

Peer Review File

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Reviewer A

the manuscript is interesting above all because it uses a promising technology not yet standardized by indications of randomized studies. I exclude any comments on the language, more highly rated reviewers can correct the authors.

it is necessary for the authors to underline the limitations of this study.

Retrospective study, non-comparative study (EMG tubes remain the standard of care in this setting).

- I agree with your comments. I described the limitations in the end of discussion (line 202-204).

What are the clinical findings about this research? the authors highlight that BMI age should affect EMG response. But how we could interpret these results into daily practice.

- Thank you for your comments. We wanted to suggest the skin electrode as an alternative method for IONM in which can overcome the shortcomings of EMG tubes in thyroid IONM. Furthermore, we wanted to suggest normal EMG values for thyroid IONM using skin electrode. We selected several clinical factors that could affect EMG results and compared them to see if there were any differences.

Reviewer B

This is a very interesting paper.

The study is clearly defined, the goals of the study are clearly exposed, the discussion is accurate.

However some minor points are arising and should be edited in the paper:

1. I do not think that comparing EMG data between males and females is relevant.

- Thank you for your comment. Your opinion may be right. But we just chose sex as one of the clinical factors which may contribute EMG amplitude. Although there may be confounding variables, there was a meaningful difference in mean amplitude by sex in this study itself. I think the difference of neck circumference and amount of subcutaneous tissue between male and female may be a confounding factor, but contribute to the EMG value. This point was described in the discussion

(line 194-195).

2. The authors must check if in this series the patients BMI increases with age. If yes, it might be the explanation of the EMG results in patients aged more than 55 years.

- Thank you for your comment. As you suggested, we additionally analyzed the correlation between age and BMI, and found that the correlation coefficient r was -0.04, indicating almost no linear correlation.

3. It is clear that the thickness of the skin, the thickness of the subcutaneous adipose tissue and the very placement of electrodes are the factors which will have an impact on the recording of the EMG data. Maybe the interpretation of EMG data may be evaluated with an evaluation of the skin thickness under the electrodes? Or does an ideal position of electrodes exist?

- Thank you for your thoughts. Like you, I think the thickness of subcutaneous tissue & skin is an important factor which contributes to EMG values of IONM using skin electrode. However, preoperative estimation of this factor is not easy and maybe subjective, so we chose BMI as a clinical factor to compare. In addition, we previously studied an ideal position of skin electrode in thyroid IONM (Surgery. 2022 Feb;171(2):377-83). When skin electrode was attached to lateral side of thyroid cartilage, evoked amplitude was higher than that of medial side. This is thought to be because the cricoarytenoid joint which is main pivotal joint of vocalis muscle is located closer to the recording electrode when attached to the lateral border of thyroid cartilage.

4. It would be interesting for readers that the authors provide a photograph of the

patients installation and the devices used for the EMG recordings (placement of electrodes etc.)

- Thank you for your comment. Representative photo of installation is Fig 1A & 1B.

5. The authors say that this system is less expensive than the classical systems. May they provide an estimation of the costs of both systems (the system presented in the paper, the NIM system (Medtronic) and the C2 nerve monitor system (Inomed) in USD (or Euro)?

- In Korea, the cost of skin electrode is at approximately \$10 per one pair of electrodes. Whereas, standard recording EMG tube is at approximately \$200, if it is covered by Korea National Health Insurance.

Overall, the only "weakness" of this paper is the insufficient number of cases (i.e. the number of studied nerves) which can not valid a normative EMG data for this technique.

However this article can be considered as an early experience paper. wa huge series of such recordings must be performed to valid a normative EMG paradigm, in particular because of the importance of inter-individual variations of vagus nerve amplitude data (in the study from Klopp-Dutote et al. (clinical otolaryngology 2015) using the Inomed system (C2 Nerve Monitor) the mean amplitude of the vagus nerve action potential was 1540 μ V on the left and 2130 μ V on the right with inter-individual variations ranging from 50 to 6210 μ V.

- Thank you for your comment. I added your point about insufficient number of cases in discussion (line 202-203).