

Risks of erasing wrinkles: Buyer beware!

Richard Barbano, MD, PhD, FAAN

Many times when one looks back, it is easy to say “it *seemed* like a good idea at the time.” After all, Botox (botulinum toxin type A), has been shown to help erase skin wrinkles. The results have been great. So when a friend offers to get some of it for you, perhaps at much less cost, and even inject it for you, well, that seems like a deal that’s too good to be true. Sometimes it is.

Caveat emptor in Latin means “let the buyer beware.” This might be a good subtitle of the article by Dr. Souayah and coauthors in this issue of *Neurology* (Souayah N, Karim H, Kamin SS, McArdle J, Marcus S. Severe botulism after focal injection of botulinum toxin. *Neurology* 2006;67:1855–1856). The article tells what happens when someone was treated with an inappropriate preparation of botulinum toxin, apparently by a friend. The results were disastrous.

A 34-year-old woman received botulinum toxin injections for cosmetic purposes. However, the preparation was not the FDA-approved botulinum toxin type A (brand name Botox). The injected substance was apparently research-grade toxin and was bought on the Internet. Two days after the injection, the woman developed progressive shortness of breath, swallowing difficulties, double vision, and generalized weakness. By the time she was examined by a neurologist, she was totally paralyzed with the exception of a little movement of her left big toe. An attempt to limit the paralysis with serum against the toxin was too late and did not help.

Electrical studies of various arm and leg muscles showed them to be totally inactive. Tests showed that the woman had extremely high levels of botulinum toxin in her blood. In fact, the authors of the article estimate that she had been given over 2,000 to 5,000 times the usual amount given for cosmetic purposes!

Botulinum toxin works by interrupting the connections between nerves and muscles. Recovery occurs only when more of the protein that has been inactivated by the toxin is made (see About Botulism). The patient was treated in the intensive care unit for any developing problems while waiting for recovery, which was slow. By 3 weeks, she could only shrug her shoulders and move her eyes. By 5 weeks, she could answer with a yes or no. The last time she was evaluated, 10 months after she was hospitalized, she still had problems with muscle pain and weakness and had some shortness of breath.

Apparently, a second person also received injections at the same time. The authors do not give information about the second person, but hopefully he/she recovered as well as the person described in the article. Although having continued problems with muscle pain and weakness does not sound like a “good” recovery, it must be remembered that botulism has claimed many lives over the last hundred years. Even now, deaths occur.

Botulinum toxin is one of the most poisonous substances known. But when that same toxin is carefully isolated and purified, it can be used as a powerful and effective medication.

Botulinum toxin was first introduced as a clinical tool in the 1980s, and its use has skyrocketed as doctors have applied it to an increasing number of medical conditions. It has revolutionized the treatment of a condition called dystonia. This movement disorder causes involuntary contractions of muscles acting in opposite directions, which results in odd postures and twisting, writhing movements of the neck, trunk, hands, or legs. With periodic injections of botulinum toxin into the muscles most affected, countless patients have been relieved of their symptoms.

Perhaps there is a general misunderstanding that anything that can be used for cosmetic purposes must be easy to use and safe. But just like cosmetic surgery, professional training is a must.

All medications have potential side effects. However, patients need to be aware that when appropriately used by trained doctors, botulinum toxin has a remarkable safety record. The important point is that it should be administered only by someone with considerable experience with the medication. It also must be emphasized that the botulinum toxin used in this sad case was NOT the commercial product found in pharmacies and administered by doctors. This was a research-grade product never meant for medical use in humans. And that is another lesson to be learned from this story, one that has a parallel in a warning of innumerable mothers to innumerable children. Don’t take candy from strangers, and don’t use a medication unless you know where it came from!

What is botulism?

Botulism is a poisoning from one of the most powerful toxins known. It is produced by a family of bacteria, the *Clostridia*. This poison, called botulinum toxin, is a protein that interferes with the normal flow of signals from certain nerves to muscles and glands. If enough toxin is present, it can cause a serious or even fatal illness.

