ISSN: 2181-3337 | SCIENTISTS.UZ VOLUME 5 ISSUE 8 AUGUST 2026

EFFECT OF DIFFERENT SUTURE MATERIALS AND TECHNIQUES ON GASTRIC WALL TISSUE HEALING IN GASTROTOMY SURGERY IN DOGS

Ulmasov Botir[1], **Abduraxmonov Sanjar**[2]
Associate Professor, Department of Veterinary Medicine,
Tashkent State Agrarian University, Tashkent, Uzbekistan[1]
Master's Student, Tashkent State Agrarian University, Tashkent, Uzbekistan[2]

DOI: 10.67620/sai.58d0002

ABSTRACT
The article investigates the effect of different suturing techniques and suture materials used to close surgical wounds of the gastric wall during gastrotomy on the wound-healing process. The study was conducted at the Veterinary Clinic of Tashkent State Agrarian University and involved gastrotomy procedures performed on six dogs of different breeds diagnosed with pathological conditions associated with gastric lesions or foreign body ingestion. The animals were divided into two groups of three dogs each. In the first group, the gastric wound was closed using a two-layer suture technique consisting of Schmieden and Lambert sutures with synthetic lavsan suture material. In the second group, the wound was closed using a single-layer seromuscular Lambert suture with silk suture material. During the postoperative period, the general condition, appetite, behavior, defecation, and local condition of the surgical wound were monitored. The wound condition was assessed on days 5 and 10 after surgery. According to the observations, the group in which the two-layer Schmieden–Lambert suture technique and synthetic lavsan material were used developed a relatively smooth and firm scar. In contrast, the group treated with a single-layer Lambert suture and silk material showed a relatively coarse scar with localized areas of prominence. The practical findings of the study were also supported by clinical cases observed in veterinary clinics in Kibray, Tashkent District, and Chirchiq.

ACCEPTED

25.08.26

Keywords: *dog, gastrotomy, stomach, foreign body, Schmieden suture, Lambert suture, Lavsan, silk, wound healing, ultrasonography, veterinary surgery.*



Introduction

In recent years, canine-service programs in Uzbekistan have highlighted the importance of maintaining the health and working capacity of service dogs, while the growing population of privately owned dogs has increased the clinical importance of digestive disorders and gastrointestinal foreign-body ingestion. Surgical intervention is often required when a foreign body cannot be managed conservatively or endoscopically (Abdurahimov & Ulmassov, 2025; Hayes, 2009; Hobday et al., 2014; Ulmasov et al., 2026).

Modern veterinary surgery emphasizes prevention of postoperative infection and careful selection of suture materials. Suture composition and structure can influence local tissue reaction, inflammation, and wound healing, and the biological behavior of the material should be considered when closing gastrointestinal incisions (Ellison, 2011; Gazivoda et al., 2015; Regier, 2022).

Standard veterinary surgical literature describes a range of suturing patterns used in abdominal surgery, including interrupted, mattress, circular, Schmieden, Lambert, Cushing, Connell, and related techniques. Selection of a pattern should account for tissue apposition, luminal diameter, vascular preservation, and the expected healing characteristics of the organ (Ellison et al., 2019; Narziev, 2023).

The use of synthetic surgical suture materials with low tissue reactivity remains an important consideration in gastrointestinal surgery. Experimental and clinical evidence indicates that both suture material and closure technique can affect tissue reaction and healing, while increasing the number of suture layers does not necessarily improve clinical outcomes. Contemporary studies also support safe alternatives to traditional double-layer hand-sewn closure, including single-layer gastric closure and stapled gastrointestinal closure in selected patients (Hastings et al., 1975; Schwartz & Coolman, 2018; Velay et al., 2024).

Accurate diagnostic evaluation is important in diseases of the digestive organs because early recognition of general and local changes can support timely treatment and reduce complications. In dogs with suspected gastrointestinal foreign bodies, diagnostic imaging contributes to determining the location and clinical significance of the obstruction (Abdurahimov & Ulmassov, 2025; Hayes, 2009).

