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AUGUST 2003

ASRA News

A PUBLICATION OF THE AMERICAN SOCIETY OF REGIONAL ANESTHESIA AND PAIN MEDICINE

ASRA NEWS

A PUBLICATION OF THE AMERICAN SOCIETY OF REGIONAL ANESTHESIA & PAIN MEDICINE

Terese T. Horlocker, MD
President

President's Message

Comfortably Numb (at Home): Trends in Regional Anesthesia and Pain Medicine*

**This article appears concomitantly in the ASA and ASRA August 2003 newsletters. Reprinted with permission of ASA.*

"Just a little pin prick…
…but you may feel a little sick"

With these words, Pink Floyd in their 1979 classic, unwittingly described the standard of postoperative pain management of the day on demand, opioid injection. Pain relief was delayed while the nurse responded to the patient's request, obtained access to the opioid cabinet, and finally administered the conservative dose of morphine or meperidine imtramuscularly. Side effects were remedied in a similar fashion. The development of infusion pumps in the 1980s was followed by the introduction of patient controlled (intravenous and neuraxial) analgesia, which revolutionized acute pain management[1]. Adverse events associated with epidural morphine infusions[2] resulted in a shift towards a local anesthetic-opioid combination in an attempt to minimize the disadvantages of each component[3]. Currently, this regimen (along with non-opioid adjuvants) remains the standard for patients undergoing thoracic or abdominal surgery. Still, concern over neuraxial catheters in the presence of anticoagulation and the need for inpatient admission during catheterization has led to increased popularity of peripheral nerve blocks over the last decade.

The techniques of peripheral neural blockade were developed early in the history of anesthesia, but the improved safety and general anesthesia supplanted their use. For example, in their respective textbooks published in the first decades of the 20th century, Braun[4] and Labat[5] described intraoperative management of patients undergoing intra-abdominal, head and neck, and extremity procedures using infiltration, peripheral, plexus, and splanchnic blockade, since neuraxial techniques were not widely applied at the time. The available local anesthetics- cocaine and procaine- essentially limited applications to intraoperative anesthesia. However, the introduction of long-acting local anesthetics, as well as innovations in equipment technology, including the development of stimulating needles and catheters and portable pumps allowing local anesthetic infusion after hospital dismissal[6], have increased the success rate and popularity of continuous peripheral blockade. Clinical studies consistently demonstrate improved perioperative outcomes, in both inpatient and outpatient settings. Following major knee surgery, continuous femoral nerve block is associated with increased joint range of motion and earlier dismissal compared to conventional opioid analgesia, and decreased catheter (technical) problems compared to continuous epidural block[7,8]. Likewise, indwelling brachial plexus catheters are often an integral component of rehabilitation following shoulder and elbow surgery[9]. Placement of a peripheral catheter/portable pump system may allow surgery previously considered "inpatient" to be performed on an outpatient basis[10]. Perhaps the most intriguing application of peripheral blockade is minimally invasive surgery (MIS), which encompasses new techniques, equipment innovations, and advancements in adjuvant therapy. Patients undergoing MIS hip or knee replacement receive a combination sciatic-continuous lumbar plexus block for intraoperative anesthesia and postoperative analgesia. Breakthrough pain is managed solely with *oral* analgesics. Importantly, no intravenous opioids are administered. Patients are discharged home, sometimes on the operative day, with an indwelling psoas compartment catheter for 48 hours. Additional clinical studies are needed to define the safety and optimal applications of continuous peripheral techniques, particularly in patients dismissed with an indwelling catheter and ongoing local anesthetic infusion. In addition, the role of peripheral blockade in prevention and treatment of chronic pain syndromes remains largely unstudied.

Thus, peripheral nerve blocks represent a new era in regional anesthesia and analgesia. Competence in these techniques is crucial to future practice models. However, adequate training and proficiency affect utilization. A nationwide survey reported that while 98% of anesthesiologists perform peripheral techniques, most perform less than five per month (although most predict increased use in the future)[11]. Likewise, despite improvements in needle/catheter technology and neural localization, these blocks often remain underutilized challenging. Studies evaluating proficiency in technical skills have noted that regional anesthetic procedures are significantly more difficult to learn than the basic manual skills necessary for a general anesthetic, such as intubation and arterial cannulation. While "minimum clinical experience" has been defined for several regional anesthetics, the minimum block numbers required for *accreditation* may be less than those needed to acquire *competency* in the technique[12,13.] Finally, the majority of resident training programs do not provide formal training in peripheral blockade. Experienced clinicians and trainees must both have access to anatomic sections and simulators, allowing the proceduralist to explore the anatomical relationships between nerves and related structures prior to patient contact. Educational efforts by professional societies must increase to meet the clinical demand.

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Call for Residents to Get Involved

Thelma Wright, MD

The future of Anesthesiology lies in our hands. To this end, we need to become involved in local, state and federal regulatory activities that effect our specialty. Topics of interest include but are not limited to issues such as scope of practice, physician reimbursement, patient safety, professional liability and tort reform, states opting out of physician supervision of nurse anesthetists, the increasing problems faced by academic anesthesiology, and expansion of our subspecialty roles. As residents, we also have our own issues, i.e. incorporation of the intern year as a part of a four-year anesthesia program, 80-hour work week, steep increases in Board application costs and moonlighting activities to subsidize our stipends. As an example of timely resident activity, the ASA Resident Component submitted a resolution to the Society of Academic Chairs and the Association of Anesthesia Program directors that anesthesia residents be given preference over other anesthesia providers in those cases involving regional anesthesia.

How can we as residents get involved?

There are several organizations that invite resident involvement. These include the resident component of the American Society of Anesthesiologists (ASA), its resident component of the House of Delegates (ASARC-HOD) and the resident component of the American Society of Regional Anesthesia and Pain Medicine (ASRA). Throughout the year there are calls for residents to become committee members for various organizations, and these are published on the corresponding organization website and newsletter/journals. We are pleased to announce the following ASRA resident component committee members for the 2003-2004 year. They are Thelma B. Wright, Newsletter Advisor and Chair- Elect (University of Virginia), Brittany Clyne (Wake Forest), John Edwards (University of Iowa), Jason R. Fellows (UCLA), Todd Horowitz (University of Florida), William Mansfield (Northwestern University), A. Cuneyt Ozaktay (Wayne State University), Hemant Yagnick (University of Mississippi).

