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CLINICAL RESEARCH

Modified closed sacculectomy in 50 dogs with non-neoplastic anal sac disease

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Abstract

Objective: To describe a modified closed sacculectomy technique for non-neoplastic anal sac disease in dogs, and to describe the management and short-term outcomes in dogs undergoing sacculectomy by the described technique.

Study design: Retrospective case series.

Sample population: A total of 50 dogs.

Methods: Electronic medical records were reviewed to identify dogs undergoing bilateral anal sacculectomy for non-neoplastic anal sac disease using the described closed technique between January 1, 2013 and February 1, 2024.

Results: A total of 50 dogs underwent bilateral anal sacculectomy for non-neoplastic anal sac disease. Intraoperative anal sac perforation was reported in five dogs (10%). A total of 43 dogs were available for two-week follow-up. Grade 1 complications were reported in 14/43 dogs (32%), grade 2 complications in 2/43 dogs (5%), and grade 3B in 2/43 dogs (5%). At two-weeks postoperatively, 13/14 dogs (93%) had resolution of grade 1 complications. Both dogs with grade 2 complications had resolution reported at two weeks postoperatively, and both dogs with grade 3B complications had resolution reported at two weeks following revision surgery.

Conclusion: Intraoperative complications consisted of anal sac perforation without further complication. Minor postoperative complications were mostly self-limiting, supporting previous literature. Major complications were infrequent and resolved following single revision surgery.

Clinical significance: The technique reported provides an alternative to excise intact and non-neoplastic anal sacs in dogs. The key features of this technique are immediate anal sac identification by following the anatomic path of the duct, minimal peri-saccular dissection, no requirement for packing of the anal sac, and complete removal of the duct and anal sac.

1 | INTRODUCTION

Anal sac disease (ASD) occurs frequently in dogs, and can be categorized as neoplastic or non-neoplastic.[1,2] Non-neoplastic ASD denotes anal sac impaction, anal sacculitis and anal sac abscessation.[3] These three diseases are considered a continuum in dogs, with impaction leading to inflammation and in some individuals abscessation, with or without perianal sinus formation.[4] Clinical signs of ASD in dogs include perineal scooting, licking, rubbing, biting, tenesmus or dyschezia.[1,5] Non-neoplastic ASD is often initially managed medically with manual expression, heat packing, local instillation of antibiotics, open drainage, increased dietary fiber, or systemic antibiotics and anti-inflammatories.[5,6] The response rate to conservative management of ASD reported in veterinary literature is 60%–85% in dogs.[4,7,8] In a study with 20 dogs receiving manual expression every 2 months, the median time to recurrence based on exhibited clinical signs was 3 weeks.[9] Where ASD is recurrent, chronic, or persistent in the face of medical management, surgical treatment with bilateral anal sacculectomy is recommended.[5,6,10]

Anal sacculectomy techniques are classed as open or closed depending on whether the anal sac is entered prior to dissection.[3,5] Further classification as modified open or closed is based on variation from originally described open and closed techniques, and the extent of incision and dissection.[3,5] Several surgical techniques are described for anal sacculectomy.[3,6,11–13] The traditional open surgical technique was reported to have higher long-term complication rates than modified open and closed techniques.[3] Since this finding, newly reported surgical techniques in the literature have been modified closed techniques.[11–14]

Downs and Stampley, Charlesworth, and Diaz et al. all describe surgical techniques for non-neoplastic ASD which require instrumentation, including Foley catheter, Spruell's needle, or gel infusion, to pack or identify the anal sac.[6,11,12] Additionally, all describe sacculectomy dissection beginning over the level of the anal sac fundus extending towards the duct.[6,11,12] More recent modified closed techniques have been reported that do not begin dissection over the fundus or require instrumentation, all of which are described for neoplastic anal sacculectomy.[14–17] The first objective of this study was to describe a modified closed surgical approach for non-neoplastic anal sacculectomy. The second objective was to describe the management and short-term outcomes in dogs undergoing sacculectomy by the described technique.

