Breast Reconstruction With Sensitive Tram Flap Reinnervation

Léo Doncatto, MD1
Maira Caleffi, MD2

1] Plastic Surgeon of Hospital Presidente Vargas
Titular of the Brazilian Plastic Surgery Association

2] Mastologist of Hospital Presidente Vargas
Member of the Brazilian Mastology Association

Work Performed at the Department of Surgery and Gynecology of Hospital Presidente Vargas (HMIPV)
Porto Alegre - RS

Address for Correspondence:
Léo Doncatto, MD
Rua Mostardeiro, 780, cj. 202 - Moinhos de Ventos
90430-000 - Porto Alegre - RS - Brazil
Phone/Fax +55 51 222-6820
e-mail: doncatto@nutecnet.com.br

Key Words: Breast Reconstruction, Mammary Sensibility, Breast Cancer, Plastic Surgery, Breast.

ABSTRACT:
Breast reconstruction with TRAM flap (a myocutaneous flap of the rectus abdominis muscle) needs the return of the sensibility to become a complete surgery. A new surgical technique, proposed by Doncatto and Hochberg sutures both the eleventh intercostal nerves of the TRAM flap to thoracic intercostal nerves. Fifty four patients submitted to breast reconstruction with TRAM flap were evaluated. Twenty seven patients were reinnervated and twenty seven were in a control group. The recuperation of the superficial feeling was the big conquest of this surgery, and it was present in all the twenty two (81.5%) (chi square test p<0.05) patients reinnervated on the 8th month after the surgery. In the control group the superficial feeling was present only in three case (11.2%). The return of the feeling occurred in all the cutaneous surface of the TRAM flap. There was an increase in the response to the tests some time after the surgery. Deep pressure and vibration tests were positive in all the twenty patients. Superficial pain and temperature were present in eight cases of reinnervated group and one case of control group.

INTRODUCTION
Breast reconstruction techniques have been presenting significant progress lately. Undoubtedly, TRAM meant important evolution regarding the shape and volume obtained in the reconstructed breast. Besides, TRAM
introduces other advantages, such as exempting the use of silicon prosthesis and making simultaneously possible an improvement of the abdomen. An important aspect which was challenging surgeons was the absence of sensibility. The transplanted tissue was denervated losing its sensibility. In some cases, after a certain time, it would occur a discrete and insufficient sensitive reinnervation beginning at the cutaneous edges.

The mammary gland receives sensibility from anterior cutaneous branches from the second to the sixth intercostal nerves and from supraclavicular branches of the cervical plexus. The fourth lateral cutaneous nerve innervates the mammilla, passing through the mammary structure. The autonomous fibers of the breast follow the lateral thoracic artery and the intercostal nerves, heading to the skin, to flat muscles of the areola and the mammilla, and also to vessels and glandular tissue.7,10, 15, 25)

In order to recreate the sensitive capacity for the new breast it is necessary to make a new nervous route which will conduct the stimuli from the TRAM flap to the brain. In the regeneration in peripheral nerves, the axonal growth primarily uses the complete and integral neurilemma sheath as a duct which occurs also through the border of the flap and of the receiving bed.17,24,26)

The reconstruction of this neuro-conductor route was proposed (6,7,15) based on anatomical studies of the thoracic and abdominal intercostal nerves. New improvements on reinnervation surgery with termino-lateral neurorrhaphy allowed the renovation of the TRAM's sensibility, without any injury to the donor area.

The sensory recovery is much more likely to occur after fasciocutaneous flap than after musculocutaneous flap.2,5) A direct comparison of reinervated and noninnervated patients suggests that the reconstruction of sensation in noninnervated is markedly inferior to that achieved by adding a neural anastomosis.3)

Some studies have documented sensory recovery in denervated skin flaps without the need of neural anastomosis,6,16,30), although other works have contested such results.14,33)

The purpose of this study is to describe the first results in twenty seven patients, after eight months of observation, submitted to breast reconstruction with sensitive reinnervation of the TRAM flap.

