

St. Luke's Hospital: Administrative Intern

Adam Norton

Oncology

Over the course of my internship at St. Luke's Hospital working under the Chief Medical Officer as an Administrative Intern, I was responsible for completing a range of projects in a variety of departments. Initially, I began working on a project in the Oncology Department looking at pain management during the injection of a radiocolloid tracer used in the sentinel lymph node biopsy procedure. Currently, no pain management protocol is in place at St. Luke's. After a thorough review of the literature and after consultation with local healthcare facilities about their practices, the use of an eutectic mixture of local anesthetic (EMLA) cream appeared to be the best option for pain management. The following paper presents the current literature about pain management in the injection of the radiocolloid for the sentinel lymph node procedure. Included in the paper are recommendations for changes to St. Luke's current policy and outlines the changes that would occur and where those changes would affect current practices.

Pain Management in Sentinel Lymph Node Biopsy Procedures

Adam A. Norton

Protocols that address pain management in patients undergoing sentinel lymph node biopsies (SLNB) are beginning to be developed as SLNB becomes more prevalent as a diagnostic tool in determining the degree of metastasis in breast cancer. Reports have indicated that the injection of the SLNB tracer can be painful due to the location and depth of the injection. Krynycky et al. (2004) report that "shallow intradermal injections [used during SLNB] are more painful than intraparenchymal ones." Due to this, several studies have been conducted to

identify pain management strategies that include the use of topical anesthetics and changes in the radiopharmaceutical composition. Fetzner and Holmes (2008) studied the use of EMLA cream in SLNB to reduce pain associated with tracer injection. They identified twenty randomly selected patients who had undergone SLNB tracer injection with EMLA cream and an additional twenty patients who underwent SLNB tracer injection prior to the implementation of the EMLA cream protocol. They recorded the patient's verbal assessment of pain (0-10 scale) per the nurse's notes. They found that prior to the EMLA protocol, the average pain score of patients was 8.8 compared to 3.4 for patients who underwent the EMLA protocol. An additional study (Crowe, 2009) looked at the differences in pain between two groups of patients undergoing SLNB: one using EMLA cream 1-2 hours prior to the procedure and another group that did not receive EMLA cream. They measured patient reported pain on a scale of 0-10, with 10 being the worst pain ever experienced. They found that the mean pain scale for patients without the cream (n=20) was 9.08 compared to a mean pain scale of 4.15 for the patients receiving EMLA cream (n=42). Both of these studies have shown the effectiveness that the use of EMLA cream can have in pain management during SLNB.

On the other hand, another study was conducted that compared the degree of pain between two different procedures for patients undergoing SLN mapping for breast cancer: injection of standard radiocolloid and injection of pH-adjusted and lidocaine-supplemented radiocolloid. They found that modifying the pH of the radioisotope did not provide any benefit to pain management as compared to the standard treatment. However, the addition of 1% lidocaine to the radioisotope provided a significant reduction in pain related to the subareolar injection (Stojadinovic et al., 2009).

These studies provide evidence that pain management is possible in SLNB procedures and should be a component of the SLNB protocol. Krynyckyi (2000) reported that the use of EMLA cream 30-60 minutes prior to the procedure was effective in managing pain due to the tracer injections. However, according to AstraZeneca, the recommended dose of EMLA cream for minor procedures (e.g. needle insertion) is 2 g/10 cm² for a minimum of 1 hour for maximum anesthetic effectiveness.

