Regional limb perfusions (RLP) is a technique to deliver an antibiotic or other medication to a selected region of the limb through the venous system. Regional limb perfusions have changed and improved treatment of septic synovial structures in the distal limb in horses. Extremely high tissue and synovial fluid concentrations can be achieved with minimal systemic drug levels, thus maximizing effect of the drug administered while decreasing the odds of systemic side effects. RLPs are easily performed in the field and are cost effective.

Several techniques can be employed to perform RLPs in horses. Usually, the intravenous technique is preferred, but intraosseous RLP can be utilized as well if needed. The volume injected is usually between 10-60 ml total. For treatment of septic synovial structures or as a preventative measure in distal limb trauma/wounds, we usually prefer a concentration dependent antibiotic. In most cases the procedure can be performed in the standing, sedated patient. If the patient is already being anesthetized for surgery or another reason, RLP can be performed under general anesthesia. A wide rubber tourniquet is applied and a catheter is inserted into an available vessel (or IO administration) and 1/3 systemic dose (+/- mepivicaine, +/- saline or LRS). A quick prep can be performed over the vessel site, and a butterfly or short angiocatheter is used to administer the perfusion. Gauze should be applied over the puncture site with tape or Vetrap after the catheter is removed; leakage of blood or perfusate will occur if not due to the increased pressure created from the perfusate injection. While originally it was theorized that volume is needed for efficacy, as it pressurizes venous system, in more recent work, there is some question as to the exact volume needed and if a concentration gradient is more important the simply volume. The tourniquet is removed in 15-30 minutes. Surpass can be used over the injection site if it becomes inflamed and/or if repeated RLPs need to be administered.

If there is need to perform an intraosseous RLP, sedation is used and a local block performed over a suitable long bone (cannon, tibia, radius most common). A 4.0 mm drill bit is used to enter the medullary cavity, and the male end of an extension set will seat nicely into the hole drilled in the cortex. A hemostat can be used to clean the portal before use on subsequent days. It does typically become harder to inject each day as the drilled fills in. IO RLP may be helpful in select cases with severe limb swelling or thrombosis, laceration of vessel, etc.

Antimicrobial selection for RLP includes choosing a drug that is safe to administer intravenously. The ideal antimicrobial is bactericidal, concentration dependent and has low tissue toxicity. Commonly used antimicrobials include Gentamicin (250 mg-1 g), Amikacin (250 mg-1 g), and Ceftiofur (500 mg-1 g). The frequency and duration of RLP administrations recommended varies, but at our clinic typically administer RLPs once a day for 3 days.
Some cases that are more severe or highly contaminated may have 3 days of perfusions, then every other day treatment for 2-4 more treatments. Some have reported performing perfusions twice a day for severe cases, and we do perform RLPs twice a day in some instances. Similarly, if there is little contamination/not in joint we may perform only one treatment. I recommend using findings at presentation, progress, and response to therapy to decide the exact frequency and duration of RLP treatments.

Reasons for failure to achieve high antibiotic concentrations (> 10 times MIC) in the tissues or fluid of interest include: inadequate tourniquet pressure, inadequate/poor placement, low antimicrobial dose, rate and site of injection, individual variation in limb vasculature, movement of animal, body weight discrepancies affecting dose.

RLPs are appropriate for open/septic joints, osteomyelitis, wounds and may be a good technique for delivery of other treatments. They are easy to perform and can be done standing. Intravenous technique preferred in most cases. Aminoglycosides are appropriate for most cases, but many antimicrobials can be used.

*See reference list below and Appendix A for evidence-based analysis of RLP use.

References

Appendix A – credit to Dr. Paul Merkatoris (Large Animal Surgery Resident – Iowa State University)