



UNIVERSITI PUTRA MALAYSIA

**RETROSPECTIVE STUDY OF INDICATION, MANAGEMENT AND
COMPLICATIONS OF OESOPHAGEAL TUBE PLACEMENT IN CATS
FROM 2018 TO 2022 AT THE UNIVERSITY VETERINARY HOSPITAL,
UNIVERSITI PUTRA MALAYSIA**

ISKANDAR ZULKARNAIN BIN IDRIS

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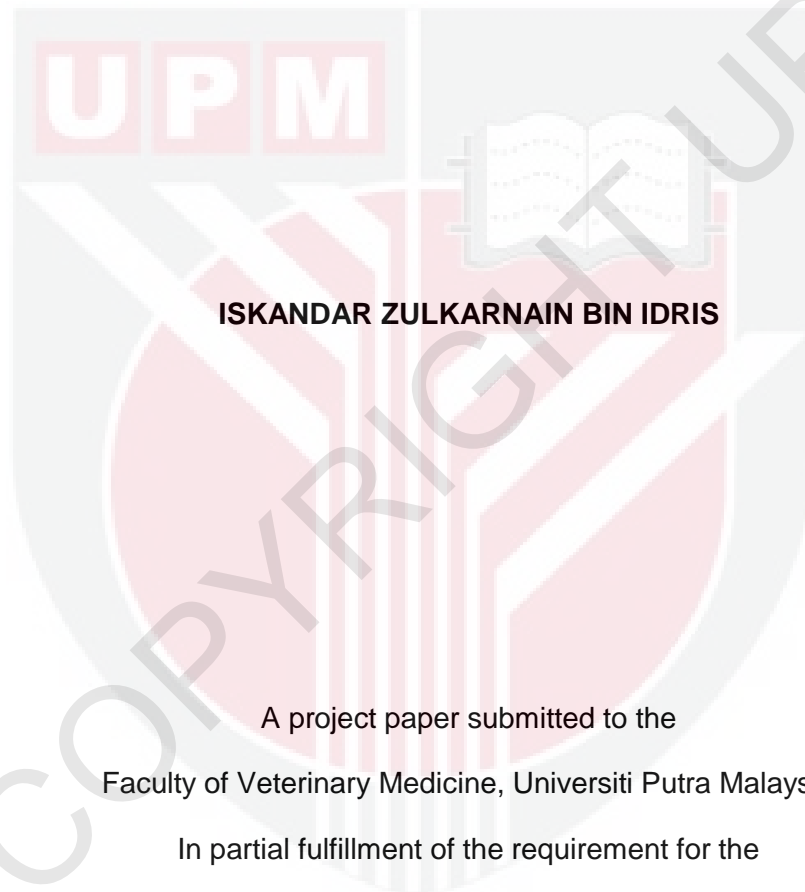
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A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia

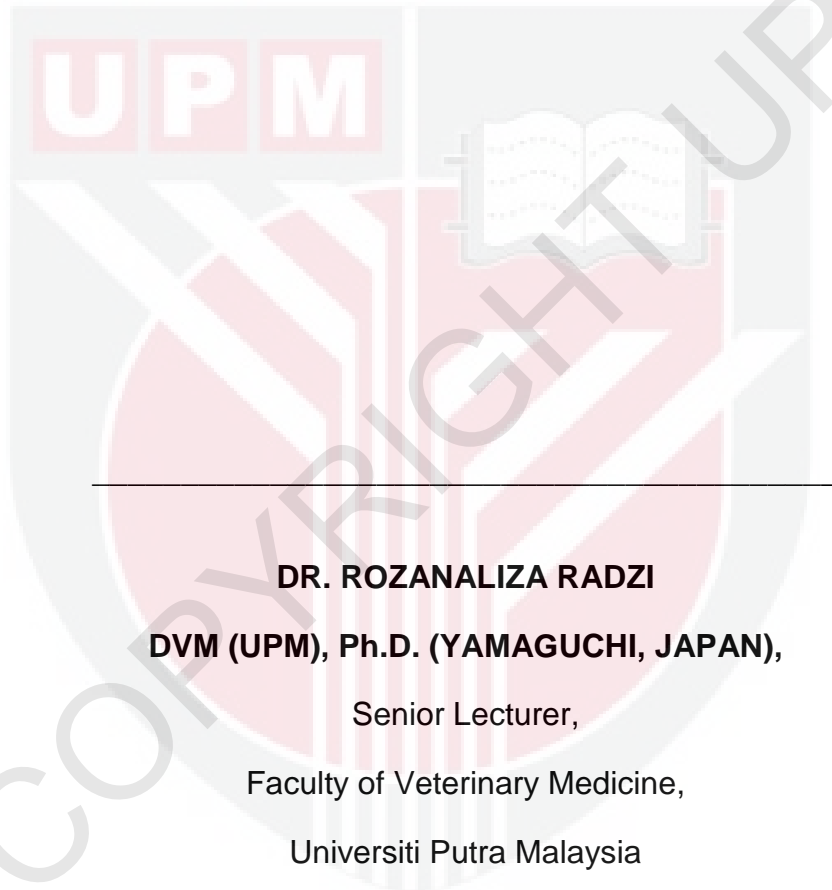
In partial fulfillment of the requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE

Universiti Putra Malaysia

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December 2023

It is hereby certified that I have read this project paper entitled “Retrospective Study of Indication, Management and Complications of Oesophageal Tube Placement in Cats from 2018 to 2022 at the University Veterinary Hospital, Universiti Putra Malaysia”, by Iskandar Zulkarnain bin Idris and in my opinion it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement of the course VPD 4901 – Project.



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DEDICATION

This thesis is dedicated to my parents,
for the never ending support.



ACKNOWLEDGEMENT

First and foremost, I am grateful to Allah S.W.T for giving me strength to complete this final year project. I would like to thank my supervisor Dr Rozanaliza for the guidance throughout this project from the start of this research until thesis writings.

I want to express my gratitude to my parents for their continuous support in my studies, my fyp partner, Aarin and all my DVM24 friends that have helped me during this research.

I want to thank my girlfriend, Nurul Maisarah Khairul Faizy for being my backbone and emotional support for this journey.

Lastly, thank you, me for finishing this thesis.

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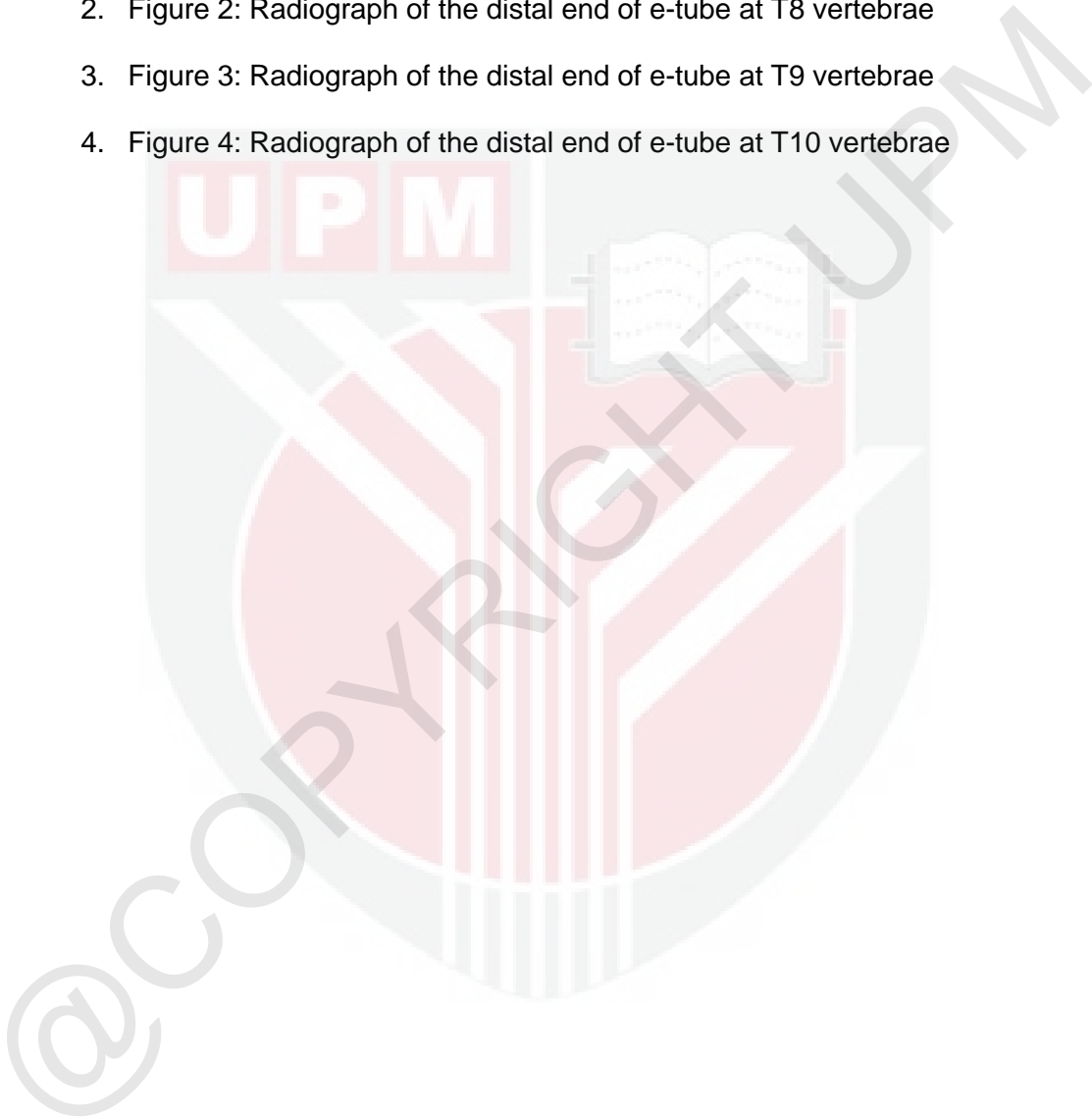
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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4901 -Projek.

