SMART DENTAL NEWSLETTER

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Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you **"SMART DENTAL UPDATES"** which contain latest and interesting news in the field of Dentistry.

This issue contain

- Postoperative Complications of Impacted Mandibular Third Molar Extraction Related to Patient's Age and Surgical Difficulty Level
- Massive macroglossia, a rare side effect of COVID-19: clinical, histologic, and genomic findings in COVID-19-positive versus COVID-19-negative patients
- Whether Bleaching affects the Microleakage of Class II Restoration with Bulk-Fill Material?
- Spot the Differences

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Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited

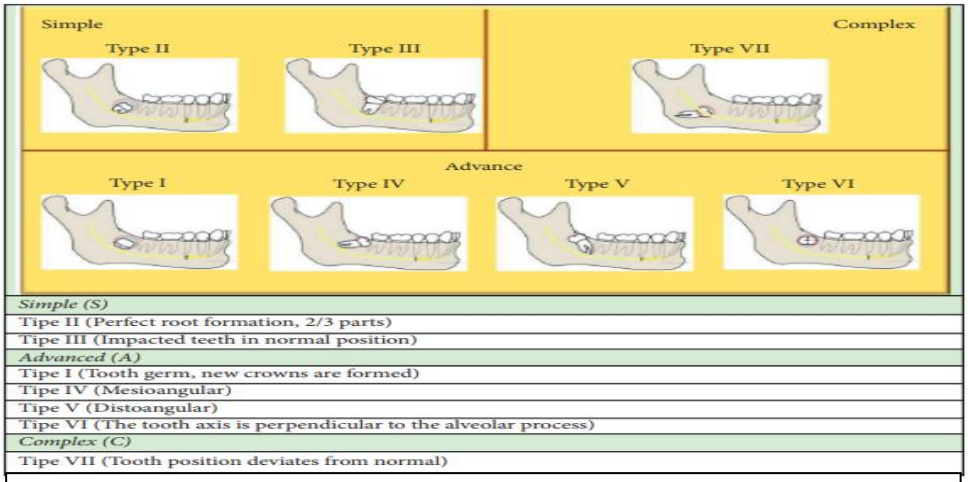
1. Postoperative Complications of Impacted Mandibular Third Molar Extraction Related to Patient's Age and Surgical Difficulty Level

Tooth impaction is a pathological situation where a tooth fails to attain its normal functional position.[1] Dontectomy is the surgical procedure of removing the impacted tooth and it is very common among mandibular third molars. However, in oral and maxillofacial surgery odontectomy is considered the most common procedure. [2] Postoperative complications rate of impacted mandibular third molar extraction varies between 2.6% and 30.9%. Patient characteristic features such as age and sex impacts tooth level, surgical techniques, and operator skills as risk factors of postoperative complications. Therefore, before performing the procedure to estimate its success rate it is crucial to analyze the surgical difficulty level.[3]

There was a significant correlation between Mandibular Third Molar Surgical Extraction and Postoperative Complications.

This study aimed to identify the correlation of postoperative complications with patient's age, sex, and surgical difficulty level.

This was a two year cross-sectional retrospective study. The study included subjects with a history of impacted mandibular third molar surgical extraction using local anesthesia and split technique using a low-speed straight handpiece. The researchers' crosssectionally analyzed the subjects data based on the first-day preoperative assessment and the seventh-day postoperative assessment to point out the postoperative complications which included persistent pain, trismus, swelling, and paresthesia in relation to patients characteristics such as age and sex and surgical difficulty level. According to the visual analog scale (VAS) postoperative pain rates was measured. By comparing the difference of preoperative measurement and postoperative measurement using a ruler Edema was measured. Trismus was evaluated by measuring maximum interincisal opening. According to Sailer and Pajarola the surgical difficulty level of the impacted mandibular third molar extraction was classified based on the type of retention.[4]



