# Short- and long-term outcomes after digit amputation in dogs: 33 cases (1999–2011)

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**Objective**—To determine complications and outcomes for dogs that underwent digit amputation.

**Design**—Retrospective case series and owner survey.

**Animals**—33 client-owned dogs.

**Procedures**—Medical records of dogs that underwent digit amputation were evaluated. Signalment, digits amputated, level of amputation, reason for amputation, and complications were recorded. Owners were contacted via mail or telephone to collect follow-up information.

**Results**—35 digit amputation procedures were performed for the 33 dogs in the study (1 dog underwent 3 procedures). Short-term (≤ 14 days) complications other than lameness were detected in dogs after 13 of 33 (39.4%) procedures for which follow-up information was available; incisional dehiscence was the most common short-term complication. Long-term (>14 days) lameness was detected in dogs after 8 of 32 (25.0%) procedures for which follow-up information was available; lameness was mild or intermittent after 6 of these procedures. Amputation of a digit in a hind limb was the only variable that was significantly associated with the development of short-term complications. Twenty-four of 33 (72.7%) owners responded to the survey via mail or telephone interview; 23 (95.8%) of those owners were satisfied with the procedure. Most dogs had a good functional outcome (including dogs that underwent amputation of digit 3 or 4 or both).

**Conclusions and Clinical Relevance**—Amputation of a hind limb digit was the only risk factor identified for development of short-term complications. Dogs that underwent amputation of digit 3 or 4 or both did not seem to have a worse outcome than dogs that underwent amputation of other digits. (*J Am Vet Med Assoc* 2013;242:1249–1254)

The digits, metacarpal or metatarsal regions, and carpal or tarsal joints transfer loads to the body during weight bearing and are essential for support, balance, and locomotion of dogs.[1] Dogs are digitigrade animals (ie, they walk on their phalanges).[2] Dogs have 5 digits on each paw; digits 2 through 5 are fully functional and weight bearing, whereas digit 1 is vestigial. Digits 2 through 5 have 3 bones each: the proximal, middle, and distal phalangeal bones. The distal phalangeal bones each have an ungual process from which the nails grow. Digit 1 (ie, dewclaw) is rudimentary and does not include a middle phalangeal bone.[2] Variations in the structure of the distal aspects of the limbs have been detected among breeds of dogs; these anatomic variations may be related to the activities for which dogs of each breed were originally used. For example, Greyhounds have long and narrow feet with a small distance between the digital pads, which is beneficial for running, whereas Labrador Retrievers have wide feet with greater separation between digital pads, which is beneficial for the types of work and swimming for which such dogs are typically used.[1,2] For cats and dogs of any breed, digits 3 and 4 are the primary weight-bearing digits, and digits 1 and 5 bear small amounts of weight.[1,3–5]

Injury to the digits of dogs is common; such injuries include comminuted fractures, articular fractures, tendon or ligament injuries, and joint luxations.[4,5] Dogs typically have a non–weight-bearing lameness acutely after a digit injury.[5,6] Dogs with chronic digit injuries may have low-severity or intermittent lameness.[5,6] Some dogs with a digit injury may not have lameness but may have visible abnormalities such as soft tissue swelling, a mass, or nail discoloration.[5,6] Treatments for dogs with injured digits are selected on the basis of the type of injury or disease; such treatments include fracture fixation, arthrodesis, reconstruction of ligaments, and partial or complete digit amputation.[4]

Nonunion fractures, chronic infections, neoplasia, and damage caused by degloving, strangulation, crushing, bandaging, or gunshot injuries may require treatment via complete, partial, or phalangeal fillet cosmetic reconstruction digit amputation procedures.[3,7,8] The level at which a digit is amputated is often selected on the basis of characteristics of the injury or disease. Radical digit resection may be required for dogs with infectious or neoplastic disease, and dogs with traumatic or degenerative diseases may be treated via amputation at the level of proximal or distal interphalangeal joints.[5,8]

Dogs can have satisfactory outcomes after digit amputation.[3] Dogs have a worse functional outcome after amputation of digits 3 or 4 than they do after

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amputation of digits 2 or 5.[1,3–5] Other complications of digit amputation include poor healing of tissues at the surgical site, infection, and continued or recurrent lameness.[8,9] Although digit amputation is a commonly performed procedure, no studies have been conducted to determine functional outcomes and owner satisfaction for dogs that undergo that surgery, to the authors' knowledge.

