Pusher Syndrome

Pusher Syndrome is a unique presentation of abnormal body posture seen in approximately 5-10% of post-stroke patients. It is also known as Contraversive pushing, Ipsilateral pushing and Lateropulsion.

Stroke patients with this syndrome actively push away from the nonhemiparetic side, leading to a loss of postural balance. Patients experience their body as oriented upright when the body is actually tilted to the side of the brain lesion. In addition, patients seem to show no disturbed processing of visual and vestibular inputs when determining subjective visual vertical.

Signs of Pushers Syndrome in patients with hemiplegia:
- Pushing towards the involved side
- Decreased awareness of midline
- Strong extension with the uninvolved arm and leg that pushes them to the weak side
- Resistance to attempts to correct their posture towards midline
- Often exhibit neglect of the involved side and decreased sensation on the involved side

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pusher Syndrome</th>
<th>Thalamic Astasia</th>
<th>Wallenberg’s Syndrome</th>
<th>Vestibular Cortex Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction of pushing or loss of balance</td>
<td>Push sideways toward the paretic side</td>
<td>Fall backward or to the paretic side without pushing</td>
<td>Fall sideways toward the non-paretic side without pushing</td>
<td>Lean and lose balance toward the paretic side without pushing</td>
</tr>
<tr>
<td>Location of Lesion</td>
<td>Posterolateral thalamus</td>
<td>Posterolateral thalamus</td>
<td>Medulla of brainstem</td>
<td>Posterior insula, aka vestibular cortex</td>
</tr>
<tr>
<td>Severity of Hemiparesis</td>
<td>Severe</td>
<td>Mild to none</td>
<td>Mild</td>
<td>Mild</td>
</tr>
<tr>
<td>Subjective visual vertical</td>
<td>Intact</td>
<td>Intact</td>
<td>Impaired</td>
<td>Impaired</td>
</tr>
<tr>
<td>Subjective postural vertical</td>
<td>Impaired</td>
<td>Not stated</td>
<td>Not stated</td>
<td>Intact</td>
</tr>
</tbody>
</table>

Treatment Interventions

The first goal for patients suffering from Pusher Syndrome is to help them realize their misconception of vertical. The next important goal is to increase their base support so that their anxiety can be lowered and stability can be improved. Next, steps are taken to encourage weight bearing on the unaffected side and away from the weaker (affected) side. This is done to restore symmetry of the body. Suggested interventions include:
- While sitting, allow the patient to realize that their perception of vertical is disturbed. Let them tip over, assist with a controlled fall if needed, until they are lying sideways on the bed. Ask the patient to find a way to get upright again. Therapist assists as needed.
While sitting on the treatment mat, instruct patient to actively explore visual surroundings and to reach upright posture by visually aligning their own body with the vertical objects in the environment. Use visual aids and mirrors to give feedback about their body orientation.

Practice quiet sitting with prevention of active pushing. Sitting on the edge of the treatment mat, therapist sits on the nonhemiparetic side and places a hand on patient’s shoulder to monitor pressure. Patient’s hemiparetic forearm is on a Swiss ball. Their pushing hand is placed palm up on patient’s thigh (discourages pushing). Watch for height of the nonhemiparetic shoulder. If it’s elevated due to pushing, remind them to relax their shoulder (either verbally or with a gentle tap). Visual feedback from a mirror helps. Nonhemiparetic leg is in good alignment (therapist leg can assist to maintain position and not allow pushing).

Ask the patient to reach for an object placed on their non-paretic side (weight shift to the non-involved side).

Perform “reverse sit-ups”. Patient sits at edge of mat with trunk in midline and no upper extremity support. Patient leans back to the point of feeling off balance, then returns to midline (promotes trunk control and midline awareness).

Wheelchair Mobility: Proper wheelchair seating is crucial. Use pelvic seat belt and rear anti-tippers to prevent falls. Contoured cushion/backrest can help maintain midline. Use brightly colored brake extensions and footrest releases to improve scanning to neglected side (colored tape or balloons are an easy modification).