Classification of surgical difficulty level of mandibular third molar

RESULTS: 916 patient medical records were included. 59% of the respondents were females and age range was 21–30 years with a percentage of 60.9%. Surgeries for impacted left

mandibular third molars were slightly more than those of the right molars, with a percentage of 50.5%. Based on the type of retention 20.9% were simple cases, 77% were advanced cases and 2.2% were complex cases. There was no significant difference among all age groups and the postoperative complication on the first-day assessment was pain with a percentage of 87% in the whole age group. The latter showed significant results in the persistent pain complaint in the age groups of 11–20 years, 21–30 years, and 51–60 years with percentages of 1.8%, 1.3%, and 12.5%, respectively. In all age groups, the first-day assessment showed no significant difference in swelling complications while the first-week assessment presented that the percentage of complications in the age group of 11–20 years was the highest (2.9%) compared to other age groups. On the first-week assessment, trismus complications was primarily reported in all age groups. Between male and female postoperative complications there was no significant difference.[4]

Gender (*N*)	Complication							
	Pain		Edema		Mouth opening restriction		Paresthesia	
	Day-1	Day-7	Day-1	Day-7	Day-1	Day-7	Day-1	Day-7
Female (540)	480 (88.9%)	6 (1.1%)	445 (82.4%)	8 (1.5%)	142 (26.3%)	4 (0.7%)	10 (1.9%)	4 (0.7%)
Male (376)	329 (87.5%)	5 (1.3%)	298 (79.3%)	7 (1.9%)	107 (28.5%)	4 (1.1%)	7 (1.9%)	1 (0.3%)
P values	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

Comparison of mandibular third molar extraction postoperative complications based on sex.

Difficulty (*N*)	Complication							
	Pain		Edema		Mouth opening restriction		Paresthesia	
	Day-1	Day-7	Day-1	Day-7	Day-1	Day-7	Day-1	Day-7
Simple (191)	149 (78%)	1 (0.5%)	153 (80.1%)	4 (2.1%)	41 (21.5%)	1 (0.5%)	3 (1.6%)	0 (0%)
Advanced (705)	644 (91.3%)	9 (1.3%)	573 (81.3%)	10 (1.4%)	197 (27.9%)	7 (1%)	10 (1.4%)	5 (0.7%)
Complex (20)	16 (80%)	1 (5%)	17 (85%)	1 (5%)	11 (55%)	0 (0%)	4 (20%)	0 (0%)
P values	≤0.001	≥0.01	≥0.01	≥0.01	≥0.01	≥0.01	≤0.001	≥0.01

Comparison of mandibular third molar extraction postoperative complications based on the surgical difficulty level.

Recent studies have revealed that pain, swelling and trismus are the complications following odontectomy.[4] Several studies have also shown sex as a determinant of postoperative complications risk and most of the articles revealed males had a lower pain risk when compared with females. [5,6] However, among males and females subjects this research presented no significant difference in postoperative complications. After surgery different kinds of flaps, suture techniques, and tightness may contribute to swelling, whereas tight closure increases postoperative swelling and pain for difficult draining. Surgery duration gets longer when the extraction technique is getting harder which leads to more edema and trismus.

This study concluded that there was a significant correlation between mandibular third molar surgical extraction and postoperative complications including pain, swelling, trismus, and paresthesia concerning patients' age and surgical difficulty level. The highest complication risk was in Age group of ≥51 years and complex cases group. It should be taken into consideration that subjects ≥51 years and complex surgical level are more vulnerable to severe postoperative complications.[4]

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2.Massive macroglossia, a rare side effect of COVID-19: clinical, histologic, and genomic findings in COVID-19-positive versus COVID-19-negative patients

