

## Original Research Article

# Disability evaluation after latissimus dorsi muscle transfer in breast reconstruction using DASH score

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### ABSTRACT

**Background:** Breast reconstruction with latissimus dorsi muscle transfer is one of the most frequent procedures at our hospital. The objective is to evaluate if there is any functional impairment after the surgery with a potential impact of patient's daily life.

**Methods:** Functional morbidity was analyzed applying the disabilities of the arm, shoulder and hand (DASH) questionnaire and shoulder range of motion with goniometer in 42 patients whose breast reconstruction was between 2016 and 2022 at our hospital. We collected data using Microsoft excel V16.47.1 and analyzed data with statistical package for the social sciences (SPSS) software, v23.0.

**Results:** There was statistically significant difference for disability/symptom DASH score in cases of bilateral reconstruction and for cases undergoing a procedure on the right side versus left side.

**Conclusions:** In patients with bilateral breast reconstruction, we found a greater DASH score in dysfunction and symptoms which associates with poor quality of life, as well as when the flap is on the contralateral extremity of the hand dominance; in those cases, there are other reconstructive procedures that provide greater safety and less disability to the patient. For evaluating extension, we need more prospective and comparative studies with strict follow up of the patients and same series of rehabilitation.

**Keywords:** Breast reconstruction, Muscular flap, Disability, DASH

### INTRODUCTION

Breast cancer is the most prevalent malignant disease in adult women in Mexico, with death rates from thirty to fifty-nine years and over sixty years of 1.52 and 4.81 per 10,000 women respectively.<sup>1</sup> Breast reconstruction is established as integral part of the treatment, the restoration of her physical integrity is an indispensable step to completion of the therapy, without excluding the morbidity at the donor site as a part of the full process.<sup>7</sup>

At Hospital General de Mexico “Dr. Eduardo Liceaga” the most frequent procedure for breast reconstruction is

delayed with latissimus dorsi flap.<sup>2</sup> This muscle plays an important role in shoulder joint biomechanics, the main action of this muscle includes internal rotation, adduction, shoulder extension, depressing of the raised arm and downward rotation of the scapula.<sup>3</sup> Those functions are shared with other six muscles in the shoulder girdle, including teres major and minor, subscapularis, deltoid, coracobrachialis, and pectoralis major muscle.<sup>4</sup> The objective of this article is to analyze the degree of disability secondary to this procedure using disabilities of the arm, shoulder and hand (DASH) score, considering that it is the most frequent technique at our hospital for breast reconstruction, and although there are synergistic

actions with other muscles, identify in which situations another reconstructive procedure represents a better result for the patient considering functionality.<sup>4,5,13</sup>

**METHODS**

A retrospective case series review of 42 patients is presented, who underwent breast reconstruction with latissimus dorsi flap between 2016 and 2022 at Hospital General de Mexico (Mexico City). Shoulder function was measured objectively with the DASH questionnaire and physical examination and goniometer to study range of motion.<sup>10</sup>

The patients were recruited by telephone contact and assisted to the plastic and reconstructive service of our hospital for the application of the questionnaire and physical examination.

The DASH score was calculated using the pre-established DASH formula.<sup>6</sup> All patients were analyzed for functional impairment in activities of daily living, and the sports and

recreational activities section only if the patient had done those activities preoperatively.

In addition to the questionnaire, a physical exploration and goniometer was applied to each patient, comparing both sides, and specific questions about postoperative complications at the morbidity site were included.<sup>9</sup>

All the data obtained were collected into a database in Microsoft excel v16.47.1. Statistical analysis was performed using statistical package for the social sciences (SPSS) software, v23.0.

**RESULTS**

The study sample is made up of 42 cases of breast reconstruction, all female, with an average age for the sample of 51.6 years ( $\pm 9.8$ ). Right-handed manual functional predominance was determined in 41 cases, and left-handed in 1 case. Twenty-one right reconstructions (50%), sixteen left reconstructions (38%) and 5 bilateral reconstructions (12%) were performed. Complications in the procedure were found in 4 cases (9.5%) (Table 1).

**Table 1: Demographic data of the patients.**

No. (total)	Middle age	Right hand dominance	Left hand dominance	Right reconstruction	Left reconstruction	Bilateral reconstruction	Complications
42 patients	51.6 years ( $\pm 9.8$ )	41 patients	1 patient	21 cases	16 cases	5 cases	4 cases

The procedures performed were listed in Table 2.

**Table 2: Procedures performed for breast reconstruction.**

Procedure	Cases	%
Immediate reconstruction with tissue expander	14	33.33
Delayed reconstruction with tissue expander	8	19.05
Delayed reconstruction with implant	7	16.67
Immediate reconstruction with implant	13	30.95

When evaluating the functional disability measured using the DASH scale, an evaluation of the disability in general was carried out for the entire sample, where an average of 32.2 points ( $\pm 18.7$ ) was obtained, and subsequently an evaluation for the disability for work, in 32 cases, obtaining an average score of 28.7 ( $\pm 12.2$ ) and the inability for artistic activities and exercise in 27 cases of the sample, with an average score of 28.7 ( $\pm 18.6$ ).

Regarding the movements measured with a goniometer, it is observed that the movement with the greatest impact is shoulder extension, with only 17.02% of the patients

achieving the complete arc of movement in the extremity in which the flap was performed.

