Motor System: Descending Pathways - Corticobulbar

Corticobulbar Tract
origins in cerebral cortex
> much the same as corticospinal tract
  pyramidal cells in lamina V of cerebral cortex
  face, head and neck regions of somatosensory cortex
descending pathway
> much like corticospinal tract
  collect in white matter beneath cerebral cortex
  enter internal capsule,
  at points of termination, axons swing out of CorticoSpinal Tract - CorticoBulbar Tract

terminations in brain stem
> in and around sensory nuclei
> in reticular formation
> in somatic motor nuclei
notes on terminations in brain stem (continued)

> motor nuclei of CNs III, IV, VI (somatic motor) - limited influence
do not considered as a part of Corticobulbar Tract

> via interneurons

> motor nuclei of CNs V, VII, IX, X, XI, XII (somatic motor) - important influence

from Frontal Eye Fields, parietal cortex (visually guided movement)

via gaze control centers in midbrain and pons

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notes on terminations in brain stem (continued)

> motor nuclei of CNs V, VII, IX, X, XI, XII (somatic motor) - important influence

> via interneurons

> general rule: bilateral terminations, but ... some exceptions with clinical importance
corticobulbar inputs and results of corticobulbar damage

for trigeminal motor nucleus (V)
bilateral input of corticobulbar fibers; contralateral may predominate (variable)

for facial motor nucleus (VII)
bilateral input to SMNs for upper part of face; contralateral input to SMNs for lower part of face

effect of corticobulbar damage (cerebral cortex, internal capsule, brain stem)
for muscles of mastication

for muscles of upper face
for muscles of lower face

X = side of corticobulbar damage
corticobulbar inputs and results of corticobulbar damage (continued)
for nucleus ambiguus (IX and X)
bilateral input, but ...
mostly contralateral to SMNs for muscles on each side of soft palate
(these muscles elevate soft palate and uvula)

**X = side of corticobulbar damage**

effect of corticobulbar damage (cerebral cortex, internal capsule, brain stem)
for soft palate and uvula

for accessory motor nucleus (XI)
bilateral input, but ..... predominantly ipsilateral, contralateral or ?
to sternocleidomastoid and trapezius SMNs

**X = side of lower motor neuron damage**

**X**

effect of corticobulbar damage for SCM

**X**

effect of corticobulbar damage for trapezius
for hypoglossal motor nucleus (XII)
bilateral input, but...
mostly contralateral to SMNs of genioglossus muscle
each genioglossus (GG) moves the tongue
in an anterior and medial direction;
together, the two GG muscles protrude the tongue

effect of corticobulbar damage
for tongue (genioglossus muscle)

tongue

upon protrusion of the tongue

pseud bulbar palsy
set of clinical signs
difficulty with swallowing, chewing, speaking, moving tongue, facial movements
paresis of affected muscles (no atrophy, no fasciculations)
bilateral loss of cortical input to CNs V - XII
due to multiple bilateral strokes, MS, ALS ....

additional signs of PSB: inappropriate outbursts - laughing, crying
result of corticobulbar and corticospinal damage

lesion of internal capsule on one side
what’s the effect on the following
- muscles of upper face
- muscles of lower face
- muscles of palate - deviation of uvula
- muscles of tongue - deviation of tongue upon protrusion
- upper limbs
- lower limbs

cause:
problem with branches of middle cerebral artery

lesion of cerebral peduncle on one side involving CN III on that side
what’s the effect on the following
- muscles that move the eyes - deviation of gaze
- iris (pupillary light reflex) and eyelid
- muscles of upper face
- muscles of lower face
- muscles of palate - deviation of uvula
- muscles of tongue - deviation of tongue upon protrusion
- upper limbs
- lower limbs

cause:
problem with branches of posterior cerebral artery
term: superior alternating hemiplegia
hemiplegia = paralysis of skeletal muscles on one side of the body due to UMN injury

term:
superior alternating hemiplegia

lesion of pons on one side involving CNs VI and VII on that side
what’s the effect on the following
- muscles that move the eyes - deviation of gaze
- muscles of upper face
- muscles of lower face
- muscles of palate - deviation of uvula
- muscles of tongue - deviation of tongue upon protrusion
- upper limbs
- lower limbs

cause:
problem with branches of basilar artery
term: middle alternating hemiplegia

lesion of medulla and pyramid on one side involving CN XII
what’s the effect on the following
- muscles of upper face
- muscles of lower face
- muscles of palate - deviation of uvula
- muscles of tongue - deviation of tongue upon protrusion
- upper limbs
- lower limbs

cause:
problem with branches of anterior spinal artery
term: inferior alternating hemiplegia

cause:
problem with branches of middle cerebral artery