

Excellent Experts Versus Witnessed Experts; Who Can Make the Difference Between Justice and Negligence?

Ashraf EL-Molla^{1a*}, Fawzia Aboul Fetouh^{2a}, Rashed Alotaibi^{3c}, Muteb Alotaibi^{4c}, Shaker Youssif^{5d}, Yasser Ali⁶, Yehya Alwahbi^{7c}, M. Taha^{8c}, Shagun B. Shah^{9f}, and Vakhtang Shoshiashvili^{10g}

¹Consultant of Anesthesiology & Intensive Care Medicine, ^aAssociated Clinical Researcher, Department of Anesthesia, Misr University for Science and Technology, EGYPT, Cairo; ²Professor of Anesthesiology, Dean of the faculty of Medicine; ³Director of Anesthesia Department; ^cPrince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia; ⁴Deputy of Anesthesia director; ⁵Consultant of Anesthesiology & Lecturer of Anesthesia & Postoperative Intensive Care, ^dAlexandria University; ⁶Consultant of anesthesiology, Egypt; ⁷Consultant of Anesthesiology; ⁸Senior registrar, ⁹Consultant of Anesthesiology, ^fRajiv Gandhi Institute and Research Center, Delhi, India; ¹⁰Professor of Anesthesiology, ^gDepartment of Anesthesiology and Intensive Care, Research Institute of Clinical Medicine, Tbilisi, Georgia; Faculty of medicine, European University, Tbilisi, Georgia

ABSTRACT

Introduction: Anesthesia is the major cause of death and disability in perfectly healthy young patients who are undergoing uncomplicated surgery. In medical practice, the common source of medicolegal proceedings is negligence. Negligence is proved in the court by assigning witnessed experts to handle the case and make fair scientific opinion. We were asked by the defendant to investigate the case and give an expert opinion whether he/she is guilty and provide our evidence based medical opinion for possible objection of the current decision. We will discuss medicolegal aspects in anesthesia and the standards of care by which anesthesiologists should abide as well as define malpractice. The role of expert witness will be explained and the ethical guidelines to be followed are outlined.

Case Presentation: 13-month old male patient, weighing 11 kg, underwent general anesthesia for lacrimal duct surgery, inhalation induction by sevoflurane and 0.9 mg/kg rocuronium were used to facilitate endotracheal intubation as well as intravenous fentanyl 2.27 mcg/kg and intramuscular pethidine 1.36 mg/kg were administered as intraoperative analgesia. Surgical duration and Post Anesthesia Care Unit (PACU) stay were 45 minutes (mins) and 80 mins respectively. In the ward, the patient stayed for 40 mins followed by cardiac arrest and resuscitation for 5 mins with residual brain damage. The court's decision was against the anesthesiologist who was considered negligent as he did not administer reversal for the neuromuscular blocking agent and also the witnessed experts considered the respiratory depression is due to narcotic analgesic.

Conclusion: Our expert opinion relied on evidence-based medicine, related to a critical literature review, which indicates that this case should be investigated in the frame of pharmacodynamic/pharmacokinetic of rocuronium, neostigmine, fentanyl, and pethidine as well as the clinical documentation of both recovery and ward's staff in addition to patient's father statements. Finally, according to our critical review; the court's decision was: The anesthesiologist is not negligent and will not pay the previously determined financial compensation.

Keywords: Malpractice; Medicolegal Claims; Witnessed Experts; Rocuronium; Postoperative; Cardiac Arrest; Pharmacodynamics/Pharmacokinetics

*Correspondence to: Ashraf EL-Molla, Consultant Anesthesiologist & Associated Clinical Researcher, Department of Anesthesiology, Misr University for science and Technology, Egypt, Cairo; E-mail: aosj244@yahoo.com

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INTRODUCTION

Anesthesia is the major cause of death and disability in perfectly healthy patients who are undergoing uncomplicated surgery [1]. In medical practice, the common source of medicolegal proceedings is negligence [2]. For negligence claim to succeed the plaintiff must prove three elements: The defendant owed a duty of care, there was a breach of that duty and the plaintiff suffered damage.

