

## 1. What is hyperhidrosis?

Hyperhidrosis is a disorder characterized by excessive sweating .

Hyperhidrosis is an unpleasant excess of **sweating**, in one or several parts of the body.

Hyperhidrosis is defined as sweating that surpasses the needs of the body to control the corporal temperature. It is a benign condition, but it can be extremely unpleasant for most people. It is a problem that is not so rare and it occurs in up to 1% of the population. In a city like São Paulo, with 12 million inhabitants, there are approximately 120.000 people with that kind of problem. It is very likely that everyone has in their family, at their workplace or among their friends somebody who suffers from hyperhidrosis. It is not so visible most of the times and, feeling embarrassed, people don't like to reveal the disease.

People who have Hyperhidrosis can present an inexplicable sweating increase in many different situations and without any apparent cause. This increase can be felt in the armpits (axillary hyperhidrosis) , in the hands (palmar hyperhidrosis) , in the feet (plantar hyperhidrosis) , in the face (facial hyperhidrosis) or in any other part of the body.

Sometimes, emotions can worsen the process of Hyperhidrosis. People can become insecure because they think they are under emotional tension/ stress , or because they imagine other people might think think they are under intense emotional tension/stress. Although Hyperhidrosis can be caused and worsened because of the emotional factor, it is wrong to say it is caused only because of psychological reasons. In other words, for the same emotion, a person who does not suffer from Hyperhidrosis would not present sweating excess, while the other with Hyperhidrosis, can manifest this excess. However, the presence of Hyperhidrosis along the years, ends up generating emotional

tension that feeds the process in a vicious cycle, where the emotional alterations intensify, turning Hyperhidrosis into a difficult condition for a lot of people to live with.

But Hyperhidrosis can also appear without any emotion, or even without any apparent reason. That causes patients a lot of embarrassment, giving the other people the wrong impression of a great emotional disarray, while actually this emotional factor does not exist in such high degree.

In some cases, people can present hyperhidrosis even in low environmental temperatures and others, in high temperatures.

Some patients refer that they started presenting Hyperhidrosis when submitted to larger responsibilities, usually in professional situations, or during periods of larger emotional loads, as the adolescence, family problems, matrimonial or economical problems. What happens is that these people already suffered from Hyperhidrosis, but with the emotional stress, it became visible.

“The Trigger for Hyperhidrosis Syndrome”, described by **Naturale Clinic’s** doctors, is the group of psychological reactions resulting from the Genetic Hyperhidrosis, that causes anxiety and worsens the signs and symptoms.

## 2.Causes

Heavy jobs, exercises, the sun or hot weather; there are a lot of factors that can cause increased sweating. The emotions can also generate **sweating**. And this **sweating** is a normal condition that causes loss of fluid by the body and maintains the corporal temperature stabilized.

There are 2 types of glands in the skin, the **apocrines** and the **eccrines**. The **sweat glands apocrines** play a smaller role in the **thermoregulation** (regulation of the

corporal temperature); they are associated to the hair follicle and they are not involved in the process of Hyperhidrosis.

The increased secretion of the glands **eccrines** is what causes the observed alterations. The glands **eccrines** are more concentrated in the armpits, palms and plants and have an important role in the **thermoregulation**. The excess of secretion of these glands is the cause of Hyperhidrosis. There are from 2 to 5 million glands **eccrines** distributed in the whole body.

There are 2 types of Hyperhidrosis: the Primary and the Secondary.

Primary Hyperhidrosis does not have an specific known cause, but it is attributed to genetic factors. People are born with the tendency to have Hyperhidrosis. It can be manifested in the first years of life or in any subsequent phase, which in fact is the most commom.

Secondary Hyperhidrosis, is associated to a cause. The most frequent ones are obesity, menopause, the use of antidepressive drugs, endocrine and neurological alterations casing the nervous system to malfunction.

