行政院及所屬各機關出國報告
（出國類別：進　修）

肺臟移植
（Lung Transplantatio）

服務機關：台北榮民總醫院
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行政院輔導會臺北榮民總醫院

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關鍵詞: 肺臟移植

內容摘要: 壹年進修期間，前　個月，職在美國聖路易市華盛頓大學醫學中心觀摩學習胸腔外科一般手術及肺臟移植。華盛頓大學醫學中心，是目前全世界完成肺臟移植最多例之醫院，截至今年初，總共完成約六百例單肺或雙肺移植，平均壹年約有伍拾例肺臟移植。在進修期間，職約觀摩了三　例肺臟移植，並曾參與數例包括捐贈肺之摘取及移植手術，亦曾隨其醫師觀摩病患術後照顧及回診過程，深感移植小組之團隊合作與病患手術之成功與存活有密不可分之關係。後兩個月，職前往美或洛杉磯市南加州大學醫學中心胸腔外科學習，此醫學中心胸腔外科以食道功能實驗魅及腹腔鏡手術治療胃食道逆流聞名，學習期間，除觀摩其食道各項手術外，另了解食道功能檢查室之設備及檢查之各項內容，收穫甚多。

本文電子檔已上傳至出國報告資訊網

摘要

進修期間, 職在美國聖路易市華盛頓大學醫學中心觀摩學習胸腔外科一般手術及肺臟移植. 華盛頓大學醫學中心是目前全世界完成肺臟移植最多例之醫院, 截至今年初, 總共完成約 600 例單肺或雙肺移植, 平均壹年約有 50 例肺臟移植. 在進修期間, 職觀摩了約 30 例肺臟移植手術, 並曾參與數例包括捐贈肺之摘取及移植手術, 亦曾隨其醫師觀摩病患術後照顧及回診過程, 深感移植小組之團隊合作與手術之成功與病患存活有密不可分之關係.

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1. 出國目的及學習內容

希望能至國外瞭解目前國外之醫療最新知識及器材，提昇本科之醫療水準，給予病患更好的照顧. 另在肺臟移植方面，深入學習，並且希望能建立本院之肺臟移植小組，為需要此一手術治療之病患提供最好的照顧.

2. 肺臟移植之發展

肺臟移植的發展起於西元1950年Dr. Metras在法國，1954年Dr. Hardin與 Dr. Kittle在美國成功完成狗之肺臟移植. 1963年Dr. Hardy在美國密西西比大學完成第一位人體肺臟移植(1)，但病患僅存活18天. 之後，約20年間，共約有40例人體肺臟移植完成，但大部分病人都在兩星期內死亡，其中僅有Dr. Derom在1971年完成之肺臟移植(2)，23歲男性病人，術後住院八個月存活並離開醫院，但不久即死於排斥，感染及支氣管狹窄. 一直到抗排斥藥的改進及 Cyclosporine 的問市，在 1982年，史丹福大學之Dr. Reitz 發表成功完成第一例心肺共同移植(3)，緊接著在1983年，Dr. Cooper及多倫多肺臟移植小組成功完成第一例單肺移植，病患為58歲之

肺纖維化患者(4). 1988 年 Dr. Patterson 發表完成第一例雙肺同時肺臟移植(5), 緊接著, 在 1989 年, 美國盛路易市華盛頓大學醫學中心肺臟移植小組完成第一例兩側肺先後移植之雙肺移植(6), 成功降低了原先雙肺同時移植容易發生之氣管吻合併發症. 1990 年 Dr. Starnes 及史丹福大學移植小組發表成功完成第一例活體捐贈肺臟移植(7). 經過近二十年之研究發展, 肺臟移植之手術成功率已大幅提升, 也成功地為末期肺病患者提供了新的生機.

3. 捐贈肺之摘取

在接獲有捐贈者之訊息後, 須了解其基本資料, 包括年齡, 性別, 身高, 體重, 血型, 腦死原因, 血氧濃度, 吸煙指數及胸部 X 光之情形. 評估後, 若符合需求, 可前往捐贈者所屬醫院, 一切資料再次確定, 包括捐贈者同意書. 除了查看 X 光之進展及血氧指數外, 還要使用氣管鏡檢查捐贈者之氣管, 支氣管, 看有無過多, 過髒之分泌物. 開始摘取之前, 捐贈者應給予點滴抗凝血劑, 在血管阻斷前, 從肺動脈給予 PGE1 500 micrograms. 灌注液則

一般使用 Modified Euro-Collins 或 UW 溶液，灌注完成後，可逆向灌注 500 至 1000C.C 之灌注液.

