

WHAT IS DECLAWING (ONYCHECTOMY)?

Declawing is the surgical amputation of all or part of a cat's third phalanges (toe bones) and the attached claws.^{1,2} Most often the procedure involves the front paws only,¹ but sometimes the claws are removed from all four paws.^{2,3} The surgery may be performed using sterilized nail trimmers, scalpel blades, or surgical lasers.^{1,2,4,5,6,7,8,9,10,11} If only part of the phalanx is removed the claw may occasionally regrow.^{12,13} While it has been suggested that retaining a portion of the phalanx allows the paw to retain more of its normal function and appearance,^{12,14} recent evidence suggests retained P3 fragments may impact the occurrence of adverse outcomes.¹³ Declawing may be performed at the same time as spaying or neutering.^{2, 15, 17, 18, 19, 20, 21}

REASONS FOR DECLAWING

Human Benefits— Many owners choose to have their cats declawed to protect their furniture or other household possessions.^{4,5,15,20,22,23,24,25,26,27,28,29,30} Scratching is a normal behavior of cats, but destructive scratching represents approximately 15 to 42% of feline behavior complaints.^{8,22,31,32,33,34,35,36} The act of scratching serves many purposes; it conditions the claws by removing aged cuticle, serves as a visual and scent territorial marker, provides defense from attack, and stretches the muscles of the limbs, thorax, and back.^{8,31,32,36,37} After declawing cats continue to show the same frequency of scratching behavior.³² Surveys of cat owners who declawed their cat report a perceived increase in the quality of the owner-cat relationship as a result.^{21,26,27,31} Declawing may also be performed to protect people, particularly those who are geriatric, diabetic or have compromised immune systems and so may suffer life-threatening complications from cat scratches;^{5,14,15,20,22,27,36} declawing decreases this risk while allowing the cat to remain in the home.^{15,26,31} Overall, owners who chose to declaw reported that the procedure met or exceeded their expectations.²⁰ A survey found three (of 273) owners reported that their cats exhibited negative behavioral changes (house-soiling, resentment of having paws handled, and refusal to cover feces); but only the owner of the house-soiling cat was dissatisfied with the declawing procedure.²⁰ Ten respondents reported the cats may have bitten harder or more frequently, but biting was considered less problematic than the previous scratching behavior. Another survey, of 60 cat owners, indicated that the only behavior problem observed significantly more often in declawed cats than clawed cats was jumping on counters or tables; this was also the most commonly reported misbehavior exhibited by clawed and declawed cats.³³

Cat Benefits— In some cases declawing may be an alternative to relinquishment, outdoor housing or euthanasia.^{15,32} For example, in a 1991 survey of Ontario veterinarians,²⁰ respondents indicated that approximately 50% of their clients would no longer own their cat if it had not been declawed. Following aggression, a survey of veterinarians reported scratching as the behavioral problem most frequently associated with abandonment of cats in Brazil.³⁵ Unacceptable behaviors such as daily scratching increase the risk of relinquishment of an animal to a shelter, and declawing decreased the risk of relinquishment. As approximately 72% of cats relinquished to animal shelters

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are euthanized,³⁹ owners may feel they are faced with the choice of declawing their pet cat or potentially condemning it to death.^{3,4,28,32} Because outdoor cats are exposed to predators, street traffic, inclement weather, and diseases (e.g., feline leukemia, feline infectious peritonitis), owners may not consider keeping a scratching cat outside to be a viable alternative.^{3,6} Thus declawing may sometimes be necessary to ensure that a pet cat keeps its home.^{6,20,26,27,32,33} One study found that declawed cats were significantly underrepresented in a Washington shelter population when compared to estimates in the population at large, and there was no correlation between declaw status and euthanasia at the shelter.³⁸ In addition, supporters of the procedure assert that a properly performed declaw is no less humane than spaying/neutering.^{6,40} Declawing is also indicated for the benefit of some cats affected by disease conditions such as paronychia and neoplasia of the nail bed.⁵

WELFARE CONCERNS: PAIN

Declawing is a painful procedure, although there is debate about the degree of pain experienced under ideal or typical conditions.^{1,8,11,15,17,18 29, 40, 41,42} Objective assessment of pain in cats is difficult, due to their stoic nature and relatively subtle behavioral indicators of pain.^{4,16,18,25, 41,42,43,44,45} Fossum's Small Animal Surgery textbook (2019) estimates the pain score at severe which should be mitigated with multi-modal pain management.¹

