



PHYSIOTHERAPY MANAGEMENT FOR ATELECTASIS IN PEDIATRICS RENAL TRANSPLANT PATIENT- DOES PRONE POSITIONING IMPROVE OXYGENATION? - A CASE STUDY.

1Krishna Chanda, 2Bharat Tiwari

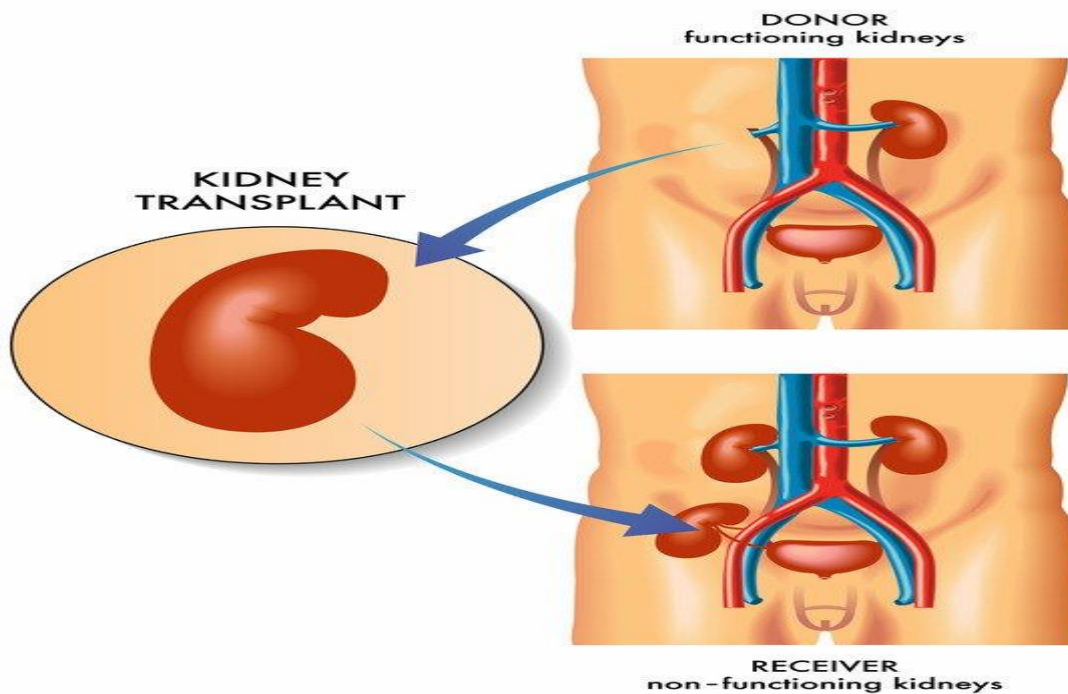
1MPT student in cardiopulmonary, 2Principal(Head Of Department)

1Institute Of Kidney Disease And Research Center - Institute of Transplantation Science,

2Institute Of Kidney Disease And Research Center - Institute of Transplantation Science

INTRODUCTION

- Renal transplantation is the most common organ transplant technique, improves quality of life and overall survival in patients with end-stage renal disease.
- Post transplant patients shows pulmonary complications such as atelectasis, pulmonary emphysema and pulmonary thromboembolic events.
- Pulmonary issues have a significant impact on the outcome of kidney transplant patients.
- Physiotherapy has been used for preventing as well as dealing with such complications by means of breathing exercises, mobility exercises and positioning.



CASE SCENARIO

- On 19TH August 2022 an 8 year old girl child present with breathlessness, cough, pain and fever immediately following renal transplantation.
- On 18th August 2022 she underwent live donor renal transplant surgery with her grand mother as the donor until then she was diagnosed with stage 5 chronic kidney disease (dysplastic kidney) and was on Maintenance Hemodialysis 3 times a week since November 2021.
- Conventional post operative rehabilitation began on POD-1.
- On 20 August, 2022, a chest x-ray was performed.
- The same day, a physical examination was performed-
- Pulse rate:-125/min,
- Blood pressure:- 134/84 mm Hg
- Respiratory rate:-28/min
- She was maintaining saturation on NRBM with 12 liters of oxygen support, for which conventional therapy was initiated.
- Patient gradually improved with respect to oxygen requirement.
- As she couldn't sustain saturation on ambient air, she was on intermittent oxygen as supplementation through nasal cannula and O2 mask.
- On 29th August 2022 she was exhibiting substantial respiratory distress, Tachypnea and Hypoxemia due to which HRCT and X-ray was performed.
- HRCT report revealed that Collapse consolidation with air bronchogram seen involving entire both lower lobes. Markedly dilated all cardiac chambers, Mild pericardial effusion.
- The patient still showed desaturation intermittently hence, along with conventional chest physiotherapy prone positioning was added on 29th August 2022.

