

Treatment of Nasal Bone Fracture using Wire Fixation in a Horse

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Abstract : A 7-year-old, 453 kg, thoroughbred-cross mare showed depression, severe nasal bleeding, diffuse swelling, and distortion of the facial contour. Physical and radiographic examinations revealed an open nasal bone fracture. Surgery was conducted under sedation with the horse in a standing position. Two holes were drilled directly above and below the fracture line. The nasal bone was raised to the normal position by inserting a periosteal elevator through the holes. Orthopedic wire was used to secure the fractured nasal bones through the holes. The horse recovered from sedation without complication. Sutures were removed three weeks after surgery. The nasal bone fracture appeared well-recovered morphologically and the recovery was confirmed by radiography. A wire fixation method is recommended to treat nasal bone fracture in a horse.

Key words : Nasal bone fracture, Facial bone, Wire fixation, Orthopedic surgery, Horse.

Introduction

Facial fractures are mainly caused by trauma resulting when a horse runs into a hard target (2,4). Facial fractures can also be caused by trauma associated with falling, kicks, collisions, and animal fights (2,4,8). Such fractures can be observed on the nasal bone, frontal bone, maxilla, mandible, and the zygomatic process (4). Nasal bone fracture is the most common facial bone fracture in a horse because that bone has low tolerance to impact (7). Clinical signs of nasal bone fracture are bony distortion, dyspnea, nasal discharge, and epistaxis (2,13). An adequate diagnosis should be conducted before deciding on a definitive treatment (5). Physical examination, radiography, and computed tomography (CT) are generally used for such a diagnosis (8,15).

Treatment should be performed after the soft tissue swelling has decreased (1). Medical treatments including antibiotics and anti-inflammatory drugs are beneficial (1,3). Surgery is needed to raise the fractured nasal bone to the normal position and reconstruct the facial contour. Many surgical procedures such as wire fixation, plate fixation, and the FlapFix system (DePuy Synthes, West Chester, PA, USA) can be considered (1,4). Wire fixation is commonly used to repair nasal bone fracture because of such advantages as sufficient rigidity and minimal subsequent complications (4). If the diagnosis and treatment are adequate, the prognosis for recovery is good without complication (2,4).

The purpose of this case report is to describe the medical and surgical treatments of a nasal bone fracture in a horse.

Case

A 7-year-old, 453 kg, thoroughbred-cross mare was referred to the Equine Hospital of the Korean Racing Authority in Jangsu, Korea. The owner had released the horse in a paddock for training, and the horse suddenly ran into a stone pillar. The horse showed depression, epistaxis at both nostrils, and distortion of the facial contour with diffuse swelling. Three holes were observed at the dorsal 1/4 point of the nasal bone, and one was connected to the nasal cavity. Other physical signs including body temperature, respiratory rate, and capillary refill time were within normal ranges. On radiography, the lateromedial and dorsolateral-ventromedial oblique views of the skull revealed that the dorsal 1/4 point of the nasal bone was transversely fractured. Also, the dorsal part of the nasal bone had collapsed as shown in Fig 1.

Corrective surgery was performed in a standing position. The horse's head was maintained at a moderate height by using a head stand. The horse was sedated with 0.004 mg/kg detomidine (Detomidine, Provet) and 0.04 mg/kg butorphanol (Butophan, Myungmoon Pharm) intravenously, and local anesthesia was performed by using lidocaine (Lidocaine, Daihan). After disinfection with chlorhexidine and ethanol, the wound area was incised and the nasal bone exposed through blunt dissection. Two holes were drilled directly above and below the fracture line. The nasal bone was raised to the normal position by inserting a periosteal elevator through two holes. A 0.5 mm diameter orthopedic (cerclage) wire was used above and below the fracture line to secure the fractured nasal bones. A Penrose drainage tube (Sewoon Medical; Cheonan, Korea) was applied for fluid draining. Throughout the surgery, the surgery site was washed thoroughly with anti-saline comprised of 1 L of normal saline with 500 mg of the antibiotic amikacin (Amikacin, Shinpoong) added. The

