

POST-OPERATIVE COMPLICATIONS ENCOUNTERED BY THE STUDENTS DURING CANINE SURGERY: A RETROSPECTIVE STUDY

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Abstract: A retrospective study was conducted on analysis of procedures performed in small animal operation theatre at the Department of clinical sciences, Faculty of veterinary sciences, Bahauddin Zakariya University Multan, Pakistan, from 2009 to 2016. During this study period, 800 surgical complications were noted. The most frequent consequences seen were wound infection (21.25%), wound dehiscence (18.75%), septicemia (15.25%), and haemorrhage (15%). A slipped ligature, edema, myiasis, intestinal obstruction, and mortality were among the other problems. Laparotomy, Cystotomy, Gastrotomy, and Entrotomy had higher complication rates. Through questionnaire interviews with students, it was discovered that septic surgical procedures, inadequate use of surgical tools, and animals with low nutritional and health status were some of the factors that contributed to a high frequency of problems. The use of systemic antibiotics was necessary to treat the surgical site as an open wound to manage the post-operative problems. Recommendations are made to stop the emergence of post-operative problems when students are practicing surgery on dogs.

Keywords: Bitch, Dog, Surgical procedure, Post-surgical complications, Student performance

Introduction

Any undesirable result that the patient or the physician perceives occurring after surgery is a post-operative complication. The most common surgical complication and infection related to healthcare is surgical site infection (Misha et al. 2021), but the key to success is early identification and timely therapy (Natalie and Semchyshyn 2009; Saunders et al. 2014). The underlying disease is directly correlated with the intervention's effect. However, other factors that affect the outcome include co-morbid diseases, surgical skill, technique, and post-operative care (Jawaid et al. 2006). The post-operative aftermath might be anything from a minor wound infection to something serious like death. Adverse events directly connected to care provision, including post-operative complications, may be a more reliable predictor of quality than death rates or other intermediate outcomes (Pinto et al. 2019).

Operating the small animal surgical facility at the Department of Clinical Sciences (Surgery section), Faculty of Veterinary Sciences, Bahauddin Zakariya University, Multan, is expensive. In addition to the price of animals, surgical supplies, and their cost, post-operative complication management is a significant issue. Experimental minor animal surgery is necessary since it is the primary subject in the undergraduate veterinary curriculum designed by the Pakistan Veterinary Medical Council in collaboration with the Higher Education

Commission, Islamabad, Pakistan, despite the numerous challenges involved.

When doing challenging portions of experimental surgery on animals, students must have experience, repetition, and practice under a variety of conditions so that they can have positive surgical experiences after graduation. Finding the surgical complication rates that students encounter during canine surgery practicals and their likely causes is the objective of this project, which aims to lower such rates.

Methodology

From 2009 to 2016, records of eight years' worth of canine surgical issues and how veterinary students handled them at the Faculty of Veterinary Sciences Bahauddin Zakariya University Multan, Pakistan, were examined. Laparotomy, cystotomy, gastrotomy, entrotomy, end-to-end anastomosis, castration, ovariectomy, tail docking, splenectomy, ear trimming, and ear canal resection were among the surgical treatments.

The students were separated into groups, each group contained 11 students who carried out the experimental surgery according to a schedule that had been established (Table I). The students were given copies of the questionnaire that had been created. The questionnaire asked for details about the student's personal information, several criteria for evaluating dogs before surgery, difficulties noticed after surgery, their causes, and how to

handle them. Between 2009 and 2016, 594 surgical procedures were performed on dogs (Table II).

Table I. Number of students per animal for canine surgery from 2009-2016.

Year	Total number of students	Average number of students/animal	Number of surgical groups
2009	44	11	04
2010	44	11	04
2011	44	11	04
2012	88	11	08
2013	99	11	09
2014	110	11	10
2015	88	11	08
2016	77	11	07

Table II. Number and Types of Surgical Procedure Performed in Canines by the Students from 2009-2016.

Name of Surgical Procedure	No. of surgical procedures Performed by students Per Year								
	2009	2010	2011	2012	2013	2014	2015	2016	Total
Laprotomy	04	04	04	08	09	10	08	07	54
cystotomy	04	04	04	08	09	10	08	07	54
Gastrotomy	04	04	04	08	09	10	08	07	54
Entrotomy	04	04	04	08	09	10	08	07	54
End to end Anastomosis	04	04	04	08	09	10	08	07	54
Castration	04	04	04	08	09	10	08	07	54
Ovariohysterectomy	04	04	04	08	09	10	08	07	54
Tail Docking	04	04	04	08	09	10	08	07	54
Splenectomy	04	04	04	08	09	10	08	07	54
Ear trimming	04	04	04	08	09	10	08	07	54
Ear canal resection	04	04	04	08	09	10	08	07	54
Total	44	44	44	88	99	110	88	77	594

Result & Discussion

From 2009 to 2016, 800 surgical complications were noted, as shown in Table III. The most frequent consequences were wound infection (21.25%), wound dehiscence (18.75%), haemorrhage (15%), septicemia (fever) (15.25%), slipped ligature (12.5%), intestinal obstruction (6.25%), edema (5.0%), myiasis (4.0%), and death (2.0%). Complications from Laprotomy, Cystotomy, Gastrotomy, and Entrotomy were more common (Table IV).

