Review Article

Anaesthesia for minor surgery in oral cancer: a review

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Abstract: Anaesthesia for minor surgery in oral cancer encompasses the perioperative care of patients undergoing a wide range of simple oromaxillofacial surgical procedures involving less extensive or minimally invasive surgery, not requiring major tissue resection and/or complex reconstruction of surgical defects, that are nevertheless essential episodes in patients' oral cancer treatment pathway, that can generally be performed in a day-case elective surgical setting. These minor procedures include diagnostic tissue biopsies and dental extractions performed in advance of major cancer resection and/or radiotherapy, restorative dental work performed after cancer resection and free flap reconstruction, as well as specialist minimally invasive techniques such as transoral laser microsurgery (TLM) and micrographic surgery. There is currently a paucity of studies and limited existing guidance covering this broad area of anaesthetic practice, largely because these procedures are wide-ranging and do not necessarily fit easily into a discrete subject topic for review. Nevertheless, such minor surgical procedures for oral cancer constitute a significant proportion of the anaesthetic caseload in oromaxillofacial surgical units, such that clinical guidance is warranted. Whilst the surgical procedure being undertaken may be relatively minor, the anaesthetic complexity of these patients must not be underestimated. Thorough airway evaluation is essential (including review of relevant imaging and nasendoscopy), paying particular attention to the anatomical site of the tumour, the potential for distortion of airway structures, and the impact of any previous surgery and/or radiotherapy. The appropriateness for procedures to be undertaken on a day-case basis is a multidisciplinary decision, taking into account patient pathology, comorbidities, the planned procedure, and postoperative requirements.

Keywords: Anaesthesia for oral cancer; transoral laser microsurgery (TLM); lingual tonsillectomy; micrographic surgery; dental anaesthesia

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Introduction

Background

The oral cavity (tongue, floor of mouth, palate, gingiva, vestibule, buccal mucosa) and lip have the highest incidence of all oromaxillofacial cancers, ranking them as the sixteenth most common form of cancer overall (1). In 2018, it was estimated that there were 35,4900 new cases worldwide, with this group of cancers identified as the leading cause of malignancy-related mortality in South Central Asia (2). Whilst radiotherapy and chemotherapy offer alternative non-surgical treatment options, surgery remains the most established, definitive treatment (3).

Anaesthesia for minor surgery in oral cancer encompasses the perioperative care of patients undergoing a wide range of simple oromaxillofacial surgical procedures, involving relatively less extensive or minimally invasive surgery, that does not involve major tissue resection or complex

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reconstruction of defects which can, therefore, generally be undertaken on a day-case basis.

Rationale and knowledge gap

Minor surgical procedures are frequently required at various stages of patients' oral cancer treatment pathway and, therefore, constitute a significant proportion of the anaesthetic caseload in oromaxillofacial surgical units. Nevertheless, there is a paucity of studies in this area, and limited existing guidance for anaesthetists involved in delivering clinical care to these patients.

Objective

This review focusses upon the anaesthetic considerations for managing patients with oral cancer undergoing minor surgical procedures—specifically, surgery undertaken to aid in cancer diagnosis (e.g., tissue biopsies), surgery performed in preparation for radiotherapy or major cancer resection (e.g., dental extractions), simple resection of suspicious lesions, minimally invasive techniques such as laser microsurgery, and procedures performed post-major cancer resection and reconstruction (e.g., osseointegrated implants). It also aims to increase understanding of the pertinent aspects of the surgical procedures commonly undertaken in this context, so that anaesthetists may tailor their technique accordingly—optimizing operating conditions and surgical access to the operative field, anticipating (and preventing) potential complications, in order to enhance patient safety and outcomes. Anaesthetic considerations for major cancer resection and free flap tissue reconstruction, oral cancer emergencies, and robotic surgical techniques are addressed in dedicated articles within this special series on anaesthesia for oral cancer surgery.

Preoperative assessment

Whilst the proposed surgical procedure may be relatively minor, these patients represent a high-risk group, necessitating thorough preoperative assessment and careful planning. Patients may be presenting for minor surgical procedures at very different stages of their disease or treatment pathway: some may be undergoing diagnostic tissue biopsies having presented with relatively subtle symptoms such as painless oral ulceration or mucosal discoloration, whereas others may have presented relatively late with dysphagia and trismus; some patients may be undergoing dental extractions in preparation for radiotherapy (removal of carious teeth to avoid infection and osteonecrosis); and, others may be undergoing restorative dental procedures having already undergone major tumour resection, with or without free flap reconstruction and/or radiotherapy.

Despite the differing stages of patients' treatment pathway at which these minor surgical procedures may be undertaken, a relatively consistent approach to their preoperative assessment may be taken, as outlined below. In contrast, the intra- and postoperative requirements differ for each individual procedure, and are therefore discussed separately in the latter procedure-specific guidance. There is currently no strong evidence in this area of clinical practice to recommend one particular anaesthetic technique over another; however, total (propofol based) intravenous anaesthesia may confer specific advantages over an inhalational technique for maintenance of anaesthesia in patients considered suitable for day-case surgery, since its use is associated with rapid smooth emergence from anaesthesia, swift return to baseline cognition, and reduced postoperative nausea and vomiting (4).

