

# Deep digital flexor tendonectomy in cats

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**Abstract** : Owner's attitudes for tendonectomy, the advantages of this surgical technique, and postoperative complication were investigated by telephone survey. 18 cats on whom tendonectomy was performed with or without concurrent ovario-hysterectomy or castration were included in this study. The first reason for tendonectomy was to avoid damage caused by the cat's scratching household materials. The first benefit of tendonectomy was decreasing damage to materials (89%). The primary concern of the owners of cats that underwent tendonectomy was postoperative pain after surgery (61%). Twelve cats (67%) that underwent tendonectomy recovered fully within the first three days and 6 cats (33%) recovered within two weeks. After combining the very positive rating and positive as positive, seventeen owners (94%) of cats that underwent tendonectomy had a positive attitude to the surgery.

**Key words** : deep digital flexor tendon, tendonectomy, cat.

## Introduction

Scratching is an inherited, normal behavior in cats that is used as a visual and olfactory territorial mark and as a stretching exercise for the forelegs<sup>1</sup>. Scratching is also a behavior that helps cats interact socially and conditions the claws by removing old, frayed, and loose layers of claw and exposing the new claw underneath<sup>1,2</sup>. While scratching for the above reasons or during playing, jumping, climbing, and aggressive displays, cats may injure people and damage household materials with their claws<sup>1-8</sup>. Although most undesirable scratching can be prevented or eliminated with en-

vironmental manipulation and behavior modification<sup>1-3</sup>, tendonectomy and onychectomy can be another alternative for those owners who are unwilling or unable to control the undesirable scratching<sup>9,10</sup>. Onychectomy and tendonectomy of the tendon of the deep digital flexor muscle of bilateral forelimbs are performed on cats to prevent use of the claws and the associated property damage and personal injury<sup>10</sup>. Bony amputation with a sterile guillotine-type nail trimmer or disarticulation of the distal phalanx with a blade are the most frequently used methods<sup>11</sup>. Pain, lameness, bleeding, swelling and dehiscence of the skin incision are the most common complications in cats that underwent these surgeries<sup>12-14</sup>. Tendonectomy has been suggested as an alternative to onychec-

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tomy which involves less postoperative pain and fewer complications. However, tendonectomy makes claws rough, grow excessively and require regular trimming by the owner<sup>9,10</sup>.

Recently, the merits of the tendonectomy have been debated<sup>10,15</sup>. On the other hand, a clinical retrospective study toward tendonectomy of their cats is few. The purpose of this study was to determine owner's attitudes for tendonectomy, the advantages of this surgical technique, and post-operative complications.

## Materials and Methods

18 cats on whom tendonectomy was performed at the Veterinary Medical Teaching Hospital of Cornell University (VMTH) with or without concurrent ovariohysterectomy or castration were included.

There were 17 domestic shorthair cats and 1 Siamese. Eleven cats underwent tendonectomy alone, 3 cats underwent concurrent castration and 4 cats underwent concurrent ovariohysterectomy. Ten cats were male and eight cats were female. Median age was 22 months (range 3 months to 121 months); median weight was 4.9kg (range 2.4 to 9.9kg).

**Anesthetic and surgical procedures :** Cats were examined at least 30 minutes before anesthesia, and heart rate, respiratory rate, and rectal temperature were recorded. Most cats were pre-medicated with ketamine hydrochloride (2.3 mg/lb of body weight, IM), glycopyrrolate (0.005mg/lb, IM), acepromazine (0.032mg/lb, IM) and oxymorphone (0.025mg/lb, IM) or butorphanol (0.09mg/lb, IM). Anesthesia was induced by administration of ketamine (0.9mg/lb) and diazepam (0.23mg/lb) IV or thiopental (4.54mg/lb, IV) and maintained by use of halothane or isoflurane in oxygen. Elective ovariohysterectomy or castration, when performed, was completed before surgeries on the paws. For cats undergoing forelimb tendonectomy, the hair on the ventral surface of the digits was clipped on both front feet. The toenails on all four feet were trimmed and the forefeet cleaned with 2% chlorhexidine detergent and water for 5 minutes. A tourniquet was placed around the proximal aspect of the antebrachium and a fenestrated drape was used to isolate the surgical area. A 0.75cm vertical skin incision was made on the ventral sur-

face of the first toe just proximal to the digital pad. Iris scissors were used to bluntly dissect around the deep digital flexor tendon (Fig 1). The tendon was isolated and tran-

sected proximally. The distal portion was grasped with Adson forceps and the tendon was transected as far as possible distally, removing a portion of tendon approximately 0.5cm in length (Fig 2). The area was blotted dry and a drop of tis-

sue glue (Vetbond TM®, Animal Care Product/3M, St. Paul, MN.) applied to appose the skin (Fig 3). This procedures was repeated on all 10 toes of the forefeet. Four cats (22%) were given an additional dose of oxymorphone after tendonectomy.

