**Songbird Fracture Stabilization**

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**Fracture Diagnosis/Evaluation**

- Observation
- Palpation
- Radiography

Diagram courtesy of Leah Schimmel & NWRA Quick Reference

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**Fracture Terminology**

**Fracture Types**

- Fracture Terminology diagrams courtesy of NWRA Quick Reference

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**External Stabilization**

- Normal position = alignment
- Immobilize joints on either side of fracture
- Include a splint, especially if close to joint or >1 fracture
- Use wraps for temporary stabilization before surgery

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**Surgical Fixation**

- Precision is necessary when repairing wing fractures, not as critical with legs
- Allows for earlier return to function (prevents soft tissue contracture)

Surgery indicated for:
- Fractures close to the joint
- Open fractures (bone exposed)
- Displaced fractures
- Most humeral & femoral fractures

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**Fracture Healing: Wrapped**

- Contracture is a common concern in birds: **DO NOT** immobilize songbird extremities >2 weeks
- Songbirds usually heal in as little as 10-12 days
- Baby songbirds may heal in as little as 3-5 days – and grow quickly – check twice daily!!

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**Left Lateral View of Osprey**
Check All Bandaged Birds

- Dirty?
- Too tight?
- Too loose?
- Shifted?
- Bloody?
- Wet?
- Limb caught?

Wing Fractures: External Fixation

- Body wrap – humeral, clavicular, coracoid & scapular fractures
- Figure-of-8 wrap – fractures distal to the elbow
- F8 with splint – carpometacarpus or >1 fracture

Skeletal Anatomy: Wing

- 1 = clavicle
- 2 = coracoid
- 3 = scapula
- 4 = humerus
- 5 = radius
- 6 = ulna
- 6a = olecranon
- 7 = carpus
- 8 = P1 of digit I (alula)
- 9 = P2 of digit II (alula)
- 10 = major metacarpal bone
- 11 = minor metacarpal bone
- 12 = greater phalanx
- 13 = metacarpal-phalangeal joint
- 14 = lesser phalanx

Diagram courtesy of: NWRA Quick Reference

Pectoral Girdle Fractures

- Cage Rest
- Body wrap

Body Wrap–Humerus & Shoulder

Body Wrap
Figure of Eight

Figure of 8–Fxrs Distal to Elbow
Figures 5.6a—e. Splinted figure–of–8 wrap: (a) Insert splint material under normally–folded good wing, trace shape that includes wrist curve and wing edge extending caudally far enough to encompass elbow. (b) Cut out shape indicated and accompanying padding (such as Telfa™ pad, larger all around than template). (c–e) Use tape or glue stick to attach pad to lie between splint and injured wing. Begin and continue taping as shown. When finished, wing posture should be symmetrical to non–injured wing.

Artwork by Rebecca Duerr, adapted from originals by Joyce Long. Copied with permission from NWRA Topics in Wildlife Medicine IV: Orthopedics

**Metacarpal Splints**

- Thermoplastic material, Orfiplast™ or Samsplint™
- For MC–P injuries
- Protects leading edge
**Skeletal Anatomy: Leg**

- 1 = femur
- 2 = tibiotarsus
- 3 = fibula
- 4 = tarsometatarsus
- 5 = tarsal bones (condyles)
- 6 = 2 phalanges of digit I (hallux)
- 7 = 3 phalanges of digit II
- 8 = 4 phalanges of digit III
- 9 = 5 phalanges of digit IV

**Leg Fractures: External Fixation**

- Immobilize joints on either side of fracture
- Leg to body wrap – femur
- Splints – tibiotarsus, tarsometatarsus
- Sandals – toes

**Leg Wrap–Femur Fractures**

**First Wrap the Hock**

**Hock Wrap**

**Then Wrap the Leg to the Body**

*Diagram courtesy of: NWRA Quick Reference*
Leg Wrap–Femoral or TbT Fxr

Leg Wrap

Leg Wrap

Leg Wrap

Leg Wrap

Leg Wrap
Leg Wrap–Femoral Fracture
(alternate pattern as shown in NWRA Topics in Wildlife Medicine IV)

L splint–Tibiotarsal Fracture +/or Tarsometatarsal Fracture

L Splint–TBT +/or TMT Fxr

L Splint–TBT +/or TMT Fxr

L Splint–TBT +/or TMT Fxr

L Splint–TBT +/or TMT Fxr
Z Splint—Tibiotarsal Fxr

Straw Splint—Tarsometatarsal Fxr

Straw Splint—TMT Fxr

Straw Splint—TMT Fxr

Straw Splint—TMT Fxr

Straw Splint—TMT Fxr
Straw Splint—TMT Fxr

Diagrams from Garcelon and Bogue, Raptor Rehabilitation, 1977.

