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Anton C. Beynen

Diet and anal-sac impaction in dogs*

*Based on article in Dutch (1)

Main points

Progressive, inflammatory anal-sac disease in the dog involves anal-sac blockage followed by infection and abscessation within one or both sacs. The condition may be initiated by fecal impaction of the anal-sac duct, or more specifically by the blocking of its opening to the anal orifice. Symptoms of anal-sac disease are, amongst others, tenesmus, licking or biting the anal area, "scooting" and perianal discharge. Therapy consists of expressing the anal-sac contents, and administration of antibiotics as appropriate. Repeated recurrence may be an indication for anal sacculectomy.

Among the dogs that are presented to a veterinary practice, the prevalence of anal-sac disease is about 5% (2-5). In one study there was no clear breed predisposition (3), but in dogs that underwent sacculectomy, Labrador-type dogs were overrepresented (6). One to three weeks prior to the diagnosis of anal sacculitis (with impaction), 75% (225/300) of the dog patients had mild, short-lasting (1-2 days) diarrhea (7).

A study found that sixty percent (180/300) of the anal-sac patients received an all-meat diet (7), which implies zero consumption of crude fiber. There is no published research on the influence of diet on the prevention of (recurrent) anal-sac disease in the dog. To promote anal-sac emptying and/or to prevent anal-duct blockage, a fiber-rich diet is often recommended (8, 9).

It is plausible that fecal impaction of the anal-sac duct is combated by short, rectal-transit time, enhanced innervation of the rectum and surrounding tissue, and increased laxity of rectal contents. That means that the diet should accelerate passage, and increase volume and water concentration of rectal contents. On closer examination, a fiber-rich diet can be further specified to a complete dry food with ± 5% cellulose (± 5% crude fiber) and ± 5% beet pulp. Efficacy of the proposed fiber-rich diet in preventing (recurrence of) canine anal-sac impaction can only be tested by controlled research.

Anal-sac content

The numerous glands of the dog's two anal sacs are located in the connective tissue near the fundus. The glands empty into the sac's lumen. Anal-sac contents contain about 88% water, 11.5% organic and 0.5% anorganic matter (10). Healthy dogs display an extreme individual variation in the appearance of their anal-sac fluids (11-16). The color varies from yellow to gray to brown, and the consistency from watery to mucous to doughy. The secretion contains mucin rich in sialic acid and other anti-microbial proteins, namely lysozyme, immunoglobulin A and lactoferrin (14, 15). Gram-positive cocci belong to the normal flora within the anal sacs (7).

The degree of malodorousness of the anal-sac contents differs between animals (16). The volatile, organic components mainly consist of short-chain fatty acids (C_2-C_6) and trimethylamine (17). Gender and estrous stage had no effect on the volatile compounds (17), while anal-sac secretions of estrous versus disestrous bitches were not more attractive to male dogs (18). Secreting anal-sac fluid into the anal channel probably serves to scent mark an individual's territory via feces.

Experimental anal-sac blockade

The canine anal sac has one duct to the anal channel. In experiments with healthy dogs, the duct of one sac per animal was ligated. McColl (19) attempted to induce anal-sac fistulas as model for humans with perianal fistulas. Halnan (20) tested whether the symptoms of canine anal sacculitis would develop. In 14 dogs, McColl found swelling of the blocked anal sacs, but no anal sacculitis within 20 weeks. Halnan saw swelling in all 8 experimental dogs, and within a week also sacculitis in four animals. The studies suggest that many dogs are resistant against infection development in a blocked anal sac, but there are susceptible animals also.

An older theory (21) advances that blocking of the anal-sac drain, by impaction of feces (and secretion), causes swelling of the sac, followed by sacculitis and empyema. When individually-determined susceptibility to infection is taken into consideration, the theory is not rejected by the two experiments (19, 20). The theory is corroborated by the statement (7) that in canine anal sacculitis the removed, abhorrently stinking anal-sac contents invariably contained a plug.

