Minimally invasive thoracic sympathectomy
Laureano Molins, MD, University of Barcelona

Slide 1
I am honored to be here.

Slide 2
I have no disclosures.

Slide 3
The learning objectives of this talk include: the different surgical approach to hyperhidrosis and flushing; results and secondary effects; the technique of clipping and unclipping; and to demonstrate that this could be an outpatient surgical program.

Slide 4
The slide shows the indications for sympathectomy.

Slide 5
There has been an evolution of the sympathectomy from unilateral to bilateral, sympathectomy, sympathicotocomy, then clipping, coming from three ports to two ports to one port and then back to two ports, from lateral to supine position, the level of the section, to place a chest tube or not, from hospitalization to outpatient.

Slide 6
Hyperhidrosis and facial blushing cause severe embarrassment, presenting not only psychological and social problems, but also educational and occupational handicaps. Interruption of the thoracic sympathetic chain has proved to be a good choice of treatment for both conditions.

Slide 7
Sympathicotomy, which entails transecting the sympathetic chain, is the most common thoracoscopic technique. It entails identifying the thoracic sympathetic chain and transecting it sharply, with electrocautery or with a harmonic scalpel. The clipping technique blocks the sympathetic chain with a titanium clip without resection.

Slide 8
There is a good expert consensus document from Dr Cerfolio and co-workers, and there are also guidelines we participated in 2 years ago.
The classical classification of Lin-Teleranta, recommend the specific sympathetic level of blockade. ‘T’ has become ‘R’ now for ‘rib’. So, for facial blushing and/or sweating you have to interrupt level R2 or level R3, for palmar hyperhidrosis go to R3 and/or R4, and for axillary hyperhidrosis you should go down to R5.

Compensatory sweating is the most common secondary effect of sympathectomy. It develops in about 30-75% of patients and may be troublesome in about 5%.

Many patients can regret deciding to have surgery, because of severe compensatory sweating.

Here, in this series, you can see compensatory sweating occurs in 45-94% of people. If you ask people, most will report this secondary effect, but severe can range as high as 30%, sorry, 13%, or as low as 1%.

Here is another series, with ranges from 10% to 100%, so it is difficult to establish.

Sympathetic nerve conduction is difficult to recover after cutting the sympathetic nerve. The surgeon can only offer to wait for spontaneous recovery of compensatory sweating or experimental techniques (such as nerve graft).

The main disadvantage of sympathectomy is its irreversibility. To date, there has been no medical or surgical method completely successful in solving this problem.

The ganglionar blockade (or the clipping) shows similar effectiveness as sympathectomy in clinical experience and published series (this series was published by myself, Dr Fiblo and co-workers). Clipping the sympathetic chain, instead of cutting it, allows an effective blockade, and has the potential benefit of reversibility in the case of Horner’s and/or severe-intolerable compensatory sweating.

Clipping offers a potential option of treating severe compensatory sweating by removing the clip from the sympathetic nerve.

There are some series telling us that the effectiveness is similar.

And it seems that compensatory sweating is even less.
Also, this series from Ringhofer in Vienna, shows the effectiveness is a little less, but the severe compensatory sweating is quite low.

Slide 21
This is another series showing the same effectiveness of cutting and clipping with similar compensatory sweating and similar satisfaction.

Slide 22
In our series since 2007, we have come from sympathicotomy to clipping, and we have seen similar results in improvement in compensatory sweating, a little less, and in severe compensatory sweating, a little less.

Slide 23
Those 200 patients with clipping were mostly female, 29 years mean age, mainly with palmar hyperhidrosis.

Slide 24
Of those patients, 85% were ambulatory, for the others the reason was they lived outside the city. The minor complications were air leak, brachial paresis in one patient, pneumothorax in one patient, and improvement was 95%. As with many series, the effectiveness is less with poor axillary hyperhidrosis.

Slide 25
We published results from outpatients in this program, and we include those patients in this program.

Slide 26
In this series of 218 patients with sympathectomy or re-sympathectomy, the substitution index was 73%, but if we include all the patients that could be included, almost all patients could be performed on an ambulatory basis.

Slide 27
Admission rate was 1.9%, readmission rate was 2.5%, and no complications, just one intercostal bleeding and one subcutaneous emphysema.