- Radiological findings:-



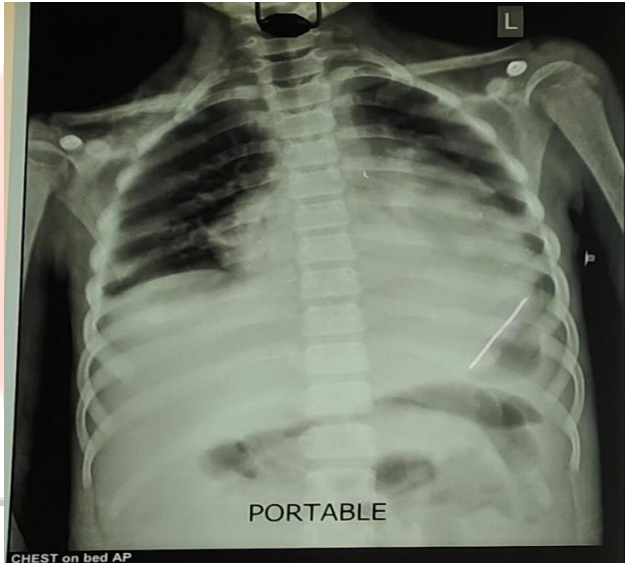
Immediate post op x



POD 2 (20-08-22)



POD 9 (27-08-22)



POD 11 (29-08-2022)

PHYSIOTHERAPY EVALUATION

Position of trachea	Midline
Shape of chest	Elliptical shape
Use of accessory muscle	Present (sternocleidomastoid)
Pattern of breathing	Rapid , shallow breathing
Tactile vocal fremitus	Absent on bilateral lower zones
Chest excursion	Reduce in lower zones LT>RT
Chest expansion	Reduce at the xiphisternum levels
Percussion	Dull on bilateral lower zone
Auscultation	Fine crackles present at upper and middle lobes and air entry absent in bilateral lower lobes.

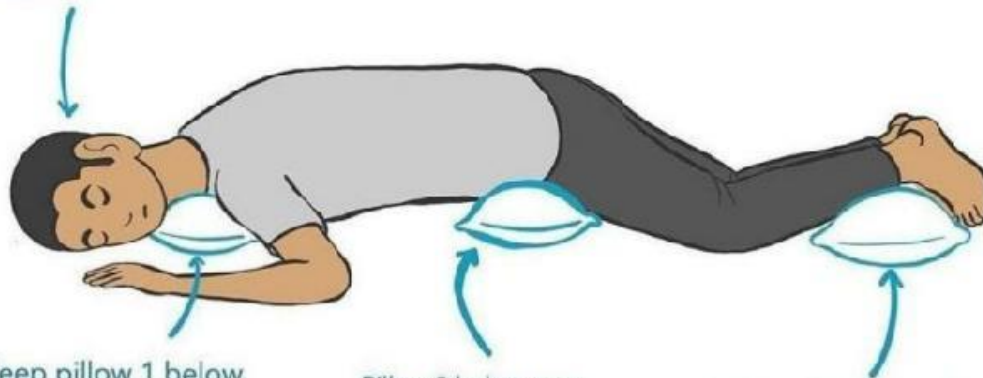
INTERNATIONAL CLASSIFICATION OF FUNCTION, DISABILITY AND HEALTH (ICF)

HEALTH CONDITION	ATELECTASIS RENAL TRANSPLANTATION	
BODY STRUCTURE AND FUNCTION	-Renal transplant -Left lower lobe collapse	-Pain -Dyspnoea -Cough
ACTIVITY LIMITATION	-Dressing and self care - Walking	
PARTICIPATION RESTRICTION	-She was unable to continue her education due to illness. -Community social and civic life	
ENVIRONMENTAL AND PERSONAL FACTORS	-Low self esteem - Low mood	-Supportive family members and caregivers