Some conferences, such as the ASA annual meeting, have booths where residents can meet and discuss various issues. There is also an annual resident's forum at the ASA meeting, which is an open opportunity for residents to gather and discuss any issues of interest, be they educational or financial. Residents who attend the annual meetings should endeavor to participate. The next ASA annual meeting is scheduled for October 11-15 and will be in San Francisco, CA. The ASRA will hold their Annual Fall Pain Meeting and Workshops in San Diego, CA and the scheduled dates are November 13-16, 2003. Currently, there are five, $1000 scholarships available to residents and/or fellows to facilitate attendance at the 2003 Annual Fall Pain Meeting and workshops. Information on how to apply is available on the ASRA website (www.ASRA.com). I hope to see you in San Francisco and/or San Diego.

Yet another way of participating in the future of legislative

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2003 Bonica Lecturer

Christopher M. Bernards, MD

A graduate of Oregon Health Sciences University, (magna cum laude), Dr. Bernards completed his residency at the University of California, San Francisco, a regional anesthesia fellowship at the Virginia Mason Medical Center and joined the faculty of the University of Washington School of Medicine as a Senior Research Fellow in 1988. Dr. Bernards is currently Professor of Anesthesiology at the University of Washington School of Medicine and Attending Physician at Harborview Medical Center. Dr. Bernards first presented at an ASRA Annual in Meeting in 1993 on the subject "Mechanisms of Opiate Transport". A prolific researcher and author, his articles have appeared in numerous refereed journals. He has also been an extensive contributor of book chapters specific to his interest in drug delivery to , "Clinical Anesthesia, "Opiods in Pain Control", "Spinal Drug Delivery", "Advances in Anesthesia" and "Best Practice and Research in Clinical Anaesthesiology". The title of his Bonica Lecture will be " Sophistry in Medicine: Lessons from the Epidural Space".

Presidents Message

Continued from inside front cover

In conclusion, regional blockade has dramatically shifted over the last two decades, from intermittent intramuscular opioid injection during an extended hospitalization to a continuous peripheral nerve block with a portable (and often disposable) pump delivering a local anesthetic solution in the home, supplemented by non-opioid analgesics. Given the current state of the art one can only surmise our patients are,

"…comfortably numb".

NEWS is a publication of the American Society of Regional Anesthesia & Pain Medicine.

Op Ed - Opinion Editorial

This article was originally published in the October 2002 issue of the *ASA Newsletter*. Information has been updated through mid 2003.

The Evolution of Training in Pain Medicine in the United States

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James P. Rathmell, MD

David L. Brown, MD

Accredited fellowship training in pain medicine is a relatively recent development. Prior to 1992, training was frequently obtained in academic anesthesiology departments, including those of Bonica, Bridenbaugh, Carron, Haugen, Moore, Raj, Winnie and others, and subsequently in programs run by their trainees. These unaccredited programs advanced the specialty, widened interest in pain medicine as a career, and propagated pain care in smaller and smaller communities across the country. The American Board of Anesthesiology (ABA) developed interest in certifying pain medicine training. Through the leadership of Bill Owens in his roles on both the ABA and the Residency Review Committee (RRC), and through his representations of the subspecialty to the American Board of Medical Specialties (ABMS), formal training programs were accredited and physicians were certified. Steve Abram and John Rowlingson were both key members of the group that assisted Dr. Owens in moving the new subspecialty forward.

The first programs recognized by the Accreditation Council for Graduate Medical Education (ACGME) were accredited in 1992. The number of ACGME-accredited programs (Figure 1) and the number of trainees in accredited programs (Figure 2) have grown steadily over the past decade. The ABA working in parallel with the ACGME developed a subspecialty certification examination in pain medicine, first named the "Certificate of Added Qualifications in Pain Management," now titled "Subspecialty Certification in Pain Medicine." The first exam was given in 1993. The number of candidates sitting for the examination has steadily grown and the pass rate has steadily declined since the first exam was given (Table 1).

Pain and its consequences draw on resources from all medical disciplines. Dr. Bonica's experiences during wartime (World War II) suggested that each medical specialist had unique expertise to bring to patients suffering in pain; hence his consistent and effective promotion of a multidisciplinary process for pain care. Also thanks largely to Dr. Bonica, anesthesiology has led the development of formal training programs. Indeed, all currently accredited programs reside within academic anesthesiology departments and the majority of program directors are anesthesiologists. Specialists from other disciplines have also focused their clinical and research efforts on pain. The most obvious example is neurology where the majority of clinical treatment and research about headache has arisen. Physical medicine and rehabilitation (PM&R) has also long had a focus and expertise in functional restoration, and many chronic pain rehabilitation programs are led by physiatrists. And, of course, psychiatrists have been closely involved where pain, depression, and substance abuse overlap. During the last decade, specialists from these other disciplines have been seeking subspecialty training in pain medicine with increasing regularity. But the historical development of pain medicine training within anesthesiology departments has left us with a problem to solve.

Pain medicine training programs, by and large, are led by anesthesiologists and they reside solely within anesthesiology departments. Specialists from disciplines other than anesthesiology who apply for fellowship training are, on occasion, overlooked in favor of anesthesiologists who have weaker academic credentials. Program Directors struggle with how to train non-anesthesiologists within existing programs. Most anesthesiology-based programs incorporate neural blockade, regional anesthesia, and acute post-operative pain into the fellowship training. But, how can we train non-anesthesiologists to safely perform regional anesthetic techniques that the anesthesiology-trained fellows are familiar with when they begin fellowship training? Should we be training non-anesthesiologists to perform neural blockade at all? Other disciplines question whether anesthesiology-based programs are providing adequate training in non-anesthesiology topics relevant to pain medicine. For instance, should the trained pain specialist be familiar with the appropriate use and interpretation of diagnostic imaging studies? How about electrophysiologic testing?

