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Difficult Airway Spectrum in Cats and Dogs - Management with Alternative Intubation Methods

Eylem Bektaş Bilgiç

ABSTRACT

***Background*:** Endotracheal intubation is defined as the procedure of placing a tube into the trachea. Endotracheal intubation methods include orotracheal, nasotracheal, retrograde, tracheostomy, and lateral pharyngotomy. Conditions where characteristic anatomical features obstruct the view of the vocal cords and tube placement are defined as "difficult airway". The American Society of Anesthesiologists (ASA) defines difficult intubation as the need for 3 or more attempts to place an endotracheal tube. Conditions that can lead to upper airway obstruction include BOHS, nasopharyngeal polyps, laryngeal paralysis and tracheal collapse, temporomandibular joint diseases, and head trauma. The aim of this study was to evaluate cases causing difficult airways and the alternative orotracheal intubation methods applied for airway management.

***Materials, Methods & Results*:** The study included a total of 34 patients, 22 cats and 12 dogs, of different ages and breeds with difficult airways, brought to the Istanbul University-Cerrahpasa Faculty of Veterinary Medicine Department of Surgery Polyclinic for elective surgery. Nasotracheal intubation was performed on 10 patients where orotracheal intubation was not feasible or was deemed to obstruct the surgical field, lateral pharyngotomy on 6 patients, tracheostomy on 17 patients, and permanent tracheostomy on 2 patients. Nasotracheal intubation was applied to patients scheduled for epiglottopexy and laryngeal saccullectomy surgeries. Lateral pharyngotomy was performed for jaw locking and nasopharyngeal reconstruction surgeries. Tracheostomy was applied for mandibular osteosynthesis, jaw locking, pharyngeal tumor resection, condylectomy, zygomatic arch resection, laryngeal tumor resection, and bilateral temporomandibular joint resection. Conditions necessitating alternative intubation methods included epiglottis retroversion and laryngeal saccula eversion lesions of BOHS, maxilla and mandible fractures resulting from head trauma, symphysis mandibula separation, laryngeal stenosis, larynx and pharynx tumors, and inability to open the mouth due to malunion.

***Discussion*:** Conditions such as BOHS findings, temporomandibular joint ankylosis, laryngeal and pharyngeal lesions, oral surgery, difficult airway, and conditions leading to difficult intubation were considered. Increased fat mass in the oropharyngeal soft tissue due to obesity not only increases the risk of airway obstruction but also complicates endotracheal intubation. The difficulty in intubation experienced in cases 26 and 30, where patients were of pug breed and assessed as obese based on body condition score, supports the literature. Orotracheal intubation is a routine procedure in cats and dogs and can be easily performed. However, alternative intubation methods may be required in cases of difficult airway. The most serious consequence of the difficult airway spectrum is the inability to intubate the patient and ensure oxygenation. Laryngeal paralysis (cases 2 and 22), temporomandibular joint ankylosis (cases 6, 9, 10, 20, 21, and 33), pharyngeal (case 11) and laryngeal tumors (case 19) were considered as situations requiring urgent intervention and where orotracheal intubation was not possible. Alternative intubation methods were required in these cases, and tracheostomy was performed urgently to ensure airway patency. It was observed that alternative endotracheal intubation methods were frequently used in oral maxillofacial surgery and otolaryngology clinics to relieve the surgical field or stabilize the patient's condition.

Keywords: difficult airway, endotracheal intubation, lateral pharyngotomy, nasotracheal intubation, tracheostomy.

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Department of Surgery, Faculty of Veterinary Medicine, Istanbul University - Cerrahpasa, Istanbul, Turkey. CORRESPONDENCE: E.B. Bilgiç [eylem.bilgic@iuc.edu.tr]. Department of Surgery, Faculty of Veterinary Medicine, Istanbul University-Cerrahpasa. 34320 Avcilar, Istanbul, Turkey.

INTRODUCTION

Endotracheal intubation in animals, although older than anesthesia itself, was demonstrated by Vesalius in 1542 when he inserted a tube into the trachea of an animal, illustrating the thoracic cavity anatomy of a living animal [9,23]. Endotracheal intubation is defined as the procedure of placing a tube into the trachea [2,15-17,28].

Endotracheal intubation methods include orotracheal, nasotracheal, retrograde, tracheostomy, and lateral pharyngotomy [27,31]. Additionally, orotracheal intubation via a transmilohyoid approach can be applied in certain cases [31,34].