2 | MATERIALS AND METHODS

Electronic medical records of dogs presenting to The Animal Hospital Murdoch University were reviewed to identify dogs which underwent bilateral anal sacculectomy between January 1, 2013 and February 1, 2024. Search terms used included anal, sac, and sacculectomy. Dogs were included in the study if they underwent bilateral anal sacculectomy for non-neoplastic ASD using the surgical technique described, had complete medical and surgical records, and had histopathology results available for review. Dogs were excluded if they had perianal fistulae. Data collected included signalment, weight, breed, reason for sacculectomy, surgical technique, histopathology results, intraoperative complications, intraoperative culture sampling, postoperative complications, postoperative medications, and the history and clinical examination findings in the postoperative period up to 2 weeks following surgical intervention gathered at follow-up appointment. Postoperative complications were classified using the Dindo classification system,[18] where a complication is any deviation from the normal postoperative course. Owner-reported defecatory changes of any duration occurring within 2 weeks of surgical intervention were also recorded.

2.1 | Surgical procedure

All dogs underwent general anesthesia, with anesthetic protocol at the discretion of the supervising board-certified anesthetist. Cefazolin (AFT Pharmaceuticals Pty Ltd) was administered intraoperatively (22 mg/kg IV every 90 min), and continued perioperative every 8 h for three doses. The perineum was clipped and prepared aseptically. A rectal purse-string was then placed deep to the opening of the anal sac ducts to allow continued access to the duct orifice. Dogs were positioned in sternal recumbency with hindlimbs hanging over the edge of the table. Padding was placed under the pelvis to elevate the perineal region to a suitable height, and the tail was reflected over the dorsum and secured. The surgical field was draped and an iodine-impregnated adhesive drape (3 M Ioban 2 Antimicrobial Incise Drapes) was placed over the field. A radial incision was made through the Ioban over the length of the anal sac. A mosquito hemostatic forcep was introduced into the anal sac duct and a circumferential incision was made around the opening of the duct with needle tip monopolar electrosurgery; on cautery and coagulation settings of 18 and 20 Watts, respectively (Medtronic Covidien Valleylab Force Triad) (Figure 1A–F). The mosquito hemostatic forcep was then directed caudally within the sac to highlight the anal sac, and a radial incision was made through the skin and subcutaneous tissue overlying the length of the anal sac with electrosurgery. The duct opening was clamped across with the mosquito hemostatic forcep, which acted as a