The examinations were performed using an ultrasound unit. The dog's abdominal cavity was examined with a transducer adapted for external imaging of the internal organs at a frequency of 4.5 MHz. During the examination, the hair over the abdominal region was clipped, the skin was treated with antiseptic, and the internal organs were evaluated by imaging with the aid of a special gel (Abdurahimov & Ulmassov, 2025).

Diseases of the digestive system in dogs, including gastric and intestinal foreign bodies, are important problems in veterinary surgical practice. Foreign bodies can be associated with obstruction, tissue injury, perforation, and the need for surgical intervention; prompt diagnosis and appropriate treatment are therefore important to outcome (Hayes, 2009; Hobday et al., 2014). Gastrotomy is an abdominal procedure used to remove foreign bodies from the stomach and to address selected gastric lesions when less invasive treatment is insufficient.

The final outcome of gastrotomy is not limited to removal of the pathological lesion. The gastric wall incision must also be closed with adequate strength, preservation of tissue perfusion, and minimal adverse effects on healing. Suture material, closure pattern, and the number of layers may influence tissue reaction and postoperative integrity (Ellison, 2011; Regier, 2022; Velay et al., 2024).

The preliminary materials of the study described Schmieden, Lambert, and other sutures used in abdominal surgery and identified the use of synthetic suture materials as a relevant area of investigation. These techniques remain part of veterinary surgical teaching and have also been discussed in recent work on gastrotomy closure in dogs (Narziev, 2023; Ulmasov et al., 2026).

Accordingly, the aim of the study was to comparatively evaluate the effects of different suturing techniques and materials on wound healing when closing gastric wall wounds during gastrotomy surgery in dogs.

Materials and Methods

The experiments were conducted at the veterinary clinic of the Department of General Animal Husbandry and Veterinary Medicine, Faculty of Zooengineering, Tashkent State Agrarian University. The study material consisted of dogs from the kennel of the Tashkent Regional Department of Internal Affairs canine service and privately owned dogs in which conditions associated with gastric injury or foreign-body ingestion had been identified.

Gastrotomy surgery was performed on a total of six dogs of different breeds, which were divided into two experimental groups of three animals each. In Group I, the gastric wound was sutured using a two-layer Schmieden-Lambert technique with synthetic Lavsan material. In Group II, a single-layer seromuscular Lambert suture with silk thread was used (see Figure 1).

ISSN: 2181-3337 | SCIENTISTS.UZ

During surgery, the animals were placed and restrained in dorsal recumbency (Figure 2). The abdominal cavity was entered through a median laparotomy, the stomach was identified and exteriorized into the operative field. After removal of the foreign body or pathological lesion, the area around the wound was cleansed with 0.9% sodium chloride solution and closed using the appropriate suture technique.

After surgery, the animals' general condition, behavior, appetite, defecation, and the local condition of the surgical wound were monitored. In some animals, the wound condition was examined by diagnostic laparotomy on day 5, and the healing process was reassessed on day 10.

The practical validation materials also included clinical cases treated in Kibray District, Tashkent District, and the city of Chirchiq. In these cases, synthetic Vicryl/Vicryl Rapide-based suture materials and different suturing techniques were used, and wound healing was monitored by ultrasonography (see Table 3).