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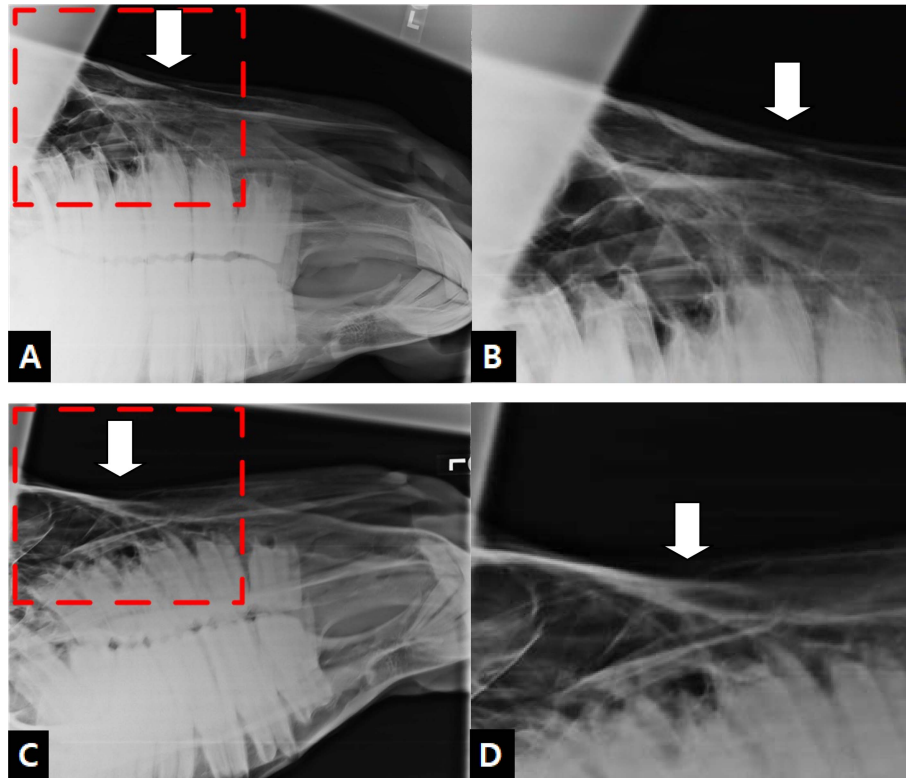


Fig 1. Preoperative radiography. A: Lateromedial skull radiograph shows that the dorsal 1/4 point of the nasal bone was transversely fractured (Arrow). B: Enlarged view of red dotted line enclosed area in A. The nasal bone fracture can be seen (Arrow). C: Dorso-lateral-ventromedial oblique skull radiograph shows the same fractured line as shown in A (Arrow). D: Enlarged view of red dotted line enclosed area in B. The nasal bone fracture can be seen (Arrow).

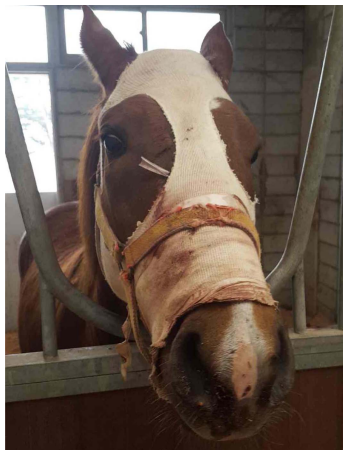


Fig 2. Postoperative management. A Penrose drain was applied for postoperative drainage and the head and nose areas banded with stokinet.

incision site was closed by using Polypropylene (Ethicon, Somerville, New Jersey, USA), and bandage was applied by Stokinet (Daihan; Busan, Korea) as shown in Fig 2.

