

## Answers to Audience Questions - WSPOS World Wide Webinars

### WWW 4 – Season 2 - Botulinum Toxin or Bupivacaine in Strabismus - The How and When?



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*Alan Scott (AS), Luisa Hopker (LH), Rita Gama (RG), Brigitte Girard (BG) & Joanne Hancox (JH),*

1. Do you inject in the operating room in adults? With anesthesiologist?

AS: No, in the office.

LH: I use as an office procedure.

RG: Only if the patient asks for sedation during the procedure.

BG: Yes, with anesthesiologists

JH: Always in clinic with EmG as otherwise could not do 30 in an

2. Has anyone seen ptosis lasting up to 3-4 months?

AS: Yes, after SR injection.

LH: No, unless injection in the SR

RG: I haven't. In my patients the longest ptosis lasted 2 months. A longer lasting ptosis can be correlated with higher dose of Botulinum toxin.

BG: Never

JH: yes, on occasion.

3. What is the mechanism by which Apraclonidine helps ptosis?

AS: Stim muller muscle

LH: Vasoconstriction

RG: No experience with apraclonidine.

BG: Stimulation of Muller Muscle

JH: I only use adrenalin to vasoconstrict

4. Can ropivacaine have a similar effect on the EOM?

AS: Not tried in EOM. In the lab is less myotoxic, so not especially attractive

LH: No. Studies in rats in skeletal muscle shows less myotoxicity, thus less regeneration.

RG: I don't think so.

BG: Don't know

JH: can't comment

5. Is it sure to use concentrations of bupivacaine greater than 0.5%?

AS: Depends on deviation. Yes, for deviation greater than 10 PD

LH: Concentrations greater than 0.75% show greater effect to correct strabismus.

RG: No experience with bupivacaine

JH: I don't currently use, but am inspired by the seminar

6. Can we take up exotropia with craniosynostoses for BP/BT in early years?

AS: Not adequate experience in children yet

LH: We still have no experience in BUP injection in children.

RG: Yes (for BT, I don't use BP). I would suggest before 2 years of age, but expect ocular alignment for 6 months to 1 year. In XT, BT's effect is always reversible.

JH: yes

7. How commonly do you Botox for Vertical Strabismus!

AS: Often for ted

LH: Not very frequent.

RG: In thyroid eye disease or superior oblique palsy with small angles (10 PD or less) and no torsion.

JH: Quite often but only to IR

8. Do you change the dose of injection for the type of strabismus Horizontal Vs Vertical?

LH: No

RG: Yes. Because I recommend botulinum toxin on small vertical angles of deviation, 2.5U/muscle of Botox are used. On the contrary, on horizontal strabismus, 2.5-5U are administered.

BG: Less in vertical

JH: No

9. Any difference between injection in anterior portion of muscle or posteriorly?

AS: Yes, greater effect posteriorly for both toxin and BUP.

LH: BUP doesn't spread well, so it has to be injected in the posterior third of the muscle.

RG: No experience with posterior portion injection of the muscle.

BG: Better in posterior, where there are more synapses

JH: No use EMG guidance and signal as a guide

10. The bupivacaine injection is inside the muscle?

AS: Yes

LH: Yes

RG: No experience with bupivacaine.

BG: Yes

JH: can't comment

11. Which is less dangerous? Botox or Bupivacaine????

AS: Neither is systemically toxic at normal doses

LH: Systemically both are safe on standard doses.

RG: Never used bupivacaine, but Botox is very safe. Global perforation is the most serious complication of botulinum toxin injection and is very rare.

BG: Botox

JH: Most people have more experience with BTXA

12. Panels' experience on botulinum toxin in acute esotropia and late onset esotropia in kids

LH: In acute esotropia and late onset esotropia in kids there is a less effect than surgery.

RG: These are the 2 types of esotropia which have the best results with botulinum toxin, both immediate and long-term effects.

BG: Better results in acute esotropia

JH: Acute onset ET anything between 50-75% so worth a try

13. Is it useful to apply bupivacaine during maximal surgery for a large deviation that you are expecting to be result in undercorrection?

AS: Large positive experience in use of Botox for this (Leuder et. al.); see paper by Hopker et. al. for BUP.

LH: BUP can be used to replace a resection, but not for very large deviations. BT can be used as an adjuvant to large recessions.

RG: No experience with bupivacaine.

JH: can't comment

14. What kind of anesthesia do you use for children injection?

LH: Sevoflurane sedation.

RG: Oxide nitrous. Short-term sedation because it is a very quick procedure.

JH: Ketamine in young children as no need to intubate

15. Hi, could the speakers share some tips on injection technique? How to target the muscle accurately without minimizing the risk of puncturing the globe?