Stand with non-hemiparetic side beside an elevated mat. Patient can practice weight shifting activities using mat as a target for non-hemiparetic hip (using a visual/tactile target circumvents the patient’s impaired sense of postural vertical). Encourage proper weight shift onto leg without pushing behavior. Add functional tasks involving weight shift to the non-involved side, i.e. reach across mat for objects.

Stand patient in a corner. The wall/corner positions provide a target for correct posture and a sense of security to decrease fear of falling. Once quiet standing is achieved, work on scanning activities, weight shift and pregait/stepping activities.

Outcome Measures (included as attachments)

Burke Lateropulsion Scale: This scale assesses the patient’s resistance to:
1. Passive supine rolling
2. Passive postural correction when sitting and standing
3. Assistance during transferring and walking.

The score for each component is rated on a scale from 0 to 3 (0 to 4 for standing) and the score is based on the severity of resistance or the tilt angle when the patient begins to resist the passive movement. The score for diagnosis of Pusher behavior is ≥2 points.

Scale for Contraversive pushing: This is made up of 3 components:
1. The symmetry of spontaneous body posture (rated with 0, 0.25, 0.75, or 1 point)
2. The use of non-paretic extremities (0, 0.5, or 1 point)
3. The resistance to passive correction of the tilted posture (0 or 1 point).

For a diagnosis of Pusher Syndrome all 3 components need to be present.

While current research has shown that rehabilitation may take longer in patients that display pushing behavior, the motor learning treatment strategies discussed here are all effective strategies used to reduce the effects of this disorder. The visual control of vertical upright orientation which is undisturbed in these patients is the central element of treatment intervention.
Burke Lateropulsion Scale


SUPINE: Use “log roll” technique to test patient’s response. Roll first towards the affected side then towards the unaffected side. Circle the side to which the resistance is most prominent. Score below the maximum resistance felt and add one point if resistance is noted in both directions. (Patients with marked lateropulsion may resist rolling to either side; hence an extra point is added if resistance is noted with rolling both towards and away from the affected side).

0= No resistance to passive rolling
1= Mild resistance
2= Moderate resistance
3= Strong resistance
1= Add one point if resistance noted in both directions

SITTING: Score with the patient seated, feet off floor, with both hands in lap. The expected hemiplegic response is for patient to carry his weight towards the unaffected side. Some patients will passively fall towards their paretic side when placed in true vertical position by the examiner. This will not be scored as “lateropulsion.” Position the patient with their trunk 30 degrees off true vertical towards their affected side, then score the patient’s response to your attempts to bring them back to vertical. The “lateropulsion” phenomenon is an active attempt by the patient to keep their center of gravity towards their impaired side as they are brought to true vertical.

0= No resistance to passive return to true vertical sitting position.
1= Voluntary or reflex resistive movements in trunk, arms or legs noted only in the last 5 degrees approaching vertical.
2= Resistive movements noted but beginning within 5 to 10 degrees of vertical.
3= Resistive movements noted more than 10 degrees off vertical.

STANDING: Score with the patient standing with whatever support is needed. The expected hemiplegic response is for the patient to carry their weight toward the unaffected side or to passively fall towards their paretic side when placed in true vertical position by the examiner. This will not be scored as “lateropulsion.” Position the patient with their trunk 15 to 20 degrees off true vertical towards their affected side then score the patient’s response to your attempts to bring them back to vertical, then 5 to 10 degrees past vertical toward the intact side. The “lateropulsion” phenomenon is a voluntary or reflexive response in the trunk or limbs to keep the center of gravity towards the impaired side, e.g., forced trunk curvature towards the paretic side, flexion of the affected hip or knee, shifting weight to the lateral aspect of the unaffected foot.

