



Extravasation of irrigant to the parapharyngeal space during temporomandibular joint (TMJ) arthroscopy requiring prolonged intubation: a case report and review of the literature

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Background: Temporomandibular joint (TMJ) arthroscopy is a common modality for the diagnosis and treatment of temporomandibular joint disease (TMD). Complications of TMJ arthroscopy are uncommon, but can include extravasation of irrigation fluid to the parapharyngeal space. The parapharyngeal space is a complex space with communication to the submandibular space and exam findings can also include edema of the sublingual and submandibular spaces. Extravasation of irrigant to the parapharyngeal space will result in airway edema and, if unnoticed, could result in unsuccessful extubation.

Case Description: This case report describes two cases of extravasation of irrigant to the parapharyngeal space during TMJ arthroscopy. The first case involved a 19-year-old female with bilateral TMJ pain and disc abnormality who failed non-surgical treatment. Treatment included bilateral TMJ arthroscopy that involved release of the lateral pterygoid muscle with synovial biopsy. Our second patient was a 63-year-old female with an unilateral ankylosing process that presented with an infection of the joint. Treatment included unilateral TMJ arthroscopy that involved a second port for synovial biopsy. Extravasation of irrigant to the parapharyngeal space was diagnosed with direct laryngoscopy for the first patient and with video assisted laryngoscopy for the second patient. Both patients remained intubated on transfer from the operating room and both were safely extubated on post-operative day 1. Rapid resolution of the airway edema over a 24-hour period was observed.

Conclusions: Extravasation of irrigant to the parapharyngeal space during TMJ arthroscopy is an uncommon, but known complication. Edema of the parapharyngeal space due to extravasation of irrigant can complicate extubation and result in upper airway obstruction. We discuss our experience with the diagnosis and management of this complication and propose an anatomic pathway for its occurrence. Extravasation of irrigant can occur to experienced arthroscopic surgeons and we have hypothesized that operative maneuvers such as avoiding over insufflation of the superior joint space prior to insertion of the arthroscope and maintaining a patent irrigation system during arthroscopy can help prevent extravasation. An understanding of this uncommon, but known, complication of TMJ arthroscopy is important for safe intraoperative and postoperative management of the airway and timely extubation.

Keywords: Temporomandibular joint (TMJ); temporomandibular joint disease (TMD); parapharyngeal space; temporomandibular joint arthroscopy (TMJ arthroscopy); case report

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Introduction

Temporomandibular joint (TMJ) arthroscopy is a common modality for the diagnosis and treatment of temporomandibular joint disease (TMD). It was first described in 1975 by Onishi (1). The technique of TMJ arthroscopy for diagnosis and treatment of TMD was further described in 1988 by McCain in a study of 67 cadaveric joints (2).

The procedure of TMJ arthroscopy primarily involves the superior joint space. It is first insufflated, then a sharp trocar is used to introduce the cannula that houses the arthroscope. An additional operative cannula can be inserted for advanced arthroscopy (3). An external view of the set-up for TMJ arthroscopy is displayed in *Figure 1*.

Complications of TMJ arthroscopy are generally uncommon. McCain and González-García *et al.* reported complication rates of 1.34–4.4% (4,5). The known complications of TMJ arthroscopy include: facial palsy (from damage to the facial nerve, most commonly the frontal branch), hearing loss (from damage of the eighth cranial nerve, tympanic disruption, and ossicle disruption with entry in the middle ear, otitis media, and hypoacusia), perforation of the glenoid fossa, hemarthrosis, infection, and damage to the articular disc (6). This case report describes the observation and management of extravasation of irrigant causing delayed extubation, an uncommon complication of TMJ arthroscopy. We present the following cases in accordance with the CARE reporting checklist (available at <https://joma.amegroups.com/article/view/10.21037/joma-21-16/rc>). This manuscript adheres to the applicable EQUATOR guideline and written HIPAA authorization was obtained.

