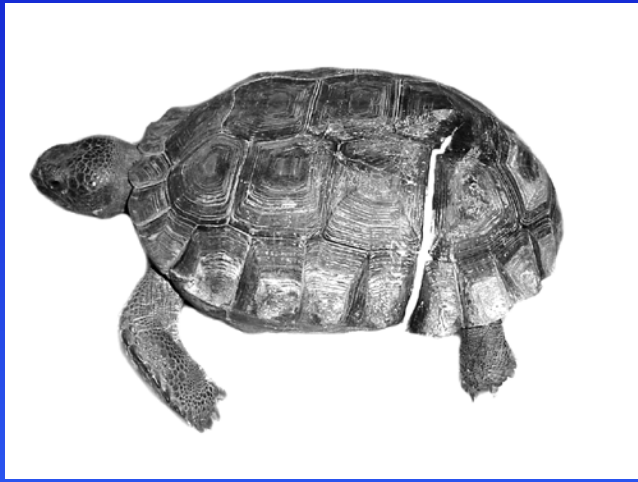
Chelonian Shell Fracture Management



Joshua Moore

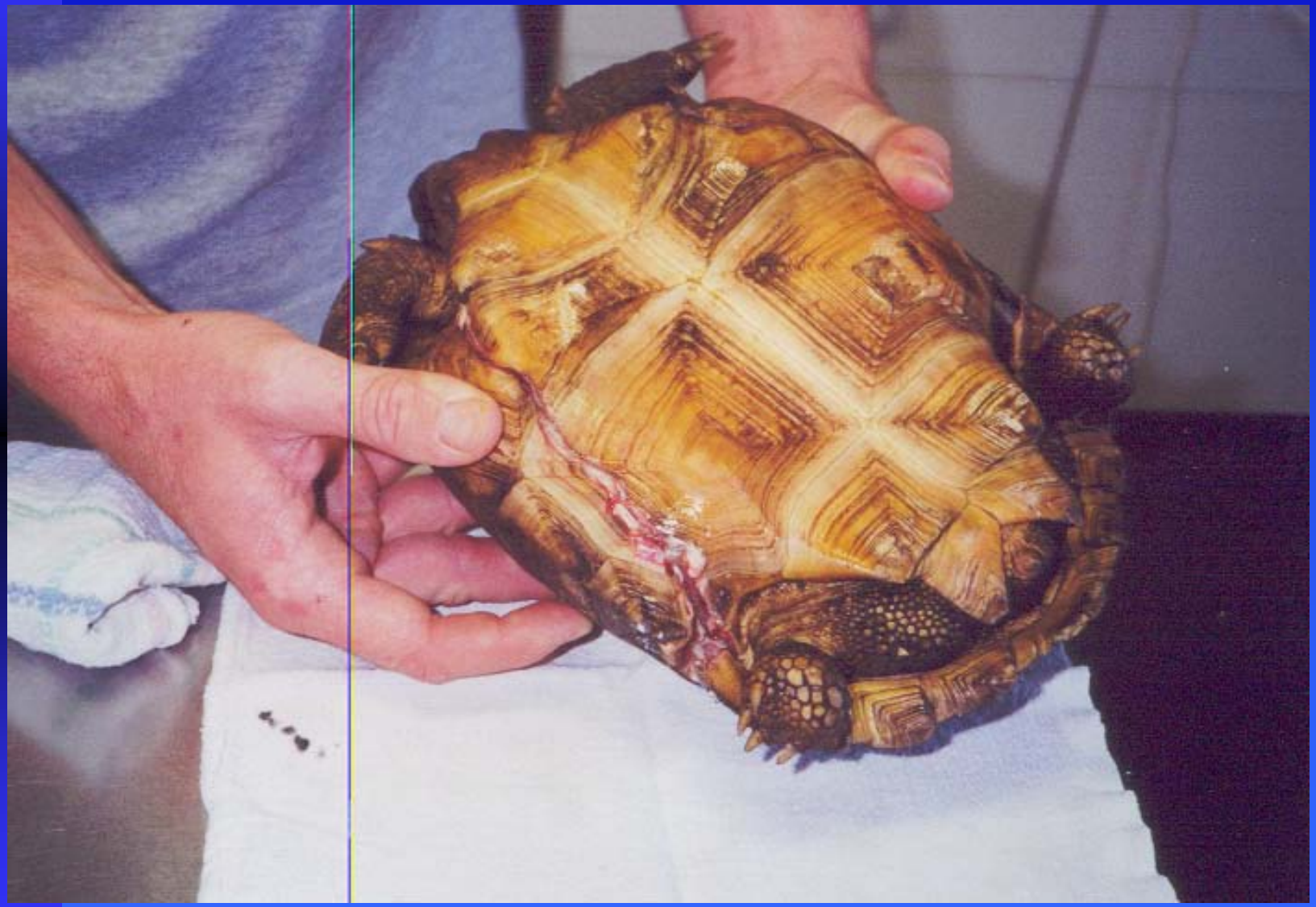
Florida Wildlife Hospital

Melbourne, FL

(321) 254-8843

e-mail Josh Moore

FloridaWildlifeHospital.org

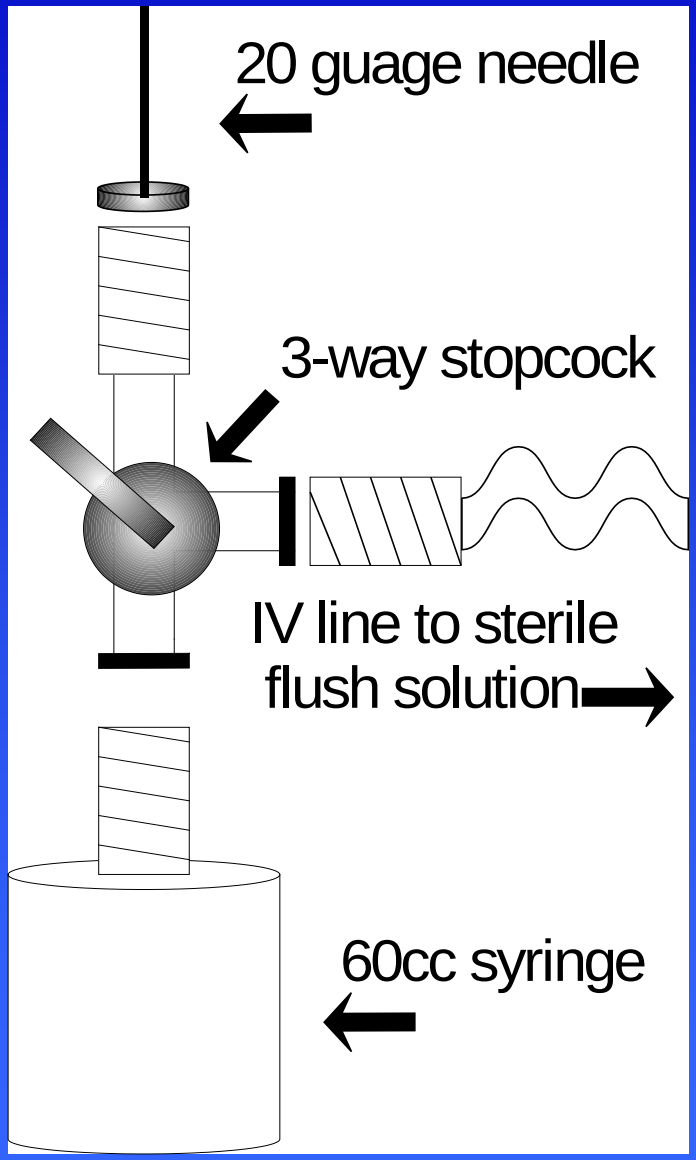


Repair? Fix? Manage!

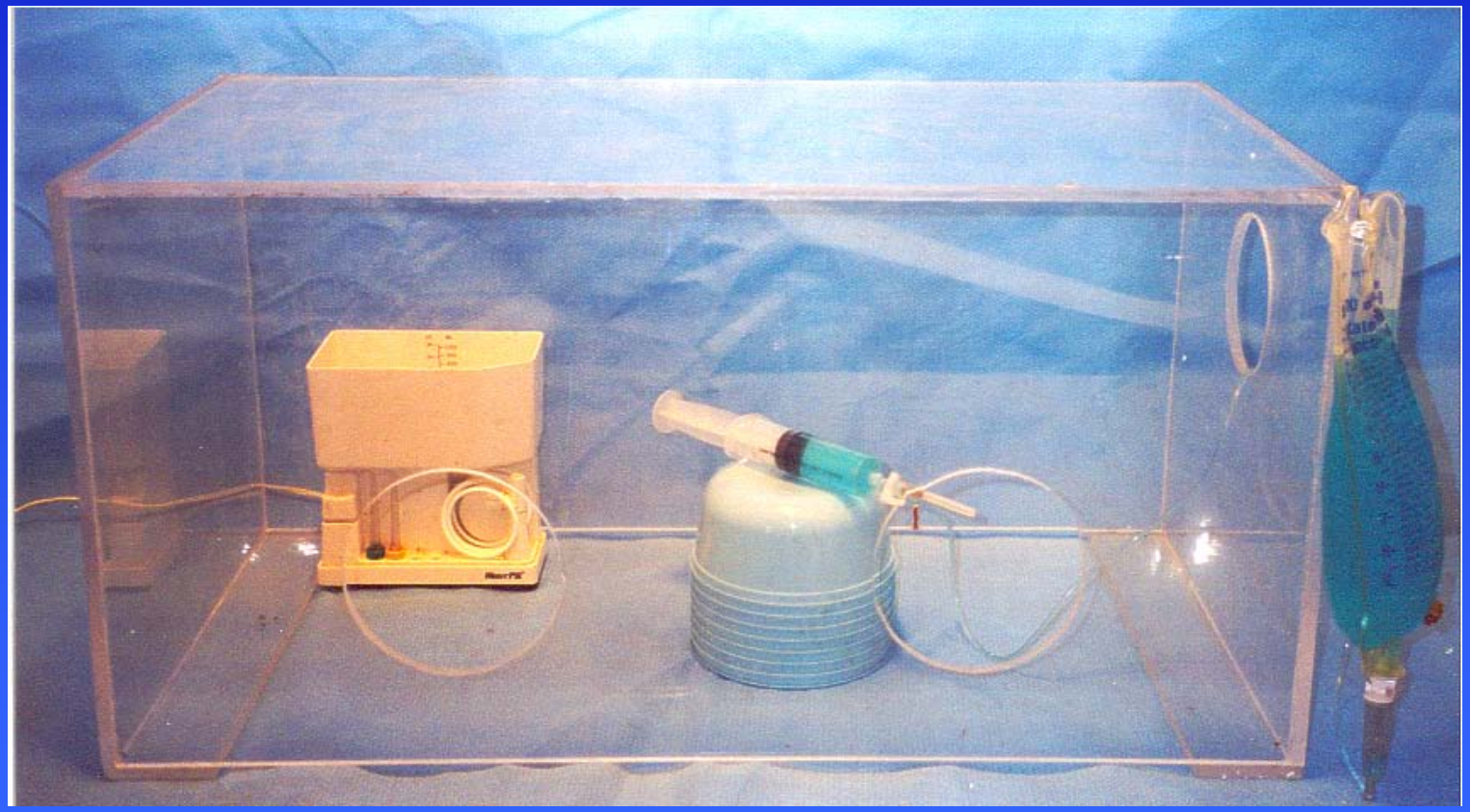
- Repairs should be saved for cars
- Fixing is what we do for broken windows
- Management is the way to guide people or “pieces” to do what we want without directly doing it.

Intake

- Stabilize
  - Gently wash away loose debris
    - Sterile fluids followed by sterilizing solutions, *Nolvasan* or *Povodine*
  - Remove occlusions
  - Relieve spinal pressure
  - Secure loose fragments


20 guage needle
3-way stopcock
IV line to sterile
flush solution
60cc syringe

Wash Station



Treatment

- Regular flushing of the wound using 4% *Nolvasan* or 0.1% *Povidone*
- Protect the tissue regularly with SSD cream
- Keep the wound covered
  - Tegaderm, medical tape, or absorbable material when necessary

SSD injection Tool

Treatment

- Maintain proper **diet** and supplement **nutrients** needed for healing
- Regular **U/V exposure**
- Maintain **thermal regulation** with heating source
- **Soak**
- Allow **grazing** when possible

Medications

Dexamethasone- IM SID, this should be given only on intake for spinal or cranial injuries. Prolonged usage can cause accumulation and affect healing.
Loading dose .25 mg/kg
Normal dose .15 mg/kg

Baytril- IM 5 mg/kg
Infection present, SID daily for 10 days.
Preventative, SID for first three days, and then SID every third day.

Amikacin- IM every 72 Hours
Loading dose 5mg/kg
Subsequent doses 2.5 mg/kg

Ketamine- IM, 22-44 mg/kg, 10-30 minute induction
Larger reptiles require lower per kilogram doses.