In cats and dogs, orotracheal intubation can be performed without the need for special equipment besides a laryngoscope [14,27,35]. However, anatomical features, pathological conditions, or trauma may make oral endotracheal intubation difficult or impossible [4,27,37]. Conditions where characteristic anatomical features obstruct the view of the vocal cords and tube placement are defined as "difficult airway" [35]. The American Society of Anesthesiologists (ASA) defines difficult intubation as the need for 3 or more attempts to place an endotracheal tube [26]. Difficult intubation poses a life-threatening situation in anesthesia [11-14,23,35,37].

Pathologies causing upper airway obstruction include brachycephalic obstructive airway syndrome (BOHS) [19,21,23,36], nasopharyngeal polyps, laryngeal neoplasia, paralysis and tracheal collapse. Conditions such as, temporomandibular joint diseases, head trauma are situations where the mouth is difficult to open [21,23]. In cases where orotracheal intubation is not possible, alternative intubation methods should be used [4,14,23,31].

The aim of this study was to evaluate cases causing difficult airways and the alternative orotracheal intubation methods applied for airway management.

MATERIALS AND METHODS

Animals

The material of the study consisted of 34 patients, 22 cats and 12 dogs of different ages and breeds, with difficult airways, brought to the Surgery Department Polyclinic of Istanbul University-Cerrahpasa Faculty of Veterinary Medicine for elective surgery. In cases where orotracheal intubation was not possible or was deemed to obstruct the surgical field, nasotracheal intubation, lateral pharyngotomy, tracheostomy, or permanent tracheostomy were performed.

Pre-operative (Pre-op) planning

All 34 patients underwent hemogram and preanesthetic panel biochemistry parameter tests in the central laboratory of our faculty to prepare for surgery.

For preventive analgesia purposes, butorphanol[1] [Butomidor® - 0.04 mL/kg, SC, SID] was administered in all patients. Premedication was administered with xylazine HCl[2] [Vetaxiyl® - 0.5 mg/kg, IV, SID] at a dose of 15 min after administration. Induction was achieved with of ketamine HCl[3] [Ketax® - 5 mg/kg, IV, SID]. Each patient received preoperative ceftriaxone[4] [Novosef® - 50 mg/kg, IV, SID], meloxicam[5] [Melox® - 0.2 mg/kg, SC, SID], and intraoperative 0.9% NaCl Serum[6] [Poliflex® - 10 mL/kg/sa, IV, SID].

Intubation methods

Nasotracheal intubation was performed on cases numbered 24, 25, 26, 27, 28, 29, 30, 31, 32, and 34 (Table 1). For nasotracheal intubation, patients under general anesthesia were placed in sternal recumbency. The head was maintained in a neutral position, and the nostril was lifted to advance the tube approximately 2-3 cm into the nostril. The tube entering the nasal cavity was directed caudoventrally and passed through the ventral meatus of the nasal cavity into the nasopharynx and further into the laryngopharynx. With the mouth open, the tube tip visible in the laryngopharynx was directed into the glottis for nasotracheal intubation. Due to the lack of an intubation tube suitable for nasotracheal intubation in dogs, a 12 Fr diameter polyurethane feeding tube was used for intubation.

Lateral pharyngotomy was performed on cases numbered 7, 12, 13, 14, and 15 (Table 1). For lateral pharyngotomy, after general anesthesia, the animal was placed in either left or right lateral recumbency. The area dorsal to the mandibular angle was identified and shaved, followed by asepsis and antisepsis. The diameter of the tube to be applied was measured according to the distance between the 2 nostrils, and 3 and 3.5 ID diameter, murphy eye, cuffed PVC endotracheal tubes were used. The length of the tube was measured to extend from the incisors to the shoulder joint of the patient and was shortened if necessary. The index finger was inserted into the oropharynx, the epiglottis was palpated on the lateral wall of the pharynx, and the fingertip was positioned dorsally to the epiglottis. By pressing the lateral wall of the pharynx with the fingertip, a mound was created externally. An incision of 0.5-1 cm was made over the created mound, and the subcutaneous tissues and muscles were dissected

with blunt dissection using a pean hemostatic forceps. The pean hemostatic forceps were then pushed through the pharyngeal wall. The upper part of the adapter-less tube was held with a pean hemostatic forceps and pulled out from the pharyngeal wall. The tube tip was then inserted into the trachea from inside the mouth, and the correct position was adjusted and the cuff was inflated. To prevent the tube from coming out during the operation, the tube was secured to the skin using 2/0 - 3/0 polypropylene suture with the Chinese finger trap technique.

