Successful Anatomical Access for Surgical Removing of the Distal Fracture of Splint Bones in Thoroughbred Horses (Case Study)

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Received: 11 March 2019/ Accepted: 30 June 2019
© Al-Mukhtar Journal of Sciences 2019
Doi: https://doi.org/10.54172/mjsc.v34i2.80

Abstract: Poor performance in athletic horses due to musculoskeletal affections is very common in Libya. Two mature thoroughbred horses suffering from poor performance and history of moderate degree forelimb lameness were admitted to the Aswany Private Equine clinic in Tripoli, Libya. The study is aiming for presenting a simple, time effective, cost effective surgical procedure to treat distal simple splint bone fracture in thoroughbred horses. Horses were examined thoroughly for the common muscle, hoof, and tendons affections. A progressed unilateral left forelimb swelling involving the lateral distal part of the fourth metacarpal bones was noticed. Three radiographs were taken to each horse including latero-medial, dorsolateral-palmaromedial, and palmarolateral-dorsomedial views to assess both splint bones. The radiographs showed that there is a complete fracture involving the distal extremity (button) of the fourth metacarpal bones. Surgical excisions of the fractured part of the splint bones have been decided to treat these horses. To precisely locate the site of the bone fragments, 1.5 mm stainless steel wires were placed over the distal part of splint prior to taking the radiographs. The surgical sites were aseptically prepared, and the horses were then sedated via intravenous injection of xylazine at a dose rate of 1 mg/kg body weight. The site of surgical incision was infiltrated with 2% lidocaine. The bone fragments were then removed after performing the surgical incision. The sharp end at the distal end of the proximal part of the splint bone was then smoothening with a scissor. The surgical incisions were then routinely closed and the post-operative care and radiographs were taken. The surgical incision made complete healing within two weeks. Both horses were followed up for up to three years post-operation, and they did well compared to what has been done in other studies. We concluded that the surgical technique used to treat the two horses with splint bone fracture enrolled in the current study is a simple and effective procedure.

Keywords: forelimb lameness, distal splint bone fracture, surgical ostectomy,
The most common site of this fracture is the distal part of the splint bone (K. Bowman et al., 1982; Jenson, Gaughan, Lillich, & Bryant, 2004; F. Verschooten et al., 1984). Additionally, splint bone fracture involving the distal part of the bone is mostly simple (Baxter 2011). Furthermore, it has been reported that distal splint bone fracture occurs mainly in horses aged between 5 to 7 years, which is proposed due to the decrease pliability of the suspensory ligament. This type of fracture occurs more frequently in forelimbs than hindlimbs and occurs mainly in the lateral splint bone of the left forelimb (Baxter, 2011).

It has been found that the distal splint bone fracture occurs either due to internal trauma resulting from excessive pulling of the bone with carpal extension by suspensory ligament and its fascial attachments during exercise, particularly in forelimb or external direct trauma (K. F. Bowman, L. H. Evans, & M. E. Herring, 1982; F. Verschooten, Gasthuys, & Moor, 1984). Additionally, distal splint bone fracture can occur because of interosseous ligament desmitis and decreasing of its pliability (Auer, 2012).

Distal splint bone fracture is usually characterized by local pain, swelling around the distal end of splint bone and heat in acute cases. Additionally, lameness may be observed in the acute stage of affection. However, all these findings are usually either not obvious or disappear in chronic cases (Baxter, 2011). Lameness may or may not be observed during trot or fast circling depending on the acuteness of the fracture (Baxter, 2011). In some chronic cases, the fracture site may create callus and cause hard swelling, which may confuse the veterinarian with other affections known as splints (Auer, 2012). The best diagnostic tool used to confirm the lesion is the radiography. Dorsolateral-palmaromedial and palmarolateral-dorsomedial views are required to confirm these fractures in the second or fourth metacarpal bones (Butler, Colles, Dyson, Kold, & Poulos, 2017).

Distal splint bone fracture associated with lameness is usually required intervention using distal splint bone osteotomy (Auer, 2012; K. F. Bowman et al., 1982; Jenson et al., 2004; F Verschooten et al., 1984).

MATERIALS AND METHODS

Case history and signalmen:
Two thoroughbred horses were admitted to Aswany Private Equine Clinic in Tripoli, Libya with a history of moderate lameness and localized pain and swelling around the distal end of the fourth splint bone. The horses were subjected to courses of anti-inflammatory without any obvious improvement. The first case was a 5 years old, male TB racing horse suffering from left forelimb lameness and localized swelling just in the dorsal to the palmaro-lateral aspect of the fetlock. The second case was a 7-years old, TB racing horse with similar clinical signs to the former case.

Radiographic examination:
Two views were taken to each horse, namely dorsolateral-palmaromedial oblique view, and palmarolateral-dorsomedial oblique view (Figure 1 A and B). One stainless steel wire was placed over the swollen area and a number of short wires were then attached to the main wire in an attempt to localize the exact location of the fracture site (Figure 2A).