Sandals—Curl or Fxr’d Digits
- One or both feet; most often curl inward
- Riboflavin deficiency
- Poor incubating conditions
- Poor husbandry/substrate
- Genetic

(Most research has been done on chickens)

Toe Fracture(s)

Sandal

Sandal
Sandal

Used curved straw for splint, as hummingbird foot doesn’t normally lay open flat.

Beak Splints

- Missing portion = poor prognosis
- >¼ of the distal beak is **missing**, scissor-beak often results
- Evaluate prior to release:
  - Must be able to prehend food
  - Must be able to preen feathers
  - Consider species feeding and foraging requirements

Beak Splints

- Cut triangle from stiff aluminum foil
  - Scalpel blade pack
  - Suture pack
  - Freezer foil

- Form to beak
- Attach with superglue
- Trim if needed
- Falls off in 5-10 days
- Reapply if needed
Beak Splints

- Cut triangle from stiff aluminum foil
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- Trim if needed
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- Reapply if needed

Beak Splints: Upper Mandible

- Can be done in similar fashion to lower mandible
- Thermoplastic also works—bulkier but more stability

Questions?

More Information in:

Topics in Wildlife Medicine
Orthopedics
Volume 2, 2017
SONGBIRD FRACTURE IMMOBILIZATION

This is a guideline for immobilizing fractures. The key word here is *guideline*; there are significant differences in size, temperament, etc. from one species to another. You will need to use your experience and creativity to apply what you learn to varying situations.

Stabilization: When a bird arrives and you suspect a fracture, the first thing to do (in any case, fracture or not) is assess the bird's overall condition and stabilize it with fluids, pain meds, heat, etc. as indicated, before carrying out any further treatment. For severe or open fractures that appear to be treatable, it is advisable to do a quick body wrap to at least keep the affected limb from incurring further damage during stabilization.

If the bird is not in critical condition and does not require an emergency wrap, try to observe it in the box/cage. Look for symmetry of the wing carriage; the position of the wing often tells what the problem could be before you've even done the physical exam (see wing position diagram). Look for the use or non-use of each leg; also watch the wing carriage—a bird will often hold out a wing on the same side as a leg injury to help balance.

While the bird is stabilizing or resting in the box, assemble all materials you may need: scissors, Micropore® tape (or other paper), splint materials, Nolvasan® or Betadine solution® for cleaning wounds, Telfa®, antibiotics, analgesics, fluids, etc. Also try to prepare a cage for the bird, so it can go directly into it after being treated.

Examination: Examine the bird gently but thoroughly, carefully palpating each limb. Start at the shoulder and work your way out to the carpus, then do the same from the hip to the toes. Hold the ends of each bone firmly and gently push along the length of the bone. If the bone "gives" at any point, it may be fractured. This method is particularly helpful in assessing greenstick fractures in young birds. Record which bones are fractured and where on the bone the fracture is.

Once you have located one fracture, don't stop—there could be other fractures, especially if the bird has been hit by a car or captured by a cat or dog.

After a thorough exam has been done, consider the prognosis of the bird, keeping in mind the species, natural history, and overall body condition.

For open fractures, the wound should be thoroughly flushed with dilute antiseptic solution (use a sterile syringe and needle), being careful to avoid soaking the bird or getting fluid inside a fractured humerus or femur (pneumatic bones that connect to the air sacs). Once the wound has been thoroughly cleaned, rinse with sterile saline, dry the area as much as possible, and apply a Telfa® pad. Topicals such as triple antibiotic ointment and Nolvasan® cream should be avoided, as they can actually impede healing in some circumstances. If the bone end is exposed and you can't pull the bone ends into alignment, apply a sterile gel (e.g., Surgilube®) over the wound and cover it with Telfa® and Tegaderm® to keep them from drying out and becoming necrotic. This type of fracture will require surgical attention as soon as the bird is stable. Any bird with an open fracture should be started on antibiotics immediately [Clavamox® (.1cc/30g bw PO q12h) or Clindamycin (10mg/100g bw PO q12h) are good choices] and an anti-inflammatory/analgesic like meloxicam (.5-1mg/kg PO q12h).

