Abstract

- Effect on breathing of a conventional and a newly designed abdominal binder
- Seven complete tetraplegic patients
- Measurements: transdiaphragmatic pressure on maximal sniff (sniff Pdi), maximum static inspiratory mouth pressure (Pimax), and vital capacity (VC)
- With and without binders
- Supine, raised up to 70° on a tilt table, and seated upright
- Both binders improved VC in sitting and at 70° tilt, and sniff Pdi at 70° tilt
- Abdominal binders assist breathing in tetraplegic patients who are seated or raised to near vertical positions.

Methods

N=27 males (7 patients and 20 controls)
- Tetraplegia due to trauma
- Complete transection of cervical spinal cord
- No detectable motor or sensory function below cervical level
- Injured at least 3 months before study
- None suffering from respiratory complication
- Controls were healthy men of similar age and stature
- Mean age of both groups = 33 years
- Mean height = 178 cm
- Mean weights = 71 kg (patients) and 70 kg (controls)

- Each subject was studied in three different positions: sitting in wheelchairs, lying supine on a tilt table, and resting at 70° to the horizontal on a tilt table
- Conventional binder vs. custom low temperature thermoplastic
- Three indices of respiratory ability:
  * Transdiaphragmatic pressure during maximal sniff (sniff Pdi)
  * Maximum static inspiratory mouth pressure (Pimax)
  * Vital capacity (VC).

Results

<table>
<thead>
<tr>
<th>(binder vs. no binder)</th>
<th>Sniff Pdi</th>
<th>Pimax</th>
<th>VC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine</td>
<td>↑↑↑</td>
<td>↔</td>
<td>↑↑</td>
</tr>
<tr>
<td>70 degree tilt</td>
<td>↔↔</td>
<td>↔↔</td>
<td>↑↑</td>
</tr>
<tr>
<td>Sitting in WC</td>
<td>↔↔</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Legend

↑ = increase
↔ = no change
2 symbols = new and conventional binder

Clinical Significance

- Abdominal binding produces some short term benefits for tetraplegic patients.
- Must match patients to subject demographics used in article when applying in practice
- Abdominal binding is effective in sitting or upright tilt, but not in supine
- Long term effects of abdominal binding were not included in the study

Conclusions

- Abdominal binders are valuable aids to breathing when tetraplegic patients are mobilized to upright
- Conventional binder should continue to be used until a better one is designed

Discussion

- ↑ VC and sniff Pdi when patient tilted up with binding
- ↔ in the supine posture with binding, while in the seated posture there was an ↑
- Binders act by increasing intra-abdominal pressure, pushing the diaphragm into a position of greater mechanical advantage.
- The new binder showed no advantage over the conventional binder.

Summary

Since systematic review and meta-analysis proved evidence for abdominal bracing to be of low quality, clinicians should only recommend abdominal bracing if more effective interventions are unavailable or prove to be insufficient.

Presented by Courtney Ahlers,
DPT Student