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## INTRODUCTION

Physical therapy is important for prevention of motor and functional complications after breast cancer surgery, especially when started early, with restoration of motor function and improvement of patients' quality of life. However, there is no prospective randomized study on different physiotherapeutic treatments in patients undergoing radical breast surgery and immediate alloplastic reconstruction.

## OBJECTIVES

The purpose of this study was to evaluate the impact of upper limb free exercise released 15 or 30 days after surgery on shoulder range of motion (ROM), pain and limb function, and on the incidence of dehiscence, seroma, infection and necrosis of breast cancer patients after mastectomy and immediate reconstruction with alloplastic implant.

## METHODS

Sixty breast cancer patientes following mastectomy and immediate reconstruction with alloplastic implant were included in a randomized controlled trial, registered in the Clinical Trials database (number NCT02480842) and approved by the research ethics committee (number 1.051.996). They underwent preoperative evaluations and 07, 15, 30, 60 and 90 days after surgery. They started exercises the day after surgery, with shoulder ROM limited to 90°. After two weeks, they were randomized into two groups of 30 patients: "Free Amplitude Group" - release of shoulder joint amplitude at the pain limit or until the surgical edges were detached, and "Limited Amplitude Group" - maintenance of shoulder movement restriction at 90° until 30 days after the surgery, at which time they were also released to free range exercises.

Active shoulder ROM was measured for flexion, extension, adduction, abduction, internal rotation and external rotation. Pain was assessed by 0 to 10 Analog Verbal Scale and upper limb function with Disabilities of the Arm, Shoulder and Hand Questionnaire.

## RESULTS

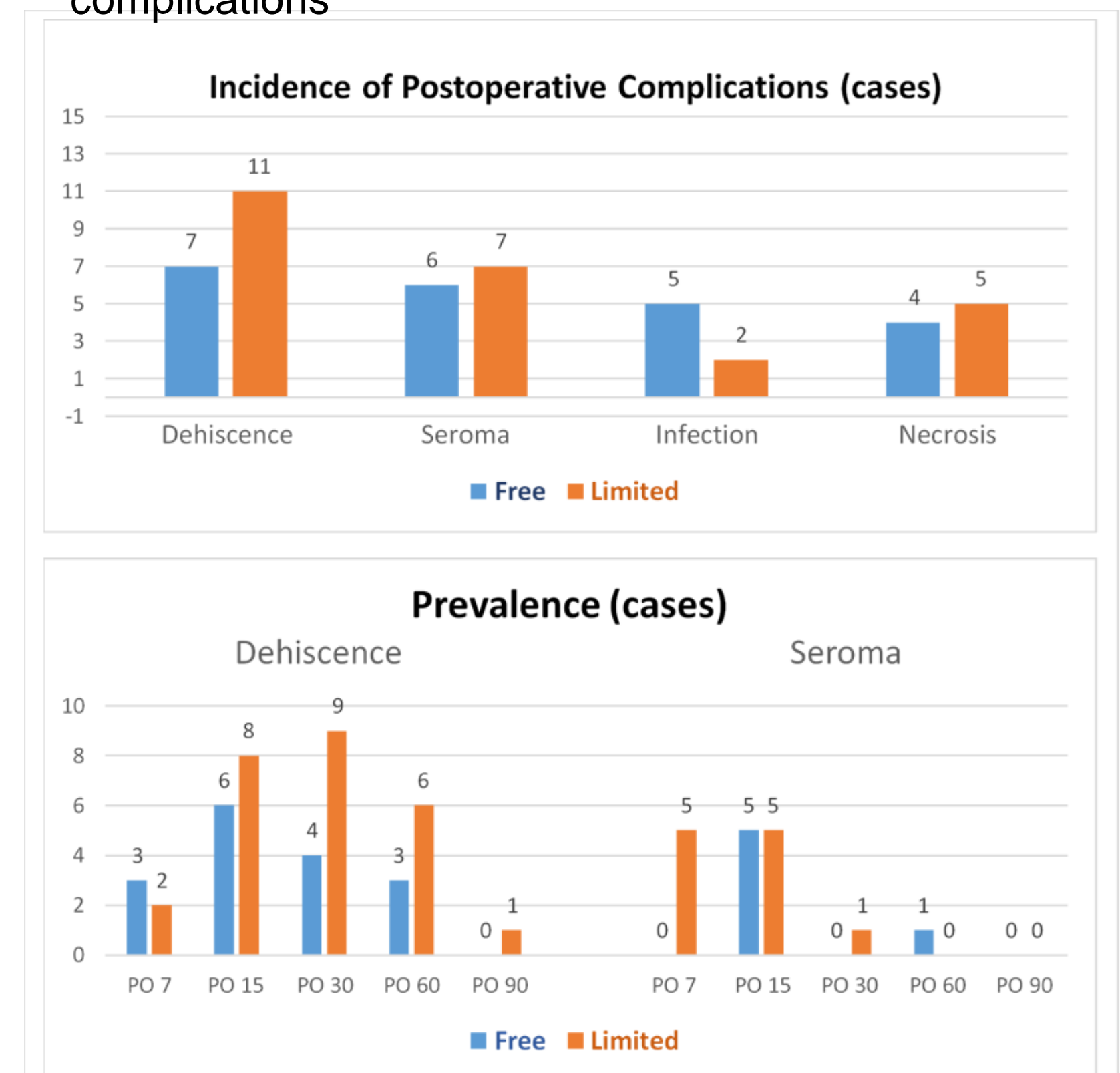
Patients of Free Amplitude Group had less pain, greater shoulder amplitude and better upper limb function, compared to Limited Amplitude Group, with no increased incidence of postoperative scarring complications.