Lidocaine 2%- SC or topical, applied to area for local anesthetic

Realignment

- Realignment is not started until the wound is stabilized
- Loose fragments can be secured if necessary
- What to use?

Realignment Options

- Invasive
  - Orthopedic Screws (or wire)
- Non-Invasive
  - Orthodontic Braces (FWH Method)
  - Hook-Eye combos
  - Fiberglass
  - Metal strips
  - Other adhesive covers

Invasive –v- Non-Invasive

- Invasive (screws or wire)

  Pros

  - Secure
  - Allow continued monitoring and treatment
  - Removed after treatment

Invasive –v- Non-Invasive

- Invasive (screws or wire)

  Cons
  - Anesthesia
  - Antibiotics
  - Invasive
  - Sterility
  - Surgical skills

Invasive –v- Non-Invasive

- Non-Invasive (FWH method)

  Pros
  - Secure
  - Allow continued monitoring and treatment
  - Removed after treatment
  - Non-invasive
  - No anesthesia
  - Quick
  - No surgical skills required

Invasive –v- Non-Invasive

- Non-Invasive

  Cons

  If applied improperly, can be weak.

Orthodontic Brackets

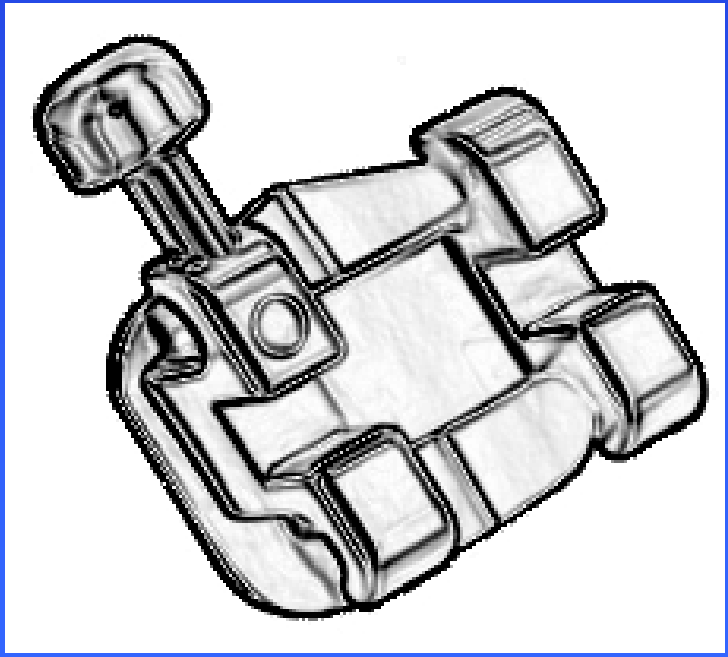
Why Orthodontic Brackets?

- Non-invasive
- Small and Unobstructive
- Upper design preformed for securing wire
- Lower design flat and textured for securing to surfaces

