Michael J. Stein, MD, Angel Arnaout, MD MBA, Kednapa Thavorn, MSc PhD, Patrick Wong, MD, Tim Ramsey, PhD, Jing Zhang, MD PhD

University of Ottawa, Ottawa, ON, Canada

PURPOSE: The increasing popularity of immediate breast reconstruction and a shifting focus towards ambulatory breast surgery has been met with growing regulatory pressures for quality assurance, patient satisfaction and cost-effectiveness. In an effort to optimize postoperative pain control following breast reconstruction, Paravertebral Blocks (PVB), have emerged as promising adjuncts to standard analgesic protocols. Studies on the efficacy and economic implications of PVB’s are limited, specifically the tradeoff between its clinical impact and incremental cost associated with delivering the service. Our objective was to evaluate the cost-effectiveness of PVB’s for the prevention and treatment of acute pain in patients undergoing breast reconstruction post mastectomy at a large tertiary care academic hospital in Canada.

METHODS: We retrospectively studied all patients who underwent immediate alloplastic breast reconstruction from 2010–2016. Data included the use of PVB, postoperative serial pain intensity scores, postoperative narcotic usage and length-of-stay in PACU. A cost-effectiveness analysis based on a net-benefit regression model was used to assess whether, from a hospitals perspective, the benefit gained from performing a PVB outweighed its additional costs compared to standard analgesia alone. The health outcome of interest was the average self-reported post-operative pain score. We also performed a sub-group analysis wherein we calculated the cost-effectiveness of specific patient cohorts according to laterality and type of mastectomy, extent of lymph node dissection and weather it was an expander or implant based.

RESULTS: A total of 298 patients undergoing immediate breast reconstruction following mastectomy met inclusion criteria. Of these, 112(38%) patients underwent standard analgesic protocols and 186(62%) underwent PVB, in addition to standard analgesic protocols. Patients who received a PVB had significant reductions in average pain scores (2.8 vs 3.3, p=0.002), total opiate usage (52units vs 63units) (p=0.038) and length of stay in PACU (92min vs 142min) (p=0.0228). The cost-effectiveness base case results show that, for the average breast reconstruction patient, a PVB is associated with a net positive benefit to the hospital if the hospital values a unit reduction in a patient’s pain score at about $2,000 or more. Sub-group analyses demonstrate that cost-effectiveness of PVB’s vary significantly depending on the extent of the procedure. More specifically, a u-shaped relationship exists between the Incremental Cost Effectiveness Ratio (ICER) of the PVB and the invasiveness in sub-type of immediate breast reconstruction.

CONCLUSIONS: The present study demonstrates that PVB’s are safe and effective at reducing narcotic usage, subjective pain and length of stay in the recovery room. Despite these promising results, a hospital perspective economic analysis is essential to ensure that such an intervention is cost-effective, particularly in the context of the Canadian public healthcare system. We illustrate here that a U-shaped relationship exists between ICER’s and the extent of the immediate breast reconstruction, thereby demonstrating that such an intervention may only be cost effective in certain patient populations. To the best of our knowledge this is the first study to critically evaluate the cost-effectiveness of PVB’s for immediate breast reconstruction in Canada and will hopefully inform future prospective randomized trials on PVB’s in breast reconstruction.

M.J. Stein: None. A. Arnaout: None. K. Thavorn: None. P. Wong: None. T. Ramsey: None. J. Zhang: None.

17

Tibial Nerve Decompression for the Prevention of the Diabetic Foot: A Cost-Utility Analysis Using Markov Model Simulations

Samuel Sarmiento, MD, MPH, MBA1, A Lee Dellon, MD, PhD1, Kevin D. Frick, PhD2

1Johns Hopkins University School of Medicine, Baltimore, MD, USA, 2Johns Hopkins University School of Business, Baltimore, MD, USA

PURPOSE: We examined whether tibial neurolysis performed as a surgical intervention for patients with diabetic neuropathy and superimposed tibial nerve compression in the prevention of the diabetic foot is cost saving and cost effective when compared to the current prevention program as per the Centers for Medicare and Medicaid Services (CMS).
METHODS: A Markov model was used to simulate the effects of standard prevention compared to tibial neurolysis on the long-term costs associated with foot ulcers and amputations. This model included eight health states. A baseline analysis was built on a five-year model to determine the cumulative incidence of foot ulcers and amputations with each strategy. Subsequently, a cost-effectiveness analysis and cohort-level Markov simulations were conducted with a model composed of 20 six-month cycles. The outcomes explored were quality adjusted life years (QALYs); the incremental cost-effectiveness of tibial neurolysis in comparison with standard treatment and the net monetary benefits of tibial neurolysis. A sensitivity analysis was also performed.