So, we are at a crossroads. Non-anesthesiologists want access to subspecialty training in pain medicine and the anesthesiologists leading existing training programs just do not know how to train them. The ABA has opened the subspecialty examination process to other specialists through the American Board of Psychiatry and Neurology (ABPN) and the American Board of Physical Medicine and Rehabilitation (ABPMR). Candidates who have board certification in a primary specialty recognized by the ABMS can sit for the ABA Pain Examination by applying through one of these two agencies (the ABA will only accept applications from trainees with primary board certification in anesthesiology). For the next several years, there is a "grandfather" process in place that allows specialists from these other disciplines who are already practicing pain medicine to sit for the examination without completing formal fellowship training. Many non-anesthesiologists have already taken the examination (Table 1). Once the window of time to enter the examination through the grandfather process elapses, all trainees will be required to complete formal fellowship training.

The ABA and ACGME as well as the other two parent Boards, ABPN and ABPMR, recognize the problems with access to training programs and the difficulties that program directors face when training non-anesthesiologists. They also feel firmly that patient care in the US will be improved by finding a way to make pain training truly multidisciplinary and capable of training specialists from various disciplines in a uniform way, always with the patient at the center of the decisions being made. Under the leadership of Drs. Steven ("Butch") Thomas and James Arens, immediate-past and current Chairs, respectively of the Residency Review Committee for Anesthesiology, the ACGME has assembled a Task Force to develop a unified curriculum for training in pain medicine. We (Drs. Brown and Rathmell) represent anesthesiology on this Task Force along with representatives from all of the other disciplines. The Task Force had an easy time deciding on what needs to be taught – with minor modifications, the group unanimously recommended that the Core Curriculum for Professional Education in Pain assembled by Dr. Howard Fields and the International Association for the Study of Pain be adopted by all training programs. During the past year, the group has grappled with how to structure the fellowship to allow training of physicians from different specialties in the most effective and pragmatic way. It is a challenge, but one from which our patients benefit.

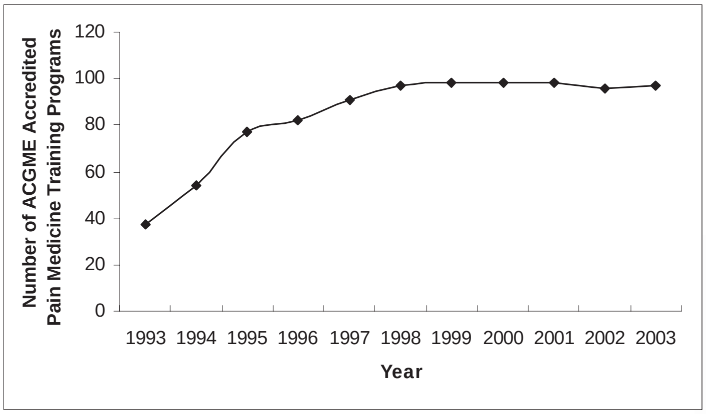

Figure 1. *Number of ACGME accredited Pain Medicine Training Programs each year since the initial programs received accreditation in 1992. The first accredited trainees completed training in 1993. (Data provided by the American Board of Anesthesiology)*

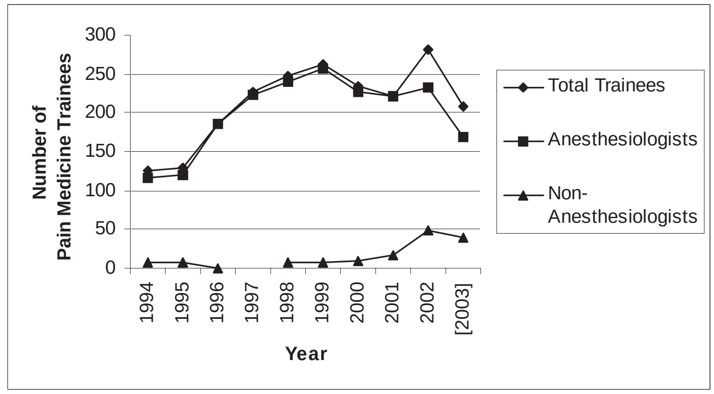

Figure 2. Number of Pain Medicine Trainees each year since ACGME accredited training programs were established in 1992. All data represent year-end reports except 2003 (mid-year report). (Data provided by the American Board of Anesthesiology)

Table 1. *Percentage of candidates receiving a passing score on the ABA Subspecialty examination in Pain Medicine. The examination was first offered to candidates from the American Board of Physical Medicine and Rehabilitation (ABPMR) and the American Board of Psychiatry and Neurology (ABPN) as well as ABA recertification candidates in 2000. (Data provided by the American Board of Anesthesiology)*

	Initial Certification Groups			ABA Recertification Group
Examination Year	ABA	ABPMR	ABPN	
2002	70%	66%	50%	89%
2001	72%	58%	71%	75%
2000	71%	68%	74%	63%
1998	81%	N/A	N/A	N/A
1996	89%	N/A	N/A	N/A
1994	94%	N/A	N/A	N/A
1993	94%	N/A	N/A	N/A

ASRA Fall Pain Meeting for 2003

The ASRA&PM Fall Pain Meeting scheduled for November 13-16 in San Diego promises to be an exciting event for all. Following the successful meeting in Phoenix last year, we hope to build on both the overall experience and the impact on members' practices. Several of the familiar courses will be replicated including Translational Refresher courses, Parallel sessions, Master's classes and Workshops. The Translational refresher sessions will again take topics of general interest, and look at them from the point of view of a basic scientist and clinician. With topics as diverse as "cannabinoids in medicine," and "spinal cord stimulation for angina" we anticipate a lively and informative discussion. Anyone who saw the parody of a "Saturday Night Live" Newscast by Tony Yaksh and Steve Abrams during last year's Cancer Translational session knows how entertaining and informative these sessions can be.

