Intracranial Pressure Fluctuations in Neurosurgical Patients Undergoing Renal Replacement Therapy: Systematic Review and Pooled Analysis

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DISCLOSURES
NONE
Dialysis disequilibrium syndrome (DDS)

- Rare but well-known complication of renal replacement therapy (RRT)
- Spectrum of clinical manifestations resulting from cerebral edema and increased ICP
- Rarely life-threatening or fatal
- Neurosurgical patients may be at increased risk

Materials and Methods

• PubMed search, June 2019

• Keywords

  "dysequilibrium" OR "disequilibrium" OR "cerebral edema" OR "brain edema" OR "herniation"
  AND
  "dialysis" OR "hemodialysis"
  AND
  "intracranial pressure" OR "ICP"

48 papers total
37 excluded
  irrelevant: 27
  review articles: 7
  animal studies: 2
  duplicate: 1
11 papers analyzed
Results: Patient Population (N=58)

44 M / 14 F
Mean age: 48y (range 6-78)

Neurosurgical conditions
- Spontaneous ICH: 27
- TBI: 16
- Ischemic/Anoxic Stroke: 6
- Tumor: 6
- Abscess: 2
- PRES: 1

Neurosurgical interventions
- Craniotomy/Craniectomy: 23
- EVD/ICP Monitor: 16
- Burr Hole/Twist Drill Craniostomy: 4

Type of RRT
- Intermittent: 33
- Continuous: 20
- Combination: 4
- Not Specified: 1
### Results: Impact of RRT on ICP (N=58)

<table>
<thead>
<tr>
<th>ICP</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Increased: 35 (60%)</td>
<td>Death: 34 (58.6%)</td>
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<tr>
<td>unchanged: 20 (34%)</td>
<td>Survival: 18</td>
</tr>
<tr>
<td>Decreased: 3</td>
<td>Not specified: 6</td>
</tr>
</tbody>
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**Intermittent RRT associated with increased ICP:**

- 73% vs. 38% (p=0.01)

**Craniotomy/ectomy associated (trend) with increased ICP:**

- 74% vs. 51% (p=0.10)

**Increased mortality (trend) in patients with increased ICP:**

- 69% vs. 43% (p=0.10)
Conclusions

ICP increases are common and potentially life-threatening in neurosurgical patients undergoing RRT. ICP may increase in as many 60% of patients, leading to mortality rates of up to 70%.

Recent craniotomy or craniectomy is a likely risk factor.

Continuous RRT techniques may reduce the risk.