

Editor's comment

[DY1] Please revise the manuscript according to the review report and my comments. And answer all of the reviewers' comments carefully (point-to-point).

[DY2] Please provide us with the funding approval.

→You can see the details of the funding we received on the Internet.

(URL:<https://nrid.nii.ac.jp/nrid/1000070436377/>)

[DY3] Please write the article highlight section accordingly.

Please don't copy from the main text.

→We wrote them in the revised manuscript.

Research background: Endoscopic treatments often take long time, however procedures are better tolerated in terms of patient satisfaction and safety when sedation is administered.

Research motivation: Recent guidelines on gastrointestinal endoscopy strongly recommend pulse oximetry and careful monitoring of breathing during sedation. But it is unclear as to how many non-critical respiratory disturbances occurred in addition to critical events.

Research objectives: The objectives are to reveal that polysomnography (PSG) can accurately evaluate respiratory disturbance incidence during sedation for gastric endoscopic submucosal dissection (ESD) compare to pulse oximetry alone and to characterize breathing patterns.

Research methods: This study included 10 elderly patients with early gastric cancer undergoing ESD under propofol sedation. Polysomnography measurements were acquired. The comparison of respiratory disturbances between PSG and pulse oximetry was tested by the apnea hypopnea index (AHI), defined as the number of apnea and hypopnea instances per hour during sedation, with and without hypoxemia. The breathing pattern was characterized by the waveform of PSG.

Research results: PSG detected 207 respiratory disturbances in the 10 patients. PSG yielded a significantly greater AHI ($10.44 \pm 5.68 \text{ hour}^{-1}$) compared with pulse oximetry ($1.54 \pm 1.81 \text{ hour}^{-1}$, $p < 0.001$). Obstructive AHI ($9.26 \pm 5.44 \text{ hour}^{-1}$) was significantly greater than central AHI ($1.19 \pm 0.90 \text{ hour}^{-1}$, $p < 0.001$). Compared with pulse oximetry, PSG detected the 25 instances of respiratory disturbances with hypoxemia 107.4 seconds earlier on average.

Research conclusions: PSG can better detect respiratory irregularities in detail compared with pulse oximetry and thus provide superior AHI values, leading to distinguish between obstructive and central events clearly.

Research perspectives: It is not necessary to take all kinds of PSG monitoring for the patients under sedation. Among PSG monitoring, nasal pressure measurement is potentially useful for respiratory monitoring and that it must be tested in future clinical studies. Moreover, we will clarify what characters of patients require strict monitoring before endoscopic procedures under sedation.

Reviewers' comment

Reviewer's code: 02917331

Strategies of intervention were fixed in the protocol? For example, if hypoxemia would be occurred, how long would you watch and stay? How would you treat at first?

→ Fundamentally, we adhered the standard institutional protocols of sedation guidelines. If we know hypoxemia (arterial oxygen saturation, $\text{SaO}_2 < 90\%$), airway maneuvers, such as chin lift, were performed immediately.

Reviewers' comment

Reviewer's code: 01467363

Based on the results of the study, I would expect recommendations when and in which patients this method of monitoring during endoscopic interventions should be used (appropriate knowledge of physiology, cost of intervention ?....)

→ If all patients with ESD under sedation use all kinds of PSG monitor, it will take lots of cost and time. The nasal pressure waveform can detect not only the respiratory rate but can also identify the decrease in ventilation, like hypopnea. Therefore, we recommend that nasal pressure measurement is potentially useful for respiratory monitoring during sedation.

Reviewers' comment

Reviewer's code: 03028174

1. This is a prospective observational study. Further randomized controlled trials need to be confirmed.

→ We agreed with you. Therefore, this sentence was added in discussion.

2. A sample size of the study is relatively small.

→ We agree, as stated in limitation.

3. Several factors influence the outcome of the study. Please discuss these factors.

→ We showed several factors in study limitations. And, the difficulty in maintaining anesthesia depth and the influence of anesthesia depth were added.

4. Please review the literature and add more details in the discussion section.

→ The relations of the type of respiratory disturbances and propofol administration have been added in discussion.

5. What are the new knowledges from this study?

→ By using PSG in patients with ESD procedure under sedation, we were able to know details of respiratory disturbances. A majority (87.9%) of the respiratory disturbances was episode of non-hypoxemic obstructive events, and these patients have the risk of potential respiratory disturbances. The respiratory disturbances with hypoxemia were detected on about 100 seconds before they were detected by pulse oximetry.

6. Finally, please recommend the readers "How to apply this knowledge for routine clinical practice?"

→ It is important that you do not rely too much on measuring the oxygen saturation in order to detect the patient's respiratory disturbances during ESD. Moreover, it should be recognized that grasping the patient respiratory condition in detail is very limited.

The nasal pressure waveform can detect not only the respiratory rate but can also identify the decrease in ventilation, like hypopnea. Therefore, we recommend that nasal pressure measurement is useful for respiratory monitoring during sedation.