Small and Unobstructive

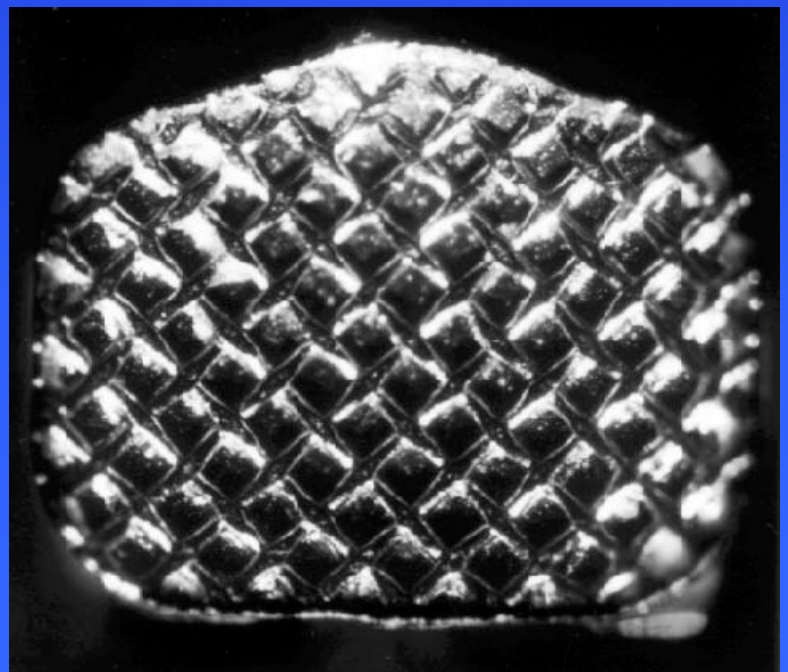
Upper Surface

-Preformed for securing wire

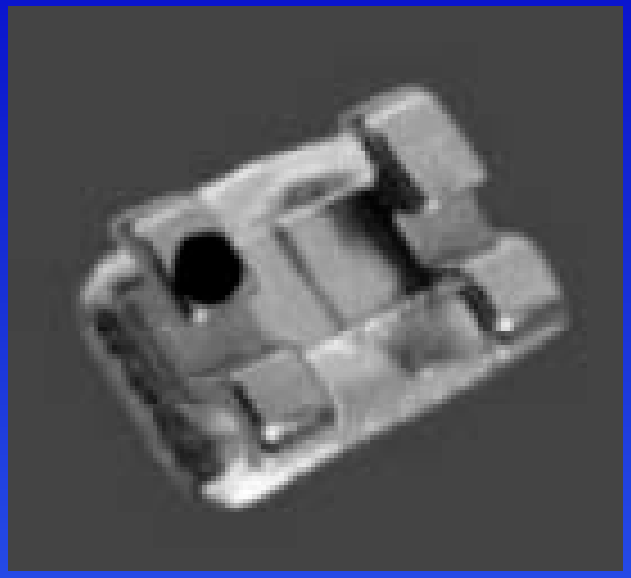


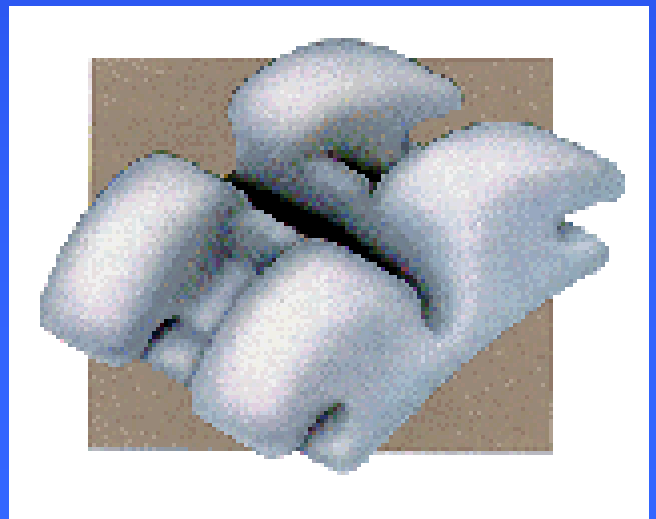
Lower Surface

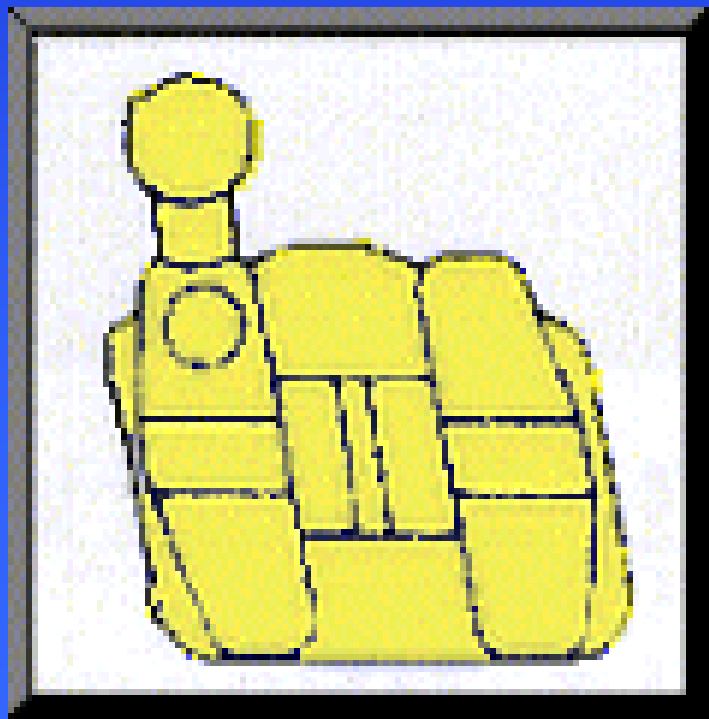
-Flat and textured for adhering to surfaces



Variety of Styles







Adhesives

- **Marine Tex®**
- **BondTech®**
  - 90 second 2-part epoxy
  - Poly-resin
  - Superglue
  - AquaMend®
  - *Dental acrylics**
  - *Hoof repair glue**

*Explored, but untested. We feel these products are to costly and or unnecessary.

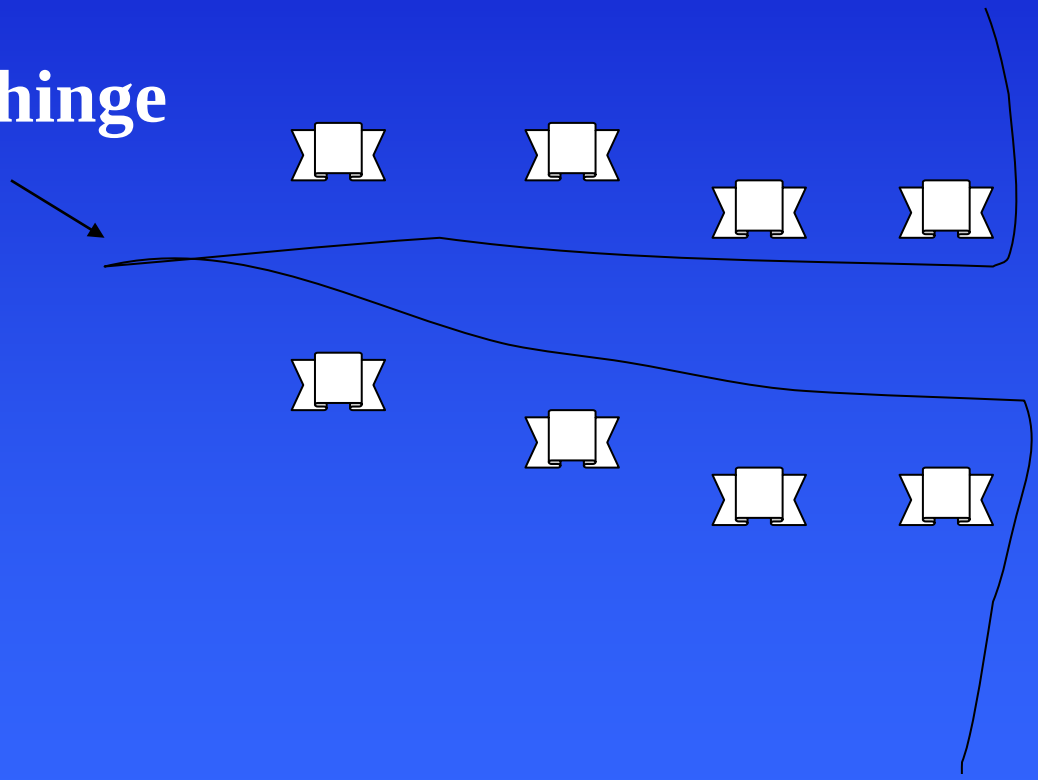
How?

- Design
- Prepare
- Secure
- Fasten

Design

- Placement
  - Optimized to reduce the distance between fragments
  - Tension should be perpendicular to fragment edges- avoid shearing
  - Use enough brackets to keep individual tension low
  - Avoid obstructing the fragment edge

Fracture hinge




MAR 14 2001

Secure w/ Marine Tex

- Etch placement areas
- Place a small dab of *MT*
- Place bracket on *MT*
  - Make sure the base is slightly covered over, and the hooks are not obstructed
  - Allow 5-7 hours to dry

Marine Tex

Hardware and Marine Supply Stores

Secure w/ BondTech

- Etch site
- Apply small amount of accelerator to site
- Hold bracket in forceps and apply small drop of adhesive to bottom of bracket and place at site
- Hold 10 seconds and release

