

Chronic Pain Management and the Surgeon: Barriers and Opportunities

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CASE PRESENTATION

“Oh great,” I thought sarcastically as I got off the phone with the answering service. The call was from Mrs. Daly, an elderly woman on whom I had operated 6 weeks earlier. She had presented with a large abdominal mass and obstructive symptoms. At the time of surgery I found a large pancreatic cancer that could not be resected, but I performed biliary and intestinal bypasses for what I hoped would be some degree of palliation of future symptoms.

The answering service said Mrs. Daly needed me to call about “pain control issues.” It was 11 o’clock at night. I thought, “Where is her oncologist?” When I called the patient, I immediately sensed she was uncomfortable and desperate. “Doctor,” she said, “thank God you called.” “My stomach and my back are hurting and this pain is unbearable. I feel like I could climb the wall.” I asked her to tell me how long this had been going on and where she was having the pain. “The pain has become gradually worse over the last couple of weeks. The pain is in the middle of my stomach and my back. I can’t find a comfortable position.” When I asked her to rank the intensity of the pain on a 0 to 10 scale, she stated it was, “way beyond the scale, like 15.”

Mrs. Daly went on to tell me she had recently seen her oncologist. The oncologist was aware of the increasing pain. The oncologist arranged for a CT scan and gave her a prescription for Percocet. The Percocet was to be taken as 1 to 2 tablets every 4 to 6 hours as needed. The patient had been taking two tablets around the clock without any relief. To complicate matters, the oncologist was out of town at a national meeting, and she did not know the name of the covering doctor. In addition, her primary care physician

of 25 years had recently retired and she had not established any relationship with the new physician assuming her care. “I thought I’d call you because, after all, you operated on me and you know me better than my new doctors.”

She went on to tell me the pain had become so bad that, despite the Percocet, her son had taken her to the emergency department. The emergency department physician gave her a “shot” of morphine which provided some relief. She was discharged from the emergency department with a prescription for Dilaudid, and the promise that “these are more potent than the Percocet.” Unfortunately, this occurred on a Sunday evening when all the local pharmacies were closed. She resumed taking the Percocet without any relief until the following morning when a friend attempted to fill the prescription, discovering none of the local pharmacies stocked Dilaudid. The patient’s friend, desperate herself, went to the new primary care physician’s office where a prescription for Oxycontin, 10 mg every 12 hours, was issued.

Mrs. Daly told me, “I took that Oxycontin and it did nothing.” She added, “I am hurting so much but I’m afraid to take this medication. I’ve heard such horror stories on the television about people overdosing on this stuff.”

I asked her, “How can I help? It seems that you need to talk to the oncologist on call to help your pain situation.” Mrs. Daly told me, “I remembered when I had my surgery 6 weeks ago how much attention you paid to my recovery and making sure that I did okay after the operation. I know that I don’t need any more surgery, but is there something you can do to help me?”

A general surgeon, Erie, PA

The above story is a common scenario encountered by surgeons today. Despite decades of subspecialization into specific procedure-oriented activities, surgeons are still frequently consulted directly by patients for chronic pain. In the current health care system fraught with discontinuity of care, patients who do not receive adequate pain relief from their primary providers, whether inter-

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nists, oncologists, or pain specialists, may turn to their surgeons in desperation. Suddenly becoming a “consultant” in these dire situations is difficult for most surgeons with busy practices. Sometimes, surgeons do their best to avoid becoming involved with treating a nonsurgical patient’s chronic refractory pain.

But the role of surgeons with patients nearing the end of their life is changing. An increasing part of surgical practice involves care of patients at the end of life, whether they are octogenarians recovering from trauma and surgical procedures, or younger patients with incurable malignancies in need of palliation. For a variety of reasons, many surgical practices accumulate a significant number of patients who are followed longterm. This is occurring in the background of a “graying” America, a major demographic change.

Currently 70 million Americans of all ages report chronic pain; many of them are permanently disabled.¹ By 2030, 70 to 78 million Americans will be older than 65 years of age.² About three quarters of the elderly will contend with chronic end-organ diseases at the end of life,³ requiring longterm pain relief. Of about 8 million Americans with a history of cancer, an average of 30% to 45% in the early stages of cancer experience considerable pain, and 75% of patients in late stage endure pain.⁴ These statistics trigger alarm when considering that nearly 90% of such patients can be effectively treated with conventional medications.^{4,5}

Alarming, The Institute of Medicine reported that 40% of families of deceased patients report their loved ones being in severe pain before death.^{6,7} Demand for health care professionals—including surgeons—attention to pain has led The Joint Commission on Accreditation of Healthcare Organizations to establish a new standard for pain management.⁸ The new standard mandates screening for the presence of pain as a “fifth” vital sign in all patient encounters. If pain is present, further assessment regarding location and severity is recommended. Designating pain as the “fifth” vital sign prompts nurses and physicians to respond to extraordinary pain scores as they would for an abnormal temperature, respiratory or heart rate, or blood pressure.

