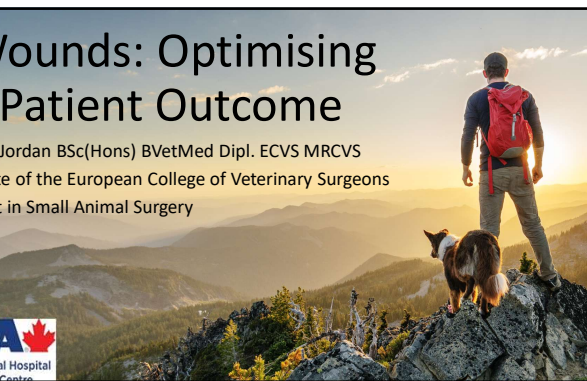


Wounds: Optimising Patient Outcome

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Background




- Veterinary degree from The Royal Veterinary College (RVC), London, England.
- Passed NAVLE in final year at vet school.
- Two years in first opinion small animal general practice.
- One year multi-disciplinary internship at The RVC.
- One year surgical internship at The RVC.
- Three year European College of Veterinary Surgeons (ECVS) residency at AndersonMoore's Veterinary Specialists, Winchester, England.
- Two years at Fitzpatrick Referrals, Guildford, England.
- Started at Tri Lake Animal Hospital and Referral Centre in September 2017.

Optimal outcome?




- Rapid assessment to mitigate risk.
- Stabilisation of patient.
- Protection of wound and local structures.
- Well defined management plan.
- Early and definitive control of infection.
- Minimize pain and discomfort.
- Rapid return to normal function.
- Durable scar.
- **Appropriate management of expectations.**

Lecture Overview




- Defining wound types.
- Management framework.
- Case examples.
- Key points.
- Questions.
- Revisit case example outcomes.
- Additional case examples...

Wound classification



- Size.
- Type.
- Location.
- Partial thickness vs. full thickness.
- Tissues involved.
- Time frame since injury.
- Stage.
- Aetiology.
- Condition of surrounding skin and tissues.

Laceration



- Thickness.
- Local structures.

Abrasion/Shearing

- Thickness.
- Local structures.

Crushing

- Often only manifests 3-5 days after trauma.

Avulsion

- Often only manifests 3-5 days after trauma.

Puncture

- Cause.
- Depth.
- What area could be covered by subcutaneous tearing component?
- Local structures.

Draining Sinus

- **SIGNIFICANT RISK OF MULTIDRUG RESISTANT INFECTION.**
- Location of nidus of infection?
- What is nidus of infection?

Burn

- Cause.
- Thermal.
- Caustic.

Indolent

- Remain in inflammatory phase and do not move to healing.
- **Cause?**

Bite

- 11% of emergencies in one study.
- Multiple components:
 - Puncture.
 - Laceration.
 - Crush.
 - Avulsion.
 - Tearing.

Cervical Bite Wounds

- 25% of bite wounds involve the cervical region
- Punctures (53%) and lacerations (15%) most common wound types.
- 25% of animals have injuries to vital structures:
 - airway injury in 11%-17%.
 - Jugular vein, hyoid apparatus, mandibular salivary gland, pharynx and oesophagus.
- Temporary tracheostomy was performed in three animals.
- Outcome:
 - 96% survived to discharge.
 - Two dogs died from septic shock related to their injuries.

Iatrogenic/surgical

- Controlled.
- High expectation of healing.

Surgical Dehiscence

- **Cause?**
 - Tension.
 - Infection.
 - Poor tissue handling.
 - Excessive movement/poor client/patient compliance.

Management Stages

- First aid.
- Initial management plan.
- Ongoing management plan.
- Healed!

First Aid

Biosecurity

- Mitigates hospital contamination.
- Mitigates wound contamination.
- Personal Protective Equipment
 - Gloves are mandatory.
- Isolation/car park/car.
- Decontaminate consult room.

Patient assessment

- Full patient assessment.
- Full history.
- Full clinical examination.
- Emergent:
 - Immediate triage.
 - 'Minimum database'.

Wound first aid

- Haemostasis.
- Protect underlying structures.
- Life threatening?
 - current extent.
 - sequelae.
- Cover.
- Local instability?
 - supportive dressing should be placed.

Initial Management

Initial wound assessment

- Ideally asses under general anaesthesia or heavy sedation.
- **Good light!**
- **Clip:**
 - Fill wound with sterile lubricant.
 - Clip all hair from around wound beyond where normal skin has been exposed.
- Wear sterile gloves to improve dexterity and allow deep exploration of larger wounds.
- Lift up wound edges.
- Use sterile probe.

Initial wound assessment

- Which structures have been damaged or could have been damaged?
- **Review local anatomy.**
- What stage of locomotion may the wound have occurred?
- Is further imaging indicated?

Contamination vs. Infection

The diagram shows three stages of wound progression from left to right: Contaminated and colonised, Critically colonised, and Infected. Each stage is accompanied by a graph showing the bacterial load over time. The 'Contaminated and colonised' stage shows a low, steady bacterial load. The 'Critically colonised' stage shows a rising bacterial load. The 'Infected' stage shows a high, rapidly increasing bacterial load. To the right of the diagram are three photographs of wounds: a clean laceration, a wound with increasing bacterial load, and a wound with a high bacterial load and associated host immune response.