Parallel sessions focus on often difficult or controversial topics. Such topics as updates in basic sciences (by several of the most prestigious investigators in the world), opiate treatment in acute pain syndromes, rehabilitation, IDET versus fusion for discogenic pain and sympathetic blocks will be presented.

An informal evening Pain Review session with audience participation will be back, as well as an evening symposium on opiate associated forensic studies.

Finally, workshops this years will include cadavers to increase the realism, and hopefully the learning impact, of several interventional techniques. Workshop participant numbers will be increased.

All things considered, we hope that you will support this meeting, and make it your premier pain event every year. ***See you in San Diego!***

Marc Huntoon, MD
Chair, Scientific Program

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Why I Prefer an Electronic Pump for Ambulatory Perineural Infusion

Brian M. Ilfeld, MD
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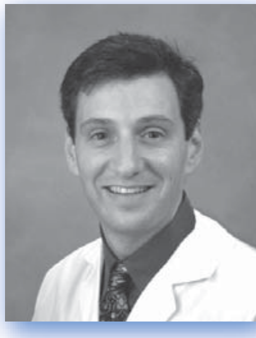

Single-injection regional nerve blocks are generally limited in providing postoperative analgesia of 12-14 hours or less.[1] The use of a perineural catheter to infuse local anesthetic allows for postoperative analgesia after the initial regional blockade has resolved. This technique to be utilized in the ambulatory setting now that small, portable infusion pumps are available. However, the optimal type of infusion pump has not yet been determined. In keeping with evidence-based medical practice, the author believes that the optimal techniques and equipment should be determined by prospective, controlled trials, and not merely by institutional preference. Because of the relatively recent evolution of these techniques, illuminating data are not yet available. Therefore, the information contained in this article should be considered the opinion of the author—based on his experience with hundreds of outpatient infusions—unless otherwise noted with referenced sources.

While there are multiple small, portable infusion pumps available, each with benefits and drawbacks, the *electronic* pumps will generally provide more clinical benefits than their non electronic counterparts. To determine the optimal device for a given clinical situation, many factors must be taken into account, including—but not limited to—acceptable flow-rate accuracy, desired infusion flexibility, and total local anesthetic volume requirement.

Accuracy/Consistency. *Accuracy* is defined here as infusing at the set/expected rate, while *consistency* is infusing at the same rate for the majority of the infusion. Electronic pumps are very accurate, infusing between 85-102% of their expected rate which remains very consistent over time (varying less than 5%).[2-4] However, non electronic pumps have dramatically varying accuracy and consistency, often exhibiting flow rates within ±15% of their expected rate for *only 18%* of their infusion duration.[2-4] At the University of Florida, we have had ambulatory patients using various non electronic pumps exhaust their local anesthetic reservoir after 50 - 150% of the expected infusion duration.[2] This is consistent with the experience of other investigators.[5] With such highly variable infusion rates, quality of analgesia may lack consistency and infusion duration is unpredictable. Furthermore, the great majority of non electronic pumps regulate their infusion rate using a temperature-dependent device, calibrated to skin temperature, affixed to the patient. Altering the temperature of this regulator further decreases infusion accuracy, with an increase of 4ºC increasing the infusion rate up to 33% and decreasing infusion.[2;3]

Flexibility. If various rates of infusion, bolus volumes, and lockout times are desired, an electronic pump will be required in the United States (Baxter markets an adjustable elastomeric device in Europe). While most of the non electronic pumps may be ordered at various infusion rates, this aspect is fixed during manufacture and cannot be adjusted. Just as found with epidural infusions, the optimal basal infusion rate for perineural catheters is highly variable among patients.[6,7] Allowing patients to vary their basal rate with instructions provided by a health-care provider *via* the telephone allows analgesia optimization.[6-8] Imagine having to guess the local anesthetic requirements for your patients when you place their epidural, and then not having the ability to adjust the infusion rate after initiation—this is the experience you will have using a non electronic pump for perineural infusion. A pump which allows for patient-controlled local anesthetic bolus dosing, also called patient-controlled regional analgesia (PCRA), provides equivalent or superior analgesia with lower local anesthetic consumption compared to continuous infusions alone.[9-12] Furthermore, by providing patient-controlled boluses of local anesthetic for breakthrough pain, oral narcotics with their frequent undesirable side effects, may be avoided.[6,7,13] PCRA is important for ambulatory patients as the infusion may be tailored to provide a minimum basal rate and lengthening infusion duration, yet allow bolus dosing for breakthrough pain and prior to physical therapy.[14] The majority of non electronic pumps do not allow for PCRA with *both* a basal rate and patient-controlled bolus available.[2,3]

Infusion Duration. All non electronic pumps have their local anesthetic reservoir internally located and are generally restricted to less than 300 mL (although two brands do provide up to 550 mL). Most electronic pumps use an external reservoir in what looks like an IV bag, allowing up to 1000 mL reservoirs. At a basal infusion rate of 8 mL/hr, most non electronic pumps exhaust their local anesthetic in less than 38 hours, greatly diminishing the effectiveness of perineural infusion since many surgical procedures result in moderate-to-severe pain for more than two days.[6,7,13,15] Since single-injection nerve blocks provide analgesia up to 14 hours, the risk/cost/time/benefit ratio of any pump providing only 24 additional hours of analgesia should be questioned.[1]

Cost/Disposability. Non electronic pumps are exclusively single-use devices, while electronic pumps are generally reusable with a disposable cassette replaced between patients. While most $250-1500 electronic pumps are more expensive than their $200-400 non electronic counterparts, the $8-15 disposable cassettes used with electronic pumps will quickly "make up" the difference in cost. For example, using ten $200 non electronic disposable pumps ($2000) is far more expensive than using a $750 electronic pump with ten $15 disposable cassettes ($900). This requires the patient to either return to the surgical center, or be provided with a hospital-addressed, stamped, padded envelope to return the infusion pump.[6-8,14,16] This author has had a 100% pump-return success rate for hundreds of patients over multiple years. However, if pump disposability is a priority, there are disposable *electronic* models available for $250-500.[3;4]