**KAJIAN RETROSPEKTIF MENGENAI INDIKASI, PENGURUSAN DAN
KOMPLIKASI PENEMPATAN TIUB ESOFAGUS DALAM KUCING DARI
TAHUN 2018 HINGGA 2022 DI HOSPITAL VETERINAR UNIVERSITI,
UNIVERSITI PUTRA MALAYSIA.**

oleh,

Iskandar Zulkarnain bin Idris

2023

Penyelia: Dr. Rozanaliza Radzi

Tiub esofagus (e-tiub) secara umumnya digunakan dalam perubatan veterinar untuk membantu haiwan memenuhi keperluan nutrien mereka dengan memintas mulutnya. Pengurusan e-tiub yang bagus boleh memanjangkan tempoh penempatannya sehingga berbulan-bulan dengan penjagaan yang betul di tapak insisi atau kawasan stoma. Walaupun berbeza pengurusan e-tiub, pelbagai faktor boleh menyumbang kepada komplikasi penempatan e-tiub. Tujuan kajian ini adalah untuk mengenal pasti indikasi, pengurusan, dan komplikasi penempatan e-tiub dalam kucing yang diamalkan di Hospital Veterinar

Universiti (HVU). Semua maklumat kes penempatan e-tiub dalam kucing di HVU dikumpulkan dari tahun 2018 hingga 2022. Data seperti maklumat pesakit, diagnosis, tempoh e-tiub, pengurusan e-tiub, dan komplikasi bagi setiap 24 kes telah dikumpulkan. Data dianalisis dengan analisis deskriptif dalam SPSS versi 27. Kebanyakan kes yang melibatkan penempatan e-tiub adalah kes traumatik iaitu 75% termasuk kehelan temporomandibular, fisur lelangit traumatik, dan kehilangan kemampuan untuk makan. Jangkitan stoma dan penjahitan semula e-tiub merupakan komplikasi terbanyak dengan 16.7% dari data. Tempoh penempatan e-tiub berkait rapat dengan pengurusan dan komplikasi. Pengurusan e-tiub adalah penting untuk mencegah komplikasi yang boleh menyumbang kepada penyakit asal. Faktor-faktor lain seperti tingkah laku kucing dan pengurusan e-tiub di rumah mungkin menyebabkan komplikasi yang mempengaruhi tempoh penempatan e-tiub.