4. 移植手術

大部分的單肺移植手術，都可經由後側式開胸切口來進行，然而，將病患置平躺姿勢，從胸前側第四肋間或胸骨正中切開方式也可進行單肺移植. 至於雙肺移植，目前一般使用雙側先後移植(8)，傷口約在兩側胸前側第四肋間，胸骨一般並不鋸開，在植入過程中，肺需一直保存於冰水之狀態中. 一般氣管先做吻合，之後為肺動脈，再來為左心房肺靜脈吻合. 一側肺完成後，先于通氣及血液灌注後，再進行另一側. 手術中若遭遇另一邊肺無法提供足夠血氧或病患生命癥象不穩之情形時，可以考慮使用心肺機.

5. 術後照顧

一般而言，肺臟移植手術完成後，病患會轉入加護病房接受照顧. 24 至 48 小時之內可以拔除氣管內管，但某些情況，如肺動脈高壓症或有早期器官排斥，感染等情

形，氣管內管拔除之時機可能會稍微延後. 所有的肺臟移植病患在術後均給予第三代之廣效性抗生素及抗病毒製劑. 抗排斥藥物仍以 Cyclosporine, Azathioprine, Corticosteroid 三種藥物合併使用為主. 在術後追蹤治療方面，則定期以胸部X光，臨床症狀，肺功能及支氣管檢查，病理檢查來評估植入肺之功能及排斥情形. 若確定有排斥嚴重之情形，則給予大量之 Methylprednisolone, 一般病患症狀均會獲得改善.

6. 手術成果

1999年, Dr. Meyers 在 Annals of Surgery 發表美國聖路易市華盛頓大學醫學中心肺臟移植十年之經驗(9). 在450例肺臟移植中291例為雙肺移植, 157例為單肺移植, 兩例為心肺共同移植，手術死亡率為8.35%，一年存活率為83.6%，五年存活率則為52.9%. 雙肺移植之手術存活率比單肺移植較好，慢性排斥(Bronchiolitis Obliterans Syndrome)之罹犯率則隨著術後存活時間而明顯增高.

7. 結論

肺臟移植經過二十年的進步，目前手術之死亡率及併發症比例已在可接受的範圍，許多肺病末期的病患也因此而獲得重生. 當然，除了器官短缺之問題外，慢性排斥之高罹犯率仍舊是目前肺臟移植手術最大之障礙. 另外器官保存時間也影響到肺臟之可利用率. 許多專家致力於免疫學及基因治療之研究，希望能了解慢性排斥之機轉，改善植入肺之功能，進而提高手術之成功率及存活率.

8. 後記與心得

職有幸能於2000年及2001年間前往美國聖路易市華盛頓大學醫學中心見習，其間參觀了有關肺臟移植之各項工作， 包括術前評估會議，捐贈肺之摘取，手術前之準備及過程，術後之照顧及門診追蹤等及參與部份手術，在此感謝台北榮總及外科長官同仁的支持，也在此感謝美國盛路易市華盛頓大學醫學中心的醫師及移植小組人員之指導. 由於肺臟本身易受感染及排斥，肺臟移植手術之成功率及五年存活率明顯較其他器官移植要偏低. 華盛頓大學

醫學中心在 Dr. Cooper 及 Dr. Patterson 之主持下, 已是全世界完成肺臟移植手術數目最多的醫院, 病患的預後也比其他醫學中心要來得好. 主要原因還是多年來訓練了各科專業人員, 分別負責各項細節, 再加上不斷地實驗及臨床研究, 手術之成功率逐年進步, 而執世界之牛耳. 職深深覺得, 肺臟移植手術不同於其他器官移植手術, 牽涉到許多各科專業人員, 除了外科以外, 包括胸腔內科, 麻醉科, 復健科, 社工人員, 營養師, 專門協調人員, 需要足夠之人力及各科良好的配合, 再加上實驗室之持續研究, 才能提高手術之成功率, 造福病患.

9. 附錄(References)

1. Hardy JD et al. Lung homotransplantation in man. JAMA 186:1065,1963
2. Derom F et al. Ten Month survival after lung homotransplantations in man. J Thorac Cardiovasc Surg 61:835, 1971
3. Reitz B et al. Heart-lung transplantation: successful therapy for patients with pulmonary