Surgical procedure:
The surgical sites were aseptically prepared. A dose of 1 mg/kg xylazine (Adwia, Egypt) was injected intravenously. The incision site was desensitized by local infiltration of 2% lidocaine hydrochloride (Vetquinoil, Belgium). The incision is made over the distal part of lateral splint bone and the bone fragment was separated from the attached...
muscles and removed. The incision is routinely closed using absorbable and non-absorbable sutures. The follow up includes systemic antibiotic, local wound dressing, and complete rest for two week. The two cases were followed up for approximately three years via phone calls.

**RESULTS**

Clinical examinations of both horses revealed moderate degree of left forelimb lameness with localized painful swelling proximal to the fetlock on the palmar aspect at the distal end of the left-fourth metacarpal bones.

The radiographs show that there is a complete non-displaced fracture involving the distal of fourth metacarpal bones (Figures 1 A and B). The surgical wounds made full recovery after two weeks with no complications. The follow-up radiographs at few months post-surgery showed that there is no bony reaction of the excision site (Figure 1 E). Additionally, follow up via phone conversation with the owners revealed that both horses were back to normal work after 2 months, and they did well with no lameness or swelling.

**DISCUSSION AND CONCLUSION**

The results of the current study correlated well with the previously published data. Both horses have no history of trauma, which indicates that both fractures are not traumatic. This finding agrees with that mentioned in the literature regarding the cause of this type of fracture (Auer, 2012; K. F. Bowman et al., 1982; F Verschooten et al., 1984). Distal splint bone fracture may associate with a moderate degree of lameness (Auer, 2012; K. F. Bowman et al., 1982; Jenson et al., 2004; F Verschooten et al., 1984), which is what we found in this study where the two horses suffered from lameness. It has been reviewed that the best treatment for distal splint bone fracture is the surgical excision (Auer, 2012). Our findings support this conclusion as both horses did well post-surgery without any complication. Additionally, the most interesting finding of the current study is that the surgical procedure for both operations was performed under sedation and local anesthesia without any difficulties. This surgical approach has many advantages as it avoids the surgeons the risks and cost of general anesthesia in equine.
Figure (1). A. Dorsolateral - palmaromedial oblique view of the metacarpal region shows that there is a slightly displaced fracture on the distal fourth of the fourth splint bone. B. Dorsomedial - palmarolateral oblique view of the same horse shows a normal second splint bone. C. Dorsomedial - palmarolateral oblique view shows the stainless steel wire over the distal third of MC3 fracture site to precisely locate the bone fragment prior to surgery. D. Dorsomedial - palmarolateral oblique view post-surgery shows the fractured splint bone after the surgical removal of the bone fragment. E. Dorsomedial - palmarolateral oblique view acquired 3 months post-surgery shows that there is no bony reaction at the osteoectomy site.
Figure (2): Illustrates the preparation of the surgical site prior to surgery and the surgical excision of fractured splint bone in thoroughbred horses. A. Preparation of surgical side and placing the stainless steel wire above the distal half of splint bone to precisely locate the site of the bone fragment. B. Shows the surgical incision. C. Shows the procedure of blind dissection in order to lose the under skin tissues. D. Shows the removal of the bone fragment after detaching it from the surrounding tissues. E. Shows the suturing of the surgical wound. F. Shows the dressing and bandaging

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المستخلص: الأداء السيء للخيول الرياضية بسبب إصابة العضلات الهيكلية هو أمر شائع جدا في ليبيا. تم إدخال عدد من الخيول للأداء السيء لمخيول الرياضي، حيث كانت تعال من سوء الأداء ووجوب في القوانين الأمامية. تم فحص الخيول بشكل دقيق لتفحص وجود أي إصابات في العضلات الأمامية، وقد لوحظ وجود إجسادات في النهاية السفلى لعظمة المشط الرابعة. تم استخدام الصور الإشعاعية لتطبيع وجوهر العظام السفلى للخيول. تم استخدام أجهزة التصوير الإشعاعي لتحديد موقع الشظايا المراد استئصالها. استعرضت الصور الإشعاعية بعد التصوير الإشعاعي. تم استخدام جرعة من مادة النيازين بمعدل 1.1 مم لكل كجم من وزن الجسم، وبعد ذلك تم حقن المادة الصليبية بتحرير الشكل الكاملي. تم استخدام نقصان العظام للرعاية الصحية، بعد أسبوعين من العملية الجراحية، تم إجلاء الخيول مرة ثانية بسبب حالة حادة. أظهرت الصور الإشعاعية في النهاية، جودة عالية للخليط الجراحي، بعد إجراء العملية الجراحية. المختصرة المفتاحية: عرب الأرجل الأمامية، كسر عظام المشط الرابعة، الإزالة الجراحية لكسر عظام المشط الرابعة.