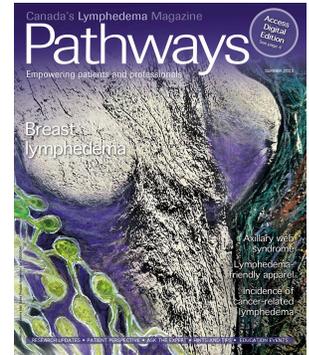


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REFERENCES

A full set of references can be found at:
<https://www.canadalymph.ca/pathways-references/>

Breast lymphedema after breast conserving surgery Prospective surveillance, evaluation and diagnosis

By Cheryl Brunelle

1. Young-Afat, D. A., Gregorowitsch, M. L., van den Bongard, D. H., Burgmans, I., van der Pol, C. C., Witkamp, A. J., Bijlsma, R. M., Koelmeij, R., Schoenmaeckers, E. J., Jonasse, Y., van Gils, C. H., & Verkooijen, H. M. (2019). Breast Edema Following Breast-Conserving Surgery and Radiotherapy: Patient-Reported Prevalence, Determinants, and Effect on Health-Related Quality of Life. *JNCI Cancer Spectrum*, 3(2).
<https://doi.org/10.1093/JNCICS/PKZ011>
2. Verbelen, H., Gebruers, N., Beyers, T., De Monie, A. C., & Tjalma, W. (2014). Breast edema in breast cancer patients following breast-conserving surgery and radiotherapy: a systematic review. In *Breast Cancer Research and Treatment* (Vol. 147, Issue 3, pp. 463–471). Springer New York LLC. <https://doi.org/10.1007/s10549-014-3110-8>
3. Boughey, J. C., Hoskin, T. L., Cheville, A. L., Miller, J., Loprinzi, M. D., Thomsen, K. M., Maloney, S., Baddour, L. M., & Degnim, A. C. (2014). Risk factors associated with breast lymphedema. *Annals of Surgical Oncology*, 21(4), 1202–1208.
<https://doi.org/10.1245/s10434-013-3408-5>
4. Riches, K., Cheung, K. L., & Keeley, V. (2023). Improving the Assessment and Diagnosis of Breast Lymphedema after Treatment for Breast Cancer. *Cancers*, 15(6).
<https://doi.org/10.3390/cancers15061758>
5. Cornacchia, C., Dessalvi, S., Santori, G., Canobbio, F., Atzori, G., De Paoli, F., Franchelli, S., Gipponi, M., Murelli, F., Sparavigna, M., Pitto, F., Fozza, A., Boccardo, F., Friedman, D., & Fregatti, P. (2022). Breast Edema after Conservative Surgery for Early-Stage Breast Cancer: A Retrospective Single-Center Assessment of Risk Factors. *Lymphology*, 55(4), 167–177.
6. Johansson, K. (n.d.). *Two-year follow-up of temporal changes of breast edema after breast cancer treatment with surgery and radiation evaluated by tissue dielectric constant (TDC)*.
7. Johansson, K., Lathinen, T., & Björk-Eriksson, T. (2014). Breast edema following breast conserving surgery and radiotherapy. *European Journal of Lymphology and Related Problems*, 25(70), 1–5.
8. Pusic, A., Klassen, A., & Cano, S. (n.d.). *BREAST-Q Version 2.0© Breast Conserving Therapy Module Pre-and Postoperative Scales English Version*.