The burden of proving negligence rests on the plaintiff helped by a specialized highly ranked scientific committee called expert witness to provide the court with the evidence that the defendant failed to comply with accepted standard of care [3]. The courts adopt the view that the anesthesiologist has the major responsibility for the care of his patient in the peri-operative time until the patient is conscious and has stable vital signs [4]. If the evidence shows that the nurse in charge had fallen short of her expected skills, then the hospital authorities may have to accept some of the responsibility [5]. Many claims have arisen against junior anesthesiologists working without supervision. It is obvious that the anesthesiologists were insufficiently trained or lacking the required experience to handle a particular case without experienced assistance. In this case there are also dual responsibilities; a responsibility of anesthetic department who trained and supervised the junior anesthetist and also assigned him to deal with such critical cases and the anesthetist for accepting to manage this case [6].

CASE PRESENTATION

13-month old male patient, weighing 11 kg, underwent general anesthesia for lacrimal duct surgery, inhalation induction by sevoflurane and 0.9 mg/kg rocuronium were used to facilitate endotracheal intubation as well as intravenous fentanyl 2.27 mcg/kg and intramuscular pethidine 1.36 mg/kg were administered as intraoperative analgesia. Surgical duration and postoperative recovery unit stay were 45 mins and 80 mins respectively. In the ward, the patient stayed for 40 mins followed by cardiac arrest and resuscitation for 5 min with residual brain damage. The court's decision considered the anesthesiologist as negligent because she/ he did not administer reversal for the neuromuscular blocking agent (NMBA), and also the witnessed experts considered respiratory depression is also due to narcotic analgesic. Anesthesiologist was considered negligent for the act of omission of reversing the NMBA and he had to pay a great amount of money as financial compensation.

DISCUSSION

Malpractice is defined as the "failure to provide professional services with the skill usually exhibited by responsible and careful members of the profession, resulting in injury, loss, or damage to the party contracting those services" [6]. Malpractice suits are usually issued to physicians who exhibited negligence

and who did not abide by the standards of care as prescribed by the anesthesia societies.

The standard of care is describing how a physician should act in a particular case. It is usually revealed by the court which assigns expert witness to judge whether the physician performed his duty or failed to do his duty [7].

The Expert Witness

The issues covered in medical malpractice suits are beyond the comprehension of the judge and jury. That is why the court assigns "expert witnesses" to establish whether the standards of care were maintained or not by the defendant-anesthesiologist. Expert witnesses are professional medical doctors. Expert witnesses should not be a personal friend of the defendant. They must be nationally acknowledged for their expertise in their field, and are expected to assist in the case through their scientific skills and training to explain the occurred events. For anesthesiologists to serve as expert witnesses, they should meet a set of qualifications, namely:

The physician should have a "current, valid, and unrestricted state license to practice medicine".

The physician should be board certified or holding an equivalent qualification.

The physician should be actively familiar with the practice of clinical anesthesiology [3].

Once accepted to be an expert witness, the anesthesiologist should keep to six guidelines during his service:

The physician's review of the medical facts should be truthful and complete without neglecting any important information in favor of one of the two parties.

The physician should evaluate the performance in light of the accepted standards of care.

The physician should distinguish between medical malpractice and unfavorable results not necessarily linked to negligent practice.

The physician should assess the alleged substandard practice in relation to the patient's outcome.

The fees the expert witness would collect should be a result of the time spent at work, not the result of the trial.

The physician should be ready to present his testimony for peer revision [3].

Excellent Expert Analysis and Critical Review of Literature

Excellent medical expert is defined as one whose special scientific knowledge causes him to be an authority in his specialty [8]. Excellence is defined as striving for perfection and to give one's best in the field of play, science, or in life. It is not

only about winning, but also about participating, making progress against personal goals [9].

Our opinion is: this case should be investigated in the frame of pharmacodynamic/pharmacokinetic of; rocuronium, fentanyl, pethidine, and neostigmine as well as the clinical documentation of both recovery and ward staff in addition to patient's father statements and we will explain and explore the following ten items:

1. The drug dose effect concerned blood level versus elapsed time in various pediatric age groups; indicates that in age group of >3 month to <2 years i.e. toddler; it takes 148.8 mins for recovery to train of four (TOF) ratio of 0.9 [10]. Our patient received less than 1 mg/kg and cardiac arrest was after 165 mins. Consequently, rocuronium cannot be the cause.

2. The following curve (Figure 1) shows the drop of rocuronium plasma concentration versus time which also confirms that after 165 mins, there will be no sufficient concentration of rocuronium in the plasma of the patient that can cause any respiratory depression [11].

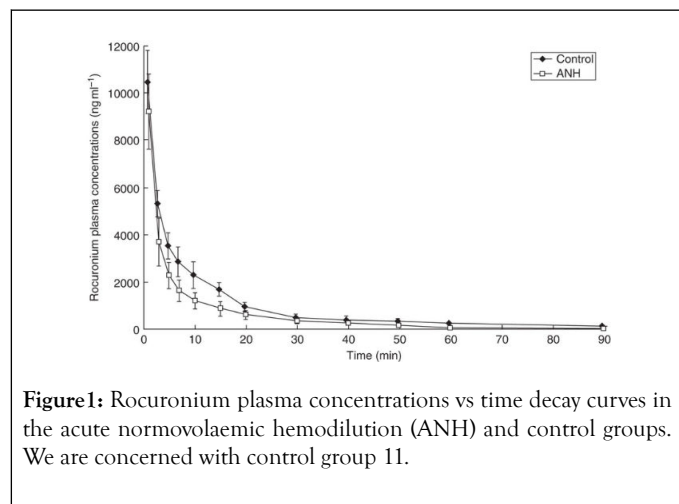


Figure 1: Rocuronium plasma concentrations vs time decay curves in the acute normovolaemic hemodilution (ANH) and control groups. We are concerned with control group 11.

3. The following curve in Figure 2, indicates the drop of rocuronium plasma level from 10000 ng/ml to about 150 ng/ml after 165 mins [12]. There is no probability of respiratory depression at this plasma level of rocuronium.

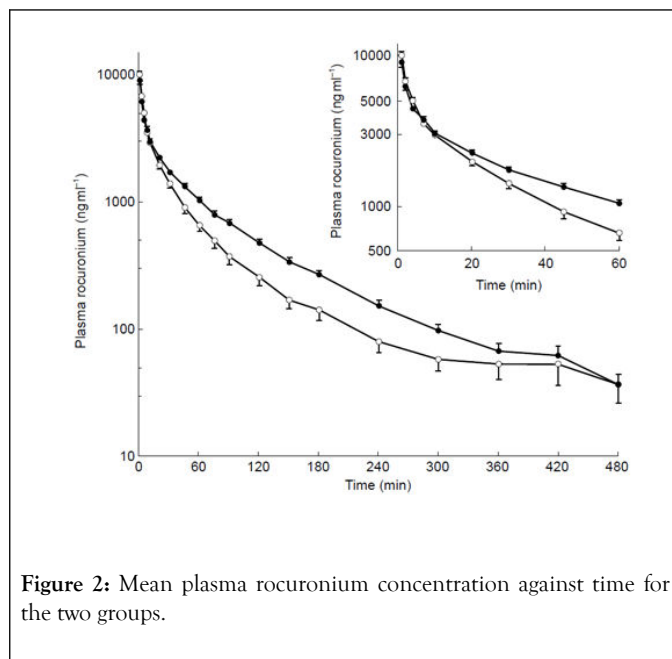


Figure 2: Mean plasma rocuronium concentration against time for the two groups.

4. The following (table 1) summarizes the result of RECITE study [13] in which we divide total rocuronium dose by total body weight and then divided by total elapsed time since last dose to get the TOF ratio >0.9. E.g. In the presented case:

$10000 / 11\text{kg} / 165 \text{ mins} = 5.509$ which leads to TOF ratio more than 0.9.

Again, this value confirms that the muscle relaxant could not be a possible cause.

Table 1: Total dose of rocuronium per minute of surgery (mcg/kg/min), and TOR ratio.

Variable	Tracheal extubation			PACU arrival		
	TOF ≥ 0.9 (N=106)	TOF<0.9 (N=135)	pa	TOF ≥ 0.9 (N=116)	TOF<0.9 (N=91)	pa
Total dose of rocuronium per minute of surgery (µg/kg/min) mean ± SD	6.1 ± 2.6	7.0 ± 3.2	0.021	6.0 ± 2.4	7.0 ± 3.0	0.007
Total dose of neostigmine (mg/kg) mean ± SD	0.034 ± 0.012	0.035 ± 0.012	0.380	0.035 ± 0.011	0.036 ± 0.012	0.792
Time between last dose of neostigmine and tracheal extubation (min), mean ± SD	15.4 ± 7.0	12.5 ± 5.8	0.002	16.2 ± 9.2	13.1 ± 6.3	0.011
Time between last dose of neostigmine and PACU arrival (min), mean ± SD	21.1 ± 8.2	17.4 ± 6.2	0.007	21.6 ± 9.3	17.9 ± 6.90	0.007

5. There is a survey which indicates that only 18% of the European and 34% of US anesthesiologists routinely reversed neuromuscular blockade [14]. We disagree on this practice

unless NMBA are monitored by quantitative objective monitoring and TOF ratio is >0.9. Reversing muscle relaxant by neostigmine is going to support the neuromuscular function for

only 20-30 min [15]. So respiratory depression that induces cardiac arrest will never occur after 165 minutes due to lack of administration of the reversal agent. Neostigmine 0.04-0.07 mg/kg has an onset of action within 1 min, and its peak effect after 9 min [16] and the duration of action is only 20-30 minutes [17].

6. In the post anesthesia care unit (PACU), there should be an anesthetist with qualified airway skills within 3 mins for any emergencies in early postoperative period. After fulfilling the discharge criteria to the ward and its documentation by the staff nurses in the PACU and acceptance-not only the progress notes from the PACU but also the clinical status of the patient-by the staff nurse from the ward the anesthesiologist is not responsible for the patient's care. This is a complete handover of care to the staff of the ward, and the anesthesiologist cannot be responsible for an administered medications or clinical monitoring or observation out of both operating room or PACU [18].

7. It is concluded that injection of 1.5 mg/kg pethidine intramuscular will result in maximum peak plasma concentration after 24 mins [19]. Consequently, cardiac arrest due to respiratory depression could not be likely after 165 min.

8. Intravenous fentanyl was injected, and it is shown that 0.5-2 mcg/kg will result in: Time to onset: 1.5 min, Peak effect: 4.5 min, Duration of peak effect: 20-30 min [20]. Respiratory depression after 165 minutes cannot be attributed to fentanyl's action.

9. The father stated that the toddler was crying, identified him, fully conscious, and requested to be carried by him during the transfer to the ward. The statement of both ward's nurse and PACU staff documented full conscious level, and stable vital signs to allow transfer.

10. It has been mentioned that the patient received an injection before the cardiac arrest which totally unknown to the anesthesiologist who cannot be responsible for that injection. It has been suggested to adopt a worldwide policy of implementing a white box (WB) which is audio/video record in PACU and operating room as well as in the postoperative surgical ward to detect good performance to learn from it and correct poor performance [9].

Witnessed experts' primary decision was a sort of cognitive error which related omission of reversing NMBA to the cardiac arrest and missing the most important detailed pharmacodynamics/pharmacokinetics of the given medications. We encourage regular evaluation of the witnessed experts to keep lifelong learning and acceptable scientific standard. The effectiveness of qualitative and subjective neuromuscular monitoring in decreasing the incidence of residual blockade remains controversial since this type of monitoring is ineffective in detecting residual blockade when TOF ratios are more than 0.40 [21-23]. We recommend quantitative objective NMBA monitoring to be included in both intraoperative and postoperative periods for decision making regarding reversing NMBA. This is in agreement with an international panel of experts that has recently developed a consensus statement which strongly recommending quantitative monitoring, anesthesia societies have been slow to adopt similar guidelines. The

expansion of such anesthesia specialty guidelines may represent the next step in the right direction to correct this pervasive patient safety threat [24].

CONCLUSION

The above critical revision and clinical evidence based scientific facts clarify that the anesthesiologist cannot be considered responsible for the cardiac arrest and consequent brain damage. Finally, according to our critical review; the court's decision was: The anesthesiologist is not responsible for the catastrophic injury and will not pay the previously determined financial compensation N.B. Attention must be given to the individual source of educational material which resides in the reports of enquiries into mishaps which have occurred in clinical anesthetic practice. Since there is no easy access of such enquiries because they are complicated by conflicting interests of the parties and witness involved in the actual or impending legal suits. The existing large accumulation of detailed information relating to anesthetic mishaps cannot continue to remain entombed in guarded vaults when disclosure of such information could provide lessons of inestimable value to the progress in the standard of care of patients requiring anesthesia [25]. We applied complete anonymity and confidentiality so that individuals and locations cannot be identified.

DECLARATIONS

Ethics approval and consent to participate: Not applicable.

AUTHORS' CONTRIBUTION

Ashraf EL-Molla; made critical literature review, and wrote the manuscript. F. Aboul Fattouh; critically reviewed, discussed, and verified the manuscript. S A Youssif, M. Taha, Y Ali, Y Alwahby, Shagun B Shah, and V. Shoshiashvili; reviewed and shared the main author's concepts. R Alotaiby, and M Alotaiby, reviewed and supervised the final manuscript.

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