Tracheostomy was performed on cases numbered 1, 3, 4, 5, 6, 8, 9, 10, 11, 16, 17, 18, 19, 20, 21, 23, and 33 (Table 1). For tracheostomy, the animal was placed in dorsal recumbency, and the forelimbs were tied back, and the maxilla was fixed to the table. After shaving, asepsis and antisepsis were performed, and the area was delimited with sterile drapes. The cricoid cartilage of the larynx was felt, and a 3-4 cm incision was made in the midline of the skin. The subcutaneous tissues and the pair of sternohyoid muscles were dissected bluntly and retracted bilaterally. After identifying the tracheal rings, the trachea was entered between the 1st and 2nd tracheal rings using an 11 number scalpel blade, and an appropriate-sized, cuffed or uncuffed endotracheal tube with a murphy eye was inserted into the trachea, and the length of the tube was adjusted so as not to exceed the lower 1/3 of the trachea. The tube was attached to the skin with a Chinese finger trap suture using 3/0 polypropylene suture. The opening remaining in the incision line was temporarily closed with simple suture techniques.

Permanent tracheostomy was performed on cases numbered 2 and 22 (Table 1). In these patients, the endotracheal tube was attached to the skin using the Chinese finger trap suture technique and left in the tracheal lumen. To prevent tube breakage, the endotracheal tube was attached to the neck with elastic bandage material.

Table 1. Species, age, gender, breed and applied method of patients in order of admission to the clinic.

Case	Species	Age	Gender	Breed	Method
1	Dog	8 Y	M	Jack Russel	Tracheostomy
2	Dog	11 Y	F	Golden Retriever	Permanent Tracheostomy
3	Cat	7 M	M	Mixed	Tracheostomy
4	Cat	7 Y	M	Mixed	Tracheostomy
5	Cat	1 Y	M	British Short Hair	Tracheostomy
6	Cat	15 Y	F	Mixed	Tracheostomy
7	Cat	1 Y	M	Scottish Fold	Lateral Pharyngotomy
8	Cat	3 Y	M	Mixed	Tracheostomy
9	Cat	3 Y	F	British Short Hair	Tracheostomy
10	Cat	6 M	F	Mixed	Tracheostomy
11	Cat	6 Y	F	Mixed	Tracheostomy
12	Cat	8 M	F	Mixed	Lateral Pharyngotomy
13	Cat	1 Y	F	Mixed	Lateral Pharyngotomy
14	Cat	1 Y	F	Mixed	Lateral Pharyngotomy
15	Cat	1.5 Y	M	British Short Hair	Lateral Pharyngotomy
16	Cat	1.5 Y	M	Mixed	Tracheostomy
17	Cat	3 Y	F	Scottish Fold	Tracheostomy
18	Cat	1 Y	M	Blue Point	Tracheostomy
19	Cat	13 Y	M	Mixed	Tracheostomy
20	Cat	3 Y	M	Exotic Short Hair	Tracheostomy
21	Cat	1.5 Y	M	Persian	Tracheostomy
22	Cat	8 M	M	Scottish Fold	Permanent Tracheostomy
23	Cat	7 Y	M	Mixed	Tracheostomy
24	Dog	1 Y	M	American Staffordshire Terrier	Nasotracheal intubation
25	Dog	6 Y	F	Pug	Nasotracheal intubation
26	Dog	3 Y	M	Pug	Nasotracheal intubation
27	Dog	2 Y	M	Pug	Nasotracheal intubation
28	Dog	6 Y	M	Pug	Nasotracheal intubation
29	Dog	6 Y	F	Pug	Nasotracheal intubation
30	Dog	5 Y	F	Pug	Nasotracheal intubation
31	Dog	4 Y	M	Cocker Spaniel	Nasotracheal intubation
32	Dog	10 Y	F	Pug	Nasotracheal intubation
33	Cat	4.5 Y	M	Mixed	Tracheostomy
34	Dog	6 Y	M	Cavalier King Charles Spaniel	Nasotracheal intubation

RESULTS

In our study, airway management of 34 patients with difficult airways, consisting of 22 cats and 12 dogs of various ages and breeds, examined at the Istanbul University - Cerrahpasa, Faculty of Veterinary Medicine, Department of Surgery outpatient clinics, was evaluated.

Nasotracheal intubation was performed in 10 dogs (Cases: 25, 26, 27, 28, 29, 30, 31, 32, and 34), lateral pharyngotomy in 5 cats (Cases: 7, 12, 13, 14, and 15), and tracheostomy in a total of 16 patients, 2 of which were dogs and 14 were cats (Cases: 1, 4, 5, 6, 8, 9, 10, 11, 16, 17, 18, 19, 20, 21, 23, and 33) [Figure 1].

