Use of Navicular Bursography in 97 Horses

Tracy A. Turner, DVM, MS, Dipl. ACVS

The injection of contrast material into the navicular bursa, accompanied by a subsequent radiographic examination, provides new and relevant information about pathologic damage to the navicular flexor fibrocartilage and the deep digital flexor tendon. It is the only diagnostic method currently being used that can determine whether adhesions have occurred between the navicular bone and deep flexor tendon. Author's address: Dept. of Clinical and Population Sciences, University of Minnesota, 1365 Gortner Ave., St. Paul, MN 55108.

1. Introduction

Many aspects of navicular disease, including the pathogenesis, diagnosis, and treatment, are controversial, in part because there is little agreement as to what characterizes this common disease.[1] The diagnosis of navicular disease is usually based on history, clinical signs, response to palmar digital analgesia, and the detection of radiographic abnormalities. However, many recent reports suggest the unreliability of radiographic changes within the navicular bone.[2] This has led many clinicians to view this disease as a syndrome because of the perceived nonspecificity of the history and clinical signs. Attempts have been made to characterize the clinical features of navicular disease and to utilize other techniques to improve its diagnosis.[1,3,4]

Pathologic diagnoses are usually made by radiography in conjunction with clinical examination. One theory on the pathogenesis of navicular disease suggests that the disease starts as a result of damage to the flexor cortical bone.[1] The palmaroproximal–palmarodistal (PP–PD) oblique (caudal tangential) radiographic projection has been utilized to evaluate the flexor surface of the navicular bone and the underlying compact bone.[1,3,4] The navicular bursa, the flexor fibrocartilage, and the tendon of the deep digital flexor cannot be imaged with plain film radiography. The technique of contrast navicular bursography can be used to illustrate structural alterations within these tissues. The objective of this report is to describe the technique and the use of contrast navicular bursography to image pathologic changes on the flexor surface of the navicular bone.

2. Materials and Methods

Ninety-seven horses presented to the University of Minnesota for palmar foot pain were evaluated by using contrast navicular bursography. Horses with palmar foot pain are in that group of lameness that is characterized by shortened stride, which is exacerbated when the horses turn in circles, and in which deep pain is noted in the foot (by means of hoof testers, distal limb flexion, or frog wedge). The lameness is alleviated by palmar digital analgesia, and there is no evidence of hoof capsular disease or injury or third phalanx disease or injury. Injection into the bursa was made from the palmar surface with the limb flexed at the carpus. Aseptic injection techniques were used to inject a 3-ml mixture of 1:1 contrast material and local anesthetic. The land-

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marks for needle insertion were just proximal to the central sulcus of the frog, with the needle directed in line with the apex of the frog and in a direction parallel to the ground surface of the hoof. A 20 gauge, 3.5-in. (~9 cm) needle was used. The needle was inserted until resistance was encountered; this was usually at 2/3 the length of the needle. If the needle was inserted further, it usually indicated incorrect placement. A lateral radiograph of the hoof was taken to confirm the position of the needle prior to injection. Ideally the needle should be midway between the proximal and distal borders. Once the needle position was confirmed, the bursa was injected with the contrast mixture and a second lateral hoof radiograph was taken to confirm the filling of the bursa. If the bursa has been injected, then a PP–PD oblique projection of the navicular bone was obtained.

3. Results

A distinct line of contrast material juxtaposed to the deep digital flexor tendon was normally separated from the navicular cortical bone by a layer of radiolucent fibrocartilage. Five basic findings were noted on contrast navicular bursography: (1) normal flexor fibrocartilage; (2) thinning or erosions of the flexor fibrocartilage, which was confirmed by a postmortem examination in three cases; (3) complete focal loss of the dye column, which was thought to be a result of flexor tendon adhesions to the bone and which was confirmed by a postmortem examination in two cases; (4) presence of flexor subchondral bone cystic defects, which were noted as focal filling of the flexor cortical area with contrast; and (5) fibrillation of the deep flexor tendon, which was noted as filling defects along the bursal surface of the deep flexor tendon. Normal fibrocartilage was seen in 13% of the examinations. Thinning or erosions of the flexor fibrocartilage was seen in 69% of the bursograms. Adhesions (loss of the dye column) were noted in 8% of the cases. Filling defects of the navicular flexor surface were noted in only 2% of the horses. Fibrillation of the deep flexor tendon was recognized in 21% of the horses.