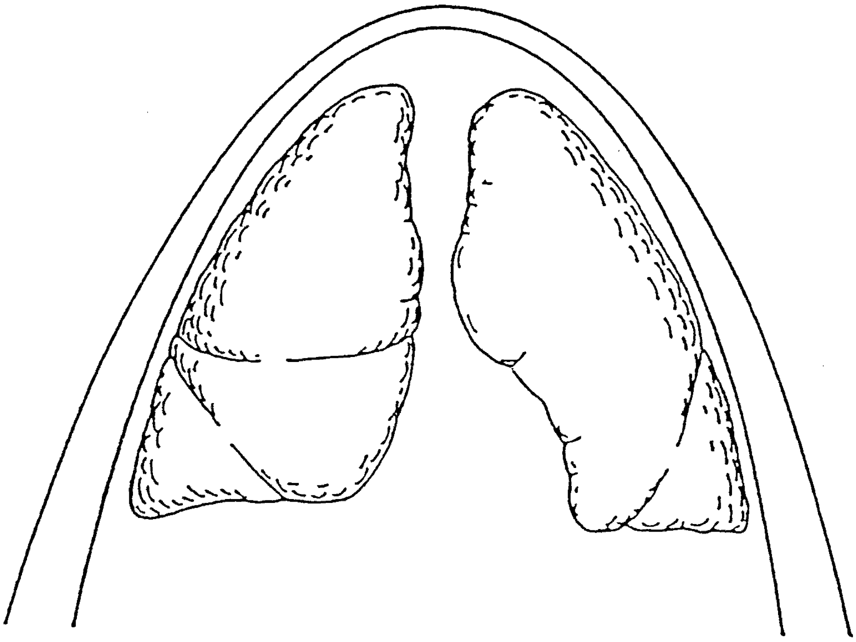
vascular disease. N Engl J Med 306:557,1982

4. Toronto Lung Transplantation Group: Unilateral lung transplantation for pulmonary fibrosis. N Engl J Med 314:1140,1986
5. Patterson et al : Technique of successful clinical double-lung transplantation. Ann Thorac Surg 45:626, 1988
6. Pasque MK et al: An improved technique for bilateral lung transplantation: rational and intial clinical experience. Ann Thorac Surg 49:785, 1990
7. Goldsmith MF: Mother to child: First living donor lung transplant. JAMA 264:2724, 1990
8. Meyers BF et al: Bilateral sequential lung transplant without sternal division eliminates post-transplant sternal complications. J Thorac Cardiovasc Surg 117:368,1999
9. Meyers BF et al: Lung transplantation: a decade of experience. Ann Surg 230:362, 1999

10. 國外資料(見附件)

美國聖路易市華盛頓大學醫學中心有關肺臟移植資料

LUNG TRANSPLANT INFORMATION



by

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Lung Transplant

Pre-Operative Education Checklist

Pre-operative education class is held every Thursday from 10:30 am to 11:30 am in the lower level transplant conference room. You must attend two CONSECUTIVE sessions, if this is not possible make arrangements with your coordinator for the remainder of the class.

-consent forms signed with transplant coordinator

Appointment with Dr. Patterson will be on a Wednesday afternoon, as these appointments often run behind please remember to bring an ample supply of oxygen. Your appointment time will be set the morning of the appointment.

-this is a social visit, so please have you questions prepared.

Verify that the lung transplant office has your St. Louis address, phone number, and pager number.

-the only way we have to reach you is with the information you provide to us so if this changes you must let us know immediately.

Weekly support group meeting every Thursday at 12:00 noon.

-the first three Thursdays of the month the meetings will be held in the 4300 conference room in the Rand Johnson building. On the fourth Thursday the meeting is held at the Lindell Townhouse building, off campus and it is a lunch meeting. **If there are 5 Thursdays in the month there is NO MEETING** on the 5th Thursday..

Clinic Appointment

-you will have a appointment with Dr. Trulock in the first couple of weeks that you move here, after that you will reschedule you appointments as directed.

Pulmonary Rehab schedule

-you must contact Pulmonary Rehab directly to set up your schedule at 362-4157. It is very important that you keep your appointments, and call them directly if you need to cancel.

If you become ILL

If you become ill while you are here you need to contact your transplant coordinator. In the evening this phone is answered by voicemail which will route you to the answering service. The direct number to the answering service may be dialed in the evening or on weekends when the office is not open. As always, if you're getting sicker as the week progresses it is better to deal with it during the work day than to let an emergency develop on the weekend. **The answering service is not used when your beeper goes off. You should call central page.**

Daytime	362-5378
Evening	362-5378 (press 1, you are a patient with a medical emergency)
Long Distance	1-800-321-4054
Answering Service	889-1952

Beeper Number

Check your beeper daily

Directions for using your beeper if you live in St. Louis.

1. Dial your beeper number from any touch tone phone
2. You will hear "your call to an Ameritech pager has been accepted"
3. Hang up
4. Your pager should begin to beep within 5 to 10 minutes

**If your pager beeps at any other time, call the lung transplant office during normal business hours (362-5378 or 800-321-4054) or the coordinator on call at 362-1242 (Central Page), to verify whether the call is regarding a donor for you or not. The pager will occasionally go off by mistake, so always call to check. When calling Central Page tell them your name, that you are waiting for a lung transplant and that your beeper has gone off and ask if anyone is trying to reach you. Central Page number 314-362-5378.

