DIMENSIONS IN SURGERY

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Surgical Case Report:

Carpal Shearing Injury

EMPHASIS:

When an automobile impacts a dog’s lower limb, commonly a shearing injury occurs. On one side the soft tissue structures, including the collateral ligament, are ground off. The underlying bone is often sheared off as well, to a greater or lesser extent.

Depending on the degree of skin loss, either primary closure, delayed primary closure or skin grafting may be required. The underlying orthopedic injury must of course be addressed, to restore proper weight bearing.

If the degree of bone loss is severe, then a pancarpal arthrodesis may be indicated, as described in a previous “Dimensions in Surgery” article. If the bone loss is minimal, then the joint does not need to be fused.

Stabilization of collateral ligament injuries using screws and a figure-of-eight wire is a common technique. However, particularly in smaller patients, placement of the screw into the small carpal bones or the metacarpals can be technically challenging. In addition, since the distal screw typically spans several bones, micromotion is present, which may produce pain and necessitate implant removal.

Restoration of collateral stability using heavy gauge suture material is a very effective technique, which avoids the above-mentioned concerns. In this paper, we will describe collateral stabilization by the use of suture.

PREOPERATIVE DIAGNOSTICS:

1. Physical Examination:

Axiom: Sedate the patient, to fully assess the stability of the joint.


Axiom: These radiographs should be taken with the patient sedated to ensure that the films are of diagnostic quality and that all bony abnormalities of the tarsus and foot are identified.

Axiom: Thoracic and abdominal radiographs are indicated if the patient was hit by a car or sustained other blunt injury. A positive contrast cystourethrogram may be needed if the integrity of the urinary tract is in question.

DANGER:

Before proceeding with surgery consider the viability of the foot. If the vascular supply is in question, conservative management may be the best initial choice, until the circulation to the foot has improved sufficiently to permit for a safe surgical procedure in this area.

4. ECG to check for traumatic myocarditis.

PREOPERATIVE CARE:

1. Indwelling cephalic catheter.

2. Intravenous anesthetic induction protocol (Ketamine/Valium, Propofol, etc.)

3. Endotracheal intubation and inflate cuff.

4. Isoflurane inhalant anesthesia to effect.

5. Lead II ECG and pulse oximetry monitoring during prep and surgery.

6. Clip and prepare the limb circumferentially.

7. Cefalexin 20 mg/kg IV immediately preoperatively.

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SURGICAL TECHNIQUE:

AXIOM: In many cases, delayed primary closure, second intention healing, or skin grafting may be needed. There is no need to delay orthopedic stabilization until the soft tissues have healed. It is preferable to stabilize the joint as early as patient stability permits, rather than waiting days or weeks to do so.

1. Extend the defect in the skin, by incising at the proximal and distal extent, if needed.

AXIOM: In many cases, the skin defect is large enough to give adequate exposure to the surgical field.

2. Debride all necrotic tissues.

3. Drill a 2.0 mm. hole, from cranial to caudal, in the distal radius at the origin of the collateral ligament (See Figure 1).

4. Similarly, drill a hole through the proximolateral edge of the second metacarpal bone.

AXIOM: Although the collateral ligament inserts on the radial carpal bone, generally there has been trauma to the lateral joint fascia over the entire region. The best stability is achieved by passing the suture from the radius to the metacarpal bone.

5. Pass one or two strands of heavy gauge nylon suture material through the holes, in a figure-of-eight pattern. In smaller patients, heavy gauge monofilament suture material such as polypropylene can be used.

6. Tie the suture (in smaller patients) or secure the nylon line by crimping a grommet (in larger patients) (See Figure 2).

AXIOM: Using a grommet is more effective with nylon line, rather than attempting to tie a knot with this cumbersome material.

7. If the skin can be closed with minimal tension, then primary closure is performed. If not, then partial closure, delayed primary closure, or some other form of grafting may be selected.

AXIOM: Do not succumb to the temptation of attempting to achieve a primary closure, using tight mattress sutures to pull the skin edges together with substantial tension. This can create a tourniquet effect, and could result in devitalization of the foot.

POSTOPERATIVE CARE:

1. Pain management using oral, injectable or transdermal analgesics.

2. Place a splint, to a level just distal to the elbow.

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AXIOM: If the splint extends to the elbow joint, there is a risk of a pressure sore developing over the olecranion.

3. Wound management, as needed, until the skin has healed.

4. Redress the splint, with the patient sedated, every two weeks until the splint is removed at eight weeks.

5. Follow-up radiographs at four to six weeks postop.

PROGNOSIS:
Do not give up on these severely traumatized limbs! In the great majority of cases, no matter how bad it may look on presentation, eventually wound healing can be achieved and a return to good functional weight bearing, if not normal weight bearing, is expected in almost all cases.

AUTHOR’S NOTE
If you have any questions concerning this paper, additional references, surgical supplies or sources of products mentioned or used in this protocol, please FAX us at 1-310-479-8976. We will answer your questions promptly.

Coming Attractions
In a previous “Dimensions in Surgery” article we described stabilization of carpal shearing injuries. As in the carpus, tarsal shearing injuries in which collateral ligament instability is lost can be stabilized using orthopedic screws and a figure-of-eight wire or suture. However, the same difficulties arise: in smaller patients, placement of the screw in the small tarsal bones or the metatarsis can be technically challenging. In addition, since the distal screw typically spans several bones, micromotion is present, which may produce pain and necessitate implant removal.

Stabilization using heavy gauge suture avoids these problems.

Next month, we shall outline our protocol for this procedure.

See you then!

Figure 2: This schematic drawing depicts a figure 8 stabilizing suture passed through the drill holes.
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