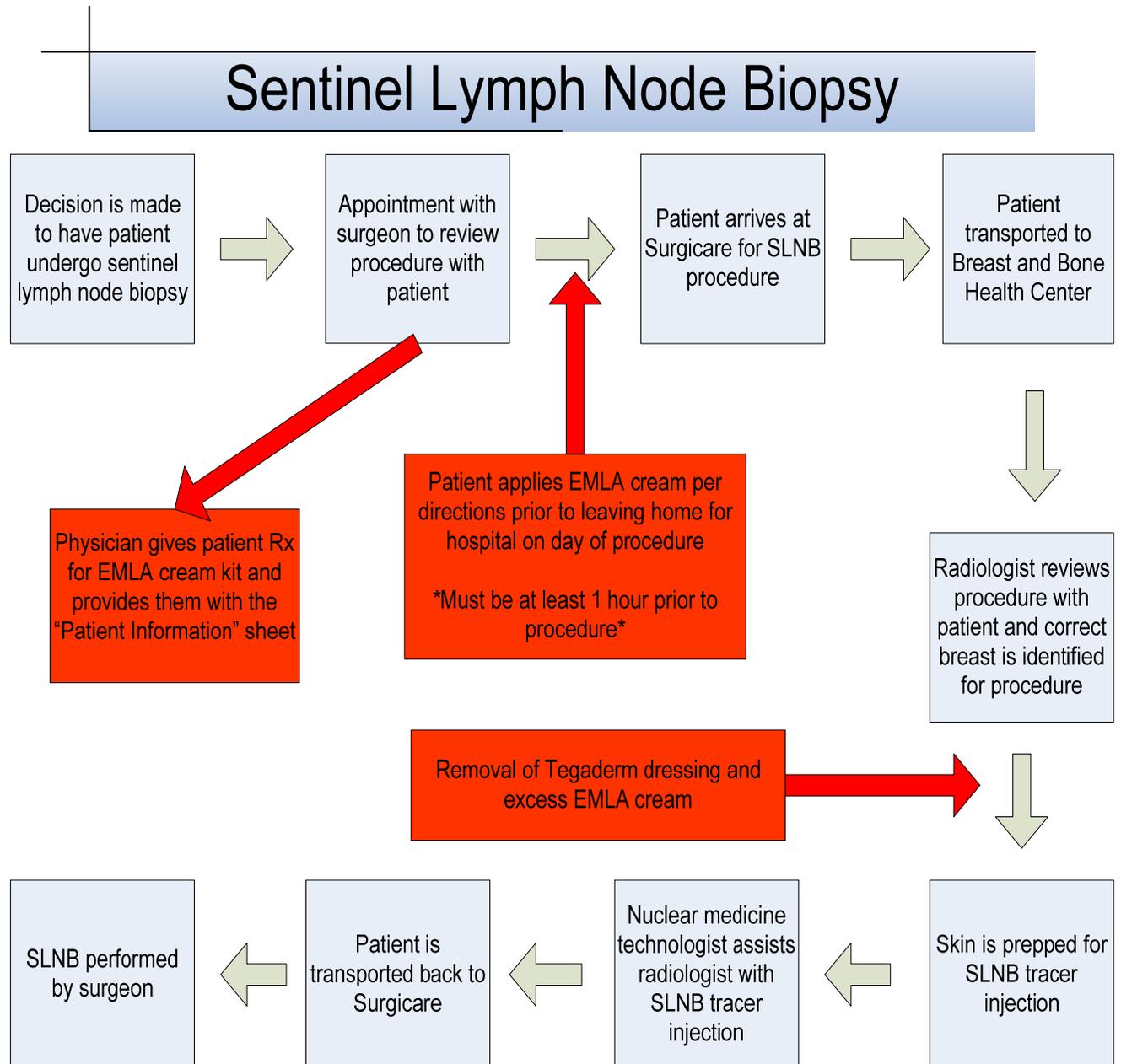
After review of St. Luke's Breast and Bone Health Sentinel Node Injection Procedure and consultation with Dr. Hemann, the use of EMLA cream for pain management is not in place at St. Luke's Hospital in Cedar Rapids.

Recommendations

After review of the literature, the best practice for pain management for patients, as well as being cost effective, would be using EMLA cream at least one hour prior to SLNB tracer injection. The implementation of this new protocol would include minor changes to the SLNB procedure. The first change would include the surgeon writing a prescription for EMLA cream for the patient to obtain prior to their procedure and giving them information on where and how to apply the cream before their procedure (see "prescription" and "patient information"). The final change in the SLNB procedure would occur when the radiologist and nuclear medicine technician prep the patient for the SLNB tracer injection. Prior to prepping the site for injection, the radiologist would be responsible for removing the Tegaderm dressing and excess EMLA cream. The site should now be anesthetized and ready for injection of the tracer.

In order to test the effectiveness of this new protocol, I propose that patients should be asked post-procedure the amount of pain they experienced during the injection of the tracer. The radiologist would ask the patient to rate their pain on a scale of 0-10, with 10 being the worst

pain they have ever experienced. The patient’s pain response would be included along with the radiologist’s notes of the procedure. It is imperative that the pain response is recorded so that the degree of pain management provided by EMLA cream prior to SLNB tracer injection can be quantified for future evaluations of this new protocol.