What causes botulism?

The spores of *Clostridia* bacteria are found in the soil, and the bacteria grow in many places. However, it is in conditions where there is little oxygen that they multiply rapidly and are most likely to be harmful to people. There are three common ways to get botulism:

1. Food-borne botulism occurs by ingesting the toxin itself by eating foods that have not been properly sterilized.
2. Infant botulism occurs by eating the bacteria or spores.
3. Wound botulism occurs by infection of cuts and wounds by contaminated soil.

Who is likely to get botulism?

There are somewhat over 100 cases of botulism reported each year in the United States. The largest number of these cases is reported in infants. Infant botulism results from eating bacteria or spores, which then grow in the gastrointestinal tract. After multiplying in the gut, the poison is produced and then absorbed. This mostly occurs in infants less than 6 months old who do not yet have the usual bacteria in their intestines. About a quarter of all cases are adult food-borne. These occur mostly after people eat improperly sterilized or contaminated home-preserved food, although any source can be contaminated. So people who eat improperly prepared foods are at risk. The small number of remaining cases of botu-

lism is from infected wounds, since the bacteria live in the soil.

What are the symptoms of botulism?

Botulinum toxin is taken in by certain nerve cells (neurons). The particular neurons that take up the toxin are those that use a specific neurotransmitter, called acetylcholine. (Neurotransmitters are substances that help messages pass between neurons and their targets, such as a muscle or gland.) These neurons control muscle movements and certain secreting glands, such as saliva and tears. Therefore, the symptoms of poisoning are dry eyes, dry mouth, and muscle weakness (see below). The muscle weakness includes the face, limbs, and even the digestive tract, leading to constipation. Double vision and difficulty speaking and swallowing are common. Weakness of the diaphragm and rib muscles leads to difficulty breathing, and sometimes patients need to be put on a respirator. Infant botulism is usually suspected when young infants develop constipation, poor feeding, and floppy heads.

Signs of botulism

- Difficulty swallowing
- Difficulty speaking
- Double vision
- Arm, leg, & trunk weakness
- Difficulty breathing
- Constipation
- Dry mouth
- Dry eyes

Can botulism be prevented?

Destroying the spores requires moist heat of 120 °C (220 °F) for 30 minutes. However, the toxin can be easily inactivated by boiling for 10 minutes or heating to 80 °C (180 °F) for 30 minutes. If you enjoy home canning, make sure to use the proper methods for sterilizing and sealing. Do not eat canned or bottled food where the seal has

been broken. Acidic foods (such as tomatoes) and acidic conditions seem to make it more difficult for the spores to become active bacteria.

Is there any treatment?

A specific antiserum is available to counteract the toxin. However, this must be used *before* the toxin enters the neuron. Whatever amount enters the neuron will not be able to be “neutralized” by the antiserum, and some weakness will develop. Patients must go immediately to a hospital, since difficulty breathing can develop rapidly. When such breathing difficulties are severe, patients need to go on a respirator. Luckily, the toxin is eventually destroyed by the body, and with intensive care, most patients can make a full recovery.

What about medical uses?

When the toxin is carefully purified, it can be used as a powerful medical tool. By taking advantage of the fact that the toxin lessens muscle activity, we can use it to treat a number of medical conditions where muscle overactivity is a problem. The doctor must be careful with the amount used and where it is placed (it is given by injection with a needle rather than taken by mouth). However, manufactured product is carefully measured in each vial and when used correctly has a very good safety record.

Botulinum toxin under the brand Botox has received approval from the Food and Drug Administration for cosmetic (nonmedical) uses as well. The major use is in treating wrinkles and facial lines that result from overactive pulling of the small muscles under the skin. It has proven to be an additional choice to the traditional “face lift.”

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Neurology 2006;67;E17-E18

DOI 10.1212/01.wnl.0000250411.93526.9e

This information is current as of November 27, 2006

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