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Diverticulitis occurs early after lung transplantation

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ABSTRACT

Background: Lung transplantation recipients are at an increased risk for developing diverticulitis. However, the incidence and natural history of diverticulitis have not been well characterized. Our objective was to identify patient and transplant-related factors that may be associated with an increased risk of developing diverticulitis in this patient population.
Materials and methods: This is a retrospective single institution study. All patients who received a lung transplant between May 2008 and July 2013 were evaluated using an existing lung transplantation database. Patient-related factors, the incidence and timing of diverticulitis, and outcomes of medical and surgical management were measured.
Results: Of the 314 patients who received a lung transplant, 14 patients (4.5%) developed diverticulitis. All episodes (100%) of diverticulitis occurred within the first 2 y after transplantation. Eight patients (57%) required surgery with a mortality rate of 12.5%. Six patients (43%) were managed medically and did not require surgery with a mean follow-up period of 442 d.
Conclusions: Diverticulitis is common after lung transplantation and occurs with a higher incidence compared with the general population. Diverticulitis occurs early in the posttransplant period, and the majority of patients require surgery. Patients who respond promptly to medical treatment may not require elective resection. A greater awareness of the risk of diverticulitis in the early posttransplant period may allow for earlier diagnosis and treatment.

1. Introduction

Intra-abdominal complications are a major source of postoperative morbidity in patients who have undergone solid organ transplantation. [1–4]. Of all the solid organs that are available for transplantation, the lung requires some of the highest levels of immunosuppression due to constant direct contact with the external environment. This high immunocompromised state predisposes to infectious complications, and in particular, the risk of diverticulitis is high [2,3,5].

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Diverticulitis is defined as perforation of a diverticulum, and the incidence of both colonic diverticulosis and diverticulitis has been steadily rising in the US population [6,7]. Risk factors for the development of diverticulitis include age, low-fiber diet, obesity, physical inactivity, and immunosuppression. In the setting of lung transplantation, diverticulitis has been associated with a more aggressive phenotype [8], leading to higher rates of emergency surgery and a higher mortality [8,9]. However, the medical and surgical outcomes of lung transplant patients who develop diverticulitis have not been fully characterized, leaving many unanswered questions regarding the optimal management of diverticulitis in this patient population.

The purpose of this study was to better define the natural history of diverticulitis in the lung transplant population. In particular, we sought to determine patient- or transplant-related factors that may be associated with an increased risk of developing diverticulitis. We also evaluated the outcomes of surgery for diverticulitis in the lung transplant population and the appropriateness of conservative nonoperative management and elective resection.

2. Materials and methods

This was a retrospective single institution study that used a lung transplantation database to identify all patients who received a lung transplant between May 2008 and July 2013. The Office of Human Research Protection Program, our institutional review board, approved the study. Medical records were reviewed for patient demographics, reason for transplantation, type of transplant (single *versus* double), timing of diverticulitis, computed tomography (CT) scan findings, medical and surgical management, and outcomes.

2.1. *Immunosuppression regimen*

Lung transplant recipients receive either thymoglobulin (rabbit anti-thymocyte globulin) for younger patients (aged <60 y) or Basiliximab (Simulect; Novartis, East Hanover, NJ) for patients aged >60 y. Patients receive "pulsed dose" Solumedrol concurrent with transplantation and are maintained on prednisone with a tapering schedule over the ensuing 6 wk to a maintenance dose of 10–15 mg daily. However, recipients may receive additional "pulsed doses" for episodes of allograft rejection.

2.2. *Statistical analysis*

Continuous data such as age, follow-up time after transplantation, and timing of diverticulitis were described as a mean or median. A two-tailed unpaired *t*-test was used to compare age differences between various groups. Chi-square analysis was used to compare the incidence of diverticulitis between the bilateral and unilateral lung transplant groups.

3. Results

A total of 314 patients underwent lung transplantation at our institution between May 2008 and July 2013 (Table 1). Of 314 patients, 175 patients received unilateral transplants and the remaining 139 patients received bilateral lung transplants. The male-to-female ratio was 1.5:1. The average age of all transplant recipients was 58 y. Of the 314 total patients, 14 (4.5%) developed diverticulitis and were managed either surgically (57%) or medically (43%). The mean follow-up period for these patients was 442 d.

Table 1 – Demographic data of all lung transplant recipients between May 2008 and July 2013.

Lung transplant recipients	
Total (*n*)	314
Mean age (y)	58
Gender	
Male	191
Female	123
Type of transplant	
Unilateral transplant (*n*)	175
Bilateral transplant (*n*)	139
Patients with diverticulitis (*n*)	14
Incidence of diverticulitis (%)	4.5
Mean follow-up (d)	442

The majority of the diverticulitis cases arose within 1 y after transplantation (Fig. 1), with the earliest case arising just 4 d after transplantation. The median interval period between surgery and diverticulitis onset was 86.5 d, and the mean interval period was 195 d. Eleven patients (79%) presented within 1 y, 13 (93%) presented within 18 mo, and all of the patients (14/14) presented within 2 y of transplantation.

The transplant recipients who developed diverticulitis were significantly older than those who did not (Table 2). The mean age of the 14 individuals who developed diverticulitis was 63 y, whereas the mean age of all transplanted individuals was 58 y ($P = 0.023$). Diverticulitis was more common in patients who received a unilateral lung transplant, arising in nine of the 175 individuals (5.1%), compared with bilateral lung transplant recipients, in which five of the 139 individuals (3.6%) developed diverticulitis. Although more common in unilateral lung transplant recipients, the difference was not statistically significant. The race, sex, and reason for transplantation also did not influence the development of diverticulitis (data not shown).

Of the 14 patients who developed diverticulitis, 8 (57%) required surgical intervention for their diverticulitis, and 6 (43%) were successfully treated medically with antibiotics (Fig. 2). Four of the eight surgically managed patients (50%) had an episode of diverticulitis before their lung transplantation, whereas only one of six medically managed patients (16%) had a previous history of the condition. Of the eight surgically managed patients, two were initially treated conservatively but failed. Seven of the eight surgical patients underwent an emergent sigmoid colectomy with an end colostomy, which included one patient who failed initial conservative treatment and subsequently underwent surgery during the same hospital admission. One patient responded to conservative measures and was discharged but developed recurrent diverticulitis and was electively treated with a sigmoid colectomy and primary anastomosis. The overall surgical mortality rate was 12.5%, as one emergently treated patient died within 2 wk of the operation.