



Three Distinct Episodes of Thumb Felon in a Fur Industry Worker

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Author's contribution

The only author performed the whole research work. Author NKS wrote the first draft of the paper. Author NKS read and approved the final manuscript.

Case Study

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ABSTRACT

Aims: To present and discuss the etiology of three distinct episodes of thumb felon in a fur industry worker, in association with the required precautions.

Case Presentation: A 61-year-old man working in a fur industry was treated for three distinct episodes of a felon of the right thumb within an 8-month period. He was treated successfully with surgical drainage and antibiotics following each episode. He was symptom-free and returned to work about two months following each episode. Felon formation, in all cases, was due to a *Streptococcus constellatus* infection secondary to mink hair penetration through the distal nail groove of his thumb. Using protective gloves, no further relapses have occurred during a 5-year follow-up.

Discussion: A felon is an abscess of the pulp of a finger or thumb usually due to percutaneous trauma. *Streptococcus constellatus*, which is included in the *Streptococcus milleri* group, is often associated with various pyogenic infections. In the reported case, the lack of hand protection during fur processing was the cause of mink hair infiltration into the pulp of the patient's thumb through the distal nail groove and of the three episodes of felon formation due to the secondary infection by *Streptococcus constellatus*.

Conclusion: Lack of hand protection during fur processing could make hands vulnerable to micro-injuries and secondary infections.

Keywords: Felon; fur industry; mink hair; Streptococcus constellatus.

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1. INTRODUCTION

Felon is an infection of the distal fat pad of a digit and is among the most common hand infections. It is caused by inoculation of bacteria into the finger-tip through a penetrating micro-trauma. The accumulation of pus causes swelling, redness, an early severe throbbing pain and may lead to skin necrosis, acute tenosynovitis, osteomyelitis and, even, septic arthritis. A felon with an abscess formation is treated surgically with drainage, irrigation and debridement as well as with the use of systemic antibiotics [1,2,3,4,5].

Streptococcus constellatus is a member of the *Streptococcus milleri* group (also known as *Streptococcus anginosus* group) and may cause widespread abscesses and systemic infections [6].

Three distinct episodes of thumb felon in a fur industry worker are presented and discussed.

2. CASE PRESENTATION

A 61-year-old right-handed man with a two days history of progressive right thumb painful swelling was referred to our clinic. On physical examination, the patient was afebrile and had normal vital signs. The pulp of his right thumb was diffusely swollen, erythematous and tender on palpation (Fig. 1). There was no evidence of penetrating trauma or draining sinus. Neurovascular examination of the right upper extremity was normal and there was no evidence of lymphadenopathy. Radiographs of the thumb indicated no bone involvement and no evidence of a foreign body. Blood tests revealed a white cell count of $14.400 \text{ cells/mm}^3$, with a left shift, and a C-reactive protein value of 10.5 mg/dl (normal values $0-0.6 \text{ mg/dl}$).



Fig. 1. A thumb felon with abscess formation in a 61-year-old man

Surgical treatment was performed using a lateral incision under digital anaesthesia. Following drainage, purulent material containing numerous mink hair was evacuated (Fig. 2).

The abscess was decompressed and irrigated. Gram's stain as well as aerobic and anaerobic culture of the purulent material collected from deep in the wound, to avoid skin contamination, was performed. The culture of the purulent material was positive and the gram-positive bacterium *Streptococcus constellatus* was isolated. No anaerobic species were detected. Bacterial identification and antimicrobial susceptibility testing were performed with Vitek 2 automated system and the API ANA identification strip (bioMérieux, France). Antibiotic treatment was based on the results of the performed sensitivity tests. Intravenous administration of ceftriaxone in a dose of 2 gr once a day for two days was followed by per os administration of amoxicillin/clavulanate potassium 625 mgr three times a day for two weeks. The wound was allowed to close by secondary intention. Healing was uneventful; the patient was symptom-free and returned to work about two months following surgical treatment.



