

Treatment of phalangeal osteomyelitis caused by a cat bite

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Abstract

In situation of a cat bite, although an external wound is small, prophylactic antibiotics should be used early and a closed observation is needed for sufficient periods. If symptoms continue, deep infection should be considered.

Title :

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Author contributions

JW Kim, DS Kim, DH Kang, WK Kim, JY KIM: wrote the first draft of the manuscript.

JD Kim: corrected the final draft of the manuscript.

Ethical approval

The written informed consent was obtained from the patient for the publication of the text and images. Ethical approval was not mandatory for publication of case reports as per the institutional policy.

Key clinical message

In the case of a cat bite patient, even if the external wound is small, prophylactic antibiotics should be used early and a closed observation is needed. If symptoms persist and infection is present, aggressive treatment including debridement may be effective for a cat bite patient.

Abstract

In the case of a cat bite patient, even if the external wound is small, prophylactic antibiotics should be used early and a closed observation is needed. If symptoms persist and infection is present, aggressive treatment including debridement may be effective for a cat bite patient.

KEY WORDS: cat bites, debridement, deep infection, osteomyelitis, prophylactic antibiotics

INTRODUCTION

Animal bite injuries account for 1-2% of emergency department visits, of which 80-90% are caused by dog bites.¹ Cat bites are the second most common, accounting for 3-15% of bites by all animals.² Although cat bites are relatively rare compared to dog bites, fatal complications such as wound infection and permanent damage can occur in about 30-50% of all cat bite patients. There complications associated with cat bites are known to occur about twice as often as those associated with dog bites.³ The authors performed surgical treatment for osteomyelitis of the second middle phalanx in a patient with a cat bite. The treatment showed good results. Here we report this case with a literature review. The authors performed surgical treatment for osteomyelitis of the second middle phalanx in a patient with a cat bite and experienced good results. Therefore, we would like to report a case report with a literature review.

jeojadeuleun goyangiege mulrin hwanjaeseo je2jungjigol golsuyeome daehan susuljeog ciryoreul sihaeng-hayeosgo joheun gyeolgwareul eodeosdda. ddaraseo munheon gocalgwa hamgge jeungrye bogoreul hagoja handa.

We report for the second lieutenant phalanx osteomyelitis of the resin occurred in a patient by a cat bite experienced good results underwent surgical treatment. We report a case with a review of the literature.

jungwi jigolsujiyi golsuyeome daehae goyangiege mulrin hwanjaeseo balsaenghayeo susuljeog ciryoreul bada joheun gyeolgwareul eodeosddago bogohabnida. munheon geomtowa hamgge saryereul bogohabnida.

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goyangie mulrin gyeonguneun gae mulrin gyeongue bihae sangdaejeogeuro deumuljiman goyangie mulrin hwanjayi yag 30~50%eseo sangceo gamyeom mic yeonggujeog sonsangwa gateun cimyeongjeogin munjega balsaenghabnida. Cat bites are serious problems, such as when compared to the bite of a dog is very low, but the relative frequency of wound infection and permanent damage can occur in all patients with a cat bite at a rate of approximately 30-50%. goyangie mulrin gyeonguneun gae mulrin gyeongue bihae maeu najeun gyeonguwa gati simgaghan munjeijiman sangceo gamyeom mic yeonggujeogin sonsangyi sangdaejeog bindoneun goyangie mulrin modeun hwanjaeseo yag 30-50%yi biyulro balsaenghal su issseubnida.