A light pressure bandage was also placed on the foot and distal limb and gave shredded paper in their litter box for the next few days.

Fig 3. The area was blotted dry and a drop of tissue glue (Vetbond TM®, Animal Care Product/3M, St. Paul, MN.) applied to appose the skin.

Follow-up for tendonectomy : Each owner was contacted by telephone at least 2 months after surgery to inquire about the reasons they wanted the cat's claws modified, what the benefit of this procedures was, what postoperative problems the cat had, and the cat's recovery times. They were given a choice of reasons for deciding to have the cat's claws modified which were : cat's scratching to household materials, preventing injury to human or preventing other household animals. They were also asked about their cat's undesirable behaviors after surgery and their own attitudes about the surgery before and after the procedure was performed. One individual surveyed all owners in order to avoid interpersonal differences.

### Results

The first reason for tendonectomy was to avoid damage caused by the cat's scratching household materials (77%). Only 17% of cats underwent tendonectomy because the owners were concerned with injury to humans and 6% of cats underwent tendonectomy because the owner was concerned with injury to animals (Fig 4).

Cats underwent tendonectomy (78%) continued to scratch ; that is the behavior but not the damage continued. One cat (6%) that underwent tendonectomy started treading for the first time after tendonectomy. Five cats (28%) that underwent tendonectomy stopped treading after surgery.

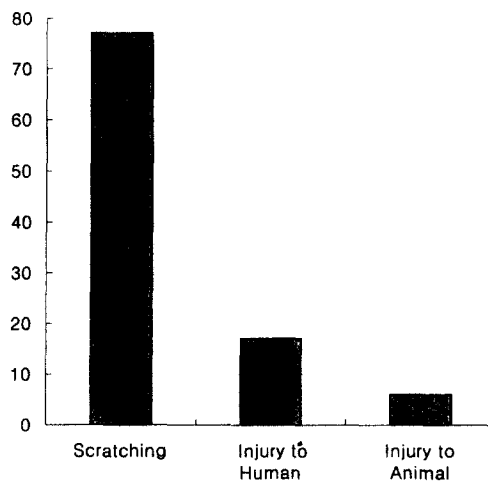


Fig 4. The reasons for tendonectomy. The percentage of owners who chose each reason.

The first benefit of tendonectomy was decreasing damage to materials (94%) and the second benefit was decreasing in-

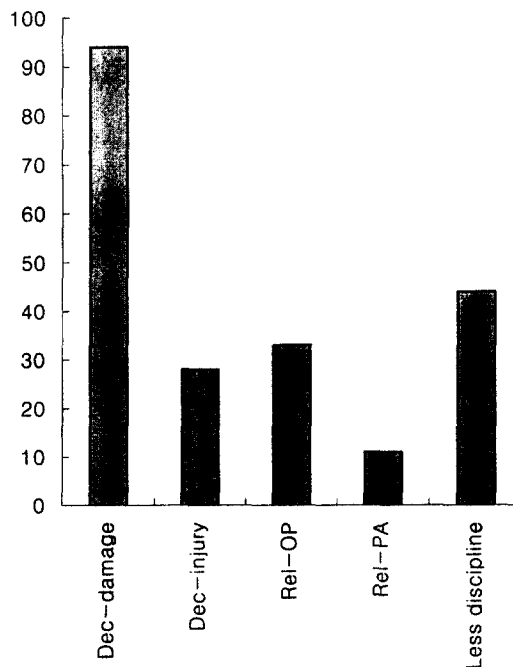


Fig 5. The benefits following tendonectomy. The percentage of owners who chose each benefit. Dec-damage : decreased damage to materials ; Dec-injury : decreased injury to humans or animals ; Rel-OP : better relation between owner and pet ; Rel-PA : better relation between pet and other animals.

jury to humans or animals (28%). Better relationships between owner and pet (33%) and the need for less discipline (44%) were also mentioned as benefits (Fig 5).

The primary concern of the owners of cats that underwent tendonectomy was postoperative pain after surgery (61%). The second concern was about the cat's inability to defend themselves (17%). After surgery cats that underwent tendonectomy were described as tender or sore (44%). Eleven cats (61%) undergoing tendonectomy had more than one immediate post operative complication following surgery.

Twelve cats (67%) that underwent tendonectomy recovered fully within the first three days and 6 cats (33%) recovered within two weeks.

Three cats (17%) that underwent tendonectomy had at least one behavior problem after surgery. Two cats (11%) wouldn't use the litter (housesoiling), and 1 cat (6%) showed an increase in biting.