9. Klassen, A. F., Dominici, L., Fuzesi, S., Cano, S. J., Atisha, D., Locklear, T., Gregorowitsch, M. L., Tsangaris, E., Morrow, M., King, T., & Pusic, A. L. (2020). Development and Validation of the BREAST-Q Breast-Conserving Therapy Module. *Annals of Surgical Oncology*, 27(7), 2238–2247. <https://doi.org/10.1245/s10434-019-08195-w>
10. Feißt, M., Heil, J., Stolpner, I., von Au, A., Domschke, C., Sohn, C., Kieser, M., Rauch, G., & Hennigs, A. (2019). Psychometric validation of the Breast Cancer Treatment Outcome Scale (BCTOS-12): a prospective cohort study. *Archives of Gynecology and Obstetrics*, 300(6), 1679–1686. <https://doi.org/10.1007/s00404-019-05362-y>
11. Brunelle, C. L., Boyages, J., Jung, A. W., Suami, H., Juhel, B. C., Heydon-White, A., Mackie, H., Chou, S. H. S., Paramanandam, V. S., Koelmeyer, L., & Taghian, A. G. (2023). Breast lymphedema following breast-conserving treatment for breast cancer: current status and future directions. In *Breast Cancer Research and Treatment*. Springer. <https://doi.org/10.1007/s10549-023-07161-1>
12. Nuutinen, J., Ikäheimo, R., & Lahtinen, T. (2004). Validation of a new dielectric device to assess changes of tissue water in skin and subcutaneous fat. *Physiological Measurement*, 25(2), 447–454. <https://doi.org/10.1088/0967-3334/25/2/004>
13. Mayrovitz, H. N., Somarriba, C., & Weingrad, D. N. (2022). Breast Tissue Dielectric Constant as a Potential Breast Edema Assessment Parameter. *Lymphatic Research and Biology*, 20(1), 33–38. <https://doi.org/10.1089/lrb.2020.0137>
14. Heydon-White, A., Suami, H., Boyages, J., Koelmeyer, L., & Peebles, K. C. (2020). Assessing breast lymphoedema following breast cancer treatment using indocyanine green lymphography. *Breast Cancer Research and Treatment*, 181(3), 635–644. <https://doi.org/10.1007/s10549-020-05661-y>
15. Warszawski, A., Röttinger, E. M., Vogel, R., & Warszawski, N. (1998). 20 MHz ultrasonic imaging for quantitative assessment and documentation of early and late postradiation skin reactions in breast cancer patients. *Radiotherapy and Oncology: Journal of the European Society for Therapeutic Radiology and Oncology*, 47(3), 241–247. [https://doi.org/10.1016/s0167-8140\(97\)00201-6](https://doi.org/10.1016/s0167-8140(97)00201-6)
16. Wratten, C., Kilmurray, J., Wright, S., O'Brien, P. C., Back, M., Hamilton, C. S., & Denham, J. W. (2000). Pilot study of high-frequency ultrasound to assess cutaneous oedema in the conservatively managed breast. *International Journal of Cancer*, 90(5), 295–301. [https://doi.org/10.1002/1097-0215\(20001020\)90:5<295::AID-IJC7>3.0.CO;2-B](https://doi.org/10.1002/1097-0215(20001020)90:5<295::AID-IJC7>3.0.CO;2-B)
17. Rönkä, R. H., Pamilo, M. S., Von Smitten, K. A. J., & Leidenius, M. H. K. (2004). Breast lymphedema after breast conserving treatment. *Acta Oncologica*, 43(6), 551–557. <https://doi.org/10.1080/02841860410014867>
18. Wratten, C. R., O'Brien, P. C., Hamilton, C. S., Bill, D., Kilmurray, J., & Denham, J. W. (2007). Breast edema in patients undergoing breast-conserving treatment for breast cancer: assessment via high frequency ultrasound. *The Breast Journal*, 13(3), 266–273. <https://doi.org/10.1111/j.1524-4741.2007.00420.x>
19. Dylke, E. S., Benincasa Nakagawa, H., Lin, L., Clarke, J. L., & Kilbreath, S. L. (2018). Reliability and Diagnostic Thresholds for Ultrasound Measurements of Dermal Thickness in Breast Lymphedema. *Lymphatic Research and Biology*, 16(3), 258–262. <https://doi.org/10.1089/lrb.2016.0067>
20. Kilbreath, S. L., Fearn, N. R., & Dylke, E. S. (2022). Ultrasound: Assessment of breast dermal thickness: Reliability, responsiveness to change, and relationship to patient-reported outcomes. *Skin Research and Technology*, 28(1), 111–118. <https://doi.org/10.1111/srt.13100>
21. Kerrigan, C. B., Ahern, T. P., Brennan, S. K., Kurchena, K. C., Nelson, C. J., & Sowden, M. M. (2022). Ultrasound for the Objective Measurement of Breast Lymphedema. *Journal of*

