TENDER LOVE AND CARE
To limit possible complications associated with the postsurgical bandage, you should educate clients about bandage care.
Role of the Veterinary Surgical Nurse in the Care of Orthopedic Patients

Veterinary surgical nurses (VSNs) are responsible for myriad roles in the preparation, care, and recovery of patients.¹ These responsibilities generally extend to all patients being treated surgically, but orthopedic surgery patients may require additional considerations compared with soft tissue surgery patients. These considerations include the need for coaptation, increased risk for infection, and use of supplemental modalities to enhance healing. Holistic approaches to analgesia (local, regional, and parenteral) may also fall under the umbrella of orthopedic surgical care, but this topic is outside of the scope of this article.

COAPTATION

Before Surgery
Knowledge of multiple external coaptation techniques enables the VSN to provide patients with appropriate care at all stages of orthopedic treatment. Preoperative coaptation, usually with a Robert Jones bandage, effectively stabilizes appendages distal to the elbow or stifle until surgical stabilization is possible.² The Robert Jones bandage, which is large and capable of immobilizing fracture sites, can be applied in 1 of 2 ways: traditional and modified. The traditional Robert Jones (FIGURE 1A) provides better stabilization; however, the more commonly applied modified Robert Jones (FIGURE 1B) enables daily examination and application of therapies (e.g., wound care) until surgical procedures are possible.² The modified Robert Jones bandage is smaller than the traditional, and consists of...
3 layers: cast padding, stretch gauze, and self-adhering tape. Application of a modified Robert Jones bandage can be viewed in FIGURES 2–6.

After Surgery
After the surgical repair has been completed, the VSN may be asked to apply further coaptation. External coaptation may be required for patients in whom rigid stabilization was not possible, to act as a barrier against surgical wound contamination, or to assist with continued immobilization of a joint. To limit possible complications associated with the postsurgical bandage, you should take care when applying and monitoring bandages and when educating clients about postoperative/bandage care.

Common complications associated with the use of external coaptation in animals include pressure sores, swelling, and ischemic injuries.

Pressure sores result from inappropriate forces on the soft tissues under the bandage. Poorly fitted bandages may result in abrasions from friction between the tissue and bandage material. A poor fit or lack of adequate padding over prominent areas of the skeleton may irritate the soft tissues. Bandages should be replaced when they become loose.

Swelling of the soft tissue around the bandage may result from inappropriate application. Attempts to limit postoperative swelling after orthopedic surgery have been studied, using modified Robert Jones bandages with and without the use of cold therapy. Neither compression with a modified Robert Jones bandage nor use of cold therapy in the postoperative period significantly reduced swelling or increased weight bearing on the limb. The use of light bandaging material to reduce incidence of nosocomial infection has been reported, and recently, use of a hydrogel liquid bandage was reported to be as effective as light bandaging material at reducing postoperative surgical site infection (SSI).

Ischemia, or loss of perfusion, results from bandages that are placed too tight or left on too long. Ischemic injuries are serious, and they can occur with all types of bandages. Bandage-related ischemia of the limbs results in loss of tissue function and, in severe cases, requires amputation of the limb. Bandages should always be placed firmly; to avoid creating a tourniquet effect, bandaging should begin at the distal end of a limb and progress to the proximal end.

SURGICAL SITE INFECTION
The rate of postoperative SSI is higher after orthopedic surgery than after other clean surgical procedures. A
study analyzing associated outcomes and costs after tibial plateau leveling osteotomy in dogs reported that on average, postoperative costs associated with SSI were $1559. The study dogs required an average of 4 postoperative visits associated with the SSI. These combined data confirm the detrimental effects of SSIs with regard to orthopedic procedures.

Multiple confounding factors have been reported to lead to SSI in orthopedic patients. Examples include use of cloth surgical gowns, prolonged anesthesia duration, lack of perioperative and postoperative antimicrobial prophylaxis, comorbidities (immune suppression, diabetes), and higher class of surgical wounds (TABLE 1).

The VSN may lower rates of SSI by acting as an infection control practitioner. In human medicine, infection control practitioners are often nurses with an interest, and possibly additional training, in infection control protocols. The jobs of the infection control practitioner involve developing infection prevention protocols, training new staff, monitoring and documenting infections, and answering questions about SSI prevention. The job of infection control is not meant to be all consuming; after protocols are in place, the infection control practitioner should need to provide minimal maintenance and analysis.