PHYSIOTHERAPY MANAGEMENT

<ul style="list-style-type: none"> • Patient counselling 	<ul style="list-style-type: none"> • A counselling session was carried out for the patient's guardians, its outcomes and importance of chest physiotherapy in this condition 	
<ul style="list-style-type: none"> • To improve ventilation 	<ul style="list-style-type: none"> • Prone position was given for 15-20 min thrice a day. • Using a pillow to support the head and trunk. 	
<ul style="list-style-type: none"> • To reduce dyspnoea 	<ul style="list-style-type: none"> • Dyspnoea relieving positions • Diaphragmatic breathing exercise 	
<ul style="list-style-type: none"> • Nebulization with mucolytic and Hypertonic Saline was given twice a day 		
<ul style="list-style-type: none"> • Airway clearance 	<ul style="list-style-type: none"> • ACBT with effective Forced expiration technique • Chest physiotherapy using percussion and vibration For five to eight minutes on all lobes from periphery to centered. 	
<ul style="list-style-type: none"> • To improve chest expansion 	<ul style="list-style-type: none"> • Segmental breathing exercise • Thoracic mobility exercise • Incentive spirometry with hold 	<ul style="list-style-type: none"> • In the beginning, 10 repetitions x one set a couple of times each day, the progressively increased to 10 repetitions x two sets three times per day
<ul style="list-style-type: none"> • To avoid muscle tightness and to enhance joint stability and flexibility 	<ul style="list-style-type: none"> • Active joint mobility exercises for bilateral upper and lower extremities. 	<ul style="list-style-type: none"> • 10 repetitions three times a day