Case presentation

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Patient #1

A 19-year-old female presented with jaw pain, TMJ

clicking and multiple instances of a closed lock (limited mouth opening from TMJ disc abnormality), which failed conservative management (NSAIDs, orthotic, and physical therapy). MRI of the TMJ revealed anterior displacement of the meniscus of the left TMJ and a right sided synovial cyst. Computed tomography was negative for erosive changes of the condylar heads bilaterally. Given her history and radiographic findings, she was a candidate for bilateral TMJ arthroscopy

On the day of the procedure, the patient was intubated with asleep fiberoptic nasotracheal intubation with a cuffed 6.0 nasal RAE endotracheal tube, which was sutured to the nasal septum. The left TMJ was operated first. A patent irrigation system of the joint was established and the arthroscope was inserted into the superior joint space. A biopsy of the anteromedial synovium was performed followed by myotomy of the lateral pterygoid muscle attachment to the anteromedially displaced disc in preparation of disc repositioning (*Figure 2*). During posterior repositioning of the disc, swelling of the temporal and parotid regions, and excessive jaw stiffness were identified by the surgical team (*Figure 3*). The right TMJ was then operated on with a similar entrance as the left side. After completion of the right TMJ treatment, a significant amount of left sided facial edema remained. Direct laryngoscopy was performed, and it was found that there was severe swelling of the left parapharyngeal space as well as the soft palate (*Figure 4*). Given this airway edema, it was determined to keep the patient intubated with the existing endotracheal tube. She was transported to the intensive care unit and remained intubated overnight. On post-operative day 1, approximately 15.5 hours after the end of surgery, the patient was evaluated clinically and deemed safe for extubation and was extubated without issue. On examination, there was only minimal amounts of swelling of the palate and left parapharyngeal space. She was monitored for 1 more day and was discharged on postoperative day 2.

Patient #2

A 63-year-old female presented with right sided facial pain and was found to have ankylosis of the right TMJ. CT imaging revealed heterotopic bone over the right condyle fossa complex. MRI revealed degenerative changes of the right TMJ with an anteriorly displaced articular disc. The recommended definitive treatment was total joint replacement. Prior to the planned procedure, the patient developed induration and erythema over the right TMJ



Figure 1 External view of TMJ arthroscopy including arthroscope (left) and operative port (right). TMJ, temporomandibular joint.



Figure 3 Intraoperative photo displaying severe extraoral edema. This photo is published with the patient's consent.

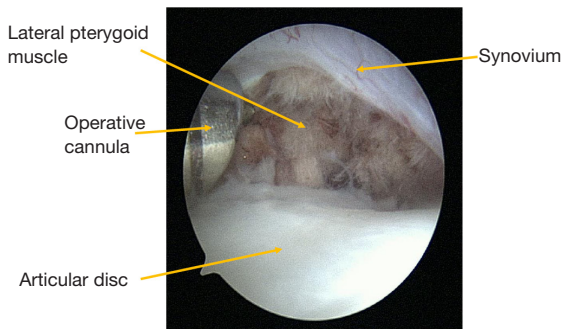


Figure 2 Left TMJ Arthroscopy. Holmium laser is used to perform myotomy of the lateral pterygoid muscle. TMJ, temporomandibular joint.



Figure 4 Intraoperative photo revealing intraoral edema with severe edema of the soft palate.

region. Diagnostic TMJ arthroscopy was performed for a concern of septic arthritis.

On the day of the procedure, an asleep fiberoptic nasotracheal intubation was performed with a cuffed 6.5 nasal RAE sutured to the nasal septum. The arthroscope was inserted into the superior joint space of the right TMJ with findings of an ankylotic joint with fibrotic tissue and no purulence. Biopsies of tissue were taken, and joint lavage was performed. Facial swelling developed and direct laryngoscopy revealed edema of the right parapharyngeal space. Given the airway edema, the patient was transported to the post-anesthesia care unit where video laryngoscopy was performed and revealed right parapharyngeal swelling without glottic edema. She was then kept intubated for 24 hours and extubated without issue on post-operative day 1.

Discussion

Extravasation of irrigant to the parapharyngeal space during TMJ arthroscopy has been previously discussed in the literature (7). The parapharyngeal space (also known as the lateral pharyngeal space) is a space that lies on either side of the neck and is composed of a prestyloid and retrostyloid component. The borders the parapharyngeal space are variable throughout the literature, but the following boundaries have been proposed. The medial wall of the parapharyngeal space is formed by the buccopharyngeal fascia (BPF) as it covers the outer aspect of the pharyngeal constrictors (8). The lateral border is marked by the medial

