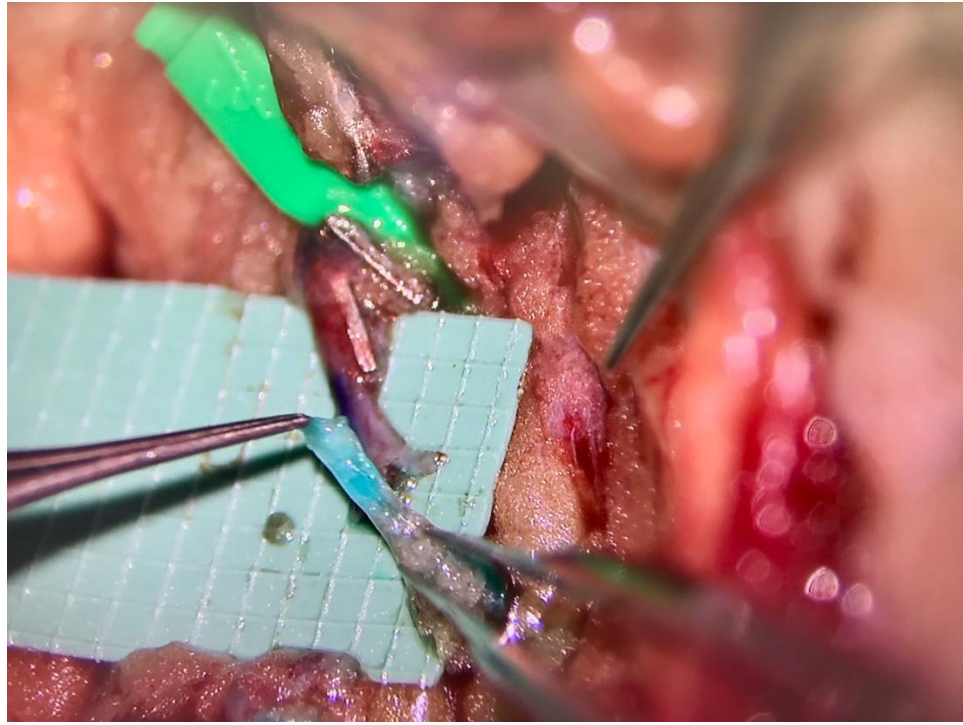


| Background                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
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| <p>It is estimated the 1.5 million Breast Cancer survivors with lymphedema world-wide</p> <ul style="list-style-type: none"><li>–Progressive swelling of the arm, chest or breast</li><li>–Heaviness, tightness, and pain</li><li>–Blisters, sores, and open wounds</li><li>–Cellulitis</li><li>–Limited upper extremity function</li><li>–Impact on quality of life</li></ul>  | <p>Retrospective chart review of patients undergoing ALND at a tertiary cancer center between 2018-2022 with at least one year follow up</p> <ul style="list-style-type: none"><li>•Variables:<ul style="list-style-type: none"><li>–Patient Characteristics</li><li>–Oncologic History and Treatment</li><li>–Operative Details</li><li>–Post-operative Complications</li></ul></li><li>•Primary Outcome:<ul style="list-style-type: none"><li>–Development of Lymphedema</li></ul></li><li>•Univariate and Multivariate Analysis</li></ul> | <p>200 patients met inclusion criteria (ALND and at least 1 year follow up)</p> <ul style="list-style-type: none"><li>–98% female (196/200)</li><li>–Age 52 years (44-65)</li><li>–BMI 27.7 (23.6-32.7)</li><li>–Race<ul style="list-style-type: none"><li>•White: 57.5%</li><li>•Black/African American: 33%</li><li>•Other/mixed race: 9.1%</li></ul></li></ul> <div></div>                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"><li>•Our study identifies both <b>patient and treatment-related risk factors</b> that are associated with the development of lymphedema.</li><li>•We show race and obesity to be as significant as chemotherapy and radiation in the development of lymphedema after ALND, <b>while ILR could mitigate this risk.</b></li><li>•Further prospective and randomized studies are warranted to clearly define the role of ILR in high-risk patients.</li></ul> |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Specific Aims                                                                                                                                                                                                                                                                                                                                                                                                                                                     | References                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Risk Factors for Lymphedema Development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| <ul style="list-style-type: none"><li>•To identify risk factors for the development of lymphedema in patients who have undergone axillary lymph node dissection.</li><li>•To determine association of development of lymphedema after axillary lymph node dissection with or without immediate lymphatic reconstruction.</li></ul>                                                                                                                                | <ul style="list-style-type: none"><li>•Armer JM, Ballman KV, McCall L, et al. Factors Associated With Lymphedema in Women With Node-Positive Breast Cancer Treated With Neoadjuvant Chemotherapy and Axillary Dissection. JAMA surgery. 2019;154(9):800-809.</li><li>•Huang A, Koesters E, Garza RM, Hanson SE, Chang DW. A single institution experience with immediate lymphatic reconstruction: impact of insurance coverage on risk reduction. J Surg Oncol. E-pub 12/2024. PMID: 39734276</li></ul>                                     | <table><tr><th>Characteristic</th><th>OR</th><th>95% CI</th><th>p-value</th></tr><tr><td>BMI Category</td><td>1.07</td><td>1.03, 1.12</td><td>0.002</td></tr><tr><td>Obese I</td><td>1.40</td><td>0.58, 3.31</td><td></td></tr><tr><td>Obese II</td><td>2.70</td><td>1.02, 7.29</td><td></td></tr><tr><td>Obese III</td><td>3.96</td><td>1.17, 14.6</td><td></td></tr><tr><td>Race</td><td></td><td></td><td>0.02</td></tr><tr><td>White</td><td>—</td><td>—</td><td></td></tr><tr><td>Black</td><td>2.44</td><td>1.30, 4.62</td><td></td></tr><tr><td>Other</td><td>1.65</td><td>0.56, 4.57</td><td></td></tr><tr><td>Chemotherapy</td><td>3.27</td><td>1.69, 6.65</td><td>&lt;0.001</td></tr><tr><td>Radiation Therapy</td><td>2.40</td><td>1.20, 5.12</td><td>0.013</td></tr><tr><td>Immediate Lymphatic