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Damage to animal bites (Animal bite injury) accounts for 1-2% of patients who visit emergency rooms, of which 80-90% is a bite by a dog 0.1

dongmule mulrin pihae(dongmule mulrin sangceo)neun eunggeubsileul cajneun hwanjayi 1-2%reul caji-hamyeo geu jung 80-90%ga gaege mulrin gyeongu 0.1

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CASE REPORT

A 44-year-old female patient visited the outpatient clinic with pain at the left middle phalanx of the second finger because she was bitten by a cat at home two days before the visit. The patient had a history of hepatitis C. She had no other special history or medical disease. On physical examination performed at the time of the first visit, mild swelling and redness were observed in the middle phalanx of the left second finger and approximately 1 mm of wounds presumed to be cat tooth marks were observed on the volar and dorsal side. As it was judged to be a very minor wound, no special suture except simple dressing was performed. Oral antibiotics were prescribed. After one week, the wound recovered without any particular problem. However, edema, redness, and mild pain persisted. Although there was no serious complaint of pain, edema and redness continued until 2 months after the injury. Thus, blood tests and simple radiographic examination were performed again. White blood cell count, Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were in their normal ranges. However, an osteolytic lesion was observed in the middle phalanx of the second finger on simple radiographic (X-ray) examination (Figure 1). This lesion had irregular borders with a local defect, especially in the anterior cortical bone. Subsequent MRI showed an abscess measuring 0.3 X 0.3cm in the distal middle phalanx with surrounding bone edema and soft tissue inflammation (Figure 2).

The authors diagnosed osteomyelitis and decided to operate. First, a zigzag incision was made in the volar side of the second finger. No particular infection was found in the subcutaneous layer. However, when the A4 pulley was incised and opened, the infected granulation tissue was easily identified along the flexor tendon. The synovial membrane of the flexor tendon had a defect presumably caused by the cat's tooth (Figure 3A). Under the flexor tendon, the anterior cortex of the metacarpal bone was penetrated and the medullary cavity was exposed (Figure 3B) Debridement of infected tissue surrounding the metacarpophalangeal joint, Gram-staining, and culture were done. The A4 pulley was then reconstructed and primary sutures were performed. (Figure 3C). After the surgery, the splint was applied until the wound was completely healed for two weeks. After the suture was removed, limited joint movement was started. Range of motion exercise was started after all stitches were removed. For antibiotics, second-generation cephalosporin was administered intravenously up to two weeks after surgery. Oral antibiotics were then administered for four weeks thereafter.

In the culture test performed for samples collected during surgery, no particular strain was identified even after culturing for more than four weeks. At 1-year follow-up, radiographic examination showed that the previous bone defect had recovered (Figure 4) and joint motion was restored to the normal range. There were no signs of infection such as edema or fever. The metacarpophalangeal and surrounding infected tissues were subjected to debridement, washing, and bacterial culture.

jungsujijeol mic jubyeonyi gamyeomdoen jojigeun goesajojig jegeo, seceog mic segyun baeyangeul badassda.

The debridement and lavage And, bacterial culture were performed in the median phalanges and surrounding tissue infections.

goesajojig jegeo mic seceog geurigo jeongjung jigol mic jubyeon jojig gamyeomeseo segyun baeyangeul sihaenghayeossda.

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After that, the A4 trochle was reconstructed and primary sutures were performed. (Fig. 7) After surgery, the splint was fixed until the wound was completely healed for 2 weeks, the suture was removed, and limited joint movement was started.

geu hu A4 trochleeul jaegeonhago 1ca bonghabeul sihaenghayeossda. (geurim 7) susul hu sangceoga wanjeonhi amul ddaeggaji 2jugan bumogeul gojeonghago bonghabsareul jegeohan hu gwanjeolyi umjigimi jehandoegi sijaghayeossda.

Was rebuilt after the A4 pulley and primary repair was performed (Figure 7) was fixed splint until the wound is completely restored two weeks after surgery to remove sutures and start a limited range of motion.

A4 pulriwa 1ca suri hu jaegeondoeossgo(geurim 7) bonghabsareul jegeohago jehandoen gadong beomwireul sijaghaneun susul hu sangceoga wanjeonhi hoebogdoel ddaeggaji bumogeul gojeonghaessseubnida(geurim 7).

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For antibiotics, second-generation cephalosporin was administered intravenously up to 2 weeks after surgery, and oral antibiotics were administered for 4 weeks thereafter.

hangsaengjeneun susul hu 2juggaji 2sedae cephalosporineul jeongmaegtuyeohago, ihu 4jugan gyeonggu hangsaengjereul tuyeohayeossda.