Figure 1

Experimental Group Design and Suture Techniques

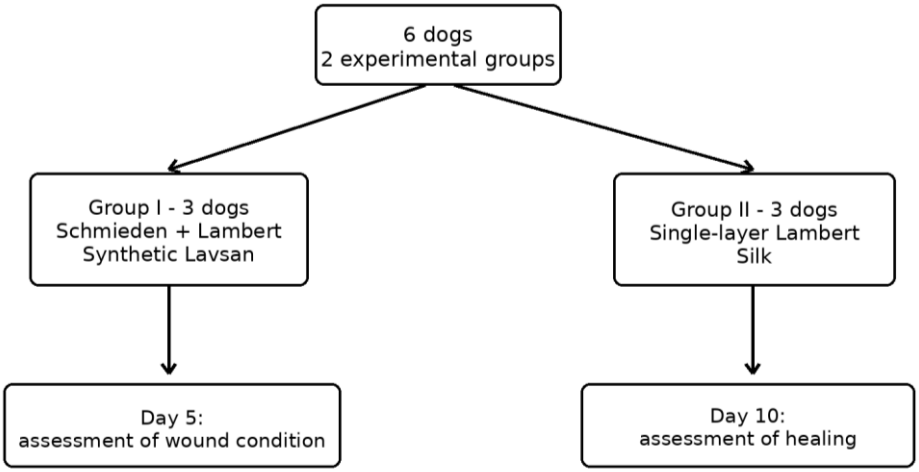


Table 1

Breed Distribution Across Experimental Groups

No.	Dog breed	Group I	Group II	Total
1	German Shepherd	+		1
2	Central Asian Shepherd		+	1
3	Belgian Shepherd	+		1
4	Cocker Spaniel	+		1
5	East European Shepherd		+	1
6	Local-breed dog		+	1
Total		3	3	6

According to the grouping reported in the source, Group I included a German Shepherd, a Belgian Shepherd, and a Cocker Spaniel; Group II included a Central Asian Shepherd, an East European Shepherd, and a local-breed dog.