Seven owners (39%) of cats that underwent tendonectomy who already had owned other cats that had been onychectomized thought that recovery time of the tendonectomy was faster than that of the earlier onychectomy.

After combining the very positive rating and positive as positive, seventeen owners (94%) of cats that underwent tendonectomy had a positive attitude to the surgery (Table 1). Only one owner of cats that underwent tendonectomy had a negative attitude.

Table 1. Owner's attitudes toward tendonectomy

Attitudes	Rating before surgery(%)	Rating at the time of telephone contact(%)
Very positive	17	39
Positive	61	56
No opinion	22	0
Negative	0	6
Very negative	0	0

## Discussion

Declawing is a controversial procedure about which many

owners have concerns<sup>1,3,5,7</sup>. In addition, many postoperative complications have been reported<sup>10,13</sup>. Some owners believe that onychectomy causes physical and emotional changes in their cats after surgery, but one study indicated that declawing did not lead to serious behavior sequelae<sup>5</sup> and the only behavior problem that declawed cats exhibited significantly more often than intact cats was jumping on counters or tables<sup>6</sup>. The complication rate with feline onychectomy is high for a routine procedure<sup>13,14</sup>. Early complications are associated with the methods used and lack of experience by the surgeon or excessive manipulation of tissue. There were many techniques described for performing onychectomy with a blade or a sterile guillotine type nail trimmer, but removing the unguis crest of claw was considered the most important technique.

Tendonectomy has been used as an alternative method of reducing problem scratching. It is recommended to owners with humane concerns or those who are worried about postoperative problems with onychectomy<sup>2,9</sup>. One study reported tendonectomy had less pain than onychectomy but regular nail trimming must be done after surgery<sup>9</sup>. Another study reported that although there was no significant difference, there was a trend for more owners of cats that underwent onychectomy to be satisfied with the procedure, compared to the owners of cats that underwent tendonectomy and the prevalence of postoperative lameness between cats undergoing onychectomy and those undergoing tendonectomy was similar<sup>10</sup>. In the present study, although regular nail trimming of thick claws can be a problem to owners, 94% of owners of cats that underwent tendonectomy had a positive attitude toward the surgery. In this study one cat (6%) that underwent tendonectomy reported prolonged lameness.

When nonabsorbable suture material was used, cats frequently would chew and remove sutures prematurely. Instead of skin closure with suture materials, in this study n-butyl monomers of cyanoacrylate tissue adhesive was used. Isobutylcyanoacrylate or n-butyl monomers of cyanoacrylate tissue adhesive could reduce surgical time of onychectomy and encourage very rapid healing of surgical sites<sup>12,16</sup> but this product should be used sparingly and before application the field should be clean<sup>16-18</sup>.

The first reason for considering tendonectomy was that the owners wanted to prevent their cats from scratching household materials. When owners considered injury to humans, fewer owners of cats that underwent tendonectomy considered this problem. This reason can be related to the characteristics of the owners of cats who underwent tendonectomy or characteristics of the cats themselves. Most owners didn't request the tendonectomy procedure, it was recommended by their veterinarian. Tendonectomy is a relatively new procedure and as such is recommended by veterinarians. The owners of tendonectomized cats may have felt that the intact claws still posed a threat to other animals.

Before surgery the owners of cats that underwent tendonectomy were most concerned about postoperative pain. Their second concern was about the cat's ability to defend itself. Forty-four percent of cats that underwent tendonectomy were tender or sore. One study reported 96% of cats that underwent onychectomy were fully recovered after two weeks<sup>5</sup> and one study reported the period of postoperative tenderness after tendonectomy was from one to three days; however, in two cases tenderness was continued for one week<sup>9</sup>. In this study tendonectomized cats recovered completely within two weeks (100%). Previously, only short term pain relief has been investigated. The administration of butorphanol to cats undergoing onychectomy can provide effective analgesia<sup>19</sup> and administration of morphine decreased catecholamine level<sup>20</sup> but irrigation of bupivacaine on the wound of onychectomy had no analgesic effects<sup>21</sup>. In this study four cats were given an additional dose of oxymorphone after tendonectomy.

Previous studies reported that behavioral problems after onychectomy were not great<sup>4,6</sup>. In this study 17% of owners reported at least one behavioral change after their cats underwent tendonectomy. Although these results suggest that there are negative behavioral changes after surgery, most owners of cats that underwent tendonectomy had positive attitudes toward the surgery. Tendonectomy can be a good alternative method for owners who consider onychectomy inhumane and/or want to subject their cat to a less painful surgical procedure than onychectomy. After combining the very positive rating and positive as positive, seventeen own-

ers (94%) of cats that underwent tendonectomy had a positive attitude to the surgery. Veterinarians should suggest tendonectomy if behavioral means of decreasing destructive scratching have not been successful.

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