The purpose of the study reported here was to determine the complications and outcomes for dogs that underwent digit amputation at a veterinary medical teaching hospital. The hypothesis was that no differences in complications rates or long-term functional outcomes would be detected for dogs that underwent amputation of digits 3 or 4 versus dogs that underwent amputation of digits 1, 2, or 5.

## Materials and Methods

**Case selection**—Medical records of dogs that underwent digit amputation at the University of Missouri Veterinary Medical Teaching Hospital from 1999 through 2011 were reviewed. Dogs of any age, sex, and weight that had undergone amputation of at least 1 digit and for which medical records were available were included in the study. Dogs with concurrent orthopedic or neurologic disease affecting the limb in which a digit was amputated were excluded from the study. If available, results of histologic examination of amputated digits were evaluated. The digit that was amputated, appearance of the affected digit prior to surgery, the level at which the amputation was performed, and short- and long-term postoperative complications were recorded. Short-term postoperative complications included complications (other than lameness) detected ≤ 14 days after surgery. Long-term complications included complications detected > 14 days after surgery to the time that the last follow-up information was obtained.

**Survey**—A survey[a] was sent to owners to determine their assessment of postoperative complications and outcomes and overall satisfaction with the digit amputation procedure for dogs. Surveys and self-addressed stamped envelopes were sent to owners on July 25, 2011. If an owner had not returned the survey by August 18, 2011, an attempt was made to contact that owner and complete the survey via telephone interview. Data collected via the survey included owner assessments regarding the severity of lameness before and after surgery, postoperative improvements in lameness (by use of a visual analog scale[10] [no lameness to non–weight-bearing lameness]), postoperative complications (including redness or swelling of the surgical site > 2 days after the procedure, purulent exudate at the surgical site, clear fluid other than purulent exudate at the surgical site, dehiscence of the incision, or no complications detected), satisfaction with the digit amputation procedure, and willingness to have the procedure performed again for a dog.

**Statistical analysis**—The Fisher exact test[b] was used to determine associations between the evaluated variables and development of complications in dogs after digit amputation; this statistical method was used and multivariate analyses were not performed because of the small number of dogs included in the study. Data for short- and long-term outcomes were evaluated via separate analyses. Dogs with complications identified via review of medical records or owner surveys were classified as having complications for the statistical analysis. If information from medical records and owner surveys or telephone interviews was available, data for the most severe complication were included in the statistical analysis. If an owner survey indicated a dog had developed a postoperative complication and the medical record did not specify or did not indicate that the dog had developed a complication, complications indicated by owners via the survey were included in the statistical analysis. Values of $P < 0.05$ were considered significant.

## Results

**Signalment**—Thirty-four dogs were identified that had undergone digit amputation; 33 of these dogs met the inclusion criteria for the study. The dog that was excluded from the study had proprioceptive deficits in the same limb in which the digit amputation had been performed attributable to an injury that occurred when it was a puppy, and it was difficult to evaluate postoperative improvement in lameness and complications for this dog. One dog had undergone digit amputation procedures in 3 paws at different times; therefore, data for 35 digit amputations were evaluated in this study. The mean age of dogs included in the study was 7.8 years (range, 1 to 16 years). Four (12.1%) sexually intact females, 14 (42.4%) spayed females, and 15 (45.5%) castrated males were included in the study. Mean body weight of the dogs was 30.1 kg (66.2 lb; median, 30.0 kg [66.0 lb]; range, 7.1 to 60.0 kg [15.6 to 132.0 lb]). Seven of the dogs weighed < 15 kg (33 lb). Seven of the 33 (21.2%) dogs were mixed-breed dogs, and 26 (78.8%) dogs were purebred. These breeds included Labrador Retriever (n = 7), Miniature Schnauzer (3), Greyhound (2), Mastiff (2), and 1 each of American Eskimo Dog, Anatolian Shepherd Dog, Beagle, Border Collie, Doberman Pinscher, Golden Retriever, Great Dane, Great Pyrenees, Standard Schnauzer, Scottish Terrier, Standard Poodle, and Weimaraner.

