

Types Of Intrinsic Muscles

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Introduction

The hands are used to perform all the manual tasks in our daily lives, so understanding the muscles of the hands and the way these muscles perform is very important. Extrinsic and intrinsic muscles are the two categories of the hand which allow its movement. The crude movement and grip are controlled by the extrinsic muscles, whereas the intrinsic muscles control the fine motor movement. The paper will focus more on the intrinsic muscles, which are located in the hand.

Types of Muscles

This intrinsic muscle can be further divided into different types, which are discussed in detail below.

Thenar Muscles: These muscles are attached to the base of the thumb. These three short muscles form a small bulge on the palm called thenar eminence and are responsible for the movement of the thumb. The names of these muscles are Opponens Pollicis, Abductor Pollicis Brevis and Flexor Pollicis Brevis.

Hypothenar Muscles: The muscles attached to the little finger form a muscular protrusion called hypothenar eminence. Similar to thenar muscles, it has three muscles, namely, Opponens Digiti Minimi, Abductor Digiti Minimi and Flexor Digiti Minimi Brevis. These muscles help the movement of the little finger.

Lumbricals: These are four muscles attached to each finger, excluding the thumb. They are extremely important for the movement of the fingers as these link the extensor tendons with the flexor tendons.

Interossei: These muscles are present between the metacarpals and can be further divided into two categories: dorsal interossei, which are the most apparent muscles, and palmar interossei, which are located on the inner side of the hand (Jones, 2020).

Sensory Stimulus Pathway

The hand is the body part that is largely associated with the sense of touch, and the neural pathway responsible for it is called the lemniscal pathway. The spinal cord's primary axon is parallel to the dorsal root. This axon is imperative for sending pain signals. This axon continues at the dorsal side of the spinal cord until it connects with the secondary axon in the neuron chain. The second axon is located in the medulla, from where it crosses the midline, travelling upwards towards the medial

lemniscus to the ventral posterolateral nucleus of the thalamus. Here, the second axon connects with the third axon in the neuron chain. The third axon is connected to the somatosensory cortex, which is the part of the brain responsible for determining the origin of the stimulus. So, the lemniscal pathway gets activated when the hand comes in contact with any object. Most of the sensory neurons of the hands are present at the tips of the fingers, which is extremely helpful as humans use their fingers to grip different objects. If the object is hot or sharp, the sensory neurons will quickly send a signal to the brain, which in turn sends a command to quickly release the object. This prevents further damage from being inflicted on the hands (Abraira & Ginty, 2013).

Prime Mover, Synergists, and Antagonists

As stated previously, the cluster of intrinsic muscles is the prime mover of the hand. These clusters of muscles include the thenar muscles, hypothenar muscles, lumbrical and interossei. Each muscle is attached either to a finger, thumb, or metacarpal and together, these help with the fine movement of the hand. The extrinsic muscles are the synergist muscles of the hand, as these are present in the forearm and move in accordance with the intrinsic muscles of the hand. These muscles mostly originate from the humerus connecting to the elbow and are responsible for the crude movements of the hand. These muscles are further divided into anterior and posterior sections. The anterior section consists of flexors of the humerus. The carpal ligament is the antagonist muscle of the hand as it works in opposition to the hand muscles, allowing for the flexion and extension of the whole hand. Located at the underside of the wrist is the transverse carpal ligament, which allows passage to numerous tendons along with the dorsal carpal ligament (H.E., 2008).

Somatosensory Cortex Damage

Somatosensory means any sensation that may arise in the sensory areas of the body. Stroke can cause severe damage to the somatosensory cortex, causing problems with balance, movement and sensation. It can lead to extreme numbness in the hands, causing the patient to lose all sensations completely. The patient may not be able to tell if something was traced on their hands or even if someone is touching their hands. In extreme cases, the patient may suffer from a paralysis attack in which either the left or right side of the body is paralyzed. In case of paralysis on the right side, the patient has a high chance of recovery; however, if the left side is affected, then the chances of survival are narrow. The hands, in this case, will lose all function like the rest of the body.

Conclusion

Treatment to reverse the somatosensory damage includes physiotherapy, which is extremely helpful in rewiring the brain. Sensory re-education exercises are used to slowly re-invoke sensation in the affected part of the body. This allows the brain to remember the sensations it felt when touching a

certain object. Damage to the somatosensory cortex can not only affect the sensory system of the body but also impact balance and movement. This can be devastating for the patient as all the manual tasks are done with the help of the hands. Even though the damage can be reversed most of the time, it can still be disheartening for the patients who are suffering from this disorder (Meyer et al., 2014).

References

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