Reliability. One published study compared a non electronic, basal-only infusion (boluses available at only two times each day

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Why I Prefer a Non electronic Pump for Ambulatory Perineural Infusion

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Continuous peripheral nerve blocks (CPNB) are very useful in providing surgical anesthesia and postoperative analgesia with minimal side effects. CPNB are often used in surgical wards after orthopedic procedures[1,2,3,4,5] and recently their use was extended to ambulatory practice[6,7,8, 9,10,11,12]. The concerns of the anesthesiologist who deals with the patient are centered on efficacy of the techniques of postoperative analgesia, safety (related on the local anesthetics used or the material) and on the ease of use of the device by the patient and the caretaker. Electronic and non electronic pumps are available. Research defining the limits for the outpatient uses of CPNB is necessary to characterize the indications and limitations of delivery devices but data is available to direct the physician towards the most suitable device. Electronic pumps allow the physician to use variable rate of infusion and to adapt to any additional patients needs[9-11,13]. The safety of these device seems optimal. Perineural patient-controlled analgesia techniques provide equivalent or superior analgesia with lower local anesthetic consumption compared with constant continuous infusions alone[3-5, 13]. The use of a PCA mode, however, is not always better than a continuous infusion in all the surgical indications and a background infusion remains essential[2, 5, 9-11, 14]. Studies reporting an advantage of the techniques of PCA over the continuous infusion[3, 4, 13] focus mainly on femoral block. The quality of sensory and motor block and pain relief depends on the location of the catheter tip under the fascia iliaca[15].

Comparison of different local anesthetic infusion regimen during a continuous femoral nerve block is only relevant if the position of the catheter tip position is verified to avoid methological biases in the analysis of the results. In the cited studies, the location of the catheter was not verified. Furthermore, it is interesting to noted that in the groups of patients who had the better analgesia, sensory block of the obturator and lateral cutaneous nerves was obtained more constantly than for other patients[3,4]. Thus it is probably more the quality of the sensory block (location of the catheter tip) rather than the local anesthetic infusion technique which was compared between groups. These are not comparing various flows of continuous infusion or PCA after verification of the position of the catheter type. Finally, in the cited papers[3,4], the average number of bolus used per 24 h periods was from 0.8 to 2.8 ! Two or three patients out of 20 requested relatively large numbers of boluses[9,10].

What are the arguments in favour of the use of non electronic pumps?

The first significant argument is the simplicity of the device. The continuous infusion through a catheter is simple, does not require flow modifications by the patient and is not limited by the electronic problems of the pumps. In a recent study, Capdevila and al[6] compared a non electronic pump and two electronic pumps for the postoperative pain control at home following orthopedic surgery. Postoperative analgesia was identical between the three groups of patients but the satisfaction of the patients was significantly higher in the elastomeric pump (non electronic) group because the technical problems were less frequent (one technical problem versus six and eleven technical problems in the two electronic pumps groups). This study confirms the limits recognized for the PCA electronic pumps at home[16,17]. Some patients (old patients or anxious patients) may be less likely to manage PCA successfully. Inappropriate use of PCA is possible and reports of problems related to the use of electronic PCA seems to be more common, although that may reflect usage patterns. However, non electronic pumps are often used at home for the postoperative period after orthopedic surgery with few technical problems in adults[6-12] and children[18]. A judicious choice of the non electric pump allows the use of a device whose flow varies little with time and temperature (Accufuser® for example)[19].

The second argument is the total cost of the technique. Non electronic pumps cost $100 per patient in ambulatory practice in comparison the electronic pumps (rental, pay-off, etc.) (table 1, not published dated).The mean cost per patient was $418±93 for the non electronic pumps and $532±81 for electronic pumps .

The main reason for choosing an electronic pump is so flow rate can be smaller and bolus can be injected. Some authors[7,8,20] used non electronic pumps to deliver up to 10 ml of local anesthetic every two hours by opening a clamp for 10-15 minutes. Unfortunately some patient received the entire content of the pump in a single infusion (high flow) because no one closed the clamp. To eliminate this risk, we, as others do[11], use multiple rate disposable pumps with bypass PCA chambers of 2 or 5 ml for patients after ambulatory orthopedic surgery. These improvements in non electronic elastomeric pumps should further contribute to safe and effective use of this type of analgesia and technique at home.

Full References are available online at www.asra.com

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Call for Residents to Get Involved

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actions is to support your individual state societies of anesthesiologists. Consider inviting the president of your state society to give a talk at your institution. Show up at their meetings! Do not hesitate to contact your local society to find out about future activities that residents can attend.

Remember, no one is more interested in our cause than ourselves. So it is to our advantage to take every opportunity to participate in these political activities. The time for residents to get involved is now so that in the future, the specialty and the model of practice will be of our choosing.

Thelma B. Wright, MD
Newsletter Editor
ASRA Resident Section Committee

Pro & Con

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from a visiting nurse following discharge), elastomeric pump, and two electronic pumps for ambulatory perineural infusion.[17] This study found the number of technical problems in one of the electronic pumps (Microject PCA, Sorenson Medical, West Jordan, Utah) to be statistically significant compared with the non electronic pump, resulting in a higher degree of satisfaction in the latter group. At the University of Florida, we have found this particular electronic pump to be prone to technical problems as well, as has the manufacturer which has recently produced a replacement pump for the Microject PCA. *However, to reject all electronic infusion pumps because of one problematic brand that is being replaced is irrational.* Of note, at the University of Florida, we have utilized multiple electronic pumps (besides the Microject PCA) for literally thousands of infusion hours, without a single pump alarm or difficulty and extremely high patient satisfaction (study manuscripts in preparation). Related to this, unlike electronic pumps, non electronic units have no alarm to alert patients/practitioners to catheter occlusion.

While it is beyond the scope of this article to comment on every variable, health-care providers should take all of these into account when deciding upon an infusion pump for ambulatory perineural local anesthetic administration.