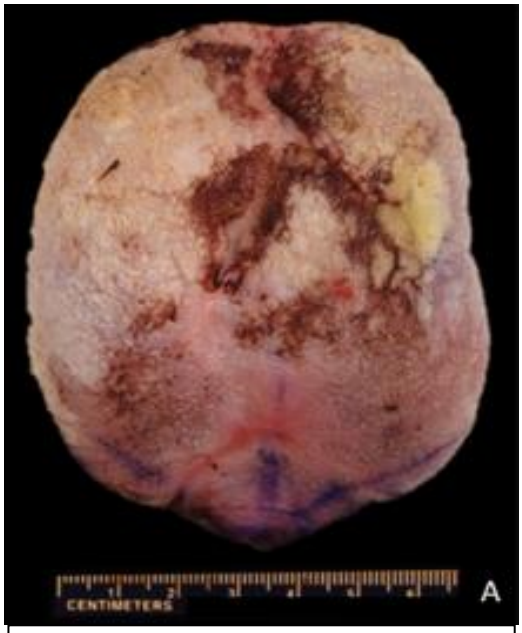
Macroglossia is the abnormal enlargement of the tongue in proportion to other structures in the mouth. Complications of macroglossia include mandibular deformities, articulation errors, deglutition difficulties, and airway obstruction. [1]Acute macroglossia is a rare medical complication and the exact etiology is largely unknown. Trauma, medication side effects, including the use of ACE inhibitors, allergic reactions, pressure packing of the oropharynx, oral surgery, and neurogenic causes are proposed etiologies of acute macroglossia. The initial, acute onset of macroglossia is hypothesized to be a form of compartment syndrome in the tongue.[2] Tongue edema is due to Compression or obstruction of the lingual arteries, veins, and lymphatic system. The number of prone positioning has drastically increased in the number of COVID-19 patients.[3]

Immunoshistochemical highlighted a CD45+predominance, indicating that a robust immune response is present in the tissues

The objective of this study was to identify if there is an underlying genetic predisposition for COVID-related macroglossia.

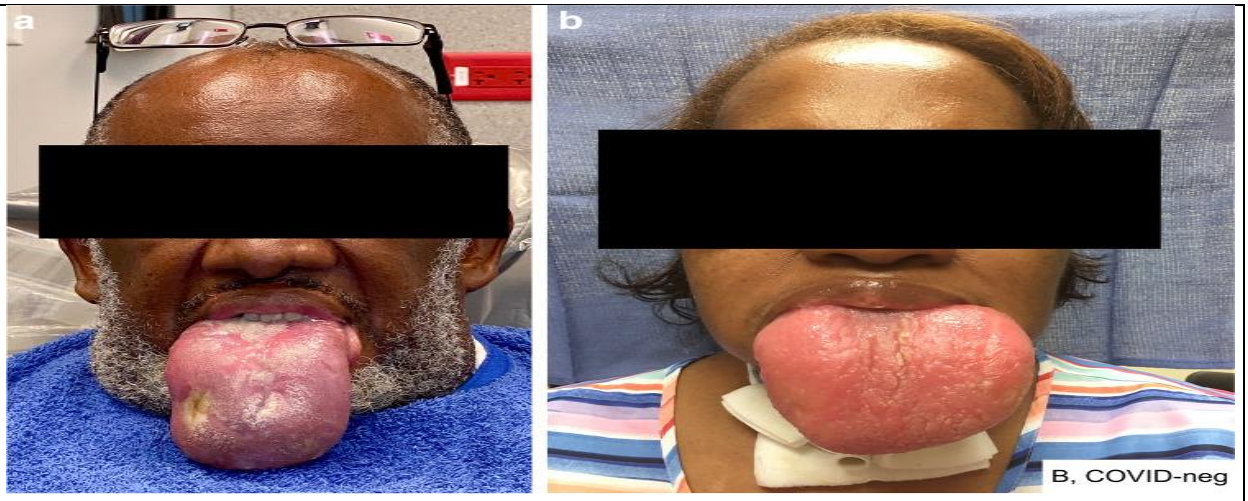
This was a combination of retrospective and prospective case series involving two patients with a history of massive macroglossia. In this study one COVID positive and COVID negative subject was included. A chart review was completed for each subject and prospectively, genetic and histopathologic analyses was completed. On formalin-fixed paraffin-embedded 3-µm sections immunohistochemistry (IHC) was performed using fully automated systems. Through a CLIA laboratory clinical whole-exome sequencing was completed and analyzed through their clinical bioinformatics process.[3]