This study included patients ranging from 7 months to 13-year-old. Fifteen males and 18 females were used. No correlation was observed between age, gender, and lesions. Nasotracheal intubation was performed on patients scheduled for epiglottopexy and laryngeal sacculectomy operations. Lateral pharyngotomy was performed for jaw locking and nasopharyngeal reconstruction operations (Figure 2). Tracheostomy was performed for mandibular osteosynthesis, jaw locking, pharyngeal tumor resection, condylectomy, zygomatic arch resection, laryngeal tumor resection, and bilateral temporomandibular joint resection. Permanent tracheostomy (Cases 2 and 22) was performed on 1 cat and 1 dog with laryngeal paralysis to stabilize the patient until the day of surgery (Figure 3).

Conditions indicating alternative intubation methods that prevent or make orotracheal intubation impossible included epiglottic retroversion and laryngeal saccule eversion, maxilla and mandible fractures shaped by head trauma, mandibular symphysis separation, laryngeal stenosis, larynx, and pharyngeal tumors, and malocclusion-induced inability to open the mouth. For this purpose, epiglottopexy, jaw locking, pharyngeal and laryngeal tumor resection, temporomandibular joint resection, condylectomy, zygomatic arch resection, and nasopharyngeal reconstruction operations were performed on patients. Table 2 shows the lesion, intervention performed, and intubation method.

In Case 2, acute dyspnea due to laryngeal paralysis occurred, and emergency orotracheal intubation was performed, and oxygenation was provided. To prevent recurrence of dyspnea, permanent tracheostomy was performed until arytenoid lateralization was achieved, stabilizing the patient. In Case 22, dyspnea occurred in the patient after a CT scan. Orotracheal intubation was performed to stabilize the general condition. The patient experienced another dyspnea attack immediately after extubation. Therefore, a permanent tracheostomy was performed (Figure 4).

Case 4 was brought to our clinic with complaints of a tumor in the throat, difficulty breathing, and continuous saliva flow, and tracheostomy was performed to achieve tumor resection.

Case 6 came with the complaint of inability to open the mouth, and a tumor affecting the left orbit in the maxilla was seen on CT. After tracheostomy, tumor resection was performed.

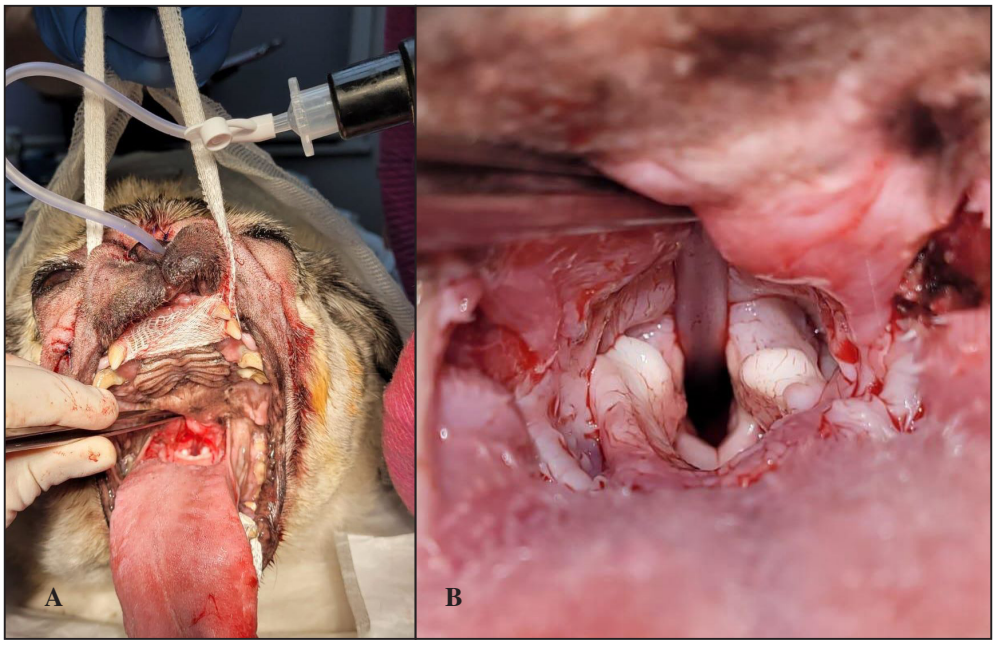

Figure 1. Case 30: Nasotracheal Intubation. A- Nasotracheal intubation with a feeding tube and the image of the intubation tube while working inside the mouth. B- View of the nasotracheal intubation tube with a feeding tube in the nasopharynx and rima glottidis.