Neurological and psychiatric medicines can unchain Hyperhidrosis. Morphine and excess of the thyroid hormones also cause hyperhidrosis. Aspirin or acetaminofen overdoses can cause sweating. The lack of feminine hormones in the menopause can lead to **sweatings**, and that is something that also happens to men with testosterone deficit, although it is not very commom. The hypoglycemia (low rate of sugar in the blood) can provoke sweating.

**Sweating** excess can happen when the fever, resulting from an infection, is decreasing after the use of anti-thermal medicines. The hyperthyroidism, a disease of the thyroid

gland, is one of the causes of Secondary Hyperhidrosis. Several infections, as tuberculosis, malaria and others, can as well cause profuse sweating.

A sweating increase can happen in common daily situations; that does not necessarily mean the person developed a Hyperhidrosis condition. We can experience sweating increase when having some substances in foods or beverages, among them, caffeine, alcohol or even spicy foods. It is also completely normal to experience **sweating** increase with exercises, hot climate and situations of emotional tension.

### 3. Signs and Symptoms

Most people who do not have Hyperhidrosis and even some professionals in the health area or the patient's family do not know how much hyperhidrosis can disturb their **sufferers**. Although it is not considered a serious health problem, only the ones who have to live with this condition can understand the discomfort it causes. People who have hyperhidrosis refer to the **sweating** excess as a great problem.

Hyperhidrosis affects men and women; it can appear in several ages.

People who suffer from Hyperhidrosis show **sweating** in the same conditions and under the same incentives that the other people; the only difference is that it happens in larger amounts. On the other hand, they can show **sweating** even in conditions where other people would not present it: in situations with low emotional loads and in normal temperature. That ends up generating an anxiety process that feeds Hyperhidrosis.

Formerly, the association of Hyperhidrosis to psychological problems was quite normal, but nowadays we understand Hyperhidrosis has a genetic cause. The patient is born with the tendency to develop the disease. The evidence of this genetic cause is that in the patients' families it is very common that their direct relatives (parents, siblings, uncles, aunts or grandparents) also suffer from the same problem. Recent publications

in the USA confirm this possibility. Another evidence of the genetic cause is that even very small children have Hyperhidrosis.

What actually happens is that Hyperhidrosis is a great problem for their **sufferers**, and it provokes psychological problems that are consequences and not the cause of Hyperhidrosis.

These psychological alterations are easily perceptible in the patients. Therefore, in the past, they motivated the psychological and pharmacologic treatment of this problem with not so good results. As we have already emphasized, the psychological alterations are consequences and not the cause of Hyperhidrosis.

Many patients refer that Hyperhidrosis first appeared or worsened when they were submitted to high professional responsibilities or to situations of emotional distress when they were young adults or adolescents.

In addition, many of the patients mention that just after they noticed they started sweating, the sweating became more intense. We called that "Syndrome of the Trigger for Hyperhidrosis."

The "Syndrome of the Trigger for Hyperhidrosis" is related to the psychological alterations provoked by Hyperhidrosis.

The patients with Hyperhidrosis, in almost its totality, can present "The Trigger for Hyperhidrosis Syndrome". They explain that when they notice that they are going to start sweating, they enter an anxiety process which is generated by their own conscience. As a consequence, they sweat in an even more intense degree. That happens because Hyperhidrosis provokes psychological alterations that feed the hyperhidrosis process, generating a vicious circle: Hyperhidrosis of genetic origin provokes psychological alterations that intensify Hyperhidrosis and, consequently, more psychological

alterations, feeding the vicious circle and generating the "The Trigger for Hyperhidrosis Syndrome"

“The Trigger for Hyperhidrosis Syndrome”, described by **Naturale Clinic’s** doctors, is the group of psychological reactions resulting from the Genetic Hyperhidrosis, that causes anxiety and worsens the signs and symptoms. That way, the psychological alterations of Hyperhidrosis are put as consequences and not as the causes the problem.

Therefore Hyperhidrosis is a cause of psychological problems and not itsr consequence.

Hyperhidrosis occurs mainly in the armpits, the hands and the feet, but it can also occur in the face, mainly in the frontal area (the forehead) and the scalp, as well as the thorax, the nape, the area under the mamma, the inguinal area or any other area of the body.