Slide 28
This series of patients from outpatient thoracic programs, shows substitution index, admission rate and readmission rate.

Slide 29
The procedure we perform is published in the Multimedia Manual of Cardio Thoracic Surgery. The patient is operated under general anesthesia and we intubate with a single or double lumen tube – sometimes a single lumen tube is OK.

Slide 30
The position is semi-Fowler with both arms abducted and axillar regions exposed.

Slide 31
We use two ports in order to clip.

Slides 32-34
I will show a video with this operative technique - we use this kind of clip that is not the regular one, and here you see the clips.

Slide 35
Here is the Acuclip, which has a _____, so we can see perfectly how the entire nerve is clipped.

Slides 36-45
You see the classical introduction of the trocars. You have to count the ribs: if you are treating flushing, you go to R2, R2 or R3 for palmar, or R5 for axillary. Here you can see the sympathetic chain, we open the _____ pleura, and dissect with cutting not coagulating. Here we see the nerve. This is the Acuclip, which is not a regular one. With a regular one you cannot see the end of the clip, so with a 30 degree camera you can see how you have the whole sympathetic chain within the clip. We used to use two clips but now we just use one. Then, what about the Kuntz nerve – even if we don’t see the Kuntz nerve, we try a little coagulation of this. Then, we insert the intercostal blockade – that is very helpful. We put in a little chest drain just to blow up the lung, and we take it out immediately after the patient is awake in the same operating room.

Slide 46
Those are the clips on the X-ray.

Slide 47
So, the major potential advantage of clipping (over, by definition permanent transection) is that, if there is severe compensatory sweating, ‘un-clipping’ is an option.

Slide 48
The clip removal is a minimal procedure with limited dissection. The clips on the thoracic sympathetic chain usually can be easily identified, accessed, and removed at repeat thoracoscopy. The improvement rate in literature ranges from 50 to 100%.

Slide 49
This is the view of the clip 7 months after the first surgery.

Slides 50-51
Using a curved endograsp instrument you can remove it.

Slide 53
Sometimes you cannot see it and you have to look for it. The clip is usually there to stay, but it is much easier to extract the clip than I thought.

[Inaudible question from the floor]
In this series of unclipping, you can see Reisfield performed over 2000 operations, he has taken out 36 with 52% of patients’ compensatory sweating improving at 1 year. With Sugimura, 34 patients were unclipped, with a 48% improvement. My group has taken out 5, now 6.

Slide 55
Sugimura had 34 patients unclipping from 1 to 57 months after clipping, with follow-up to 31 months. More or less 50% had a substantial decrease in severe compensatory sweating, and most importantly, about 40% have the initial hyperhidrosis or flushing well controlled.

Slide 56
These are results from our patients. In 2013, we have now one more patient, giving us 50% improvement.

Slide 57
So what is the optimal time for clip removal? The general idea is to do it in the first 2 months after surgery. Therefore, it is crucial to diagnose intolerable compensatory sweating as soon as possible. Lin suggested that the clip should be removed prior to 2 weeks after clipping, but in contrast, Reisfield suggested that removal within 6 months might be acceptable for obtaining a successful result. But for sure, the sooner the better.

Slide 58
The improvement of the symptoms and the nerve regeneration can take a few months or up to a year. Kang observed improvement of compensatory sweating 4 weeks after removal. Lin saw it 1 year after.

Slides 59
Patients expect to be cured from their symptoms but they fear intolerable compensatory sweating and like the idea that this procedure might have an option of reversibility. The effect of clip removal is not 100% effective, and needs to be studied further. The mere fact that the efficacy of clipping and sympathicotomy are equivalent, and that reversal is an option only with clipping, makes it a more attractive technique.

Slide 60
In conclusion, sympathetic nerve clipping by VATS is a safe and effective procedure for the management of facial blushing and palmar / axillary hyperhidrosis. Levels of compensatory sweating are somewhat lower than with standard sympathicotomy and, if necessary, this technique allows us to try to revert the sympathetic block by removing the clips. Because of these advantages, it is at present our standard procedure for the treatment of this disease.

Slide 61
Thank you very much for your attention, and thanks to Steve Cassivi for his kind invitation.