Patient 1 was 46 years old male who was admitted to the hospital due to COVID-19 infection-related complications approximately 3 months. In the prone position for 21 days, he was intubated and placed on a ventilator. He developed severe macroglossia while in the prone position. Although the subject recovered from the COVID-19 infection, the macroglossia resulted in both airway compromise and decreased oral intake necessitating a tracheostomy and percutaneous endoscopic gastrostomy (PEG) tube. Including compression therapy the subject was refractory to non-surgical treatment of the macroglossia and then referred to the Oral and Maxillofacial (OMS) department. Patient 2 was a 48-year-old female presented with a cerebrovascular accident. For 14 days she required intubation during her hospital stay. Following the administration of an ACE inhibitor extubation was complicated by angioedema and macroglossia. The subject required a tracheostomy and PEG placement. The subjects macroglossia was also refractory to conservative measures and was referred to the OMS department.



A Gross examination showed a 9.2×7.1×2.5 cm hemi-glossectomy

With focal white plaques on its surface the gross evaluation showed a 9.2×7.1×2.5 cm hemi-glossectomy specimen. Without distinct mass formation sectioning showed a homogeneous, glistening cut surface with focal fibrosis. Mild hyperkeratotic mucosal surface with no dysplasia was revealed by histologic sections. With splaying of skeletal muscle fibers, submucosal tissue was edematous, with focal fibrosis and hemosiderin-laden macrophages, and moderate peri-vascular and peri-lymphatic chronic inflammation composed primarily of small mature lymphocytes, scattered plasma cells and mast cells, and few eosinophils. Within the lymphoid aggregates the focal germinal center formation was noted. IHC panel was performed which showed predominantly CD45+ lymphocytes , of which ~ 85% were CD3 + T-cells and ~ 15% were CD20 + B-cells. Of the CD3+T-lymphocytes, 90% were CD4+helper T-cells and 10% were CD8+cytotoxic T-cells. Approximately 10% of lymphocytes were CD4+-regulatory T-cells of CD4+T-helper cells in the lymphoid aggregates. Within the lymphoid aggregates D2-40 stain highlighted endothelial cells of the lymphatic and vascular spaces. For amyloid deposition congo-red cytochemical stain was negative. [3]



A and B Clinical photos of patient 1 and patient 2, respectively. Both patients demonstrate persistent, massive macroglossia

Macroglossia has been noted to be caused by Trauma, genetic disorders, lymphedema, medication side effects, or other metabolic derangements. The present article presented two subjects with same clinical presentation persistent massive macroglosia after prolonged intubation in the prone position but showed different histological features.[3] In a study conducted by Bearse M et al. and Jacobs W et al. found evidence of the viral RNA in the liver and kidneys, indicating that the virus has a multi-organ presence. The presence of SARS-CoV-2 was associated with increased densities of lymphocytes and macrophages in cardiac tissues.[4,5]

Further studies are required to determine which subject factors may indicate susceptibility for the development of massive, persistent macroglossia. This study showed that the findings are consistent with others that have observed a lymphocytic infiltrate in the organs of subjects infected with SARS-CoV-2. Immunohistochemistry highlighted a CD45+predominance, indicating that a robust immune response is present in the tissues. Further studies are required for the pathobiology of this phenomenon and its role in the development and/or persistence of massive macroglossia. Whole-exome sequencing revealed no pathological variants and for macroglossia the limited sample size does not rule out genetic predisposition as a possible etiology.[3]

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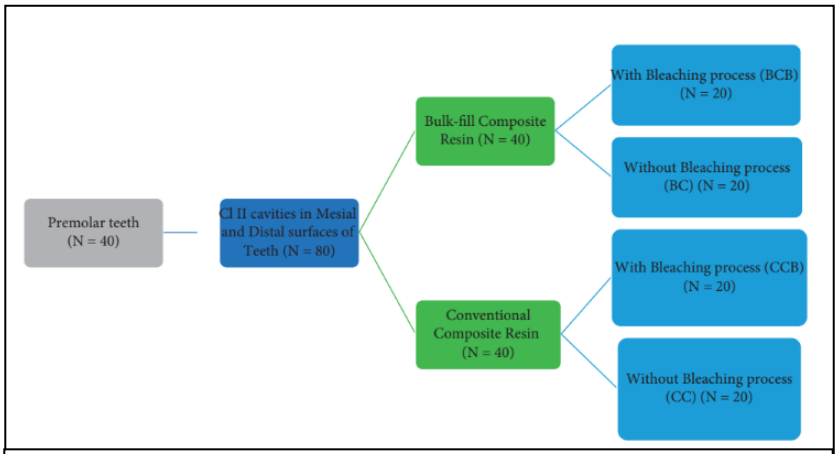
3. Whether Bleaching affects the Microleakage of Class II Restoration with Bulk-Fill Material?