The most common clinical sign before performance of digit amputation was lameness (27/35 [77.1%] procedures). Dogs had soft tissue swelling of affected digits before 13 of the 35 (37.1%) procedures. Dogs had a visible mass on affected digits before 9 of the 35 (25.7%) procedures. Other clinical signs of dogs before undergoing digit amputation included draining wounds (8 [22.9%] procedures), soft tissue ulceration (4 [11.4%] procedures), soft tissue necrosis (2 [5.7%] procedures), degloving injury (1 [2.9%] procedure), bite wound with infection (1 [2.9%] procedure), and dehiscence of a surgical wound after a procedure performed at another hospital (1 [2.9%] procedure).

Of the 35 digit amputation procedures that were performed, 19 (54.3%) were in forelimbs and 16 (45.7%) were in hind limbs. Digit 3 was the most commonly amputated digit (n = 9 [25.7%]), followed in descending order of frequency by digit 4 (8 [22.9%]), digit 2 (7 [20.0%]), digit 5 (5 [14.3%]), and digit 1 (1 [2.9%]). Partial foot amputation[11] (ie, amputation of 2

adjacent digits) was performed during 2 (5.7%) of the 35 procedures. For 2 (5.7%) dogs (one dog with a severe degloving injury and another dog with a severe infected dog bite injury), pandigital (ie, removal of all digits in a limb) amputation and reconstructive podoplasty were performed. One (2.9%) dog underwent complete amputation of digit 2 and removal of the third phalangeal bone of digit 3 because of benign tumors. Information regarding placement of bandages after surgery was not available in medical records of dogs.

Twenty of the 35 (57.1%) digit amputations were performed at the level of a metacarpophalangeal or metatarsophalangeal joint. Nine of the 35 (25.7%) amputation procedures were performed at the level of a proximal interphalangeal joint, and 1 (2.9%) procedure was performed at the level of a distal interphalangeal joint. Three (8.6%) amputation procedures were performed at the level of the proximal or middle aspect of a metacarpal or metatarsal bone. During 1 (2.9%) procedure, digit amputations were performed at multiple levels (in a dog with a severe degloving injury). The location of digit amputation could not be determined via evaluation of medical records for 1 dog.

Eleven of the 35 (31.4%) digit amputation procedures were performed for treatment of malignant tumors (6 for treatment of squamous cell carcinoma, 3 for treatment of malignant melanoma, and 2 for treatment of mast cell tumor). Ten (28.6%) digit amputation procedures were performed for treatment of acute or chronic fractures or trauma of unknown cause, and 6 (17.1%) were performed for treatment of chronic infection or inflammation (1 of these procedures was performed for treatment of a chronic fungal infection). Six (17.1%) digit amputation procedures were performed for removal of benign masses (subungual keratoacanthoma [n = 2], plasma cell tumor [1], hemangiopericytoma [1], basal cell epithelioma [1], and angiomatosis [1]). During 1 (2.9%) procedure, multiple digits were amputated because of circulatory constriction at the level of the carpal joint region, and 1 (2.9%) procedure was performed for amputation of digits 3 and 4 because of digital thromboembolism secondary to acute renal failure and disseminated intravascular coagulation.

**Short-term complications**—Results of short-term (≤ 14 days) postoperative evaluations (performed by the surgeon or referring veterinarian) were available in medical records for dogs after 27 of the 35 (77.1%) digit amputation procedures. Referring veterinarian records were not available for dogs for 10 of the amputations because a long time had elapsed since the surgery (n = 3), the dog had died (4), the owner had died (1), or the veterinarian had not performed a follow-up examination (2). Information regarding short-term postoperative complications for dogs after 6 of these 10 procedures was obtained via client surveys or telephone interviews alone.