AS: Start 10 mm from the limbus over the muscle

LH: I use Mendonça's forceps that helps to hold the muscle and allows a safe injection.

RG: We inject the muscle without EMG control. Because we rotate the globe outwards (to inject the medial rectus), the needle is inserted horizontally. If you insert the conjunctiva instead of the muscle, you will feel no resistance; on the contrary, you should feel some resistance when it reaches the muscle.

BG: Just have a good idea of muscles anatomy; usually ophthalmologists used to strabismus have no problem. Child under anesthesia.

JH: Angle at 90 degrees for the lateral away from the globe then change angle towards the muscle under EMG guidance. Angle at 45 degrees for the medial away from the globe then angle to the muscle under EMG guidance.

16. How many Units of Botulinum toxin? How can we do it without an EMG?

AS: EMG is not necessary for unoperated horizontal muscles.

LH: For both BUP and BT depends on the deviation. My experience with BUP injection is either with EMG or under direct visualization with a conjunctival opening.

RG: WRT 'How many units':

Children  $\leq 2$  years of age and angles of deviation  $\leq 30$  PD, inject 2.5 U in both medial recti (total=5U), Children  $> 2$  years of age and/or angles of deviation  $> 30$  PD, inject 5U on non-fixing eye and 2.5U on fixing eye (total=7.5U). I avoid using 10 U, because side-effects are more frequent.

WRT 'Without EMG':

First rotate the globe outwards, insert the needle horizontally at 5.5mm from the limbus, feel the resistance of the muscle, rotate the globe inwards and inject the syringe content. Of course, there is a risk of making a subconjunctival injection instead of the muscle, but botulinum diffuses very easily and will reach the muscle fast if you inject at 5.5 mm from the limbus.

BG: 2 to 3 units by muscle to prevent ptosis. Surely in the muscle. Keep the needle a while in the muscle after injection.

JH: 2.5 U Dysport and always use an EMG

17. What is the approach of those NOT using EMG?

LH: For BUP: Direct visualization

RG: Answered in 16.

JH: can't comment, always use EMG

18. Do you give any treatment to the consecutive deviations in children, such as patching, while waiting for the full results?

LH: If a marked eye preference, yes.

RG: Botulinum toxin - We don't consider that the exotropia observed after the injection is a consecutive exotropia, because it is reversible and is a sign of response to treatment. We prefer to use the term "overcorrection" instead. Patching will be necessary if 1 month after treatment the angle is large and there is amblyopia. It is not very frequent, but can happen. The surprising effect of BT is that promotes fusion during the period of overcorrection.

JH: No

19. Do you inject both MR or one of them?

AS: Children usually both, adults only one

LH: If large deviation, both MR.

RG: Bilateral in children, unilateral in adults

JH: yes, if a child under GA

20. Hi, it is a quick procedure but, do you keep the needle injected some seconds after injection to avoid spill?

AS: Moorfields (10,000 injections, surely the world's largest experience) keeps it in 25 sec

LH: I do not, but I hold the site of injection with a Q-tip right afterwards.

RG: Yes, 1-2 seconds

BG: Yes

JH: yes 35 secs for adults 1min for children

21. Ptosis occurred on the 16th day after injection in one of my patients last week; how to explain the mechanism of its occurrence after 1-week same dose?

AS: Toxin is a huge molecule that hangs around and diffuses slowly

RG: I don't know, but I believe Dr. Scott answered this one

JH: Maximum effect 2 weeks after so not that far outside normal

22. Which is the technique when we don't use the EMG?

LH: Already answered.

RG: Answered on 16.

BG: Anatomy

JH: N/a

23. Do you do injection in adults sitting 45 degrees too, or lying down

LH: Sitting

RG: 30 degrees

JH: often more than 45 degrees and never lying down

24. Does apraclonidine work in these patients?

RG: No experience with apraclonidine

BG: Only on ptosis

JH: Can't comment

25. Does anybody have any experience with the Korean or Chinese or German brand?

AS: Xeomin = Botox. No experience with Korean and Chinese

RG: No, only Botox

BG: I Have experience with German toxin. Very good efficacy. And secure although not in AMM. I agree with Alan Scott Xeomin=Botox (more or less) in action.

JH: No

26. What EMG machine are you using

AS: Strabismus research model. Clavis is just as good

RG: Don't use EMG

JH: A non-portable one, but only worth it if large volume

27. Does Apraclonidine work in patients who received Botox and developed ptosis?

RG: No experience with apraclonidine

BG: Yes, a little

JH: don't use

28. Once mixed how long can this be stored, how to store and how much potency does it lose?

AS: Botox is labelled to use in a few hours. In the refrigerator, keep it for a week. Loses 10-15% potency if frozen then thawed. Does not contain anti-bacterial components

LH: I use up to 30 days stored on the refrigerator.

