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Original Research Article

Bronchoscopic survillance during early postoperative period after lung transplantation

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ABSTRACT

Background: Lung transplant has become an accepted modality of treatment of patients with end stage pulmonary disease, establishing protocols for improving survival in these patients is the need of the hour. The aim of this study was to assess the use of bronchoscopic surveillance during early post-operative period after lung transplantation.
Methods: It is a hospital based retrospective study; the study was carried out in a lung transplant centre located in Chennai, India. A total of eight cases of single lung transplantation were done during the period of one year. Six patients were selected based on the inclusion criteria and the use of bronchoscopy during the immediate post-operative period followed by bronchoscopy during the early hours of everyday for the first week and the success in reduction of immediate post-operative infection and observations has been analysed.
Results: In analysis of all the six cases, the positive signs of early morning bronchoscopy done were identified, mucus plugs which contribute to significant hypoxemia and morbidity were not observed in any of the patients. New patch was also not observed in any of these patients. Culture positivity from the donor lung carrying over to the recipient was observed in just one of these patients.
Conclusions: This protocol based frequent bronchoscopy prevents 'Surprise' patches in the lungs. Performance of Broncho Alveolar Lavage on a regular basis avoided the possibility of infections developing by early screening and aided as a tool for identification of acute neo lung rejection.

Keywords: Acute neo lung rejection, Bronchoscopic Surveillance, Lung Transplant, Postoperative Period

INTRODUCTION

Lung transplantations in humans was first attempted almost 55 years ago by James Hardy in 1963.[1] Lung transplant has become an accepted modality of treatment of patients with end stage pulmonary disease, the actuarial survival rate in developed countries are in the region of 60% after two years. Graft rejection, infection, and the development of bronchiolitis obliterans continue to be the leading causes of both early and late morbidity and mortality as well as progressive attrition of the lung allografts.[2]

Infection in the early post-operative period still poses an uphill battle in ensuring survival for these patients. In India lung transplant is at its nascent stages, with few centres being employed in the procedure with moderate success. Single lung transplant is commonly done in majority of the centres in India; the success rate depends on the level of expertise in the centre which grossly

differs between them.[3] Fibre–optic brochoscopy has remained the gold standard in managing tracheobronchial pathology since its introduction in 1968.[4-7] Because of its diagnostic and therapeutic versatility, bronchoscopy plays a central role in the management of lung transplant recipients.[8] Establishing protocols for improving survival in these patients is the need of the hour. Lung transplant is generally done as Double lung transplant, Single lung transplant and cardiopulmonary transplant.[9]

A nationalised protocol to manage these patients with guidelines established by studies done on Indian population to better serve the purpose of providing the best possible outcome for lung transplant is needed.

METHODS

This study is a retrospective analysis of data from one year at a lung transplant centre located in Chennai, India. Total of 8 cases done over a period of one year from 1st January 2016 to 28th February 2017, the observations and the use of bronchoscopy during the immediate post-operative period followed by bronchoscopy during the early hours of everyday for the first week and the success in reduction of immediate post-operative infection has been analysed.

Inclusion criteria

More than four bronchoscopy done during the post-operative period

Exclusion criteria

- Less than four bronchoscopy done in the post-operative period
- Pre-existing proven culture growth in the native lungs.
- The following protocol is followed in our institute for Bronchoscopy.
- Bronchoscopy done using a fibre optic flexible scope during the final perioperative period at 00:00 hrs for the neo lung followed by Bronchoscopy again at 12:00 hrs for the neo lung.
- Bronchoscopy every 24 hrs once henceforth in the early hours of the day for the first week.
- Bronchoscopy on alternate days in the early hours for the second week.

Advantages

- Identification of the bronchial anastomosis.
- Clearance of clots which might cause segmental and sub-segmental collapse.
- Clearance of secretions accumulated over 24 hours.
- Early surveillance cultures for carry over infections from donor lung.
- Early surveillance to identify primary rejection.
- Reduction in the possibilities of new patches in the lung.
- Assist in encouraging nutrition for the patient.

Case definitions

A total of eight cases had been subjected to single lung transplant in the entire duration of one year, six of the patients fulfilled the inclusion criteria and were used for analysis. Demographic and follow-up data were presented in (Table 1).

Table 1: Demographics and follow up data.

S. no	Case diagnosis	Surgery	Demographic	Survival	No of bronchoscopy	Pre op infection in native lung
Case 1	Interstitial Lung Disease	Right Lung Transplantation	60/M	YES	9	NIL
Case 2	Interstitial Lung Disease	Right Lung Transplantation	42/M	YES	9	NIL
Case 3	Interstitial Lung Disease	Right Lung Transplantation	58/F	YES	10	NIL
Case 4	Interstitial Lung Disease	Right Lung Transplantation	58/M	YES	17	NIL
Case 5	Interstitial Lung Disease	Right Lung Transplantation	34/M	YES	10	NIL
Case 6	Severe PAH	Bilateral Lung Transplantation	19/M	YES	11	NIL

All the patients were in end stage lung disease and were evaluated in detail with the protocol for ensuring no pre-existing pulmonary or cardiac ailment which can complicate the procedure. All of them were accordingly

placed on the transplant list and after availability of organ they were brought into the hospital for transplant. Of the eight cases, only six cases met the inclusion criteria and thus have been taken for analysis.