Reconstruction</td><td>0.21</td><td>0.15, 0.27</td><td>&lt;0.001</td></tr><tr><td colspan="4">OR = Odds Ratio, CI = Confidence Interval</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Characteristic | OR | 95% CI | p-value | BMI Category | 1.07 | 1.03, 1.12 | 0.002 | Obese I | 1.40 | 0.58, 3.31 |  | Obese II | 2.70 | 1.02, 7.29 |  | Obese III | 3.96 | 1.17, 14.6 |  | Race |  |  | 0.02 | White | — | — |  | Black | 2.44 | 1.30, 4.62 |  | Other | 1.65 | 0.56, 4.57 |  | Chemotherapy | 3.27 | 1.69, 6.65 | <0.001 | Radiation Therapy | 2.40 | 1.20, 5.12 | 0.013 | Immediate Lymphatic Reconstruction | 0.21 | 0.15, 0.27 | <0.001 | OR = Odds Ratio, CI = Confidence Interval |  |  |  |
| Characteristic                                                                                                                                                                                                                                                                                                                                                                                                                                                    | OR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 95% CI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | p-value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| BMI Category                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.03, 1.12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Obese I                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.58, 3.31                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Obese II                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.02, 7.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Obese III                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.17, 14.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Race                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| White                                                                                                                                                                                                                                                                                                                                                                                                                                                             | —                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Black                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2.44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.30, 4.62                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Other                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1.65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.56, 4.57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Chemotherapy                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.69, 6.65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <0.001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Radiation Therapy                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.20, 5.12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| Immediate Lymphatic Reconstruction                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.15, 0.27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <0.001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
| OR = Odds Ratio, CI = Confidence Interval                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Acknowledgements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>This project was funded by a Cancer Research Foundation Breakthrough Board Grant through the University of Chicago Comprehensive Cancer Center.</p> <p>The authors thank Rachel Nordgren, PhD, for statistical support.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |    |        |         |              |      |            |       |         |      |            |  |          |      |            |  |           |      |            |  |      |  |  |      |       |   |   |  |       |      |            |  |       |      |            |  |              |      |            |        |                   |      |            |       |                                    |      |            |        |                                           |  |  |  |