Follow-up information was available for 33 digit amputation procedures performed for 31 dogs. No short-term postoperative complications were identified for dogs after 20 of 33 (60.6%) amputations. Short-term complications other than lameness were detected for dogs after 13 of the 33 (39.4%) digit amputation procedures for which follow-up information was available. These complications included infection and dehiscence of the incision (n = 5), dehiscence of the incision without signs of infection (3), soft tissue inflammation and swelling (1), mild serosanguineous drainage from the incision (1), partial dehiscence and mild mucoid discharge from the incision (1), soft tissue redness and serous discharge from the incision (1), and delayed healing attributable to licking by the dog (1). Body weights of dogs with short-term complications ranged from 7.1 to 60.0 kg (15.6 to 132.0 lb; mean, 29.7 kg [65.3 lb]; median, 27.5 kg [60.5 lb]). Three of the 13 (23.1%) dogs with short-term complications weighed < 15 kg. For the 8 dogs with dehiscence of the incision (with or without infection), all incisions healed completely via second intention healing.

Dogs were significantly ($P$ = 0.003) more likely to develop short-term postoperative complications after digit amputation in a hind limb than they were to develop such complications after digit amputation in a forelimb. Factors that were not significantly associated with development of short-term postoperative complications included amputation of digits 3 or 4 versus digits 2 or 5 ($P$ = 0.484), purebred versus mixed-breed dog ($P$ = 0.392), weight < 15 kg versus ≥ 15 kg ($P$ = 1.00), amputation performed for treatment of a pathological process (neoplasia or infection) versus trauma ($P$ = 1.00), or amputation performed at the level of a metacarpophalangeal or metatarsophalangeal joint versus a different location (interphalangeal joint or the proximal or middle aspect of a bone; $P$ = 1.00; **Table 1**).

**Long-term complications**—Long-term follow-up information was available in medical records of the hospital or referring veterinarian for 16 of the 33 (48.5%) dogs, including 1 dog that underwent 3 digit amputation procedures. Owners of 15 of the 33 (45.5%) dogs completed and returned the survey, and an additional 9 (27.3%) owners provided information via telephone interviews. Therefore, survey information was available for 24 of the 33 (72.7%) owners. Long-term follow-up information was available (in medical records or surveys returned by mail or completed via telephone interview) for 30 dogs (32/35 [91.4%] digit amputation procedures); such information was not available for 3 dogs (3/35 [8.6%] digit amputation procedures). The mean follow-up time was 43.1 months (range, 2 months to 11.5 years). Characteristics of dogs with owners who did (n = 24) or did not (9) respond to the survey were summarized (**Table 2**). No significant differences were detected for characteristics between dogs with owners who responded to the survey versus those with owners who did not respond to the survey. Twenty-three of the 24 (95.8%) owners who responded to the survey or telephone interview were satisfied with the outcome of the digit amputation procedure and would be willing to have the procedure performed again if needed. One owner would not be willing to have a digit amputation performed again; that owner's dog was a Great Dane that had postoperative complications (incision infection and dehiscence) after undergoing amputation of the third digit of the right hind limb at the level of the distal interphalangeal joint; additional surgery for that dog was performed at another hospital to remove the first phalanx because of continued lameness.

Table 1—Association between various variables and development of short- (≤ 14 days after surgery) and long-term complications (> 14 days after surgery) for dogs that underwent digit amputation.

| Variable | No. of procedures performed without complications | No. of procedures performed with complications | *P* value |
|---|---|---|---|
| Short-term complications | 20 | 13 | |
| Limb | | | 0.003 |
| Hind limb | 4 | 10 | |
| Forelimb | 16 | 3 | |
| Digit amputated* | | | 0.484 |
| Digit 3 or 4 or both | 10 | 9 | |
| Digit 2 or 5 or both | 8 | 4 | |
| Breed | | | 0.392 |
| Purebred | 17 | 9 | |
| Mixed | 3 | 4 | |
| Body weight | | | 1.00 |
| < 15 kg | 6 | 3 | |
| ≥ 15 kg | 14 | 10 | |
| Reason for amputation | | | 1.00 |
| Pathological process | 13 | 9 | |
| Trauma | 7 | 4 | |
| Level of amputation | | | 0.46 |
| At or proximal to MCP or MTP joint | 15 | 8 | |
| Distal to MCP or MTP joint | 5 | 5 | |
| Long-term complications | 24 | 8 | |
| Limb | | | 0.704 |
| Hind limb | 10 | 4 | |
| Forelimb | 14 | 4 | |
| Digit amputated* | | | 1.00 |
| Digit 3 or 4 | 14 | 5 | |
| Digit 2 or 5 | 9 | 2 | |
| Body weight | | | 1.00 |
| < 15 kg | 7 | 2 | |
| ≥ 15 kg | 17 | 6 | |
| Level of amputation† | | | 1.00 |
| At or proximal to MCP or MTP joint | 16 | 5 | |
| Distal to MCP or MTP joint | 7 | 3 | |