**If you are living away from the transplant center, you will need to obtain your own beeper in your community. If your pager should go off we will put in our phone number with the area code (314) so you will know it is us trying to reach you. If your beeper number changes please contact the transplant office and let us know as soon as possible.

Lung Transplant Team

The Lung Transplant Program at Barnes Hospital was initiated in July 1988, when Dr. Joel Cooper joined the staff. Protocols have evolved to examine new treatment approaches and to increase success.

In this booklet, we have written the basic information to help you understand what you may experience as a lung transplant candidate at Barnes Hospital and Washington University School of Medicine. We have included information about the pretransplant process, the surgery itself, and what to expect during your recovery after surgery.

At this time, transplant is something you probably know very little about. For most patients and families, this is a very anxious time -- you have a lot of questions that will hopefully be answered by this booklet. As you read this material, and find that you have more questions, please write them down so you can ask.

Members of the lung transplant team and their jobs with the team are outlined below. Prior to your acceptance as a lung transplant candidate, each specialist evaluates your health. They review the results of your blood work, x-rays, scans, exercise and breathing tests that were done.

The members of the team include:

1. **Pulmonologist**______________________________
   This doctor is an internist specially trained in the diagnosis and treatment of lung disease. Dr. Bert Trulock is the Medical Director of the Lung Transplant program; there are other lung transplant pulmonologists on staff (Dr. John Lynch). They will manage your medial problems whenever you are in the hospital and see you in clinic both before and after transplant.

2. **Thoracic Surgeon**______________________________
   This doctor is specially trained in lung surgery. Dr. G. Alexander Patterson is the Surgical Director of the Lung Transplant Program; there are other lung transplant surgeons on staff (Dr. Joel Cooper, and Dr. Sudhir Sundaresan). These surgeons perform the transplant operation and are your primary doctors while you are in the hospital recovering from surgery to manage any surgical problems. They are also involved in your long-term follow-up care. It may be any one or a team of the surgeons that perform your operation.

3. Transplant Coordinator____

   The transplant coordinator is an R.N. who has specialized in transplantation. We assess problems and coordinate your care before and after transplant. Teaching you is one of our most important tasks. We coordinate the timing of the transplant operation with the arrival of the donor lungs.

4. Cardiovascular Surgeon____

   This doctor specializes in heart surgery. He is present during the transplant operation to perform any necessary heart surgery.

5. Anesthesiologist____

   This doctor provides anesthesia during the operation. Throughout the surgery he monitors your condition and is involved in managing your pain medications afterwards.

6. Pulmonary Rehabilitation____

   The Pulmonary Rehab unit is run by Dottie Biggar, R.N., MSN, along with a staff of respiratory therapists. These people will be working with you throughout the entire transplant process.

7. Social Worker____

   The Social Worker will help you with your social, emotional, and financial needs. She will also provide you with emotional support and counseling throughout the transplantation process.

8. Psychologist____

   The psychologist may have seen you during your evaluation, but if not or if you would like to have their assistance during this process you may ask your coordinator, the social worker or contact them yourself, for added assistance.

9. Dietician____

   A sound nutritional program is essential for, preparation for and recovery from, a transplant operation. The dietician will provide nutritional information and counseling. We will recommend a well-balanced dietary program that meets your particular needs after surgery.

10. Chaplain____

    A Chaplain is one of the team members and after evaluation, she will provide you with spiritual support as needed.

What the Lungs Do

The lungs are organs that provide your entire body with oxygen. No part of your body can survive without oxygen, therefore the lungs play an essential role. Oxygen is absorbed through the lungs while excess carbon dioxide is removed from the body through the lungs.

The lungs are located in the chest and are protected and supported by the 12 pairs of ribs, the intercostal muscles, which lie between the ribs, the neck muscles and the diaphragm. You have 2 lungs. The right lung is divided into 3 lobes, the upper, the middle and the lower lobe. The left lung is divided into 2 lobes, the upper and the lower lobe. Each lung is surrounded by 2 protective layers of tissue called pleura.

The lungs are made up of tiny tubes called bronchi, gas exchange sacs called alveoli and numerous blood vessels. The bronchi are a series of highly branched hollow tubes. The branches look similar to those of an upside down tree. Each branch becomes smaller and more numerous at each branching. The smallest of these tubes ends in the tiny gas exchange sacs called alveoli. There are approximately 300 million alveoli in the lungs. Tiny blood vessels or capillaries cover each alveoli. The oxygen in the alveoli crosses over the membranes and enters the blood vessels. The carbon dioxide in the blood then crosses the membranes and enters the alveoli so it can be exhaled.