Even the courts are encouraging physicians to address inadequate pain relief at the end of life. In two case rulings in 1997,^{9,10} the US Supreme Court effectively required all states to ensure that state laws do not pose barriers to adequate palliation of pain.¹¹ In California, the Patient’s Bill of Rights requires physicians to treat

pain or refer the patient to a pain management specialist. In Florida, health care providers are required to treat pain on request.¹² In Oregon the State Board of Medical Examiners reprimanded a physician who failed to treat a patient’s severe pain.¹³ Plaintiffs who suffered inadequate pain treatment were awarded in the courts, based on claims such as injury and damages, infliction of emotional distress, abandonment, and elder abuse.^{14–17}

Surgeons may request a multidisciplinary pain service or a palliative care service to help manage chronic pain of surgical patients. But pain specialists may not be available when needed. Often surgeons are alone to face the dilemma of treating their patients’ chronic pain, as encountered with the patient described previously. The diverse and complex pharmacology of opioid analgesics and adjuvant drugs can be overwhelming. Governmental regulatory restrictions imposed on Schedule II narcotics send a signal that opioid medications should be used judiciously, if not sparingly. In our culture of “Just Say No” to drugs, surgeons may feel conflicted about chronically prescribing opioid medications, fearing the specter of addiction and abuse even when they sense a necessity for the patients. Uneasiness with opioids may explain why even acute postoperative pain is sometimes suboptimally managed.¹⁸ Surgeons, who both cause and relieve pain through their craft, walk a narrow plank between “too much” and “too little” when dealing with pain management. But the moral imperative of adequately treating a patient in severe pain is self-evident. The American College of Surgeons’ Committee on Ethics gently reminds its Fellows, especially for patients who have no hope of survival at the end of life, “Ensure alleviation of pain....”¹⁹

The purpose of this paper is to explore the barriers to optimal pain management as they relate to surgeons in care of patients with chronic pain, whether from cancer, trauma, or other nonmalignant conditions. Misperceptions about chronic pain management are presented. With the recent challenge for surgeons to become more involved with pain management, future opportunities in research and clinical practice are also discussed.

“Too much pain medication will cause addiction.”

Mrs. Daly was taking the “maximum” clinical dose of Percocet (Endo Lab, Chadds Ford, PA), 12 tablets per day, without relief. The common misperception may be that patients seek more opioids despite the maximal dose because of a drug-seeking behavior. In fact, the maxi-

Table 1. Examples of Stepwise Dose Escalation of Morphine Sulfate Administered as Oral Immediate-Release Preparation, Oral Controlled-Release, and Continuous Infusion

Step	Oral immediate-release		Oral controlled-release (with immediate-release rescue dosing)		Subcutaneous infusion (with subcutaneous rescue doses)	
	"Around the clock" (mg)	Rescue dose PRN (mg)	"Around the clock" (mg)	Rescue dose PRN (mg)	mg/hour	Rescue dose PRN (mg)
1	10 q4h	5.0 q1h	30 q12h	7.5 q1h	3	2.0 q 15–30 min
2	15 q4h	7.5 q1h	30 q 8h	15.0 q1h	5	2.5 q 15–30 min
3	30 q4h	15.0 q1h	60 q12h	15.0 q1h	7	3.5 q 15–30 min
4	45 q4h	22.5 q1h	100 q12h	30.0 q1h	10	5.0 q 15–30 min
5	60 q4h	30.0 q1h	100 q 8h	30.0 q1h	15	7.5 q 15–30 min
6	90 q4h	45.0 q1h	200 q12h	45.0 q1h	20	10.0 q 15–30 min
7	120 q4h	60.0 q1h	200 q 8h	60.0 q1h	30	15.0 q 15–30 min

PRN, pro re nata (as needed).

(From: Cherny NI, Foley KM. Current approaches to the management of cancer pain: a review. *Ann Acad Med* 1994;23:139–159, with permission.)

mum dose of Percocet is determined by the acetaminophen, not by the oxycodone. For each patient the opioid dose must be individualized based on patient response, with the knowledge that there is no arbitrary ceiling on opioid dose.

Studies on undertreatment of pain show that clinicians' concern about addiction is among the most frequently cited reasons.^{20–22} This is even more understandable considering the discussion of addiction and dependence in the media. As noted by Mrs. Daly, the recent spread of injecting or snorting ground OxyContin (Purdue Pharma, Stamford, CT) powder^{23,24} highlights the potency of opioid analgesics commonly used in daily surgical practices and the potential for abuse.²⁵ It is important to understand the distinction between a patient population with a clear medical condition that causes pain and the population without a medical need that abuses opioid drugs by means of fraud or diversion.

At a cursory glance, the concern for addiction seems justified when surgeons frequently encounter patients who vociferously complain of unrelieved pain and request escalating doses of opioids. Although dismissed as drug-seekers, such patients more accurately represent examples of pseudoaddiction.²⁶ Pseudoaddiction, unlike true addiction, is a syndrome resulting from chronic undertreatment of pain from, in part, inadequate understanding of opioid pharmacology.

The apparent high prevalence of addiction may be from the confusion about the terms, *tolerance*, *physical dependence*, and *addiction* (or substance abuse).²⁷ The following are definitions from a consensus document from the American Academy of Pain Medicine, the

American Pain Society, and the American Society of Addiction Medicine.²⁸

Addiction is a primary, chronic, neurobiologic disease, with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.

Physical dependence is a state of adaptation that is manifested by a drug class-specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug, or administration of an antagonist.

Tolerance is a state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more of the drug's effect over time.

Patients treated with prolonged opioid therapy develop physical dependence and, occasionally, tolerance to analgesic effects. Pharmacologic tolerance leads to escalation of opioid dose for diminishing analgesic effect, but it also results in abatement of some of the side effects of opioids, eg, nausea, vomiting, or sedation. It should be noted that increasing opioid requirement is usually from worsening pain from the progression of the underlying disease rather than from the pharmacologic tolerance. Dependence and tolerance should be expected consequences of chronic opioid use in surgical patients with refractory pain, and should not be confused with addiction.

