Anesthetic Considerations for Masticatory Muscle Tendon-Aponeurosis Hyperplasia: A Report of 24 Cases

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Masticatory muscle tendon-aponeurosis hyperplasia (MMTAH) is a new disease entity characterized by limited mouth opening due to contracture of the masticatory muscles, resulting from hyperplasia of tendons and aponeuroses. In this case series, we report what methods of airway establishment were conclusively chosen after rapid induction of anesthesia. We had 24 consecutive patients with MMTAH who underwent surgical release of its contracture under general anesthesia. Rapid induction of anesthesia with propofol and rocuronium was chosen for all the cases. In 7 cases, intubation using the Macintosh laryngoscopy was attempted; however, 2 of those cases failed to be intubated on the first attempt. Finally, intubation using the McCoy laryngoscopy or fiber-optic intubation was alternatively used in these 2 cases. In 7 cases, the Trachlight was used. In the remaining 10 cases, fiber-optic intubation was used. Limited mouth opening in patients with MMTAH did not improve with muscular relaxation. "Square mandible" has been reported to be one of the clinical features in this disease; however, half of these 24 patients lacked this characteristic, which might affect a definitive diagnosis of this disease for anesthesiologists. An airway problem in patients with MMTAH should not be underestimated, which means that other intubation methods rather than direct laryngoscopy had better be considered.

Key Words: Masticatory muscle tendon-aponeurosis hyperplasia; Square mandible; Difficult airway management.

Masticatory muscle tendon-aponeurosis hyperplasia (MMTAH) is a new disease entity characterized by limited mouth opening due to contracture of the masticatory muscles, resulting from hyperplasia of tendons and aponeuroses.¹ The other clinical feature is that the face of the patient with this disease displays a square mandible configuration.¹ MMTAH does not include muscular hypertrophy. Therefore, limited mouth opening is not relieved by muscle relaxants.¹ On the contrary, there is a possibility that jaw-opening muscular relaxation by muscle relaxants makes keeping the mouth opening more difficult because muscle

relaxants do not affect hyperplastic tendons and aponeuroses of the masticatory muscles, which means that tension in those muscles does not change. Put simply, jaw-opening muscles allow patients to keep their mouth open when awake. However, the force necessary to keep the mouth open is removed with muscle relaxants.² Previously, we reported a case of MMTAH that resulted in difficult laryngoscopy after induction of anesthesia.² This disease per se does not include any factors of difficult ventilation. Therefore, we planned to easily move on to alternative airway management in case of difficult laryngoscopy due to MMTAH because rapid induction was used as our primary induction choice. Since the first case, we have had 24 MMTAH cases. In this case series, we report what methods of airway establishment were conclusively chosen after rapid induction of anesthesia.

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Table 1. Patient Characteristics

Gender, Male/Female	4/20
Age, y	50 ± 15
Preoperative active mouth opening, mm	24 ± 5
Preoperative passive mouth opening, mm	24 ± 4
Postoperative passive mouth opening, mm	52 ± 7
Square mandible, yes/no	12/12

CASE REPORT

Institutional review board approval and informed consent were exempted because no ethical problem was included in this case series and the patients could not be identified from case series presentation. Between January 2008 and April 2010, 24 consecutive patients with MMTAH underwent aponeurectomy of the masseter muscle with coronoidectomy to release the temporal muscle tendon under general anesthesia. Patient characteristics are presented in Table 1. We obtained preoperative information of possible limited mouth opening after anesthetic induction and the degree of active mouth opening (Table 1) from the surgeons. Because of lack of evidence for difficult ventilation, rapid induction of anesthesia with propofol 1.5–2.0 mg/kg, fentanyl 2–3 µg/kg, and rocuronium 0.6–0.8 mg/kg was chosen for all the cases. Nasal intubation was carried out for all patients. Basically, the methods of intubation were done according to preference of the attending anesthesiologists. Summary of the methods of intubation is presented in Table 2. In 7 cases, intubation using the Macintosh laryngoscopy was attempted; however, 2 of those cases failed to be intubated on the first attempt. Intubation using the McCoy laryngoscopy or fiber-optic intubation was alternatively used in these 2 cases. In 7 cases, the Trachlight was used. In the remaining 10 cases, fiber-optic intubation was used. These cases were successfully intubated on the first attempt. After induction of anesthesia and the planned surgery, passive mouth opening was evaluated by surgeons. The degrees of preoperative active and passive mouth opening and postoperative passive mouth opening are presented by

methods of intubation. In addition, these values are also presented by the presence of square mandible (Table 3).