Clinical signs of pain following declawing include a "guarding" posture, reluctance to bear weight on the declawed limb(s), and reluctance to move.^{2,43} Nine of 163 (5.5%) declawed cats were non-weight-bearing on the affected limbs for one day after the operation, and another cat was non-weight-bearing for three days. The risk of non-weight-bearing lameness was increased by the use of adhesives to close the surgical wounds, especially if nail trimmers were used to amputate the third phalanx.²

Some physiological parameters, such as heart rate, respiratory rate, and rectal temperature, have been determined to be poor indicators of postoperative pain in cats⁴¹ and other parameters have yielded mixed results. Systolic blood pressure increases were reliable indicators of increased cortisol concentrations and pain following declawing of laboratory cats,⁴⁵ but failed to correlate with cortisol increases for client-owned cats following ovariohysterectomy.⁴⁶ Painful stimuli are known to elicit an adrenal response,^{43,45} and declawing induced significant increases in epinephrine and/or norepinephrine concentrations in adult cats.^{43,47} Postoperative administration of morphine or xylazine significantly attenuated the catecholamine response, while postoperative administration of salicylate had no effect.⁴³ In contrast, Cambridge et al (2000)⁴¹ did not observe increased catecholamine concentrations following declawing or tenectomy (resection of tendon to leave claws permanently extended and impede normal scratching). Although increases in plasma cortisol concentrations were good indicators of pain following ovariohysterectomy,^{45,46} they were not significantly elevated by declawing^{18,41,48} or tenectomy.⁴¹

Sixty-one of 163 (37%) cats exhibited signs of pain for a median duration of two days (range 1-42 days).² Lameness was also observed for a median of two days in 43 of 163 (26%) cats (range 1-54 days).² The risk of lameness increased with longer surgical time and the use of a scalpel blade for disarticulation of the third phalanx.² Thus, postoperative analgesia should be provided on the day of surgery and for a minimum of one full day after surgery.¹⁶ Measurements obtained from use

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of a pressure-sensitive mat to assess weight-bearing after declawing suggested that mild lameness was still present 40 hours after surgery despite administration of analgesics.¹⁹ Declawing with a surgical laser or using sharp dissection with a scalpel blade produced observable lameness for eight days after surgery.⁴⁹ Limb function in 27 declawed cats was still significantly reduced 12 days after surgery in one study, leading the investigators to recommend analgesia for the duration of this period.⁴² A review of onychectomy studies reported that persistent lameness was observed in less than one percent of declawed cats (five of 582, or 0.86%).²⁸ However this rate varies according to the population being observed, for example one study comparing onychectomy methods classified 12 of 88 (13.6%) of cats as mildly lame at the long-term recheck.⁵⁰ Another study showed that declawed cats were at an increased risk of back pain (OR 2.9) and barbering (OR 3.06) when compared to an age and location matched non-surgical control group.¹³ Retained P3 fragments may impact the occurrence chronic pain as declawed cats with radiographic evidence of retained P3 fragments were at an increased risk of back pain (OR 2.66) when compared to declawed cats with complete removal of P3.¹³ The short-term and possibly long-term pain that can result from onychectomy could be related to neuropathic pain, residual inflammation, infection, or remaining bone fragments.⁵¹

WELFARE CONCERNS: SURGICAL COMPLICATIONS

The reported incidence of postoperative complications ranges from rare to 50%.^{1,2,8,20,24,52} An examination of medical records at a veterinary teaching hospital revealed that two of 76 (3%) cats developed postoperative complications.²¹ In another study, one or more surgical complications were observed during the immediate postoperative period in approximately 50% of 163 cats, and the overall complication rate was higher when scalpel blade disarticulation was performed than when guillotine nail trimmers were used (complications during the immediate postoperative period were more often associated with the use of a scalpel blade for disarticulation of the third phalanx, whereas later-onset complications were more frequently associated with the use of guillotine nail shears).² Complications that arose after discharge from the hospital were observed in 24 of 163 (20%) cats.² A survey of private practice records reported a higher postoperative complication rate associated with spaying/neutering when performed in conjunction with declawing.²¹