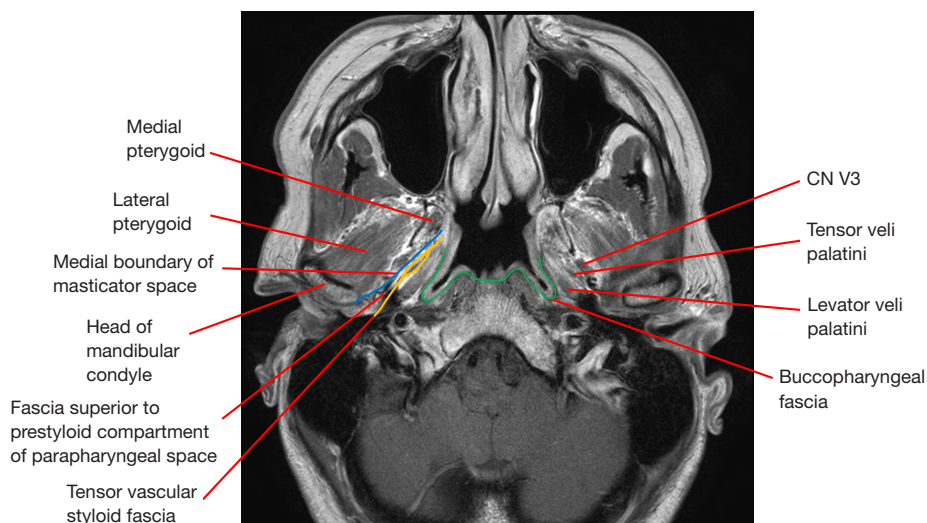


Figure 5 Axial MRI image at the level of the TMJ. The proposed mechanism for extravasation during TMJ arthroscopy is that fluid will extravasate along the superior belly of the lateral pterygoid muscle within the masticator space, then, by an unclear mechanism, the irrigant will exit the masticator space and travel along the tensor vascular styloid fascia within the prestyloid compartment parapharyngeal space. TMJ, temporomandibular joint.

pterygoid muscle along with the fascial layer extending from the muscle to the skull base (9). Anteriorly the BPF and the interpterygoid fascia fuse at the pterygomandibular raphe. This space extends from the skull base superiorly to the angle of the mandible inferiorly. The posterior border is thought to consist of the carotid sheath in the retrostyloid compartment of the parapharyngeal space. The parapharyngeal space is described as communicating with the submandibular space inferiorly (10). This could explain sublingual and submandibular swelling that can also be seen with extravasation.

Based on this anatomy, is hypothesized by the authors that the fluid will extravasate along the superior belly of the lateral pterygoid muscle within the masticator space. Then, by an unclear mechanism, the irrigant exits the masticator space and travels along the tensor vascular styloid fascia within the prestyloid compartment parapharyngeal space where it can also communicate with the sublingual and submandibular spaces (*Figure 5*).

One study by Sasaki *et al.* attempted to elucidate the mechanism of extravasation and injected contrast medium into 43 joints and found extravasation of contrast medium with 9 of the joints, most commonly occurring at the anteromedial aspect (11). TMJ arthroscopy was completed on 2 of these 9 joints and no perforation was identified surgically. Anatomically it is known that, especially

during pathological states, the pterygoid shadow at the anteromedial aspect of the joint space can become thin to the point a perforation may be seen resulting in herniation of the lateral pterygoid muscle into the superior joint space (12).

Other causes of extravasation of fluid include iatrogenic perforation of the medial joint space during insufflation. This can occasionally be identified by lack of plunger rebound after the insufflation of the superior joint space with 2–3 cc of fluid. It is also possible that increased irrigation pressure could also increase the amount of fluid that extravasates. It is important that the irrigation system remains patent and that the surgical team monitor the patency of this system.

During the surgery, this patient initially presented with external facial swelling which prompted further investigation of the airway by the surgical and anesthesia teams. Often this is also associated with a decreased mobility of the joint. The two cases reported suggest that involvement of the parapharyngeal space and delayed extubation should be considered a known complication of TMJ arthroscopy. Our experience reveals rapid resolution of the swelling. Some case reports have described successful extubation after one to two hours post operatively (7,13,14). Physical exam (not limited to intraoral exam of pharyngeal tissues, the use of video laryngoscopy, or nasopharyngoscopy) and assessment

of clinical criteria are essential for determining timing of extubation. The resolution of the extravasation of this sterile irrigant should not be compared to that of an inflammatory process, as in the former case, resolution can be quite rapid and frequent assessments should be performed to ensure that the patient can be extubated in a timely fashion. The authors have chosen to highlight this case report as it is important for both the surgical and anesthesia teams to recognize and properly manage this potential airway complication of TMJ arthroscopy.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://joma.amegroups.com/article/view/10.21037/joma-21-16/rc>

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://joma.amegroups.com/article/view/10.21037/joma-21-16/coif>). JPC serves as an unpaid editorial board member of *Journal of Oral and Maxillofacial Anesthesia* from July 2021 to June 2023. JW serves as an unpaid editorial board member of *Journal of Oral and Maxillofacial Anesthesia* from August 2021 to July 2023. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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