

## Passive Leg Raise

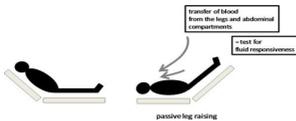
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## Objectives

- Define passive leg raise
- Recognize indications and contraindications for passive leg raise
- Perform passive leg raise
- Identify if passive leg raise shows fluid responsiveness in a patient

## What is Passive Leg Raise?

- Passive leg raise or "PLR" is a simple mechanical maneuver used to determine whether a patient will be fluid responsive
- PLR is done by elevating the legs of a patient to a 45 degree angle



## How does it work?

- Passive leg raises mimics the effect of fluid by shifting peripheral venous blood to the core of the patient
- The blood transferred is measured to be about 150 mL
- PLR increases venous return and thus increases right cardiac preload

## What are we measuring?

- The increased venous return effects stroke volume (SV) and thus effects cardiac output (CO)
- Stroke volume can be measured by monitoring CO
  - Additionally, pulse pressure from an arterial line positively correlates to SV
- An increase in stroke volume by 10% or more will show that the patient would be fluid responsive
  - Sensitivity of 97% and a specificity of 94%

Monnat, X., & Tabou, J. (2008). Passive leg raising. *Intensive Care Medicine*, 34(4), 659-663. doi:10.1007/s00134-008-0994-y

## Measuring Cardiac Output & Stroke Volume

- TEE and TTE
  - Minimally invasive
  - Does not provide continuous CO monitoring
  - Requires calculations and advanced training to determine CO
- FloTrac (EV 1000)
  - Continuous monitoring of CO
    - Requires an arterial line
- Swan-Ganz/ PA Catheter
  - Continuous CO monitoring
    - Requires catheter placement and can be somewhat more invasive

## Why PLR?

- It's reversible!
  - Fluid is often given when there are signs of hypo-perfusion in a critically ill patient
  - Only about 50% of patients respond to fluid administration with an increase in stroke volume
  - Giving unnecessary fluid to critically ill patients is often contraindicated and may result in pulmonary edema
- It's quick and easy!
  - Requires a simple bed maneuver
  - Data can be collected and fluid responsiveness can be determined within minutes

Monnet, X., Marik, P., & Teboul, J. (2016). Passive leg raising for predicting fluid responsiveness: a systematic review and meta-analysis. *Intensive Care Medicine*, 42(12), 1935-1947. doi:10.1007/s00134-015-4134-1

## Indications – When to think about PLR?

- Hypotension
- Low urine output
- Elevated lactate
- CAN be used in patients with arrhythmias
- CAN be used in patients who are mechanically ventilated

Monnet X, Rienzo M, Osman D, Anguel N, Richard C, Pinsky MR, Teboul JL (2006) Passive leg raising predicts fluid responsiveness in the critically ill. *Crit Care Med* 34:1402-1407

## Contraindications

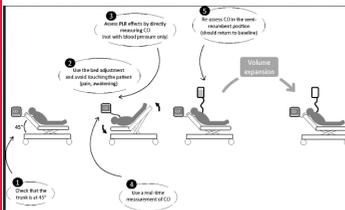
- Use caution in agitated patients
  - Pain, movement, and agitation can skew results
- Aspiration risk
- Increased intracranial pressure (ICP)
- May be contraindicated in patients who are considered too unstable to lie flat

## Performing PLR

- Sit patient in a semi fowlers position with head of bed at a 45 degree angle
- Assess baseline stroke volume by looking at cardiac output or pulse pressure
- Lie patient into a supine position and raise legs to a 45 degree angle
- The maximum effect of the fluid shift should be seen within 30-90 seconds of performing the maneuver
- Assess stroke volume while performing PLR

Monnet X, Rienzo M, Osman D, Anguel N, Richard C, Pinsky MR, Teboul JL (2006) Passive leg raising predicts fluid responsiveness in the critically ill. *Crit Care Med* 34:1402-1407

## Performing PLR



Monnet, X., & Teboul, J. (2015, January 14). Passive leg raising: five rules, not a drop of fluid! Retrieved June 21, 2017, from <http://ccforum.biomedcentral.com/articles/10.1186/s13054-014-0708-5>

## References

1. Monnet, X., & Teboul, J. (2008). Passive leg raising. *Intensive Care Medicine*, 34(4), 659-665. doi:10.1007/s00134-008-0994-y
2. Monnet, X., & Teboul, J. (2015, January 14). Passive leg raising: five rules, not a drop of fluid! Retrieved June 21, 2017, from <http://ccforum.biomedcentral.com/articles/10.1186/s13054-014-0708-5>
3. Monnet X, Rienzo M, Osman D, Anguel N, Richard C, Pinsky MR, Teboul JL (2006) Passive leg raising predicts fluid responsiveness in the critically ill. *Crit Care Med* 34:1402-1407
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