Kata Kunci: *E-tiub, Kucing, Komplikasi, Pengurusan, Tempoh.*

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4901- Project.

**A RETROSPECTIVE STUDY OF THE INDICATIONS, MANAGEMENT AND
COMPLICATIONS OF ESOPHAGEAL TUBE PLACEMENT IN CATS FROM
2018 TO 2022 AT THE UNIVERSITY VETERINARY HOSPITAL, UNIVERSITI
PUTRA MALAYSIA.**

by

Iskandar Zulkarnain bin Idris

2023

Supervisor: Dr. Rozanaliza Radzi

Oesophageal tube (e-tube) is generally used in veterinary medicine to help animals to meet their nutrient requirement by bypassing the mouth. Good management of an e-tube can prolong the placement up to months with proper care at the incision site or stoma area. Despite the different management of e-tube, many factors can contribute to the complications of e-tube placement. The purpose of this study is to identify the indications, managements and complications of e-tube placement in cats in University Veterinary Hospital (UVH) practices. All information of cases of e-tube placement in cats in UVH were

collected from 2018 to 2022. Signalment, diagnosis, duration of e-tube, management of e-tube and complications for each 24 cases were collected. The data was analysed with descriptive analysis in SPSS version 27. Most of the cases that involve e-tube placement were traumatic cases which is 75% including temporomandibular luxation, traumatic palate fissure and loss of ability to eat. Stoma site infections and resuturing of e-tube were the most complication with 16.7% from the data. Duration of e-tube placement is associated with management and complications. Management of an e-tube is important to prevent complications which can be contributing to the primary diseases. Other factors such as cats' behaviour and outpatient management of e-tube may cause complications affecting the duration of e-tube placement.

Keywords: *E-tube, Cats, Complications, Managements, Durations*

1. INTRODUCTIONS

An esophageal tube (e-tube) is an essential medical tube for hyporexia with acute or chronic nutritional requirements (Nathanson et al., 2019). E-tube is generally used in veterinary medicine to help animals to meet their nutrient requirement by bypassing the mouth as the patients cannot use their mouth due to diseases or patients with chronic anoxia. The management of an e-tube can prolong the placement up to months with proper care at the incision site or stoma area (Breheny et al., 2019). Outpatients with e-tube placement depend on the owner's compliance to manage the feeding tube and daily nutrient intake which is very important for recovery back to healthy status. Despite the different management of e-tube, whether in home setting or hospital settings, many factors can contribute to the complications of e-tube placement. Primary diseases that cause the patient into chronic state which requires feeding tubes need to be treated for faster recovery of the patients and their wellbeing.

Common complications associated with the placement of the e-tube are inflammation, infection, or abscessations at the entry site or dislodgement in the vomiting patient (Han, 2004). There are also other complications such as suture that hold the feeding tube at the stoma is

1.1 Objective

To identify the indications for e-tube placement, management of e-tube and complications post e-tube placement in University Veterinary Hospital (UVH) practices.

1.2 Justification

A retrospective study of indications for e-tube placement can help give the common indications for the feeding tube placement. This study also summarised the management of e-tube in UVH practices while comparing it to other management journals. Other than that, common complications post e-tube placement will be studied in this research and provide the overall data for UVH records.

This study was done to enhance the understanding of the indication, management and complications of e-tube in UVH settings. In addition, there is no prior study about e-tube in UVH, hence this can be a guide for future study.

2. LITERATURE REVIEW

2.1 Oesophageal tube (e-tube)

Oesophagostomy tubes are cost-effective, simple to insert, and involve a brief anesthesia duration for the procedure (Bexfield, 2010). To ensure proper positioning in the distal esophagus and prevent crossing the lower esophageal sphincter, the tube should be measured and marked from the intended insertion point to the seventh to ninth intercostal space, stated by Bexfield (2010). According to a journal by Fink et al. (2014) mentioned that verification of correct placement in the distal esophagus, avoiding the trachea, lower esophageal sphincter, stomach, or subcutaneous tissues, should be done through a lateral thoracic radiograph or endoscopy. Securing the esophagostomy tube involves a purse-string suture in the skin around the stoma, followed by a "Chinese finger-trap" suture using 2-0 or 3-0 non-absorbable nylon suture. The Chinese finger-trap suture functions as a "friction suture," allowing tightening around the tube with applied tension (Smeak, 1990).