After the surgery, 4.4 mg/kg phenylbutazone (Fenylbutazone, Phenix) and 25 mg/kg penicillin G (PPS, Daesung Microbiological labs) were administered for 5 days. Postoperative care, such as disinfecting the surgical site and replacing the bandage, was provided regularly. The horse was discharged from hospital five days after surgery. Three weeks

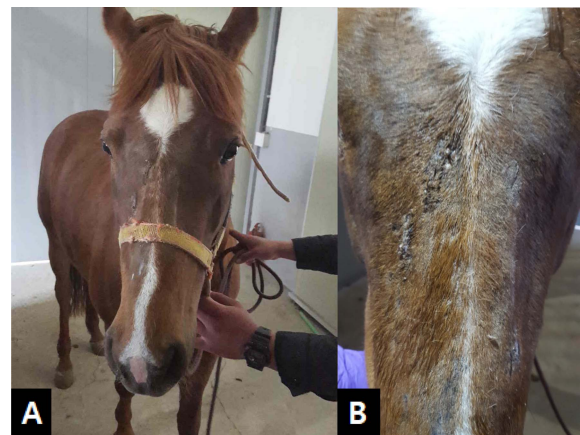


Fig 3. Facial appearance three weeks after surgery for nasal bone fracture. A: The surgery area can be seen, and the incision site is well closed. B: Enlarged view of the facial appearance. The incision site is well closed as shown in A. The sutures have been removed.

after the surgery, the sutures were removed and the incision was observed to be well closed as shown in Fig 3. Recovery of the fracture was confirmed by using radiography with the results shown in Fig 4.

Discussion

For the treatment of the nasal bone fractures, an appropri-

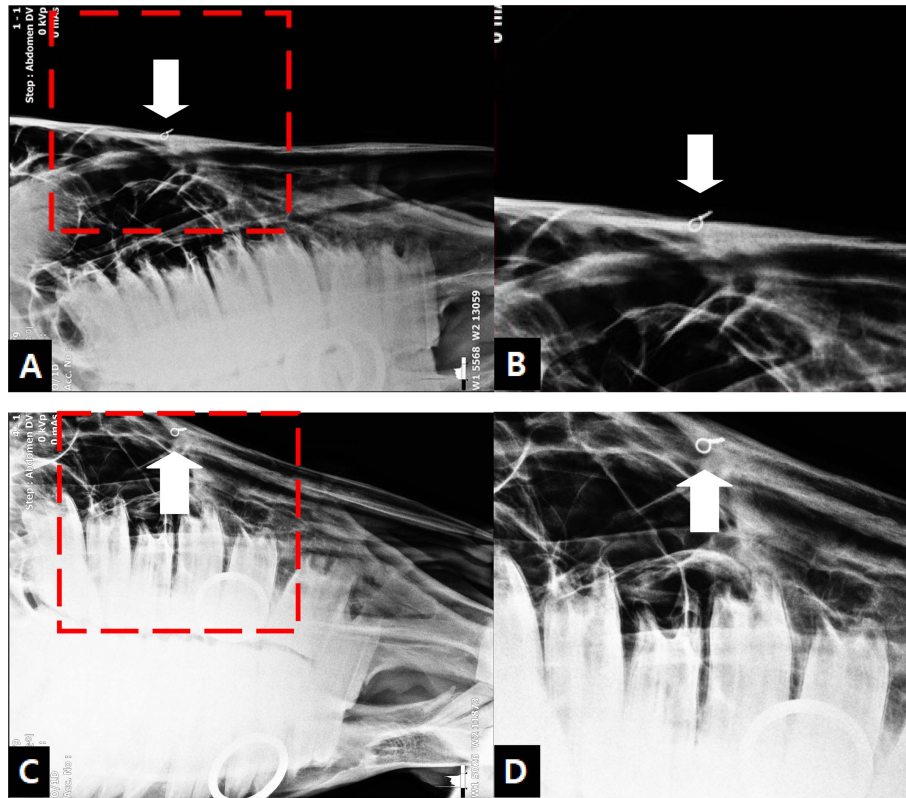


Fig 4. Postoperative radiography. A: Lateral view of the skull shows recovery from treatment. The fractured nasal bone is raised to a normal position. Orthopedic wire (Arrow) is used to secure the fractured nasal bones. B: Enlarged view of red dotted line enclosed area in A. C: Oblique view of the nasofrontal region of the horse. The fractured nasal bone is well recovered as shown in A (Arrow). D: Enlarged view of red dotted line enclosed area in B shows orthopedic wire (Arrow).