ISSN: 2181-3337 | SCIENTISTS.UZ

Figure 2
Gastrotomy Surgery: Tissue Dissection



Figure 3
Continuous Suturing of the Soft Tissues of the Gastric Wall

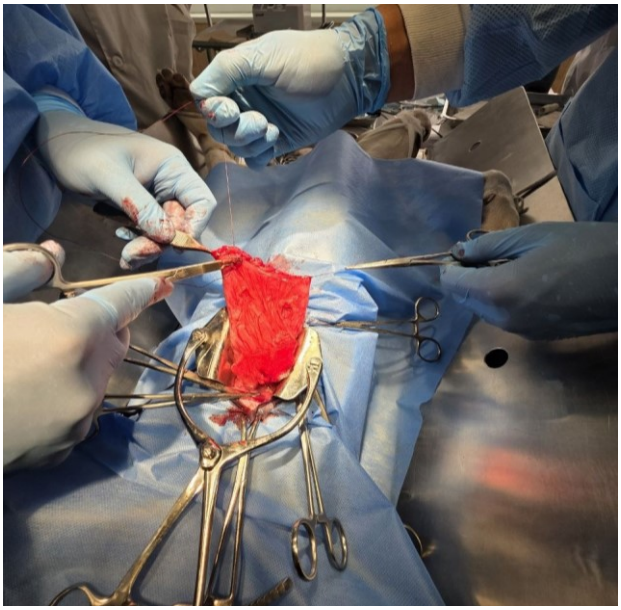


Figure 4
Schmieden Suturing of the Gastric Wall

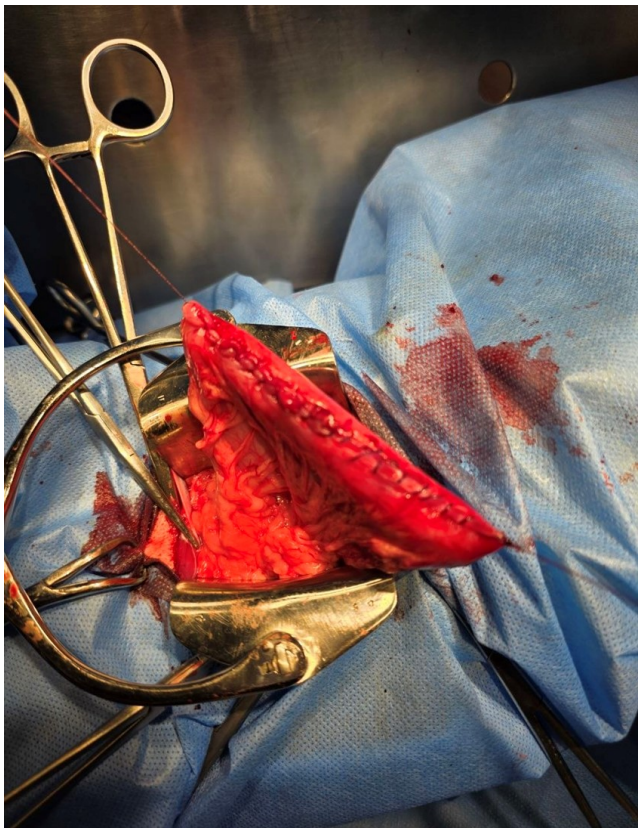
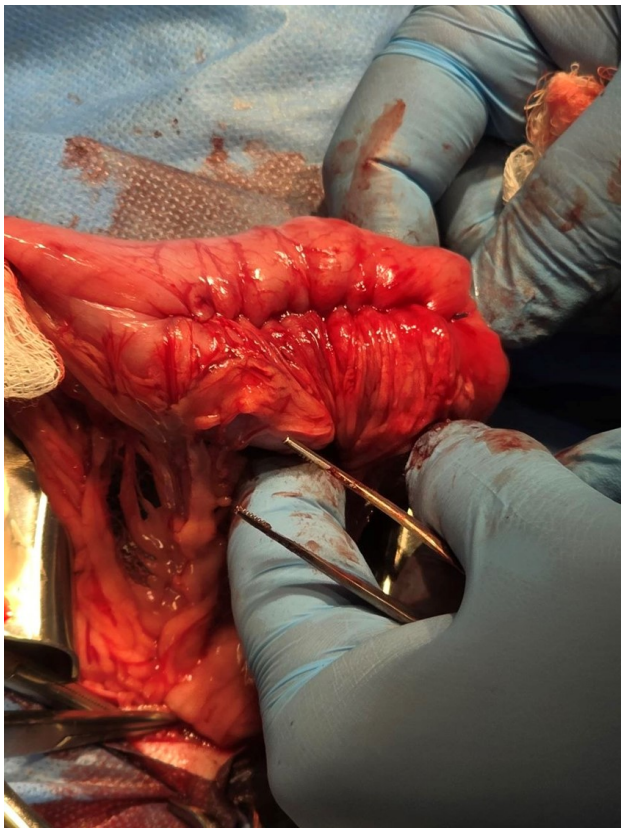


Figure 5
Lambert Suturing of the Gastric Wall



Results

During the main stages of the gastrotomy procedure, the gastric wall wound was handled carefully, with attention to controlling bleeding, cleaning the area around the wound, and anatomically approximating the wound edges (Figure 3).

In experimental Group I, use of the two-layer Schmieden-Lambert suture combination with synthetic Lavsan thread resulted in satisfactory wound healing during the 10-day observation period. A smooth scar formed at the wound site, and the animals' general condition was satisfactory (Figure 4).

In Group II, a single-layer seromuscular Lambert suture with silk thread was used. Wound healing

ISSN: 2181-3337 | SCIENTISTS.UZ

was also observed in this group; however, at the day-10 assessment the scar appeared relatively coarse and protruded in some areas (Figure 5).

During the early postoperative period, inflammatory reactions such as local redness and swelling were observed in both groups. The source material reported redness and swelling in Group I and redness with marked swelling in Group II (Table 2).

These observations indicate that the suturing technique and material influence the morphology of wound healing. However, because the study included only six experimental animals, caution is required when statistically generalizing these results to a broader population.

Table 2

Postoperative Wound Appearance by Experimental Group

Indicator	Group I Schmieden + Lambert / Lavsan	Group II Lambert / silk
Wound healing	Observed	Observed
Scar appearance	Smooth	Relatively coarse, with localized bulging
General condition	Satisfactory	Satisfactory
Local reaction	Redness and swelling recorded	Redness and marked swelling recorded

Results of Practical Validation

The practical significance of the study results was also evaluated in individual clinical cases. In Kibray District, gastrotomy was performed on a 6-month-old German Shepherd and a foreign body was removed from the stomach. The gastric wound was sutured using the Schmieden-Lambert technique with synthetic Vicryl material, and wound healing was monitored by ultrasonography.