2.2 Functions and benefits of e-tube placement

The insertion of an e-tube is intended to assist patients in fulfilling their nutritional needs. In veterinary medicine, ensuring early and suitable nutritional support is crucial for the recovery of patients from illness (Blaser, 2017). The Daily Energy Requirement (DER) plays a vital role in ensuring that patients receive adequate energy for maintenance and recovery.

2.3 Possible complications of e-tube placement

Contraindications for placing an esophagostomy feeding tube include conditions affecting the esophagus, such as megaesophagus, esophagitis, or stricture, as well as uncontrolled vomiting, diminished gag reflex, or altered consciousness (Fink et al., 2014). If active vomiting occurs with an esophagostomy tube in position, it may result in aspiration pneumonia or require the tube's replacement under general anesthesia (Levine et al., 1997). Complications linked to esophagostomy tubes encompass issues like infection or swelling at the stoma site, gastroesophageal reflux (arising from tube placement across the lower esophageal sphincter), self-removal of the tube by the patient, tube kinking or obstruction, esophageal perforation, and head and neck swelling due to excessively tight neck wrap application (Larsen, 2012).

2.4 Management post e-tube placement

Oesophagostomy tubes can be effectively maintained at home for a duration of up to 8 weeks with proper care (Larsen, 2012). The safe maximum volume of food administered per feeding to a cat is likely influenced by individual patient factors and the underlying disease process (Chan, 2009). In cases where cats are generally healthy but unable to consume food orally, such as due to a symphyseal jaw fracture, larger feeding volumes (15–20 ml/kg) may be tolerated. However, it is crucial to administer this volume slowly over 15–20 minutes to allow for gastric accommodation, preventing potential vomiting (Chan, 2009).

Daily monitoring and cleansing of the stoma using diluted chlorhexidine or povidone-iodine are recommended. Washable fabric neck wraps, available commercially

for cats and dogs of various sizes, offer aesthetic appeal and eliminate the need for frequent bandage changes (Fink et al., 2014). An Elizabethan collar (e-collar) may be necessary to prevent the animal from scratching at or removing the tube (Devitt, 1997). Once the patient is eating independently, the feeding tube may be unnecessary. The sutures can be cut, the proximal tube end kinked to prevent movement of any tube content, and the tube can be removed with the patient awake. The stoma will heal naturally and appear closed within 24 to 48 hours. (Devitt, 1997)

3. MATERIALS AND METHODS

Data collection was done at UVH from 2018 to 2022 with 5 years range of retrospective study. The inclusion criteria for data collection were cat patients. These patients have e-tube placement in the Surgery Unit and patients from the Intensive Care Unit (ICU) with conditions necessary for e-tube placements. Several cases that may necessitate e-tube placements were generalized weakness, head trauma, oral cancer, pleural effusion and chronic kidney disease (CKD) cases.

All data were carefully selected and filtered out the cases that not have e-tube placements. A total of 24 cases were successfully obtained and all medical records such as signalments, duration of the e-tube placement, management, daily progression and complications on the e-tube placement were recorded with 'Google Spreadsheet' for all 24 cases.

Descriptive analysis was done by using statistical software (SPSS version 27). The indications, underlying disease category, body condition score (BCS), durations and complications were the variables that were analysed and compared with other studies.

4. RESULTS

4.1 Overall data collection

Table 1, shows 5 years of data for a total of 24 cases were collected with evidence of e-tube placement in records. However, not all cases have complete records hence the missing data records were included in this study. The variables that have been recorded were BCS, underlying disease category for an e-tube placement, position of the distal end of e-tube, duration of the e-tube placement and complications of e-tube placement. One case had all the recorded data from the total cases of e-tube placement.

Variables	Recorded cases	Missing cases	Total cases
Body Condition Score (BCS)	18	6	24
Underlying disease	24	0	24
Distal end e-tube position	6	18	24
Duration of e-tube placement	18	6	24
Complication of e-tube placement	24	0	24

Table 1: Overall data of 24 cases.