- Contaminated and colonised**
 - Bacteria are present within the wound
 - They are not multiplying
 - There is a steady state of replicating organisms that maintains a presence in the wound but do not cause delayed healing.
- Critically colonised**
 - The bacterial burden in the wound bed is increasing
 - This burden initiates the body's immune response locally but not systemically
 - The wound is no longer healing at the expected rate.
- Infected**
 - Bacteria are present within the wound and are multiplying
 - There is an associated host immune response locally and then systemically
 - The wound is painful and may increase in size.

www.worldwidewounds.com

Contamination vs. Infection

- Even a 'clean' laceration <six hours old should be considered **contaminated**.
- **Infected:**
 - Grossly purulent.
 - Necrotic material.
 - Heavily contaminated with foreign material.
 - > six hours old.

Decontaminate

- Goal is to remove the majority of bacteria contaminating.
- Remove gross debris.
- Lavage.
- Should be performed as soon as possible but **ideally within six hours** of the wound occurring and **definitely within 12 hours**.
- **Chlorhexidine should not be used on wounds because it is cytotoxic.**
- **DRY!**

Deep culture

- Following decontamination
- **Culture of swabs of the superficial aspect of a wound most often does not represent the bacteria deeper in the wound.**
- Tissue culture more accurate than swab.

Antibiotic therapy

- Broad spectrum antibiotics:
 - should be administered intravenously as soon as possible **but** after a deep culture has been obtained.
- Duration:
 - 48 hours of intravenous antibiotics followed by five days of oral antibiotics.
 - Risk of septic arthritis
 - oral antibiotic therapy should be extended to four weeks.
- Discontinue antibiotics when healthy granulation tissue covers wound.

Initial management plan

- Surgical exploration:
 - Often indicated to enable appropriate assessment.
- Puncture wounds:
 - not possible to fully assess the extent of subcutaneous damage associated with puncture wounds without surgical exploration.
- Review the local anatomy:
 - explore wound from a local surgical approach that you are familiar with or can obtain a reference source.

Initial management plan

- Aseptic preparation:
 - Dilute povidone iodine.
 - Chlorhexidine should not be used because it is cytotoxic.
- Debride:
 - Excise unequivocally devitalized tissue.
- Lavage

Ongoing Management

Closure

- Primary closure/reconstruction ideal **BUT** only if not contraindicated.
- **Is closure contraindicated?**
 - Crushed and/or devitalized tissue may only manifest at up to seven days after injury.
 - manage with dressings and staged debridement for 5-7.
- Wounds that can be effectively decontaminated can be closed primarily where possible or using reconstruction techniques.

Effusion

- Leave wound fully or partially open.
- Drain
 - Should always exit the surgical site through a separate incision through healthy skin.
- 'Open' drain
 - external portion should always be covered by a dressing to mitigate nosocomial infection and hospital contamination.
- Remove when effusion significantly reduced and/or effusion cytology only nondegenerate neutrophils with no intracellular bacteria.

Dressings

- Is a dressing needed?
 - As a minimum, light dressing should be placed for at least 48 hours post-operatively.
- Type will vary based on:
 - Wound stage.
 - Discharge.
 - Support/protection needed.
 - Management plan.

Dressings

- Transport dressing:
 - Unstable patient being referred.
 - Haemostasis then even just wrap with incontinence pad and VetWrap.
- Debridement:
 - Wet to dry:
 - PAINFUL in place and when removed.
 - Honey:
 - Tube or dressing.
 - Change every 48 hours and lavaged.

Dressings

- Support:
 - Modified RJ.
 - Splint.
- Protection:
 - Light wrap.
- Other:
 - 'Tie over'/'stent'.

CLIENT EDUCATION!!!!

Ongoing management plan

- If a wound has not been primarily closed:
 - Repeat debridement.
 - Ongoing dressing management will be indicated at least until healthy granulation tissue covers the wound.
 - Frequency of dressing changes will depend on effusion and wound stage.
 - Avoid near joints/orifices due to contraction.
 - physical therapy.
 - Accurate descriptions and photos.

Time frame expectations.

Time after wound	Wound activity
5-10 minutes	Vasoconstriction and coagulation.
30-60 minutes	Vasodilation, transudation, leukocyte infiltration.
1-3 days	Inflammation: Transudation, migration of polymorphonuclear cells, cytokine cascades.
3-5 days	Early repair: macrophages beginning to predominate, proliferation of fibroblasts and endothelial cells.
4-6 days	Repair: Granulation tissue becomes established – wound resistant to infection.
5-7 days	Epithelialisation. Contraction of wound starts.
>7 days	Continued contraction and epithelialisation.

Healed!

Key Points

- PPE and biosecurity.
- Treat whole patient.
- Classify wound.
- Formulate a plan.
- Manage expectations.
- If you are not comfortable managing a case, contact a surgical Specialist to discuss the case.

QUESTIONS?