**Table 3: Maximum shoulder extension on the side of breast reconstruction (47 flaps, 37 unilateral and 5 bilateral).**

Shoulder extension (maximum extension)	Cases	%
31-40°	3	6.38
41-50°	13	27.66
51-60°	23	48.94
61-70°	8	17.02

Subsequently, the functional capacity was compared using the DASH scale of the cases subjected to a unilateral procedure and those subjected to a bilateral reconstruction procedure, finding that during the functional evaluation by DASH, for mobility in general, there was an average score of 28.08 ( $\pm 14.9$ ) for cases with unilateral reconstruction and a score of 62.8 ( $\pm 16.4$ ) for cases undergoing bilateral reconstruction, whose differences are statistically significant (p value 0.001); while the functional evaluation for work activities and for artistic and exercise activities did not show differences between the groups.

Likewise, the functional capacity was compared using the DASH scale of the cases undergoing a procedure on the

right versus left side, which showed that in the general functional evaluation using DASH, the cases undergoing right breast reconstruction showed a score of 23.9 ( $\pm 12.9$ ), and the cases undergoing reconstruction on the left side

showed a score of 33.4 ( $\pm 15.9$ ), whose differences are significant ( $p=0.05$ ). On the other hand, when evaluating functional capacity for work or for arts and exercise, there were no differences.

**Table 4: DASH score for unilateral and bilateral reconstruction.**

DASH	Reconstruction	Cases	Mean	Standard deviation	P value
Disability/ symptom	Unilateral	37	28.08	14.91	0.001
	Bilateral	5	62.83	16.47	
Work	Unilateral	8	31.22	12.5	0.21
	Bilateral	2	18.75	0.000	
Sports/arts	Unilateral	13	22.60	19.18	0.31
	Bilateral	2	37.50	8.83	

**Table 5: DASH score comparing right versus left side.**

DASH	Reconstruction	Cases	Mean	Standard deviation	P value
Disability/ symptom	Right	21	23.99	12.97	0.05
	Left	16	33.44	15.97	
Work	Right	6	29.17	13.50	0.46
	Left	2	37.38	9.01	
Sports/arts	Right	8	17.97	13.12	0.29
	Left	5	30.00	26.29	

**DISCUSSION**

Incidence of breast cancer has shown a significant increase in recent years, as well as breast reconstruction, since it has shown both psychological and physical benefits; however, we also consider it necessary to analyze the morbidity of the procedure.<sup>7</sup> At our hospital, latissimus dorsi flap is the most frequent procedure for breast reconstruction.<sup>2</sup> Previous studies have claimed that latissimus dorsi flap reconstruction has little effect on shoulder morbidity.<sup>8,11,12</sup> The objective of this study was to analyze the level of disability of the extremity after a breast reconstruction with latissimus dorsi flap using DASH score. DASH score gives a percentage disability score, where 0=no disability and 100=complete disability.<sup>6,13</sup> We applied the DASH score to a population of 42 patients and quantified the grades of shoulder motion with goniometer comparing both extremities.

According to the angles measured with a goniometer, shoulder extension is decreased in the extremity in which the flap was performed in most cases, with only 3 cases that reached less than 40° of extension, 36 cases between 41-60° and 8 cases that achieved full arc of motion. It is questionable whether this lack of extension is clinically significant to the subjects function.<sup>8</sup> Glassey et al found minimal change in the range of motion, with an eventual increase at 1 year after the surgery.<sup>8,12</sup> In patients with bilateral breast reconstruction, Lee et al found similar scores on the main DASH score but higher scores on the sports/art module; however we found statistically significant difference for the main DASH score (mean 62.83 for bilateral flaps versus 28.08 for unilateral flaps), which is associated with greater disability and therefore

with lower quality of life.<sup>10</sup> Our study did not find any statistical difference in the sports and arts module of DASH score. Glassey et al found that extended latissimus dorsi had poorer recovery scores and that subjects whose breast reconstruction was on the same side as their dominant hand were slower to recover, however according to our study, when the flap is on the contralateral extremity of the hand dominance (33.44 left versus 23.99 right), there were greater disability scores.<sup>8</sup>

**Limitations**

There are several limitations. First, our study does not take into account preoperative measures, we only have postoperative DASH score and range of extension, therefore it does not take into account the possibility of prior morbidity of the shoulder, which could affect the results. Second, we do not have a standardized protocol of rehabilitation after LD reconstruction, further study is needed to determine the relationship between rehabilitation and improvement in disability and quality of life. Third, this study has a small sample size. Further research comparing range of motion preoperatively and postoperatively with the same routine of rehabilitation could enhance our understanding of shoulder morbidity. Equally, a greater population is needed to establish whether flap laterality and hand dominance influences the disability score.

**CONCLUSION**

Our study has shown that there is significant disability for patients with bilateral breast reconstruction with latissimus dorsi flap, it is advisable to use a reconstruction method

other than the latissimus dorsi flap in those cases, as in cases in which the flap is made on the contralateral side corresponding to manual dominance we found greater disability scores, we suggest complementing with strict rehabilitation to enhance recovery. For unilateral reconstructions or reconstructions made in the same side as manual dominance it is considered a safe procedure with no statistical differences in the DASH score.

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