*Data for 2 pandigital amputation procedures (ie, amputation of all digits in a limb) are not included. †Data for 1 procedure in which multiple procedures were performed at various levels of a digit are not included.

MCP = Metacarpophalangeal. MTP = Metatarsophalangeal.

Information regarding short-term complications was available for 31 dogs that underwent 33 digit amputation procedures. Information regarding long-term complications was available for 30 dogs that underwent 32 digit amputation procedures.

Table 2—Characteristics of dogs owned by clients who did (n = 24) or did not (9) respond to a survey used to identify complications that developed in dogs after digit amputation.

| Variable | Did not respond | Responded |
|---|---|---|
| Breed of dog* | | |
| Purebred | 8/9 (88.9) | 18/24 (75) |
| Mixed | 1/9 (11.1) | 6/24 (25) |
| Body weight (kg) | | |
| Mean | 29.87 | 30.25 |
| Range | 9.7–60.0 | 7.1–59.5 |
| Limb in which procedure was performed† | | |
| Left forelimb | 2/11 (18.2) | 7/24 (29.2) |
| Left hind limb | 3/11 (27.3) | 3/24 (12.5) |
| Right forelimb | 3/11 (27.3) | 7/24 (29.2) |
| Right hind limb | 3/11 (27.3) | 7/24 (29.2) |
| Level of amputation procedure‡ | | |
| Proximal or middle aspect of metacarpal or metatarsal bone | 1/10 (10.0) | 2/24 (8.3) |
| Metacarpophalangeal or metatarsophalangeal joint | 7/10 (70.0) | 12/24 (50.0) |
| Proximal or distal interphalangeal joint | 1/10 (10.0) | 9/24 (37.5) |
| Multiple levels | 1/10 (10.0) | 1/24 (4.2) |
| No. of procedures after which short-term complications were detected†§ | 2/11 (18.1) | 9/24 (37.5) |
| No. of procedures for which follow-up information was not available† | 3/11 (27.3) | 8/24 (33.3) |

Data are number of dogs or procedures/total number of dogs or procedures (%) unless otherwise indicated.

*Data are shown for the 33 dogs in the study (9 dogs without survey responses and 24 dogs with survey responses). †Data are shown for the 35 digit amputation procedures performed for the 33 dogs in the study; survey information was not available for 11 procedures, and such information was available for 24 procedures. ‡Data are shown for 34 procedures because the level of digit amputation was unknown for 1 of the 35 procedures performed for the 33 dogs in the study; survey information was not available for 10 procedures, and such information was available for 24 procedures. §Short-term complications included incisional infection and dehiscence (n = 3), dehiscence and drainage (3), soft tissue inflammation (2), and self-trauma (1).