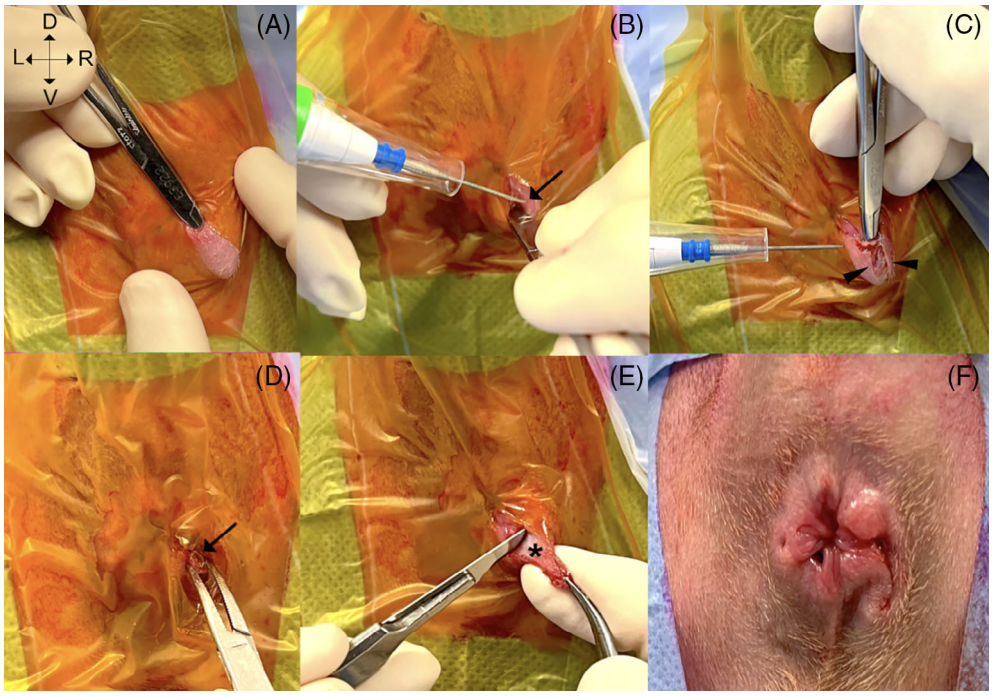

FIGURE 1 (A–F) Intraoperative images of modified closed anal sacculectomy. The images show the surgical field from the surgeon's perspective; the tail is dorsal, the hindlimbs are ventral, left of image is left and right of image is right. (A) Mosquito hemostatic forceps inserted into the right anal sac orifice. (B) Monopolar electrosurgery used to incise around the duct orifice (single arrow). (C) Monopolar electrosurgery used to incise the length of the sac through the skin and subcutaneous tissue (arrowheads). (D) The anal sac duct (single arrow) is grasped with mosquito hemostatic forceps directed perpendicular to the duct to act as a handle for manipulation. (E) The duct is supported over the index finger and the scalpel blade is used to push the anal sphincter muscle off the sac (asterisk). (F) Image following closure of right sacculectomy prior to left sacculectomy.

handle for anal sac manipulation. A number 15 scalpel blade was used to push the anal sphincter muscle fibers off the duct and anal sac, remaining as close to the anal sac as possible. During this process, the duct and sac were supported over the index finger to provide resistance for dissection. Electrosurgery was used throughout dissection for hemostasis of vessels visualized, mostly on the medial surface of the anal sac. All anal sacs were inspected visually and submitted for histopathology for assessment of complete excision. The site was lavaged with sterile saline prior to closure, and sampling for culture was collected if there was concern over intra-operative contamination. The external anal sphincter tissue was apposed with buried simple interrupted sutures (Ethicon polydioxanone 3–0 or 4–0), followed by buried simple interrupted sutures in the superficial subcutaneous tissues to appose the skin edges. In all dogs the skin edges were left unsutured. The procedure was then repeated for the contralateral anal sac. At the end of the procedure the purse-string suture was removed and dogs were monitored throughout recovery. All dogs had an Elizabethan collar fitted, and remained hospitalized overnight before discharge the following day.

2.2 | Statistical analysis

Categorical variables including sex, breed, reason for sacculectomy, histopathology, intraoperative complications, postoperative medications, and follow-up findings, are summarized as a frequency count and proportion (%). Continuous variables, including age and weight are summarized as median and range.

3 | RESULTS

A total of 50 dogs met the inclusion criteria, comprising 33 female dogs (30 neutered and 3 intact) and 17 male dogs (16 neutered and 1 intact). The median age was 5 years (range 1–10), and the median weight was 13 kg (range 4–50). Breed distribution consisted of crossbreeds (18), Cocker spaniels (6), Pugs (3), and Chihuahuas (3). Breeds represented by two dogs each included French Bulldogs, Australian Bulldogs, and Miniature Dachshunds. Other breeds were represented by one dog each. Presenting complaints were scooting 28/50 (56%), licking 16/50 (32%), leakage of anal sac fluid 9/50 (18%), nonspecific 6/50 (12%), frequent sitting 3/50 (6%), biting at

the perineum 3/50 (6%), pain 2/50 (4%), and altered behavior 1/50 (2%). Dogs often had more than one complaint reported simultaneously, with 18/50 (36%) having at least two complaints. The combination of scooting and licking occurred most frequently in 9/50 dogs (18%). Historical diagnoses recorded included sacculitis in 31/50 dogs (62%), anal sac abscessation in 11/50 dogs (22%), and impaction in 8/50 dogs (16%).

All dogs underwent bilateral anal sacculectomy by board-certified surgeons (49/50) or a surgical resident under the supervision of a board-certified surgeon (1/50). Histopathology confirmed complete excision and a diagnosis of bilateral anal sacculitis in all 50 dogs (100 anal sacs). Intraoperative complications were reported in five dogs (10%), all unilateral anal sac perforation. Intraoperative culture sampling was performed in 30/50 dogs, including all dogs with intraoperative anal sac perforation. All 50 dogs received Cefazolin (AFT Pharmaceuticals Pty Ltd) intraoperatively (22 mg/kg IV every 90 min), and every 8 h for three doses following surgery. Ten dogs received antibiotics, either cephalexin, amoxycillin-clavulanic acid, or enrofloxacin, beyond this 24-h perioperative period. These dogs received antibiotics due to abscessation noted at surgery (1), perivulvar dermatitis (1), chronic skin infection (1), individual clinician discretion (3), and postoperative complication (4). Continuation of antibiotic therapy was based on intraoperative bacterial culture and susceptibility in 8/10 dogs, and empirical selection in 2/10 dogs. Of the five dogs with intraoperative anal sac perforation, only one dog received antibiotics postoperatively.