Hemorrhage— Hemorrhage is the most commonly reported complication of declawing,^{1,2,28} and older cats may bleed more profusely than kittens.⁶ Intermittent hemorrhage was observed in 51 of 163 cats (31%) for one to 13 days following surgery and was more often observed in older cats.²

Claw regrowth— Claw regrowth is a consequence of incomplete removal of the ungual crest and can result in abscess formation and pain.^{1,2,12,28,31} Approximately 3% of declawed cats exhibit claw regrowth,^{13,31} but a 10% incidence was reported with a technique that left the flexor surface of the third phalanx in situ.¹²

Wound dehiscence— Reopening of the surgical incision resulting in lameness was observed in 17% of cats that underwent declawing at a veterinary teaching hospital.¹² Although the differences were not statistically significant, dehiscence occurred more frequently following scalpel dissection and disarticulation, and was attributed to increased surgical time, greater soft tissue dissection, and tissue handling techniques.¹²

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Paralysis— Neuropraxia or radial nerve paralysis from improper tourniquet application has been reported with signs usually resolving in 6-8 weeks.^{1,2,28,29} Manual compression of the brachial artery by a technician may be an alternative to tourniquet use.¹

Distal limb ischemia— Distal limb ischemia secondary to improper bandage application has been reported as a potentially serious complication.^{1,2,28,31,53} Bandages are usually removed 12-24 hours after surgery.¹

Disease— Pain activates the stress response, which can reduce immune function and potentially increase the animal's susceptibility to disease.⁴⁸ Opponents of declawing claim that the procedure can worsen or induce chronic illnesses such as skin disorders, asthma, and cystitis.^{26,28,31} Neither clinical evidence nor anecdotal reports support this assertion to date.

Other reported complications include wound infection, draining tract formation, sequestration of the third phalanx, and exposure necrosis of the second phalanx.^{1,2} Bilateral flexor tendon contracture following declawing of two cats was reported by Cooper et al;²⁴ the affected cats were unable to extend the digits of the front limbs, and fibrosis and adhesions between the deep digital flexor tendon and the soft tissues surrounding the second phalanx were observed in one cat. Deep digital flexor tenectomies were necessary to return normal forelimb function in both cats.

WELFARE CONCERNS: BEHAVIOR

Impairment of normal behavior— Because scratching is a normal feline behavior, opponents state that declawing causes emotional stress when the animal cannot scratch.¹⁵ However, between 59 and 78% of declawed cats will continue to exhibit scratching behavior with a normal appearance.²² Critics also claim that declawing adversely affects balance, climbing, and feline social interactions.^{20,26,31} Because scratching is considered a means of stretching and using the muscles of the forelimbs, shoulders, and torso, it has been suggested that declawing eliminates the normal isometric resistance associated with the claws pulling against a stationary surface and so may produce weakening of these muscles.^{20,26,28} Neither clinical evidence nor anecdotal reports to support this assertion have been reported to date.

Incidence of problem behavior— Opponents of the procedure state that declawing increases undesirable behaviors, including inappropriate elimination, aggression and biting.^{13,15,26,28,31,32} Empirical studies show that behavioral changes may occur, but are conflicting as to whether there is a net increase in problem behaviors. One study of 122 cats revealed no significant difference in serious behavior problems between declawed and clawed cats.³³ Another, of 877 cat owners, suggested that declawed cats were not more likely to bite than clawed cats.⁵⁴ One smaller study found that 3 of 25 (12%) cats exhibited increased biting behavior following declawing and one began to defecate outside the litter box; however, declawed cats had better scores for overall good behavior than did clawed cats.²³ In a study comparing declawing to tenectomy, one of 18 (5%) declawed cats exhibited inappropriate elimination for two days after discharge. A survey of 57 owners of declawed or tenectomized cats reported that three of 18 (16%) tenectomized and 13 of 39 (33%) declawed cats developed at least one behavioral change following surgery, but the difference was not statistically significant.³⁶ Six of 39 (15%) cats house-soiled following declawing;³⁶ because the overall incidence of house-soiling in cats (clawed and

