

Is Muscle Atrophy From Botox A Thing?

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Neuromodulators have been called everything from a miracle in a syringe to the ultimate skin smoother to a life-changer and everything in between. Yet, some say that long-term use of botulinum toxin type A injections (think: Botox®, Dysport®, Jeuveau®, Xeomin®) – particularly in the masseter muscle (read: the jaw) – can potentially lead to muscle atrophy. But does the claim hold up, or is it another one of those anti-aging tall tales that swirl around the world of aesthetics? We tapped the experts to dig deeper and unearth the truth about muscle atrophy from Botox.

What Is Muscle Atrophy?

No matter where in the body a muscle lives, failure to exercise it and ‘flex’ it regularly (often daily) can render the muscle atrophied or pretty much useless — almost as though the muscle is wasting away and shrinking in size. Treating muscles with neuromodulators is no different.

For a neuromodulator to work correctly, it must limit the activity of a given muscle or muscle group. For that limitation to be visible in terms of a wrinkle-free or slimming result, there must be some form of temporary paralyzation and, in turn, atrophy. It's only natural that the muscle inherently becomes smaller with less activity as a result of the neuromodulator — it's expected to happen. After all, the goal of Botox® and the like (in most uses) is to minimize the appearance of fine and wrinkles. The less time there is between touch-ups and the more product added continuously to the face, the higher the likelihood for atrophy to set in.

Neuromodulators are perhaps one of the most popular aesthetic treatments available today, with more than four million Americans choosing to 'get popped' in 2020 alone. BoNT-A injections work by blocking the nerve and muscle communication signals, and, without that interaction, the muscle does not contract. Just like when wrapping a limb in a cast temporarily shrinks the muscle, the same thing happens to a muscle at rest via neuromodulators, says Dustin Portela, MD, a board certified dermatologist in Boise, ID. "This is desirable when we want to diminish the appearance of lines and wrinkles," he adds.

Some muscle fragility must occur for neuromodulator treatments to be effective. The muscle softening (which can happen in any area on the face) transpires when the muscles are injected with Botox and weaken, in turn getting smaller over time, says Michael Schwartz, MD, a board certified plastic and reconstructive surgeon in Westlake Village, CA. "However, once the muscle starts moving again, it tends to regain its size and strength," he explains.

Neurotoxin-induced atrophy is when the muscle atrophies (i.e. wanes in strength or shrinks) as a result of treatment. It likely occurs temporarily in any muscle into which we inject Botox, says Jonathan Cabin, MD, a double board certified facial plastic and reconstructive surgeon in Arlington, VA. "In general, Botox atrophy is most likely to be noticed when someone has a target muscle that is particularly defined or large or in muscles that more significantly contribute to the facial shape and shadowing," he says. "The jaw, temple, chin, and brow muscles are the most common to have noticeable atrophy."

In some cases, this is the desired effect that wears away over the lifespan of the injection. In others, it's an unwelcome side effect that lingers. Typically, within three to nine months, after treating the muscles with the chosen neuromodulator, they will begin to regain their normal function, says Babak Azizzadeh, MD, a double board certified facial plastic and reconstructive surgeon in Beverly Hills. However, in particular (rare) cases, this does not occur for reasons that are still unknown.

What Botox-Induced Muscle Atrophy Looks Like

Just because you opt for treatment with neuromodulators doesn't necessarily mean that the area will atrophy to the point that it's noticeable or detrimental to how your face looks. "It can happen with the first treatment, but atrophy tends to be more common in patients who consistently receive Botox on a regular schedule in the same area," says **Steven Williams, MD**, a board certified plastic and reconstructive surgeon in Dublin, CA, and the vice president of the American Society of Plastic Surgeons (ASPS). In this instance, the treated areas weaken, and the surrounding muscles may need to overcompensate for the loss of functionality. Plus, as the muscles begin to shrink, they will not fill out the space they consume and a lack of volume may ensue.

Certain parts of the face are more likely to show the effects of atrophy than others (if it even truly happens at all). "It's generally not noticeable in the area between the eyes, like the eleven [lines]," Dr. Portela says. "However, aggressively treating the forehead can cause the frontalis muscle to thin over time." The impact of atrophied muscles can also lead to what some would describe as an undesirable appearance. For this exact reason, Dr. Portela recommends younger patients who seek out preventative Botox do it one to two times per year. "This allows the muscles a chance to recover and move to prevent atrophy," he says.

