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Clinical Practice versus Field Surgery: A Discussion of the Regulations and Logistics of Implanting Radiotransmitters in Snakes

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Abstract

A major technology break in snake biology was the publication of surgical protocols for implanting radiotransmitters in the body cavities of snakes. While many researchers have reported using some variant of these protocols successfully, protocol details often vary from study to study and best-practice procedures are not easily determinable given the variety of circumstances over which studies occur. Although professional society standards and federal regulations make explicit recommendations about this surgical procedure, some of the nonstandard techniques recommended for this protocol may raise the eyebrows of institutional animal care and use committees. In this commentary we discuss regulatory and logistical aspects of the intracoelmic radiotransmitter implant procedure for snakes, and we provide a pragmatic framework for choosing among surgical variables. (WILDLIFE SOCIETY BULLETIN 34(5):1470–1471; 2006)

Key words

field surgery, institutional animal care and use committees, radiotelemetry, radiotransmitter, snakes.

The publication of surgical protocols for implanting radiotransmitters in the body cavities of snakes (Reinert and Cundall 1982, Hardy and Greene 1999) contributed to a substantial increase in research on this once understudied taxonomic group (see reviews in Reinert 1992, Shine and Bonnet 2000). Alternatives to intracoelomic implantation included force-feeding (Fitch and Shirer 1971, Osgood 1971, Fitch 1987, Lutterschmidt and Reinert 1990), fastening to the tail or body (Ciofi and Chelazzi 1991, Rathburn et al. 1993), and subcutaneous placement (Anderka and Weatherhead 1983, Weatherhead and Anderka 1984, Peterson 1987). Implanting radiotransmitters in the peritoneum had various advantages over other approaches and remains the most commonly used technique for snakes.

Though most researchers continue to use some variation of the Reinert and Cundall (1982) protocol, where the surgery is conducted, the type of equipment used, and the personnel performing the procedures often vary by study. In most instances the surgical environment is dictated by circumstances. The most common practice is for implantation to be done in the field under aseptic conditions, performed by trained research personnel using an anesthetic chamber (Hardy and Greene 2000), and this practice has been recommended in several publications by experienced individuals (Reinert 1992, Hardy and Greene 1999).

While experienced researchers have advocated performing implant surgeries in a field setting, many radiotelemetry studies of snakes are supported by federal funding and are governed by certain regulations and guidelines, specifically 1) the Animal Welfare Act (United States Code 1966), and 2) the Guide for the Care and Use of Laboratory Animals (National Research Council 1996). Although there are provisions for nontraditional species and references to professional society standards many local institutional animal care and use committees (IACUCs) may require biologists to abide by standard surgical and anesthesia methods.

Though local IACUCs may require researchers to adhere to standard surgical and anesthesia methods, having trained researchers perform implant surgeries in a field setting is within the bounds of federal regulations and professional society standards. For example the Guidelines for Use of Live Amphibians and Reptiles in Field and Laboratory Research (Herpetological Animal Care and Use Committee 2004), compiled by the American Society of Ichthyologists and Herpetologists, The Herpetologist League, and the Society for the Study of Amphibians and Reptiles, supports having trained technicians implant radiotransmitters under aseptic conditions according to species-specific protocols or expert opinion. Likewise, federal guidelines only require that institutions provide proof of training of individuals who will be performing surgeries and do not require technicians to have formal medical society certifications. It appears that many conflicts arising between local IACUCs and researchers over field-surgery protocols are due to differences in culture rather than regulatory constraint.

However, in some situations using standard clinical practices to implant radiotransmitters in snakes may be worthwhile, because highly trained veterinarians in well-equipped facilities may be better able to deal with surgical complications (e.g., anesthesia difficulties). Although the frequency of such complications typically is low, extra

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precaution may be justifiable when sample individuals are of noteworthy conservation, scientific, or monetary interest, as well as when sample sizes are small. In these types of situations, it may be advantageous to have a team of trained individuals (including veterinarians, technicians, and researchers) perform these procedures in a well-equipped, sterile surgical facility if available.

If researchers choose to have transmitters implanted in a clinical setting, one challenge is to identify skilled personnel, since few veterinary surgeons have extensive experience in surgical and anesthetic techniques using exotic animals. In addition, the costs of these procedures may be in excess of the budgetary constraints for many studies due to the high costs of anesthesia equipment and materials needed for strict aseptic surgical technique. If such a clinical approach is required, we suggest researchers seek out veterinarians experienced with radiotelemetry implant techniques and removal times be minimized, because it is conceivable that these factors may have an affect on behavioral patterns.

In other situations (e.g., large, long-term studies in remote locations) using the field-oriented protocol may be preferable. Although using this approach could conceivably result in complications or mortalities (especially when the surgeon is inexperienced), the long-term success rate may make this option worthwhile, especially if saved resources facilitate increased sample sizes.

Although the choice of particular radiotransmitter implant–protocol variables may be influenced by a variety of factors, authors of empirical publications rarely specify such variables beyond citing the basic Reinert and Cundall (1982) protocol. Researchers could improve reporting of surgical methodologies and empirical results (including negative results) in an effort to identify complications and best-practice procedures. Although best-practice procedures are subject to debate, we believe continued study and refinement of this technique is in the best interest of all parties.

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