Intravenous antibiotics were the second-generation cephalosporin to 2 weeks after surgery were administered oral antibiotics for four weeks.

2sedae sepalroseuporin jeongmaegjusayong hangsaengjeneun susul hu 2juggaji 4jugan gyeonggu hangsaengjereul tuyeohaessda.

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In the culture test performed during surgery, bacteria were cultured for more than 4 weeks, but no particular strain was identified.

susul jung sihaenghan baeyanggeomsaeseo 4ju isang gyuneul baeyanghayeosseuna teugbyeolhan gyunjuneun hwagindoeji anhassda.

The incubation tests performed during surgery, but the culture for more than four weeks a special bacteria strains were not identified.

susul jung baeyanggeomsareul sihaenghaesseuna 4ju isang baeyanghan gyeolgwa teugsusegyun gyunjuneun hwagindoeji anhassda.

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At 1-year follow-up, radiographic examination showed that the previous bone defect had recovered (Fig. 9,10), and joint motion was restored to the normal range.

1nyeon cusi si bangsaseon geomsaeseo ijeonyi gol gyeolsoni hoebogdoeeossgo(Fig. 9,10) gwanjeol undongi jeongsang beomwiro hoebogdoeeossda.

1 year follow-up was observed on the previous radiological findings of bone defects is restored observed (Figure 9,10) motion was restored to the normal range.

1nyeon cusieseo gwancaldoen ijeonyi bangsaseon sogyeoneseo golgyeolsoni hoebogdoeeo gwancaldoeossgo(geurim 9,10) undongi jeongsang beomwiro hoebogdoeeossda.

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There were no signs of infection such as edema or fever.

bujongina balyeol deungyi gamyeom jinghuneun eobseossda.

Swelling, infection did not occur findings such as hot flushes.

jonggi, gamyeomeun anmyeon hongjo deungyi sogyeoneun balsaenghaji anhasseubnida.

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DISCUSSIONFirst, a zigzag incision was made in front of the second resin.

meonjeo 2ca rejin jeonmyeone jigeujaegeu jeolgaereul hayeossda.

First was that the zigzag incision at the front of the second resin.

ceos beonjjaeneun du beonjjae rejinyi jeonmyeone jigeujaegeuro jeolgaehan geosibnida.

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No particular infection was found in the subcutaneous layer, but when the A4 trochle was incised and opened, the infected granulation tissue was easily identified along the flexor tendon, and the synovial membrane of the flexor tendon had a defect presumably caused by a cat's tooth (Figure 5).

pihaceungeseoneun teugbyeolhan gamyeomeun eobseosseuna A4 hwalcareul jeolgaehayeo yeoleosseul ddae gamyeomdoen yugajojigi gulgoggeoneul ddara swibge sigbyeoldoeossso gulgoggeonyi hwalmage goyangi ciae yihan geoseuro cujeongdoeneun gyeolsoni isseossda(geurim 5).

Subcutaneous layer has not been able to find a specific infection findings could easily see the granulation tissue infected along the flexor tendon opened and cut the A4 pulley had a deficit is estimated that arises by the teeth of the cat in the synovial membrane bending cases (Figure 5).

pihaceungeun teugjeong gamyeom sogyeoneul cajeul su eobseossso gulgoggeoneul ddara gamyeomdoen yugajojigeul swibge bol su isseossso A4doreuraereul jeoldanhayeo gyeolsoni isseossdeon goyangiyi hwalmagi gubhyeojin gyeongue balsaenghaneun geoseuro cujeongdoenda(geurim 1). 5).

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Under the flexor tendon, the anterior cortical bone of the metacarpal bone was penetrated and the medullary cavity was exposed (Fig.

gulgeungeon araeeseo jungsugolyi jeonpijilgoli gwantongdoeeo golsugangi noculdoeeossda(Fig. through the flexor tendon below the median phalanx anterior cortical had to see that the bone marrow is exposed (Figure 6).

jungang jigol araeyi gulgeun himjuleul tonghae jeonbang pijileun golsuga noculdoen geoseul hwaginhaeya haessseubnida(geurim 6).