Prescription

EMLA Cream Kit (5 g tube w/ Tegaderm dressing)

Finger Cot for application of EMLA cream

Quantity: 1

Use as directed

Patient Cost

St. Luke's Pharmacy

EMLA Kit (includes 5 g tube and Tegaderm dressing)

Generic → \$31.81

Brand name → \$41.61

Mercy Pharmacy

EMLA Kit (includes 5 g tube and Tegaderm dressing)

Generic → \$19.26 for 5 kits (before fees and taxes)

Depending on insurance, co-pay for generic EMLA kit would be approximately \$10-15

Pharmacy supplies information on in-home application procedure

Surgeon must provide information on where to apply EMLA cream and provide patient with "patient information"

Patient Information: Sentinel Lymph Node Biopsy

Application of EMLA Cream

Application of the cream will be at the periareolar region, the area around the edge of the nipple where it meets the surrounding breast tissue. The cream should cover approximately a 1.25 inch by 1.25 inch area at either the 10 o'clock position of the right breast or the 2 o'clock position of the left breast, as this will be where the injection occurs. For proper application purposes, rub the cream into the specified area until it is no longer being absorbed. Next, apply the remaining cream to the area indicated and cover with a clear, occlusive dressing called a Tegaderm Dressing. Do this at LEAST one hour prior to coming to the hospital on the day of surgery.

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Pain associated with the injection of radioactive tracer for sentinel lymph node biopsy with and without use of EMLA cream (*Publish Only*).

Meeting: 2009 Breast Cancer Symposium Abstract No: 91 First Author: J. B. Crowe

Category: Detection / Diagnosis - Axillary/Sentinel Nodes

Stojadinovic, A., Peoples, G. E., Jurgens, J. S., Howard, R. S., Schuyler, B., Kwon, K. H., et al. (2009). Standard versus pH-adjusted and lidocaine supplemented radiocolloid for patients undergoing sentinel-lymph-node mapping and biopsy for early breast cancer (PASSION-P trial): A double-blind, randomised controlled trial. *Lancet Oncology*, 10(9), 849-854.

Inpatient Pediatrics

After completion of the Oncology project, I began working on a study for Dr. James Matsuda, a pediatric hospitalist. The focus of the project was looking at the prevalence of respiratory syncytial virus (RSV) induced bronchiolitis in pediatric patients and the use of constant pulse oximetry as a criterion for admission to the hospital. The following paper also addresses additional treatments and presents evidence for the feasibility of home oxygen use for pediatric patients suffering from RSV bronchiolitis. The rationale behind the use of home oxygen would result in a shorter length of stay for pediatric patients who were only being hospitalized for a lower than normal oxygen saturation level. After conducting a thorough literature review, I began data collection on approximately 90 patients included in this study. I collected data on oxygen saturations at time of admission, the oxygen saturation range over the length of stay, and discharge oxygen saturation level. In addition to that, I worked with the Performance Improvement Department to obtain cost data for each patient. This information will be used to analyze current practices at St. Luke's Hospital and make changes to current practices in order to result in a cost savings for the hospital when a patient presents with RSV induced bronchiolitis.

Bronchiolitis in Pediatric Patients

Adam A. Norton

The number of pediatric patients being hospitalized for bronchiolitis has increased by 239% over the past two decades (Shay et al., 1999), while mortality rates have remained relatively constant (Shay et al., 2001). This increase in admission is thought to be related to the reliance placed on pulse oximetry measurements for the decision to admit the patient to the hospital (Mallory et al., 2003). Pulse oximetry has been effective in allowing physicians to

detect subclinical hypoxemia (oxygen saturations below 94-95%), due to subsegmental atelectasis and mucus plugging, which is related to bronchiolitis (Seiden and Scarfone, 2009). When this is present, infants are generally hospitalized and administered supplemental oxygen in order to ensure adequate oxygen levels within the body. This increase in hospital admissions is resulting in an estimated annual cost of more than \$500 million in the United States alone (Pelletier et al., 2006). With healthcare costs increasing, effective low-cost alternatives must be developed in order to decrease the economic strain placed on the healthcare system and also decrease the inpatient population and length of stay for patients in medical centers across the United States.

There is much variation in hospital length of stay in patients suffering from bronchiolitis. Unger et al. (2008) reports an average hospital length of stay for patients to be 3 days, while Willson et al. (2001) reports an average length of stay at 4.5 days. In a study conducted by Schroeder et al. (2004), they found that patients suffering from bronchiolitis often remain in the hospital on supplemental oxygen even after other clinical parameters have shown improvement. Of these patients, 26% of them have an additional 1.6 days of supplemental oxygen therapy in the hospital on top of the average length of stay of patients not on supplemental oxygen.

