CONCLUSION: Overall, we have demonstrated that RPNIs produce motor specific contractions and high amplitude signals. Implanted electrodes enable an amputee to control numerous independent degrees of freedom in real-time with an advanced prosthetic arm.

Immediate Reconstruction of Oncologic Spinal Wounds Is Cost Effective Compared to Conventional Primary Wound Closure

Alexander F. Mericli, M.D., Justin E. Bird, M.D., Laurence D. Rhines, M.D., Jun Liu, Ph.D., Jesse C. Selber, M.D., M.P.H.

The University of Texas M.D. Anderson Cancer Center, Houston, TX, USA

PURPOSE: Several studies have demonstrated a reduced wound complication rate when immediate soft tissue reconstruction is performed at the time of oncologic spine surgery. Most authors document the use of bilateral paraspinous muscle flaps in this clinical scenario, demonstrating good outcomes. Despite the clear clinical advantages, the cost-effectiveness of this technique is not known. We hypothesized that immediate reconstruction of oncologic spine wounds using bilateral paraspinous muscle flaps would be a cost-effective strategy compared to the standard of care (oncologic spine surgery with conventional primary wound closure).

METHODS: We employed a decision tree model to evaluate the cost-utility, from the perspective of a hospital/insurer, of immediate reconstruction with bilateral paraspinous muscle flaps relative to primary incision closure after oncologic spine surgery. A systematic review of the literature on oncologic spine surgery and immediate and delayed spinal wound reconstruction was performed to estimate health state probabilities. Costs were estimated using 2014 Center for Medicare and Medicaid Services data for relevant associated CPT and DRG codes. Overall expected cost and quality-adjusted life years (QALYs) were assessed using a Monte Carlo simulation and sensitivity analyses.

RESULTS: Bilateral paraspinous muscle flaps performed in conjunction with oncologic spine surgery had an expected cost of $81,458.90 and an expected average QALY of 24.19, whereas primary wound closure (no reconstruction) had an expected cost of $83,434.34 and an expected average QALY of 24.17, making immediate soft tissue reconstruction the dominant, most cost-effective strategy. Monte Carlo sensitivity analysis demonstrated that immediate soft tissue reconstruction was the preferred and most cost-effective option in a statistically significantly greater number of iterations (81.3 percent vs. 18.7%; p<0.001), supporting its overall greater cost-utility. Even when the willingness-to-pay threshold varied from $0 to $100,000 per QALY, immediate soft tissue reconstruction remained the dominant strategy across all iterations.

CONCLUSION: This cost-utility analysis suggests that performing bilateral paraspinous muscle flaps in conjunction with oncologic spine surgery is more cost-effective than primary spine incision closure alone.

Two-Stage Prosthetic Prepectoral Breast Reconstruction: A Comparison of Tissue Expansion with Carbon Dioxide and Saline

Karan Chopra, MD\(^1\), Devinder Singh, MD\(^2\), Nick Hricz, B.A.\(^2\), Kylie Brassard, B.A.\(^2\), Luther Tripp Holton, III, MD\(^2\)

\(^1\)Johns Hopkins University, School of Medicine, Baltimore, MD, USA, \(^2\)Anne Arundel Medical Center, Annapolis, MD, USA

PURPOSE: The AeroForm tissue expander is a carbon dioxide-filled breast tissue expander that allows gradual, needle-free expansion using a hand-held remote controller. This study evaluates two-stage, prepectoral tissue expander-to-implant breast reconstruction with the carbon-dioxide tissue expanders and compares the outcomes to our recent experience with saline tissue expanders.