Dogs had long-term lameness (> 14 days after surgery) after 8 of the 32 (25.0%) digit amputation procedures for which long-term follow-up information was available. Dogs had intermittent lameness after 5 of those 8 procedures, and a dog had lameness during ambulation on surfaces such as gravel or cement (determined via evaluation of medical records and the owner survey) after 1 procedure. Long-term lameness in 1 dog was attributed to tendon contracture; the owner of this dog indicated that lameness in the dog improved when a protective boot was placed on the affected foot. One dog had long-term lameness after undergoing pandigital amputation in a limb. Body weights of the 8 dogs with long-term lameness ranged from 8.9 to 48.8 kg (19.6 to 107.4 lb; mean, 29.5 kg [64.9 lb]; median, 30.0 kg [66.0 lb]). Two of the 8 dogs with long-term lameness were < 15 kg. For the 8 dogs with long-term lameness, 2 amputations were performed in the right forelimb, 2 in the right hind limb, 2 in the left hind limb, and 2 in the left forelimb. Digit 4 was amputated for 3 of the 8 dogs, digit 3 for 2 dogs, digit 2 for 1 dog, and digit 5 for 1 dog; a pandigital amputation was performed in a limb for 1 dog with long-term lameness. Of the 8 dogs with long-term lameness, digits were amputated at the level of the metacarpophalangeal or metatarsophalangeal joint for 4 dogs, at the level of the proximal interphalangeal joint for 3 dogs, and at the level of the middle aspect of the second metatarsal bone for 1 dog. No significant differences were detected regarding development of long-term complications between dogs that weighed < 15 kg versus those that weighed ≥ 15 kg ($P = 1.00$), between dogs that underwent digit amputation at the level of the metacarpophalangeal or metatarsophalangeal joint versus those that underwent digit amputation at a different site (interphalangeal joint or the proximal or middle aspect of a bone; $P = 0.704$), between dogs that underwent amputation of digits 3 or 4 versus those that underwent amputation of digits 2 or 5 ($P = 1.00$), or between dogs that underwent digit amputation in a forelimb versus those that underwent digit amputation in a hind limb ($P = 0.704$; Table 1).

## Discussion

Few reports[9,11–13] of digit amputation in dogs have been published. Amputation of digits 3 or 4, amputation of 2 adjacent digits, amputation of digits at the level of a joint, and failure to remove the metacarpophalangeal or metatarsophalangeal sesamoid bones negatively affect prognosis for dogs.[4,8,9] Although dogs that undergo digit amputation typically tolerate the procedure well, the overall amount of function lost and prognosis after the procedure is unknown.[3] All dogs in the present study tolerated digit amputation. Only 1 dog that underwent pandigital amputation licked the operated foot for a short period after surgery; licking of the foot after surgery may have been caused by phantom digit pain, nerve damage caused by the initial shearing wound, or discomfort attributable to tension on the wound. Of the 24 owners who responded to the survey via mail or telephone, 23 (95.8%) were satisfied with the procedure and believed their dog had tolerated the surgery well (even if postoperative complications had developed). This study supported our hypothesis that no differences in complication rates or long-term functional outcomes would be detected for dogs that underwent amputation of digits 3 or 4 versus dogs that underwent amputation of digits 1, 2, or 5. An increased risk for short-term complication development was identified for dogs that underwent amputation of any digit in a hind limb versus those that underwent amputation of a digit in a forelimb.

The prevalence and types of short-term complications for dogs after digit amputation have not been previously determined, to the authors' knowledge. Lameness of dogs is expected immediately after a digit amputation; therefore, lameness was not considered as a short-term postoperative complication in the present study. However, lameness that was detected after healing of the incision or >14 days after surgery was considered as a long-term complication. Dehiscence at the surgical site with or without infection was the most frequently detected complication (n = 8 procedures) of dogs in this study. The only variable that was significantly associated with development of short-term complications in dogs after surgery was amputation of a hind limb digit. This finding may have been attributable to hind limb digits digging or clawing into the ground for traction and propulsion during ambulation (which would have placed high stresses and strains on incision sites), scratching with hind limbs, or more frequent licking of hind limb incisions versus forelimb incisions because of easier access around Elizabethan collars. Although not evaluated in this study, the use of protective bandages to prevent direct contact of a foot with the ground during weight bearing, such as is recommended for dogs with paw pad lacerations,[14–16] might be warranted to decrease the development of short-term complications (particularly surgical incision dehiscence).

Other authors[4] have recommended that digits of dogs should be amputated at the most distal location possible for treatment of a disease. Of the 13 amputation procedures after which short-term complications were detected in the present study, 7 involved digit amputation at the level of a metacarpophalangeal or metatarsophalangeal joint, 4 at the level of a proximal interphalangeal joint, 1 at the level of a distal interphalangeal joint, and 1 at the middle aspect of a metatarsal bone. Dogs that undergo amputation at the level of a metacarpophalangeal or metatarsophalangeal joint typically have an increased risk for complications, versus dogs that undergo digit amputation at other levels.[8,9,11] The level at which a digit amputation was performed was not significantly associated with development of short- ($P = 0.46$) or long-term ($P = 1.00$) complications of dogs in the present study.