Even though there is a growing proportion of relatively young patients with human papilloma virus-related malignancy presenting without significant premorbid disease (5), tobacco smoking and alcohol consumption remain the predominant risk factors in the majority and, as such, associated cardiorespiratory disease (chronic obstructive pulmonary disease, ischaemic heart disease, peripheral vascular disease, hypertension, etc.) is common. Similarly, anaemia, nutritional deficiencies and substance dependency are also common to this patient population. Early treatment is crucial in oral cancer survival (6) so a relatively pragmatic approach to preoperative assessment must be taken to avoid unnecessary delays in treatment (i.e., it may not always be possible to have arranged every investigation one might ideally have requested in patients undergoing elective non-cancer surgery). Nevertheless, every effort should be made to identify comorbidities, evaluate their severity, and optimize them prior to surgery.

Thorough evaluation of the airway is crucial. Obvious challenges to airway management such as trismus (relating to the underlying disease process, fibrosis post-surgery or irradiation), require careful planning and advanced airway techniques (discussed in detail in the dedicated article, "advanced airway management techniques for oral cancer surgery" in this special series on oral cancer). However,

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more subtle anatomical changes should be actively sought. A high index of suspicion for difficult airway management is indicated in patients that have undergone previous head and neck radiotherapy, and previous major cancer resection with or without flap reconstruction.

The effects of radiotherapy can sometimes be obvious externally (especially on palpation, or on patient head and neck movement) as non-pliable neck tissues, a fixed immobile larynx and reduced cervical flexion/extension. However, this is not always the case, and the history alone should prompt caution and high expectation of difficult airway management. Direct/videolaryngoscopy, tracheal intubation, supraglottic airway insertion, facemask ventilation and front of neck airway may all be more challenging.

Patients presenting for minor surgery post-major cancer resection (e.g., restorative dental procedures) also warrant special attention as there may be significant anatomical distortion; reconstructive flaps may be bulky and impair access, laryngoscopy, supraglottic airway positioning and facemask seal; and patients may have undergone temporary tracheostomy (the presence of an anterior neck scar should be actively sought as an indicator of potential subglottic stenosis). A retrospective analysis of patients undergoing surgery for oral cancer revealed that up to 14.7% of tracheal intubations were difficult (7). Indeed, patients undergoing head and neck procedures accounted for 39% of all reported airway complications in the UK Fourth National Audit Project (NAP4) (8). The presence of tumour limiting neck movement or mouth opening, previous radiotherapy or postoperative fibrosis and airway oedema are all recognized risk factors for airway management difficulties (9). Airway management must, therefore, include "planning for failure" of that chosen technique (contingency planning, as part of a comprehensive airway strategy rather than a singular airway plan), and be compatible with the patient and their underlying pathology, i.e., if there are indicators of predicted airway difficulty, then a traditional approach with induction of anaesthesia and direct laryngoscopy is more likely to lead to complications (10), and an advanced airway technique is advocated (including consideration of awake techniques).

For more detail on preoperative assessment in patients with oral cancer (including risk stratification and pre-optimization), please see the dedicated article, "anaesthetic preoperative considerations for oral cancer surgery" in this special series on oral cancer.

Procedure-specific anaesthetic considerations

Tongue biopsy

Tongue cancer accounts for 36.5% of all oral malignancies (11), usually arising from the submucosal layer such that it may be difficult to detect early and assess the extent clinically (12). Late presentation is relatively common as patients may neglect the painless swelling until the lesion reaches significant size. Biopsy with direct laryngoscopy under general anaesthesia was the traditional approach to obtaining a tissue specimen for diagnosis; however, tumours located on the posterior third of the tongue can bleed on insertion of the laryngoscope blade and risk pulmonary aspiration, as well as potentially impairing facemask ventilation when the tongue (and lesion) lose tone following induction of anaesthesia (13).

Videolaryngoscopy with gradual advancement of the blade under indirect vision ("incremental exposure" technique) can usually reduce the risk of bleeding associated with instrumentation; specifically, the use of a hyperangulated blade is advocated since it provides a superior wider-angle view, requires less force during laryngoscopy, and does not require the blade tip to be advanced into the vallecula to achieve a view of the glottis or permit tracheal intubation (reducing the risk of traumatic bleeding from potentially friable malignant tissues, especially those involving the base of tongue) (14).