Fig. 2. Numerous mink hair is noticed within the evacuated purulent material

The patient was admitted two more times (three and eight months later) with the same symptoms and signs; he received the same treatment, exhibited the same surgical findings, and the microbiological examination revealed the same pathogenic bacterium.

The entrance site of the foreign material (mink hair) through the distal nail groove of his thumb was clearly defined only on the patient's last admission (Fig. 3a, b). He declared that, although he was obliged to wear gloves during fur processing, he refused to do so, because gloves would significantly compromise animal and fur handling.



Fig. 3. The entrance point was obvious only at the third episode of thumb felon (a). A piece of mink hair is shown while removed from the distal nail groove (b)

The patient reported that he was convinced to continuously use hand protection (gloves) by the time he returned to work following the recovery of the third episode.

In the follow-up period of five years no skin problems, bone involvement or recurrences were encountered.

3. DISCUSSION

Felons are among the most common hand infections, involve the distal phalanx pad of a digit, usually the thumb or index finger, and may lead to an abscess formation. Etiology is controversial but most felons occur after inoculation of bacteria through abrasions, puncture wounds and penetrating trauma usually by splinters of glass, wood, bone or metal. The

causative agent in most hand infections is *Staphylococcus aureus* (including methicillin-susceptible and methicillin-resistant isolates), but β -hemolytic streptococci, as well as gram-negative bacteria have also been reported [1,2,3,4,5,7,8,9,10].

In the presented case, the site of injury and, moreover, the entrance point of the foreign material (mink hair) was the distal nail groove. The trauma was further complicated by a *Streptococcus constellatus* infection and a felon was formed. To our knowledge, a felon following a *Streptococcus constellatus* infection has not been previously reported.

Streptococcus constellatus is a gram-positive catalase-negative bacterium, which is a member of the *Streptococcus milleri* group. It is included in the normal flora of the human oral cavity, gastrointestinal, and genitourinary tract [6,11].

In cases that infection involves patients with occupational exposure to animals or animal products, it is of utmost importance to investigate the sources of the responsible pathogenic organism. A clear distinction should be tried between human and animal sources [12].

The source of this patient's infection by *Streptococcus constellatus* was not defined.

The likelihood that the infection originated from a human source was significantly diminished, since no intentional or unintentional contact of his fingers with his mouth or saliva was reported. On the other hand, it seemed more likely that the pathogenic bacterium in our patient was acquired directly from the animals involved in the fur industry (mink). *Streptococcus*, among other types of bacteria, has been found on the bodies of infected or healthy animals used in the fur industry [12,13]. However, it could not be clarified whether the bacteria were primarily hosted in the fur of the animals or the fur was secondary contaminated from animal products, carcasses or from environmental surfaces at work, which could be intermittently contaminated with the organisms. In addition, the animal source of the detected *Streptococcus constellatus* seemed more likely, since the complete clinical remission following treatment of each episode excluded the possibility of a residual infection, while the continuation of his occupation in the mink fur processing was the only independent variable. Furthermore, the physical barrier provided by the protective gloves and the resulted post-operative absence of recurrences, following the third episode, excluded the power of the aforementioned variable.

Finally, it may be prudent to realize that health precautions should be taken during most stages of fur processing, although in fur industries the use of animals bred in captivity has considerably reduced the likelihood of transmission of animal diseases to fur workers. Ergonomic problems can result from manual lifting and moving of materials, especially pushing hand-carts and manual loading and unloading of pelts, particularly when they are wet. In addition, appropriate protective clothing for both hands and feet is necessary during the series of treatment steps that the pelts go through. Strict attention to hygiene, ventilation and temperature needs also to be emphasized during the fur-processing engagement [14].

The presented case supported the fact that the lack of hand protection during the stages of fur processing can be associated by micro-injuries and secondary infections.

4. CONCLUSION

This report emphasizes the need for hand protection during all stages of fur processing in order to avoid injuries and secondary infections.

CONSENT

Written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable.

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COMPETING INTERESTS

The author certifies that he has no commercial associations (such as consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. The author received no financial support for this study.

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