The infection control practitioner may institute protocols pertaining to SSI surveillance (active or passive), instrument sterilization and storage, preoperative surgical site preparation, and postoperative surgical site care.

SSI Surveillance

Active SSI surveillance requires preoperative bacterial culture of all patients’ skin to screen for carriers of methicillin-resistant Staphylococcus spp. as well as routine bacterial culture of treatment area and operating room surfaces to check for contamination. This information may prove to be useful, but Andrade et al. found that the bacteria in these routine samplings were not consistent with the bacteria identified in active SSIs. Therefore, this lack of correlation and the
economic burden of multiple bacterial cultures may make active SSI surveillance counterproductive.

Passive SSI surveillance has been shown to be effective and economical. Passive SSI surveillance relies on identifying and analyzing trends that lead to SSIs. These trends may include procedure location, participating staff, or preoperative surgical wound classification. In human surgical practice, analysis of specific feedback to surgeons was found to effectively lower SSI rates, but these data should be kept confidential to avoid any stigma for certain staff members associated with higher SSI rates.

**Instrument Care**

Protocols for appropriate sterilization of surgical equipment reduce risk for SSI. There are many ways to accomplish sterilization, although the most commonly used is steam sterilization in an autoclave. When equipment cannot be steam sterilized, chemical sterilization methods (e.g., ethylene oxide, hydrogen peroxide gas plasma) may be used. Because of the increased risk for SSI in surgical procedures involving implants, “flash sterilization” should not be used for these procedures except in emergency situations. For all cases, a high class (IV or V) indicator should be used to verify sterility of the pack contents; routine biological indicator tests should be run according to hospital protocols.

**Surgical Site Preparation and Care**

Preoperative skin preparation begins during the first interaction with patients and their caretakers. Comorbidities that put a patient at increased SSI risk should be noted and discussed with the veterinarian so that a plan can be implemented. Although some practices may test urine for bacteremia before elective surgery, a study found that bacteriuria found by urinalysis does not correlate with a positive urine culture and that these data should not be used to determine eligibility for surgery. In some human patients undergoing joint arthroplasty, chlorhexidine gluconate shampoo (2%) is used as a prophylactic body wash for several days before the procedure. A study reporting the use of preoperative chlorhexidine gluconate bathing regimes found a significantly lower incidence of SSI in high-risk patients receiving the treatment than in similar patients that were not prescribed the treatment. However, treatment or lack of treatment did not significantly impact the prevalence of SSI in patients with low
preoperative SSI risk. To my knowledge, this bathing regimen has not been reviewed in veterinary populations, but it may be effective for animals at high risk for SSI.

Postoperative SSI prevention in orthopedic patients may include appropriate handling of the surgical site, use of coaptation contact layers (thin, nonadherent sheets placed between the wound and other wound dressings), and the judicious use of antimicrobial therapies. The surgical site should be treated as an open wound, and the site should not be touched by personnel. The site should be aseptically cleaned of debris and covered with a protective layer before the patient leaves the operating suite. Antimicrobial therapies for prevention of SSI should be based on the risk for SSI.

The choice of preoperative and perioperative antimicrobial therapy should be guided by preoperative wound classification (TABLE 1), and the choice of postoperative antimicrobial therapy should be guided by any confounding factors (breaks in sterility, contamination, extended anesthesia time). In human medicine, antimicrobial therapy is not typically indicated for patients undergoing clean, low-risk procedures. However, various veterinary studies have shown a significant decrease in SSIs after orthopedic procedures when perioperative and postoperative antibiotics have been prescribed. The VSN should discuss individual risk assessments and SSI prevention plans with the surgeon.

**SUPPLEMENTAL MODALITIES TO IMPROVE OUTCOMES**

In addition to sterilization of instruments, surgical site preparation, and care, the VSN may also be expected to prepare or administer supplementary treatments to enhance healing. Such treatments include administration of platelet-rich plasma (PRP) and extracorporeal shock wave therapy (ESWT) under supervision of the clinician.

**Platelet-Rich Plasma**

PRP is a compound harvested from autologous blood. The blood sample is manipulated via specific protocols according to the instructions of the kit being used. VSNs should be capable of performing this sampling and preparation for administration as preoperative, perioperative, or postoperative therapy. PRP has many uses, including, but not limited to, significant gait improvement after untreated cranial cruciate ligament rupture, chondrocyte protection during injection of lidocaine into joints after arthroscopic procedures, and co-therapy during surgical repair of tendon rupture.