Nasotracheal intubation is generally undertaken for this procedure since it permits unobstructed surgical access to the tongue and tongue-base, though, a south-facing Ring-Adair-Elwyn (RAE) tracheal tube may be a suitable alternative in patients in whom there is a contraindication to nasotracheal intubation, e.g., large nasal polyps that may cause epistaxis on traumatic passage of the tube. Given the brevity of this particular surgical procedure, judicious dosing of neuromuscular blocking agent to facilitate initial tracheal intubation is advised, and care must be taken to ensure full reversal of any neuromuscular blocking agents by utilizing quantitative neuromuscular monitoring prior to emergence from anaesthesia—in accordance with the Association of Anaesthetists "Recommendations for standards of monitoring during anaesthesia and recovery 2021" (15).

Traditionally, throat packs were inserted routinely by anaesthetists for even minor oromaxillofacial procedures such as this, with the theoretical benefit of minimizing airway and respiratory complications at emergence from anaesthesia—caused by blood that has collected

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above the tracheal tube cuff and emesis from intragastric blood-load. However, throat pack insertion is no longer recommended routinely, following a systematic review that demonstrated a lack of evidence to support this practice together with many complications associated with their use (16). The accompanying consensus guidance from the Difficult Airway Society, the British Association of Oral and Maxillofacial Surgery, and the British Association of Otorhinolaryngology, Head and Neck Surgery, provides useful algorithms (outlining safety precautions) to follow if a throat pack is deemed necessary, though in practice, a surgical swab (that is part of the swab count, and less likely to be accidentally retained), inserted by the surgeon in event of significant intraoperative bleeding, is likely to be safer.

Following completion of the procedure, and prior to emergence and tracheal extubation, the airway should be inspected with direct/videolaryngoscopy and suctioning of any secretions/blood undertaken. Passing a rigid suction device (e.g., Yankaeur) blindly into the oropharynx is not recommended since this may cause trauma, precipitate bleeding from friable tissues, or disrupt haemostasis of the surgical bed.

As is the case with most "shared airway" surgical procedures, tracheal extubation is advised in the awake, spontaneously breathing patient. Advanced tracheal extubation techniques such as "deep extubation" and tracheal tube exchange for a laryngeal mask airway (LMA) prior to emergence from anaesthesia are not advocated in these patients since there is an unnecessary risk of pulmonary aspiration from any ongoing bleeding, and the cuff of the LMA may cause bleeding from the biopsy site on insertion. Smooth tracheal extubation (without excessive coughing that may disrupt sutures, cause increased venous pressure and promote haematoma formation) may be achieved by utilizing the anti-tussive qualities of remifentanil which may be continued (if used intraoperatively) as a low-dose infusion during emergence, titrated carefully to achieve a conscious, spontaneously breathing patient.

Intraoperative analgesia requirements are not generally significant, and bolus administration of small incremental doses of a short-acting potent opioid (e.g., fentanyl or alfentanil) is usually sufficient to attenuate the brief sympathetic response to tissue biopsy, with paracetamol and a non-steroidal anti-inflammatory drug or coxib usually adequate for postoperative analgesia. However, in patients undergoing multiple synchronous biopsies, those presenting late with more extensive lesions, and those undergoing excision biopsy (with wider resection margins) or biopsy more akin to a wide local excision, intra- and postoperative analgesic requirements may be more significant. In such cases, a continuous intravenous infusion of remifentanil (in combination with a longer acting opioid administered towards the end of the procedure, e.g., morphine or oxycodone) is often the mainstay of intraoperative analgesia, since it can be easily and rapidly titrated to the varying surgical stimulus. In addition, local anaesthetic containing adrenaline (typically lidocaine 2% with 1:80,000 adrenaline) should be infiltrated to reduce intraoperative analgesic requirements, reduce surgical bleeding and improve the operative field. A longer-acting local anaesthetic agent (such as 0.5% levobupivacaine) may also be infiltrated at the end of surgery, to reduce postoperative pain. Nevertheless, rescue opioid analgesia is more likely to be required in the immediate Post Anaesthesia Care Unit (PACU).

A limited single-centre, retrospective case review suggested that transcervical ultrasound-guided fine needle aspiration of a solitary lesion under local anaesthesia is also feasible in patients considered to be at high risk for general anaesthesia (17). The use of local anaesthetic regional nerve blocks, such as glossopharyngeal nerve block, have also been described for excision of minor tongue lesions instead of general anaesthesia (18).

Transoral laser microsurgery (TLM or TOLM)

TLM facilitates precise tumour resection, limiting tissue trauma with better preservation of normal tissue and disease-free margins. It is associated with superior functional and aesthetic outcomes (19), and permits resection of tissues (e.g., the entire tongue base mucosa and lingual tonsils) that would be technically challenging using more traditional surgical techniques. Laser safety is a major concern with these procedures, and familiarity with safety precautions, and the immediate management of airway fire is crucial when managing patients undergoing TLM. Precautions include displaying laser-in-use warning signs, restricting access to operating theatres during laser use, having an appointed laser safety officer, adhering to laser safety protocols and providing regular staff training, mandating a single laser operator, using a laser sheath when not in use and a shrouded operating footswitch to prevent accidental activation, placing non-reflective surfaces and damp gauze swabs around the operating field, applying caution with flammable alcohol-based skin preparations (including avoidance of pooling on the skin or on surgical drapes),

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and ensuring the provision of sterile water on the surgical instrument trolley to immediately extinguish any fire.