4.2 Indication with underlying disease category for e-tube placement

The highest indication of e-tube placement was patients inability to eat (14) with 58.3%. Other indications of e-tube placement like anorexia or inappetence (10) 41.7% of the total cases.

Indications	Cases
Inability to eat	14
Anorexia / Inappetence	10
Total	24

Table 2: Indication of e-tube placement in cats in UVH (2018 - 2022).

The primary underlying disease that necessities for e-tube placement were traumatic cases (18) with conditions of mandibular fracture, temporomandibular fracture and traumatic soft palate fissure. All neoplastic cases (4) that were identified were involving oral mass, squamous cell carcinoma. Renal disease case and pneumothorax case each have one case each that had been observed.

Underlying disease	Cases
Traumatic	18
Neoplastic	4
Renal	1
Pneumothorax	1
Total	24

Table 3: Underlying disease that requires e-tube placement.

4.3 Distal end of e-tube placement positions

Three positions of the distal end of e-tube placement in the thoracic region recorded in this study were at thoracic vertebrae 8 (T8), T9 and T10. Most cases have no record evidence of the distal end position of the e-tube (18).

Distal end e-tube placement (at thoracic vertebrae, T)	Cases
T8	3
T9	2
T10	1
Missing data	18
Total	24

Table 4: Distal end position of e-tube placement at the thoracic vertebrae.

4.4 Management post e-tube placement

The management of e-tube placement can be summarised into 10 steps from all recorded cases shown in table 5.

No.	Instructions
1.	Must be in a sternal position during the feeding process.
2.	No food given through orally, only through e-tube.
3.	Remove the bandage, check e-tube insertion site.

4. Kink e-tube, flush drinking water 5 ml, check if coughing/swallowing.
 5. Make blended food by using a/d (1/4 can) per meal.
 6. Feed using a 20 ml syringe, slowly (in 5 mins).
 7. Check if the cat swallows during the feeding process.
 8. Flush with 10 ml of water after finishing the food.
 9. Use new gauze, cut halfway, dab with iodine and placed at the e-tube site
 10. Bandage 3 times over the neck .
-

Table 5: Management procedure for e-tube during feeding process.

4.5 Duration post e-tube placement

Duration of e-tube placement ranges from minimum of 0 days to maximum of 63 days with a median of 22.5 days. Apparently there are 6 cases that have missing data of the duration of e-tube placement.

Figure 1, shows modes for duration of e-tube placement were 23 days and 26 days with the same number of cases (2).

Duration of e-tube placement	Days
Minimum	0
Maximum	63
Median	22.5

Table 6: Minimum, maximum and median duration of e-tube placement in cats in UVH (2018 - 2022).