Required dietary effects

There are no experimental data on how diet may affect anal-sac impaction in the dog. Only reasoning can lead to a possible diet composition for the prevention of (recurrent) anal-sac disease. It is plausible that fecal impaction of the anal-sac duct is combated by short rectal transit time, enhanced innervation of the rectum and surrounding tissue, and increased laxity of rectal contents. That means that the diet should accelerate passage and increase volume and water concentration of rectal contents.

The three requirements match the observation (7) that an all-meat diet increased the risk of anal sacculitis (with impaction). Compared with a dry food, an all-meat diet decreased the passage velocity of chyme in dogs (22). The fiber-free, all-meat diet possibly also decreased the volume of rectal contents. That suggestion is supported by the likenesses of all-meat and deep-frozen foods. The latter foods are meat-based and (very) low in carbohydrates and fiber (23). Per unit of energy intake, four deep-frozen versus four dry foods reduced feces weight in dogs by on average 54% (24), possibly associated with less filling, and thus less distension of the rectum.

Dietary fiber and feces

Chyme passage, fecal volume and water content, are all influenced by the amount and type of dietary fiber, or the indigestible carbohydrates in the diet. Three fiber sources are exemplary: cellulose, beet pulp and psyllium. Cellulose is insoluble and non-fermentable in the dog's gut. Beet pulp holds about 20% pectin, a soluble, viscous, fermentable fiber. Psyllium hulls contain about 60% soluble, non-fermentable arabinoxylans that appear as a gel in feces (25).

In dogs, higher dietary levels (≥ 5% in dry food) of cellulose (26, 27), beet pulp (28, 29) or psyllium seed (30, 31) accelerate chyme passage and increase both feces volume and defecation frequency. The studies also showed that cellulose lowers water content of feces to a limited degree, whereas beet pulp and psyllium seed have a clear increasing effect. That would mean that only dietary cellulose makes firmer stools.

Diet proposal

The three required diet effects and the reported fiber effects are possibly reconciled by a combination of insoluble and soluble fibers. Dietary cellulose and beet pulp demonstrably speed up chyme passage and may enlarge the volume of rectal contents. Beet pulp may raise the amount of water in rectal contents, and cellulose, as bulk-forming fiber, may innervate the rectal area. In stating those fiber effects, it is assumed that greater volume and water concentration of feces go hand in hand with greater volume and water concentration of rectal contents. A dry food containing about 5% cellulose and 5% beet pulp is realistically feasible and theoretically effective. With psyllium seed or hulls at the same, high inclusion level, the food would be too expensive.

Dietetic food and supplements

A production information text for dog owners clarifies about the dietetic food concerned that the bulk-forming effect of the insoluble fiber component promotes natural expressing of the anal glands (32), but presumably the anal sacs are meant. The dry, dietetic food declares vegetable fibers as second ingredient, beet pulp as twelfth ingredient and psyllium husks and seeds as sixteenth (33). The dietary content of crude fiber is 11.1% (33), which probably for the most part represents cellulose.

Some dietary supplements, in the form of treats and powders, claim the support of healthy anal glands by promoting their natural emptying (34-38). Soft chews for anal-gland support are offered with guaranteed success within 3-5 weeks (34). According to a paper backing the formulation, post-marketing surveillance indicates that 85.7% of pet owners reported measurable effectiveness (39). The soft chews contain pumpkin seed powder, granulated pumpkin seed and apple pectin cellulose powder as active fibrous ingredients (40). They provide, as based on the dosing advice (41), a total amount of fiber that is equivalent to ± 0.07% in a dry food (Note 1), which is negligible.

Note 1

The active, fibrous ingredients per soft chew (4 g) are 158 mg pumpkin seed powder, 68 mg granulated pumpkin seed and 34 mg apple pectin cellulose powder (40). Taking into account that pumpkin seed contains about 29% total fiber (42), one soft chew provides 100 mg fiber. For dogs weighing 26-50 pounds, the daily dosage is two soft chews (41). A dog weighing 38 pounds (17.2 kg) would consume 200 mg fiber per day. That intake is equivalent to 0.07% in dry food for a 17-kg dog consuming 16.7 kg dry food/kg body weight, or 284 g food/day.

