

**TABLE 114-1** SYMPTOMS AND SIGNS APPROACH TO NEUROANATOMIC LOCALIZATION OF MOTOR SYSTEM DYSFUNCTION

| NEUROANATOMIC LOCALIZATION       | SYMPTOMS  | SIGNS   |
|----------------------------------|---|---|
| <b>CENTRAL NERVOUS SYSTEM</b>    |   |   |
| <b>PYRAMIDAL TRACT</b>           |   |   |
| <b>Cortical</b>                  | Weakness<br>Cortical symptoms (e.g. aphasia)  | Hemiparesis or focal weakness<br>Spasticity<br>Babinski's sign<br>Other cortical findings   |
| <b>Subcortical</b>               | Isolated weakness/clumsiness  | Hemiparesis of face and body<br>Spasticity<br>Babinski's sign   |
| <b>Brainstem</b>                 | Weakness<br>Bulbar symptoms<br>Somnolence   | Absence of cortical findings<br>Crossed facial and body paresis<br>Spasticity<br>Babinski's sign<br>Cranial nerve findings (e.g. INO)<br>Cerebellar signs   |
| <b>Spinal Cord</b>               | Weakness<br>Sensory loss, paresthesia/dysesthesia<br>Gait imbalance and falls<br>Back pain<br>Bowel and bladder dysfunction   | Impaired arousal<br>Paraparesis > hemiparesis<br>Sensory level<br>Absence of bulbar signs<br>Babinski's sign<br>Hoffman's sign  |
| <b>BASAL GANGLIA</b>             | Changes in gait, gait imbalance, and falls<br>Changes in voice<br>Impairment in voluntary motor actions<br>Involuntary movements<br>Behavioral changes                          | Tone abnormalities (rigidity)<br>Postural abnormalities<br>Postural instability<br>Gait disorders<br>Akinesia/hypokinesia<br>Tremor<br>Chorea/ballism/athetosis<br>Dystonia<br>Tics                   |
| <b>CEREBELLAR</b>                | Gait imbalance and falls<br>Slurred speech<br>Tremor with intentional tasks<br>Incoordination   | Oculomotor abnormalities<br>Hypotonia<br>Gait ataxia<br>Titubation<br>Scanning dysarthria<br>Dysmetria<br>Intention tremor<br>Past pointing<br>Dysdiadokinesis<br>Excessive rebound<br>Impaired check |
| <b>PERIPHERAL NERVOUS SYSTEM</b> |   |   |
| <b>ROOTS (RADICULAR)</b>         | Pain radiating into limb/trunk<br>Localized sensory loss, parasthesias, dysesthesias<br>Localized weakness  | Combined motor and sensory deficits in a radicular distribution<br>Reduced MSR in region subserved by root(s)<br>Muscle atrophy   |
| <b>PLEXUS</b>                    | Localized sensory loss, parasthesias, dysesthesias in a single limb<br>Localized weakness in a single limb<br>Bowel and bladder symptoms in lumbosacral plexus                  | Combined motor and sensory deficits involving multiple roots and subserving multiple nerves<br>Reduced MSR in region subserved by multiple roots<br>Muscle atrophy                                    |
| <b>PERIPHERAL NERVE</b>          | Polyneuropathy<br>Distal/bilateral sensory loss, parasthesias, dysesthesias<br>Distal/ascending and bilateral weakness<br>Mononeuropathy<br>Localized pain and sensory symptoms | Distal predominant weakness<br>Stocking-glove sensory loss<br>Reduced MSR<br>Hypotonia<br>Muscle atrophy  |
| <b>NEUROMUSCULAR JUNCTION</b>    | Fluctuating weakness<br>Worsening weakness over the course of the day or with physical activity<br>Diplopia<br>Slurred speech<br>Absence of sensory symptoms                    | Bulbar weakness<br>Normal MSR<br>Normal muscle bulk<br>Fatigable weakness<br>Normal sensory exam  |
| <b>MUSCLE</b>                    | Proximal greater than distal weakness<br>Myalgias<br>Absence of sensory symptoms  | Proximal weakness<br>Normal muscle tone and bulk<br>Normal to reduced MSR   |

INO, Intranuclear ophthalmoplegia; MSR, muscle stretch reflexes.