Anaesthesia-specific laser safety strategies include utilizing the lowest fractional inspired concentration of oxygen to maintain adequate patient oxygenation, avoidance of nitrous oxide, use of closed breathing circuits, and minimizing circuit leaks (20). Consequently, airway management during TLM usually entails the use of a laser-resistant oral cuffed tracheal tube with two tracheal tube cuffs (a second distal cuff maintains a secure airway and seal with the trachea in event of laser damage to the proximal cuff; the cuffs should be inflated with water rather than air; methylene blue dye may be added to aid in rapid identification of cuff damage; and, the cuffs should be inflated carefully, to ensure an adequate seal is obtained, without any audible gas leak—an oxygen rich environment increases fire risk).

Nevertheless, high flow nasal cannula oxygenation (and tubeless anaesthesia) has been used safely for laser procedures (21), although many institutions currently avoid the routine use of high flow nasal oxygen and laser due to the potential airway fire risk, particularly following a case report describing intra-oral ignition of monopolar diathermy during transnasal humidified rapid-insufflation ventilatory exchange (THRIVE) (22). More recently, a feasibility and safety study investigating the use of THRIVE and TLM in a porcine model using carbon dioxide laser demonstrated fire, sparks and smoke, but no combustion during THRIVE in the absence of an endolaryngeal material; however, fire occurred systematically during laser use in the presence of dry cotton or plastic endolaryngeal material (23).

Eye protection and facemasks must be worn during laser use. Due to the potential for permanent damage to the cornea or retina from an errant beam (direct or reflected), operating theatre staff should wear approved wavelength-specific eye safety glasses, and the patient should be provided with eye pads or shields. The bio-aerosol (smoke plume) produced during laser use may have toxic or carcinogenic constituents, that are not removed by standard operating theatre ventilation systems. Therefore, facemasks and a smoke evacuator are advised.

For small, superficial oral cavity and oropharyngeal lesions, TLM is well-suited to day-case surgery. Postoperative analgesia requirements are usually minimal due to the increased accuracy of resection and reduced tissue trauma inherent to the laser technique. Simple analgesics such as regular paracetamol and regular non-steroidal anti-inflammatory drugs (NSAIDs), with mild opioids such as dihydrocodeine as required for breakthrough pain are usually sufficient in the postoperative period (dispersible or liquid formulations are advisable given the site of surgery and likelihood of mild postoperative dysphagia). However, TLM-lingual tonsillectomy is at the limits of what can be considered "minor surgery" for oral cancer. This procedure meets the requirements for this review since it utilizes minimally invasive surgical techniques, generally involves limited volume of resected tissue, where the surgical defect heals spontaneously and does not require surgical flap reconstruction; however, lingual tonsillectomy is not generally considered suitable for day-case surgery (for the reasons discussed below).

Lingual tonsillectomy

Cervical lymphadenopathy (proven for carcinoma, on biopsy) may be the first presenting sign in 2–4% of head and neck squamous cell carcinomas, with an unknown primary site (so called "carcinoma of unknown primary", CUP) (24). All effort should be made to identify the primary tumour, as this avoids unnecessary irradiation of unaffected areas, minimizing radiation-related side-effects (25). Thus, if the primary site still remains uncertain after full history, physical examination, and appropriate imaging (including computed tomography, magnetic resonance imaging, or even positron emission tomography), panendoscopy and biopsy under general anaesthesia may be undertaken to evaluate the upper aerodigestive tracts. As studies have shown that over 80% of occult primary tumours have been identified in the palatine tonsil or tongue base (26), lingual tonsillectomy and tongue base biopsy are now included in the diagnostic workup and may be performed at the time of panendoscopy and biopsy, rather than separately following negative targeted biopsies.

Lingual tonsillectomy (also often called tongue base mucosectomy) involves the removal of lymphoid tissue at the base of the tongue with preservation of the underlying musculature, and can be performed unilaterally or, more commonly, bilaterally. Both TLM and transoral robotic surgery (TORS) have been shown to be effective surgical techniques in tongue base mucosectomy undertaken for this purpose. Indeed, a retrospective review of patients with CUP demonstrated that a surgical approach that included a TLM-assisted technique and lingual tonsillectomy offered the highest possibility of locating the occult primary tumour (27).

In addition to this role in staging patients with an occult

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primary malignancy, TLM-lingual tonsillectomy may also be undertaken for definitive resection of oropharyngeal squamous cell carcinoma of the base of tongue (+/– selective neck dissection).