METHODS: This was a retrospective study of consecutive patients from a single institution. The subjects consisted of women who underwent mastectomy and either immediate or delayed breast reconstruction with AeroForm or saline tissue expanders. Outcomes encompassed postoperative complications including mastectomy flap necrosis, infection requiring readmission and/or intravenous antibiotics, capsular contracture, hematoma, seroma, skin dehiscence, extrusion, premature explant, and loss of communication with the device (AeroForm) or rupture of the device (saline).
RESULTS: This study evaluated 115 patients with 185 breast reconstructions. Of the 185 breast reconstructions, 74 (40%) utilized AeroForm tissue expanders and 111 (60%) utilized traditional saline tissue expanders. Treatment was successful in 100% and 94% in the AeroForm and saline groups respectively (p=0.025). The incidence of adverse events was greater in the saline group (45.9% versus 32.4%). Surgical-site infection (SSI) occurred more commonly in the saline group (5.4% versus 0%). Full-thickness skin necrosis occurred at a significantly higher rate in the saline cohort as compared to AeroForm (5.4% versus 0%).

CONCLUSION: The use of AeroForm tissue expanders offers notable advantages for breast reconstruction. This device, when employed in the prepectoral space may be associated with reduced infection rates and decreased utilization of healthcare and patient resources.

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Mandibular Reconstruction in the Elderly: Are Outcomes Comparable to Younger Patients?

Sina J. Torabi, Fouad Chouairi, BS, Jacob Dinis, BS, Henry Hsia, MD, Michael Alperovich, MD

1Yale School of Medicine, New Haven, CT, USA, 2Yale School of Medicine, North Haven, CT, USA

PURPOSE: Definitive reconstruction following extirpative mandibulectomy or glossectomy is critical for ensuring airway stability, restoring swallowing and speech, maintaining isolation of oral contents from critical vascular structures, and optimizing aesthetic outcomes. While microvascular free flaps have become the gold standard in head and neck reconstruction, the increased morbidity and operative time has limited their use in the elderly population where local pedicled flaps have remained popular. To date, no large, national studies have evaluated peri-operative outcomes and complications following head and neck reconstruction in the elderly population. A better understanding of the outcomes for elderly patients undergoing head and neck reconstruction can aid surgeons in future decision making, pre-operative counseling, and selection of reconstruction technique.

METHODS: An “older” (≥71 years) cohort undergoing reconstruction after mandibulectomy or glossectomy was compared to the remaining population in a 9-year analysis of the National Surgical Quality Improvement Program. Chi-square analyses for demographics, comorbidities, type of ablative procedure, and type of reconstructive flap were performed. Outcomes were compared and stratified by reconstruction type. A Bonferroni correction was applied to all univariate chi-square analyses according to the largest family of comparisons. Multivariate regressions were performed to calculate the impact of age on length of hospital stay (LOHS) and operative time.

RESULTS: A total of 966 patients who underwent concurrent mandibulectomy or glossectomy with reconstruction were identified. Ablative procedures were comparable, but older patients received local flaps compared to microvascular reconstruction at significantly higher rates (22.5% vs 9.6%; p<0.001). Although the older population had more comorbidities (higher ASA class, diabetes, and hypertension), univariate analysis revealed no differences in adverse events, operative time, or LOHS compared to the remaining population. Univariate subgroup analysis of soft tissue and bone/microvascular flaps revealed similar outcomes between cohorts except for increased medical complications in the older cohort undergoing a bone free flap. Controlling for demographic factors, comorbidity number, and procedure type, older age resulted in longer hospital stay only (B: 1.5; 95% CI: 0.1 to 2.8; p=0.032), but not operative time.

CONCLUSION: To our knowledge, we present the first national study characterizing differences in demographics, comorbidities, surgical factors, and reconstructive outcomes for older patients undergoing mandibulectomy with microvascular reconstruction. While local flaps are more commonly performed in the older cohort (≥71 years), a majority of older patients receive microvascular reconstruction with outcomes comparable to the remaining population except for a slightly longer hospital stay. Comorbidities rather than age predict post-operative outcomes. Age alone does not preclude microvascular reconstruction in the head and neck. Current practice patterns from this study suggest that surgeons may already be choosing the reconstruction type based on the patient’s overall health status. Among patients who received microvascular reconstruction, there were no differences in proportion of higher ASA class patients between the older cohort and the remaining population. Given the aging population nationally, a better understanding of post-operative outcomes for head and neck reconstruction in the older population is essential.