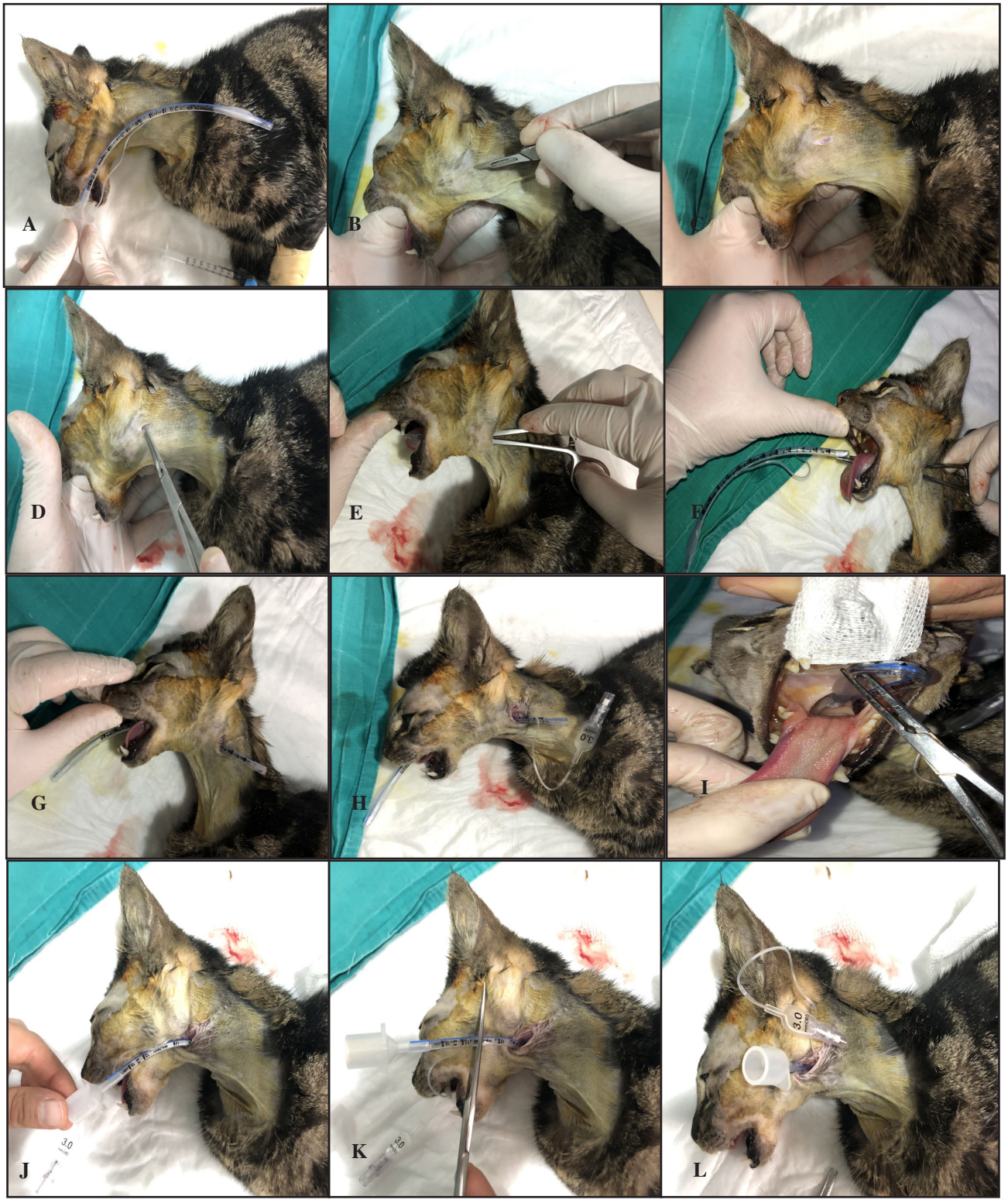

Figure 2. Case 13: Lateral Pharyngotomy Procedure. A- Measuring intubation tube length. B- Determination of pharyngotomy site. C, D & E- Opening the pharyngotomy hole. F, G & H- Passing the endotracheal intubation tube through the pharyngotomy. I- Directing the entotrachel intubation tube to the rima glottidis. J, K & L- Cutting the entotrachel intubation tube from the appropriate place.