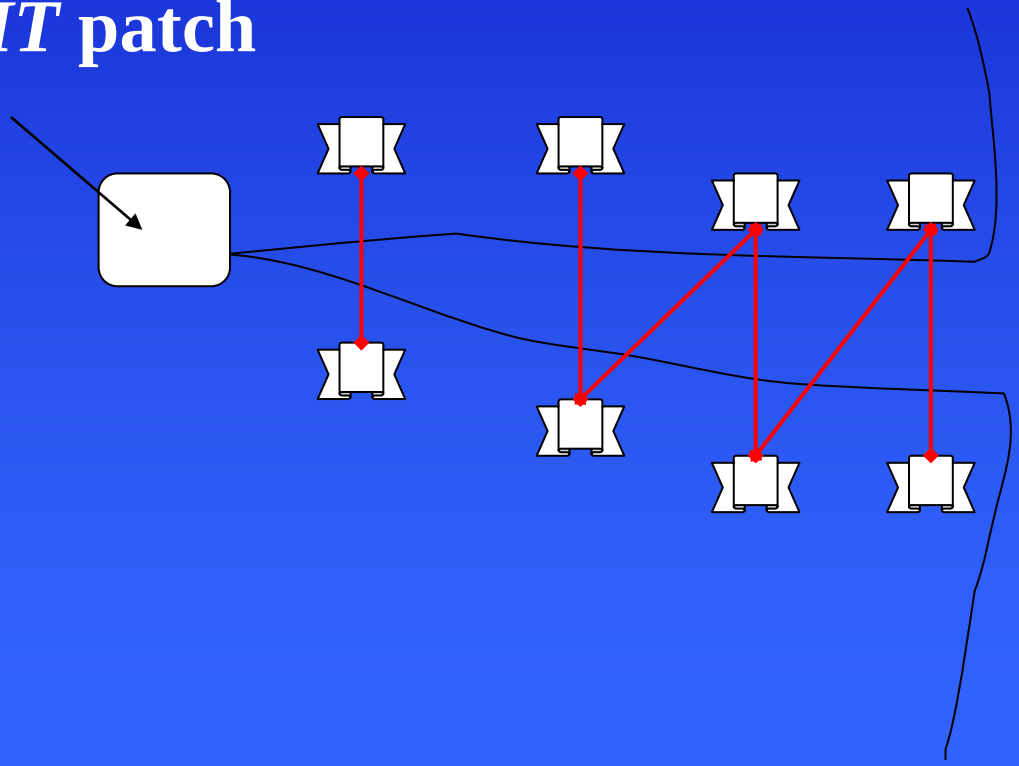
BondTech Glue

www.bondtechglue.com

Fasten

- Secure the wire to the loose fragment first
- Pull tightly and secure the wire to the next bracket
  - All loose brackets can be started before tightening. This will make it quicker and cleaner to fit the fragments together

Fracture hinge w/ *MT* patch

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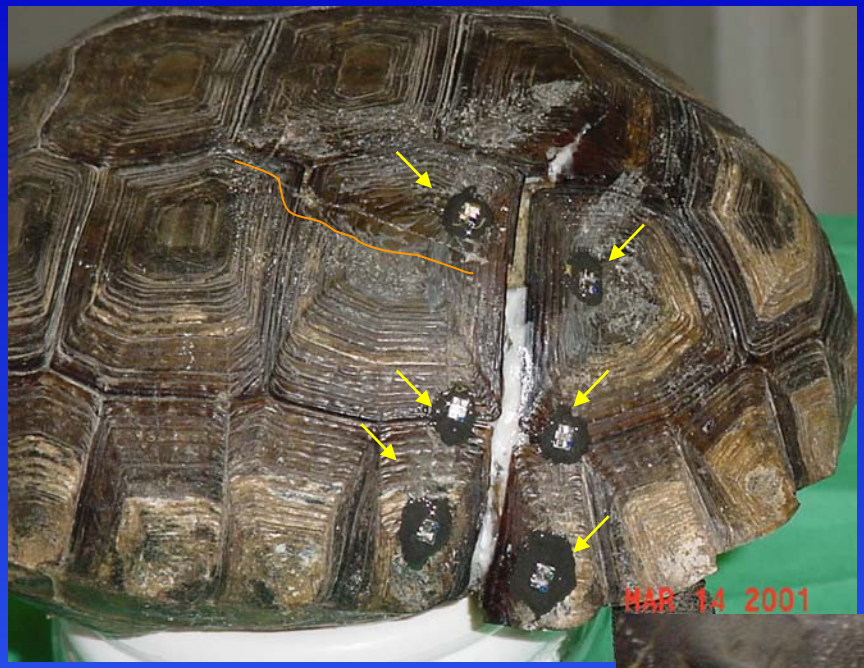
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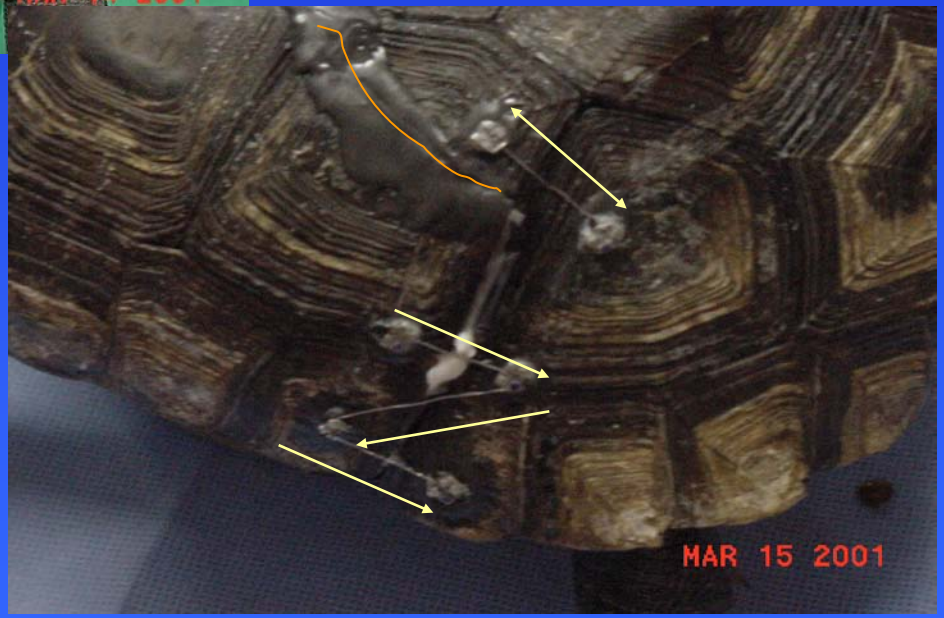
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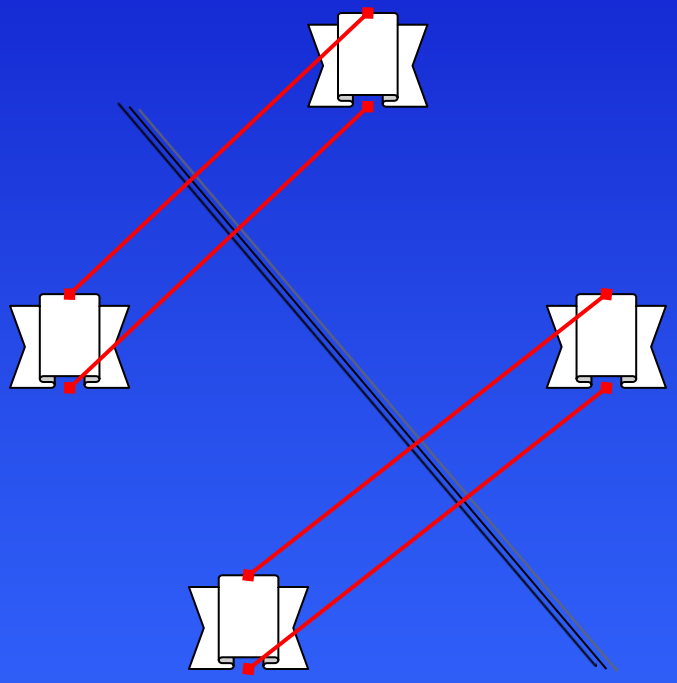