Records of clinical examination at 2 weeks postoperatively were available for 43/50 dogs. Overall, 18/43 dogs (42%) had reported complications, with 14 grade 1 (32%), two grade 2 (5%), and two grade 3B (5%).[18] Grade 1 complications consisted of perineal irritation indicated by scooting (6), increased frequency of defecation (1), and isolated inappropriate defecation (9). Two dogs were reassessed and hospitalized for 24 h of medical management for perineal scalding. Both dogs were dispensed antibiotics and pain relief by the attending clinician and were therefore classified as grade 2 complications.[18] No further intervention was required following hospitalization in these two dogs. At two-week follow-up, 13/14 grade 1 and 2/2 grade 2 complications had resolved. The one remaining dog was reported to have ongoing isolated inappropriate defecation, only when barking.

Both dogs with grade 3B complications[18] returned 7 days postoperatively for swelling and discharge at the surgical site. Neither dog had intraoperative complications reported. The first dog had unilateral abscessation with purulent discharge noted. A small tear in the terminal rectal wall was found at revision surgery, and was repaired with interrupted sutures. The abscess was incised and sampled for culture, before lavage and Mesalt packing (Mölnlycke Mesalt 20% w/w sodium chloride). Mesalt packing was removed the following day and the site was left to heal by second intention. Two days following surgery the dog was discharged on oral amoxycillin-clavulanic acid (20 mg/kg every 12 h; Amoxyclav Dechra Veterinary Products Pty Ltd). Two weeks following revision surgery the site had healed on examination, with no further complications reported. The second dog had unilateral incisional dehiscence and abscessation. At revision surgery, inappropriate surgical closure was apparent unilaterally. A step was present between the edges of the mucocutaneous junction allowing fecal contamination of the sacculectomy site. The previous sacculectomy site was opened, lavaged and Mesalt was packed into the defect for open wound management. The defect was closed primarily 2 days later. The defect was closed with buried simple interrupted absorbable sutures in the deep subcutaneous tissue and simple interrupted absorbable sutures were placed to appose the mucocutaneous junction of the anus. Intravenous enrofloxacin (5 mg/kg IV every 24 h; Baytril Bayer Animal Health) was administered during hospitalization based on initial culture and susceptibility results, and continued following discharge. Two weeks after revision surgery, complete resolution was achieved.

4 | DISCUSSION

Multiple surgical techniques are described for non-neoplastic anal sacculectomy in dogs. The technique described here differs from those previously reported for non-neoplastic anal sacculectomy,[3,6,11–13] as surgical dissection is performed immediately adjacent to the anal sac wall, causing minimal disruption to the surrounding tissues. By using a scalpel to push the anal sphincter muscle off the anal sac, the sac is removed with negligible sphincter muscle attached (Figure 2). As this dissection follows from the wall of the duct along the neck and fundus of the anal sac, it eliminates the need for deep dissection beyond the anal sac. Thus, limiting inadvertent damage to the perineal nerves and vasculature during dissection.[19,20] While the pattern of perineal innervation to the external anal sphincter has been reported to be consistent in 116 dogs, the classically described model of perineal arteries was only present in 46% of these dogs.[19] It was concluded that perineal vascular variations are common in dogs,[19] which reinforces the need for careful and minimal surgical dissection. In addition, by following the anatomic path of the anal sac, the anal sac is clearly identified, therefore obviating the need for any packing

FIGURE 2 Anal sac following excision. Note complete excision of the entire anal sac complex with minimal muscular attachment.

material within the anal sac. Consequently, additional surgical materials and instruments, such as Foley catheters,[6] modified Foley catheters,[12] gels or Spruell's needles[11] are not required. This is useful in chronic cases where identification can be difficult and packing may be prohibited by fibrotic tissue[10,20] and decreased luminal capacity.