**Table 1.** Range of motion, pain, and upper limbs function

		Pre	PO 07	PO 15	PO 30	PO 60	PO 90	P#	P&
<b>Flexion (degrees)</b>								<0.001	0.005
Free	Mean (SD)	166.9 (9.2)	113.6* (20.9)	121.9* (21.1)	144.4* (18.7)	153.5* (18.5)	156.9 (15.9)		
Limited	Mean (SD)	163.3 (14.7)	99.7* (19.5)	115.2* (23.0)	129.7* (22.4)	136.7* (30.8)	148.7* (16.9)		
<b>Abduction (degrees)</b>								<0.001	0.033
Free	Mean (SD)	171.0 (9.9)	101.3* (27.8)	106.5* (28.1)	132.5* (28.5)	150.7* (25.8)	159.4 (21.5)		
Limited	Mean (SD)	168.3 (16.5)	86.8* (22.5)	102.4* (31.7)	113.3* (32.0)	136.5* (34.5)	148.5* (30.6)		
<b>External Rotation (degrees)</b>								<0.001	0.011
Free	Mean (SD)	87.6 (5.8)	82.1 (11.9)	82.3 (12.1)	85.5 (6.9)	86.3 (8.0)	85.5 (6.9)		
Limited	Mean (SD)	86.0 (8.4)	75.5* (13.9)	79.7 (9.3)	80.4 (8.6)	81.2 (9.1)	82.6 (7.5)		
<b>Analog Verbal Scale for Pain</b>								<0.001	0.016
Free	Mean (SD)	0.6 (1.40)	3.0* (2.9)	2.4 (3.0)	0.9 (1.9)	1.2 (1.5)	0.8 (2.0)		
Limited	Mean (SD)	1.1 (2.2)	3.3* (3.4)	3.3* (3.2)	2.2 (2.5)	3.3* (3.7)	2.2 (2.9)		
<b>Disabilities of the Arm, Shoulder and Hand Questionnaire</b>								<0.001	0.022
Free	Mean (SD)	5.1 (11.1)			11.7 (11.2)		9.4 (12.4)		
Limited	Mean (SD)	7.6 (13.1)			24.7* (20.5)		14.4 (13.9)		

SD - Standard Deviation; Repeated Measures ANOVA Test: p # for differences over time and p& for differences between groups; \* for intragroup differences in relation to preoperative values by Tukey post-hoc test

**Figure 1.** Incidence and prevalence of postoperative complications



Pre, preoperative; PO, postoperative. Chi-square test for incidence of dehiscence and seroma and Fisher two-tailed test for incidence of infection and necrosis (P-value > 0.05 in all analyses). Note: frequencies presented by number of patients with the complication

## CONCLUSIONS

Postoperative protocol with free shoulder ROM released after 15 days of surgery is safe and beneficial for kinetic-functional recovery and pain control of patients after mastectomy and immediate reconstruction with alloplastic implant for breast cancer.

**Key words:** breast neoplasms, breast implantation, exercise therapy, surgical wound dehiscence, articular range of motion

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