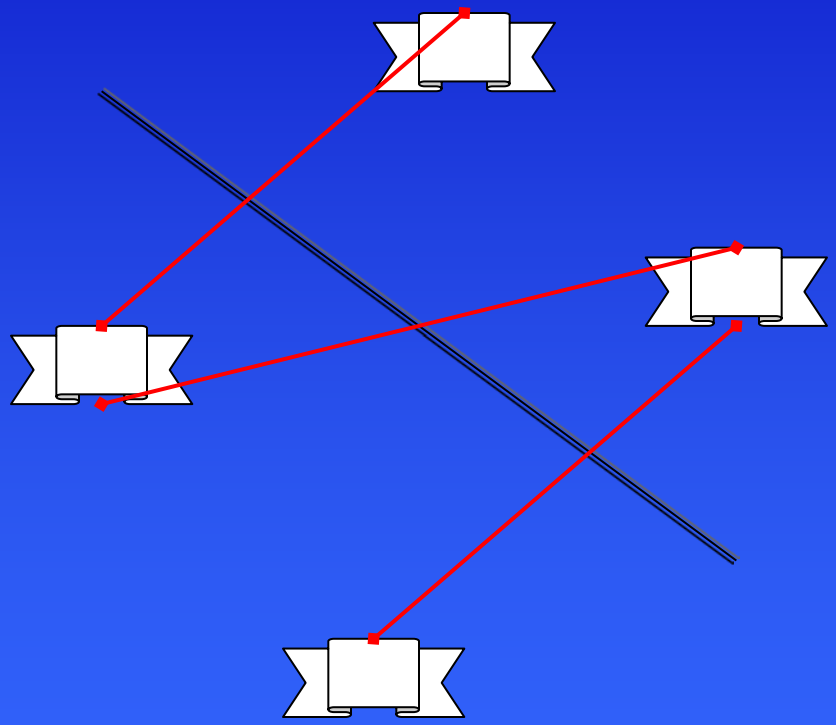

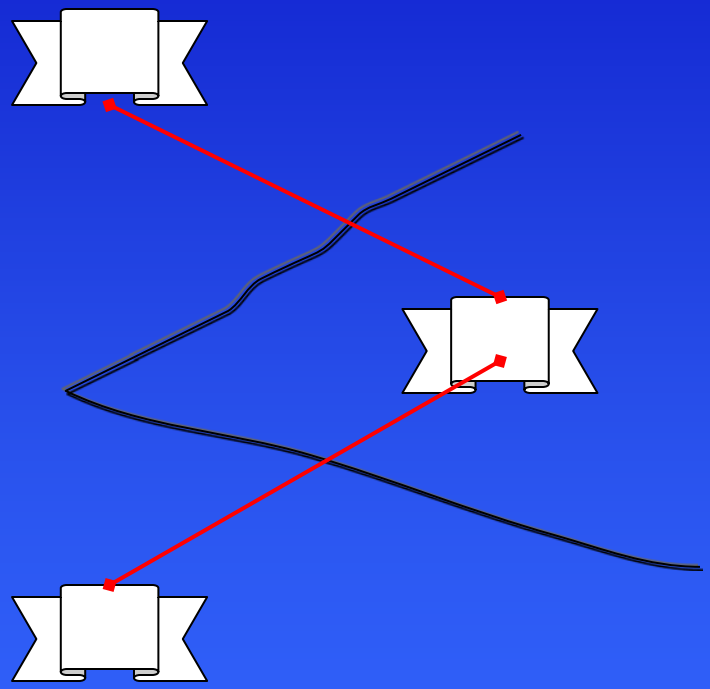

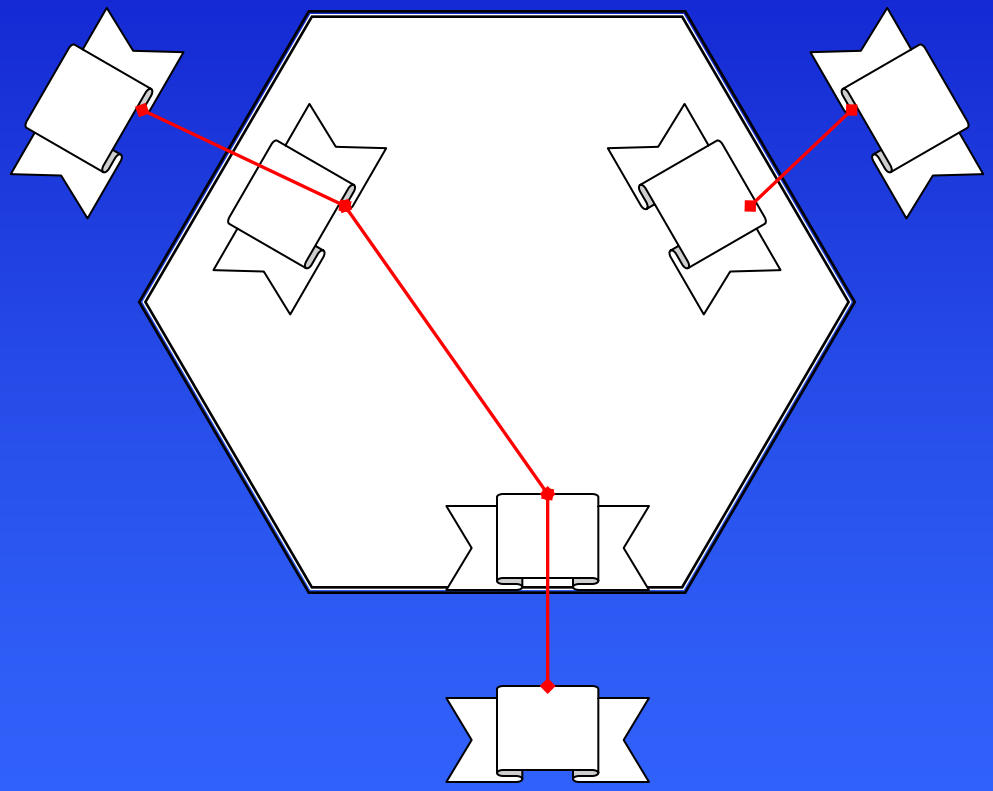