Bleaching is the process of lightening the colour of a tooth by the application of the chemical agent to oxidize the organic pigmentation on the tooth.[1] Cosmetic dentistry demand is increasing day by day and is an important part of dental treatments.[2] The most common cosmetic restorative material are composite resins used in the anterior part of the mouth best meet aesthetic and durability needs of restorations. To achieve long-term clinical success composites have several undesirable properties to overcome. [3]The common problems in composite restorations are microleakage of marginal area, reduction of light intensity entering material mass by increasing depth of composite material, failure of dental mass and insufficient cure depth.[4] During polymerization most problems of composite resin restorations can be directly or indirectly related to shrinkage. Volume shrinkage due to polymerization of the composites is about 2–6%.

There was no statistically significant difference observed in microleakage between bulk-fill and conventional composites with and without bleaching.

The objective of this study was conducted to determine whether bleaching affects the microleakage of class II restoration with bulk-fill material.

This study was performed on 40 normal human premolars collected within 2 months and kept in normal saline solution. There was no cracks, decay or any other defects in the teeth. The teeth were kept in Stimol 0.2 solution for 24 h for disinfection after cleaning by using a scalpel and brush and applying pumice and later were kept in distilled water for 24 hours. Groups were divided based on the bleaching process by 20% carbamide peroxide gel and composite type. (i) CC group: conventional Z250 composite without bleaching. (ii) BC group: Tetric EvoCeram bulk-fill composite without bleaching. (iii) CCB group: conventional Z250



The study design (the materials and methods)

composite with bleaching. (iv) BCB group: Tetric EvoCeram bulk-fill composite with bleaching. According to the manufacturer's instructions the samples in groups were restored by the conventional Z250 composite or Tetric EvoCeram bulk-fill composite. Using 37% phosphoric acid for 15 seconds the cavities were etched in CC and CCB groups and then were dried by a gentle stream of air for 2 seconds. Single Bond Adhesive was applied in two different layers in the samples. In the cavities of layers the Z250 composite was placed with 2 mm of thickness. Bluephase C8 light-curing device with an intensity of 800 mW/cm2 was used for 15 s for exposing the restorations in all cavities. CCB and BCB groups were bleached and restorations were finished, and after performing a thermal cycle for 30 seconds with 500 cycles and a rest time of 10 s using a thermocycling device bleaching was done.

Thermal cycles were performed without bleaching in CC and BC groups. For 14 days and 2 h a day daily 20% carbamide peroxide was used in equal amounts in each of the CCB and BCB groups for the bleaching process. At the end of the bleaching period, the teeth were kept in water for 24 hours and the apex of the sample was sealed using adhesive wax. For 24 hours the samples were immersed in 0.6% alkaline fuchsine solution after which roots of the teeth was removed, and crowns of the teeth were cut in the mesiodistal direction. Using a stereomicroscope the degree of pigment penetration was evaluated. The data was analyzed using one-way analysis of variance (ANOVA), and a p value <0.05 was considered as statistically significant.