The **sufferers** of Axillary Hyperhidrosis (armpits) complain about excessively wet, stained and damaged clothes; the aspect of lack of hygiene; the impression they give people of emotional disarray, and lack of adaptation to the necessary clothes for their work.

The **sufferers** of Palmar Hyperhidrosis (hands) complain about problems to handle papers in several types of activities, to play instruments, to type, to greet with a handshake, in closer contacts, to drive and to practice sports. .

The **sufferers** of Plantar Hyperhidrosis (feet) complain about exaggerated humidity, tendency to get mycoses and the sensation that the feet slip inside the shoes.

We could observe an increase in the number of bacteria in humid areas of the body. Hyperhidrosis can be associated to the increase of odors of the body, although it is not the directly responsible for this kind of problem.

#### **4. Treatments**

There are two efficient treatments for Hyperhidrosis: the Botulinum Toxin and Sympathectomy.

Sympathectomy is a kind of surgery that has been used for a very long time, performed with an old technique, through a cut above the clavicle, or with a modern technique, through a small incision in the thorax and with the aid of video equipment. It is a very efficient technique, but SYMPATHECTOMY HAS COMPLICATIONS. These complications, although rare, are real, making the choice of that kind of treatment a very serious decision for both the doctor and the patient.

A new, modern and free of risk technique, the Botulinum Toxin (Botox / Dysport), was added to the treatment of Hyperhidrosis. The injection of the Botulinum Toxin in the hand, in the armpit or in other parts of the body eliminates the **sweating** completely. The procedure is performed without the need of hospitalization. It can be carried out in a medical clinic and the patient can return to his normal activities on the same day. The treatment with the Botulinum Toxin is not definitive, but other injection applications can be made every 6/12 months, depending on the case. This procedure keeps the area being treated free of sweating.

The advantage of the Sympathectomy is that it is definitive. The disadvantage is that it is a surgery and complications can result from it. Some of them may be irreversible .

The advantage of the Botulinum Toxin (Botox / Dysport) is that it does not present any risk and it is not a surgery. Its disadvantage is that it is not definitive. Therefore, the two techniques exist exactly because they are different.

Considering the absence of risks or complications and due to the fact that procedure is quite simple, we prefer using the Botulinum Toxin (Botox / Dysport) to Sympathectomy in our Clinic. The Botulinum Toxin has undeniable advantages to the surgical techniques. It can be applied in the hands and armpits, in the front area of the face, in

areas of the neck and in small areas of the thorax, with risks that are practically inexistent. **Naturale Clinic's** Medical group presented the first scientific work in Brazil, the fourth in the world, regarding the Botulinum Toxin and Hyperhidrosis.

In the past, other treatments were tried, but they did not show efficiency: The ointments and salves use, the psychological treatments, the medicines, the iontoforesis, the surgery to remove the glands were used with very limited efficiency.

### **5. Naturale Clinic's Treatment**

Many patients can benefit from the Sympathectomy, but some few ones can not. As the problems resulting from the surgery are unexpected and do not depend on the doctor who performs the surgery, we prefer to treat Hyperhidrosis with the Botulinum Toxin (Botox / Dysport) because it does not cause neither Compensatory Hyperhidrosis nor Syndrome of Horner, and there are no surgical complications.

If the choice is safety, the best option is the Botulinum Toxin (Botox / Dysport) injection. If the choice is the fact of being definitive, the best option is Sympathectomy, in spite of its important risks and possible complications.

### **6. The Treatment with Botulinum Toxin (Botox / Dysport)**

Although it is unpleasant, Hyperhidrosis is a benign problem. Therefore any procedure that involves disproportionate risks to the problem should be discarded as a treatment form. In recent years, the use of Botulinum Toxin has begun to be dominated. This treatment has been safely used and it can be applied for a wide variety of indications, among them, the control of Hyperhidrosis. The Botulinum Toxin seems to be a safe and simple alternative for the control of the excessive sweating.