WING FRACTURE IMMOBILIZATION

Treatment: In general, one person can wrap a smaller bird's wing, but it is usually easier on any bird (less handling time) if two people work together to immobilize the fracture. The wing should be positioned as normally as possible—don't over flex the joints. The wrap
and/or splints should immobilize the fracture but not the circulation. Movement of the fracture slows healing and increases the size of the callus and the risk of a non-union.

Wings are always wrapped in a flexed, natural position. The immobilization technique is based on the type of fracture:

**Humerus**—These fractures are difficult to align properly with external wraps. Surgical pinning is usually more effective but may not be possible depending on available veterinary time and skills. Wrap the wing to the body. Remember that the **body wrap** goes under the good wing and above the legs. It should fit snugly so that the bird's feet do not get caught in it, but make sure it is not so tight that it impedes the bird's breathing.

**Radius/Ulna**—The best scenario is when just one bone is broken, which allows the other to help keep the broken bone in alignment. Whether it's one bone or both, the wing is wrapped in a **figure-of-eight** bandage. If only one bone is broken, this wrap is usually all that is needed. A splint may also be indicated for a multiply-fractured bone(s). If the bird is excessively active, the wing may need to be wrapped to the body as well, but this is usually not necessary.

**Stabilization of fractures distal to the elbow**

Using Micropore™ or similar paper tape, start with the wrap end behind the carpus (wrist) (A), and apply the wrap down in the direction of the feathers. Come up behind the elbow (B), making sure to incorporate the axillary feathers (C) in the wrap. Continue the wrap towards the carpus (D), and come up behind the wrist to complete the **'Figure of 8'**. Repeat this pattern. If the wing is large/long, complete the wrap by circling the wing at the point of the elbow (E), making certain that the elbow is included in the wrap.

The position of the two wings should look the same, with both wings at the same height and the wrapped wing not protruding away from the body. Both wing tips should lie at the same level above the tail. When doing the body wrap (not shown), it is important not to wrap tightly, as this will impair the bird's ability to breathe!

** For figure-of-8 wraps, make sure the wrap goes over the elbow securely and does not extend off the back of the elbow!!!** The axillars (feathers over the scapula) must be included in the figure-of-8 wrap to ensure a snug fit up in the "wingpit".

Metacarpus/carpus—Again, a figure-of-8 wrap is usually sufficient for most birds, though a splint may be helpful; use THIN strips of Micropore® tape for small passerines. Keep in mind that open carpal fractures carry a very poor prognosis. Most carpal/metacarpal fractures in songbirds cannot be surgically pinned due to their size and a limited blood supply. Healing is also slow in this area for that same reason.

Coracoid/Clavicle/Scapula—When more than one of these bones is fractured, the prognosis is often poor; however release is still possible, especially for non-migratory passerines. The wing is wrapped in a body wrap and activity is restricted. Cage rest for 10–14 days is the key, and may be sufficient without a wrap as long as the wing isn't drooping. If the wing IS drooping, wrap it with a body wrap only. If any of these 3 bones is luxated/dislocated, the prognosis is grave and euthanasia is recommended.

**LEG FRACTURE IMMOBILIZATION**

**Treatment:** The injured leg should be positioned as normally as possible—don't over flex the joints. The wrap and/or splints should immobilize the fracture but not the circulation. Movement of the fracture slows healing and increases the size of the callus and the risk of a non-union. When possible, immobilize the joints on both ends of the bone that is fractured.

The position of immobilization depends on the species; most birds respond best if the leg is wrapped in a normal, partially flexed position; however, this may not always be practical.

**Immobilizing Leg Fractures**

Femur—The femur is difficult to immobilize effectively. In general, the leg is flexed and then taped to the body, being careful to not over flex the leg. A splint may be needed around the hock to keep the wrap from constricting the leg. Surgical pinning is advised as soon as the bird is stable.