Results of other studies[4,9] indicate long-term complications are more severe for dogs that undergo amputation of digit 3 or 4 (the digits that bear the most weight) versus those that undergo amputation of digit 2 or 5. Amputation of digit 3 or 4 is well tolerated by dogs, but such dogs are more prone to functional disturbances in ambulation versus dogs that undergo amputation of other digits.[3,17] Amputation of digits 2 and 3 or digits 4 and 5 causes more functional disturbance than does amputa-

tion of 1 digit because of increased stress, pain, and ulceration of the skin.[3] Splaying of the second and fifth digits and subsequent signs of pain are detected in some dogs that undergo amputation of the third and fourth digits.[3] Results of one study[3] indicate dogs that undergo partial foot amputation (removal of 2 adjacent digits) have severe functional disturbances; however, 8 of 11 dogs in another study[11] that underwent partial foot amputation for treatment of tumors had clinically normal limb function within 37 days after surgery. All 30 dogs (32 digit amputations) in the present study with available long-term follow-up information had acceptable functional outcomes, including 8 dogs with long-term lameness; lameness was mild or intermittent after 6 of these procedures. Of the 2 dogs in the present study that underwent pandigital amputation, one was lost to follow-up; the owner of the other dog that underwent that procedure reported the dog had long-term lameness but had acceptable function and was able to run and jump. Two dogs in this study underwent partial foot amputation; one of these dogs underwent amputation of digits 3 and 4 in the right hind limb, and the other dog underwent amputation of digits 4 and 5 in the right hind limb. Those 2 dogs did not have long-term lameness (as indicated in medical records and owner surveys). Results of another study[1] indicate that, although the pads of digits 3 and 4 are the primary weight-bearing pads in feet of dogs, loads are more evenly distributed among digital pads than was previously believed. Results of ground reaction force testing by use of a pressure sensor walkway in that study[1] indicate the fifth digital and the metacarpal and metatarsal pads bear a substantial amount of load during walking, and load distribution among digits may vary among breeds of dogs.

More short-term postoperative complications than long-term complications were detected for dogs in the present study, suggesting that dogs did not typically have long-term lameness after healing of an incision. Functional disruption of the gait in dogs may not be severe after digit amputation because weight is distributed among all digits in a foot.[1]

The present study had several limitations, including the retrospective design. Data were collected from both medical records and owner surveys. If information for dogs was available from medical records and owner surveys, information for the most severe complication was included in statistical analyses. Limitations of this data collection method included the potential for missing information that was not recorded in medical records and differences in reliability of information in medical records versus information in owner surveys because of inaccuracies in information recalled by owners. Because of the small number of dogs included, the study may have had a low power for detection of significant differences among data; therefore, factors that may be associated with complications in dogs after digit amputation may not have been identified. Results of univariate logistic analysis indicated body weight, digit amputated, affected limb (forelimb vs hind limb), diagnosis, level of amputation, and dog breed were not significantly associated with short- or long-term outcomes; multivariable logistic model analysis was not performed. Possible reasons for these findings were low statistical power because of a small sample size or a true lack of an association between evaluated factors and outcomes for dogs. Statistical analysis was not performed to identify risk factors for each complication because the number of dogs with each complication was small.

Results of the present study indicated that digit amputations were typically well tolerated by dogs, 23 of the 24 (95.8%) owners who responded to the survey were satisfied with the results of the surgery, short-term complications (most commonly incisional dehiscence with or without infection) developed after 39.4% of surgeries, and long-term lameness was only detected after 8 of the 32 (25%) procedures for which long-term follow-up information was available. Prospective studies in which a larger number of dogs are evaluated via force plate analysis may be indicated to further identify factors associated with a successful outcome for dogs after digit amputation and to identify risk factors for each detected complication.

a. Copies of the survey are available on request from the corresponding author.
b. GraphPad QuickCalcs, GraphPad Software Inc, La Jolla, Calif.
c. Stata, version 12.1, StataCorp LP, College Station, Tex.

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