In cancer patients who require escalating doses of opioids, Table 1 suggests an effective step-up program on an "around the clock" morphine regimen.²⁹ Management of tolerance effects without the risk for addiction is easily

Table 2. Approach to Pain Management in Substance Abusers with Human Immunodeficiency Virus (HIV) Disease²⁷

Substance abusers with HIV deserve pain control; we have an obligation to treat pain and suffering in all of our patients.

Accept and respect the report of pain.

Be careful about the label *substance abuse*; distinguish between tolerance, physical dependence, and addiction (psychological dependence or drug abuse).

Not all substance abusers are the same; distinguish between active users, individuals in methadone maintenance, and those in recovery.

Individualize pain treatment plan.

Use the principles of pain management outlined for all patients with HIV disease and pain (World Health Organization analgesic ladder).

Set clear goals and conditions for opioid therapy: set limits, recognize drug abuse behaviors, make consequences clear, use written contracts, and establish a single prescriber.

Use a multidimensional approach: pharmacologic and nonpharmacologic interventions, attention to psychosocial issues, and a team approach.

(From: Breitbart W. Pain in human immunodeficiency virus disease. In: Loeser J, ed. *Bonica's management of pain*. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2000:750, with permission.)

achieved if anticipated and addressed in a controlled manner.²⁷ Dependence is also easily managed by a slow-taper schedule of the analgesic, as one would with most medications in chronic use.³⁰

A close examination of available data suggests that the concern for addiction is overly exaggerated. Although the incidence of pseudoaddiction is lessened by careful pain management, the incidence of true addiction with chronic use of opioid analgesia has been found to be negligible.³¹⁻³³ In a study of nearly 12,000 hospitalized patients who received opioids, addiction occurred in only 4 patients.³⁴ The rate increases only slightly among patients with an earlier history of substance abuse. A study of chronic opioid analgesic in a cancer pain clinic confirmed that indeed addiction is a rare occurrence in this patient population.³⁵ Even among substance abusers with AIDS and cancer, adequate pain management is quite achievable without the disastrous consequence of addiction.^{22,27,36-39}

Sometimes surgeons become involved in the care of previous substance abusers, for example, patients with AIDS. Interestingly, physician attitudes toward previous substance abusers correlate with their undertreatment of pain. Only 15% of AIDS patients with pain receive adequate analgesic therapy, compared with almost 60% of patients with cancer.³⁵ Concern for addiction in some patients with a high risk for addiction may be valid, but this does not mean undertreatment is warranted or that the responsibility for alleviation of pain can be waived. Breitbart²⁷ offers a practical approach to management of pain in high-risk patients in Table 2.

For most surgeons, the time required to adequately manage pain in high-risk patients is impractical and prohibitive. It may serve both the surgeon and the patient well to involve at an early stage the pain specialists, psy-

chiatric clinicians, and substance abuse specialists²⁷ before any major surgical procedure with potential for difficult pain control.

“Too much pain medication will cause respiratory depression and lead to respiratory arrest.”

Opioids produce inhibitory effects on respiratory centers of the pontine and bulbar brainstem through their actions on mu-receptors and kappa- and sigma-receptors. Parameters such as respiratory rate, tidal volume, and responsiveness to carbon dioxide tension have been shown to decrease as a result of the sedative effects of opioids.⁴⁰ In acute pain management, respiratory compromise from intravenous or intrathecal opioid analgesia is a serious complication that raises a great deal of concern. Bradypnea, hypercarbia, and other potentially serious respiratory complications occur between 0.5% and 1.8% in clinical experiences of 2,500 to 3,000 patients.^{41,42}

The risk of respiratory depression is overly exaggerated in cases of chronic opioid use.³⁰ Pharmacologic tolerance to respiratory depression occurs quickly, and sudden respiratory arrest does not occur without the preceding occurrence of CNS effects such as gradual sedation, mental clouding, and somnolence. Respiratory distress associated with tachypnea and agitation should not be attributed to opioid analgesia, and other causes such as pulmonary embolism or edema should be ruled out.²⁹ Opioid analgesic dosing should be appropriately titrated to its side effects to prevent oversedation, without which respiratory arrest does not occur.

Pain is a potent stimulant of respiratory drive that counteracts the opioids' respiratory inhibitory effect. So, a patient on chronic high doses of opioids who undergoes a procedure in which the source of pain is suddenly

eliminated, such as nerve block or ablative neurosurgery, should be monitored closely. Patients with upper abdominal surgery, previous history of sleep apnea, morbid obesity, and severe chronic obstructive pulmonary disease are at increased risk for respiratory compromise. The opioids further compromise the patient's dependence on intercostal and accessory muscle breathing.^{42,43} Patients may also be at increased risk of significant respiratory depression from opioid analgesia if they have renal dysfunction from decreased clearance of the parent compound or active metabolite(s).

Mild respiratory depression when a patient can be aroused (respiratory rate > 6 breaths/min) can be managed with temporary discontinuation of opioids, whereas significant respiratory depression (respiratory rate < 6 breaths/min) can be treated with intravenous naloxone until the patient becomes alert.³⁰ If necessary, a vial of naloxone (0.4mg in 1 mL) should be diluted in 9 mL of 0.9% NaCl and administered as 1 mL solution every 2 to 3 minutes until respiration increases. Often patients do not require a full dose, and this approach prevents the possibility of full reversal of the analgesic effect and causes a fulminant withdrawal reaction.