Table III. No. of Post-operative Complications Observed in Canines from 2009-2016.

Post-Operative Complications	Nos.	Percentage of Occurrence
Hemorrhage	120	15.0 %
Wound Dehiscence	150	18.75 %
Wound Infection	170	21.25 %
Slipped Ligature	100	12.5 %
Septicemia (fever)	122	15.25 %
Myiasis	32	4.0 %
Intestinal Obstruction	50	6.25 %
Edema	40	5.0 %
Death	16	2.0 %
Total	800	100 %

Debridement and lavage with isotonic solution, occasionally with the addition of povidone-iodine solution, were frequently used to treat wound dehiscence and infection. Bandages have occasionally been used to protect

the incision from severe contamination and animal rubbing.

Table IV. Number of post-surgical complications observed in canine procedures by students 2009-2016.

Surgical procedures	Number of operations	Total number of complications	Percentage occurrence
Laprotomy	54	160	20.0 %
Cystotomy	54	120	15.0 %
Gastrotomy	54	125	15.62 %
Entrotomy	54	120	15.0 %
End-to-end anastomosis	54	90	11.25 %
Ovariohysterectomy	54	60	7.5 %
Tail docking	54	44	5.5 %
Splenectomy	54	40	5.0 %
Ear trimming	54	21	2.62 %
Ear canal resection	54	20	2.5 %
Total	594	800	100 %

Diuretics like furosemide (Lasix) were administered to treat edema cases. According to the respondents, difficulties were caused by the animals' poor nutritional status, septic surgical methods, improper use of surgical instruments, and poor behavior in the operating theatre. According to Windahl et al. (2015) and Mohammad et al. (2013), streptococcus and staphylococcus organisms were the most common isolates from wound infection cases.

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This study's high incidence of wound infection may be related to septic procedures during surgery or dirty animals following surgery (Nelson 2011; Knights et al. 2012). According to Lin et al. (2019), adhering to high standards of asepsis and using sound surgical techniques are crucial elements of a successful surgery with few or no problems. One of the leading causes of the spread of infection to the surgical site is contamination (Sousa et al., 2020). In this study, lousy operating room behavior, dirty pens where animals were kept after surgery, and students' inability to alert supervisors when asepsis was broken were the sources of infection. The prevalence of wound dehiscence in this study may have been caused by poor surgical wound closure. Yao et al. (2020) and Chhabra et al. (2017) also noted that unnecessary tissue trauma, such as incorrect surgical instruments for tissue excision and experimental animals' poor nutritional and physical condition interfere with wound healing. According to Fawcus and Moodley (2013), bleeding may be caused by blood vessel rupture and insufficient ligation of prospective bleeders. Scalise et al. (2016) speculate that the lack of exercise following surgery and insufficient surgical site draining could cause the edema observed in this study. Surgical errors included wound closure under high tension, inadequate preoperative planning, using the wrong suture material, and failing to provide adequate drainage. Sometimes, trainee surgeons are observed switching between surgery teams to obtain instruments. In student-performed experimental surgery, inadequate haemostasis and infections are the main contributors to postoperative bleeding. Laparotomy complications may occur by sitting and massaging the surgical sites, including the Tail docking. According to Monstrey et al. (2023), septic irrigation of surgical wounds with antiseptics such as chlorhexidine and povidone-iodine is adequate. Preoperative antibiotic administration may offer protection against microbial colonization, intraoperative antibiotic administration will ensure adequate tissue levels during the critical period, and postoperative antibiotic therapy may prevent postsurgical sepsis, all while intraoperative medication will ensure appropriate tissue levels during the crucial period (Scotton et al. 2012; Hughes et al. 2013).

Conclusion

The cost of performing students' experimental surgery can be decreased by limiting the additional expenses associated with managing postoperative complications, closely monitoring the students, and educating them about postoperative complications, their causes, and ways to prevent them.