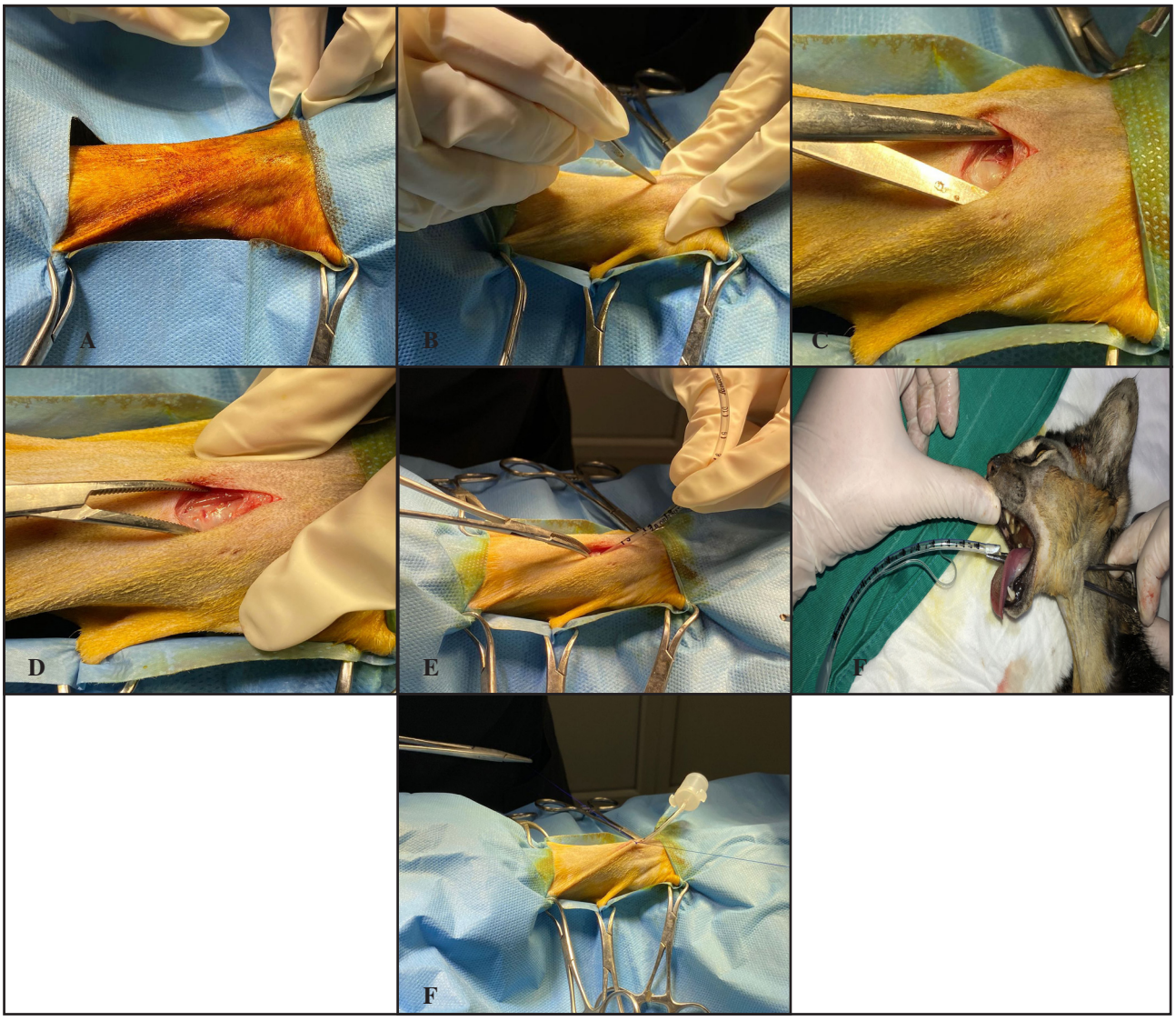

Figure 3. Case 4: Tracheotomy Procedure. A & B- Preparation of the tracheostomy site and skin incision. C & D- Dissection of muscles and incision made between the 2nd and 3rd tracheal rings. E, F & G- Placing the endotracheal intubation tube into the trachea and attaching it to the skin using the Chinese finger trap suture technique.

Figure 4. Case 2: Fixing the permanent tracheostomy tube with elastic bandage material.

Table 2. Lesion, intervention performed, and intubation method.