**Extracorporeal Shock Wave Therapy**

ESWT uses sound waves to stimulate an inflammatory response and treat various disease processes. Shock wave technology was first used as a low-energy, targeted treatment to break apart stones in the kidney and urinary bladder (lithotripsy). Low-energy, targeted devices exist in veterinary medicine, but high-energy devices have gained traction in the treatment of orthopedic disorders in equine and small animal practices. Clinical studies have shown multiple areas of

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td><strong>CLASS I</strong></td>
<td></td>
</tr>
<tr>
<td>Clean</td>
<td>Operative incisions that do not enter contaminated areas (alimentary, respiratory, or urogenital tracts)</td>
</tr>
<tr>
<td><strong>CLASS II</strong></td>
<td></td>
</tr>
<tr>
<td>Clean-contaminated</td>
<td>Operative incisions that enter the alimentary, respiratory, or urogenital tracts under controlled circumstances</td>
</tr>
<tr>
<td><strong>CLASS III</strong></td>
<td></td>
</tr>
<tr>
<td>Contaminated</td>
<td>Open, fresh wounds, or operations with major contamination events (e.g., spillage from the gastrointestinal tract)</td>
</tr>
<tr>
<td><strong>CLASS IV</strong></td>
<td></td>
</tr>
<tr>
<td>Dirty</td>
<td>Chronic, traumatic wounds with devitalized tissue or wounds with pre-existing infection</td>
</tr>
</tbody>
</table>

*Adapted from who.int/infection-prevention/tools/surgical/SSI-surveillance-protocol.pdf.
TABLE 2 Sterilization Methods

<table>
<thead>
<tr>
<th>MODALITY</th>
<th>SETTINGS</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIGH TEMPERATURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravity displacement autoclave</td>
<td>• Temperature: 250°F (121°C)</td>
<td>• Not good for temperature-sensitive items</td>
</tr>
<tr>
<td></td>
<td>• Cycle length: 30 min</td>
<td>• Drying cycle required</td>
</tr>
<tr>
<td>Pre-vacuum autoclave</td>
<td>• Temperature: 270°F (132°C)</td>
<td>• Biological indicator: Bacillus steatothermophilus</td>
</tr>
<tr>
<td></td>
<td>• Cycle length: 4 min</td>
<td></td>
</tr>
<tr>
<td><strong>LOW TEMPERATURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylene oxide</td>
<td>• Gas concentration: 450-1200 mg/L</td>
<td>• Ethylene oxide toxic</td>
</tr>
<tr>
<td></td>
<td>• Temperature: 84°–149°F (29°–65°C)</td>
<td>• Moisture contraindicated</td>
</tr>
<tr>
<td></td>
<td>• Exposure time: 2–5 h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cycle length: 12–24 h</td>
<td></td>
</tr>
<tr>
<td>Hydrogen peroxide gas plasma</td>
<td>• Temperature: &lt;122°F (50°C)</td>
<td>• Use of this modality is contraindicated</td>
</tr>
<tr>
<td></td>
<td>• Cycle length: 75 min</td>
<td>when processing linen or cellulose (paper)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>goods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manufacturer service unavailable for</td>
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<tr>
<td></td>
<td></td>
<td>veterinary medicine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Biological indicator: Geobacillus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>steatothermophilus</td>
</tr>
<tr>
<td>Paracetic acid</td>
<td>• 35% Paracetic acid</td>
<td>• Expensive</td>
</tr>
<tr>
<td></td>
<td>• Temperature: 122°F (50°C)</td>
<td>• Great for endoscopy</td>
</tr>
<tr>
<td></td>
<td>• Cycle length: 30 min</td>
<td>• Biological indicator: Geobacillus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>steatothermophilus</td>
</tr>
</tbody>
</table>

**References**


**CONCLUSIONS**

Veterinary surgical nurses have a wide variety of jobs and responsibilities. Many of these jobs relate to soft tissue, neurologic, or orthopedic surgeries; however, certain aspects of the VSN’s job focus more strongly on preparation and care of orthopedic surgery patients. Understanding and implementing these skills may help VSNs perform more successfully and improve patient outcomes. **TVN**

Disclosure
The author occasionally teaches ESWT therapy on behalf of Pulse Veterinary Technologies, LLC; this relationship did not influence the content of this article.