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However, an osteolytic lesion was observed in the middle phalanx of the second finger on simple radiographic examination (Fig. 1, 2). This lesion had irregular borders and showed a local defect, especially in the anterior cortical bone.

geureona dansun bangsaseon geomsasang du beonjjae songaragyi gaunde jigole golyonghaeseong byeongbyeoni gwancaldoeossda(Fig. 1, 2). i byeongbyeoneun bulgyucighan gyeonggyereul gajimyeo teughi jeonbang pijilgoleso gugso gyeolhameul boyeossda.

However, the osteolytic lesion in the median phalanx of the second resin was observed in the radiological examination (Fig. 1, 2) are the lesions have irregular boundaries especially exhibited a local defect in the anterior cortex.

geureona bangsaseon geomsaeseo du beonjjae sujiyi jeongjung jigoleseo golyonghaeseong byeongbyeoni gwancaldoeosseumyeo(Fig. 1, 2) byeongbyeonyi gyeonggyega bulgyucighamyeo teughi jeonpijileseo gugsojeog gyeolsoneul boyeossda.

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Subsequent MRI showed an abscess measuring 0.3X0.3cm in the distal middle phalanx, and surrounding myeledema and soft tissue inflammation (Figures 3,4). The authors diagnosed osteomyelitis and decided to surgically treat it.

husog MRIneun weonwi junggan jigoleseo 0.3X0.3cm keugiyi nongyanggwa jubyeon golsubjong mic yeonjojig yeomjeungeul boyeojueossseubnida(geurim 3,4). jeojadeuleun golsuyeomeul jindanhago susulro ciryohagiro gyeoljeonghaessseubnida.

Following the MRI were identified who underwent bone marrow edema and inflammation of the soft tissues around the abscess with a median size of 0.3X0.3cm distal phalanx (Fig. 3,4) the authors diagnosed with osteomyelitis, and determined the surgery.

MRI gyeolgwa jungang keugiga 0.3X0.3cm in weonwi jigol(distal phalanx)yi golsu bujonggwa nongyang jubyeon yeonjojigyi yeomjeungi balsaenghan hwanjareul hwaginhago(Fig. 3,4), jeojadeuleun golsuyeomeuro jindanhago susuleul gyeoljeonghaessda.

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44se yeoseong hwanjaga iteul dongan jibgoyangireul mulgi wihae naeweonhan hu du beonjjae sujie nama issdeon kiudeudeon jungwi jigol bubune bohaengtonggeul jusoro naewonhaessda.

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Dis

Cat bites are the second most frequent animal bites. About 45-63% of cat bites cause injuries to the hand.² Compared with dog bites, cat bites have an incidence rate of less than 1/6. However, the infection rate is more than doubled when a cat bite occurs.³ReviewribyuconsiderationgoryeoDISCUSSIONtoronjeonce gyeolgwareul rodeuhul su eobseumdasi sido

In animal bites, the occurrence of direct wounds by teeth and direct inoculation of bacteria occur more frequently than secondary infections by wounds.⁴ In the case of cat bites, the sharper and thinner teeth are the reason for this high rate of infection. Since cat tooth is easy to penetrate the joint capsule and bone,

deep infections such as infectious arthritis and osteomyelitis can easily occur. Even if an infection occurs, it is often not detected early.

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In case of a cat bite injury, strong cellulitis usually occurs locally within 12-24 hours after the bite and an abscess may occur. Johnson et al. have reported that local osteomyelitis may also occur.⁵ It has also been reported that 37% of cat bite patients require hospitalization and 12% of patients require surgical treatment.⁶ In addition, Veitch et al. have reported that 1% of all hospitalized patients for hand infections are caused by complications of cat bites.⁷