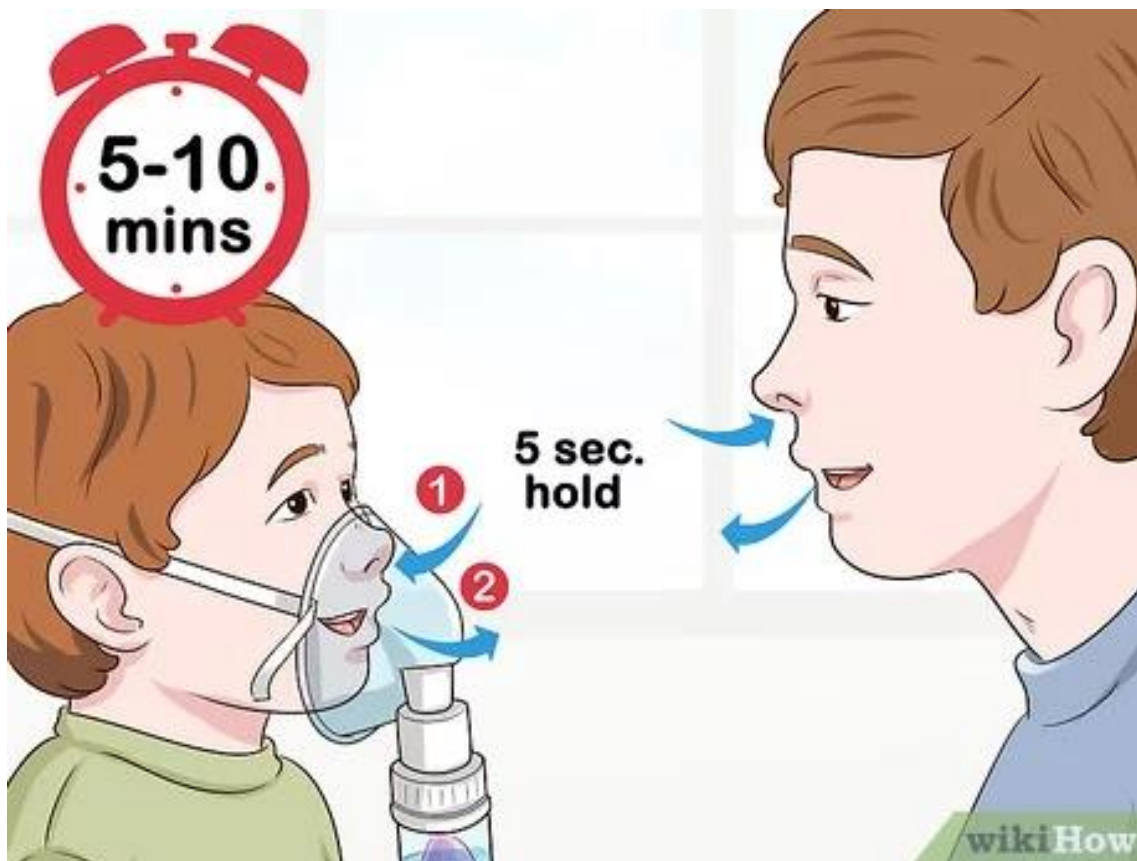
Keep your head below
body level



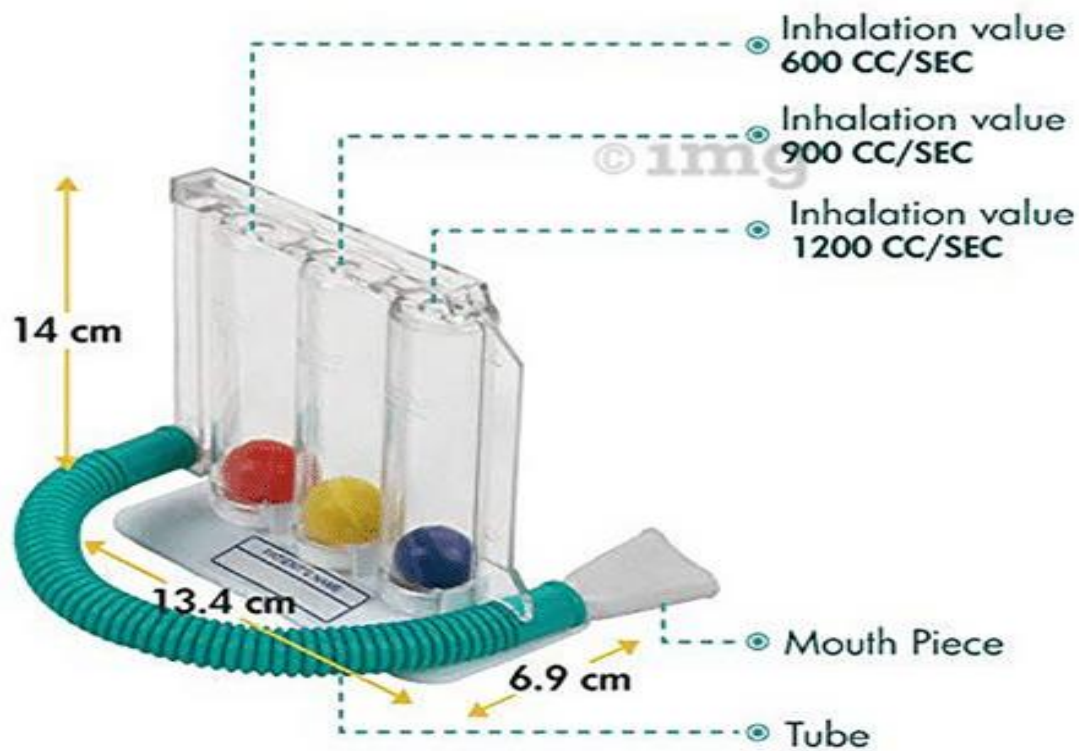
Keep pillow 1 below
your neck bone

Pillow 2 below your
Pelvis area (Belly should
be free enough to let
one hand pass from
below)