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declawed) was reported to be 16%,³³ there did not appear to be an increased risk of house-soiling following declawing. In a study of shelter cats, no significant correlation was found between declawing and biting.³⁸ Finally, a study addressing risk factors for relinquishment of cats to animal shelters²⁸ did not observe a statistically significant difference in aggression or inappropriate elimination between declawed and clawed cats. In contrast, a recent retrospective cohort study reported an increased risk for inappropriate elimination (OR 7.2), aggression (OR 3.0) and biting (OR 4.5) in declawed cats when compared to an age and location matched non-surgical control group.¹³ However, it was unknown whether the undesirable behaviors began before or after onychectomy.¹³

DECLAWING REFINEMENTS

Indoor housing of declawed cats— A 2003 survey of 181 cat owners identified that approximately 31% of declawed cats were allowed outdoor access.⁵⁵ A 1991 survey of 276 owners of declawed cats reported that 41% of the declawed cats were allowed outdoors, and no problems were reported by the respondents.²⁰ Owners in this study,²⁰ and anecdotally,^{3,14,22} report that declawed cats allowed outdoors climb well, hunt well, and are able to defend themselves successfully. However, in general, declawing of outdoor cats is still not recommended.^{1,33}

Early age declawing— It has been suggested that declawing is best performed on young cats because it is more emotionally traumatic for adults to be declawed.¹⁵ Although age-related psychological repercussions of declawing have not been empirically reported, younger animals may experience fewer complications and recovery more rapidly.^{1,32} In a survey of 276 owners of declawed cats, respondents reported that cats declawed at one year of age or less exhibited fewer postoperative problems and faster recoveries than those declawed when they were older than one of age.²⁰

Surgical tool selection— Declawing using a surgical laser resulted in improved subjective pain assessment for eight days after surgery compared to scalpel blade dissection, but both treated groups were walking normally within nine days after surgery.^{56,57} Although anecdotal reports claim that postoperative pain level and the recovery period are improved by use of a laser, the clinically observed effect was minimal in ten cats that underwent scalpel onychectomy on one paw and laser onychectomy on the other paw.⁵ Despite a potentially reduced level of pain postoperatively, analgesic therapy is still recommended for laser onychectomy.¹⁰ Use of guillotine nail trimmers was associated with an increased risk of infection.² An evaluation of short-term limb function following onychectomy suggested that improved limb function observed during the 48 hours after surgery in cats undergoing onychectomy with laser versus scalpel techniques may be evidence that there is decreased pain immediately following laser onychectomy.⁵⁸ Another study found that the frequency of owner reported complications, including reluctance to jump or chewing at paws, was significantly lower in patients having undergone laser onychectomy as opposed to scalpel or guillotine onychectomy.⁵⁰ Radiographic evidence of retained P3 fragments, which was associated with increased risk for back pain, inappropriate urination and aggression, was identified in cats which underwent onychectomy using all three methods.¹³

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ANALGESIA

Preoperative analgesic administration is often considered superior to postoperative administration because it prevents the central hypersensitivity response that prolongs and amplifies sensitivity to noxious stimuli.^{1,17,18,19,41} However, in a 1994 study of 163 declawed cats,² administration of narcotics before or during the operation was associated with a significantly increased occurrence of postoperative pain. A 2015 systemic review of pain and analgesia following onychectomy in cats highlighted that while there were often statistically significant differences among treatments within studies, no treatment was consistently superior across these different studies. It did note that a combination of meloxicam or robenacoxib with an opioid may provide more effective analgesia and should be evaluated.⁵⁹ Multimodal, perioperative analgesia is recommended for a minimum of 24-48 hours after surgery.¹

Local anesthetics— Bupivacaine or lidocaine block nerve transmission and are inexpensive and safe when used at appropriate doses.^{1,4} However, a 4-point regional forelimb nerve block using bupivacaine in addition to preoperative administration of buprenorphine did not decrease discomfort scores when compared to cats treated only with buprenorphine prior to onychectomy.⁴ Evaluation of a lidocaine-bupivacaine combination, which should result in a shorter onset of action and a longer duration of action, has not been performed.⁴ Postoperative topical application of bupivacaine to the incisions did not provide sufficient analgesia, and was not recommended.^{29,42} It is important to note that none of these studies tested the effect of the applied bupivacaine to determine if the nerve block technique actually decreased sensation from the limb.⁵⁹