RG: You can store it on the fridge for 1 week, although I've heard reports of 1-month storage. Use it as early as possible because it will lose power, not quantified, I'm afraid.

BG: I don't store it and I prepare it in front of the patient, as needed.

JH: I use only on that day, I do not store

29. What is the higher concentration Dr Brigitte uses (for less volume)?

BG: 200u/ml to inject 0.02 ml or 0.03ml.

30. Does anyone use or recommend botulinum toxin for third nerve palsy?

AS: Useful in partial palsy to allow fusion

LH: Just in the acute phase until ready for surgery, but not good results.

RG: Yes, on the acute phase. Inject both lateral rectus (total 5-10U) and, if vertical deviation, ipsilateral inferior rectus (2.5U).

JH: yes, can help in certain circumstances

31. Any experience with nystagmus?

AS: For bed-bound or chair-bound patients can be valuable. Typically, 25 U in lower orbit

RG: Yes, in small children (< 1 year of age) on 4 horizontal recti, to increase foveal fixation. But it will recur. On older children with associated torticollis, to compensate it. Inject the muscles you would weaken on the

RG: Kestenbaum procedure. Again, expect recurrence.

JH: I only use if non-ambulatory and inject a high dose retrobulbar

32. What dose do you use in treatment of nystagmus?

RG: Indications explained on 31. 2.5 U on medial rectus, 5 U on lateral rectus.

JH: 25 units

33. How does Dr Girard avoid ptosis in injection of Botox into the superior rectus?

BG: It is special cases with very strong tonic action. And 0.02 ml in the muscle.

34. Any experience with Botox in strabismus related with thyroid disease?

RG: Yes. In acute or chronic phase. 2.5U on inferior rectus, 2.5-5U on medial rectus. Expect long term effects on the acute phase, recurrence on chronic phase.

JH: Yes, usually to help residual deviations after surgery

35. Dear experts, what is your experience in bupivacaine in children? Age? Type of strabismus?

AS: No experience yet

LH: There are still no studies. We are working on that.

RG: No experience with bupivacaine

36. Does bupivacaine work just as well when injected in a previously operated muscle?

AS: Yes, but tricky to find the muscle sometimes

LH: Yes. It does work well in previously operated muscle. It doesn't work in paralysed muscle.

RG: No experience with bupivacaine

37. What is the duration of the effect of bupivacaine? is it reversible like Botox?

AS: Paralysis for one day, myotoxic for one week, rebuilt one month

LH: It is long lasting. Studies show up to 5 years.

RG: No experience with bupivacaine

38. Why it is necessary to use EMG to inject Bupivacaine and not for Botox?

AS: Larger volume posteriorly in the orbit

LH: Because the injection has to be in the posterior third of the muscle.

RG: No experience with bupivacaine

JH: I always use EMG for BTXA

39. How do patients who have had no fusion or BSV for years suddenly acquire/ re-acquire it after Botox/surgery?

AS: They had fusion once before

LH: It depends on what age the deviation has occurred. If the pt. has developed binocular vision at some point of life, it can be restored.

RG: Very interesting question, but have no objective answer. It demonstrates how reversible amblyopia is, even when all the signs suggest irreversibility.

JH: It's a mystery but if you have the potential the best you can do is realign the eyes

40. In TED with larger deviation do you think it is useful to do Botox and surgery at the same time?

RG: Yes, I would suggest it, but no experience so far.

JH: Usually only do surgery in the first instance

41. Is there room for BTA or bupivacaine in patients with CPEO-type muscle disease?

AS: BUP has little effect on atrophic muscle

LH: For BUP there is no studies on that type of strabismus, but probably not as it doesn't work in an anomalous innervated muscle.

RG: Yes. I only use BTA, have no experience with bupivacaine. Use it to test diplopia before strabismus surgery. If diplopia is noted after BTA, strabismus surgery is not advisable.

JH: yes, for residual deviations following surgery

42. Would you repeat the injection soon if no effect was noted after the first injection of Botox in adults?

AS: Yes, after a week and you concluded that you missed the muscle

LH: I wait at least 60 days.

RG: No. On adults it is advised to wait 1 month to note the Botox effect. If there is no effect observed 1 month after treatment, means it is non-responsive. It does not merit to try again.

BG: I will wait at least 3 weeks to avoid ptosis or other complication. You can reinject once quite soon after the first injection but only once although you get greater risk for antibodies.

JH: yes 2 weeks later