Treatment of patients with bronchiolitis is largely supportive, through maintaining hydration and oxygenation, and keeping airways clear of mucus. The main treatment employed by medical centers is the use of supplemental oxygen when oxygen saturations fall below normal values. The recent literature has suggested guidelines for acceptable oxygen saturation ranging from 90-94%, yet a specific threshold value has not been agreed upon (Schroeder, 2003). These arbitrary thresholds for supplemental oxygen therapy can lead to increased medical costs without providing any clear benefit (Unger et al (2008), Schroeder et al (2004), and Wainwright et al

(2003)). In response, the American Academy of Pediatrics (AAP) has published guidelines that advise on the use of supplemental oxygen in patients with bronchiolitis. The AAP recommends that supplemental oxygen should be administered to patients when their oxygen saturation falls steadily below 90% in spite of other therapies. Additionally, the AAP recommends that once an infant begins to improve clinically, pulse oximetry can be done intermittently while the patient is hospitalized as fluctuations in oxygen saturation are common (American Academy of Pediatrics, 2006). For instance, Hunt et al. (1999) conducted a longitudinal study of hemoglobin oxygen saturation during unperturbed sleep in infants. They found that the oxygen saturation in healthy young infants fluctuates throughout sleep. It was found that these infants experienced brief, but frequent drops in oxygen saturations below 90% while sleeping. This complicates treatment that uses constant pulse oximetry in patients suffering from bronchiolitis as a means to implement supplemental oxygen therapy.

In addition to supplemental oxygen, other therapies have been developed and studied to combat subsegmental atelectasis and mucus plugging in patients in order to allow for easier breathing and quicker recovery. Recent studies have looked at the effectiveness of these therapies in decreasing the hospital length of stay in patients suffering from bronchiolitis. The use of nebulized 3% hypertonic saline, a standard treatment for cystic fibrosis, is effective in clearing thickened secretions and has the potential to serve as an additional therapy in patients with bronchiolitis. Several studies have shown the effectiveness of using nebulized 3% hypertonic saline in reducing hospital length of stay. Kuzik et al. (2007) found that treatment with nebulized 3% hypertonic saline reduced hospital length of stay by 26% (2.6 vs. 3.5 days, $P=0.05$). In a parallel study conducted by Chauhry and Sinert (2009), they found that the administration of nebulized 3% hypertonic saline significantly reduced hospital length of stay by

25.9%, with a mean decrease in length of stay of 0.94 days. An additional study looked at administering a combination of nebulized 3% hypertonic saline with 1.5 mg of epinephrine to patients in order to see the effects it had on hospital length of stay (Tal et al, 2006). They found that over the course of this two year study the use of a nebulized hypertonic/epinephrine treatment in hospitalized infants decreased the length of stay from 3.6 to 2.8 days ($P < 0.05$). These studies provide evidence for an effective therapy that can reduce hospital length of stay in pediatric patients suffering from bronchiolitis.

Even though additional therapies are being considered in the treatment of bronchiolitis, supplemental oxygen remains the cornerstone of treatment. Many medical centers rely on patients maintaining a certain oxygen saturation level for criteria to discharge from the hospital which has the potential to result in a prolonged length of stay. Lalit et al. (2006) looked at the effectiveness of discharging patients suffering from bronchiolitis with home oxygen therapy. The rationale behind this was to reduce the number of days patients were spending in the hospital on supplemental oxygen alone thus decreasing healthcare costs and opening up additional beds in the hospital. Their study found that there was a high rate of caregiver (parents) and primary care provider satisfaction with the use of home oxygen therapy for patients with bronchiolitis. While this study did not look at the safety or economic impacts of home oxygen use in pediatric patients, a study by MacLean and Fitzgerald (2006) assessed the use of home oxygen therapy for pediatric patients with chronic neonatal lung disease. They found that patients on home oxygen therapy did not experience any negative health consequences, it helped to reduce healthcare costs, and it was seen as a benefit to the parents to have their child at home instead of the hospital.

After a thorough review of the literature, studies indicate that the length of stay for pediatric patients suffering from bronchiolitis is prolonged due to the use of supplemental oxygen for lower than normal oxygen saturation levels. The discrepancies amongst physicians on the oxygen saturation threshold prevent a standard of care from being developed in terms of supplemental oxygen use in patients with bronchiolitis. Acceptable oxygen saturation levels range from 90-94% but physicians must handle patients on an individual basis and assess the potential benefits and risks of supplemental oxygen use. If the physician deems supplemental oxygen use necessary for a patient, it is feasible to discharge that patient on home oxygen therapy as long as their clinical symptoms have improved and there are no additional risks to their health besides a lower than normal oxygen saturation. Prior to discharge on home oxygen use, it is imperative that the parents of the patient be educated on the proper use and handling of home oxygen. In conclusion, by employing additional therapies such as nebulized 3% hypertonic saline, adequate hydration, and supplemental home oxygen therapy, the length of stay for patients can be dramatically reduced resulting in decreased healthcare costs and an increase in overall patient satisfaction.

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