Literature

1. Beynen AC. Voeding en anaalzakimpactie bij de hond. Dier-en-Arts 2019; Nr 12: 312-313.

2. Harvey CE. Incidence and distribution of anal sac disease in the dog. J Am Anim Hosp Assoc 1974; 10: 573-577 (incidence retrieved via reference 10).

3. Halnan CRE. The frequency of occurrence of anal sacculitis in the dog. J Small Anim Pract 1976; 17: 537-541.

4. Hill PB, Lo A, Eden CAN, Huntley S, Morey V, Ramsey S, Richardson C, Smith DJ, Sutton C, Taylor MD, Thorpe E, Tidmarsh R, Williams V. Survey of the prevalence, diagnosis and treatment of dermatological conditions in small animals in general practice. Vet Rec 2006; 158: 533-539.

5. O'Neill DG, Butcher C, Church DB, Brodbelt DC, Gough AG. Miniature Schnauzers under primary veterinary care in the UK in 2013: demography, mortality and disorders. Canine Gen Epidemiol 2019; 6:1. https://doi.org/10.1186/s40575-019-0069-0

6. Charlesworth TM. Risk factors for postoperative complications following bilateral closed anal sacculectomy in the dog. J Small Anim Pract 2014; 55: 350-354.

7. Halnan CRE. The diagnosis of anal sacculitis in the dog. J Small Anim Pract 1976; 17: 527-535.

8. Halnan CRE. Therapy of anal sacculitis in the dog. J Small Anim Pract 1976; 17: 685-691.

9. Rutherford L, Lee K. Anal sac disease in dogs. In Practice 2015; 37: 435-444.

10. Montagna W, Parks HF. A histochemical study of the glands of the anal sac of the dog. Anat Rec 1948; 100: 297-317.

11. Van Duijkeren E. Disease conditions of canine anal sacs. J Small Anim Pract 1995; 36: 12-16.

12. Lake AM, Scott DW, Miller Jr WH, Erb HN. Gross and cytological characteristics of normal canine anal-sac secretions. J Vet Med A 2004; 51: 249-253.

13. Robson DC, Burton GG, Lorimer MF. Cytological examination and physical characteristics of the anal sacs in 17 clinically normal dogs. Aust Vet J 2003; 81: 36-41.

14. Nara T, Yasui T, Fujimori O, Meyer W, Tsukise A. Histochemical properties of sialic acids and antimicrobial substances in canine anal glands. Eur J Histochem 2011; 55: e29. doi: 10.4081/ejh.2011.e29

15. Meyer W, Tsukise A, Neurand K, Hirabayashi Y. Cytological and lectin histochemical characterization of secretion production and secretion composition in the tubular glands of the canine sacs. Cells Tissues Organs 2001; 168: 203-219.

16. Doty RL, Dunbar I. Color, odor, consistency, and secretion rate of anal sac secretions from male, female and early-androgenized female beagles. Am J Vet Res 1974; 35: 729-731.

17. Preti G, Muetterties EL, Furman JM, Kennelly JJ, Johns BE. Volatile constituents of dog (*Canis familiaris*) and coyote (*Canis latrans*) anal sacs. J Chem Ecol 1976; 2: 177-186.

18. Doty RL, Dunbar I. Attraction of Beagles to conspecific urine, vaginal and anal sac secretion odors. Physiol Behav 1974; 12: 825-833.

19. McColl I. The comparative anatomy and pathology of anal glands. Ann R Coll Surg Engl 1967; 40: 36-67.

20. Halnan CRE. The experimental reproduction of anal sacculitis. J Small Anim Pract 1976; 17: 693-697.

21. Dimić J, Putnik M. Unsere Untersuchungen über Pathogenese und Therapie der durch Paranalbeutelerkrankungen hervorgerufenen Veränderungen bein Hunden. Kleintier Praxis 1964; 9: 97-103.

22. Banta CA, Clemens ET, Krinsky MM, Sheffy BE. Sites of organic acid production and patterns of digesta movement in the gastrointestinal tract of dogs. J Nutr 1979; 109: 1592-1600.