Patient-controlled analgesia (PCA) with an appropriate dosing and lock-out interval can reduce the risk of an overdose and respiratory compromise. Somnolence from extra dosing will prevent the patient from pushing for additional doses. It is important to instruct family members to abstain from pressing the PCA control button for the sleeping patient. The basal infusion mode should be carefully considered and used in a situation where frequent monitoring is available to avoid respiratory complication in high-risk patients.

Careful attention to the above factors should abate the fear of respiratory depression and reduce this barrier to optimal pain management. The risk for respiratory arrest has not been a problem among physicians who use opioid analgesia effectively to alleviate pain in patients with cancer.^{29,45}

It is the rare patient who succumbs to respiratory arrest while on systemic opioid who strikes fear in the minds of the surgeons faced with chronic pain management. The terror of legal liability—the threat of criminal charge—looms large at the moment of writing the prescription. In light of this, recent US Supreme Court decisions are encouraging. The US Supreme Court decisions in *Washington v. Glucksberg* and *Vacco v. Quill* in

1997 provided strong legal protection for physicians who aggressively treat pain for a palliative purpose, but “lose the patient” as a consequence of the respiratory complication of systemic analgesia.^{9,10} The critical legal principle defending the practitioner is intent. As long as the stated intent of analgesic administration is palliation rather than the hastening of death, the Supreme Court provides a strong defense for the physician. As Chief Justice William H Rehnquist affirmed in his majority opinion,

Just as a State may prohibit assisting suicide while permitting patients to refuse unwanted lifesaving treatment, it may permit palliative care related to that refusal, which may have the foreseen but unintended “double effect” of hastening the patient's death.⁹

Justice Sandra Day O'Connor concurred in her opinion,

The parties and *amici* agree that . . . a patient who is suffering from a terminal illness and who is experiencing great pain has no legal barriers to obtaining medication, from qualified practitioners, to alleviate that suffering, even to the point of causing unconsciousness and hastening death. . . .⁹

Accordingly, the prescribing surgeon is on firm legal ground if the documented intent of opioid analgesia (or any other palliative procedure) is explicitly for palliation, and that the informed consent process has been carried out with respect to disclosure of potential complications such as adverse effects from respiratory depression.

In consideration of the recent Supreme Court ruling, surgeons should not feel exposed, legally or ethically, to prescribe appropriately high doses of opioid analgesics to relieve pain in patients with terminal conditions, such as in Mrs. Daly's case. As a matter of careful and compassionate practice, surgeons should always carefully document palliative intent, anticipate and manage side effects of treatment, and follow preestablished clinical guidelines.

“Pain medication should be used sparingly to prevent development of side effects.”

Inadequately treated pain, if severe, is an intolerable and inhumane condition for the patient. It is important to understand that many of the side effects of pain medication are treatable. Rather than withholding analgesia because of concern for side effects, surgeons may con-

sider treating both pain and the side effects simultaneously in patients with terminal conditions.

Nausea and vomiting, for example, are potent and highly disliked side effects of opioid analgesia, mediated by direct stimulation of the chemoreceptor trigger zone in the medulla. This can be treated with concomitant use of prochlorperazine, droperidol, or haloperidol. But other mechanisms mediated by cholinergic, histaminergic, and serotonergic receptors contribute to nausea and vomiting in patients with opioid analgesia. For example, emesis from vestibular stimulation in ambulatory patients can be controlled with a scopolamine patch. If the emesis is a complication of constipation, senna products or bicosadyl may be appropriate, while metoclopramide may be prescribed for gastric dysmotility.⁴³⁻⁴⁶

Other side effects include mood alteration, depression, cough suppression, hypotension, peristaltic dysmotility, colonic ileus, acalculus biliary colic, etc.⁴³ Each of these side effects needs specific supplemental therapy.

No one would withhold furosemide from a cardiomyopathic patient in need because of associated hypokalemia. The diuretic is prescribed with potassium supplementation. Likewise, the side effects of opioid analgesia can be managed effectively with specific adjunctive therapies and should not pose a major barrier to adequate pain management. In addition to "Ensuring] alleviation of pain..." surgeons must also attempt "management of other physical symptoms."¹⁹

"Any pain medication will mask the symptoms of underlying disease process and complicate diagnostic workup."

In many surgical emergencies involving a patient with chronic pain, such as in acute abdomen, the patient's subjective pain is an important assessment tool for making the correct diagnosis. Concern about pain medications masking symptoms and signs is theoretically understandable. Traditional surgical teaching recommends withholding analgesia until evaluation with physical examination is completed. The need for reliable clinical evaluation must be weighed against the moral imperative to relieve the patient's pain, especially if severe at the end of life.

The concern for unreliable examination under analgesia may be more theoretic and anecdotal than driven by outcomes evidence. Zoltie and Cust⁴⁷ reported results of a prospective double-blind trial in 288 patients with acute abdominal pain relieved by opioid analgesia.

There was alteration of physical signs in response to varying doses of the pain medication, but there was no effect on clinical diagnosis. A thorough review was recently conducted of all prospective trials investigating the safety, adverse effects, and outcomes of patients with acute abdominal pain receiving narcotic analgesia.⁴⁸ Again, there were no adverse outcomes or delays in diagnosis associated with the administration of opioid analgesia.