Recommendations

For student-performed experimental surgery, healthy animals must be acquired and fed enough nutritional food. Animal enclosures must also be cleaned and sanitized daily. Before surgery, make sure that students have reviewed surgical techniques and equipment. Administering a preoperative exam could have an impact on this; strict supervision of trainees to ensure aseptic technique, appropriate use of tools, sutures, and proper knots/patterns for sutures; maintain the 4-5

student/animal ratio; Give each surgical group a comprehensive surgical package.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

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Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

References

- Chhabra S, Chhabra N, Kaur A, and Gupta N. (2017). Wound healing concepts in clinical practice of OMFS. *Journal of maxillofacial and oral surgery*, 16, 403-423.
- Fawcus S, and Moodley J. (2013). Postpartum haemorrhage associated with cesarean section and cesarean hysterectomy. *Best practice & research Clinical obstetrics & gynaecology*, 27(2), 233-249.
- Hughes, M. J., Harrison, E., & Paterson-Brown, S. (2013). Post-operative antibiotics after appendectomy and post-operative abscess development: a retrospective analysis. *Surgical infections*, 14(1), 56-61.
- Jawaid M, Masood Z, Iqbal SA. (2006). Post-operative complications in a general surgical ward of a teaching hospital. *Pak J Med Sci*. 22:171-175.
- Knights CB, Mateus A, and Baines SJ. (2012). Current British veterinary attitudes to using perioperative antimicrobials in minor animal surgery. *Veterinary Record*, 170(25), 646-646.
- Lin F, Gillespie BM, Chaboyer W, Li Y, Whitelock K, Morley N, and Marshall AP. (2019). Preventing surgical site infections: Facilitators and barriers to nurses' adherence to clinical practice guidelines qualitative study. *Journal of Clinical Nursing*, 28(9-10), 1643-1652.
- Misha G, Chelkeba L, and Melaku T. (2021). Bacterial profile and antimicrobial susceptibility patterns of isolates among patients diagnosed with surgical site infection at a tertiary teaching hospital in Ethiopia: a prospective cohort study. *Annals of Clinical Microbiology and Antimicrobials*, 20, 1-10.
- Mohammed A, Adeshina GO, and Ibrahim YK. (2013). Incidence and antibiotic susceptibility pattern of bacterial isolates from wound infections in a tertiary hospital in Nigeria. *Tropical journal of pharmaceutical research*, 12(4), 617-621.
- Monstrey SJ, Govaers K, Lejuste P, Lepelletier D, and de Oliveira PR. (2023). Evaluation of the role of povidone-iodine in the prevention of surgical site infections. *Surgery Open Science*.
- Natalie L, Semchysyn N. (2009). Dermatological surgical complications. Online Available from: <http://www.emedicine.com/derm/topic829.htm>
- Nelson, LL. (2011). Surgical site infections in small animal surgery. *Veterinary Clinics: Small Animal Practice*, 41(5), 1041-1056.
- Pinto BB, Chew M, Buse GL, and Walder B. (2019). The concept of peri-operative medicine to prevent major adverse

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- events and improve outcome in surgical patients: a narrative review. *European Journal of Anaesthesiology EJA*, 36(12), 889-903.
- Saunders RS, Fernandes-Taylor S, Rathouz PJ, Saha S, Wiseman JT, Havlena J. (2014). Outpatient followup versus 30-day readmission among general and vascular surgery patients: a case for redesigning transitional care. *Surgery*. 156(4):949–58. doi: 10.1016/j.surg.2014.06.041
- Scalise A, Calamita R, Tartaglione C, Pierangeli M, Bolletta E, Gioacchini M, and Di Benedetto G. (2016). Improving wound healing and preventing surgical site complications of closed surgical incisions: a possible role of incisional negative pressure wound therapy. A systematic review of the literature. *International wound journal*, 13(6), 1260-1281.
- Scotton W, Cobb R, Pang L, Nixon I, Joshi A, Jeannon JP, and Simo R. (2012). Post-operative wound infection in salvage laryngectomy: does antibiotic prophylaxis have an impact?. *European Archives of Oto-Rhino-Laryngology*, 269, 2415-2422.
- Sousa AFL, Bim LL, Hermann PRS, Fronteira I, Andrade D. (2020). Late postoperative complications in surgical patients: an integrative review. *Rev Bras Enferm*. 73(5):01-07.
- Windahl U, Bengtsson B, Nyman AK, and Holst BS. (2015). The distribution of pathogens and their antimicrobial susceptibility patterns among canine surgical wound infections in Sweden in relation to different risk factors. *Acta Veterinaria Scandinavica*, 57(1), 1-10.
- Yao X, Zhu G, Zhu P, Ma J, Chen W, Liu Z, and Kong T. (2020). Omniphobic ZIF-8@ Hydrogel membrane by microfluidic-emulsion-templating method for wound healing. *Advanced*



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