Case	Lesion	Intervention	Method
1	Mandibular fracture	Mandibular osteosynthesis	Tracheostomy
2	Laryngeal paralysis	Patient stabilization, followed by cricoarytenoid lateralization	Permanent Tracheostomy
3	Mandibular fracture	Jaw locking	Tracheostomy
4	Pharyngeal tumor	Pharyngeal tumor resection	Tracheostomy
5	Mandibular fracture	Jaw locking	Tracheostomy
6	Temporomandibular joint ankylosis	Tumor resection	Tracheostomy
7	Nasopharyngeal stenosis	Nasopharyngeal reconstruction	Lateral Pharyngotomy
8	Mandibular fracture	Jaw locking	Tracheostomy
9	Temporomandibular joint ankylosis	Condylotomy	Tracheostomy
10	Temporomandibular joint ankylosis	Zygomatic arch resection	Tracheostomy
11	Pharyngeal tumor	Pharyngeal tumor resection	Tracheostomy
12	Maxillary fracture, Mandibular symphysis separation	Jaw locking	Lateral Pharyngotomy
13	Mandibular fracture	Jaw locking	Lateral Pharyngotomy
14	Nasopharyngeal stenosis	Nasopharyngeal reconstruction	Lateral Pharyngotomy
15	Mandibular fracture	Jaw locking	Lateral Pharyngotomy
16	Bilateral mandibular fracture	Jaw locking	Tracheostomy
17	Mandibular fracture	Jaw locking	Tracheostomy
18	Mandibular fracture	Jaw locking	Tracheostomy
19	Laryngeal tumor	Laryngeal tumor resection	Tracheostomy
20	Temporomandibular joint ankylosis	Condylotomy	Tracheostomy
21	Temporomandibular joint ankylosis	Bilateral Temporomandibular Joint Resection	Tracheostomy
22	Laryngeal paralysis	Patient stabilization, followed by cricoarytenoid lateralization	Permanent Tracheostomy
23	Temporomandibular joint ankylosis	Condylotomy	Tracheostomy
24	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation
25	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation
26	Epiglottic retroversion, Laryngeal saccule eversion	Epiglottopexy, Laryngeal Sacculectomy	Nasotracheal Intubation
27	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation
28	Epiglottic retroversion, Laryngeal saccule eversion	Epiglottopexy, Laryngeal Sacculectomy	Nasotracheal Intubation
29	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation
30	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation
31	Epiglottic retroversion, Laryngeal saccule eversion	Epiglottopexy, Laryngeal Sacculectomy	Nasotracheal Intubation
32	Epiglottic retroversion, Laryngeal saccule eversion	Epiglottopexy, Laryngeal Sacculectomy	Nasotracheal Intubation
33	Temporomandibular joint ankylosis	Condylotomy	Tracheostomy
34	Epiglottic retroversion	Epiglottopexy	Nasotracheal Intubation

DISCUSSION

Airway problems can be observed in small animals due to anatomical features or diseases [8]. Upper airway obstruction in brachycephalic breeds leads to difficult intubation [23,26]. In our study, conditions such as BOHS findings, temporomandibular joint ankylosis, laryngeal and pharyngeal lesions, oral surgery, and situations causing difficult airway and intubation were evaluated. Brachycephalic breeds accounted for 52.9% of the cases. This is consistent with the findings in the literature [23,26] suggesting that difficult intubation may occur in brachycephalic breeds, prompting the need for alternative intubation methods other than orotracheal intubation to ensure airway patency during operations in these breeds.

Orotracheal intubation is a routine procedure in cats and dogs and can be easily performed. However, alternative intubation methods may be required in cases of difficult airway [35]. The most severe end of the difficult airway spectrum is the inability to intubate the patient and ensure oxygenation [20]. In the study, laryngeal paralysis [cases: 2 and 22], temporomandibular joint ankylosis [cases: 6, 9, 10, 20, 21, and 33], pharyngeal [case 11], and laryngeal tumors [case 19] were considered as conditions requiring urgent intervention and deemed situations where orotracheal intubation may not be feasible [18,20,24]. Alternative intubation methods were required in these cases, as reported by literature [7,35], and tracheostomy was performed urgently to ensure airway patency.

Literature reported a high complication rate of tracheostomy in cats [7,19] while the other stated that tracheostomy is a more invasive method with higher complication rates compared to other alternative intubation methods [3]. However, no complications were encountered with the tracheostomy application used in most cases. Additionally, especially in cats with temporomandibular joint ankylosis, where mouth opening is very limited, tracheostomy was found to be a necessary intubation method.

Alternative intubation methods are reported to be more commonly used in species other than cats and dogs [35]. This opinion on this is thought to stem from the easier access to the rima glottidis in cats and dogs compared to other species [35]. However, this study showed that there could be many indications for difficult airway management in cats and dogs and the necessity of using alternative intubation methods.

Increased fat mass in oropharyngeal soft tissue due to obesity increases the risk of airway obstruction and makes endotracheal intubation difficult [13]. In cases where difficult airway is expected, the anesthetist should be prepared for difficult intubation [8]. In the research, patients being of the pug breed [cases 26 and 30], being determined as obese in the body condition score assessment, and the consequent difficult intubation support the findings of literatures [13]. Therefore, conditions that may lead to difficult intubation should be identified in advance, and equipment and instruments should be prepared as stated in the source [8]. A good pre-anesthetic evaluation should be performed in patients undergoing elective surgery, and examination of the airway should be an important step in the physical examination performed for pre-anesthetic evaluation of breeds predisposed to BOHS. At the same time, the body condition score of every patient planned for surgery should be determined, and the predisposition of obese patients to difficult intubation, especially those classified as obese, should be taken into account.