Despite the lack of evidence on negative impact of analgesia on clinical diagnosis, physician beliefs and attitudes remain mixed. In a recent study in the *Journal of the Royal College of Surgeons of Edinburgh*, about 88% of local surgeons favored early administration of analgesia. Prospective audits of 100 emergent cases revealed that patients with acute abdominal pain waited excessively for analgesia.⁴⁹ The delay to analgesic administration was 2.3 hours for patients with severe pain and 6.3 hours for those with moderate pain. The causes of delay were thought to be the result in part, of the junior staff's fear of masking physical signs with pain medication, in contrast to the opinion of the more senior surgical staff. Wolfe and associates⁵⁰ reported that 85% of the 440 members of the American College of Emergency Physicians who were surveyed believed judicious administration of analgesia did not alter the reliability of physical findings. Even so, 76% of them chose not to administer pain medication to their patients until they were evaluated by the surgeons, contributing to the delay in pain relief. The mixed beliefs and attitudes are further demonstrated in a survey of general surgeons in Iowa, in which about half of the respondents believed pain medications preclude valid informed consent.⁵¹

These data suggest a disconnect between the outcomes data from prospective clinical trials and the attitudes of the physicians, surgeons, and emergency staff. In short, their beliefs and attitudes remain mixed despite the literature clearly supporting the use of analgesia in patients with an acute abdomen. A suggested solution is that each medical institution develop a clinical guideline to ensure adequate relief of pain in the specific patient populations. The guideline should be based on the evidence in the literature and the comfort and consent of the surgical department. It would be counterproductive to attempt to improve pain management of any patient without support from the literature or without making any effort to improve the system of pain relief.

Table 3. Approximate Equianalgesic Doses of Opioids for Chronic Pain³⁰

Oral dose (mg)	Usual oral dosing interval	Analgesic	Parenteral dose (mg)	Usual parenteral dosing interval
200	q3-4h	Codeine*	130	q3-4h
30	q3-4h	Hydrocodone [†] (Vicodin, Zydone)		
20	q4h	Oxycodone [†] (Percodan, Percocet, Tylox, Roxicet, Roxicodone, Roxiprin)		
30	q4h	Morphine	10	q3-4h
7.5	q3-4h	Hydromorphone (Dilaudid)	1.5	q3-4h

*Codeine is a poor choice for chronic pain management. Meperidine (Demerol) should not be used for chronic pain because it has a short duration of action and tends to accumulate normeperidine in the setting of frequent use or renal dysfunction. Normeperidine is a cerebral irritant with a long duration of action, causing potent neurologic effects, including grand mal seizures.⁴⁴

[†]Use of combination oxycodone and hydrocodone products must be limited because of the risk of acetaminophen toxicity (no more than 3.2 to 4 g/d). (Modified from Emanuel L, vonGunten CF, Ferris FD. Education for physicians on end-of-life care. http://www.ama-assn.org/ethic/epcc/download/module_4.pdf, 1999: M4-10, with permission.)

“Intravenous analgesics work effectively against severe pain, but it’s difficult to achieve the same analgesia with oral medications.”

Patients with severe pain can be relieved by continuously titrated intravenous opioids in the hospital. Patients can encounter an abrupt change in the level of relief when they are discharged on oral pain medications. The reason may be that the dose conversion from intravenous to oral form is often inadequate. It is also easy to underestimate dose conversion from one analgesic to another. In Mrs. Daly’s case, when Dilaudid (Knoll Laboratories, Mount Olive, NJ) was unavailable at the pharmacy, she was prescribed Oxycontin. She had been taking two Percocet tablets every 4 hours (60 mg of oxycodone per day), and yet, she was prescribed only 10 mg of Oxycontin every 12 hours (20 mg of oxycodone per day).

Table 3 is a conversion table for the equivalent analgesic doses of various opioids for chronic pain.^{30,52} For each opioid, conversion from oral to intravenous form and vice versa can be made along the horizontal axis in the table. Along the vertical axis, conversion from one opioid to another can be made. The information should help maintain the same level of analgesia across various points of care. It should be noted that equianalgesic dosing charts are to be used as a guide only, and one should anticipate incomplete cross-tolerance from one opioid to another and wide variability among patients.

Transdermal delivery of an opioid, such as with a fentanyl patch, can be an effective alternative to oral dosing of opioids for chronic pain relief. The fentanyl patch is not intended for someone who is “opioid naive” because of its potency. Transdermal delivery of fentanyl takes time to reach peak effect (approximately 20 hours). Steady state does not occur until two patch changes (6 days), so patients need another route of opioid delivery

for breakthrough pain, especially during the initial application and titration of transdermal fentanyl.

When used on patients with a stable requirement of oral morphine, conversion from intravenous morphine, for example 3 mg per hour, to the transdermal fentanyl patch is performed using the following guidelines:^{53,54}

Step 1: Calculate the 24-hour morphine dose: 3 mg IV/hour × 24 hours = 72 mg IV morphine per 24 hours.

Step 2: Convert IV morphine to PO morphine (1:3 ratio): 72 mg IV morphine per 24 hours × 3 = 216 mg PO morphine per 24 hours.

Step 3: Use the factor of between 45 to 60 mg of PO morphine per 24 hours for each 25 µg of the transdermal fentanyl patch: 216 mg PO morphine per 24 hours divided by 60 mg PO morphine times 25 µg fentanyl patch equals 90 µg fentanyl patch. This can be approximated to either a 75 µg patch or a 100 µg patch. (Transdermal fentanyl is available in 25, 50, 75, and 100 µg preparations.)

Using these simple conversion factors, patients can be prescribed either intravenous, oral, or transdermal forms of opioid analgesia at equivalent doses. Again, it should be noted that the equianalgesic conversion described above is only a guideline. Optimal analgesia always requires careful attention to reassessment of the impact of equianalgesic conversion and ongoing titration.