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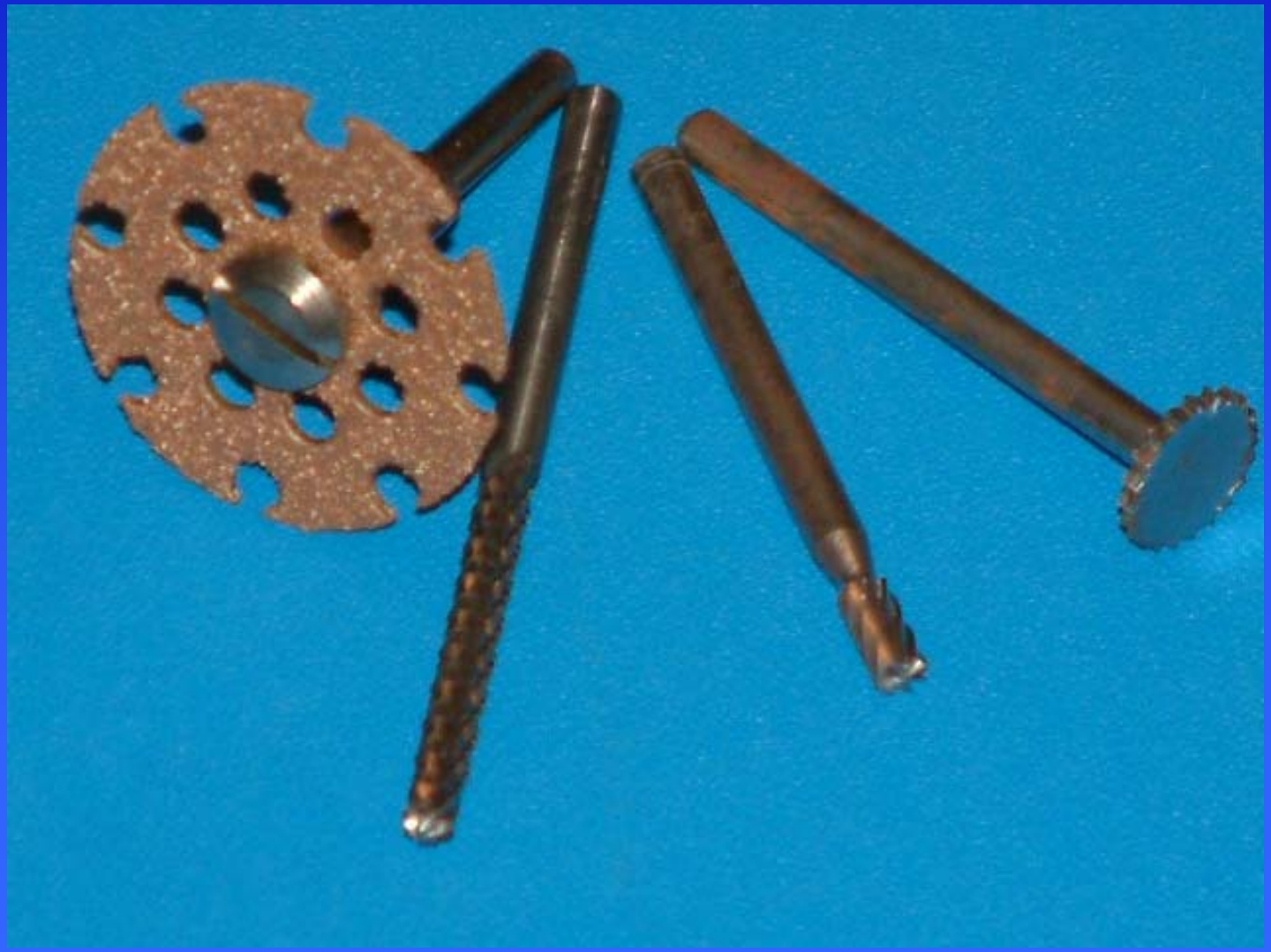
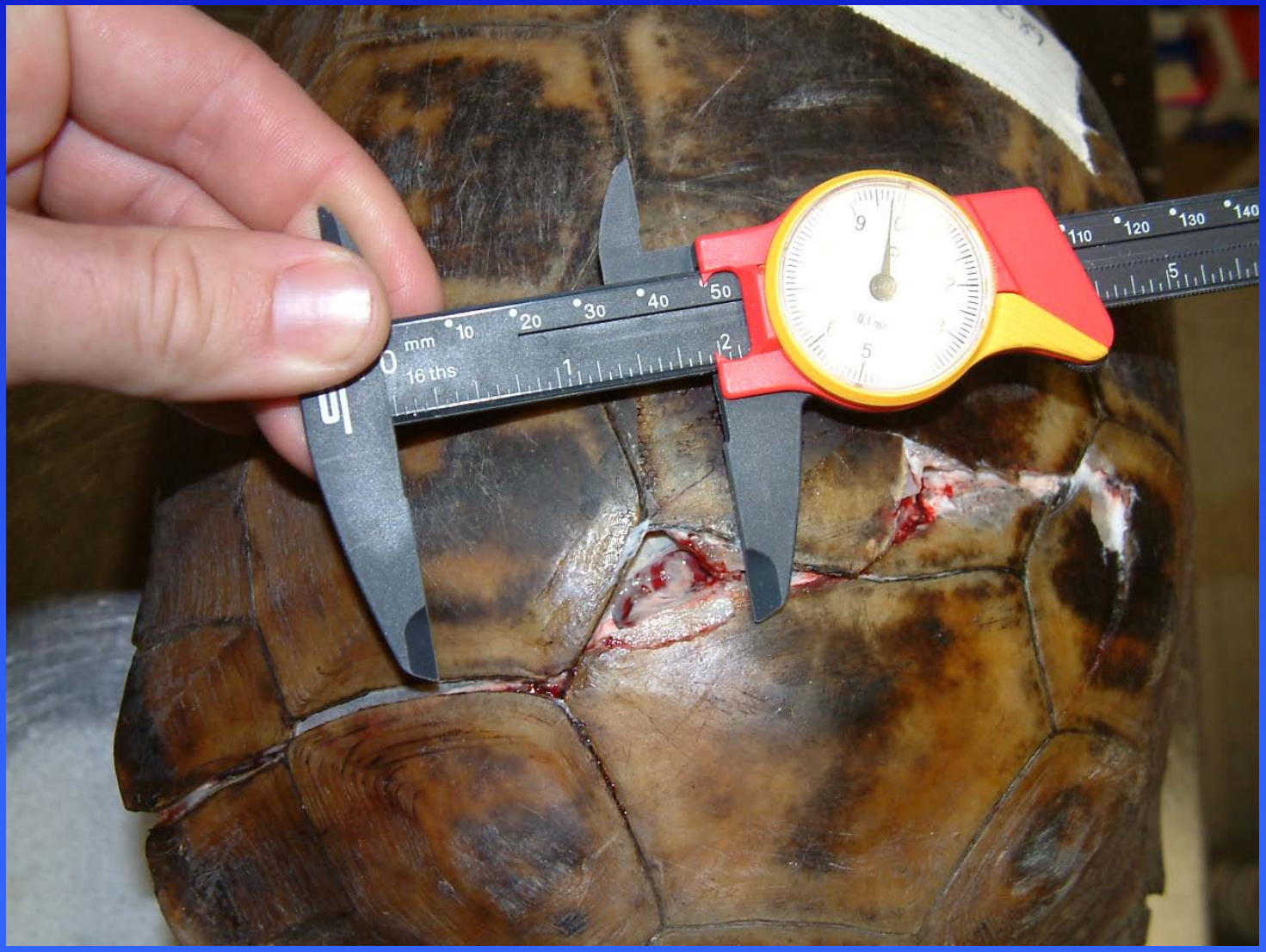
Repair Tools