Pasteurella multocida is the most identified in results of culture for patients with cat bite wounds.⁸ This is because *Pasteurella multocida* is present in the normal flora of the oral cavity in more than 90% of felines.⁹ Westling et al. have performed a study on 78 cat bite patients and reported that *Pasteurella multocida* is identified in 70% of cases.¹⁰ Mitnovetski et al. have reported that *Pasteurella multocida* is found most frequently in culture of cat bite wounds.^{6,7} *Pasteurella multocida* can easily cause death. There are cases where it shows false negatives during culture. Serology itself cannot differentiate between current infection and past exposure. The fastest and most accurate identification method is polymerase chain reaction (PCR). However, even if there is a deep infection caused by a cat bite, 7-8% of cases might not be culturable.¹¹ In the present case, no bacteria were identified in the culture test performed for samples collected during surgery. However, false negatives cannot be ruled out. Talan et al. have reported that a bite wound can be considered to be infected if it meets one or more of three main criteria (fever, abscess, and lymphangitis) and if it meets 4 or more of five sub-criteria (erythema more than 3 cm from the margin of the wound, tenderness, edema, purulent discharge, and a white blood cell count of 12,000 /ml or more.¹¹ Hospitalization should be considered for patients with severe cellulitis, systemic symptoms of infection (fever, vomiting, confusion), clear evidence of bone, joint, ligament, or nerve involvement, rapid spread of infection within 24-48 hours, or unresponsive to oral medications.² However, there are cases with an incubation period for months or years without symptoms. In the case of our patient, there was no fever. In addition, ESR and CRP were normal. However, symptoms such as erythema, tenderness, and edema were found.

Mitnovetski et al. have reported that early and appropriate treatment is very important for patients with cat bites.⁹ If it is determined that an infection is present, immediate treatment is required. If osteomyelitis is suspected as in the present patient, surgical treatment and appropriate antibiotic treatment should be combined to remove the infected tissue. Treatment can be largely divided into treatment of wounds caused by direct damage and treatment of infection by the causative strain. It is based on opening the wound at an early stage. After that, whether to suture should be decided while observing the progress at intervals of 1-2 days. Early disinfection of the wound, keeping it open, and administering appropriate antibiotics usually yield good results. In order to use appropriate (accurate) antibiotics, a bacterial culture test is required. Since it takes 24-48 hours to know the result of bacterial culture, prophylactic antibiotic treatment is necessary. Prophylactic antibiotic treatment after 48 hours will result in poor prognosis. As a prophylactic antibiotic, penicillin is mainly used. It is more effective to prescribe the 2nd and 3rd generation cephalosporin class antibiotics than the 1st generation.⁶ In most patients, treatment is completed with only 10-14 days of antibiotic administration for superficial wounds. Intravenous administration of antibiotics for 6 weeks is required for wounds that have invaded bones or joints. The use of prophylactic antibiotics for small wounds can reduce the frequency of infection from 28% to 2%.¹² We administered the second-generation cephalosporin intravenously for up to 2 weeks after the surgery followed by oral antibiotics for 4 weeks.

For cat bite patients, it is effective to prescribe appropriate antibiotics before results of culture, even for wounds that are considered insignificant. It is also important to actively implement surgical incisions and debridement resections if infection is suspected. Talaneun daeumgwa gateun gyeongue mulrin sangceoga gamyeomdoeossdago pandanhaessseubnida.

Talan was determined that following the bite wound is infected if: 0.8

Talaneun daeumgwa gateun gyeongue mulrin sangceoga gamyeomdoen geoseuro hwagindoeossseubnida. 0.8
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It was also suggested that hospitalization should be considered for patients who do not respond to oral medications.²

ddohan gyeonggu yagmule baneunghaji anhneun hwanjayi gyeongue ibweoneul goryeohaeya handago jeandoeossseubnida.²

In addition, patients unresponsive to oral medications suggested that the hospital consider 0.2

ddohan gyeonggu yagmule baneunghaji anhneun hwanjaneun byeongweoneseo 0.2reul goryeohal geoseul jeanhaessseubnida.

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Conclusion

In the case of a cat bite patient, even if the external wound is small, it is necessary to observe it closely while prescribing an appropriate antibiotic. If symptoms persist and infection is present, aggressive treatment including debridement may be effective for a cat bite patient.

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