The main anaesthetic considerations for TLM-lingual tonsillectomy, in addition to laser safety precautions, are airway device selection, provision of adequate postoperative pain management, and safe resumption of oral intake. Patients are positioned on the operating table with their head placed in extension; an additional shoulder roll may/may not be required to optimize exposure of the operative field. An oral laser-resistant tracheal tube is generally required, carefully positioned and secured at the corner of the mouth to maximize surgical access (some institutions do still undertake nasotracheal intubation, since it offers superior access to the operative field, utilizing dampened surgical swabs to "protect" the tracheal tube during laser use—though this practice is not recommended). Anterior traction is applied to the tongue (with/without a suture passed through the tongue) and a tonsillar gag/retractor may also be used to facilitate access to the operative field by the surgeons' distending oropharyngoscope. Neuromuscular blockade is advocated to maximize this process and to abolish the risk of coughing during laser use—which can be achieved using a continuous infusion of neuromuscular blocking agent or appropriate bolus dosing, guided by quantitative neuromuscular monitoring. In practice, since intraoperative analgesia is often provided by a continuous infusion of remifentanil, patients' airway/cough reflexes are grossly attenuated. A longer-acting opioid should be administered towards the end of the surgical procedure, prior to emergence, to ensure provision of adequate analgesia in the immediate recovery period (following cessation of the remifentanil infusion).

Unlike many of the "minor surgical" procedures discussed in this review, TLM-lingual tonsillectomy is generally more painful, and a multimodal approach to analgesia is recommended. Many surgical centres that undertake this particular procedure (and TORS) have implemented dedicated pain management protocols, and members of the Acute Pain Management Team often routinely review these patients postoperatively to ensure adequacy of analgesia. Typical pain management protocols include regular paracetamol (1 g intravenous or dispersible formulation 4–6 hourly), regular NSAIDs (e.g., ibuprofen 400 mg, liquid formulation, 6–8 hourly), and oral morphine for break-through pain (e.g., oramorph liquid 10 mg, as required 1-hourly). Some analgesic regimens also include regular gabapentinoid administration (e.g., gabapentin 100–300 mg liquid formulation, 8-hourly) or patient-controlled analgesia (for the first 24 hours). Regular aperients and antiemetics should be prescribed. Analgesic regimen/dose adjustment may be required, particularly in elderly patients, patients with pre-existing liver or renal impairment or reduced weight <50 kg (not uncommon in this patient population, where dysphagia caused by the patients' underlying pathology may limit oral intake).

Temporary bulbar dysfunction is not uncommon following TLM-lingual tonsillectomy; therefore, particular care should be taken when resuming oral intake in these patients to prevent pulmonary aspiration. Patients considered to be at higher risk of this complication (e.g., those undergoing resection of larger lesions, or where there is involvement of the epiglottis) should be formally assessed by Speech and Language Therapy (SLT) specialists, and a nasogastric tube inserted prophylactically at the end of surgery, prior to emergence and tracheal extubation. Postoperatively, initial clinical assessment of swallow should be undertaken by a SLT specialist, with nasogastric feeding continued until deglutition is deemed safe for resumption of oral intake [other modalities that may be used in assessment include videofluoroscopy or fibreoptic evaluation of swallow (FEES)].

Aside from temporary bulbar dysfunction, the most common postoperative complication following TLM-lingual tonsillectomy is bleeding (the bleeding rate was found to be 2.8% in a retrospective review of 52 patients) (27). Meticulous surgical technique is essential, and towards the end of surgery patients' systemic blood pressure should be returned to baseline (or supra-normal) to identify any bleeding points. A Valsalva manoeuvre is also frequently performed at the end of surgery to assess adequacy of haemostasis. As already described in the earlier subsection on "Tongue biopsy", prior to emergence and tracheal extubation, the anaesthetist should inspect the airway for bleeding or swelling and perform any suction manoeuvres under vision (not blindly). Whilst airway oedema is generally less of a concern with TLM than TORS, intravenous dexamethasone is routinely administered intraoperatively, and is often continued regularly in the immediate postoperative period (e.g., 6.6 mg 8-hourly for the first 24 hours).

For greater detail on the anaesthetic considerations for TORS specifically, please see the dedicated article "anaesthetic considerations for transoral robotic surgery in oral cancer" in this special series on oral cancer.

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Dental procedures

Radiotherapy is often utilized for patients with oral cancer, and is associated with significant side-effects. Xerostomia has been reported in 90% of patients, mucositis in 60%, radiation dental caries in 50%, and osteonecrosis in 15% (28). The risk of osteoradionecrosis is life-long post-radiotherapy (i.e., the risk does not diminish over time), and occurs most commonly after dental extraction (particularly mandibular teeth within the radiation field). Xerostomia increases patients' susceptibility to dental caries and periodontal disease, reducing the prognosis of teeth. Radiotherapy may cause trismus, compromising oral hygiene and reducing access for future dental treatment. To minimize these negative sequelae, meticulous dental care is necessary, with patients undergoing dental assessment and extraction (if required) prior to irradiation treatment.