Transdermal fentanyl— Patches provide sustained release of fentanyl for prolonged periods with few adverse effects, and are well tolerated by cats.^{19,48} Transdermal administration of fentanyl and intramuscular administration of butorphanol produced similar degrees of analgesia following onychectomy.⁴² There is a time lag between application of the patch and fentanyl reaching therapeutic concentrations in serum, so it is recommended that the patch be placed at least six hours before recovery.¹⁹ Use of transdermal fentanyl patches in this manner produced serum fentanyl concentrations in excess of 4 ng/ml and significantly improved recovery, pain, and lameness scores, when compared with postoperative administration of butorphanol.¹⁹ Fentanyl patches placed 18 to 24 hours prior to induction of anesthesia produced serum fentanyl concentrations of less than 2 ng/ml and were not superior to butorphanol.⁴⁸ There may be wide variation in absorption and response to transdermal fentanyl patches among cats.^{42,48}

Opioid agonists— Many veterinarians are concerned about the safety of potent opioid agonists in feline patients, and this concern may affect their use of analgesics.⁴⁸ Postoperative administration of the opioid butorphanol did not significantly affect cats' physiologic parameters, but reduced postoperative lameness scores and improved quality of recovery quality.¹⁶ Cats that received butorphanol were more comfortable, less lame, and ate better than untreated cats.^{16,28} Butorphanol was superior to oxymorphone in preventing the postoperative catecholamine increase associated with onychectomy.⁴⁷ One of 42 (2%) onychectomized cats that received butorphanol was non-weight-bearing or minimally weight-bearing at time of discharge from the hospital, compared to 4 of 21 (19%) of untreated cats.²⁸

Buprenorphine, an opioid, is considered 30 times more potent than morphine, and has a reported duration of action of 8 to 12 hours.¹⁸ Postoperative administration of buprenorphine

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significantly reduced the cumulative postoperative pain score of onychectomized patients when compared to saline (control), oxymorphone, or ketoprofen.¹⁸ Although onychectomy was not one of the surgeries evaluated, a separate study comparing postoperative analgesia in cats found buprenorphine provided better and longer postoperative analgesia than butorphanol.⁶⁰

Nonsteroidal anti-inflammatory drugs— Historically, veterinarians have avoided the use of preoperative NSAIDs due to concerns about adverse effects in feline patients.^{16,17,45} However, newer generation NSAIDs are associated with fewer adverse effects. Preoperative administration of meloxicam produced superior analgesia compared to butorphanol during the 24-hour postoperative period, and significantly fewer meloxicam-treated cats required rescue analgesia during the immediate postoperative period.¹⁷ Robenacoxib has also shown evidence of being beneficial and tolerable for cats being castrated or ovariohysterectomized with onychectomy.⁶¹

ALTERNATIVES TO DECLAWING

Behavior modification— The use of suitable attractive scratching surfaces such as dedicated posts and boards, positive reinforcement training methods, remote punishment such as a squirt bottle filled with water or a rattle, and pheromone sprays are recommended and successful methods of correcting undesired scratching behavior in cats.^{8,20,22,30,31}

Frequent claw trimming— Frequent nail trims do not alter a cat's scratching behavior, but can lessen the damage resulting from scratching.⁸ Weekly trimming may be required to maintain optimal nail length,⁸ however, some cats strongly resist nail trimming and some owners are uncomfortable with the procedure.

Nail caps— As with nail trimming, covering the claws with plastic caps will not alter scratching behavior, but lessens the potential damage.^{1,8} The caps must be replaced every four to six weeks.^{1,8} Although most cats will tolerate cap placement, sedation is required in some cases; this may be undesirable for some owners due to the stress of transporting and sedating the cat.⁸

Deep digital flexor tenectomy— Tenectomy of the deep digital flexor tendon (DDFT) has reportedly been associated with shorter hospitalization, less pain, and the elimination of the need for postoperative bandaging.^{1,8,34,36} This procedure removes five to 10mm sections of the DDFT of each digit, resulting in the cat's inability to protrude the claw.^{1,8,34} Because the claws cannot be protruded, they may overgrow; this can result in the return of a limited ability to scratch. The claws are often rough and thick because the aged cuticle cannot be removed by scratching.^{1,8,34} In addition, overgrown claws may grow into footpads, causing pain and infection, if they are not regularly trimmed.^{1,8,34} Cats' claws must be trimmed regularly following tenectomy to mitigate these problems.^{8,34}

Pain levels were observed to be the same⁴¹ or higher for tenectomy compared to declawing. In a 2001 survey of cat owners, respondents indicated that tenectomized cats exhibited less postoperative pain and faster recoveries, but no significant difference was observed for owner satisfaction with tenectomy compared to declawing.³⁶ Tenectomized cats were typically reported by their owners to be walking normally in two to four days up to a maximum of 30 days; declawed cats required six to seven days up to a maximum of 21 days (not a statistically significant difference). Similar complication rates were reported for onychectomy (24%) and tenectomy (26%) in a study of 38 feline patients.

