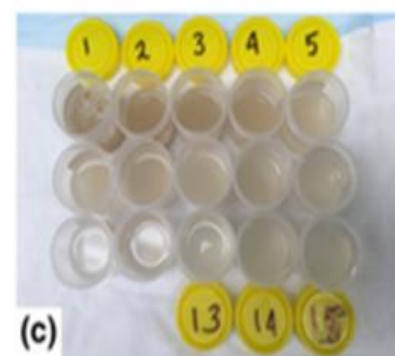
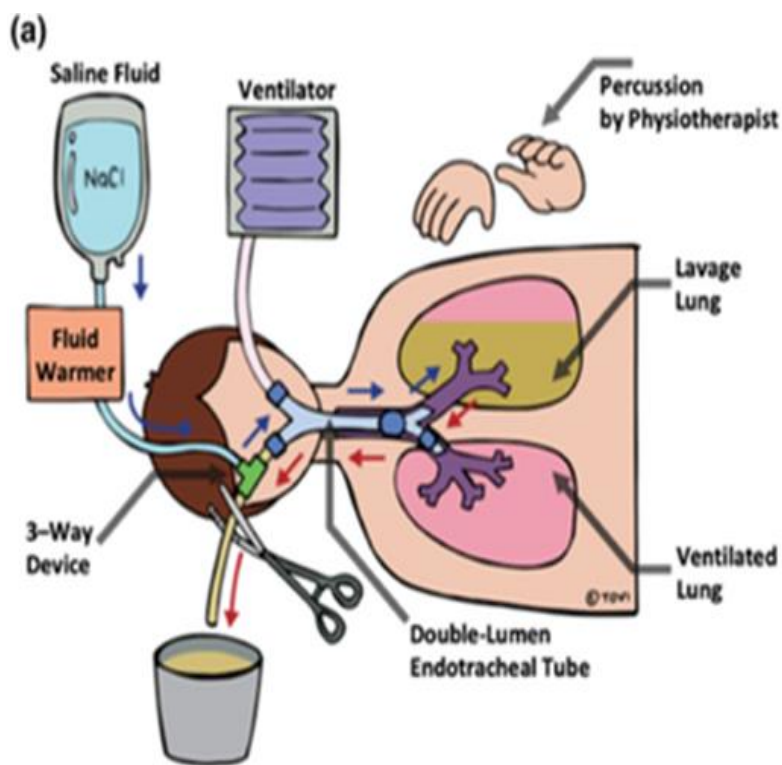


# The Royal Melbourne Hospital

## Perfusion Protocol – Lung Lavage



Bronchopulmonary lavage (Lung lavage) is when one or both lungs are washed out with warm fluid which will hopefully improve lung function. It is considered the “gold standard” treatment for patients with severe autoimmune pulmonary alveolar proteinosis (Guevara, Gillespie, Klompas, Torres and Barbara, 2018). The anaesthetist will intubate with a double lumen ETT and ventilate from one lung while the other is being lavaged. Typically the more severely affected lung will be washed out first. Following the washout of the first lung the surgeon and anaesthetist may proceed with washing out the second lung, alternatively they may return to theatre at a later stage to have the other lung washed out. If both lungs are severely affected and there are concerns that the patient may not tolerate being ventilated from one lung, the patient may be placed on VV ECMO before the lung lavage to ensure adequate oxygenation and ventilation.

The anaesthetist may want the fluid to flow passively, via gravity only, into the lung or alternatively they may prefer to use the heart lung machine. The benefits of using the heart lung machine is ensuring that the fluid is warmed. The lavaged fluid can be drained out passively or with some gentle suction. This circuit will allow for either.