Simple dental extractions are most commonly performed under local anaesthesia. For extraction of multiple teeth or impacted teeth, the number of teeth to be removed, the location of the impacted teeth and their proximity to other structures affect the duration and complexity of surgery, as well as the anaesthetic technique. Depending on the region of the intended surgery, a range of targeted nerve blocks may be used alone or in conjunction with sedation or general anaesthesia. For procedures involving the maxillary dentition, a posterior superior alveolar nerve block, middle superior alveolar nerve block, anterior superior alveolar nerve block, greater palatine nerve block, nasopalatine nerve block, and/or local infiltration of the palate may be used (29). For mandibular dentition, an inferior alveolar nerve block is the most common technique employed.

Patients with oral malignancy may also undergo dental restorative procedures after major cancer resection with or without flap reconstruction. The insertion of osseointegrated implants (to support dental prostheses) can usually be performed under local anaesthesia with or without sedation; though, general anaesthesia may be more appropriate in patients requiring extensive bone grafting and/or placement of multiple implants, or in those with severe dental phobia or prominent pharyngeal reflexes (30,31). Unfortunately, prior irradiation to the head and neck region (common to many of these patients) is associated with trismus and an altered oral environment, posing additional challenges to dental rehabilitation (28). The bonding efficacy of adhesive material to the teeth may be impaired (32), and there is an increased risk of implant failure (33) for implants placed into irradiated bone (radiation-induced fibrosis of blood vessels and soft tissues cause impaired healing and increased risk of infection). Increased surgical difficulty and prolonged surgery should be anticipated in these patients, and must be taken into consideration when selecting the most appropriate anaesthetic technique.

For patients requiring general anaesthesia for dental procedures in the context of oral cancer, nasotracheal intubation is often required to maximize surgical access and may be necessitated in some patients with marked trismus (following irradiation therapy).

Airway assessment and planning should be meticulous; where there are concerns regarding trismus (+/– other anatomical distortion relating to cancer pathology and surgical/non-surgical treatments) such that there is predicted difficulty with laryngoscopy and rescue oxygenation techniques (facemask ventilation, supraglottic airway insertion/seal and front of neck airway), an awake fibreoptic-guided nasotracheal intubation should be performed rather than an asleep technique. Particular care should be taken when manipulating and instrumenting the airway given the high incidence of mucositis and friable oral tissue in these patients. In keeping with the most recent guidance on throat packs (described earlier in this review), their requirement should be discussed on a case-by-case basis by the multidisciplinary team at the pre-surgical brief, and the recommended algorithms followed if a throat pack is deemed necessary.

Intraoperative and postoperative analgesic requirements are rarely significant and an opioid-sparing multimodal approach is advocated, utilizing local anaesthetic techniques (as described above) in combination with simple analgesics.

Micrographic surgery

Micrographically oriented histographic surgery (MOHS) involves microscope-facilitated excision of skin cancer, and is often used in the treatment of recurrent malignancy or when tissue sparing is required (to lessen functional and aesthetic defects) (34). In the context of oral cancer, MOHS predominantly refers to excision of lip lesions, though it may also be used for carcinoma-*in-situ* (stage 0) of the oral cavity. It involves minimal tissue resection with immediate histological evaluation of excised margins to maximize normal tissue preservation. It is usually performed under local anaesthesia, though larger lesions or certain patients may be more suitable in combination with sedation or general anaesthesia (e.g., some patients may be unable to

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remain in a stationary position for the necessary duration of time to permit excision of larger lesions). In cases performed under general anaesthesia, the anaesthetist should take care with the chosen airway device (and method of securing the *in-situ* device) not to tether/disrupt patients' normal anatomy (e.g., a nasotracheal tube that is not secured/supported appropriately at the naris can disturb the natural position of the upper lip). Procedures can be prolonged; therefore, patients should be positioned carefully, with all pressure areas protected. Normothermia should be maintained using forced air warmers as indicated. Supplementary intra- and postoperative analgesia is rarely required in addition to effective infiltration of local anaesthesia by the surgeon, and these cases are well-suited to day-case surgery. However, anaesthetists should also be vigilant that excision of larger lesions may require high volumes of local anaesthetic, and care should be taken to not exceed the maximum safe dose, to reduce the risk of local anaesthetic toxicity (lidocaine 3–4.5 mg/kg; lidocaine with adrenaline 7 mg/kg; not to exceed a maximum total dose of greater than 500 mg per surgical procedure over 8 hours) (35). Nevertheless, rather reassuringly, in a retrospective review of 563 patients undergoing MOHS where high volumes of local anaesthetic were utilized (the average volume of 1% lidocaine received was 40 mL, and the average patient weight was 86.69 kg) adverse events directly attributable to local anaesthetic were reported in only two patients (36). In practice, the risk of exceeding maximum recommended doses of local anaesthetic is more likely during prolonged procedures involving multiple stages of cutaneous resection and reconstruction, conducted solely under local anaesthetic, when re-dosing/supplementation may be required (37).

