Reviewer's report

Title: Surgical factors affecting oculocardiac reflex during strabismus surgery

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Reviewer: Robert Arnold

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Summary of Paper:
IRB study in Korea retrospective chart review from 10-2015 through 1-2016.
Pediatric patients given pre-op IV IV atropine 0.01mg/Kg. Induction thiopentone plus rocuronium and maintained with sevo. HR monitor every 5 seconds.
Single surgeon performed all surgery.
Pre-operative data included age, gender, surgery type. Then sequence of EOM, HR before traction, maximum decrease after traction, HR at max recovery, adrenergic HR maintained during traction, and HR at cutting of muscle. OCR defined as maximum decrease HR >20% at first traction.
Adrenegic HR was defined thus: if HR decrease noted with EOM traction, then HR monitored over time until it reached near baseline. If HR was maintained 10 second without decreases, that was defined as adrenergic HR.
Two cohorts were delinitated by whether the initial traction produced greater than 20% HR change- or less.
99 patients had one or muscle operated- a total of 162 muscles. 65% of patients had OCR defined- during first or second EOM?
The age of OCR patients 11.1 years differed from those who did not (7.9 years) and baseline HR was higher is the non-OCR group who were also much younger. The pediatric patients received pre-op atropine, also.
Lateral rectus constituted about ¾ of muscles for OCR and non-OCR cohorts. Most cases were recessions.
In multivariate analysis, first EOM was substatnal contributer. Second cases were usually less OCR if OCR was initially defined.
Conclusions were: there was a reduction in HR that did not fully recover during surgery. The first of two muscles was more likely to have at least 20% HR drop from baseline.

Major Comments:
Planning to collect data after each strabismus surgery EOM tension is prospective, - please explain the "retrospective" in line 73 ((line 12 page Methods)

The same surgeon did the surgery- was this surgeon just doing routine cases observed by anesthesia, or was surgeon involved in the investigation?

Did the surgeon quantify the amount, the duration, or the wave-form of the muscle traction? If not, marked deviation in amounts can occur.

Tension and duration of tension and which EOM matters.
With a 10-second, 200 gram square wave tension (similar to tight strabismus or RD traction, you get an 11% decrease in HR for Lateral rectus, about 16% decrease for medial rectus and superior rectus, and about 18% HR reduction with inferior rectus.
The standard deviation of hear rate drop is about 18%.
Therefore, the power to detect a 10% difference in average OCR change 0.8 and alpha 0.05 gives sample size of about 30 cases. From your table 4, if data pooled, these are similar percent changes in heart rate and standard deviation.

Braun, et al, found an adrenergeic phase with prolonged OCR with 600 grams tension (far beyond regular strabismus surgery- and very painful.

Was fentanyl used during these cases?

I have generated a figure of events, timing and hear rate so you can better define when heart rates were extracted .
It would be most useful to determine influence of various aspects of the strabismus EOM manipulation, to pool all your first case data, and report descriptive statistics for each phase: pre-HR, isolation of muscle, muscle tension, prlonged tension, suturing muscle, severing muscle, re-attaching muscle.

What were your maximal changes from baseline heart rate?

Children and adults can be compared by calculating a percent change in heart rate, rather than absolute number of beats per minute- which are poorly comparable between a large adult male and a petite adult female, let alone child versus adult.

Your pre-medication with atropine did not complete block OCR, but also attenuated it.

Table 3 is confusing for me: The groups are separated by presence or lack of your definition of OCR- but then you report a sequence of operated muscle with a Percent first muscle and second muscle- what event constituted 38% (68) with the OCR group fwith first muscle and 44 (64%) of the cohort without OCR in the second muscle?

Table 4 is helpful: actual percent changes in heart rate between groups. Since you have this data, please report the absolute changes for your whole pooled group for each phase of the initial muscle cases, and then add the subsequent muscle cases.

Please identify the proportion of the OCR group and the non-OCR group who got pre-op atropine. (This was not included in Methods, but mentioned in line 170-

From Table 5, first operated muscle was significant; did traction or technique differ between first and second muscle (ie did you use less tension on cases with prior defined OCR? When tension is carefully uniform, the difference in heart rate is only slightly decreased between first and subsequent cases. As surgeon who worries that the first case produced profound OCR will often pull less hard and long on the subsequent muscle.
Were OCR cases defined purely by the first muscle traction? Or could it be the second EOM pulled?

Minor Comments:
Title: Consider
Abstract
Introduction: Braun explained counter-regulator effect line 61 - what was EOM tension?
Methods:
Include how extraocular tension was quantified: routine? Follow-up after substantial OCR "reduced routine?", tension and time quantified?
Results:
Your cohort comparisons are valid, but may be confused by age difference and whether or not pre-op atropine was given.
Please group all your cases, report by percent change heart rate for each phase of EOM manipulation for first muscle alone.
Discussion
Tables:
Please better define what is reported in table 3-

References:
Please review this reference as it relates to EOM technique also:


Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.
No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.
No
Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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