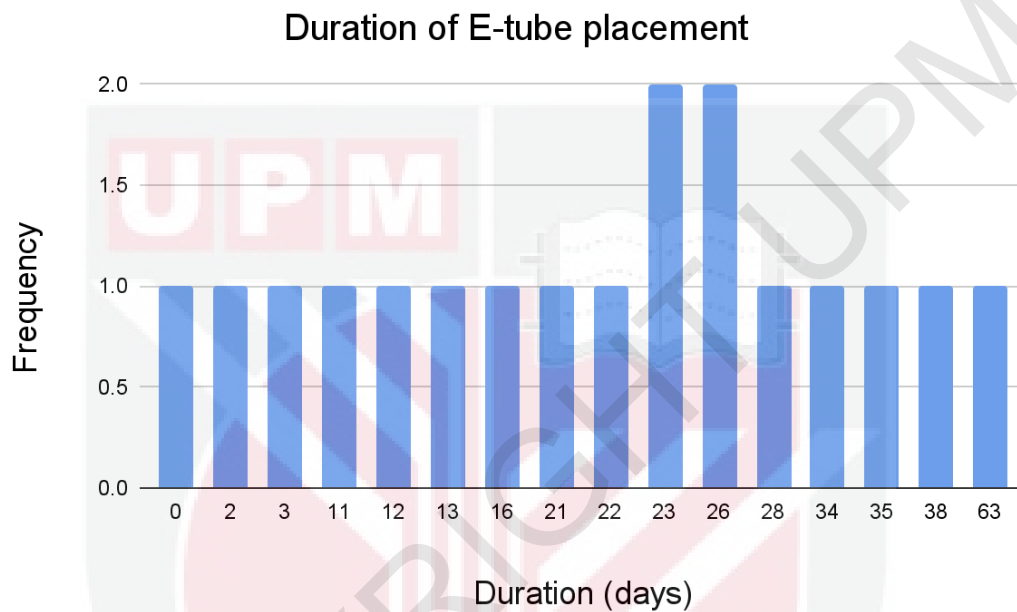


Figure 1: Frequency of duration of e-tube placement

4.6 Complications post e-tube placement

More than half of the cases have no complications (15) with a percentage of 62.5%. Stoma site infection and resuture complications both have the same (4) percentage 16.6%. Only one case with complications of e-tube was removed by the cat itself with 4.3% from the total percentage.

Complications	Cases
None	15
Stoma site infection	4
Resuture	4
Removed by cat	1
Total	24

Table 7: Complications post e-tube placement for 24 cases.

5. DISCUSSION

The missing record data were included in this study and considered as findings in the single research institute. Statistical analysis could not be calculated due to low sample size and insufficient data.

The placement of an e-tube into a patient is based on the indications and underlying diseases that are necessary for it. Based on the result, most of the cases have the indication of inability to eat which can be related to the primary underlying disease for traumatic cases. Neoplastic cases such as oral mass can be an indication for the placement as the patient cannot eat due to mass obstruction in the mouth. Anorexic or inappetence cat can also be associated with traumatic, neoplastic, renal disease and pneumothorax cases. Animals with normal oral function but without appetite can lead to severe malnutrition will need e-tube placement.

According to Craig (2019) retrospective study on e-tube placement in cat patients, the most underlying disease that necessities for e-tube placement were traumatic and neoplastic categories which was comparable with this research

Distal end of the e-tube was positioned at T8 (Figure 2), T9 (Figure 3) or T10 (Figure 4) in the middle of the oesophagus. A journal from Cox (2009) stated that the tube should be measured from the proposed incision site to 8th to 9th intercostal space. Hence, the ideal position for the distal end of the e-tube was at T8 or T9 in the oesophagus. This is because during the feeding process, feed content will enter the oesophagus and trigger peristalsis, relaxing the cardiac sphincter and allowing food to enter the stomach (Shazia, 2023). The placement of the distal end of the e-tube prior to

the cardiac sphincter of the stomach will cause backflow of the feed content because there is no peristalsis movement to relax the sphincter and food cannot enter the stomach.