In outbreaks of Botulismo B that happened in Switzerland, it was observed that the Botulinum Toxin, besides the blocking action in the striated musculature, it also

blocked the neuro transmission of the autonomous nervous system. There were patients with Botulism that presented sweating suppression that lasted up to 2 years .

The first report of sweating suppression using the pharmacological Botulinum Toxin was made in a study in 1995. At that time, a volunteer doctor injected in himself 1 unit of Botulinum Toxin in the subcutaneous of the forearm. As a result, the sweating of this region was decreased.

Nowadays, the Botulinum Toxin has been used to control the palmar and axillary Hyperhidrosis and even the Hyperhidrosis of other parts of the body. The time of action varies from 4 to 12 months, depending on the case and on area of the injections. The effects aren't definitive, but the repeated injections may be used, showing great results in the immense majority of the cases.

Botulinum Toxin used for therapeutical situations is increasing, and the indications reach wide areas of medicine. It is used in neuromuscular dystonia, in aesthetic treatments, in oftalmologic problems, for Frey' s Syndrome, muscular spasms, and an indication that promises to be very positive, the tensional migraine. Frequently, patients who are submitted to the Botulinum Toxin treatment for aesthetic control of the forehead wrinkles, refer to the improvement of chronic tensional migraine. It is not hard to find patients who regularly use the Botulinum Toxin to control wrinkles requesting the re-injections because of the improvement they obtained in chronic tensional migraine they previously suffered from.

Although several vascular surgeons who are part of our group are used to the technique of the Sympathectomy, we prefer using the Botulinum Toxin (Botox / Dysport). We do not use Sympathectomy because of the risks involved in it. They are rare, but real and may cause definitive complications as the syndrome of Horner, that is the fall of the eyelid, an unsightly complication, that cannot be corrected. This decision

is mainly because of the risk of Compensatory Hyperhidrosis (profuse **sweating** in another part of the body as a consequence of Sympathectomy)

Botox is already a widely known product, although there are others like Dysport and Myoblock. It is a substance that has been used by the medicine for a long time. In great doses, it is a powerful poison; in small doses, it is a wonderful medicine.

The Botulinum Toxin (Botox / Dysport) is used for the treatment of muscular contractions, wrinkles, migraine, spasms, spastic paralyzes, hyperactivity of sphincters, and many others fields of the medicine. Recently, new uses for this substance have been discovered, including the control of Hyperhidrosis.

When applied in the skin, the Botulinum Toxin turns the nerve of the sweat gland off. It is as if it turned off the light switch. The nerve is quite normal and so is the **sweating** gland, but there is no passage for the nervous impulse that provokes the **sweating**. As Hyperhidrosis is just a **sweating** abundance, the Botulinum Toxin is able to abolish Hyperhidrosis temporarily.

As the nerve is normal and so is the **sweating** gland, after a period of time that depends on the place where the Botulinum Toxin was injected in the body, there is a reconnection of the nerve and the gland. As a result, the nervous impulse reaches the gland and the **sweating** appears again. But the Botulinum Toxin (Botox / Dysport) can be injected repeatedly, causing the Hyperhidrosis to decrease again.

If the necessity of re-injecting the Botulinum Toxin seems to be inconvenient, it is in fact a warranty that if any complication happens, they will be reversible. These problems are rare and practically inexistent. With Sympathectomy, things are different; if the procedure results in complications, they aren't reversible.

## **7. Hyperhidrosis - Treatment with the Botulinum Toxin - Efficiency length of the blocking action**

In **Naturale Clinic's** researches, we observed that the suppression of Hyperhidrosis does not last the same for all patients. In the case of the armpit, the chemical blocking action is efficient for an average of 7,33 months, varying from 4 to 12 months. With the evolution of the technique, the efficiency of this substance is going to be increased.