Full References are available online at www.asra.com

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Why I Prefer an Electronic Pump for Ambulatory Perineural Infusion

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Why I Prefer a Non electronic Pump for Ambulatory Perineural Infusion

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President's Message

Comfortably Numb (at Home): *Trends in Regional Anesthesia and Pain Medicine**

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Extensive Retroperitoneal Hematoma without Neurological Deficit in Two Patients who Underwent Lumbar Plexus Block and Were Later Anticoagulated

Weller RS, Gerancher JC, Crews JC, Wade KL. *Anesthesiology* 2003;98:581-5

They report two cases of major, delayed retroperitoneal hemorrhage following lumbar plexus block (LPB) in patients with normal coagulation at the time of needle placement, who received anticoagulants postoperatively for thromboprophylaxis.

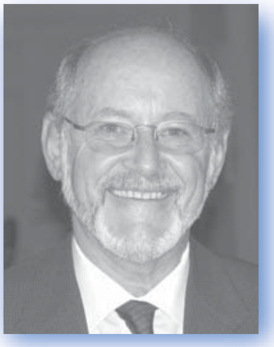
The first case involved an 85-yr-old female (weight 66 kg) who presented for unicompartmental right knee arthroplasty. Past medical history included osteoarthritis, depression, and hypothyroidism, and her medications included mirtazapine, levothyroxine, omeprazole, zolpidem, and calcium. Laboratory data were all within the normal range including hemoglobin (14.4 g/dl), platelet count (223 x 10^3), prothrombin time (12 sec), INR (0.94) and aPTT (24.5 sec).

A sciatic and continuous LPB *via* the posterior approach were performed. A single-shot sciatic block was performed via the Labat approach. Following this, the lumbar plexus catheter was fitted with a Tuohy-Borst adaptor, at which point blood could be steadily aspirated. The catheter was withdrawn 2-3 cm, flushed with saline, and after negative aspiration a test dose of lidocaine with 1/200,000 epinephrine was negative. A supplemental supine sciatic and femoral nerve block (15 ml and 7 ml respectively) was added. After surgery, a lumbar plexus infusion was initiated.

The lumbarplexus infusion was stopped the evening of postoperative day (POD)-1. The next morning (POD-2) the hemoglobin (12.4 g/dl) and platelet count (157 x 10^3) were normal and the patient received enoxaparin 30 mg subcutaneously at 9:00 am. The lumbar plexus catheter was removed intact at 10:40 am. Four hours later, physical therapy was prevented by new, significant back pain (9/10 on VAS scale). Morphine was administered, and enoxaparin was continued at 30 mg subcutaneously every 12 hours. On POD-3 the patient complained of right paravertebral pain, however, her vital signs were stable, there was no neurological deficit, the catheter site was unremarkable, and her hemoglobin was 9.1 g/dl. Ten hours later her pain decreased by 50%, vital signs were stable, Hb was 9.4 and no neurological deficit was present. The next day her pain had diminished, she was walking unassisted, and discharge was planned, however, it was discovered that her Hb had dropped to 7.1 (repeat was 6.5). Her PT, aPTT, platelet count, and fibrinogen were normal, and vital signs and physical examination were unchanged. Enoxaparin was stopped, she was transfused and CT scan demonstrated an extensive retroperitoneal hematoma.

Her postoperative course was protracted, however she never developed a neurological deficit and was able to ambulate and participate in physical therapy.

The second case involved a 65-yr-old male who presented for arthroscopy of the left knee. His medical history included a CABG and mechanical AVR 5 years prior to admission requiring chronic anticoagulation. In addition, he presented with a Brown-Sequard lesion following a gunshot wound to the thoracic spine 30 years previously. Medications included coumadin 5 mg/day, aspirin 81 mg twice a day, metoprolol, furosemide, ranitidine, and amitriptyline. Laboratory data revealed a PT 29.1 sec, INR 5.19, aPTT 37.5 se, Hb 12.8 g/dl, and platelet count 204 x 10^3.



Anthony R. Brown, MB

Coumadin was stopped and heparin was started in preparation for the surgery. Twelve hours later his INR was 9.27 and he was given 1 unit of FFP and 10 mg Vitamin K. The day before surgery his PT was 12.9 sec and INR 1.08, and the morning of surgery the PT was 11.9 sec and the INR 0.92. Heparin was discontinued at 1:00 am on the day of surgery and the aPTT was 23.9 sec at 7:00 am. A single injection LPB (posterior approach) and sciatic block were performed The 45-minute procedure was performed with the patient sedated.

His immediate postoperative course was complicated and bizarre. It included long-term memory loss, mental status changes, and chest pain. Emergent CT scan showed no intracranial bleeding and cardiac enzymes were normal. PACU Hb was 13.7 g/dl. His heparin infusion was reinitiated at 1200 U/h 8 hours after the LPB. On POD-1 his aPTT was 77.7 and Hb 13.4. Coumadin was restarted in the evening.

On POD-3 he complained for the first time of back pain at the site of the LPB. His Hb was 12.6, aPTT > 100 and INR 1.4. The heparin infusion was adjusted and the following day (POD-4) his Hb was 10.5, aPTT was 60.2, and his vital signs remained stable. An abdominal CT scan showed a "moderate-sized retroperitoneal hematoma that appears to originate in the left psoas muscle". The Hb level decreased further to 8.8 on POD-5, all anticoagulation was discontinued and the patient received vitamin K 1 mg subcutaneously and 2 units of PRBCs. He was discharged on POD-10 with a plan to restart anticoagulation 2 weeks after discharge.