- Ultrasound in Medicine : Official Journal of the American Institute of Ultrasound in Medicine*, 41(8), 1993–2002. <https://doi.org/10.1002/jum.15881>
22. Riches, K., Cheung, K.-L., & Keeley, V. (2023). Improving the Assessment and Diagnosis of Breast Lymphedema after Treatment for Breast Cancer. *Cancers*, 15(6), 1758. <https://doi.org/10.3390/cancers15061758>
 23. Adriaenssens N, Verbelen H, Lievens P, L. J. (2012). Lymphedema of the operated and irradiated breast in breast cancer patients following breast conserving surgery and radiotherapy. *Lymphology*, 45, 154–164.
 24. NCCN. (2024). *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Survivorship*.
 25. National Lymphedema Network Medical Advisory Committee. (2011). Position Statement of the National Lymphedema Network: Screening And Early Detection Of Breast Cancer-Related Lymphedema: The Imperative. In *National Lymphedema Network*. <https://lymphnet.org/position-papers>
 26. Lymphology, I. S. of. (2020). Consensus document of the International Society of Lymphology. *Lymphology*, 53, 3–19.
 27. Brunelle, C. L., Jackson, K., Shallwani, S. M., Hunley, J. H., Kennedy, A., Fench, S., Hill, A., Paskett, E. D., Rush, K., Thiadens, S. R. J., White, J., & Stewart, P. (2024). Evidence-based recommendations regarding risk reduction practices for people at risk of or with breast cancer-related lymphedema: consensus from an expert panel. In *Medical oncology (Northwood, London, England)* (Vol. 41, Issue 11, p. 298). <https://doi.org/10.1007/s12032-024-02510-6>
 28. Verbelen, H., Tjalma, W., Dombrecht, D., & Gebruers, N. (2021). Breast edema, from diagnosis to treatment: state of the art. *Archives of Physiotherapy*, 11(1). <https://doi.org/10.1186/s40945-021-00103-4>
 29. Gupta, S. S., & Mayrovitz, H. N. (2022). The Breast Edema Enigma: Features, Diagnosis, Treatment, and Recommendations. *Cureus*. <https://doi.org/10.7759/cureus.23797>
 30. Johansson K, Jonsson C, B.-E. T. (2020). Compression Treatment of Breast Edema: A Randomized Controlled Pilot Study. *Lymphatic Research and Biology*, 18(2), 129–135.
 31. Gregorowitsch, M. L., Van Den Bongard, D. H. J. G., Batenburg, M. C. T., Traa-Van De Grootevheen, M. J. C., Fuhler, N., Van Het Westeinde, T., Van Der Pol, C. C., Young-Afat, D. A., & Verkooijen, H. M. (2020). Compression Vest Treatment for Symptomatic Breast Edema in Women Treated for Breast Cancer: A Pilot Study. *Lymphatic Research and Biology*, 18(1), 56–63. <https://doi.org/10.1089/lrb.2018.0067>
 32. Finnerty, S., Thomason, S., & Woods, S. (2010). Finnerty_2010_kinesiotape-for-breast-edema. *Journal of Lymphoedema*, 5(1), 38–44.

Axillary web syndrome/cording

A common but often overlooked side effect after breast cancer surgery

By Beth Hoag

1. Che Bakri, N. A., Kwasnicki, R. M., Khan, N., Ghandour, O., Lee, A., Grant, Y., Dawidziuk, A., Darzi, A., Ashrafiyan, H., & Leff, D. R. (2023). Impact of Axillary Lymph Node Dissection and Sentinel Lymph Node Biopsy on Upper Limb Morbidity in Breast Cancer Patients: A Systematic Review and Meta-Analysis. *Annals of surgery*, 277(4), 572–580. <https://doi.org/10.1097/SLA.0000000000005671>
2. Harris S. R. (2018). Axillary Web Syndrome in Breast Cancer: A Prevalent But Under-Recognized Postoperative Complication. *Breast care (Basel, Switzerland)*, 13(2), 132–135. <https://doi.org/10.1159/000485023>
3. Koehler, L. A., Haddad, T. C., Hunter, D. W., & Tuttle, T. M. (2018). Axillary web syndrome following breast cancer surgery: symptoms, complications, and management strategies. *Breast cancer (Dove Medical Press)*, 11, 13–19. <https://doi.org/10.2147/BCTT.S146635>
4. Yeung, W. M., McPhail, S. M., & Kuys, S. S. (2015). A systematic review of axillary web syndrome (AWS). *Journal of cancer survivorship : research and practice*, 9(4), 576–598. <https://doi.org/10.1007/s11764-015-0435-1>
5. Lippi, L., de Sire, A., Losco, L., Mezzan, K., Folli, A., Ivanova, M., Zattoni, L., Moalli, S., Ammendolia, A., Alfano, C., Fusco, N., & Invernizzi, M. (2022). Axillary Web Syndrome in Breast Cancer Women: What Is the Optimal Rehabilitation Strategy after Surgery? A Systematic Review. *Journal of clinical medicine*, 11(13), 3839. <https://doi.org/10.3390/jcm11133839>
6. O'Toole, J., Miller, C. L., Specht, M. C., Skolny, M. N., Jammallo, L. S., Horick, N., Elliott, K., Niemierko, A., & Taghian, A. G. (2013). Cording following treatment for breast cancer. *Breast cancer research and treatment*, 140(1), 105–111. <https://doi.org/10.1007/s10549-013-2616-9>
7. Brunelle, C. L., Roberts, S. A., Shui, A. M., Gillespie, T. C., Daniell, K. M., Naoum, G. E., & Taghian, A. (2020). Patients who report cording after breast cancer surgery are at higher risk of lymphedema: Results from a large prospective screening cohort. *Journal of surgical oncology*, 122(2), 155–163. <https://doi.org/10.1002/jso.25944>
8. McNeely, M. L., Courneya, K.S., Al Onazi, M.M., Wang, Q., Bernard, S., Dickau, L., Vallance, J.K., Culos-Reed, N., Matthews, C.E., Yang, L., Friendenreich, C.M. (2024). Axillary Web Syndrome in Newly Diagnosed Individuals after Surgery for Breast Cancer: Baseline Results from the AMBER Cohort Study. *Physiotherapy Canada*.
9. Chou, Y. H., Liao, S. F., Chen, D. R., Chen, S. T., & Wang, W. T. (2025). The incidence of and risk factors for axillary web syndrome with limited shoulder movement after surgery for breast cancer, and the effect of early physical therapy intervention. *Discover oncology*, 16(1), 7. <https://doi.org/10.1007/s12672-025-01740-y>
10. Koehler, L. A., Blaes, A. H., Haddad, T. C., Hunter, D. W., Hirsch, A. T., & Ludewig, P. M. (2015). Movement, Function, Pain, and Postoperative Edema in Axillary Web Syndrome. *Physical therapy*, 95(10), 1345–1353. <https://doi.org/10.2522/ptj.20140377>
11. College of Physiotherapists of Ontario. (2023, November 1). *Evidence-Informed Practice Standard*. Standards & Resources. <https://collegept.org/standard/evidence-informed-practice-standard/>
12. Australian Institute of Family Studies. (2021 March). *What is an evidence-informed approach to practice and why is it important?* Australian Government. Australian Institute of Family Studies.