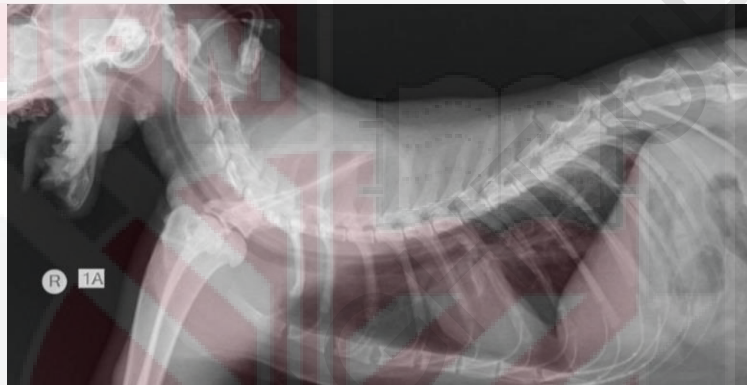


Figure 2: Radiograph of the distal end of e-tube at T8 vertebrae

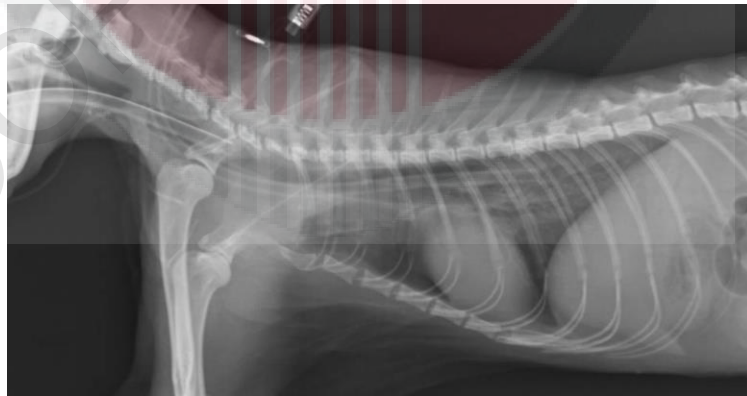


Figure 3: Radiograph of the distal end of e-tube at T9 vertebrae



Figure 4: Radiograph of the distal end of e-tube at T10 vertebrae

Management of post e-tube placement in UVH was the same compared with other articles on the management of post e-tube placement. Each step is crucial because complications might occur if the management was not done properly. The risk of obstructions, aspiration pneumonia and stoma site infections can occur with improper management of the e-tube into the oesophagus (Perea, 2008).

Placement of an e-tube lasts for a few weeks or a few months depending on the management and the behaviour of the cat. The minimum duration was 0 days which was the patients did not survive after the placement and most probably due to the severe conditions prior to the admission into UVH. Maximum duration of 63 days was recorded in a 7 months old kitten and the e-tube was removed by itself at home. This shows that an e-tube can be placed more than a month and to be removed when it is necessary.

Most cases do not have complications post e-tube placement because of UVH management practices that contribute to it. According to Craig (2019), the discharges from stoma of the placement was expected and self-limiting which do not necessitate treatment hence not considered as treatment. Stoma site infection was considered when

there were presences of pus from the stoma indicating ongoing infection at the site of infection. Organisms that originated from skin, oral cavity, gastrointestinal tract, in contact animals, humans or environment can be associated with stoma site infection (Craig, 2019). Patients' behaviour for scratching at the suture site of e-tube was unable to be controlled while in home settings because of the association with owners compliances. The loose suture needs to be resuture back to prevent the e-tube from falling off the stoma. According to Lisa (2003) cats that have gained strength may have scratched the suture that holds the e-tube and made it loose.

Table 8 shows complications based on the duration of e-tube placement for 0, 23, 26 and 63 days of placement. Complication for patients with 0 days of e-tube placement was not recorded as the cat did not survive post surgical procedure of mandibular fixtured and e-tube placement. Complication can be seen in cases of 23 days post placement of feeding tubes were recorded with stoma site infections. Whereas, for cases of 26 days, stoma site infections and resuture were observed for complications post e-tube placement. However, for a case of 63 days of e-tube placement is associated with the cat behaviour at home where the cat removed the e-tube. Lisa, (2003) stated that, as the cats' strength increases, there are increasing incidence of scratching at the e-tube and causing suture breakdown and lastly the e-tube fell off from the stoma.

Complications based on duration of e-tube placement (days)	Resuture	Stoma site infection	Removed by cat
0 days	-	-	-
23 days	-	D7 – D17	-
26 days	D5	D9 – D11	-
63 days	-	-	D63

*D = Days post e-tube placement

Table 8: Complications of e-tube post placement for 0, 23, 26 and 63 days.

6. CONCLUSION AND RECOMMENDATION

Most common indications for an e-tube placement in UVH was loss the ability to eat with the underlying disease of traumatic and neoplastic diseases at the mouth region. E-tube placement proves that there are some expected complications while providing aid to the patients for nutritional requirements. The management of e-tube in UVH practices has a standard management protocol with other institutes' management.

Other than that, e-tube can be placed more than a month with proper management. However animal behaviour was one of the factors that can shorten the duration of e-tube placement because of the feeding tube was removed by the cat due to scratching at the suture. Compliance and strict observation at home settings are crucial for the management of e-tube to prevent complications from occur.

In conclusion, UVH practices e-tube placement that aids the patients return to a healthy condition as well as good management procedure during the feeding process with minimal complications post placement.

Recommendation for this observational study is to do longer research with multiple sources of institution for data collection. This may increase the sample size and the accuracy in this study. Larger sample size will be able to do statistical analysis to prove hypotheses for this study.

The missing data can be lessened by practice for a complete recording system for every procedure and tool used for each case. Detailed recording system is important not only for research but also for medical references.

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