Commentary

These case reports draw attention to the fact that patients receiving anticoagulants during the perioperative period are at risk of bleeding during as well as following peripheral nerve blockade with or without catheter placement. Posterior lumbar plexus block as well as infraclavicular brachial plexus blockade are two techniques of particular concern as significant concealed hemorrhage can occur before a diagnosis is confirmed and management may require a second surgical procedure. With the exception of the above, most peripheral nerve blocks are performed in areas in which bleeding is obvious and can be stopped by simple compression. There are however certain "gray areas" in which the risk of concealed and/or partially concealed hemorrhage may occur in this setting, e.g. supraclavicular and posterior sciatic nerve blocks. Unfortunately there are no data at this point to guide us therefore the benefit of performing a peripheral nerve block in a patient receiving perioperative thromboprophylaxis needs to be weighed against the risk of bleeding in each individual case.

continued on the following page

Extensive Retroperitoneal Hematoma without Neurological Deficit in Two Patients who Underwent Lumbar Plexus Block and Were Later Anticoagulated

Continued from previous page

Neurological Complications of 405 Consecutive Continuous Axillary Catheters

Bergman, BD, Hebl, JR, Kent J, Horlocker TT. *Anesth Analg* 2003;96:247-52

Recent advances in needle and catheter technology have facilitated performance of continuous techniques and the ability to successfully maintain brachial plexus catheters. In this study the authors retrospectively reviewed the risk of complications after 405 consecutive continuous axillary catheters.

Medical records of all patients receiving continuous axillary brachial plexus blockade at the Mayo Clinic from 1990 to 2000 were retrospectively reviewed.

There were 405 continuous axillary catheters placed in 368 patients with a mean patient age of 39 ± 15. Forty-eight preexisting neurological conditions were present in 41 patients with ulnar neuropathy being the most common preoperative neurological diagnosis (30/41 patients). The most common indication for catheter placement was to facilitate rehabilitation and allow the use of CPM after major elbow surgery (75.3%) followed by the need for prolonged sympathectomy after digit reimplantation (4.9%) and CRPS involving the upper extremity (4.4%). A tourniquet was used in 369 patients with a mean tourniquet inflation time of 89 ± 48 min.

Catheters were usually placed in the PACU after documentation of the patient's normal neurological examination. In only 78 patients was the catheter placed before the surgical incision and used intraoperatively. A stimulating needle was used in 362 patients, catheters were advanced 10.6 ± 6.0 cm and bupivacaine (0.125%-0.25%) or mepivacaine (0.5%-1.25%) was administered as the initial loading dose in 351 patients with a mean volume of 31 ± 12 mL. The local anesthetic infusion solution contained bupivacaine (0.125%-0.25%) in 355 patients and mepivacaine (0.5%-1.25%) in 45 patients with a mean infusion rate of 10 ± 2 mL/h. The axillary catheter was replaced in 31 patients one or more times because of technical problems or inadequate analgesia.

Supplemental IV opioid analgesia was required in 62% patients undergoing elbow surgery, 35% of patients undergoing digit replant, and 28% non-surgical chronic pain patients during the first 24 h after catheter placement.

Nine complications occurred in 8 patients resulting in an overall frequency of 2.2%. These included (1) an axillary hematoma after catheter insertion (resolved spontaneously without sequlae), (2) a patient complaining of persistent axillary pain several days after hospital dismissal (due to a retained 4-cm catheter fragment that was surgically excised uneventfully), (3) local skin infection in the axilla after 48 hours of axillary analgesia (*Staph. Aureus* was cultured, the catheter was removed and antibiotic therapy initiated resulting in full recovery). There were 5 patients with neurological complications. Two patients developed transient signs and symptoms of systemic local anesthetic toxicity that did not proceed to overt seizure activity or cardiac dysrhythmias while 4 patients reported new postoperative nneurologic deficits. All had uneventful catheter placements without the elicitation of paresthesias and had undergone major elbow surgery with tourniquet inflation times £ 100 min. Symptoms consisted of pain/ paresthesias in 3 patients and profound numbness/weakness in 1 patient. In 2/4 patients the neurological complication was non-anesthesia related. Neurologic recovery was good in 32 patients, poor in the patient with profound sensorimotor deficits, and unknown in the remaining patient.

Commentary

Although this is a retrospective study, its strength lies in the fact that all patients underwent serial daily neurological examinations making it unlikely that any significant neurological deficit would go undiagnosed. The management of perioperative pain is receiving a great deal of attention from many quarters, both medical as well as non-medical. Patients are undergoing surgical procedures of increasing complexity and magnitude at a time that duration of hospital stay is getting progressively shorter. As a result, the management of postoperative pain has become a major challenge. Most orthopedic surgical procedures lend themselves to the use of regional anesthetic techniques. The major limitation of these techniques has been the limited duration of postoperative analgesia provided by single injection peripheral nerve blockade. The use of continuous regional analgesia techniques affords us the ability to provide prolonged postoperative analgesia to both inpatients as well as outpatients. These techniques are gaining in popularity despite the fact that they are technically more challenging than single injection techniques. The benefits of any technique have to be weighed against the risks associated with these techniques including neurological complications, infection, and local anesthetic toxicity. The value of this study lies in the fact that the risk of neurological complications was shown to be similar to that associated with single-dose techniques.

Spinal Anesthesia: Functional Balance is Impaired after Clinical Recovery

Imarengiaye CO, Song D, Prabhu AJ, Chung F. *Anesthesiology* 2003;98:511-5

In this study, the authors compared clinical markers of gross motor recovery with objective data of functional balance after spinal anesthesia.

The study included 22 ASA I and II male outpatients (18-65 yrs old) scheduled for elective ambulatory peroneal surgery. Spinal anesthesia was administered in the sitting position at L2-L3 or L3-L4 intervertebral space with a 25-gauge Whitacre needle. A 3 mL mixture of 5 mg heavy bupivacaine (7.5%), 10 mg fentanyl, and 0.9% saline was injected slowly into the subarachnoid space. The patient was placed in the supine position to achieve sensory blockade to T10-T12 within 10 min. and supplementary fentanyl 25-50 mg was administered IV on patient request.

Motor function of the lower extremities was assessed using straight leg raises, deep knee bends, heel-to-shin maneuvers, and modified Bromage scores 30-60 min before anesthesia (baseline), 5 min after spinal injection, 60 min after spinal injection (first postoperative assessment), and every 30 min thereafter until the patient was discharged home. The level of the block was determined at the same time intervals by testing response to pin-prick stimulation.