“My patients do not have pain. If they were in pain, they would complain and ask for more pain medication. But I don’t hear them complaining.”

It is tempting to assume adequate pain control when the patient does not complain of pain. This is particularly understandable given the time constraint for bedside or office visit in the surgeon’s busy schedule. Effective communication of inadequate pain control can be a difficult,

time-consuming task between the physician and the patient, an impossible task during the usual time allotted for most patient encounters. As a result, miscommunication often occurs, as shown in the literature.

Analysis of trauma patients in the ICU reveals that undertreatment of pain occurs, in part, from patients not requesting more analgesia despite moderate to severe pain.⁵⁵ Patients' fear of addiction and side effects is a major barrier to their requesting more analgesia, even when medically warranted.^{20,56-58} Patients often have a desire to be seen as a "good" patient by withholding their request for analgesia from their physicians.^{20,56-58} Sometimes, the family caregiver of a patient with terminal cancer may believe that reporting the patient's pain might distract the physician from treating the cancer.⁵⁹ Such patient-related barriers to adequate pain management appears to be particularly notable among patients and families of lower education,⁵⁹ lower income,⁶⁰ the elderly,⁶¹ and infants and children.⁶²

These data indicate that patients (and families) should not be depended on to reliably communicate their pain. In the end, it may rest on well-informed physicians and nurses to both educate and diligently evaluate the patients' level of pain to ensure adequate analgesia. Otherwise, clinicians may be misled to complacency while the patients silently suffer from considerable pain.

Studies have demonstrated that clinicians can misjudge the level of analgesic requirement in surgical patients and administer only a fraction of the maximum allowable analgesia.^{63,64} In one study, 64% of surgical and trauma patients were often in moderate to severe pain.⁶⁵ In neonatal intensive care units where the clinicians should have a heightened awareness of the patients' inability to communicate, postoperative pain management was still suboptimal in 35% of minor surgical patients, and 12% of major surgical patients, respectively.⁶⁶

The clinicians' attention to nonverbal behavior and subtle indications of ongoing pain may improve the patients' pain management regardless of the patient-related barriers to effective communication. In an interventional study, an educational program for clinicians was found to be successful in reducing fear of addiction to pain medication among postoperative patients of orthopaedic and abdominal surgical procedures.⁶⁶ It is important for the surgeons to remember that patients may be dependent on them to ensure adequate level of pain relief.

"I've done the operation. Pain management is not the surgeon's problem. Send the patient to the anesthesiologist or the primary care physician. Let them deal with it."

Pain management is an integral part of the surgical practice. One might even argue that pain management is the essence of surgery. Throughout the history of changing disease models, from Galen's notion of humoral imbalance to the modern construct of cellular and organ dysfunction, patients have always experienced disease foremost as pain, for which surgeons were often brought in to provide a cure. There is a remarkable tradition of surgeons becoming preoccupied with methods of pain relief throughout history. This is because for most of the past two millennia, surgeons were delegated the unpleasant responsibility as described by the Roman, Celsus (42 BC to 37 AD):

... [surgeons] must have a strong, stable and intrepid hand, and a mind resolute and merciless; so that to heal him [the patient]..., he be not moved to make more haste than the thing requires; or to cut less than is needful; but which doth all things as if he were nothing affected with their [the patient's] cries. . . .⁶⁷

It is no wonder that in the 16th century, Ambroise Paré desperately ligated the proximal limb to reduce pain during amputation.⁶⁷ In 1784, James Moore described a compression device on the main nerves as "A Method of Preventing or Diminishing Pain in Several Operations of Surgery."⁶⁷ At one time even snow and ice were tried on the site of surgical incisions to dull the pain, as espoused by Thomas Bartholin in 1661.⁶⁷ Napoleon's surgeon general Dominique-Jean Larrey in 1807 further ruminated that -19°F weather allowed him to perform painless operations on the battlefield.⁶⁷

Surgeons played an integral part in the development of both general and regional anesthesia to relieve operative pain. It was a Jefferson, GA, surgeon, Crawford W Long—for a mere \$2 for both surgical and anesthesia fees—who first administered ether to a patient in 1842 while removing a cystic tumor on the skin.⁶⁸ Boston surgeon John Collins Warren, in 1846, allowed a dentist William Morton to administer the same gas to his patient to demonstrate publicly the first recorded case of successful inhalation general anesthesia.⁶⁹

Ether soon fell out of favor because of its side effects. It was a British obstetric surgeon James Young Simpson

who first used chloroform in 1847 as a desirable anesthetic agent during childbirth. He was attacked by the church for interfering with God's "natural birth" and was unable to promote the practice for the general public.⁷⁰ It was John Snow, a former surgical apprentice under William Hardcastle, and a member of the Royal College of Surgeons of England (although he was a physician), who successfully administered chloroform to Queen Victoria during her childbirth in 1853 to win over critics and popularized the practice in Britain and across Europe and America.⁷¹

In Vienna, during their experimentation with cocaine on muscle strength, Karl Koller and Sigmund Freud noticed cocaine's numbing effect on the tongue as the drug was swallowed(!). It was the ophthalmology intern Koller who applied the coca extract to a frog's conjunctiva in Freud's absence that demonstrated its potential as a local anesthetic in ophthalmologic procedures. Later in 1884, an ophthalmology surgeon Joseph Brettauer presented the paper on behalf of Karl Koller and provided a practical demonstration at the Ophthalmological Congress of Heidelberg to launch a new era of regional anesthesia throughout the medical world.⁷²

Why did all these surgeons spend their energy and careers to pioneer the techniques of general and local anesthesia? One might guess several reasons. It might have been the excitement of scientific research and new discovery, while at the same time, their empathy for the patient drove them to find ways to alleviate pain. It may have been the more pragmatic reason that improved analgesia made increasingly complex and delicate operations possible. And finally, the promise of improved analgesia may have even encouraged the reluctant patient to agree to undergo a surgical procedure. Their efforts helped transform one's expectation of surgery. In contrast to pre-19th century, when unmitigated operative pain was the expected norm, no one would now consider any operative procedure without proper anesthesia.