Tibiotarsus—A tape wrap with or without a Z splint or tibiotarsal splint can be used on songbirds; in general, the leg is flexed and then taped to the body being careful to not over flex the leg. These fractures are easy to pin surgically, but generally hold a good prognosis for recovery even without surgery.

Tarsometatarsus—Try to immobilize in a normal position whenever possible. Padded splints, L splints, and straw splints work well on these fractures. Be careful that you don’t rotate the bone when immobilizing this bone. The hock should be immobilized in the splint-wrap or the fracture may not heal well.

Place leg in flexion, trying to align fracture fragments. Using Micropore® or other paper tape, secure the tibiotarsus to the tarsometatarsus so that the intact bone acts as a splint for the fractured bone. If the injury involves the proximal tibiotarsus or the very distal femur, the limb is also taped to the body.

Diagrams of the application of a toe splint from Garcelon and Bogue, Raptor Rehabilitation, 1977.
Digits - A broken toe on a small bird can be taped to an adjoining healthy toe. ‘Sandals’ secured with paper tape or plastic tape are very suitable for toe fractures or digits that remain flexed. Thermoplastic splints also work very well for toe and foot fractures.

Beak Fractures: A fractured beak that is missing a portion carries a poor prognosis unless only the tip of the beak is missing. When more than ¼ of the distal beak is missing, the beak tends to grow in very slowly and irregularly, often resulting in scissor-beak. Any beak fracture that has healed should be evaluated well prior to release: the bird must be able to grasp and manipulate food and preen feathers. Evaluate the feeding and foraging requirements of each species: an injury in one species may be treatable, but may be life threatening in another species. E.g., robins need to grasp and pull worms from the ground, cardinals need to crack seeds, hummingbirds need to probe flowers for nectar, and woodpeckers need to split open bark and extract larvae and insects.

When the fractured beak portion is still attached, splinting is often possible. A triangle cut from stiff aluminum foil (freezer quality) or a foil suture pack can be formed to the beak and attached with superglue or suture glue. This usually falls off in 5-10 days, approximately when the fracture is stable; reapply if longer time is needed.

General Considerations: After the fracture has been wrapped, place the bird in the cage and observe it. Is the wing carriage normal? Can the bird move around, feed itself, etc.? Does it fall into its water dish and get soaking wet? A bird with a leg or foot wrap should not have a bathing pan or large food dishes as bandages on wet feet can chafe and/or loosen.

If the bird appears relatively comfortable, the next thing to do is recheck it within 12 hours to see if there is any swelling or coldness in the extremities indicating that the wrap is too tight. For growing nestling birds, wraps should be checked very carefully at least TWICE DAILY for constriction. If a wrap appears too tight, loose, wet or soiled, change it!

Be sure to check the good foot/feet for signs of wear, pink areas, sores, etc. resulting from increased weight-bearing on that foot.

If the limb has been immobilized for more than 7 days, physical therapy may be needed to stretch out muscles and tendons. PT should be done gently any time a bandage is changed.

Fractures should be checked and re-evaluated after a certain amount of time (depends on species, type of fracture, age of the bird). In general:

Juvenile songbirds: check in 3-5 days; remove in 5-10 days
Adult songbirds: check in 5-7 days; remove in 10-14 days

Healing of the bone takes place in four stages: the initial hemorrhage and clot formation, formation of a fibrous soft callus, mineralization of the callus, and finally remodeling of the bone with use. Although the times above show when the wrap may be able to stay off, complete mineralization of the bone and a return to full strength can take weeks.

NO fracture should go more than 10 days without re-evaluation and perhaps a radiograph.

Growing birds or birds suspected of having metabolic bone disease (MBD; usually seen as soft bones and poor feathers) may benefit from calcium supplementation. Calcium Glubionate (Calcionate Syrup, Rugby Laboratories) can be used at .1ml/50g body weight, PO BID x 5-7 days, or a Calcium Slurry (100mg/mL) can be made by mixing 5g calcium carbonate powder + 10mL ORA-Plus suspension vehicle + 10mL water. Shake well and keep refrigerated. Discard after 30 days. (Source: NWRA Topics in Wildlife Medicine IV: Orthopedics).