## EQUIPMENT

- Oxygenator
- Level Sensor
- 4 x 3/8 tubing
- 3 x 3/8 straight connectors with luer port
- 3 x 3/8 Y connectors
- 1 x ¼ ¼ 3/8 Y connector
- 2 x spike lines – spike end and only approx. 15 cm required, so you will need to cut with a sterile blade or sterile scissors
- 2 x bubble isolator
- 1x pigtail – for ease of sampling drainage fluid
- Blue discard reservoirs – may need several of these depending how many litres of fluid are being exchanged
- Sterile yellow sample pots
- Sterile syringes
- Ensure you have plenty of fluid available, may need 30 litres or more but discuss with anaesthetist
- +/- suction tubing

## SET UP

- Place oxygenator in holder as per usual
- Attach heater cooler water hoses to the oxygenator and set heater cooler unit on 38 degrees
- Use 3/8 tubing from the outlet of the venous reservoir to the inlet of the oxygenator
- Change main arterial pump to 3/8 tubing size and adjust collars as necessary
- Cut a 3/8 straight luer connector into another piece of 3/8 tubing and attach a bubble isolator to the luer of the 3/8 straight connector.
- Connect the above piece of 3/8 tubing to the outlet of the oxygenator. On the other end of the 3/8 tubing put a 3/8 Y connector – see diagram to ensure the correct end of the connector is attached
  
- Using sterile scissors or a sterile blade cut both spike lines so that you have the spike end and approximately 15-20cm of the tubing. Keeping this sterile, attach the cut ends of the 1/4 inch spike line tubing to a 1/4 x 1/4 x 3/8 Y
- Keeping everything sterile, get another piece of 3/8 tubing and cut about a third of the tubing.
- Attach one end of the 3/8 tubing to the 1/4 x 1/4 x 3/8 Y from the cut spike lines
- Attach the other end of the 3/8 tubing to the 3/8 Y connector that is distal to the bubble isolator.
  
- On the other side of the 3/8 connector that is distal to the bubble isolator and that now has the spike lines attached, put the remaining 2/3 of the 3/8 tubing.
- Attach a 3/8 Y connector to the end of the above 3/8 tubing.
  
- Open another piece of 3/8 tubing and, using sterile scissors or a sterile blade, cut approximately 5-10cm of the 3/8 tubing off.
- Use one of the caps from the 3/8 tubing to keep one end of small cut piece of tubing sterile and attach the other end to the 3/8 Y connector that already has a piece of 3/8 tubing attached
- Attach the remaining section of the 3/8 tubing to the last end of the 3/8 connector.
  
- Approximately 10-15cm from the other end of the 3/8 tubing, using sterile scissors or a sterile blade, cut in a 3/9 straight luer connector and attach the pig tail to the luer
  
- This end of the 3/8 tubing will attach to the blue discard canister during the lung lavage however for priming purposes, attached the end to the 3/8 connector on the top of the venous reservoir.
- Prime circuit using CSL (Hartmanns)
- Level sensor on
- Change arterial line pressure to warning 40mmHg and stop 50mmHg
- Aim to deliver the fluid in at a pressure of 30mmHg
- Check occlusions as per usual
- Aim for the fluid temperature to be 36.5 – 37 degrees, you will need to have the HCU on approx. 38-38.5 degrees to achieve this

## DIAGRAM

### METHOD FOR LUNG LAVAGE USING CPB

- Clamp drainage line
- Clamp the passive inflow line
- Using the roller pump, aim for approximately 1lt in (or as much as tolerated), keeping a close eye on the line pressure as you go
- Transfuse a volume up to the patients estimated FRC (functional residual capacity) of that lung which is approximately 30ml/kg in a normal lung.
- **BE CAREFUL as the pressure may rise suddenly, in which case, STOP infusing fluid IMMEDIATELY**
- When you have reached the desired inflow volume, clamp the inflow line
- At this point the surgeon may want to do some chest percussion on the patient and rotate their position slightly.
- Unclamp the drainage line and allow the fluid to drain passively out of the lung

- Try passive drainage first, but may require some gentle suction, start with 10 -20mmHg
- You can take samples of the fluid draining out via the
- While the fluid is draining out of the lung, recirculate the fluid in the reservoir through the manifold and the pre and post oxygenator ports to keep the fluid warm
- Aim to continue the lung lavage until the fluid draining out runs clear and sample the drainage fluid via the pigtail and tap as requested.
- Ensure you keep an accurate record of volume in and out and running fluid balance so that you know how positive the patient is and communicate with the anaesthetist so that they are aware too.

#### TROUBLESHOOTING

- Keep

#### REFERENCES