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Overall, owner satisfaction at five months after surgery was greater with declawing (89%) compared to tenectomy (70%). Dissatisfaction with tenectomy resulted from a continued ability of the cat to scratch following tenectomy, long-term lameness, excessively thick claws that appeared to irritate the cats, and difficulty in trimming the claws. Two tenectomized cats were later onychectomized. Although the initial manuscript describing the tenectomy technique reported no complications during the one- to five-year follow-up period for 17 tenectomized cats,³⁴ more recent anecdotal reports have suggested that the forelimbs of tenectomized cats become stiff and appear painful several years after surgery.^{8,62} No significant differences were observed in behavioral changes following declawing or tenectomy in an survey of 57 cat owners.³⁶ Due to the potential complications and owner dissatisfaction, deep digital flexor tenectomy is not routinely recommended.¹

DECLAWING IN THE UNITED STATES AND OTHER COUNTRIES

In the United States in 1991, it was estimated that approximately 14.4 million, or 24.4% of approximately 59 million owned cats, were declawed.²⁸ A study published in 2014 reported that 21% of cats seen in vet hospitals near Raleigh, NC were declawed.⁶² In a survey of over 3,000 veterinarians conducted in 2014, 24.0% of respondents did not perform onychectomy.¹¹ Of the 72.7% indicated that they did, 61.4% performed the procedure less than once a month. Responses to opinion questions about the ethics and necessity of declawing differed significantly between veterinarians who did and did not perform the procedure.¹¹ Both the Cat Fancier's Association and the Canadian Cat Association forbid declawed or tenectomized cats to be shown.^{20,26,31}

In April 2003, the city of West Hollywood, California passed an ordinance banning the onychectomy of domestic cats which is currently in force after being upheld by the appellate court.¹⁵ As of 2018, state level legislation to limit or criminalize declawing of cats had been introduced in 6 states with a New York bill to ban declawing enacted into law in 2019. No related federal legislation has been introduced.

The current AVMA policy on Declawing of Domestic Cats recommends that the procedure only be performed after exhausting other methods of controlling scratching behavior or if it has been determined that the cat's claws present a human health risk. Position statements of the American Association of Feline Practitioners, Canadian Veterinary Medical Association and the American Animal Hospital Association oppose declawing as an elective procedure.

Declawing is not performed in the United Kingdom unless it is carried out for therapeutic purposes. Article 10 of the European Convention for the Protection of Pet Animals prohibits declawing for "non-curative purposes," but exceptions are permitted if the veterinarian considers the procedure "necessary for veterinary medical reasons or for the benefit of any particular animal."

SUMMARY

Some commentators compare declawing to cosmetic procedures such as ear cropping and tail docking²⁰ because it is typically performed primarily to benefit the owner rather than the cat.^{4,28, 64} In a 1991 survey of 276 owners of declawed cats, 2% of owners were dissatisfied with the declawing procedure because they felt guilty about declawing their cats.²⁰ Because of the

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controversy surrounding the procedure, the veterinary profession is divided. Some veterinarians vehemently oppose declawing, while others feel that the procedure is a veterinary service that can preserve and improve the human-animal bond. Many veterinarians neither encourage nor discourage declawing, but chose to inform the clients of the benefits, risks, and alternatives and allow the client to make the choice.

There is conflicting scientific evidence about the implications of declawing. In many of the studies involving larger numbers of cats, the procedures were performed by senior veterinary students,^{2,12,16,17,19,29,36} although supervised by experienced clinicians, the impact of inexperienced surgeons on the data collected complicates its interpretation. Although owner perceptions of the procedure are important, surveys are subject to self-selection and respondent bias. Accurate determination of the long-term behavioral effects, age-related effects, and complication rates following declawing or tenectomy by experienced practitioners requires further investigation.

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