

Does Placement of the Patient Return Electrode Make a Difference?

VALLEYLAB Clinical Information Associates receive dozens of calls each month asking for patient return electrode (pad) placement suggestions. Placement of the patient return electrode **does** make a difference to the safety of surgical patients.

During electrosurgery, the current is flowing from an area of high concentration (the pencil or other instrument) to an area of lower concentration (patient return electrode). To place the return electrode in the "safest" area, the nurse must consider these five points:

Distance current must travel from active electrode to return electrode

The current must "push" its way through the body tissue. The farther it must travel, the more energy it will require. Example: if a return electrode is placed on the patient's calf during a head or neck procedure, the current must travel a great distance from the surgical site to the return electrode. The power setting must be increased, resulting in a greater likelihood that the current will divert from the intended path. The arms, flanks or even a muscular abdomen can be suitable sites for the patient return electrode. Remember, in an isolated system, the current returns to the generator through the return electrode but, in a ground referenced system, the current will attempt to reach ground through the path of least resistance. In either case, the current may take a path we do not intend. Keep the *intended* path as short as reasonably possible.

Selection and maintenance of a clean, dry pad site

Consider the length of the procedure. If it is a long procedure and/or the patient's position will be changed, the pad site should be easy to reach throughout the surgical procedure. Select a location near the surgical site, but take care that the

return electrode is not so close to a surgical area that it may become jeopardized by fluid invasion. Prep solutions, body fluids and irrigation may divert the electrical current which can potentially harm the patient. It may be necessary to protect the return electrode with an impervious adherent drape; however, do not enclose or seal over the entire return electrode with an impervious drape. Doing so could increase the site temperature, cause perspiration, and possibly dislodge the pad, resulting in a contact quality ("REM® System") alarm.

Pad sites must be free of lotions, oils and **excessive** hair. Body oils, lotions and **excessive** hair increase the resistance at the pad to patient interface. In these instances, wash and dry the site and remove hair if necessary. Likewise, do not choose a dry skin site due to the potential for high resistance.

Resistance of the tissue under the return electrode

Electrical current travels easily through vascular and muscular tissue, but less well through adipose, bone and scar tissue. These non-vascular tissues, as well as some drugs and diseases, will increase the impedance at the pad to patient interface. This may result in a need to increase the power setting. To avoid using higher power settings, place the return electrode on a well vascularized, muscular area. A bony prominence may cause "tenting" of the return electrode and will also cause current concentration at the tissue surrounding the bony prominence.

Prostheses, pacemakers, or metal "attachments"

Some prostheses, whether metal or plastic, are large and will have scar tissue encircling the implant. Scar tissue is high in resistance. Placing a return electrode over an area of high resistance may result in a temperature increase at the pad to patient interface. As the electrical current attempts to exit the



Jan Fickling RN, CNOR
Clinical Information Associate

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1-800-255-VLAB (8522) ext 2005

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Cherle Ryan Loeffler RN, BSN, CNOR
Clinical Information Associate

body via the less resistive (muscular/vascular) tissue, the skin temperature under the return electrode at the areas of current concentration will increase and could compromise skin integrity. Other joint prostheses, such as finger and knee replacements, are not considered good sites for return electrodes because of the convex, concave and irregular nature of the area.

For patients with existing pacemakers, contact the pacemaker manufacturer. If surgery is necessary, bipolar electrocautery is recommended. If monopolar electrocautery is required, select a pad site which will direct the current away from the heart and pacemaker generator. ICD's (internal cardiac defibrillators) must be deactivated prior to surgery. Contact the manufacturer. (Refer to Valleylab Hotline Newsletter Vol.1 Issue 2)

All jewelry should be removed from the patient preoperatively to help prevent current diversion. This includes body piercing jewelry. Metal of any kind can attract the current as it travels from the surgical site to the return electrode. Removing all metal objects and decreasing the distance between the surgical site and the pad will decrease the incidence of current diversion. (Valleylab Hotline Newsletter Vol. 1 Issue 1)

Return electrode placement during a bipolar procedure.

Do not place a patient return electrode on a patient undergoing a bipolar only surgical procedure. Doing so can waste time and money and could divert the electrical current from the tips of the bipolar instrument. In a bipolar only procedure, the current passes from one tip of the bipolar instrument to the other and does not require a return electrode. Many procedures, however, demand the use of both bipolar and monopolar electrocautery. Monopolar surgery **always** requires the use of a patient return electrode. If a return electrode is required because of the dual nature of the surgery, be aware of two facts:

- 1) Although unlikely, some current can be drawn away from the intended electrocautery pathway during bipolar surgery. If the return electrode is located close to the bipolar surgical site, the current may attempt to return to the generator via the return electrode instead of the intended bipolar instrument. The result may be a slight increase in the area of desiccation around the tip of the bipolar instrument.
- 2) There may be a need to increase the bipolar power setting slightly because the current is "pushing" its way to the return electrode as well as across the intended tissue to the adjacent bipolar instrument tip. Again, this would be a very rare occurrence and would be unlikely to do patient or staff harm. When placement of a return electrode for a bipolar/monopolar procedure is necessary, do not place the patient return electrode adjacent to the bipolar surgical site. Be aware of the potential for the current to travel to the return electrode.

Selecting an appropriate patient return electrode site saves valuable nursing time, reduces potential for complications, and limits legal liability. Evaluate patient return electrode "hold harmless" agreements. Terms may vary widely and mismatched accessories may void the agreement. **Always follow the instructions on the return electrode package. Each manufacturer has guidelines for the safe use of their product.** If you have questions, please call the VALLEYLAB Clinical Information Hotline. 800 255-VLAB (8522).