Cutting Tools

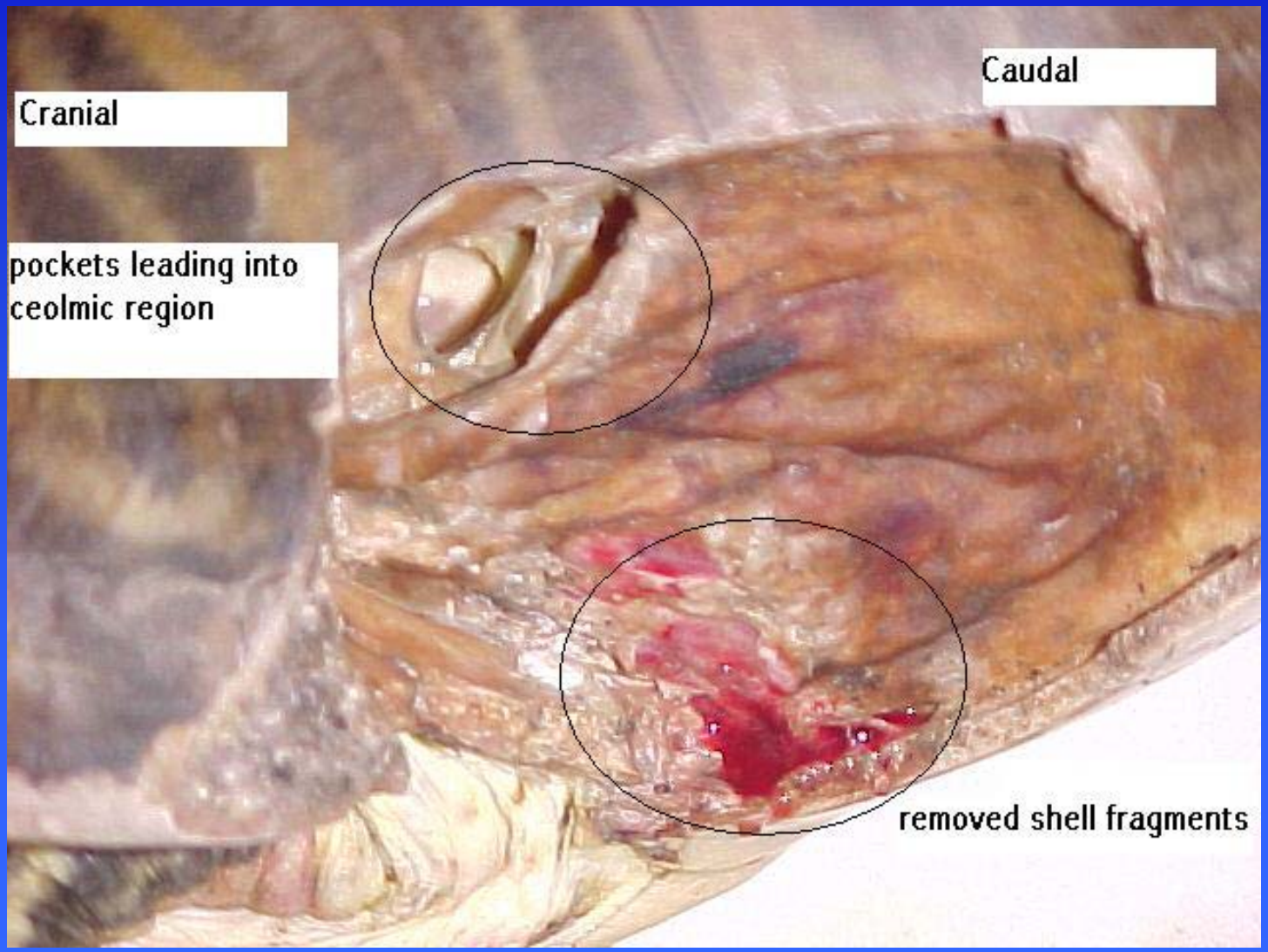


Picks for debriding and fragment manipulation

Monitor Progress of Healing



Non-Candidates



Patching

- Sterilize wound
- Rapid heat dry
- Inject SSD as resilient antibiotic
- Cover with Tegaderm and trim to within 10mm of the wound edge
- Tape boundary beyond 10mm of Tegaderm
- Begin by applying the *MT* around the edges and working inward

Patching

Patching

Old Wounds

Old Wounds

New Shell Growth

New Shell Growth

Acknowledgments

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