FEV_1) values were collected to evaluate lung function at 3 monthly intervals. The first measurement was recorded 6 months preoperatively, and the last one was taken 18 months postoperatively.

2.1. Statistical analysis

The Student *t* test was used to compare mean values. In cases with an abnormal distribution, nonparametric statistics assessment was used. If the frequency of the variable was low, and fewer than 30 investigations were performed, the Fisher exact test was used. Significance was defined as a *P* value less than 0.05.

Ethics approval had been obtained for this low-risk study.

3. Results

Of the 218 patients who underwent lung transplant surgery between February 2002 and December 2009, 64 (29%) underwent antireflux surgery.

The mean age of the patients was 41 years (SD 13.6; range 16–61), and there were 30 women. Fifty patients had bilateral sequential single lung transplantation, six patients had a single lung transplant, and eight patients underwent a heart–lung transplant before antireflux surgery.

The mean age at which Nissen fundoplication was performed was 45 years (range 17–68). There were no conversions to open surgery. Of these 64 patients, 57 completed follow-up.

The time line since the patients had lung transplant surgery and antireflux surgery was calculated from when the patient was last seen. The mean survival time posttransplant was 6.6 years. The mean survival time from when Nissen fundoplication was performed was 3.2 years. The mean time from initial transplant to the time that the patients required Nissen fundoplication was 3.3 years.

51 of the 61 patients (clinical symptoms of three patients were not recorded sufficiently for evaluation) had typical GERD symptoms before antireflux surgery despite receiving regular PPIs. Regurgitation, reflux and nocturnal coughing were common among this group of patients. All the patients were unsatisfied with their condition preoperatively (Table).

All the patients underwent 24 h pH-metry before the antireflux procedure. The overall acid exposure fraction was 14.4% (SD 12.7%) (normal range up to 4%). The range was from 1.1% to 72%. The nocturnal values range from 0% to 50% and the mean value was 15.4% (SD 12.9%) (normal range up to 2%).

There were no postoperative deaths. Four complications occurred early postoperatively. One patient had febrile neutropenia, two patients had early dysphagia, and one had sputum retention. All complications were resolved.