Distribution of the data regarding microleakage in each of the 4 groups was checked and the results revealed that the data in all 4 groups follow a normal distribution. Adherence to normal distribution in these groups was confirmed because the significance level of this test was more than 0.05 in all groups. There was no significant difference in microleakage in the 4 groups including the groups that received bleaching, Z250 and Tetric EvoCeram composites. None of the studied groups presented grades 0 and 3 of microleakage. In any of the sample there was no case of microleakage or severe microleakage. No significant difference in the frequency of different degrees of microleakage in the studied groups was revealed by chi-square test.[5]

Groups	Degrees of microleakage	Frequency	The significance level
Group 1 (Z250 composite without bleaching)	0	0	0.476
	1	9 (45%)	
	2	11 (55%)	
	3	0	
Group 2 (Tetric EvoCeram composite without bleaching)	0	0	
	1	11 (55%)	
	2	9 (45%)	
	3	0	
Group 3 (Z250 composite with bleaching)	0	0	
	1	8 (40%)	
	2	12 (60%)	
	3	0	
Group 4 (Tetric EvoCeram composite with bleaching)	0	0	
	1	6 (30%)	
	2	14 (70%)	
	3	0	

Frequency and percentage of each degree of microleakage in the studied groups.

The use of these restorations is associated with problems, such as polymerization shrinkage and microleakage, which have reduced the success rate of these restoration, despite the increasing

use of dental composites in modern dentistry.[6] A study conducted by Sever EK et al. showed that bleaching treatment has received a great attention, and can have different effects on the patients' restorations. [7] A study conducted by Torneck CD et al. revealed that teeth whitening effects on increasing the amount of fine leakage can be caused by peroxides deposited on the tooth surface and activated oxygen released by whitening agents.[8] The present study showed that there was no difference between microleakage of bulk-fill composites and CC with and without bleaching, and bleaching had the same effect on microleakage of these two types of composites.[5]

Limitations of this study was difficulty in collecting intact samples, tooth damage, lack of necessary equipment and high costs of materials and equipment. This study results showed some amount of microleakage in all the samples. There was no statistically significant difference observed in microleakage between bulk-fill and conventional composites with and without bleaching. Bleaching had the same effect on microleakage of these two types of composites.[5]

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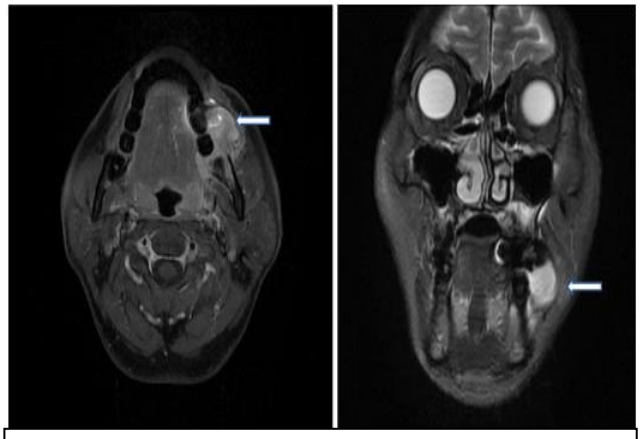
4. A case study on Airway Management Failure after Delayed Extubation in a subject with Oral Malignant Melanoma Who Underwent Partial Mandibulectomy and Reconstruction with a Free Flap

Oral melanoma is an uncommon malignant tumor which originates from the proliferation of melanocytes.[1] Maxillofacial surgery can cause anatomical changes, haematoma formation in the head and neck region, oedema which can cause severe problems with airway management.[2] In subjects with oral cancer airway management would be complicated in patients who have undergone invasive surgery, such as reconstruction with a free flap with or without radical neck dissection. To secure the airway during the perioperative period tracheostomy (TT) is used. The rate of TT complications is as high as 8%–25%. Most of the studies have shown that delayed extubation resulted in faster recovery and less time spent in the intensive care unit, without a significant difference in airway-related complications when compared to Tracheostomy. [3]

Subjects should be closely monitored during the postoperative period to prevent airway failure. Early diagnosis and airway management before airway failure occurs are important.