There is also another very important effect of the Botulinum Toxin called Psychological Residual " Positive Effect ". What happens is that, once applied, the Botulinum Toxin (Botox / Dysport) will cause the suppression of the sweating for the length of time mentioned above. However, we have noticed that although the chemical effect disappears after this period of time, the patients take longer to return for new injections. Even taking longer to re-inject the substance, 92% refer an improvement in their quality of life. Another important fact is that 61% of the patients, refer that Hyperhidrosis reappeared in smaller amounts than the initial phase.

Almost all the patients present "The Trigger for Hyperhidrosis Syndrome", a condition we have already described. That means that when they notice they are going to start sweating, they sweat even more. That is a result of an anxiety process generated by the patient's conscience.

Recent reports associate Hyperhidrosis to genetic basis. However, psychological alterations are easily perceptible in the patients who **suffer from hyperhidrosis**. In old times, these psychological alterations motivated the use of medicines and psychological treatment, with no uniform results.

We believed that the psychological alterations are consequences and not the cause of Hyperhidrosis. Hyperhidrosis is observed even in children of very young age who haven't been submitted to the psychological processes of life. This is a strong argument

against the psychological causes of the problem. However, many patients refer that Hyperhidrosis appears or is worsened when they are submitted to pressures of life, like professional responsibility when they are young adults or in adolescence. We repeat, because it is important, that almost all the patients present what we called "The Trigger for Hyperhidrosis Syndrome"; they explain that when they notice they are going to start sweating, they sweat even more. That causes an anxiety process which results in an even more intense sweating condition.

That happens because Hyperhidrosis causes psychological alterations that generate a vicious circle: Hyperhidrosis, of genetic origin, provokes psychological alterations that provoke more Hyperhidrosis and, consequently, more psychological alterations. That feeds the vicious circle and causes "The Trigger for Hyperhidrosis Syndrome".

The transitory chemical suppression of the sweating with the Botulinum Toxin makes the patients feel more confident. The patients understand they control the sweating, re-injecting the toxin when necessary. The patients did not have this capacity before. In other words, the vicious circle is broken; the trigger is disarmed with the positive psychological action of the toxin. This positive psychological action of the toxin is responsible for smaller sweat volumes observed in many patients after its chemical effects are finished.

The psychological alterations of Hyperhidrosis are consequences and not the cause of the problem. The suppression of the sweating with Botulinum Toxin has an immediate chemical effect and a positive psychological late effect, what results in better quality of life for the patients. "The Trigger for Hyperhidrosis Syndrome" is the group of psychological reactions resulting from the Genetic Hyperhidrosis, that causes anxiety and worsens the signs and symptoms.

As the Botulinum Toxin injection (Botox / Dysport) is a very simple procedure, it can be performed at the clinic. In our opinion, it is the best alternative to control most of the cases of Hyperhidrosis. .

## **8. How the Botulinum Toxin (Botox / Dysport) is applied**

How to perform the treatment of Hyperhidrosis with the Botulinum Toxin (Botox / Dysport)

### **8.1 the Appointment**

We suggested an appointment before the injection of Botulinum Toxin for the correct evaluation of the case and planning of the treatment. Besides, it is the time for explanations to the patient and an important time to answer eventual doubts. If the patient comes from another place/city, the appointment can be scheduled for the same day of the procedure, and the previous explanations can be given by telephone or E-mail.

### **8.2 the Procedure**

It is performed at the clinic for cases of axillary, plantar or facial Hyperhidrosis. In cases of plantar Hyperhidrosis, the treatment is performed at the day hospital. The treatment is performed under local anesthesia . After the local anesthesia, the Botulinum Toxin (Botox / Dysport) is applied in the skin of the affected area. The whole procedure takes an average of 15 minutes for each armpit and 25 minutes for each hand.

### **8.3 preparation before the treatment**

Just a good hygiene of the area to be treated with medicinal soap is necessary .

### **8.4 after the treatment of axillary Hyperhidrosis**

It is not necessary any special care. The patient can return to his professional activities immediately. Exercises can be practiced on the following day.