<https://aifs.gov.au/resources/short-articles/what-evidence-informed-approach-practice-and-why-it-important>

13. Luz, C. M. D., Deitos, J., Siqueira, T. C., Palú, M., & Heck, A. P. F. (2017). Management of Axillary Web Syndrome after Breast Cancer: Evidence-Based Practice. Tratamento da síndrome de rede axilar pós-câncer de mama: prática baseada em evidências. *Revista brasileira de ginecologia e obstetricia : revista da Federacao Brasileira das Sociedades de Ginecologia e Obstetricia*, 39(11), 632–639
14. Brunelle, C. L., Jackson, K., Shallwani, S. M., Hunley, J. H., Kennedy, A., Fench, S., Hill, A., Paskett, E. D., Rush, K., Thiadens, S. R. J., White, J., & Stewart, P. (2024). Evidence-based recommendations regarding risk reduction practices for people at risk of or with breast cancer-related lymphedema: consensus from an expert panel. *Medical oncology (Northwood, London, England)*, 41(11), 298. <https://doi.org/10.1007/s12032-024-02510-6>

Addressing dressing

An introduction to lymphedema-friendly apparel

By Naomi Dolgoy, Kerri McBee-Black and Elizabeth Anderson

1. Eidenberger M. Patient-reported outcome measures with secondary lower limb lymphedemas: A systematic review. *J Adv Pract Oncol* 2021;12(2):174-187 doi: 10.6004/jadpro.2021
2. Viehoff PB, Gielink PDC, Damstra RJ, Heerkens YF, van Ravensberg DC, Neumann, MHA. Functioning in lymphedema from the patients' perspective using the International Classification of Functioning, Disability and health (ICF) as a reference. *Acta Oncol* 2015;54(3):411-421 doi:10.3109/0284186X.2014.952389
3. Moore Jr JE & Bertram CD. (2018). Lymphatic system flows. *Annual review of fluid mechanics*, 50(1), 459-482.
4. Blausen.com staff (2014). "[Medical gallery of Blausen Medical 2014](#)". *WikiJournal of Medicine* 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436
5. Files GG. (2025). The joy of sleeves: Especially when you find the best length for you. <https://gloriaglamont.com/2020/08/05/the-joy-of-sleeves-especially-when-you-find-the-best-length-for-you/>
6. Liberare (2025). Adaptive intimates. <https://liberare.co/product>
7. Big Brand Wholesalers. (2025). Online sellers: Names of women's pant/short lengths. <https://bigbrandwholesale.com/wholesale-101/online-sellers-names-of-womens-pant-short-lengths-cheat-sheet/>
8. Ivy and Pearl Boutique. (2018). Pant styles: The complete illustrated fashion guide to women's pant styles and types. <https://ivyandpearlboutique.com/blogs/fashion-howto/the-complete-illustrated-fashion-guide-to-pant-styles-and-types>