A 56 year old male presented with a malignant melanoma in the left side of the oral cavity, gingiva, and buccal mucosa was advised for mass excision and reconstruction with a fibular free flap. An ill-defined mass lesion that was 2:6×2:4×1:8 cm in size in the left lateral part of the oral cavity was revealed by preoperative magnetic resonance imaging (MRI). There was no history of systemic disease or medication. Laboratory tests, electrocardiography, and chest radiography, was unremarkable. General anaesthesia was induced with intravenous injections of fentanyl (100 μg), lidocaine (60 mg), propofol (120 mg), and rocuronium (50 mg) and maintained with 7–10 vol% desflurane. Nasal packing was performed with cotton swabs moistened with a 0.01% epinephrine solution after the induction of anaesthesia. Using fibreoptic bronchoscopy nasotracheal intubation was performed and a 6.5 mm reinforced tube was inserted. Using the anatomical landmark technique a central venous catheter was inserted into the right subclavian vein. Partial mandibulectomy, radical neck dissection, and reconstruction with a fibular free flap was performed. The infused volume was crystalloid 7200 ml, colloid 1700 ml, packed red blood cells 5 units, and fresh frozen plasma 5 units. The estimated blood loss was approximately 1800 ml and the urine output was 3800 ml. The subject was transferred to the intensive care unit and was kept sedated with endotracheal intubation. 3 hours later the subject recovered from anaesthesia after surgery. On the first



A 2:6×2:4×1:8 cm sized enhancing ovoid mass lesion in the left buccal area and oral cavity.

postoperative day ventilator weaning was initiated at 8 AM, the ventilator was stopped at 1 PM, and oxygen (5 L/min) was administered via a T-piece. No bleeding was noted from the surgical wound and his blood pressure was maintained between 110/60 mmHg and 140/90 mmHg. Intravenous infusion of patient-controlled analgesia with fentanyl and nefopam was administered for the postoperative pain. Arterial Oxygen saturation was 100% and there was no dyspnoea. At 8 AM postoperative day (POD 2), the subject was extubated and oxygen (3 L/min) was administered via a nasal prong. His haemoglobin level decreased to 8.9 ml/dl four hours after extubation. One unit of pRBC was transfused. The patient complained of dyspnoea, and arterial oxygen saturation decreased from 100% to 87% after seven hours after extubation. To open the airway oral and nasal airway insertion was not sufficient. Conventional direct laryngoscopy, video laryngoscopy, and laryngeal mask insertion were not successful. While performing bag-mask ventilation an otolaryngologist performed an emergency tracheostomy (TT). The heart rate decreased from 90 bpm to 42 bpm during tracheostomy. Intravenous atropine (0.5 mg) and epinephrine (200 µg) was administered to the patient. To treat cardiac arrest, and epinephrine (1 mg) was administered , ten minutes after the initiation of bag-mask ventilation, cardiopulmonary resuscitation. Blood pressure was 80/30 mmHg, and dopamine, dobutamine, and norepinephrine infusion (20 µg/kg/min each) was administered. The subject was connected to a ventilator and was sedated with midazolam. Midazolam sedation was stopped on POD 3 and subjects mental status was semicomatose and he showed seizure-like movements. Postoperative computed tomography revealed severe swelling and increased soft tissue density with airway compression in the left side of the face and neck. A brain MRI showed a diffusely restricted lesion involving the whole cerebral cortex and basal ganglia on POD 4. His mental status did not recover. A recurring tumour was found on POD 67. Further chemotherapy or radiotherapy was considered. On POD 103, the patient was transferred to a hospice.

The resected tumour and related lymphoid tissue

This was a case study on postoperative airway management failure in a subject with oral cancer. This study revealed the importance of early recognition and airway management for subjects with head and neck cancer.[3] Many studies have shown that delayed extubation was considered safe option and it can prevent the complications related to Tracheostomy.[4,5] A study conducted by Graboyes et al. performed a retrospective review of 15 cases of failed extubation in 129 cases of delayed extubation. [6] This case study reported a case of failed airway management during the postoperative period. The cause of difficult airway access is the airway compression caused by haematoma and oedema in the oropharyngeal area. After extubation delayed extubation (DE) also carries the risk of causing airway failure. Even 24 hours after

extubation close observation and reevaluation of the airway are needed. Early diagnosis and securing of the airway are essential. Medical staff should be aware of airway management algorithms.[3]

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SPOT THE DIFFERENCE