Pillow 3 below your foot



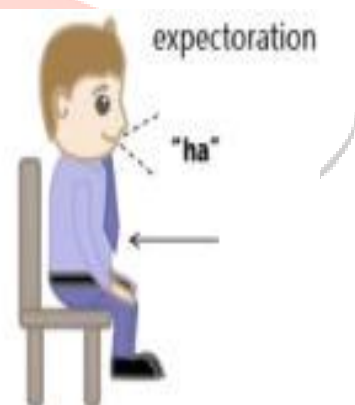
PRODUCT DESCRIPTION



Breathing Control



Thoracic Expansion Exercise

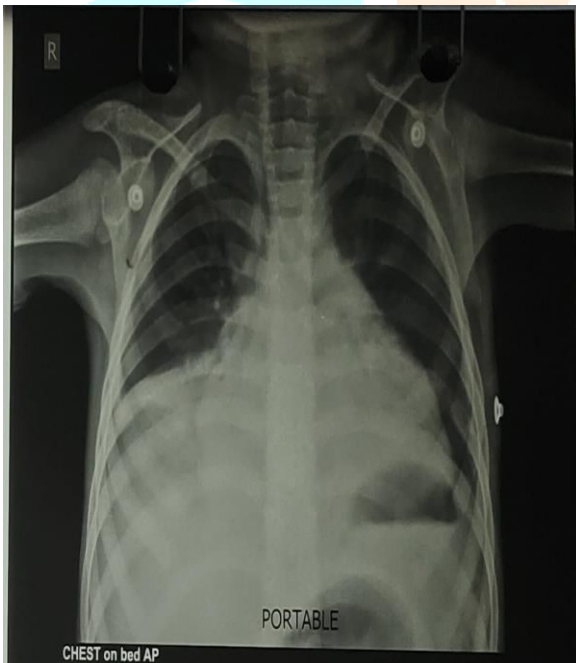


Forced Expiration Technique

LATERAL COSTAL EXPANSION SITTING



RESULT:-



POD 13 (31-08-2022)



POD 14 (01-09-2022)

- This radiographical images shows the improvement in lung fields.
- Following successful in-hospital pulmonary rehabilitation, improve in requirement of oxygen and physical function, the patient was given a structured home-based exercise program to follow after discharge.

DISCUSSION

- In present case:-
- On the MMRC grading for dyspnea, there was a drastic change from a value of 3(very heavy) to a value of 0 (no breathlessness at all).
- Initially when prone position was given, patient's O₂ saturation level got stable. And when this position was given thrice a day for next three days, patient gradually improved with respect to O₂ requirement. And she was maintaining saturation on room air.
- She can complete the incentive spirometer with 2 sec hold. As a result, coughing becomes more effective, making it easier to clear mucus.
- The segmental breathing technique has improve the chest excursion and increase the chest expansion overall.
- Siddiquie, Amna et,al. concluded that prone positioning reduce the risk of intubation on awoken prone positioning for patient with acute respiratory failure .
- Chad H et,al. had studied on prone positioning practices in patients with COVID19 ARDS concluded that a rapid increase in the use of prone positioning among patients with COVID-19 improve the ventilation and reduce the risk of recurrent pulmonary infections.
- Aparna Sarkar et,al. she had studied on effect of segmental breathing exercises on chest expansion in conclude from this that segmental breathing exercises play an important role in early re-expansion of lungs and hence should be an integral part in early rehabilitation.
- Freitas E. et,al, had reviewed on Incentive spirometry for preventing pulmonary complications are coronary artery bypass graft and he concluded that incentive spirometry is preventing the post pulmonary complications , improving oxygenation and pulmonary functions

▪ CONCLUSION

- Physiotherapy management for patient with primary atelectasis in post renal transplant pediatric patient, the intervention that is prone position and along with chest physiotherapy increase the oxygenation, relieve breathlessness and increase thoracic expansion.
- Prone positioning can be incorporated with conventional physiotherapy to improve ventilation .

REFERENCES

Eltorai AE, Baird GL, Eltorai AS, Healey TT, Agarwal S, Ventetuolo CE, Martin TJ, Chen J, Kazemi L, Keable CA, Diaz E. Effect of an incentive spirometer patient reminder after coronary artery bypass grafting: a randomized clinical trial. *JAMA surgery*. 2019 Jul 1;154(7):579-88

Pencheva VP, Petrova DS, Genov DK, Georgiev OB. Risk factors for lung diseases after renal transplantation. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*. 2015 Dec;20(12):1127.

Elkins MR, Robinson M, Rose BR, Harbour C, Moriarty CP, Marks GB, Belousova EG, Xuan W, Bye PT. A controlled trial of long-term inhaled hypertonic saline in patients with cystic fibrosis. *New England Journal of Medicine*. 2006 Jan 19;354(3):229-40.

Rubin BK. Aerosol medications for treatment of mucus clearance disorders. *Respiratory Care*. 2015 Jun 1;60(6):825-32

Eltorai AEM, Baird GL, Eltorai AS, Healey TT, Agarwal S, Ventetuolo CE, Martin TJ, Chen J, Kazemi L, Keable CA, Diaz E, Pangborn J, Fox J, Connors K, Sellke FW, Elias JA, Daniels AH. Effect of an Incentive Spirometer Patient Reminder After Coronary Artery Bypass Grafting: A Randomized Clinical Trial. *JAMA Surg*. 2019 Jul 1;154(7):579-588. doi: 10.1001/jamasurg.2019.0520. PMID: 30969332; PMCID: PMC6583822.

Lewis LK, Williams MT, Olds TS. The active cycle of breathing technique: a systematic review and meta-analysis. *Respiratory medicine*. 2012 Feb 1;106(2):155-72.