The physiologic importance of acute perioperative pain management is well appreciated.^{73,74} Pain causes a variety of physiologic effects that can delay optimal postoperative recovery. Pain interferes with return of normal pulmonary function, and postoperative epidural analgesia has been shown to decrease pulmonary complications.⁷⁵ Persistent pain, through a complex array of interactions, perpetuates the "stress-hormone" response in the patient. This response leads to profound alterations in the neuroendocrine systems of the body manifested as

an increased secretion of catabolic hormones (cortisol, glucagon, growth hormone, catecholamines) and inhibition of anabolic mediators, especially insulin. Interestingly, perioperative analgesia with epidural catheter has been shown to blunt postoperative protein catabolism and improve nitrogen balance.⁷⁶ It has also been shown to decrease cortisol response and hyperglycemia in association with increased pain relief after abdominal hysterectomy⁷⁷ and gastrectomy.⁷⁸ These effects may attenuate postoperative hypertension, tachycardia, and increased oxygen demand, helping to mitigate the unfavorable physiologic conditions for the myocardium. In high-risk surgical patients, for example, epidural anesthesia and postoperative analgesia have been shown to decrease postoperative cardiac complications.⁷⁹ Immobility from pain increases the risk for thromboembolism. Postoperative analgesia with epidural catheter in post-hip replacement patients was associated with significant reduction in deep vein thrombosis of the lower extremity.⁸⁰

An argument can be made that chronic pain management is equally important and pertinent to the surgeons. If not for the reason of surgical interest in physiology such as above, the pressure for optimal surgical outcomes may interest the surgeons to consider chronic pain management as an important part of surgical practice, research, and teaching.^{74,81,82} There are reports in the literature suggesting that chronic, refractory postoperative pain maybe more prevalent than previously assumed. In a prospective study of chronic pain 1 year after open groin hernia repair, up to 19% of patients reported some degree of pain, and as many as 6% of the patients reported moderate or severe pain.⁸³ This is a disturbing finding for a procedure in which most patients—and surgeons—expect a complete resolution of pain after surgery.

Likewise, despite the early enthusiasm for decreased pain in the immediate postoperative period after minimally invasive thoracic operations, a longterm study revealed 32% of patients suffered from chronic pain at median followup of 59 months. The high prevalence of chronic pain caused the authors to put into perspective the role of minimally invasive thoracic surgery in lieu of simple drainage therapy for the first episode of spontaneous pneumothorax.⁸⁴ In another study, chronic pain after thoracotomy has been reported to be as high as 61% at 1 year after surgery, causing interference with the patient's normal daily activity in more than half of the patients.⁸⁵ It is surprising to note a British study of 5,130

patients managed for their chronic pain in 10 different outpatient clinics. Surpassing traumatic injury as a cause (18.7%), previous surgery was among the most frequent cause in 22.5% of all patients with chronic pain, namely from operations involving the abdominal, anal, perineal, and genital areas.⁸⁶ The report raises the possibility that there may be postoperative patients whose chronic refractory pain is not reported to nor cared for by the operating surgeons.

These data may have important ramifications. Discussions about the risk of chronic refractory pain after the acute perioperative period should become an important part of informed consent. The nature of longterm management of chronic postoperative pain should also be discussed. After procedures known to be associated with significant, longterm postoperative pain, surgeons must anticipate and closely monitor for chronic pain. Because of the fear of addiction and the desire to be “good” patients, they may suffer silently unless the surgeons ask directly about the presence of pain. Chronic postoperative pain, when discovered, must be treated aggressively, including a referral to the multidisciplinary pain service if available. Knowledge of chronic postoperative pain is an important feedback to the operating surgeon, in terms of his or her surgical outcomes, and an opportunity to modify operative techniques or the criteria for surgical indication.

Surgical outcomes are no longer based solely on the “survival-mortality” model. Quality of life and functional status are becoming increasingly important measures of outcomes. Inadequately treated chronic postoperative pain significantly compromises the quality of life and functional status, especially among fragile elderly patients. Chronic pain leads to longterm disability and adverse outcomes. Surgeons may do well to acquire a detailed knowledge of chronic pain control, including practical opioid pharmacology, as an adjunct to their surgical therapy. Assessment and treatment of chronic pain should be an important part of surgical postgraduate education, and acute pain management, and should be included as a topic for qualifying examinations for specialty boards.

It has been argued in surgical oncology that the surgeon should not only know the chemotherapeutic agents in advanced cancers, but also know how to select minimal surgical procedures in early cancers in conjunction with regional and systemic adjuvant treatments.⁸⁷ More broadly speaking, a parallel can be drawn to state

that surgeons in general should not only know the advanced pharmacologic analgesics for chronic refractory pain, but also know how to use minimal surgical procedures for select pain syndromes in conjunction with pharmacologic analgesia.