Day case surgery

Many of the aforementioned minor procedures are appropriate for day surgery (or on a short stay inpatient basis); however, some patients may require a longer period of pre- and postoperative care to optimize the perioperative management of underlying chronic disease, and to maximize patient safety (particularly in the context of challenging airway management). Indeed, despite the day case nature of the surgical procedure, postoperative care of these patients may be best delivered on a dedicated head and neck/maxillofacial surgical ward, or in a critical care environment rather than on a day case discharge ward, depending upon the specific patient challenges, availability of suitably trained staff, and accessibility to support from anaesthesia and surgical teams. Many of these patients are graded American Society of Anesthesiologists' Physical Status (ASA-PS) class III or above, such that they fail to meet standard criteria for day case surgery (38). Although there is a general trend towards surgery in patients of a higher ASA-PS class being undertaken in the day case setting, case selection is key. When considering the suitability for day surgery, multidisciplinary team decision-making is crucial, with an appreciation that the relatively straight forward surgical procedure for which the patient is scheduled may belie the true complexity of the case.

Strengths and limitations of the review

The strength of this review is that it provides much needed guidance to anaesthetists in an area of clinical practice that is currently lacking in the existing scientific literature. It distils evidence from a wide subject area, presenting the pertinent considerations for key procedures that are performed frequently.

The main limitations pertain to the broad subject matter, the paucity of studies and scarcity of high-level evidence available. Despite the regularity with which these minor procedures are performed, they do not receive the same degree of research attention compared with anaesthetic techniques for major complex surgery, such that there are few randomized controlled trials, with guidance based largely upon smaller studies, expert and consensus opinion.

Conclusions

A high index of suspicion for potential airway management difficulties is essential in patients with oral malignancy, especially those that have undergone previous surgery or radiotherapy, even with apparently normal external airway examination. A clear management strategy for oxygenation is essential and must be shared with the multidisciplinary team. Despite the relatively minor nature of some of the surgical procedures, the principles of assessment and planning of airway management, intra-, and postoperative care must be as thorough as for major surgery in this high-risk group of patients.

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References

1. World Cancer Research Fund International. Mouth and oral cancer statistics. [Internet]. London (UK): World Cancer Research Fund International; [accessed 2022 Sep 13]. Available online: https://www.wcrf.org/cancer-trends/mouth-and-oral-cancer-statistics/
2. Ferlay J, Colombet M, Soerjomataram I, et al. Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. Int J Cancer 2019;144:1941-53.
3. Shah JP, Gil Z. Current concepts in management of oral cancer - surgery. Oral Oncol 2009;45:394-401.
4. Wolf A, Selpien H, Haberl H, et al. Does a combined intravenous-volatile anesthesia offer advantages compared to an intravenous or volatile anesthesia alone: a systematic review and meta-analysis. BMC Anesthesiol 2021;21:52.
5. Guo T, Kang SY, Cohen EEW. Current perspectives on recurrent HPV-mediated oropharyngeal cancer. Front Oncol 2022;12:966899.
6. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol 2009;45:309-16.
7. Nikhar SA, Sharma A, Ramdaspally M, et al. Airway Management of Patients Undergoing Oral Cancer Surgery: A Retrospective Analysis of 156 Patients. Turk J Anaesthesiol Reanim 2017;45:108-11.
8. Patel A, Pearce A, Pracy P. Chapter 18 Head and neck pathology. In: Cook T, Woodall N, Frerk C. editors. Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society. Major complications of airway management in the United Kingdom. Report and Findings. London. Royal College of Anaesthetists; March 2011:143-54.
9. Supkis DE Jr, Dougherty TB, Nguyen DT, et al. Anesthetic management of the patient undergoing head and neck cancer surgery. Int Anesthesiol Clin 1998;36:21-9.
10. Cumberworth A, Lewith H, Sud A, et al. Major complications of airway management: a prospective multicentre observational study. Anaesthesia 2022;77:640-8.
11. Mathew Iype E, Pandey M, Mathew A, et al. Squamous cell carcinoma of the tongue among young Indian adults. Neoplasia 2001;3:273-7.
12. Mancuso AA, Hanafee WN. Elusive head and neck carcinomas beneath intact mucosa. Laryngoscope 1983;93:133-9.
13. Chhabra AK, Gupta S, Saini P, et al. Anticipated Difficult Intubation Due to Polypoidal Squamous Cell Carcinoma on Posterior One Third of Tongue. Res Pract Anesthesiol Open J 2018;3:13-4.
14. Hansel J, Rogers AM, Lewis SR, et al. Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation: a Cochrane systematic review and meta-