### **8.5 after the treatment of Hyperhidrosis of the hands**

The patient can return to his normal activities immediately after the end of the local anesthesia effect. We just advise the patient to avoid the use of the hands in activities that expose them to the dust, grease, etc, for one day. Exercises can be practiced on the following day. Exercises with weights can be practiced after two days.

## **9.History**

It was a German poet, who was also a doctor and scientist, that explained the disease called botulism. Dr. Justinus Kerner of Wurttemberg, published the first studies about the disease from 1817 to 1822. Dr. Kerner, a representative of the romantic German poetic movement, had his poems turned into music by Schumann. But in his first studies of the botulism, Dr. Kerner already imagined that the toxin that caused such a serious disease, could be used to treat diseases like muscular spasms. That great poet, great doctor, excellent scientist, and amazing human being, always stood out in all of the areas he was involved. But the medical poet could not glimpse that this toxin would one day be used to treat people's appearance and to make them happier.

In 1978, the toxin was applied in humans as treatment by Scott, and surprisingly, it was so safe that it would be used in many other medical indications, besides the aesthetics field. Jean Carrhuters worked with Scott applying the toxin for strabismus treatment. A strabismus patient treated by Carrhuters told him her wrinkles got a lot better after the toxin was applied. Along with her husband, Jean Carrhuters started to use the toxin for cosmetic proposes; it was the beginning of a revolution that we have observed in the treatment of the wrinkles and of the aging of the facial skin .

In a Botulism B epidemic in Switzerland, it was observed that the Botulinum Toxin, besides the blocking action in the striated musculature, it also blocked the neuro transmission of the autonomous nervous system. There were patients with Botulism that presented sweating suppression that lasted up to 2 years .

The first report of sweating suppression using the pharmacological Botulinum Toxin was made in a study in 1995. At that time, a volunteer doctor injected in himself 1 unit of Botulinum Toxin in the subcutaneous of the forearm. As a result, the sweating of this region was decreased.

Then, in Europe, there were studies to block the sweating in volunteers without Hyperhidrosis, and finally, in patients with axillary Hyperhidrosis. Therefore, later in the USA, the toxin was applied in Hyperhidrosis of the hands.

**Naturale Clinic's** head, Miguel Francischelli Neto MD PhD, presented the first scientific work in Brazil about the use of the Botulinum Toxin to control the Hyperhidrosis. This scientific work was the fourth in the world. Many other works , BY Prof. Francischelli, followed this one.

The use of toxins are part of the history of the medicine. It was the same with the penicillin produced by a mushroom, and with the captopril, a drug that is widely used for hypertension derived from the “jararaca” snake poison. Many other toxins resulting from natural substances have been used as well. The doses used for the treatment of the wrinkles are around 30 times inferior to the ones that would cause larger complications or diseases. This makes all the procedure very safe. The doctor, poet and scientist Kerner, would be satisfied if he saw such dangerous toxin being tamed and used for the happiness and the improvement of the people's quality of life

## **10. Video Endoscopic Sympathectomy**

The videoendoscopic Sympathectomy is performed under general anesthesia. A stem is introduced through a small cut in the thorax. With the aid of the video, the surgeon identifies the sympathetic nerve. Through a cauterizer, the responsible nerves for Hyperhidrosis are destroyed. The technique is efficient, with excellent results. But it presents complications, among them, the most frequent one is the Compensatory Hyperhidrosis (a **sweating** increase in other parts of the body), that it is a very unpleasant situation.

The surgical treatment of Hyperhidrosis, the Sympathectomy, involves the removal of a specific part of the main sympathetic nerve. It is well known that the sympathetic nerves are part of a separate and parallel nervous system. The anatomical position and the function is separate from the somatic nerve system (voluntary), which are the nerves that control the sensations and the movements. The "chain" of sympathetic nerves is formed by a group of nerves located close to the ribs in the thorax. They are very close to the spine. The nervous branches, that leave the ganglia, reach the gland and stimulate the sweating. There is a ganglion in each vertebral level of the spine and all these ganglia are attached one to another longitudinally forming the "sympathetic chain". The branches of the sympathetic nerve come off each one of these ganglia and they will act on the blood vessels and **sweating** glands in the body. The surgical therapy for Hyperhidrosis requests the removal and destruction of this specific ganglion that cause the **sweating** of the hands and armpit. There is a variety of manners of working with the sympathetic ganglia: removing, cauterizing, or cutting the branches. All of these techniques are capable to block Hyperhidrosis.

