

# Preserving shoulder function, quality of life, in breast cancer patients

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After a prophylactic double mastectomy in 2015, Tina Harrison discovered that she did, indeed, have breast cancer—it just hadn't been detected.

Harrison, of Pinckney, Mich., correctly predicted the cancer—it ran in her family—but she didn't anticipate her ongoing pain and loss of [shoulder](#) function after [reconstructive surgery](#).

Harrison isn't alone, said David Lipps, assistant professor at the University of Michigan School of Kinesiology and director of the Musculoskeletal Biomechanics and Imaging Laboratory. His lab works to understand the best treatment options for women undergoing [breast reconstruction](#) after mastectomy.

To that end, Lipps and his team examined three different types of reconstructive surgeries to determine how each influenced long-term shoulder function in breast cancer survivors.

The study, recently published in the journal *Breast Cancer Research and Treatment*, confirms that patients who undergo reconstructive surgeries after [radiation therapy](#) using a large back muscle, called the latissimus dorsi, have the greatest losses in shoulder stability and function.

In this procedure, called a latissimus dorsi flap [reconstruction](#), the surgeon cuts the back muscle and pulls it into the chest to restore the breast mound and create a flap for the implant.

Women who undergo radiation often require this type of reconstruction because radiation therapy causes scar tissue to develop within the skin and pectoral muscles, so it's necessary to incorporate the back muscle during surgery, Lipps said.

"Our finding that the latissimus dorsi (back muscle) flap reconstruction objectively decreases shoulder strength is important because this will need to be communicated to women ahead of time and may affect the choice they make for procedures," said Adeyiza Momoh, surgeon on the research team and associate professor of plastic surgery at Michigan Medicine.

In the long-term, the findings may lead to fewer breast reconstructions that use both the back and pectoral muscles. As a next step, biomechanical changes in the shoulder should be correlated to a patient's actual experience or perception of function, to better understand clinical significance, Momoh said.

The other two methods produced equally good results for future shoulder function. The second method involves using pectoral muscles to rebuild the breast mound by inserting tissue expanders beneath the [muscle](#) to make room for a future implant. It accounts for more than 60 percent of all reconstructions.

The third method recreates the breast without an implant by transferring abdominal tissue to the chest. Like the implant-only method, it also retained shoulder function and stability. This method is called deep inferior epigastric perforator flap reconstruction, or DEIP flap reconstruction.

During the testing sessions in Lipps' lab, Harrison slipped her arm into a cast attached to a robotic device that measures how stiff her shoulder is following treatment. The study examined 14 patients who had the

immediate implants without radiation, and 10 each who had the lat flap reconstruction and the DIEP reconstruction.

Harrison underwent saline implants and fat grafting, and now, heavy lifting and raising her arms over the shoulder both cause pain. She says physical therapy has helped immensely. She recently had another surgery and expects to undergo another round of occupational and physical therapy.

"Everyone knows a [breast](#) cancer survivor," Lipps said. "My mom was a [breast cancer](#) survivor, and people are probably aware of the quality of life issues survivors face. My hope is really to enhance the availability of rehabilitation and, hopefully, our lab can develop new screening tools to enhance these rehabilitation programs."

**More information:** Joshua M. Leonardis et al, The influence of reconstruction choice and inclusion of radiation therapy on functional shoulder biomechanics in women undergoing mastectomy for breast cancer, *Breast Cancer Research and Treatment* (2018). [DOI: 10.1007/s10549-018-5003-8](#)

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