0= Patient prefers to place his center of gravity over the unaffected leg.
1= Resistance is noted when attempting to bring the patient 5 to 10 degrees past midline.
2= Resistive voluntary or reflex equilibrium responses noted, but only within 5 degrees of approaching vertical.
3= Resistive voluntary or reflex equilibrium responses noted, beginning 5 to 10 degrees off vertical.
4= Resistive voluntary or reflex equilibrium responses noted, >10 degrees off vertical

TRANSFERS: Score this one by transferring the patient first to the unaffected side, then if possible, to the affected side. The expected hemiplegic response would be for the patient to require more assistance to transfer towards the affected side (use a sit-pivot, modified stand pivot, or stand pivot transfer, depending on the patient’s functional level).

0= No resistance to transferring to the unaffected side is noted.
1= Mild resistance to transferring to the unaffected side.
2= Moderate resistance to transferring is noted. Only one person is required to perform the transfer.
3= Significant resistance is noted with transferring to the affected side. Two or more people are required to transfer the patient due to the severity of pushing.
WALKING: Score lateropulsion by noting active resistance by the patient to efforts by the therapist to support the patient in true vertical position. Do not score passive falling or leaning to the paretic side. Score lateropulsion as follows:

0= No lateropulsion noted.
1= Mild lateropulsion noted.
2= Moderate lateropulsion noted with walking.
3= Strong lateropulsion noted, takes two individuals to walk with the patient, or unable to walk because of severity of lateropulsion.

Circle most prominent direction of lateropulsion: left, right, posterior-left, posterior-right.

Note: Some patients may show such marked lateropulsion that they cannot be assessed while standing or walking. In such cases, they are scored as having a maximum deficit for those tasks not testable due to the severity of their lateropulsion.

TOTAL SCORE = SUM OF THE ABOVE ___ (Max = 17)
**Scale for Contraversive pushing:** This is made up of 3 components:
1. The symmetry of spontaneous body posture (rated with 0, 0.25, 0.75, or 1 point)
2. The use of non-paretic extremities (0, 0.5, or 1 point)
3. The resistance to passive correction of the tilted posture (0 or 1 point).

For a diagnosis of Pusher Syndrome all 3 components need to be present.

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**Table 2** Clinical Assessment Scale for Contraversive Pushing (SCP). (Translated from ref. [6])

<table>
<thead>
<tr>
<th>Examination Form</th>
<th>Clinical Scale for Contraversive Pushing (SCP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name.................. Date of birth.............. Ward..................</td>
<td></td>
</tr>
<tr>
<td>Examination date.............. Diagnosis..................</td>
<td></td>
</tr>
<tr>
<td>Physician in charge.............. Physical therapist in charge..................</td>
<td></td>
</tr>
</tbody>
</table>

(A) Spontaneous body posture

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
<th>Sitting</th>
<th>Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>severe contraversive tilt with falling to that side</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0.75</td>
<td>severe contraversive tilt without falling</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0.25</td>
<td>mild contraversive tilt without falling</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0</td>
<td>inconspicuous</td>
<td>☐️</td>
<td>☐️</td>
</tr>
</tbody>
</table>

Sum total (max. = 2):

(B) Use of the non-paretic extremities (abduction & extension)

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
<th>Sitting</th>
<th>Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>performed spontaneously, already when at rest</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0.5</td>
<td>performed only on changing the position (e.g. on transferring from bed to wheelchair)</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0</td>
<td>inconspicuous</td>
<td>☐️</td>
<td>☐️</td>
</tr>
</tbody>
</table>

Sum total (max. = 2):

(C) Resistance to passive correction of tilted posture

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
<th>Sitting</th>
<th>Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>resistance occurs</td>
<td>☐️</td>
<td>☐️</td>
</tr>
<tr>
<td>0</td>
<td>resistance does not occur</td>
<td>☐️</td>
<td>☐️</td>
</tr>
</tbody>
</table>

Sum total (max. = 2):

*Touch the patient at the sternum and the back. Instruction: “I will move your body sideways. Please permit this movement.”*