A lung transplant is needed because the lungs can no longer perform their vital gas exchange function. We evaluate people with severe end stage pulmonary disease, having no alternative treatment, and with a disability and rate of progression indicating very limited life expectancy in the range of 12 - 18 months. The causes of end stage lung diseases vary as outlined below.

The following lung diseases can be considered for lung transplant:

1. Chronic Obstructive Pulmonary Disease (COPD)
    Asthma
    Chronic Bronchitis
    Emphysema
    Alpha 1 Antitrypsin Deficiency

2. Interstitial Lung Diseases
    - Idiopathic Pulmonary Fibrosis
    - Sarcoidosis
    - Eosinophilic Granuloma
    - Goodpasture's Syndrome
    - Idiopathic Pulmonary Hemosiderosis
    - Wegener's Granulomatosis

3. Airway Diseases
    - Bronchiectasis
    - Cystic Fibrosis

4. Pulmonary Hypertension
    - Primary
    - Secondary

Waiting for a Transplant

You may be residing in St. Louis while you are on the waiting list, or living at home and flying in. In the following paragraphs we will answer some of the most commonly asked questions during this time.

What services are available from Social work to help me during this time?

The Social workers can help you with many problems such as lodging, transportation and medical equipment. They also have access to community resources, and can provide you with information on housing, employment, legal issues and finances. Your social worker can also provide you with individual or family counseling, when your illness causes anxiety, depression family conflict, stress, bereavement or changes in physical or mental capabilities.

What can the Chaplain do to help me?

For you Spiritual Care and support the lung Transplant Chaplain is available for you and your family. You may want to call the Chaplain to be with you and your family.

For Help With:

Devotional Needs
Sacramental Needs
Advance Directives
Prayer
Religious Rituals
Contacting Home Clergy
Linking With a St. Louis Congregation

In dealing With:

Life Changes
Difficult Decisions
Uncertainty
Difficulty Coping
Meaning
Family Concerns
Loss
Death
Religious and Ethical Issues
Maintaining Hope

To contact the Chaplain call 362-5200. The Chaplain's Office is located on the Main Level of the East Pavilion, near the Chapel. If you are in the hospital and wish to talk with a Chaplain, any time 7 days a week, any time day or night, ask you nurse to page the Chaplain for you and a Chaplain will be with you as soon as possible.

Routine Chaplain Services include:

Visiting Patient/Family while hospitalized
Pre-Surgical Prayer/Ritual/Support (Request Chaplain to be paged)
Co-Facilitation Lung Transplant Support Group

How do I get started in pulmonary rehab?

You should call the pulmonary rehab unit at 362-4157. You will be started in pulmonary rehab on a daily basis. You will be assigned a time to start your exercise. This is an appointment and every effort should be made to be on time. If you are not going to be on time you must call them and let the staff know. You will also need to let them know if you are not going to be at rehab. If you feel that you are too ill to attend rehab you **MUST** call the transplant office and let your coordinator know. It is likely that you will be instructed to go to rehab anyway for someone to have a look at you.

Rehab consist of either walking on the treadmill or riding a stationary bicycle for 30 minutes of continuous exercise, and lasts a total of about 45 minutes. As well, you will use the arm ergometer for upper body exercise. Some patients also use weights to strengthen their upper body, under supervision. If you want to perform any additional exercise at home you need to consult with your rehab staff for their advice on how to proceed and what is safe to do in an unsupervised setting.

Who can help me with my insurance questions?

Barnes Hospital Transplant Services has provided you with access to a financial coordinator. You probably met with her during you initial evaluation, and discussed you insurance responsibilities and insurance coverage during your transplant. Her function is to help you with any insurance matter and to direct you to the proper departments when you have billing problems or questions.

When you are actively waiting for a transplant, either after moving to St. Louis or when you have made your flight arrangements, and have a beeper, you will need to schedule an appointment with the Financial Coordinator. The purpose of this meting is to review your insurance coverage. You may reach her by calling the transplant office at 362-5378.

If at any time during the transplant process your insurance situation changes it is **VERY IMPORTANT** to let your coordinator know so this information can be shared with all parties.

How often do I see the Doctor?

You will be scheduled to see the Pulmonary physician every four to six weeks as long as you are well. If you become ill it may be necessary to see the doctor more often. After seeing the doctor it is good practice to schedule your follow up visit before leaving the clinic. You should never schedule an appointment on a different day or with a different doctor, without first speaking to your coordinator.

How can I get help if I become anxious?