When the cases were divided between horses with navicular pain and palmar foot pain according to the criteria described by Turner,[4] more interesting comparisons could be made. Horses with normal flexor cartilage were more likely to have navicular pain (8/97) rather than palmar foot pain (5/97). This is in contrast to horses with cartilage thinning or erosions, who were more likely to exhibit palmar foot pain (38/97 palmar foot pain vs. 29/97 for navicular pain). Horses thought to have adhesions were all in the navicular pain group, whereas there was no difference between horses with flexor filling defects (1/97 with palmar foot pain and 1/97 with navicular pain). Horses showing tendon fibrillation were also more likely to show palmar foot pain (14/97) rather than navicular pain (6/97). Contrast navicular bursography indicated pathology in the flexor cortex region 60% more often than plain-film radiography.

4. Discussion

Navicular bursography was devised to confirm an injection of local anesthetic into the bursa. The bursa is not only a small space but is also proximal to other synovial structures, such as the distal interphalangeal joint or distal tendon sheath. Because of this the bursa can be difficult to inject. The use of this technique allows one to know that the bursa injection has occurred. The contrast study was begun once it was realized that one could identify the flexor fibrocartilage of the navicular bone. Afterward, the changes that were noted were simply identified and recorded for every case.

Interestingly, normal flexor fibrocartilage was noted more frequently in horses thought to have navicular pain. This finding tends to refute the long-believed premise that navicular disease begins as damage to the flexor fibrocartilage, or at the very least it suggests that there may be more than one pathogenesis of navicular pain. Following these cases with subsequent bursography would be a method to follow the pathogenesis of these cases. To date, the bursography has not been repeated on any case.

The most common change noted on the bursograms was that of flexor cartilage thinning. However, when horses that were lame because of navicular pain were compared with horses that were lame because of other pain in the palmar foot, there was no statistical difference between the two groups, although the thinning occurred more frequently in the palmar foot pain group. This may reflect the fact that this change is a normal wearing process, or it may be either a primary or secondary response. Rooney has shown that toe-first landing can lead to this change.[5] Toe-first landing may be seen with any cause of palmar foot pain. It would follow, then, that the change in biomechanics from the toe-first landing is causing this thinning, rather than some other biomechanical reason. The results of this study would tend to support this reasoning, since this change was more common in palmar foot pain cases. Further, this would underline the importance of pain management in these cases in order to get the horse to load the foot correctly.

Adhesion formation was only noted in horses with navicular pain, whereas flexor filling defects occurred equally in navicular as well as other causes of palmar foot pain. This indicates that the adhesions are associated with navicular pain, but that defects on the flexor surface may be developmental and have no effect on pain. Lesions of the flexor surface of the deep flexor tendon have been noted, and some have suggested that this may be an early navicular pathology.[6] However, in this study, fraying of the tendon was seen more than two times more often in the palmar foot pain group. In most cases, tendon fraying was associated with flexor fibrocartilage

thinning and erosions (12/20 cases). At this time no speculation can be made concerning which came first.

5. Conclusions

Overall, navicular bursography is a simple technique that can be used to confirm injection into the navicular bursa and can also give valuable new information regarding pathology in the region of the navicular bone. Changes seen by means of contrast navicular bursography represent stages of pathologic damage and allow a more timely therapeutic intervention and more accurate prognostication. My approach to these types of cases is to develop a treatment strategy based on the individual case needs rather than to use a treatment formula. Bursography has improved the ability to identify pathology such as flexor cartilage erosions and to utilize therapy such as chondroprotective agents. The identification of tendon injuries causes concern for tendinitis, but then strict rest can be instituted to allow healing of the tendon; the identification of adhesions has been a grave prognostic indicator for conservative management. This technique also provides a means to study the pathogenesis of navicular disease or navicular pathology, because it provides important information about anatomical structures that could only be evaluated following a postmortem examination. By utilizing this technique, we can further our understanding of navicular problems.

References

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