In the classic technique to treat Palmar Hyperhidrosis (hands), the ganglion of T2 is moved away or destroyed. Many surgeons will also remove the third ganglion to maximize the chance to stop the **sweating** of the hands completely. To treat the armpit, the second and third ganglion is moved away or destroyed. Just the same, some surgeons will also destroy the fourth ganglion to maximize the result. To reduce the possibility of

Compensatory Hyperhidrosis, the ganglions are being more selectively chosen. But this does not guarantee that compensatory Hyperhidrosis won't happen and it increases the chances of reoccurrence of Hyperhidrosis.

In the past, an incision of larger size was used in the thorax or in the lateral of the neck. That demanded cuts with scars to expose the sympathetic chain. However, recent progresses in technology produced less invasive methods, such as the videoendoscopic Sympathectomy. This requests general anesthesia for the patient. Once asleep, two or three small holes (5-10 mm) are performed in the thorax. Through these holes, an endoscope with a video camera sends images to the doctor. With this technique, the sympathetic chain can be identified. Through the incisions, instruments are introduced to allow the surgeon to remove and destroy the specific ganglions, depending on the patient's symptoms. To perform this operation, the patient's lung has to be collapsed to allow appropriate space for the surgeon to maneuver. After the conclusion of the operation, the lung is refilled and the incisions are closed. Occasionally, a small tube is maintained inside the thorax to allow evacuation of air, however, that is removed some hours after the surgery. After a side is completed, the surgeon repeats the procedure on the opposite side

Usually, the patients leave the hospital in a period of 24 hours following the surgery. There is some post-operative pain, which requires medication for some days.

## **11. Complications of the Sympathectomy**

### **11.1 Compensatory Hyperhidrosis**

When Videoendoscopic Sympathectomy is performed, with the destruction of the sympathetic chain, the Hyperhidrosis in the superior members is extinguished, whether it is in the hand or in the armpit. However, the capacity to sweat does not disappear only in the armpit and in the hands, but also in the whole superior member and part of the

thorax and neck. As the **sweating** is a form of regulating the temperature of the body, an increase of sweating in other parts of the body can be felt. This process is normal after a surgery and it is called Compensatory Hyperhidrosis. For most of the patients, Compensatory Hyperhidrosis is light and it can disappear after some time. This condition is acceptable and the patient has a better situation than the initial problem of axillary and palmar Hyperhidrosis that motivated the surgery. However, in a smaller percentage of cases, around 5 to 10%, Compensatory Hyperhidrosis is unpleasant and in rare cases worse than the previous situation. Some patients complain about **sweating** in the abdominal region, on the back, in the inguinal area, part of the face, or in the feet. The Compensatory Hyperhidrosis does not depend on the surgeon's expertise, because it is not only a complication, but a side effect of the treatment that can happen in different ways for each patient.

Some patients feel so disturbed by the Compensatory Hyperhidrosis that they would like to revert the surgery. This is not possible nowadays, although some attempts have been made in other countries, but with poor results.

In some cases, injections of Botulinum Toxin (Botox / Dysport) can improve Compensatory Hyperhidrosis.

When we use injections of Botulinum Toxin for the treatment of Hyperhidrosis, there is no risk of Compensatory Hyperhidrosis since the treated area is not the whole superior member as in Sympathectomy. The treatment with Botulinum Toxin is performed in a smaller area, corresponding to the Armpit or the Hand. **This is the main reason why we prefer the Botulinum Toxin (Botox / Dysport) to Sympathectomy to treat Hyperhidrosis.**

## **11.2 Gustatory Hyperhidrosis**

Another potential side effect is the gustatory **sweating**. Patients that develop this type of problem increase the **sweating** when they are eating. This happens in approximately 5-10% of the patients, but it is rarely severe.