DISCUSSION

As shown, limited mouth opening in patients with MMTAH did not improve with muscular relaxation. We speculated that limited mouth opening might be enhanced by muscle relaxants in our previous report²; however, such a situation does not seem to happen in most cases. The 2 cases with failed intubation with the Macintosh laryngoscopy tended to show enhanced limited mouth opening after anesthetic induction. Apart from the reliability of our proposed mechanisms for enhanced limited mouth opening as previously shown, we should keep in mind that mouth opening of some patients with MMTAH can become more difficult with muscular relaxation.

In the previous report, we noted that “square mandible,” which represents a facial configuration characterized by a pronounced lower angle of the mandible, is a clinical feature of the patient with MMTAH.^{1,2} Therefore, the caution remains that we need to suspect difficult airway when patients have limited mouth opening with square mandible configuration. However, half of these 24 patients lacked this characteristic. Moreover, presence of square mandible does not appear to be related the degree of limited mouth opening. Therefore, it may be even harder to predict difficult laryngoscopy under muscular relaxation without a definitive diagnosis of this disease. Hypoplastic mandible, which is one of the factors of difficult laryngoscopy because of its short thyromental distance,³ was not observed in any patients even in cases with a lack of a typical square mandible. A problem with mouth opening might tend to be underestimated because of lack of a hypoplastic mandible. We should bear in mind again that some patients with limited mouth opening never show improved mouth opening by muscular relaxants.

Table 2. Preoperative Active and Passive Mouth Opening and Postoperative Passive Mouth Opening Sorted by Methods of Intubation

	Macintosh (n = 5)	Failed Macintosh (n = 2)	Trachlight (n = 7)	Fiber Scope (n = 10)
Preoperative active mouth opening, mm	26 ± 4	24 ± 5	27 ± 5	22 ± 6
Preoperative passive mouth opening, mm	27 ± 5	20 ± 0	25 ± 4	22 ± 4
Postoperative passive mouth opening, mm	49 ± 4	50 ± 7	54 ± 7	51 ± 9
Cormack, I/II/III/IV	3/1/1/0	0/1/1/0	Not applicable	Not applicable

Table 3. Preoperative Active and Passive Mouth Opening and Postoperative Passive Mouth Opening Sorted by the Presence of Square Mandible

	Square Mandible (n = 12)	Non-square Mandible (n = 12)
Preoperative active mouth opening, mm	25 ± 6	24 ± 5
Preoperative passive mouth opening, mm	24 ± 4	23 ± 4
Postoperative passive mouth opening, mm	53 ± 8	50 ± 7

Regarding anesthetic induction for patients with MMTAH in this case series, rapid induction of anesthesia with muscular relaxants was basically used if specific reasons did not coexist for an alternate technique. This issue should be a matter of debate. As a result, airway establishment with tracheal intubation in all patients was successfully performed; however, the first intubation device was changed to the others because of failed attempts in 2 patients when the Macintosh laryngoscope was chosen. Interestingly, limited mouth opening in the 2 cases tended to be enhanced after induction of anesthesia. Preoperative limited mouth opening has been reported to show the largest relative risk for difficult intubation using direct laryngoscopy.⁴ Thus, although limited mouth opening can sometimes be relieved after induction of anesthesia to reduce the risk of difficult laryngoscopy, it may not be relieved and may even worsen, as in these 2 cases. In addition, it has been suggested that many repeated attempts at intubation should be avoided because progressive development of laryngeal edema and hemorrhage and the ability to ventilate the lungs via mask consequently may be lost.⁵

Therefore, it may be better that we avoid the airway devices requiring sufficient mouth opening in patients with a definitive diagnosis of MMTAH. Awake tracheal intubation is obviously another option. Either way, the method for airway establishment in patients with MMTAH should be carefully chosen, although it may basically depend on the attending anesthesiologists' preference.

In conclusion, an airway problem in patients with MMTAH should not be underestimated, which means that other intubation methods rather than direct laryngoscopy had better be considered. We need to keep in mind that limited mouth opening in some patients, especially with typical square mandible, is never improved after induction of anesthesia.

REFERENCES

1. Yoda T, Sato T, Abe T, Sakamoto I, et al. Long-term results of surgical therapy for masticatory muscle tendon-aponeurosis hyperplasia accompanied by limited mouth opening. *Int J Oral Maxillofac Surg*. 2009;38:1143–1147.
2. Inoue S, Yamamoto I, Ikeda S, et al. Possible difficult laryngoscopy caused by masticatory muscle tendon-aponeurosis hyperplasia: we anesthesiologists should be aware of this disease. *J Anesth*. 2010;24:930–931.
3. American Society of Anesthesiologists. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on management of the difficult airway. *Anesthesiology*. 2003;98:1269–77.
4. Rose DK, Cohen MM. The airway: problems and predictions in 18,500 patients. *Can J Anaesth*. 1994;41:372–383.
5. Benumof JL. Management of the difficult adult airway. With special emphasis on awake tracheal intubation. *Anesthesiology*. 1991;75:1087–1110.