Bronchoscopy

For all the above patient's bronchoscopy was done as per our institute protocol with minimum of seven or more bronchoscopies done in entirety and on analysis of the bronchoscopy reports the below results are being published. Bronchoscopy was also done when indicated and samples collected accordingly.

RESULTS

A total of six cases were included in the analysis, they were observed for mucus plugs, new patches, blood clots, culture growth, fresh bleed, collapse of segments, these findings are presented in Table 2.

Table 2: Findings of bronchoscopy.

S. No	mucus plugs (n)	new patches (n)	blood clots (n)	Culture growth (n)	Fresh bleed (n)	Collapse of segments (n)
Case 1	Nil	Nil	Nil	Nil	Nil	Nil
Case 2	Nil	Nil	Yes	Nil	Nil	Nil
Case 3	Nil	Nil	Nil	Nil	Nil	Nil
Case 4	Nil	Nil	Yes	Yes	Nil	Nil
Case 5	Nil	Nil	Nil	Nil	Nil	Nil
Case 6	Nil	Nil	Nil	Nil	Nil	Nil
Total	00	00	02	01	00	00

In analysis of all the six cases, the positive signs of early morning bronchoscopy done were identified, findings of bronchoscopy include mucus plugs observed during the post-operative period remains at zero. Mucus plugs which contribute to significant hypoxemia and morbidity was not observed in any of the patients as clearance of secretions retained over 24 hours period was removed constantly especially during the artificially ventilated periods.

A new patch which has no explanation leading to increase in number of investigations was also not observed in any of these patients. Culture positivity from the donor lung carrying over to the recipient was observed in just one of these patients. It subsided after appropriate treatment with antibiotics.

Airway anastomotic events which accounts for life threatening airway complication has been reduced and anastomosis healing as witnessed during bronchoscopy stands at mean of 4.5days. No anastomotic infection was observed, thus prevented the development of dehiscence, stenosis, malacia, fistulas, and granulation tissue. Blood clots has been observed in only 2 cases and the clearance of blood clots stands at mean of 2.5 days. Hemothorax after lung transplantation may result in increased post-operative morbidity and mortality, in our study no endobronchial bleed was observed in this group of patients. Collapse of segments was also not observed in any of these patients which translate to increased oxygen delivery and better outcome in the post ventilated period. No lethal complications occurred due to the surveillance bronchoscopies. As the bronchoscopic surveillance reduced the post-operative complications mechanical ventilation period was also reduced in the patients. The results had an impact on management of rejection and infection.

DISCUSSION

Among the eight patients who received single lung cadaver donor transplantation six of them met the inclusion criteria and were included in the study. In our search of literature, Authors did not identify any articles were a similar protocol for bronchoscopy was followed and thus this process is innovative and its merits have been discussed in detail.

Acute neo lung rejection was only observed in 16.67% of these patients indicating our current screening and intra operative delivery of anti-rejection medications is a successful combination.[10] No infection was observed in these during the post-operative period. 16.67% of the patient had an infection from the donor lung carryover but was promptly managed with antibiotics and no new infections were observed in that scenario. This proves that early bronchoscopy and surveillance helps in preventing post-operative infections which are a major concern for mortality and morbidity in lung transplant recipients. Mucus plugs causing collapse of bronchial segments leading to hypoxemic damage of the neo lung was not observed in any of these cases as bronchoscopies done daily have reduced the possibility of secretions clogging over time.

Blood clots which arise from the anastomosis are the next common cause of collapse, daily saline washing with appropriate measures ensures clearance of airways. Reduction in the requirements for frequent suctioning has also been avoided and thus reducing the possibility of exogenous contaminations of the neo lung. Broncho alveolar lavage done and cytochemical analysis of the cell count helps in identifying the possibility of acute rejection in the early stages resulting in appropriate immunosuppressant's to ensure better results.

Bronchoscopy during the early hours of the day ensures the patient need not be kept fasting for long and concentrates on improving the nutritional status of these patients which is also an important aspect of recuperation.

Clearance of secretions accumulated over 24 hours will provide a clear airway which increases the oxygen drive and reduces possibility of hypoxemia. Broncho alveolar lavage was also done in all of these cases at frequent intervals with or without evidence of any lesion on radiographs to rule out the possibility of infection entering the neo lung through the scope used. To maintain good sterility for the procedure the bronchoscope used is cleaned regularly with standard procedures.

CONCLUSION

This protocol based frequent bronchoscopy prevents 'Surprise' patches in the lungs by the way of early identification. Performance of Broncho Alveolar Lavage on a regular basis avoided the possibility of infections developing by early screening and aided as a tool for identification of acute neo lung rejection.

The gross advantages observed during the analysis were clearance of tracheobronchial tree early in the morning provides good ventilation condition for the whole day and since done in the early hours of the day no additional fasting is required.

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