The waiting period for a transplant varies because the number of donors is small. You will usually wait at least fourteen to sixteen months, but some people will wait longer. This waiting is normally frustrating and stressful and perhaps frightening. All candidates are encouraged to utilize the resources available to help them cope. People who can help during this period are:

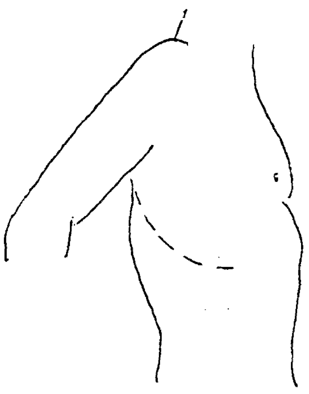
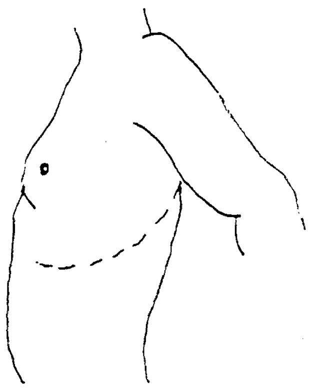
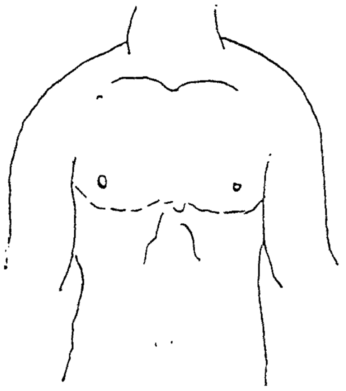
1. Social Worker
2. Psychologist
3. Support Group
4. Transplant Coordinator

What happens when a lung is found?

The organ procurement agency (Mid America Transplant Services-MTS) in our area will contact the transplant coordinator and relay the information about the donor. After which the surgeon is notified. After acceptance of the organ, a retrieval team is organized. This team consists of two surgeons, and a nurse or tech from MTS. Once the retrieval team arrives at the donor hospital a final determination about the quality of the lungs will be made. At this point we will be notified that it is safe to proceed with your operation.

During this time you will be in the hospital, and will have several tubes of blood drawn, an EKG done and a chest x-ray performed. As well you will have several monitoring lines placed. Once confirmation of the quality of the lungs is obtained you will be moved to the operating rooms on the second floor. Your family will be placed in the Cardiothoracic Surgical waiting room. This is where the operating room staff and the surgeon will look for them.

In all likelihood you will not see the coordinator, and information about the progress of the surgery can be obtained by entering the Intensive care unit on the second floor and having the staff call into the operating room for an update. As these people are quite busy this communication should be limited to no more than every two hours. If any difficulties arise during the procedure the operating room staff will make every attempt to keep you family apprised.

		
Right Posterolateral Right Side	Left Posterolateral Left Side	Transverse Sternal Bilateral

Lung Transplant Surgery

You will be taken to the operating room on a stretcher. You will find that the OR is cool and there will be quite a bit of equipment. This equipment is used to monitor your heart and blood pressure during the surgery. You will also see many members of the team as they prepare you for the operation.

Single Lung Transplant

You will have one incision after a single lung transplant. The incision will be on your side. This is called a thoracotomy incision. It will be either on your right or left side, depending on which lung is being replaced. Once the transplant surgeons are notified that the donor lung is good, they will begin to remove your diseased lung. You will be ventilated using your other lung. Partial cardiopulmonary bypass is used if your remaining lung is unable to exchange enough oxygen. This bypass system places oxyge in your blood and removes carbon dioxide as the blood filters through a machine outsi your body.

Your diseased lung is removed after the donor lung arrives in the operating room. There will be 3 connections, or anastomosis, to attach the new lung. First, the donor main bronchus is attached to your bronchus. Then the blood vessels are attached -- first the pulmonary artery and then the pulmonary vein. After the last connection is made, the surgeon will reinforce the bronchial suture line, usually with pericardial fat which is found in the chest. The other technique that is used to reinforce the airway connection is to telescope the donor airway with your airway. The smaller airway is inside the larger and they are sewn together. Finally, your chest is closed and you are taken to the ICU. You will be asleep for several hours after the surgery is completed. You will have 2 to 3 chest tubes in place to help reexpand your new lung and help drain your chest.

Bilateral Lung Transplant

Patients with cystic fibrosis, bronchiectasis, Alpha 1 Antitrypsin Emphysema (under 50 years of age) will have both lungs transplanted. Your surgeon will inform you of the planned procedure when you are placed on the waiting list.

A bilateral (both lungs replaced) lung transplant is done using an incision which goes from your right side to your left side just at the base of your breasts. It is called a transverse sternotomy incision.