Functional balance was determined using a Balance Master system (model 6.1). This is a computerized force platform in which the patient's feet are placed on 2 foot pads, each resting on a transducer that's transmits movement-generated signals to a computer that calculates and tracks the force and movement of the patient's center of gravity and displays the value on a monitor. The functional balance tests chosen for this study included the sit-to-stand test, the step-up/-over test, and the tandem walk. The timing of the tests were the same as those testing motor function with the exclusion of the one performed 5 min after spinal anesthesia. Motor function and ability to ambulate were assessed clinically prior to each balance test. Ambulatory readiness and candidacy for discharge were defined by the patients' ability to walk steadily without assistance. Temporal measurements included time to onset of spinal anesthesia, duration of anesthesia and surgery, times to return of motor and sensory function, recovery to ambulatory readiness, PACU discharge, and discharge home.

All patients achieved satisfactory surgical anesthesia to T11-T12 and none required supplemental intraoperative analgesia. Most patients maintained motor function and proprioception 5 min after spinal injection: 96% were able to achieve the straight leg increase, 82% were able to perform deep knee bends, 77% were able to perform heel-to-shin maneuvers, and 91% were able to identify joint positions.

At 60 min after spinal injection the level of sensory blockade averaged T12 (T3-L3) and all patients were able to straight leg increase. The remaining tests of motor function were similar to those recorded 5 min after spinal anesthesia. In contrast, functional balance tests demonstrated that only 36% of patients could actually stand and even fewer (18%) could complete the Balance Master assessment. The latter group had significantly lower rising indexes compared to their preanesthesia baselines.

At 90 minutes after spinal injection the level of sensory blockade averaged L2 (T3-S2) and all patients could successfully perform the motor function tests and identify joint position. The percentage able to stand increased to 73% and 55% fulfilled functional balance tests.

At 150 min after spinal injection, 96% of patients had fully recovered their ability to walk steadily without assistance, and their balance scores achieved preanesthesia values (within ± 20% ranges). At this time their median level of blockade was L2 (T10-S2). Only 1 patient achieved full ambulatory recovery at 180 minutes.

Commentary

This elegant study clearly demonstrates that tests of gross motor function are inadequate as indicators of the ability to ambulate in readiness for discharge. As concluded by the authors, these results suggest that the ability to walk without assistance after spinal anesthesia requires a longer recovery period than predicted solely by gross motor recovery, making its return inadequate as a sole marker of ambulatory ability and readiness for discharge. Spinal anesthesia is favored by many of us over general anesthesia in the outpatient setting as a technique that is easy to perform, with a low failure rate and rapid onset, and affords us the opportunity of avoiding the side effects associated with general anesthesia and opioid analgesia. Pressures to discharge ambulatory patients from the hospital in the shortest possible time has resulted in ever decreasing doses of spinal local anesthetic with various additives to limit the degree and duration of motor blockade. This study serves as a warning that even with low doses of local anesthetics, we should not only determine that full motor recovery has been achieved, but in addition, we should be aware that the recovery time to unassisted ambulation is longer than has been assumed. In addition, the standard clinical markers of gross motor function are poor predictors of functional balance following ambulatory surgery.

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Matters of Interest

This exerpt is from the June 27, 2003 issue of the ASA President's Update concerning matters of interest to anesthesiologists that came before the AMA House of Delegates. The full ASA President's Update can be viewed at www.asa.org.

Office-Based Surgery and Anesthesiology:

The AMA House considered Board of Trustees Report 23 "Office-Based Surgery Regulation" that outlines a set of core principles for optimal office-based surgery which have been agreed upon by ASA with the American College of Surgeons and other national medical specialty societies, state medical associations, health care accreditation organizations, the Federation of State Medical Boards and the National patient Safety Foundation.

The report was referred back to the Board and is available on the AMA Web site at: <www.ama-assn.org/ama1/upload/mm/annual03/bot23a03.rtf>. This document also refers to the ASA guidelines on the "Continuum of Depth of Sedation" and the ASA physical status classification system.

"Core Principle #1: Guidelines or regulations for office-based surgery should be developed by states according to levels of anesthesia defined by the American Society of Anesthesiologists (ASA), excluding local anesthesia or minimal sedation. (American Society of Anesthesiologists. *Continuum at depth of sedation*. Available at: <www.ASAhq.org/publications and services/standards/20.htm>. Accessed February 27, 2003)

Core Principle #2: Physicians should select patients by criteria, including the ASA Physical Status Classification System and so document. (American Society of Anesthesiologist. *ASA physical status classification system.* Available at: <www.ASAhq.org/clinical/physicalstatus.htm>. Accessed February 27, 2003)

Also of particular note to anesthesiologists is proposed **Core Principle #10**, which states: "Physicians administering or supervising moderate sedation/analgesia, deep sedation/analgesia or general anesthesia should have appropriate education and training."

Continuous Regional Analgesia for Labor:

Resolution 530 "Registered Nurse Participation in Epidural Analgesia" was not a new issue for anesthesiologists, particularly those who practice primarily obstetric anesthesia, but adoption by AMA serves as an affirmation that registered nurses can, and should, continue to be involved appropriately in the administration of continuous regional analgesia for the laboring patient.

A copy of Resolution 530 is available on the AMA Web site at: <www.ama-assn.org/ama1/upload/mm/annual03/e530a03.rtf>.

The recommendation of Reference Committee E (Science and Technology) was as follows:

"Resolution 530 asks that our American Medical Association:

1. consistent with the American Society of Anesthesiologists position statement adpot the following statement on administration of epidural analgesia: 'In order to provide optimum patient care, it is essential that registered nurses participate in the management of analgesic modalities. A registered nurse — qualified by education, experience and credentials — who follows a patient-specific protocol written by a qualified physician should be allowed to adjust and discontinue catheter infusions;'
2. work with the ASA and other necessary stakeholders (e.g. Association of Women's Health, Obstetric and Neonatal Nurses) to ensure that patients receive the necessary pain relief during labor and delivery; and
3. encourage the National League of Nursing Accrediting Commission and the Commission on Collegiate Nursing Education to emphasize education and certificate training programs that assure the necessary clinical skills for labor and delivery nurses to be able to adjust the rate of epidural infusion for patients."