Amputation of Finger by Horse Bite With Complete Avulsion of Both Flexor Tendons

LIOR KOREN, MD; SHALOM STAHL, MD; ALEXEY ROVITSKY, MD; ELI PELED, MD

abstract

Full article available online at ORTHOSuperSite.com. Search: 20110627-26

Amputation of fingers with tendon avulsion occurs through a traction injury, and most occur through a ring avulsion mechanism. Usually the flexor digitorum profundus is torn out with the amputated finger. Replantation usually is recommended only when the amputation is distal to the flexor digitorum superficialis insertion. Animal bites are relatively common, with a decreasing order of frequency of dogs, cats, and humans. Horse bites are relatively infrequent but are associated with crush injuries and tissue loss when they occur.

This article describes a 23-year-old man with amputation of his middle finger at the level of the proximal phalanx after being bitten by a horse. The amputated stump was avulsed with the middle finger flexor digitorum profundus and flexor digitorum superficialis torn from the muscle-tendon junction from approximately the middle of the forearm. The patient had no other injuries, and he was able to move his other 4 fingers with only mild pain. As the amputated digit was not suitable for replantation, the wound was irrigated and debrided. The edges of the phalanx were trimmed, and the edges of the wound were sutured. Tetanus toxoid and rabies vaccine were administered, along with intravenous amoxicillin and clavulanic acid. The patient was discharged from the hospital 2 days later, with no sign of infection of the wound or compartment syndrome of the forearm. This case demonstrates the weakest point in the myotendinous junction and emphasizes the importance of a careful physical examination in patients with a traumatic amputation.

Figure 1: Photograph showing the stump of the third finger. Figure 2: Photograph showing the amputated middle finger with the tendon attached up to the myotendinous junction. The avulsed flexor digitorum profundus and flexor digitorum superficialis are attached to the amputated finger, and a few muscle fibers are attached to the tendons in the proximal part.
Amputation of fingers with tendon avulsion from their musculotendinous junction are caused by a traction injury, most of which occur through a ring avulsion mechanism. Ring avulsion has been classified by Urbaniak et al and revised by Kay et al. Several case reports describe this specific injury. When a tendon is torn out with the amputated segment, it is usually with the flexor digitorum profundus. Replantation is recommended only when the amputation is distal to the flexor digitorum superficialis insertion.

This article presents a case of a 23-year-old man with amputation of his middle finger at the level of the proximal phalanx after being bitten by a horse.

**Case Report**

A 23-year-old right-handed man presented after being bitten by a horse, with amputation of his middle finger at the level of the proximal phalanx (Figure 1). The amputated stump was avulsed with the middle finger flexor digitorum profundus and the flexor digitorum superficialis from the muscle-tendon junction to the middle of the forearm (Figure 2). The patient reported pain in the proximal forearm. He had no other injuries, and he was able to move his other 4 fingers with only mild pain. The digit was not suitable for replantation.

The wound was irrigated by saline and debrided. The edges of the phalanx were trimmed, and the edges of the wound were proximated by single sutures nylon 4/0. Tetanus toxoid and rabies vaccine were administered, and the patient was given intravenous amoxicillin and clavulanic acid. The patient was discharged from the hospital 2 days later with no sign of infection of the wound or compartment syndrome of the forearm.

**Discussion**

In their classification system for ring avulsion injuries, Kay et al described 4 categories:
- I—circulation adequate,
- II—circulation inadequate,
- III—circulation inadequate with fracture or a joint injury, and
- IV—complete amputation.

In their review of 55 cases of ring avulsion injuries, Kay et al found 3 had adequate circulation and 8 had primary amputation. Salvage was attempted in 44 cases; of these, 9 were amputated secondarily, 19 were successfully revascularized, and 16 were successfully replanted.

In 1974, Ponnampalam described a 17-year-old adolescent who suffered a ring avulsion injury with amputation of the finger at the distal interphalangeal joint. The flexor digitorum profundus was avulsed from the musculotendinous junction, the flexor digitorum superficialis was intact. The finger was replanted with shortening and fusion of the distal interphalangeal joint. At his final follow-up examination, the patient was satisfied with the outcome.

In another case report, Huemer and Dunst described a 17-year-old adolescent who suffered a ring avulsion injury with amputation of the finger at the distal interphalangeal joint with avulsion of the flexor digitorum profundus from the myotendinous junction. The torn-out tendon was resected, and the amputated part of the finger was replanted microsurgically. The final result was 50° of motion at the proximal interphalangeal joint and 30° of motion at the distal interphalangeal joint.

A search of the English literature did not reveal an injury that resulted in complete avulsion of both the flexor digitorum profundus and the flexor digitorum superficialis at the musculotendinous junction. A case of incomplete avulsion of both tendons was reported by Docker and Titley who described a 37-year-old woman who fell and whose ring finger was caught in a rack; the finger was amputated at the level of the midshaft of the middle phalanx. The distal finger was still attached to the hand via 10 to 15 cm of the flexor digitorum superficialis and flexor digitorum profundus tendons that were not completely avulsed. Interestingly, the patient developed compartment syndrome of the forearm, which was treated with a fasciotomy.

Animal bites are relatively common, with a decreased order of frequency of dogs, cats, and humans. Horse bites are relatively infrequent, but when they occur, they are associated with crush injuries and tissue loss. Failure has been reported to occur with muscle strain injuries within the muscle belly, at the myotendinous junction, or within muscle near the myotendinous junction.

Our case demonstrates the devastating power of a horse bite and its traction force in addition to its cutting force. This type...
of bite demonstrates the weakest point in the myotendinous junction and emphasizes the importance of a careful physical examination of patients with a traumatic amputation. If the patient arrives with just the stump, the level of the tendon injury might not be recognized at first.

REFERENCES