ate approach to the initial management and diagnosis is important to the recovery (5). Physical examination should be conducted to identify clinical symptoms like swelling, epistaxis, skin lacerations, and bone collapse (2,13). Treatment should be initiated after the soft tissue swelling has decreased because the swelling can act as an impediment when making an accurate radiographic diagnosis of the fractures (4). At the beginning of the examination, sedation is generally required to calm the horse and to proceed with diagnostics such as physical and radiographic examinations. However, sedation should be used carefully because a sedated horse can lower its head, which could increase the blood pressure in its nose. Therefore, the horses should be monitored continuously to ensure their heads are held up and to determine whether they exhibit any abnormal behaviors (5). In the present case, the procedure was performed immediately because the swelling was sufficiently mild to proceed with appropriate diagnosis and treatment. The horse's head was maintained at a moderate height through the use of a head stand so not to increase pressure in the nose area. Applying ice packs onto the swelling area can be useful if the swelling is severe (5).

Radiography with multiple oblique views is necessary to evaluate fractures that are not observed by visual inspection (2,17). Ultrasonography may be used to evaluate anatomic reduction of depressed fractures. Endoscopic examination of the upper airways, as well as neurologic and ocular examinations, can help develop an effective diagnosis (2,8). Addition-

ally, CT can be useful in depicting the fracture and internal structures because CT can provide three-dimensional images and a high degree of soft tissue contrast compared to conventional radiography (8,15). Although only radiography was performed in the present case, a combination of radiography, ultrasonography, endoscopy, and CT is recommended for a definitive diagnosis.

If the nasal bone fractures have communication with the nasal or oral cavity and sinuses, they are considered open, and contamination of the injured area with bacteria from the airway can occur. In such a case, broad-spectrum antibiotic therapy should be initiated from the beginning to ensure a wide range of defense (1). Non-steroidal anti-inflammatory drugs are also administered to produce analgesic effects and anti-inflammatory actions (3). If the surgery is conducted in an open procedure, it is hard to avoid infection of soft tissues. Therefore, the surgical approach should be as minimally invasive as possible (1). In the present case, lavage with anti-saline was performed throughout the surgery to prevent secondary infection. As a result of treatment using these methods mentioned above, the present case had good prognosis without complication.

Depressed fragments can be elevated by drilling holes into the bone and inserting a periosteal elevator to raise the fragment back to the proper alignment. If necessary, the fragment can be fixed with surgical techniques such as wire fixation, plate fixation, or the FlapFix system (1,5). Wire fixation is commonly used to repair nasal bone fracture because it is

cost-effective, easy to control, sufficiently rigid, and minimal complications (4). In the present case, orthopedic wire was used to provide stable fixation at the fracture line, and the broken bone fragments on both sides were well combined after fixation. If comminuted fractures are severe, wire fixation combined with bone plates may be considered (4). The FlapFix clamp, a round plate with a perpendicular tube, is also considered a promising surgical method (1).

In equine nasal fracture, complications can include sinus empyema, stenosis of the nasal passages, nasal fistulae, facial deformity, poor functional outcome, unhealed wounds, and re-fracture (1,4). However, in most cases, the prognosis is good and an improved prognosis can be expected through appropriate postoperative management such as the use of antibiotics, anti-inflammatory drugs, and bandage replacement (1,2). In the present case, the horse recovered well and had no complications due to the provision of appropriate treatment and postoperative care.

Conclusions

In this case report, an open nasal bone fracture was diagnosed via physical and radiographic examinations. The purpose of this case report is to describe the medical and surgical treatment procedures used on a nasal bone fracture in a horse. The nasal bone fracture recovered well without complication. The wire fixation method is recommended to treat this type of nasal bone fracture in a horse.

Acknowledgements

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