There is little doubt that opportunities will increase for developing new palliative surgical procedures, as they have in the past. During the turn of the 20th century, newly armed with anesthetic and antiseptic techniques, great surgical figures have dedicated their efforts to the development of surgical procedures for pain relief: Leriche for sympathectomy for causalgia, Horsley for retrogasserian neurectomy for tic douloureux followed by Krause, Frazier, Cushing, Dandy, etc.⁸⁸ Enthusiasm for ablative neurosurgical procedures have faded over the years, but recently new developments in several fields are converging to begin a new era in palliative surgical care. Contributing factors include new understanding of the pathophysiology of chronic pain and the role of chemical mediators, new classes of nonopioid and opioid pharmacologic agents, simultaneous miniaturization of digital electronic components with magnification of their computing power, new classes of implantable devices to stimulate nerves and deliver drugs to inflamed tissue, minimally invasive surgical capabilities along with enhanced stereotactic diagnostic imaging, and just as important, the emergence of multidisciplinary specialists dedicated to chronic pain management with centralized patient populations in pain clinics.

Already in neurosurgery, former ablative neurosurgical procedures are giving way to newer methods of high-tech neuroaugmentation, such as electrical stimulation of the spinal cord, peripheral nerves, and brain.⁸⁹ Opportunities abound for both basic scientific and clinical research as these technologies evolve. In a small study on a general surgical topic, the inguinal neural anatomy of patients with debilitating refractory groin pain was evaluated. Nerve resection or neurolysis resulted in 90% of patients receiving excellent or good relief from pain and restoration of function.⁹⁰ In patients with unresectable pancreatic cancer, palliative bypass procedures and celiac plexus blockade are already available for effective symptom control. But, one may only be scratching the surface of a whole armamentarium of palliative procedures that can be offered to patients with chronic refractory pain in the abdomen. Surgical management of pain from chronic pancreatitis is already an established surgical topic,⁹¹ but there is room for improvement with mini-

mally invasive techniques. There have been interesting reports of laparoscopic lumbar sympathectomy⁹² and thoracoscopic splanchnicectomy.⁹³ These minimally invasive approaches to old procedures require further evaluation, but at least they represent renewed interest in the treatment of chronic pain in the present milieu of rapid technological development and surgical empowerment.

With little imagination, one can soon foresee the convergence of various technologies to enable effective regional blockade of pain sensory pathways from either postoperative surgical field or chronically inflamed organ, introduced by laparoscopy or stereotactic imaging technique. Pain after traumatic fracture or burn may soon be eliminated, as may postoperative pain and various local pain "syndromes."

In "aging" America, nearly 25% of the population will soon be greater than 65 years of age. Eighty to 85% of elderly persons will develop significant morbidities⁹⁴ that predispose them to chronic pain. Chronic pain has been identified as a major public health issue and an economic challenge.⁹⁵ If surgeons relegate the responsibility of chronic pain research and management wholly to other specialties, they may miss a great opportunity for future clinical and technologic reward. In the great tradition of Paré, Long, Warren, Morton, Simpson, Leriche, Horsley, Cushing, and others who sought to relieve the patient's pain that faced them, hopefully surgeons today will also embrace patients like Mrs. Daly above and seek innovative means to palliate their suffering.

APPENDIX

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Invited Commentary

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Despite decades of sub-specialization into specific procedure-oriented activities, frequently surgeons are still consulted by patients for chronic pain. In the current healthcare system fraught with discontinuity of care, patients do not receive adequate pain relief from the physicians, whether internists, oncologists, or pain specialists, and they turn to their surgeons. . . .

Dr K Francis Lee opens his discussion of “Chronic Pain Management and the Surgeon” with a scenario and the above statement. He builds a logical case indicating that the surgeon needs to be prepared to deal with chronic pain management in his/her patients. He suggests there are a number of reasons why surgeons are uncomfortable in this role, but the highest among these are a number of misperceptions about chronic pain management. Dr Lee thoughtfully and carefully addresses seven of these misperceptions, ranging from the fear of addiction to the perceived lack of effectiveness of oral analgesics to frank denial.

This article should be of use to any surgeon who has said “Too much pain medication can cause addiction; too much pain medication may cause respiratory depression and lead to respiratory arrest; pain medication should be used sparingly to prevent development of side

“The pain has become gradually worse over the last couple of weeks. The pain is in the middle of my stomach and my back. I can’t find a comfortable position.” When I asked her to rank the intensity of the pain on a 0 to 10 scale, she stated it was, “way beyond the scale, like 15.” Mrs. Daly went on to tell me she had recently seen her oncologist. The oncologist was aware of the increasing pain.Â Chronic pain management and the surgeon: barriers and opportunities. @article{Lee2001ChronicPM, title={Chronic pain management and the surgeon: barriers and opportunities.}, author={Kathleen F. Lee and James B. Ray and Geoffrey P. Dunn}, journal={Journal of the American College of Surgeons}, year={2001}, volume={193 6}, pages={. 689-701; discussion 701-2 } }. Abstract Chronic pain is a widespread issue accompanied commonly by depression and anxiety. Chronic pain has been shown to alter brain processing within the emotional and reward circuits, pointing towards a possible link between pain and more. Abstract Chronic pain is a widespread issue accompanied commonly by depression and anxiety. Chronic pain has been shown to alter brain processing within the emotional and reward circuits, pointing towards a possible link between pain and comorbid mood disorders.Â The design ideas presented in this work were influenced by the health care management needs, barriers and opportunities suggested by patients with type 2 diabetes and DCCs. Save to Library. Download.