The bilateral lung transplant is done by replacing each lung separately. As in a single lung transplant, the surgeons do not begin removing one of your lungs until they know the donor lungs are good. When the donor lungs arrive at Barnes, your first lung -- the one with the poorest function -- is actually removed. You will be ventilated on your remaining lung. Partial cardiopulmonary bypass will be used, if necessary.

Once your first lung is removed, a donor lung will be attached. There will again be 3 connections for each lung. First, the donor bronchus will be attached to your main bronchus. Then the blood vessels will be attached, first the pulmonary artery, then the pulmonary vein. At this point, blood flow is restored to this lung.

If bypass was not needed for the first lung to be transplanted, the second side may be transplanted without the use of bypass as well. More often though, partial bypass is used during the second lung transplant to reduce stress on the heart and the first new lung.

Your second diseased lung is then removed. The other new lung is attached exactly as the first one. Once the second lung is completely connected, blood flow is restored. Again the airway connections are reinforced either with pericardial fat being wrapped around them, or telescoping one airway into the other or both.

Finally, your chest is closed and you are taken to the intensive care unit. You will have 5 chest tubes to help reexpand your new lungs and help drain your chest.

While You're in the ICU

Your doctors will bring you from the operating room to the cardiothoracic intensive care unit in your bed. It is located on the second floor adjacent to the operating room. It will take approximately one hour for the nurses to do their initial assessments and help you get comfortable. Then the nurses will call your family and let them visit. You will still be asleep because the anesthesia will take 2 - 4 hours or longer to wear off.

When you wake up, it is normal to feel confused. Your nurses will tell you that your surgery is over, what day it is, what time it is and where you are. You will be in a small room in the ICU with many monitors and machines. You will also have many IV lines and tubes. Your hands may be loosely tied with soft gauze until you fully wake up, to prevent you from pulling out any of your tubes. Most patients do not remember the first 12 to 24 hours after surgery.

You will have a breathing tube (endotracheal--ET--tube) in your mouth and throat. This tube will be connected to your ventilator which will breathe for you until you are able to breathe on your own. You will have another small tube in you nose to your stomach--called an NG tube. This tube will drain the stomach contents and help prevent you from feeling nauseated. The NG tube will be removed after the anesthesia wears off, and your stomach and intestines begin to work again.

You will also have a large IV catheter in a vein in the side of your neck. This allows us to monitor you heart function closely. You may have an IV in your arm for fluid or medicine, and one in your wrist which monitors your blood pressure continuously. There will be pumps by your bed with bags of IV fluids hanging overhead. This fluid contains various medications to control your heart rate and blood pressure. You will also be receiving IV medications to prevent rejection, and antibiotics to prevent infection.

You will have drainage tubes in your side(s) aptly called chest tubes. These chest tubes drain the space between the lung and the chest wall of fluid and air. These tubes will be connected to suction for a few days to help the lung(s) completely expand. Once the lungs are fully expanded and there is no longer fluid or air draining from the chest tubes, the tubes will be removed.

You will also have a foley catheter. Your nurses will measure and record your urine output every hour. This is to ensure that you stay in good balance.

Finally, you will have a small sensor on your finger connected to a pulse oximeter (like the one in rehab) to monitor your pulse rate and the oxygen level in your blood.

Every patient experiences pain after a major operation, but each person feels differently. You will probably have an epidural catheter in your back. Medicine is placed into this catheter to help numb the nerves which are causing the pain. Please let the nurses and doctors know if you pain is not being controlled so different treatment can be ordered if indicated.

For the first 24 hours after a single lung transplant, you will be turned on your side with you transplanted lung up. After a bilateral lung transplant, you will be flat on your back for at least 24 hours. Certain positions are used to increase drainage from the lungs and help them expand more completely.

You will begin physical therapy about 12 hours after the end of your surgery. First, you will receive chest physical therapy, postural drainage, percussion and vibration. You may also sit on the side of your bed and dangle your feet this first evening. You will receive physical therapy two to four times a day for 30 to 60 minutes each time. You will get up in a chair the first or second day after surgery and you will walk by the third or fourth day.

Transplanted lungs do not have the usual nerve attachments. Therefore, your new lung(s) will not feel irritation below the airway connection in the donor lungs. This means you will not feel like coughing when you have secretions below the bronchus suture line (anastomosis). Since it is common for the lung to have many secretions after surgery, it extremely important to cough. You must make yourself cough as deeply as possible and take deep breathes as often as possible. If your are unable to clear your secretions the doctors will help you with the bronchoscope. This is a lighted flexible tube that they will pass down into your lungs to have a look at the airway connections and to remove any secretions.

You need to help your nurses and physical therapists keep your lungs clear and open. Each therapy session focuses on the areas of you lungs which appear to be congested. You'll have a chest x-ray once or twice a day to look for these areas of congestion.

