**Supplemental material**

**Supplemental Table 1. Clinical Clues for Functional Dystonia Subtypes.**

|  |  |
| --- | --- |
| **FD body region/semiology** | **Clinical clues** |
| **General**  | - Movement not patterned/stereotyped and is inconsistent and incongruent with other forms of dystonia (such as a mismatch between perceived and examination abilities and vice versa)\*- Multiple different and varying semiologies\*- Foot dystonia in an adult\* (100)- Dystonia at rest at onset\* (100)- Lack of overflow dystonia\*- Reduced or absent co-contraction of antagonistic muscles compared to other forms of dystonia (but with overlap with OD) (61)- Distractibility\*- Unusual/atypical sensory tricks\*, such as sudden benefit with the application of a tuning fork- Immediate placebo response to botulinum toxin injections\*- Other functional neurological signs (give-way/collapsing weakness, functional/midline-splitting sensory loss)\*- “Whack-a-mole” sign (102)\*, where moving out of one abnormal posture can result in spread to the contralateral side or flit into another abnormal posture\*- Caution: there may commonly be hypertrophy and palpable spasm of affected muscles owing to excessive use, given frequent or fixed posturing\*# |
| **Limb (general)** | - Fixed dystonia early in course (not to be confused with CBS, where this typically starts on the left or non-dominant side, sometimes with superimposed myoclonus)\*- Frequently painful on attempted movement of the affected limb- Fixed dystonia may be associated with chronic regional pain syndrome type 1\* (99)- Active resistance against passive movement\*#- Tremor or clonus-like movement when evaluating range of motion or reflex testing of the limb but without any superimposed spasticity or hyperreflexia- Straightening out posture or passively moving into a different posture can cause this to become a new resting fixed posture (akin to waxy flexibility of catatonia)- Sensory symptoms, particularly anesthesia of the affected limb- Ponderous and deliberate, slowed movements on affected side and can appear very effortful |
| **Lower limb** | - Typical semiology of plantarflexion and inversion with toe curling\*- Functional striatal toe sign\* (101)- Persistence of abnormal posture when walking backwards- If bilateral, can involve a “frog-legged” posture- Dragging leg behind and static abnormal posture throughout gait cycle- Paradoxical improvement with stress gait or walking in tandem- Appearance of weakness on movement away from the dystonic direction- Excessive signs of effort in contrast to observed severity of gait disorder – the “huffing and puffing” sign- Sensory symptoms particularly anesthesia of the foot- Straightening out posture or passively moving into a different posture can cause this to become a new resting fixed posture (akin to waxy flexibility of catatonia) |
| **Upper limb** | - Typical semiology is fisting posture and wrist flexion, occasionally also elbow flexion or flexion of fingers at MCP or at IP joints\*- Ring/Little fingers commonly affected; Thumb least affected\*- Posture resolves with contralateral Luria sequencing- Normal spontaneous movements in an affected limb (putting on glasses, using phone) |
| **Cervical** | - Varying semiology (i.e. changing from torticollis to laterocollis etc.) and may change when doing certain tasks- Fixed neck posture, without a clear spasmodic nature- Unusual, erratic and sometimes high amplitude associated tremor- Active range of movement not possible during examination to despite spontaneous normal head movement at other times- Lack of typical sensory tricks, such as resting head against a surface or lying flat- Resolution of posture when writing or performing other tasks requiring concentration |
| **Trunk/gait** | - Inappropriate difficulties standing from sitting in comparison to gait- Fixed posturing when walking, either extension or flexion at the waist- Posture resolves when adjusting clothing or when doing a repetitive task (clicking fingers, tapping)- Associated knee bending or unusual dromedary gait in an adult patient- Posture does not improve when resting against a wall- Associated episodic knee buckling- Unusual relieving maneuvers (e.g. standing on one leg)- Early use of crutches or other walking aid despite objective stability- Associated prominent back pain- Associated functional gait features (astasia abasia, unusual Romberg, unusual retropulsion pull testing), which may be at odds with apparent preserved balance when walking |