Ensuring occlusion of the teeth is crucial in all fracture reductions and stabilizations of maxillofacial surgery [1,33]. Orotracheal intubation tubes prevent the mouth from closing and evaluating occlusion [33]. Occlusion can be controlled by lateral pharyngotomy or transmilohyoid method by providing endotracheal intubation [5]. Additionally, tracheostomy is a practice that completely relieves the operation field in oral and maxillofacial surgery [22,30,32]. In this study, as mentioned by some literatures [18,33], tracheostomy and lateral pharyngotomy methods were used to prevent the intubation tube from obstructing occlusion in 10 patients who underwent maxillofacial surgery [Cases: 1, 3, 5, 8, 12, 13, 15, 16, 17, and 18]. Literature stated that occlusion could be achieved by lateral pharyngotomy or transmilohyoid methods [5], but tracheostomy method was used in most cases due to completely bypassing the upper airway in both cranial and caudal mandible fractures. According to the findings of this study, it was agreed with literature [22] that tracheostomy in oral and maxillofacial surgery is considered a better option compared to other alternative intubation methods.

Lateral pharyngotomy should be removed immediately after surgery, and orotracheal intubation should be performed until extubation [1]. According to the source [1], the necessity of transitioning

to orotracheal intubation after lateral pharyngotomy makes it impossible to perform jaw locking, which is a treatment option in oral and maxillofacial surgery. In this study, tracheostomy was preferred in 6 patients undergoing jaw locking to stabilize the fracture, and nasopharyngeal intubation or transmilohyoid method was never used. Since all patients were cats and nasal passage is narrow in cats, nasotracheal intubation was not preferred.

Lateral pharyngotomy facilitates appropriate anatomical reduction and proper dental occlusion in the stabilization of bilateral mandibular fractures [6]. However, in this study, lateral pharyngotomy was used not only for the reduction of mandibular fractures but also in cases of nasopharyngeal stenosis, and it was seen as an indicated method in these patients due to relieving the operation field. The technique used in lateral pharyngotomy applications in this study showed parallelism with the method expressed by literature [1], and it was thought to facilitate access to the nasopharynx. Additionally, the need for a feeding tube in these patients in the postoperative period facilitates the placement of a feeding tube through the pharyngostomy tube created for lateral pharyngotomy. Therefore, in cases where the tube obstructs the operation field or occlusion, lateral pharyngotomy was found to be more suitable for intubation in patients where jaw locking was not performed and postoperative placement of a feeding tube via pharyngostomy method was planned.

Faringotomy carries a high risk of complications due to important neurovascular structures. It can cause laryngeal dysfunction and aspiration in the long term [3]. Bleeding, nerve damage, local wound infection, and tube breakage are complications of pharyngotomy [1,10]. In the study, no complications mentioned by sources [1,10] were encountered in any patient in whom lateral pharyngotomy was applied.

In patients with preoperative dyspnea or those with recurrent respiratory distress, laryngeal edema or pharyngeal mass should be considered [25]. In this study, pharyngeal edema [case no: 14] and laryngeal edema [case 23] were considered as conditions requiring urgent intervention. In these patients, where pharyngeal edema was seen as a complication of elective surgery, tracheostomy was applied due to the high risk of laryngeal and pharyngeal edema [25,29].

CONCLUSION

Airway obstruction or respiratory distress may occur postoperatively, especially in patients undergoing maxillofacial surgery. In these patients, airway assessment should be the 1st step in the differential diagnosis. In this study, the patients evaluated in the postoperative period underwent oxygen support due to the risks of laryngeal and pharyngeal edema. In all patients, the condition was corrected by ensuring airway patency by either oral or nasal intubation or re-tracheostomy. Therefore, in patients undergoing elective surgery, especially in oral and maxillofacial surgery, preoperative evaluation of the airway and appropriate surgical planning are important in preventing postoperative complications. Additionally, in the postoperative period, patients should be closely monitored for respiratory distress and edema, and appropriate treatment should be applied immediately when necessary.

MANUFACTURERS

[1]Richter Pharma AG. Feldgasse, Austria.

[2]Vetagro. Lublin, Poland.

[3]VEM Ilaç. Istanbul, Turkey.

[4]Zentiva. Prague, Czech Republic.

[5]Nobel Ilaç. Istanbul, Turkey.

[6]Polifarma. Istanbul, Turkey.

***Ethical approval*.** This study is not subject to HADYEK's permission under Article 8(k) of the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees".

***Declaration of interest*.** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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