Title: ANALYSIS OF ANESTHETICS AS REPORTED IN THE BIOMEDICAL LITERATURE

Authors: LJ Saidman, M.D., MS Scheller, M.D., TC Thomas, M.D.

Affiliation: Department of Anesthesiology H-770, University of California at San Diego, San Diego, CA 92103

Introduction: Experiments described in the biomedical literature frequently employ the administration of an anesthetic. In nonanesthesiology journals, the review process may not include anesthesiologists or other reviewers familiar with the many possible effects of anesthetic agents on physiology or data interpretation. In order to determine the incidence and character of suboptimal anesthetic design, reporting, or analysis of anesthetic effects, we examined articles from 5 biomedical journals with a questionnaire constructed to identify essentials of what we considered ideal anesthetic design, reporting, and analysis.

Methods: The five journals examined were, The Journal of Pharmacology and Experimental Therapeutics (JPET), The Journal of Applied Physiology (JAP), Surgery (SURG), Journal of Neurosurgery (JNSURG), and The Journal of Cardiovascular and Thoracic Surgery (JCTS). All original articles from 2 of the 5 journals were examined for the month of January 1987 only (JPET, JAP) while all original articles from the other three journals were examined for the three month period, January thru March, 1987. This allowed roughly equal numbers of articles from each journal to be included in the analysis. Each article was analyzed by one of three anesthesiologist reviewers with a standardized set of questions. Each article was analyzed for the type of experiment (e.g animal, human, tissue, etc.) and anesthetic technique(s) used. In addition, questions were answered for each article. Answers were either YES, NO, UNKNOWN (UK) or NOT APPLICABLE (NA). Because many of the answers fell into the NA category, only answers to questions about those articles reporting work which included the administration of a "relevant" anesthetic (i.e. one possibly affecting results or conclusions) were included in the data analysis. The numbers of each YES, NO or UNKNOWN answers were totalled for the individual questions and expressed as a percentage of answers to questions about articles in which a "relevant" anesthetic was administered.

Results: 254 articles were analyzed. Of these, 40% described human studies, 50% described animal studies and the remainder tissue or technical studies. Approximately 34% of the articles described experiments in which an anesthetic was administered which was thought by an anesthesiologist reviewer to be possibly important ("relevant") to the results or conclusions of the study. In 40% (14% of total) of these articles it was impossible to determine exactly what anesthetic techniques were used or which drugs were administered. Of these, two thirds (9% of total) were human outcome studies for which the type of anesthetic may not have mattered (e.g. the incidence of postoperative wound infections with various antibiotics). However, the remaining one third were animal studies where knowledge of the anesthetic may have been helpful in completely understanding the results. The questions and the percentages of YES, NO, and UNKNOWN answers to each of the questions are listed in Table 1.

Discussion: If this analysis is representative of the biomedical literature as a whole, it demonstrates that anesthetic administration is an integral part of a relatively high percentage of reported work in the medical sciences. It is clear from the data in Table 1 that basic facts about anesthetic administration such as which agents were used and in what doses are frequently omitted in peer reviewed published articles. Furthermore, it is clear that inattention to anesthetic depth, blood pressure, temperature and/or acid base status was frequently perceived by anesthesiologist reviewers as possibly diminishing the scientific quality of the work. The data indicate at the very least that many experiments are improperly conceived, reported or discussed from an anesthetic viewpoint. Just as it was determined that fully one half of the articles examined from a leading medical journal used improper statistical analyses when comparing the means of groups, it is clear that a similar arguement can be made for the improper application of current anesthetic knowledge.[1] On the basis of these data, it would seem prudent to suggest that qualified anesthesiologists be solicited by biomedical journal editors to selectively review anesthetic administration as reported by contributing authors in their journals.

TABLE 1-Answers to Specific Questions Expressed as (%) of answers to questions about articles in which "relevant" anesthetic was administered

	YES	NO	UK
Specific anesthetic agent(s) identified?	60	40	
Adequate description of anesthetic technique?	38	62	
Documentation of depth, e.g. ET or blood level?	9	91	
Was dose administered stated?	56	44	
Was temperature measured?	30		70
Could this have influenced results?	21	61	18
Was blood pressure measured?	43		57
Could this have influenced results?	24	62	14
Could anesthetic depth have been changing?	84	16	
Could this have influenced results?	35	51	14
Was this discussed adequately?	8	92	
Was method of ventilation stated?	39	61	
Were blood gases measured?	30		70
Could acid/base changes have influenced results?	48	44	8
Was an anesthetic control group used?	8	92	
Did anesthetic technique insure no conscious distress?	26		74
Was anesthetic reviewed by animal or human care committee?	15		85

References:

1. Godfrey K: Comparing the means of several groups. N Engl J Med 1985;313:1450-1456