In Tashkent District, gastrotomy was performed on a 4-month-old dog and a foreign body was removed. The gastric wound was closed using the Connell-Lambert technique with synthetic Vicryl Rapide material. Wound healing and suture absorption were monitored dynamically by ultrasonography.

In the city of Chirchiq, gastrotomy was performed on a 3-month-old Drahthaar. After removal of the foreign body, the gastric wound was sutured using the Cushing-Lambert technique with synthetic Vicryl suture material. The wound surface was treated for 10 days, and healing of the muscle and gastric wounds was monitored by ultrasonography.

These practical cases do not directly replace the results from the experimental groups; however, they demonstrate the feasibility of using synthetic absorbable suture materials and layered suturing techniques in routine veterinary practice (Table 3).

Table 3

Clinical Validation Cases and Suturing Approaches

Location	Animal	Procedure	Suture method/material	Monitoring
Kibray District	6-month-old German Shepherd	Gastrotomy	Schmieden-Lambert / Vicryl	Ultrasound
Tashkent District	4-month-old dog	Gastrotomy	Connell-Lambert / Vicryl Rapide	Ultrasound
Chirchiq City	3-month-old Drahthaar	Gastrotomy	Cushing-Lambert / Vicryl	Ultrasound

ISSN: 2181-3337 | SCIENTISTS.UZ

Discussion

The observations obtained indicate the importance of selecting the suturing technique and material together when closing a gastric wall wound. This interpretation is consistent with evidence that gastrointestinal tissue response and healing can vary with closure pattern and suture material (Ellison, 2011; Hastings et al., 1975; Regier, 2022). In the two-layer Schmieden-Lambert combination used in the present study, the inner layer approximated the wound edges and the outer layer brought the serosal surfaces together; the day-10 scar appeared smoother in this group.

Although wound healing occurred in the group in which a single-layer Lambert suture with silk was used, the scar was reported to be coarser and to protrude in some areas. This finding should not be attributed solely to the suture material because the suture technique also differed between groups. Recent clinical evidence indicates that single-layer gastric closure can be safe in dogs, emphasizing the need to separate the effects of closure pattern from those of suture material in future controlled studies (Velay et al., 2024).

The practical validation cases included synthetic Vicryl and Vicryl Rapide materials, and wound healing was monitored by ultrasonography. Experimental evidence indicates that absorbable synthetic materials can differ in the degree of local tissue reaction they produce, supporting deliberate material selection rather than treating all absorbable sutures as equivalent (Gazivoda et al., 2015).

Future studies should increase the number of animals, randomize group allocation, separate suture-material effects from suture-technique effects, assess wound healing with standardized clinical and histological scoring criteria, and calculate statistical significance. Larger, controlled clinical studies of gastric closure techniques provide an appropriate model for such comparisons (Velay et al., 2024).

Conclusions and Practical Recommendations

Gastrotomy is one of the effective surgical methods for removing foreign bodies that have entered the stomach in dogs. In the group in which the two-layer Schmieden-Lambert suture combination and synthetic Lavsan material were used, the scar on day 10 appeared relatively smooth and firm.

In the group in which a single-layer Lambert suture and silk material were used, wound healing was observed; however, the scar was relatively coarse and protruded in some areas.

In practical clinical cases in Kibray District, Tashkent District, and the city of Chirchiq, synthetic Vicryl/Vicryl Rapide-based suture materials were used, and wound healing was monitored by ultrasonography.

The study results indicate that, when closing gastrotomy wounds, the suturing technique and material should be selected with consideration of the animal's age, the characteristics of the wound, and the anatomical and physiological condition of the stomach.