Why are some parts of the face more inclined to atrophy than others? It comes down to the fiber type of the muscle, Dr. Azizzadeh says. "For example, the neck muscles have different fibers — they contain a lower portion of type I fiber and a higher component of type IIb fibers — and these muscles respond differently to neuromodulators than those in the face," he explains. "Skeletal muscles are composed of three types of fibers, type I, IIa, and IIb, and we could postulate that muscles abundant in type I fibers recover better." It's also believed that certain muscle groups take longer to regain movement than others.

Atrophy may also be seen in the temple area when using neuromodulators as a treatment modality for migraine headaches. "The temporal muscle makes up a significant amount of volume in the temples, and volume loss in the temples can lead to a skeletonized, aged appearance of the upper face," Dr. Cabin cautions. So, if you rely on Botox® to help alleviate the symptoms associated with recurring migraines, be aware that there is the potential for this to occur — especially in those patients who require long-term use. "We can easily correct any temple hollowness with temple filler," he adds.

If some form of atrophy occurs, it doesn't take effect right away – it usually takes four to six weeks to become evident. “The muscle must first weaken, which takes up to two weeks before it starts to shrink from inactivity,” Dr. Cabin explains. Need an analogy to better visualize? “You can compare this to someone who works out a lot and then suddenly stops,” he shares. “Although the person's muscles will rapidly get weaker, there is a delay until the muscle size is actually impacted.”

THE BOTOX-MASSETER RELATIONSHIP

Let's talk about the jaw for a moment. There's a small space where the angle of the ball-and-socket of the jaw meet that houses a muscle known as the masseter. Overactivity and an abundance of strength in the muscle can make the jaw appear square and even be the reason for persistent teeth grinding while you sleep. One of the easiest ways to tone down the muscle's hyperactivity is with a few injections of a neuromodulator.

Years ago, doctors started injecting neuromodulators, specifically Botox®, to slim the jaw and create (in women) less of a square-shaped face and more of a heart-shaped one. This off-label use of the muscle-relaxing injectable provides benefits for three to four months before repeat injections are necessary. While there's still mobility and functionality in the jaw, force is put on a small part of the muscle to relax it and, in turn, soften the jaw. In addition to slimming the jawline, those who experience side effects from temporomandibular joint (TMJ) disorders also enjoy relief.

There is, however, research that suggests there could be ramifications to long-term use. “When treating the masseter muscles to narrow the jaw and or to treat TMJ, if the muscle is kept weak over a while with repeated Botox injections, there is some evidence to suggest that it can negatively impact the strength of the surrounding bone,” Dr. Cabin notes. Any changes to the muscle itself, meanwhile, are believed to be temporary. Dr. Cabin says neuromodulator-related atrophy poses no risk of direct long-term damage to the muscle.

The Net-Net on Muscle Atrophy From Botox

So, is short-term atrophy post-injections all that bad? No. True muscle atrophy – which depends on if the entire area is compromised – can carry risk. However, the chances of long-lasting muscle atrophy occurring from a neuromodulator is rare. Remember that facial paralysis from poorly injected toxins can cause droopiness, laxity, and a change in how the face looks. “But this is different from true atrophy that isn't related to Botox,” Dr. Azzizadeh says.

In the end, a reduction of lines and wrinkles is what everyone wants from Botox. Hence, most see any short-term atrophy as a positive event because the wrinkles they are treating tend to be less visible and potentially require either less Botox or less frequent treatments. On the other hand, once a patient stops using a neuromodulator, the muscle starts to reactivate slowly. With time, it will (with rare exception) regain full strength and size. “Additionally, the functions that that muscle is responsible for and the wrinkles the muscle is responsible for will also come back to typical pre-treatment strength over time,” he adds.

Patients need to know there is not a clinically significant problem since any muscle atrophy is temporary and is often even a desired effect, Dr. Schwartz advises. When it comes to neurotoxin injections, atrophying muscles isn't top of mind for most patients or providers. Plus, true ‘Botox atrophy’ is not commonly seen, Dr. Azizzadeh says. “I've done Botox on over 1,000 patients and have not seen this,” he shares. “Even the patients who are getting Botox don't experience this in their lifetimes.”

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