USE OF THE TRENDELENBURG POSITION

Two Reviews

Trendelenburg Position –first review

- The Trendelenburg position was originally used to improve surgical exposure of the pelvic organs and is credited to a German Surgeon Friedrich Trendelenburg (1844-1924)
- Healthcare workers have continued to use this position on the assumption that it will divert blood to the central circulation to augment cardiac filling and central blood volume.
- Despite surgeons questioning it's use in the 1950's it continues to be a mainstay of resuscitation.

- Data to support the use of the Trendelenburg during shock or hypotension are limited.
- PubMed was searched from 1966 through 2004 and articles pertinent to resuscitation, shock, hypotension or both were reviewed.
- Standard classifications for levels of evidence etc. were used. (Table 1)

- Two Pub Med searches yielded 31 and 29 articles respectively.

- 8 peer-reviewed publications were found with grade C strength of recommendation and no grade A or grade B level data was found

- In a prospective study of 10 **normotensive patients** 24-38 y.o.- volume of blood distribution was quantified with tagged RBC's. The Trendelenburg position resulted in an overall median increase of 1.8% blood volume in the upper compartment but no significant hemodynamic or clinical effect was found.

- In a prospective study of 12 hypovolemic patients on mechanical ventilation, intrathoracic blood volume and cardiac performance were assessed before, during and after Trendelenburg position x 15 minutes.
- Trendelenburg position caused slight increase in preload volume, despite marked increase in cardiac filling pressures, without significantly improving cardiac performance. A deterioration in cardiac performance occurred when moved back to supine position.

- 22 elderly non hypotensive patients were placed in Trendelenburg to assess the safety of use. Heart rate, mean arterial pressure, CVP, PA pressures, CO, PaO2 and CO2 with O2 sat were noted. Researchers concluded the position does not have a deleterious effect and encouraged the use for only a minimal amount of time.

Question

- Does the use of the Trendelenburg position cause clinically significant increases in blood pressure, CO/CI in hypotensive patients?

- MEDLINE and CINAHL Search:
- 20 studies found- including modified Trendelenburg.

- 90 women age 24-56 y.o. undergoing spinal anesthesia were examined in Trendelenburg for hypotension. A small and limited increase in systolic blood pressure occurred in patients who had a decrease in SBP greater than 30% from the control.

- 61 normotensive and 15 hypotensive critically ill patients in Trendelenburg had mean arterial pressure increased from 87.1 to 88.3.

- 8 hypovolemic patients placed in Trendelenburg had an increase in mean arterial pressure with no significant effect on oxygenation variables.

- See Table 1 for effect of Trendelenburg
- CO/CI transiently (1-3 minutes) increased in healthy populations
- 50% of studies on acutely ill patients showed transient (3-5 minutes) increase in CO/CI however-
- Although CO/CI increased there was NO CHANGE in the blood pressure.

- In one study ONLY 1.8% total blood volume was displaced centrally. Explanation included the fact that preload changes are limited because of venous capacitance vessels being rapidly depleted and therefore have little blood volume to add to the central circulation.

- When blood pressure is low and the patients are tilted, the abdominal contents shift and compress the vena cava fooling baroreceptors that blood pressure is back to normal. This blocks the reflexive sympathetic activity to increase SVR and BP= inadvertent vasodilatation.

- Some studies suggested potentially harmful effects i.e. reduced blood flow, increased myocardial oxygen consumption, lower limb ischemia, decreased respiratory expansion, hypoventilation, increased ocular and intracranial pressure.
- Also can cause anxiety, restlessness, vascular headache, nasal congestion, progressive dyspnea, loss of cooperation (hostility), efforts to sit up.

Recommendations for Practice

- 1. Because most of the evidence that is grade B indicates that Trendelenburg does not lead to beneficial changes in blood pressure, CO/CI, it is probably not useful in resuscitation.
- 2. Hemodynamic effects are small and un-sustained and unlikely to have significant impact on hypotensive patients
- 3. Could be harmful

- Therefore –clinicians should position patients flat and use other interventions for hypotension.
- The use of the Trendelenburg position may be an example of an intervention that is based on tradition rather than scientific evidence.

- 39 patients were studied prospectively to determine if the **modified** Trendelenburg position could be used to predict the response to fluid loading. Positive results suggesting that this could effectively displace blood from the lower extremities into the central circulation.

- Textbooks were reviewed for treatment and management of hypovolemic shock. Authors stated that the use of the Trendelenburg position can cause shifting of blood volume from lower extremities to central circulation but that this did not offer consistent benefits.
- Second group of authors discouraged use because of the detrimental effects such as worsening gas exchange and cardiac function without significant redistribution of blood volume centrally

- Conclusions:
- 1. The literature on the positon for resuscitation is scarce
- 2. Available literature lacks strength
- 3. There is a suggestion that the Trendelenburg is probably not useful in resuscitation
- 4. Could possibly be used to predict response to fluid loading