RESULTS: When compared to standard prevention, for a patient population of 10,000, surgery prevented a total of 1,447 ulcers and 409 amputations over a period of 5 years. In a subsequent analysis that consisted of 20 six-month cycles (10 years), the incremental cost of tibial neurolysis compared to current prevention was $12,772.28. The quality-adjusted life years were 6.30 for tibial neurolysis versus 5.90 for current prevention, with an incremental effectiveness of 0.41 QALYs. The incremental cost-effectiveness ratio (ICER) for surgery was $31,330.78. In relation to survival, given the difference in death rates between the two strategies, survival was 73% for those receiving medical prevention compared to 95% for those undergoing surgery.

CONCLUSION: These results suggest that among patients with diabetic neuropathy and superimposed nerve compression, surgery is more effective at preventing serious comorbidities and is associated with a higher survival over time. While more costly initially, surgery is more cost-effective than the current prevention strategy. It also generated greater long-term economic benefits than those obtained with standard prevention. These results coupled with the QALYs gained make surgery the strategy worth considering.

Trends observed over a 10-year simulation period (20 six-month stages) showing a considerably higher probability of preventing foot ulcers in the surgical intervention strategy. Amputations and mortality are also lower in this group.

S. Sarmiento: None. A.L. Dellon: None. K.D. Frick: None.

Post-Operative Protocol for Autologous Free Flap Breast Reconstruction Optimizing Resources and Patient Safety

Allison Haley, BS, Tobias J. Bos, BSc, Brian H. Cho, MD, Deepa Bhat, MD, Hannah M. Carl, BS, Benjamin Ostrander, BS, Michele A. Manahan, MD, Gedge D. Rosson, MD, Justin M. Sacks, MD, MBA, FACS

Johns Hopkins University, Baltimore, MD, USA

PURPOSE: There are multiple post-operative protocols in the literature for autologous free flap breast reconstruction patients. Commonly, this demographic of patients can be admitted to the intensive care unit (ICU) postoperatively for close monitoring of flap viability and then be subsequently transferred to a general surgical floor prior to discharge. With the advent of devices that enable continuous tissue-oximetry monitoring, it may no longer be necessary for these patients to go to the ICU post-operatively. We aim to show that our three-day post-operative protocol not only maintains excellent clinical outcomes, but is also more cost and resource effective than protocols with longer length of stay (LOS) or overutilization of the ICU.

METHODS: Current literature was reviewed for validation of tissue oximetry use in free flap monitoring. Costs for our post-operative pathway were collected from the Department of Plastic and Reconstructive Surgery. We abstracted demographics, LOS and short-term complications on all consecutive patients who underwent autologous free flap breast reconstruction at our institution from January 2013 to August 2014. Our complication rates were then compared to those in the literature.

RESULTS: We reviewed 153 consecutive patients with a total of 239 free flaps using our post-operative protocol. The mean age was 50 years (SD=10.2) and mean body mass index (BMI) was 29.4 (SD=5.2). Our institution’s rate of flap failure was not significantly different from the published national rate (p=0.367). Unplanned reoperation was significantly lower than the published national rate (p<0.001). Patients are cared for immediately on the general surgical floor, which costs $1827/day compared to the national average for monitoring a non-mechanically ventilated patient in the ICU of $6667/day. We use one tissue oximetry probe per free flap, which cost $713 each. 71% of patients are discharged on or before POD 3. Patients who are discharged after POD 5 were due to complications, including pulmonary embolism, infection and deep vein thrombosis. Our protocol has been standard of care for over 12