### **11.3 syndrome of Horner**

Another fortunately very rare problem that can be a side effect of a Sympathectomy is the syndrome of Horner. That means the the drop of the eyelid. These complication although rare, is irreversible.

There is a ganglion called “stellate” , from where nervous fibers that are responsible for maintaining the eyelid open come off. During a Videoendoscopic Sympathectomy for Hyperhidrosis, due to alterations of the anatomy or due to the heat of the cauterization of the vessels close to the stellate ganglion, this ganglion can be damaged during the surgery. As a result, an inadvertent lesion of this ganglion can happen.

Such situation does not depend on the surgeon's expertise; it could happen even when the surgeon takes the maximum of care. Although it is a very rare situation, it can happen in numbers that vary from 1 to 5% of the surgeries performed. Although rare, it is the most feared complication of the surgery of videoendoscopic Sympathectomy.

### **11.4 General risks**

Other complications as bleeding (hemotorax) and perforation of the lung (pneumotorax) can happen, but they are rare and treatable. There may be cases of complications resulting from the anesthesia, although in their majority, they are controllable. The infection is rare, but there is a risk. Because an endoscope and instruments are passed between the ribs, it is possible to damage an artery, a vein or a nerve that run under each rib. This could potentially lead to a bleeding or inflammation of the nerve with chronic irritation or pain. Although most of these operations are

performed in young adults, older patients are exposed to larger probability of complications when they undergo this procedure. These patients are subject to the risks of heart problems (heart attack, abnormal rhythm), pneumonia, clot, and infections and urinary infections. The incidence of any of these potential complications is very low (1% or less) but such problems can appear with any surgery form, and the patients should be aware of all of the risks involved. Lung adherences can hinder or impede the treatment, increasing risks.

### **11.5 Justifying our position**

Many patients are benefitted by the Sympathectomy, but some few ones are not. As there are unexpected situations that do not depend on the doctor who performs the procedure, we prefer treating Hyperhidrosis with the Botulinum Toxin (Botox / Dysport). This is our choice because the procedure does not cause Compensatory Hyperhidrosis, Syndrome of Horner, or surgical complications. If the choice is safety, the best option is the Botulinum Toxin (Botox / Dysport). If the choice is the fact of being definitive, the best option is Sympathectomy .

12. Sympathectomy X Botulinum Toxin (Botox / Dysport)

Most of the patients who are submitted to the Sympathectomy can benefit from it, but others can not. The number of patients who develop Compensatory Hyperhidrosis and who are unhappy with the results can reach 10%. Besides, this is a condition that is frequently not reversible.

Many patients are benefitted by the Sympathectomy, but some few ones are not. As they are unexpected situations that do not depend on the doctor who performs the procedure, we prefer treating Hyperhidrosis with the Botulinum Toxin (Botox / Dysport). This is our choice because the procedure does not cause Compensatory Hyperhidrosis, Syndrome of Horner, or surgical complications. If the choice is for safety, the best option is the Botulinum Toxin (Botox / Dysport). If the choice is the fact

of being definitive, the best option is Sympathectomy . "Although we recognize the risks of the videoendoscopic Sympathectomy are rare, we state that no doctor can say they do not exist. That's the reason why we have chosen the treatment with injections of Botulinum Toxin (Botox / Dysport) to control Hyperhidrosis. We have not suggested or performed Sympathectomy as a treatment for Hyperhidrosis. In the future, if the method proves to be safer and more previsible in relation to its complications, we can review our position "

This is the opinion of **Naturale Clinic's** medical team, which has already been clearly declared in publications in medical magazines and presented in Congresses as well. However, we remind that other points of view are accepted by the medical and scientific community, including the practice of the Sympathectomy, that is performed by many institutions in Brazil and in other countries. This is a subject that is still in development and in debate.