Level of SB Function

**CERVICAL REGION**

- **C1** Elbow flexors: Partial upper extremity function
- **C2** Wrist extensors: Standing with stander/orthotics
- **C3** Elbow extensors
- **C4** Finger flexors

**THORACIC REGION**

- **T1** Complete upper extremity function
- **T2** Standing with stander/orthotics
- **T3–T8** Possible exercise ambulation
- **T9–T12** Partial function of trunk muscles
- **T10–L2** Exercise ambulation
- **T12–S5** Sexual function varies

**LUMBAR REGION**

- **L1** Complete trunk function: exercise ambulation, sometimes household ambulation
- **L2** Hip flexor muscles present: exercise ambulation, household ambulation
- **L3** Knee extensors or Quadriceps muscles present: household ambulation, possible community ambulation
- **L4** Medial knee flexors present. Ankle dorsiflexors, 3/5 strength
- **L4–S5** Community ambulation
- **L5** May walk with or without crutches in home

**SACRAL REGION**

- **S1** Hip abductors, 3/5 strength
- **S2** Hip extensors, 4/5 strength. Ankle, plantarflexors, 3/5 strength. May walk with or without crutches
- **S2–S4** Bowel and bladder function varies. Bladder: parasympathetic input from the pelvic nerve. Somatic input from pudendal nerve to urethral sphincter
- **S3** All muscle activity may be within normal limits
- **S4** Be aware of signs and symptoms of shunt malfunction and tethered spinal cord

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<table>
<thead>
<tr>
<th>Spine Level</th>
<th>Possible Muscle Function</th>
<th>Possible Orthopaedic Concerns</th>
<th>Possible Orthotics Needed</th>
<th>Possible Equipment for Functional Mobility</th>
<th>Possible Cognition, Executive Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6-9</td>
<td>Upper trunk (abdominals)</td>
<td>Kyphoscoliosis, Lumbar hyperlordosis</td>
<td>TLSO Night splints: body, hip abduction, KAF, AF</td>
<td>Community: Wheelchair/wheelchair cushion, transfer board</td>
<td>Executive function impairments can impact educational, social and self help skills.</td>
</tr>
<tr>
<td>T9-12</td>
<td>Abdominals + paraspinals = some pelvic control</td>
<td>Coxa valga–hip dislocation Decreased bone density Fractures</td>
<td></td>
<td>Home: Walker/Crutches (for household or exercise walking), Raised, padded commode seat.</td>
<td>Cognitive function can vary with the degree of hydrocephalus number of shunt infections, and the involvement of the nervous system. Function may not be related to level of lesion or ability to walk. Support early assessment of attention difficulties, sensorimotor integration, visual perception, visual motor ability, psychosocial development in addition to fine/gross motor + communication ability.</td>
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<tr>
<td>L1</td>
<td>Complete trunk function Lower trunk (abdominals) Hip flexors (weak) 2/5</td>
<td></td>
<td></td>
<td>Bath bench Mirror for skin checks Stander: 1 hour/day minimum starting at 10-12 months of age. Driving with hand controls Learn public transportation</td>
<td></td>
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<tr>
<td>L3</td>
<td></td>
<td>Contractures: Hip: flexion Knee: flexion, extension Foot: Heelcord, clubfoot</td>
<td></td>
<td>Home: Stander: 1 hour/ day minimum Early: may use walker or crutches Later: wheelchair in home</td>
<td></td>
</tr>
<tr>
<td>L5</td>
<td>Hip adductors (weak) 2/5 Lateral knee flexors 3/5 Ankle inverters 3/5 Long toe extensors (palpate at ankle)</td>
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</tr>
<tr>
<td>S1</td>
<td>Hip abductors 3/5 Hip extensors (weak) 2/5 Planter flexors (weak) 2/5</td>
<td>Monitor hips closely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>Hip extensors 4/5 Planter flexors 3/5 Toe flexors 3/5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3-5</td>
<td>All muscle activity + bowel/bowel bladder function may be normal</td>
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</tr>
</tbody>
</table>

**Shunt malfunction and/or tethered cord:** May cause deterioration of daily living skills, progressive weakness, muscle contractures or orthopaedic deformities of the legs, scoliosis, back pain at the site of closure, deterioration of gait, changes in bowel and/or bladder function.

**Muscle grades:**
- 5 = normal
- 4 = good
- 3 = fair
- 2 = poor
- 1 = trace

**Flexion = bend**
**Extension = straighten**
**Adduction = bring toward**
**Abduction = take away**
**Invert = move in**
**Evert = move out**
**Medial = inner**
**Lateral = outer**

**T = thoracic**
**L = lumbar**
**S = sacral**
**O = orthosis**
**RGO = reciprocating gait orthosis**
**H = hip**
**K = knee**
**A = ankle**
**F = foot**
**CC = crouch control**
**Gait = walking style**

- **Coxa = hip**
- **Calcaneus = heel bone**
- **Talus = ankle bone**

**Contributing Editors**
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This information does not constitute medical advice for any individual. As specific cases may vary from the general information presented here, SBA advises readers to consult a qualified medical or other professional on an individual basis.