23. Beynen A.C. Raw-positioned dog foods. Dier-en-Arts 2017; Nr. 5: 136-139. https://www.researchgate.net/publication/332263519_Beynen_AC_2017_Raw-positioned_dog_foods

24. Rodi rapport metabolisme. Rodi B.V. Diervoeders, Opmeer, juni 1989.

25. Marlett JA, Fischer MH. The active fraction of psyllium seed husk. Proc Nutr Soc 2003; 62: 207-209.

26. Lewis LD, Magerkurth JH, Roudebush P, Morris Jr ML, Mitchell EE, Teeter SM. Stool characteristics, gastrointestinal transit time and nutrient digestibility and nutrient digestibility in dogs fed different fiber sources. J Nutr 1994; 124: 2716S-2718S.

27. Burrows CF, Kronfeld DS, Banta CA, Merritt MA. Effects of fiber on digestibility and transit time in dogs. J Nutr 1982; 112: 1726-1732.

28. Fahey Jr GC, Merchen NR, Corbin JE, Hamilton AK, Serbe KA, Lewis SM, Hirakawa DA. Dietary fiber for dogs: I. Effects of graded levels of dietary beet pulp on nutrient intake, digestibility, metabolizable energy and digesta mean retention time. J Anim Sci 1990; 68: 4221-4228.

29. Beynen AC. Beet pulp in dog food. Creature Companion 2018; May: 34, 36.
DOI: 10.13140/RG.2.2.18461.41443

30. Roussel AJ, Keele S, Willard MD, Laflamme DP. Type and amount of fiber affects gastric emptying and small intestinal transit time in dogs. Dig Dis Sci 1996; 41: 1882.

31. Tortola L, Brunetto MA, Zaine L, Vasconcellos RS, De Camargo Oliveira MC, Nogueira SP, Carciofi AC. The use of psyllium to control constipation in dogs. Ciência Rural, Santa Maria 2009; 39: 2638-2641.

32. Fibre Response Canine Feline. Royal Canin SAS 2013 (Ireland, United Kingdom). https://vetportal.royalcanin.co.uk/wp-content/uploads/2016/02/Fibre-Response-Caring-For_Layout-1.pdf

33. Product Book June 2017. Royal Canin SAS 2017 (Ireland, United Kingdom).

34. Glandex®. Vetnique Labs 2016. https://cdn.shopify.com/s/files/1/0848/9668/files/Glandex_Brochure_6.29.16.pdf

35. No Scoot supplement powder. NaturVet. https://th.iherb.com/pr/NaturVet-No-Scoot-for-Dogs-Plus-Pumpkin-60-Soft-Chews-6-3-oz-180-g/69704?gclid=EAIaIQobChMI-pDY9ICg5gIVSz5gCh0A6AbSEAAYASAAEgLyCfD_BwE&gclsrc=aw.ds

36. Scoot Bars. PetNaturals. https://www.petnaturals.com/index.php?l=product_detail&p=700664030

37. Scoot Away Bites. Zesty Paws. https://th.iherb.com/pr/Zesty-Paws-Scoot-Away-Bites-Digestive-Immune-Health-for-Dogs-All-Ages-Chicken-Flavor-90-Soft-Chews/81146?gclid=EAIaIQobChMIq82Ts4Gg5gIVSXZgCh2w0QYeEAAYASAAEgKWtvD_BwE&gclsrc=aw.ds

38. Fibor. VetPlus. https://www.medpets.be/vetplus-fibor/

39. Ehrenzweig J. Novel fiber-rich supplement effective for prevention and treatment of acute, episodic and chronic anal gland disease in dogs and cats. Int J Vet Anim Med 2018; 1 (1): 104 (3 pages).

40. Glandex Soft Chews. Ingredients. https://www.glandex.com/pages/glandex-ingredients

41. Glandex Soft Chews. Instructions and Dosing. https://www.glandex.com/pages/dosing-number-of-servings

42. Silva JS, Simão AA, Marques TR, Leal RS, Corrêa AD. Chemical constituents of the pumpkin seeds flour. J Biotechnol Biodivers 2014; 5: 148-156.