The intent of this retrospective study was to discern the frequency of complications and short-term outcomes for this modified closed technique. Complications of anal sacculectomy are discussed as intra- or postoperative; intraoperative complications include anal sac perforation, iatrogenic trauma to the external anal sphincter muscle, rectal wall laceration, and caudal rectal artery or nerve damage.[11,13,21] In this study, five dogs had inadvertent anal sac perforation during dissection. In all dogs, once the anal sac was excised, the surgical field was lavaged and sampled for aerobic culture and susceptibility. Only one of the five dogs received a prophylactic antibiotic course postoperatively, and none developed postoperative complications. Thus, immediate lavage and perioperative antimicrobial protocols mitigated postoperative infection. Similarly, Hill and Smeak compared outcomes for open, modified open and closed anal sacculectomies and did not find any difference in short term complications across surgical techniques with differing levels of contamination.[3]

In this study, postoperative complications were reported using the Dindo classification system.[18] This system allows standardization of postoperative complications and comparison of outcomes across studies.[18] It is reported that minor complications, equivalent to grade 1–2 complications,[18] occur in 3%–32% of anal sacculectomies.[13,21] Most minor complications relate to ongoing perineal irritation seen as scooting, biting or licking at the perineum, and defecatory changes, such as weak anal tone, diarrhea and fecal accidents.[1,11,12] Charlesworth reported all grade 1[18] complications for 20/62 dogs (32%) following closed anal sacculectomy for non-neoplastic ASD using Spruell's needle or gel distension.[11] Nine of the dogs had defecatory changes, all of which were self-limiting and had resolved within a two-week postoperative period.[11] In our study with follow-up available for 43 dogs, 14 dogs had grade 1 complications and two had grade 2 complications. Almost all minor complications (15/16) resolved prior to two-week follow-up appointment, apart from one dog with grade 1 complication that had ongoing inappropriate defecation only when barking. True fecal incontinence is persistent lack of fecal control for more than 3 to 4 months following surgery.[2,3,21] It is typically associated with aggressive surgical dissection, occurring where >50% of the external anal sphincter muscle is compromised or the caudal rectal nerves are damaged.[1] Modified-closed or closed surgical techniques may cause transient loss of fecal control due to sphincter muscle disruption.[2,11–13] While true fecal incontinence is rare in both open and closed anal sacculectomy,[3,11] owners should be counseled appropriately prior to surgery so that realistic expectations around fecal control in the postoperative period are established.

Major complications following anal sacculectomy are reported infrequently.[6,11,13,14,21] Long-term complications including chronic licking, fistulation, fecal incontinence and anal stricture have been previously reported in 14 dogs,[3] but specific reporting on treatment was not available. Several others report no major complications following anal sacculectomy.[6,11,13,14] Detailed descriptions of wound management for the two major complications in our series are provided to inform the reader. It is likely both complications could have been avoided with meticulous attention paid to examination of the tissues during closure.

Although we are satisfied that this technique has low morbidity, comparison to the outcomes in the literature provides a more objective point of reference. Direct comparison between studies is limited because of variations in the study populations and surgery skillsets, but in general, our outcomes compare favorably. While a two-week period is a brief follow-up period, previous studies all state that short-term complications following anal sacculectomy had resolved by seven days[13] and 10 days.[11] Due to the retrospective nature of the study, the effect of management practice, such as antimicrobial administration, cannot be discerned.

5 | CONCLUSION

This study describes a modified technique for closed anal sacculectomy in dogs with non-neoplastic ASD. The only intraoperative complication in this case series was

inadvertent anal sac perforation, but this did not cause postoperative complications. The frequency of minor postoperative complications was comparable to previous literature, with mostly self-limiting defecatory changes that resolved within 2 weeks postoperatively. Major complications were infrequent (5%) and managed with surgical revision leading to complete resolution. This technique is an alternative to other closed techniques with comparable outcomes. The key features of this technique are immediate anal sac identification by following the anatomic path of the duct, minimal peri-saccular dissection, no requirement for packing of the anal sac and complete removal of the duct and anal sac.

AUTHOR CONTRIBUTIONS

Davis AT, BSc, BVMS, GradDipEd, MVetClinStud: Conception of study design, acquisition, analysis and interpretation of data, drafting of work and revision of work, final approval of version to be published and accountable for work.

Hosgood GL, BVSc, PhD, DACVS: Conception of study design, analysis and interpretation of data, revision of work, final approval of version to be published and accountable for work.

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CONFLICT OF INTEREST STATEMENT

The author have nothing to disclose–no financial support or conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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