The use of a two-layer Schmieden-Lambert suture combination is considered appropriate for closing a gastric wall wound during gastrotomy. When selecting suture material, its biological compatibility with tissues, mechanical strength, and absorbability should be taken into account. During the postoperative period, regular monitoring of the animal's general condition and local wound signs is recommended, with dynamic ultrasonographic monitoring when necessary.

REFERENCES

1. Abdurahimov, I. E., & Ulmassov, B. F. (2025). Diagnosis of diseases of the abdominal area of dogs belonging to different breeds, operations in the gastrointestinal departments. *Science and Innovation, 4*(7). https://doi.org/10.5281/zenodo.16746148
2. Ellison, G. W. (2011). Complications of gastrointestinal surgery in companion animals. *Veterinary Clinics of North America: Small Animal Practice, 41*(5), 915–934. https://doi.org/10.1016/j.cvsm.2011.05.006

ISSN: 2181-3337 | SCIENTISTS.UZ

3. Ellison, G. W., Case, J. B., & Regier, P. J. (2019). Intestinal surgery in small animals: Historical foundations, current thinking, and future horizons. *Veterinary Surgery, 48*(7), 1171–1180. https://doi.org/10.1111/vsu.13275
4. Gazivoda, D., Pelemiš, D., Vujašković, G., & Djurdjević, S. (2015). Influence of suturing material on wound healing—An experimental study on dogs. *Vojnosanitetski Pregled, 72*(5), 397–404. https://doi.org/10.2298/VSP140122054G
5. Hastings, J. C., Van Winkle, W., Barker, E., Hines, D., & Nichols, W. (1975). Effect of suture materials on healing wounds of the stomach and colon. *Surgery, Gynecology & Obstetrics, 140*(5), 701–707.
6. Hayes, G. (2009). Gastrointestinal foreign bodies in dogs and cats: A retrospective study of 208 cases. *Journal of Small Animal Practice, 50*(11), 576–583. https://doi.org/10.1111/j.1748-5827.2009.00783.x
7. Hobday, M. M., Pachtinger, G. E., Drobatz, K. J., & Syring, R. S. (2014). Linear versus non-linear gastrointestinal foreign bodies in 499 dogs: Clinical presentation, management and short-term outcome. *Journal of Small Animal Practice, 55*(11), 560–565. https://doi.org/10.1111/jsap.12271
8. Narziev, B. D. (2023). *Operativ xirurgiya va topografik anatomiya [Operative surgery and topographic anatomy]*. Fan Ziyosi.
9. Regier, P. J. (2022). Current concepts in small animal gastrointestinal surgery. *Veterinary Clinics of North America: Small Animal Practice, 52*(2), 437–454. https://doi.org/10.1016/j.cvsm.2021.11.002
10. Schwartz, Z., & Coolman, B. R. (2018). Disposable skin staplers for closure of linear gastrointestinal incisions in dogs. *Veterinary Surgery, 47*(2), 285–292. https://doi.org/10.1111/vsu.12759
11. Ulmasov, B., Narziev, B., Mamatkulov, A., Boltayev, F., & Abdurahimov, I. (2026). Importance of using natural and synthetic sutures in wound healing in gastrotomy surgery in dogs. In A. M. Bozdoğan, A. Ton, M. Ç. Güney, K. Hatioğlu, B. Dalkiliç, M. Özçetin, & T. Esatbeyoğlu (Eds.), *Proceedings of the 5th International Conference on Research of Agricultural and Food Technologies (I-CRAFT 2025)* (pp. 642–650). Atlantis Press. https://doi.org/10.2991/978-94-6239-666-1_57
12. Velay, L., Thibaud, J., Serghini Rousseau, K., Lhuillery, E., Libermann, S., Gautherot, A., Bonneau, L., & Etchepareborde, S. (2024). Safe gastric wall closure in dogs using a single-layer full-thickness simple continuous suture pattern. *Journal of the American Veterinary Medical Association, 262*(2), 1–5. https://doi.org/10.2460/javma.23.06.0344