



Intermittent hyperventilation as a safe adjunct to hyperosmolar therapy in the treatment of refractory intracranial hypertension

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Introduction

- Hyperventilation is an established adjunct to the treatment of intracranial hypertension
- Its use in the acute phase is helpful when facing acute herniation
- Its subacute use has been subject to debate as it might lead to cortical ischemic side effects if prolonged



Hypothesis

- The use of hyperventilation in an intermittent fashion would potentially provide the intracranial pressure lowering effect without ischemic damage to the injured brain



Objective

- To study the safety of intermittent hyperventilation in patients with diffuse brain injury



Methodology

- We included patients with diffuse brain injury with no evacuated or potential surgical lesion of all adult patients presenting with severe TBI
- All patients have ICP monitoring and are treated with a standardized protocol
- Patients selected on the basis of transcranial Doppler of normal velocity and flow patterns

Methodology

- The hyperventilation protocol was used intermittently to PCO₂ of 25 (range was 30-25) for 6 hours on and 6 hours off for a total of 5 days
 - The effect can be observed within minutes (unpublished data)
- Started after 24 hours of the injury to ensure stability of the diffuse injury
- All patients were followed with daily TCDs and CT scan when needed and at the end of the 5 days

Results

- 56 potential subjects
- After excluding all surgical and potentially surgical patients, 5 patients were selected for this protocol



Results

- out of 5 patients
 - 1 went on for decompressive craniectomy post trauma day 3
 - 4 patients were treated non-operatively as they did not need escalation of therapy beyond hyperosmolar therapy and intermittent hyperventilation despite the diffuse nature of there TBI



Results

- Out of the 4 patients treated with the intermittent hyperventilation protocol,
 - No ischemic events on the CT
 - Reasonable control of their ICP in the refractory period they were evaluated in



Discussion

- Intermittent hyperventilation use in refractory ICP in severe TBI is an interesting novel use
- It provides the ICP lowering effect and avoid the ischemic damage that might accompany prolonged hyperventilation
- In essence, it resembles the bolus effect of hyperosmolar therapy versus the continuous mode of therapy used in past times

Limitation

- Small number preclude generalization
- MRI is more sensitive in detecting ischemic changes
 - Difficult to obtain in acute phase



Future Work

- We would employ this in a prospective randomized manner to validate these findings
- In addition we would study the effect of timing of initiation of this protocol on the durability of its effect during the refractory ICP period



Conclusion

- Intermittent hyperventilation is a safe adjunct to hyperosmolar therapy in severe TBI with refractory intracranial hypertension



Thank You