Throughout your recovery, you will be taught various ways to help you maintain clear airways. You will remain in the ICU until you are stable and breathing on your own off the ventilator for at least 24 hours. This varies between 2 and 7 days, for most patients.

Visiting Hours

2300 ICU	8:30 am, 11:30 am; 2:30 pm, 5:30 pm, 8:30 pm 15 minutes each--limit 2 visitors
6200 Floor	11:00 am to 9:00 pm daily Limit of 2 visitors at a time

**visiting is at the discretion of the nursing staff

6200 Nursing Division

On the Thoracic Surgical Nursing Division you will continue to recover and regain your strength. Again, each person recovers at their own rate. You will still have an IV, at least one chest tube, and being on oxygen is not uncommon. As you recover, each item will be removed. Oxygen is usually stopped by two weeks after surgery.

Your physical therapy will continue to be a priority. You will walk at least three times a day, trying to go further each time. Your deep breathing, coughing postural drainage, chest physical therapy, percussion,and vibration will continue. You will also be doing muscle toning and strengthening exercises as well as flexibility stretching. Typically, patients can walk 1 mile per day by 3 or 4 weeks after surgery and then go back to supervised treadmill and/or bicycle therapy. You can expect to be discharged from the hospital about 3 to 4 weeks after you operation, if everything goes well.

You will be in the hospital for approximately three weeks after you operation. When you are getting better, but are not quite ready to leave the hospital, you will be granted a "Pass" for several hours to leave the hospital. This is a very important process that will help you build confidence in yourself and your support people as we begin the separation process. It can be quite scary to leave the hospital, and trust that you and your support people can do what is necessary to take care of you, but we believe in you and know you can do it.

You will also be visited by a post transplant coordinator who will go over with you and your support person everything you will need to do when you are out of the hospital. So, it is very important that your support person be present during these visits.

Pulmonary Rehabilitation

You will begin walking on the treadmill as soon as you can walk 1000 - 1500 feet unassisted. There is a treadmill and stationary bicycle on 6200, and you will begin the process of rehabilitation as soon as you are able. Once you are discharged you will return to, or begin if you have not previously lived in St. Louis, the rehab unit on the ground floor of Queeny Tower. You will come to rehab daily, five days a week, during your recovery period. The exercise period lasts approximately 45 minutes, you will build up to 30 minutes of continuous exercise. You will be monitored closely.

You will need to speak with the rehab unit **PRIOR TO** initiating any additional outside exercise. They will advise you how to proceed, and how much is safe to do unsupervised.

You will be instructed on how to use a home monitoring lung function device - microspirometer by the pulmonary rehab staff. You will need to do this everyday. You will be told to contact your transplant coordinator if your values drop 10%.

Complications

Various complications can occur after transplant. They include rejection, infection, technical complications and recurrent diseases. Any changes in your lung function or other symptoms will be evaluated thoroughly. It is important that we carefully decide the cause of your symptoms -- so that we may treat you appropriately.

Fever, fatigue, shortness of breath or decreased spirometry readings can be symptoms of rejection or infection. Rejection can be a frightening word. We really should say "rejection process." When rejection is treated properly, it is reversed in most cases. Therefore, early reporting of symptoms and treatment, is essential to restore your good health and stop the rejection.

It is important to take care of your heart as well as your lungs after lung transplant. Make sure you eat nutritious foods low in sodium, low in cholesterol and low in fats. We also recommend that you do not eat large amounts of sweets. It is not unusual for people to have higher blood sugars while they are on large doses of prednisone. It is not unusual for people to develop coronary artery disease after transplant operations so it is especially important that you reduce your risk, by maintaining your weight and exercising. You should avoid second hand tobacco smoke as much as possible and do not drink alcohol without first checking with your doctor about the interaction between it and your other medications.

Your blood pressure indicates how hard your heart is pumping and how much volume it is pushing through your blood vessels. You will be keeping track of your blood pressure once you go home so find out what your normal blood pressure is while you are in the hospital.

Conclusion

You will never leave us, you will always be a part of our program and be followed by our group. We will work with you physician at home to provide you with the same care we would if you live here in St. Louis. You will need to return to St. Louis six months and one year after you transplant and once a year for the rest of your life.

Our goal for you during this process is to provide you with the information that you need to maneuver through this system. We recognize that this may be a first visit to Barnes Hospital and to St. Louis. We have many dedicated professionals in our group who are here to assist you and make this transition easier. For your part all you have to do is ask and we will do our best to provide you with any assistance or information that you need during this process.

PLEASE WRITE DOWN YOUR NOTES AND QUESTIONS: