

CORRESPONDENCE

Neal H. Badner, M.D., F.R.C.P.C.
Associate Professor
nbadner@julian.uwo.ca
Adrian W. Gelb
Professor and Chair
Department of Anaesthesia
Faculty of Medicine
University of Western Ontario

London, Ontario, Canada
adrian.gelb@lhsc.ca

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In Reply:—Drs. Litwak and DeGruttola appropriately advocate the use of more sophisticated statistical modeling techniques for developing and interpreting risk profiles in patients undergoing surgery. Clearly, surgical patients are not only older and more sick, but also have a broad array of acute and chronic diseases. Therefore, no universal paradigm can be created for perioperative care, and only through risk stratification can appropriate and cost-effective paradigms be tailored to individual patients. Therefore, our energy should be focused on developing greater sophistication in our approaches, as recommended by Drs. Litwak and DeGruttola.

Another issue addresses the characterization of the heart rate response and the association with adverse outcome. We now understand that elevations in heart rate occur commonly with emergence from anesthesia and throughout the first postoperative week, even when pain responses have been controlled. Such elevations in heart rate not only affect patients with fixed coronary artery stenosis, but also those with unstable plaque and endothelial dysfunction *vis a vis* plaque alteration by increased sheer stress. We also have appreciated that such alterations manifest not only acutely after surgery, but also during the weeks to months after hospital discharge. As suggested by Drs. Litwak and DeGruttola, more comprehensive characterization of the heart rate response may lead to greater insight into this pivotal association with

adverse outcome, thereby facilitating a more rational design of in-hospital and long-term therapeutic paradigms. Although the recent findings show that perioperative β blockade improves long-term survival are noteworthy, this approach is only the first step in the development of a comprehensive paradigm. We need to look no further than the experiences derived from clinical trials in ambulatory patients with cardiovascular disease. Only by intelligent stratification can the appropriate therapies be determined for an individual surgical patient, in whom excitotoxic and inflammatory responses are added to the inherent pathology of the chronic disease state.

Therefore, the questions raised by Drs. Litwak and DeGruttola clearly are important because they emphasize the complexity of the perioperative pathophysiologic derangements and the implications regarding postdischarge adverse outcome.

Dennis T. Mangano, Ph.D., M.D.

Director

McSPI Research Group and
San Francisco Veterans Affairs Medical Center
San Francisco, California

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Obstetric Anesthesia 1988-1996 in Northrhine/Germany: Results of the Perinatal Survey at the Chambers of Physicians

To the Editor:—Dr. Hawkins and colleagues¹ have to be congratulated on their task. To provide comparative information for Germany, we used the data contained in the Rhineland Perinatal Survey at the Chamber of Physicians of Northrhine/Germany (Rheinische Perinatal-Erhebung bei der Ärztekammer Nordrhein/RPE). Our goal was to evaluate the distribution of births among hospitals of different sizes and to define the use of regional and general anesthesia.²

Note that it is mandatory to report perinatal data to the Perinatal Survey at the Chamber of Physicians of Northrhine. The collected data

regarding number of births were compared with the data supplied by the State Office of Statistics. This verified the completeness of the data (99.3%).

The survey monitored 890,422 births between 1988 and 1996.

Of these, 654,308 were spontaneous deliveries. The number of all labor epidurals increased from 22,355 (24.3%) in 1988 to 24,095 (24.4%) in 1996.

In 1988, 15,038 patients underwent cesarean sections. In 1996, the number had risen to 19,767 patients, which constitutes 20.1% of all deliveries. This is an increase of 4,729 deliveries or 3.7%. The increase

CORRESPONDENCE

Table 1. Births per Year and Hospital in 1988 and 1996 Stratified by the Hospital Facilities Provided

	Number of Hospitals		Births/Year	
	1988	1996	1988	1996
Perinatal centers (PC)	12	11	1,115	1,258
Level III	11	12	1,042	1,196
Level II	13	16	946	1,102
Level I	85	80	644	662
Total	121	119		

Data from the Perinatal Survey at the Chambers of Physicians of Northrhine.

in cesarean sections was caused by concerns about medicolegal liability and the increasing average age of the parturient patients.⁵

The maternal mortality rate related to pregnancy, birth, and confinement decreased from 8.9 per 100,000 pregnancies during this period in 1988 to 5.2 per 100,000 in 1996.

The Commission on Medical Malpractice at the Chamber of Physicians of Northrhine did not record any maternal deaths attributed to obstetric anesthesia in their closed-claim database (1988–1996).

All 119 obstetric units in the Rhineland participate in this program. They provide different facilities by category. There are Perinatal Centers that serve as referral centers for high-risk obstetrics, *i.e.*, hospitals capable of caring for women in premature labor before the 28th week of gestation on a 24-h basis. There are hospitals with obstetric and

neonatal units (level III), hospitals with obstetric and pediatric units (level II), and stand-alone obstetric units in community hospitals (level I). A small reduction in the number of hospitals providing obstetric care has been taking place during these years.

We distinguished the strata by hospital facilities provided and reported the number of deliveries in 1988 and 1996 (table 1).

General anesthesia was administered between 1988 and 1996 in 60.8% of the cesarean sections. Only 39.2% of the patients received regional anesthesia, *i.e.*, primarily epidural anesthesia (36.1%) for cesarean section delivery. The remaining 3.1% were recorded on the data form as local anesthesia without differentiation between spinal and epidural anesthesia.

In 1996, regional anesthesia rates for cesarean section delivery were similar in all hospital groups stratified by facilities (table 3). Differences between the strata were caused by the variation of risk groups of women admitted for delivery.

Anesthesiologists or physicians in training under supervision or direction of an anesthesiologists administer most anesthesia for cesarean sections in Germany, there are no nurse anesthetists. Pediatricians were present in the labor ward or operating room in 15.4% of the deliveries.⁵

The number of certified anesthesiologists working in hospitals has increased from 744 in 1987 to 1,335 in 1996 within the area covered by the Perinatal Survey.

Hospitals can charge only a procedure-related lump sum (in some aspects comparable with the diagnosis-related groups in the United States) for most cesarean sections irrespective of the kind of anesthesia administered.

Hospitals with an obstetric unit are within fairly easy reach (10–15 km) of 95% of the parturient patients in the Rhineland/Germany. This enhances competition between the hospitals providing obstetric care

Table 2. Number of Hospitals Providing Obstetric Care by Number of Births: 1988, 1992, 1996

	Stratum I $\geq 1,500$ Births		Stratum II 500–1,499 Births		Stratum III < 500 Births		Total Births
	Hospitals	Births	Hospitals	Births	Hospitals	Births	
1988	5	8,805 (10%)	85	72,953 (79%)	31	10,087 (11%)	91,845
1992	8	14,981 (15%)	94	81,022 (78%)	22	7,465 (7%)	103,468
1996	9	17,084 (17%)	87	73,520 (75%)	23	7,700 (8%)	98,304

Data from the Perinatal Survey at the Chambers of Physicians of Northrhine.

Table 3. Anesthesia for Cesarean Sections: 1996

	Perinatal Centers		Level III		Level II		Level I	
Cesarean sections	3,940	(19.9)	3,228	(16.3)	3,425	(17.3)	9,174	(46.4)
General anesthesia	2,828	(67)	2,044	(62.8)	2,483	(65.5)	5,359	(58.4)
Regional anesthesia	1,302	(33)	1,201	(37.2)	1,183	(34.5)	3,833	(41.7)

Values are number (%).

Data from the Perinatal Survey at the Chambers of Physicians of Northrhine.

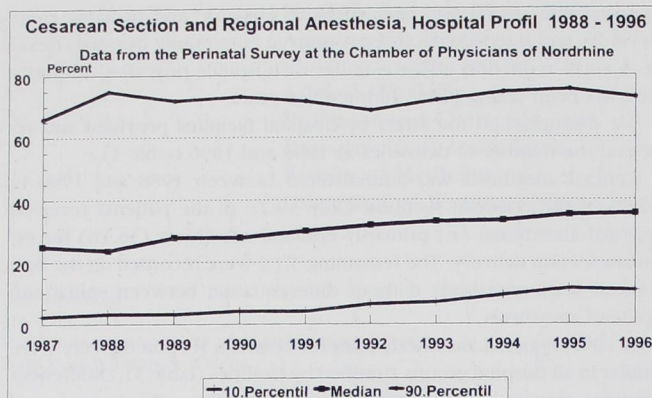


Fig. 1.

and gives mothers-to-be a choice about where to be delivered of a baby and how. Lay publications related to pregnancy, delivery, and confinement and antenatal classes are easily available.

The discussion about whether epidural analgesia for labor increases the risk of cesarean section^{1,3,4} is not confined to the United States. We cannot answer the question whether labor epidural increases cesarean section rates in general. The Survey is applied in an unselected population with an observed variability in practice pattern of the obstetricians. This makes it difficult to study one intervention (labor epidural analgesia). We can state, however, that a high epidural analgesia rate does not imply a high cesarean section rate in an obstetric unit. Obviously, the practice patterns described⁵ differ from those seen in the United States and in other countries. The data presented do not provide any information about the reasons underlying those differences. However, proper assessment of this comprehensive data base may permit the evaluation of important issues in the future.

Klaus U. Josten, M.D.

Abteilung für Anaesthesiologie Johanniter-Krankenhaus
Bonn, Germany

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Lippincott Williams & Wilkins

Chairman of the Committee on Quality Assurance
Ärztchamber Nordrhein

Düsseldorf, Germany

klaus.josten@dgn.de

Hannes Wolf, M.D.

Projektgeschäftsstelle Perinatalogie/RPE bei der Ärztekammer
Nordrhein

Düsseldorf, Germany

Robert Dietrich Schäfer, M.D.

Geschäftsführender Arzt der Ärztekammer Nordrhein
Düsseldorf, Germany

The data submitted have been in part presented in a lecture at the European Academy of Anaesthesiology Meeting September 4, 1997—the data have not been published in whole or part elsewhere.

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Acute Bronchospasm Associated with Methylmethacrylate Cement

To the Editor:—We read with interest the case report of acute bronchospasm associated with methylmethacrylate cementing during cranioplasty.¹ The authors proposed that the bronchospasm was directly related to the action of absorbed methylmethacrylate.

We do not believe that they presented credible evidence regarding the cause of bronchospasm. First, they based their proposal on previous reports of reversible small airway obstruction and occupational asthma with methylmethacrylate exposure.^{2,3} However, the reports they quoted were with long-term rather than acute exposure to methylmethacrylate.

Second, the authors' exclusion of pulmonary embolism regarding the cause of bronchospasm in their patient is not convincing. Bron-

chospasm is known to occur as an early manifestation of pulmonary embolism.⁴⁻⁷ Although various mechanisms have been proposed to explain bronchospasm associated with pulmonary embolism, the most plausible mechanism is the decreased local carbon dioxide (CO₂). Severinghaus *et al.*⁶ and Swenson *et al.*⁷ showed that with unilateral occlusion of pulmonary artery, the decrease in blood flow shifts the ventilation away from the unperfused areas and local CO₂ decreases. The decreased CO₂ causes direct bronchiolar smooth muscle constriction, which can be prevented by inhalation of 6% CO₂.^{6,7}

Third, the authors excluded pulmonary embolism as the cause of bronchospasm because of the nature of the surgical procedure (crani-