MATERIALS AND METHODS

The clinical study was aleatory and prospective; it consisted of fifty four women, ages between 30 and 60 years, submitted to the mastectomy and breast reconstruction immediately or 2 years later, at the maximum, using TRAM flap. Twenty seven of these patients had TRAM reinnervated by the technique proposed by Doncatto & Hochberg, which consists in suturing both the eleventh intercostal nerves of TRAM to the lateral side of the fourth, fifth, sixth or seventh intercostal nerves, after the opening of a 1 mm of diameter window at the epineurum, with three stitches of nylon 8-0 - 10-0 (6,7,15) in a termino-lateral position of Viterbo.29, 30, 31) (pictures 1 and 2). The other twenty seven cases were not reinnervated and served as control. The patients were operated by the same crew, at Hospital Presidente Vargas - MS, in Porto Alegre, following the same surgical routine. They were submitted to monthly evaluation, by two examiners, by the clinical method described by Adams & Victor:1) touch (hair brush), pressure (finger), pain (needle), thermal sensibility (hot and cold water-filled test tube) and vibration (forks). We have evaluated both touch and moving touch, deep pressure, temperature, vibration and superficial pain. The tests were repeated ten times, and we considered them positive when patients declared that they were feeling the stimuli in at least half of the skin flap. The intensity of the stimulus was not measured.
RESULTS

Superficial feeling was the positive test that made a difference between the two groups. The twenty seven patients who were observed had positive results at the superficial feeling test after the 8th month of post-reinnervation (chi square test $p < 0.05$). On the twenty patients submitted to the neurorrhaphy with only one of the 11th intercostal nerves, it was observed the delimitation of the sensibility on the skin of TRAM between the areas with or without reinnervation in seventeen cases. In eight cases thoracic skin was completely insensitive, but the reinnervated TRAM got a positive response from the test. In another case, in spite of the resection of the peripheral scar to the flap, it remained sensitive. At the control group, not reinnervated, there was three cases with positive response to superficial feeling. Tests of deep pressure and vibration remained identical on both groups, turning positive in all cases. The temperature and superficial pain were present in eight cases in the reinnervated group and in one case in the control group.

DISCUSSION

New and important contributions to the breast reconstruction surgery arise, such as the possibility of the return of the new breast’s sensibility, aesthetic refining of the TRAM, preservation of the submammary...
third, crosses its lateral sheath and the subcutaneous
and divides itself in multiples branches, ending up at
the derma, and being responsible for the sensibility
of the skin flap (fig. 3).

Works about termino-lateral neurorrhaphy made by
Viterbo (28) and repeated by Ross (29) have been prom-
ing towards the sensitive and motive (30, 31) rein-
nervation, allowing the utilization of one donor nerve
without any damage to the structures innervated by
it.

The results obtained in terms of superficial feeling,
positive in twenty two reinnervated cases, which makes
81.5% ($P<0.005$), prove the success of the employed
method when compared to the three positive result
Breast Reconstruction With Sensitive Tram Flap Reinnervation

obtained in the twenty seven cases (11.2%) of the control group (not reinnervated). The results achieved with the bilateral reinnervation using both the eleventh intercostal nerves and obtaining sensibility on the full isle of TRAM indicate that this is the best option, since when the single neurorrhaphy was done, occurred an unilateral sensibility of the flap (fig. 4). The eight described cases where the thoracic skin nearby the flap was insensitive, opposing to the TRAM, confirm that the sensibility obtained was provenient from the neurorrhaphy. In another case, although there were a full resection of the scar around TRAM, the patient maintained the reinnervation tests. In these cases there would be no possibility of growth of the axons through the scar to make the TRAM sensitive17,24,26.

The termino-lateral neurorrhaphy occurred between the anterior and medium axillary lines because in this area 70 to 90% of the fibers are sensitive9,17).

A progressive increase in the response to all of the tests, once the time of microneurorrhaphy went by, was noticed. It suggests an increase on the density of reinnervated receivers on the surface of TRAM17,24). These finds were previously reported only for deep pressure and vibration21).

The control group had three cases of superficial feeling present, which could be explained by aleatory reinnervation9,17,21,26).

The increase of the sensitive capacity of this new reinnervated breast will allow the patient to develop a sensitive reeducation of the postoperative and consequently to feel a visual response to localize the spots of the sensibility return. It will also allow the patient to acquire new feelings towards the new reinnervated breast13,21).

CONCLUSIONS

The presented cases show the possibility of sensitive reinnervation of TRAM flap in breast reconstruction with termino-lateral neurorrhaphy. Reinnervated patients presented a return of the superficial feeling at the surface of TRAM. The rest of the tests were similar on both groups.

REFERENCES


32. VRIES J. P. M.; ACOSTA, R.; SOUTAR, D. S.; WEBSTER, M. H. C. - Recovery of sensa-
Breast Reconstruction With Sensitive Tram Flap Reinnervation

tion in the radial forearm free in oral reconstruc-
tion. Plastic and Reconstructive Surgery. 98(4)
649-656.1996.

33. WOODWARD, K.; KENSHALO, D. - The re-
covery of sensory function following skin flaps

ACKNOWLEDGMENT

We acknowledge Dr. Julio Hochberg for his help in turn-
ing the anatomical dissection feasible, and for his contri-
bution in the technique development.