| **Blepharospasm/Meige** | - Gentle eye closure without spasms (pseudoptosis)\*- Forceful eye closure with episodes of normal eye opening\*- When eyes fully open, blink rate is normal- When asked to actively and forcefully close eyes, does not provoke spasms (in sharp contrast to other forms of blepharospasm) with sudden, normal eye opening when opening- Asymmetry and alternating spasms- Eye/facial movements entrain with finger tapping or other hand movements- Functional sensory symptoms/signs of the face, such as midline splitting or differential vibration sensation across frontal bone- Can resolve with speech tasks requiring concentration (months of the year backwards, serials 7s etc.)- Tonic spasms both involving eye closure and facial grimacing\*- Lower facial spasms resolve when talking or when testing tongue movements |
| **Hemifacial spasm** | - Lack of other Babinski sign\* (124)- Painful spasms or facial pain in general\*- Very forceful spasms, lasting longer than typical hemifacial spasm\*- Alternating spasms from one side to the other- Lower face involvement at onset\*- Lower face more involved- Tonic spasm with periods of normal facial movement in between- Lack of synchronicity between upper/lower face- Episodes of bilateral facial contraction\* (104)- Sensory symptoms of the face, particularly on the affected side, such as midline splitting or differential vibration sensation- Stuck facial expression, which is variable during assessment - Associated with stuttering/functional speech- Normalizes or enhanced when testing eye movements or other facial movements |
| **Paroxysmal** | - Onset in adulthood (above age 20)\*- Associated tremor\*- Non-stereotyped episodes which are highly variable in semiology\*- Attacks precipitated by examination\*- Altered awareness during episodes (may overlap with functional / dissociative seizures)\*- Atypical triggers\* (loud noises, light touch, startle etc)- Absence of typical triggers (alcohol, caffeine, prolonged exercise etc)- Unusual relieving maneuvers\* (certain posture changes etc, touching a particular part of the body, massaging limb, passive range of motion), with sudden resolution- Paroxysmal fixed posturing- Additional FMD associated with episodes\*- Atypical response to medication with rapid, complete resolution\*- Stuttering functional speech during an episode |
| **Oromandibular** | - Ipsilateral downward and lateral jaw pulling (103)- Complete resolution with certain facial movements, for instance whistling (caution for paradoxical improvement in certain oral mandibular OD) (105) |
| **Tongue**  | - Tonic posturing- If associated give-way weakness, deviation towards the side of facial weakness (“wrong way” sign) (103)- Normal speech despite clearly involving the tongue- Resolution of tongue involvement with testing individual speech sounds (lingual, labial and guttural) and holding prolonged phonation (“Ahh”, “Ee”) or even deep breathing- Full range and normal active tongue movements despite deviation at rest- Tongue moves in direction of eyes when testing eye movements |
| **Functional Spasmodic Dysphonia** | - Typically has a whispering, breathy quality\* (100) or a persistent strained quality that is absent of voice breaks and spasms- Breathy, high-pitched falsetto, or diplophonia (two tones)\* (107)- Lack of vocal tremor and rare vocal arrest\* (100)- Presence of a globus sensation\* - Speech accompanied by effortful and exaggerated facial, lip, tongue, neck, or respiratory movements- Episodes of normal phonation with automatic activities (laughing, coughing, yawning), nonpropositional activities (counting, singing) and with facilitated distraction\* (107)- Speech may normalize when trying to count as far as the patient can in a single breath as they near the end of the breath - Laryngoscopy reveals uniform hyperfunction across voice tasks, no phonetic variability and worsening at the end of a breath; false vocal fold constriction\* (106) |

\* Previously published (16, 39, 52, 99-107)

# Caution - can also be seen in primary dystonia at rest, particularly when the contractions are intense and forceful.