analysis update. Br J Anaesth 2022;129:612-23.
15. Association of Anaesthetists. Recommendations for standards of monitoring during anaesthesia and recovery 2021. Guideline from the Association of Anaesthetists. 2021 May. Available online: https://anaesthetists.org/Home/Resources-publications/Guidelines/Recommendations-for-standards-of-monitoring-during-anaesthesia-and-recovery-2021 [Accessed 25 Feb 2023].
16. Athanassoglou V, Patel A, McGuire B, et al. Systematic review of benefits or harms of routine anaesthetist-inserted throat packs in adults: practice recommendations for inserting and counting throat packs. Anaesthesia. 2018;73:612-8.
17. Reeder A, Aulet R, Sajisevi M, et al. Feasibility of In-office Fine-Needle Aspiration for Base of Tongue Tumors. Otolaryngol Head Neck Surg 2020;163:849-51.
18. Eswaran K, Saini HS, Khadakban DS, et al. Management of a Case of Excision of Tongue Lesion with Neck Dissection under Regional Anesthesia in a Patient with High Risk for General Anesthesia. Res Inno in Anesth 2022;7:19-21.
19. Sinha P, Hackman T, Nussenbaum B, et al. Transoral laser microsurgery for oral squamous cell carcinoma: oncologic outcomes and prognostic factors. Head Neck 2014;36:340-51.
20. Ward P. Anaesthesia Tutorial of The Week: Airway Fire. [Internet]. The US: World Federation of Societies of Anesthesiologists; 2017 [accessed 2022 Sep 13]. Available online: https://resources.wfsahq.org/wp-content/uploads/353_english.pdf
21. Flach S, Elhoweris A, Majumdar S, et al. Transoral laser microsurgery using high-flow nasal cannula oxygenation: Our experience of 21 cases. Clin Otolaryngol 2019;44:871-4.
22. Onwochei D, El-Boghdadly K, Oakley R, et al. Intra-oral ignition of monopolar diathermy during transnasal humidified rapid-insufflation ventilatory exchange (THRIVE). Anaesthesia 2017;72:781-3.
23. Baudouin R, Rigal T, Circiu M, et al. Feasibility and safety of THRIVE in transoral laser microsurgery. Am J Otolaryngol 2022;43:103605.
24. Grau C, Johansen LV, Jakobsen J, et al. Cervical lymph node metastases from unknown primary tumours. Results from a national survey by the Danish Society for Head and Neck Oncology. Radiother Oncol 2000;55:121-9.
25. Fu TS, Foreman A, Goldstein DP, et al. The role of transoral robotic surgery, transoral laser microsurgery, and lingual tonsillectomy in the identification of head and neck squamous cell carcinoma of unknown primary origin: a systematic review. J Otolaryngol Head Neck Surg 2016;45:28.
26. Cianchetti M, Mancuso AA, Amdur RJ, et al. Diagnostic evaluation of squamous cell carcinoma metastatic to cervical lymph nodes from an unknown head and neck primary site. Laryngoscope 2009;119:2348-54.
27. Nagel TH, Hinni ML, Hayden RE, et al. Transoral laser microsurgery for the unknown primary: role for lingual tonsillectomy. Head Neck 2014;36:942-6.
28. Beech N, Robinson S, Porceddu S, et al. Dental management of patients irradiated for head and neck cancer. Aust Dent J 2014;59:20-8.
29. Preziosi BD, Hershkin AT, Seider PJ, et al. Oral & Maxillofacial Regional Anesthesia. [Internet] New York. NYSORA, Inc. 2022. [accessed 2022 Sep 13] Available online: https://www.nysora.com/topics/regional-anesthesia-for-specific-surgical-procedures/head-and-neck/maxillofacial/oral-maxillofacial-regional-anesthesia/
30. Sidenö L, Hmaidouch R, Brandt J, et al. Satisfaction level in dental-phobic patients with implant-supported rehabilitation performed under general anaesthesia: a prospective study. BMC Oral Health 2018;18:182.
31. Smith LP, Ng M, Grubor D, et al. Outcomes of dental implants placed in a surgical training programme. Aust Dent J 2009;54:361-7.
32. Yesilyurt C, Bulucu B, Sezen O, et al. Bond strengths of two conventional glass-ionomer cements to irradiated and non-irradiated dentin. Dent Mater J 2008;27:695-701.
33. Fenlon MR, Lyons A, Farrell S, et al. Factors affecting survival and usefulness of implants placed in vascularized free composite grafts used in post-head and neck cancer reconstruction. Clin Implant Dent Relat Res 2012;14:266-72.
34. Asgari MM, Olson JM, Alam M. Needs assessment for Mohs micrographic surgery. Dermatol Clin 2012;30:167-75, x.
35. Kouba DJ, LoPiccolo MC, Alam M, et al. Guidelines for the use of local anesthesia in office-based dermatologic surgery. J Am Acad Dermatol 2016;74:1201-19.
36. Patrinely JR Jr, Darragh C, Frank N, et al. Risk of adverse events due to high volumes of local anesthesia during Mohs micrographic surgery. Arch Dermatol Res

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2021;313:679-84.
37. Flanagan K, McLean R, Goldberg D. Is It Time to Redefine Lidocaine Administration Guidelines in Mohs Surgery? J Drugs Dermatol 2020;19:433.
38. Bailey CR, Ahuja M, Bartholomew K, et al. Guidelines for day-case surgery 2019: Guidelines from the Association of Anaesthetists and the British Association of Day Surgery. Anaesthesia 2019;74:778-92.

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