



The use of reverse abdominoplasty for treatment of chemical burn in the thoracoabdominal region

O uso da abdominoplastia reversa para o tratamento de queimadura química em região toracoabdominal

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■ ABSTRACT

Chemical burn is a challenge owing to its severity compared to thermal burns. The depth and extent of lesions in different areas of the body lead us to look for different possibilities for the best treatment of the patient. A reverse abdominoplasty surgical technique was proposed; this involves a skin flap that could reduce the exposed area of a chemical burn. The result was satisfactory, reducing the patient's treatment, surgical and hospitalization time, highlighting the proposed technique as an important tool for thoracoabdominal reconstruction.

Keywords: Chemical burns; Surgical flaps; Burns; Abdomen; Sodium hydroxide.

■ RESUMO

A queimadura química é um desafio devido à sua agressividade em comparação com as queimaduras térmicas. A profundidade e extensão das lesões em diferentes áreas do corpo nos levam a buscar diferentes possibilidades para auxiliar no melhor tratamento do paciente. Foi proposto, a partir da técnica cirúrgica abdominoplastia reversa, um retalho cutâneo que pudesse reduzir a área exposta de uma paciente vítima de queimadura química. O resultado foi satisfatório, reduziu tempo de tratamento, cirúrgico e de internação da paciente, evidenciando uma ferramenta importante de reconstrução toracoabdominal.

Descritores: Queimaduras químicas; Retalhos cirúrgicos; Queimaduras; Abdome; Hidróxido de sódio.

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INTRODUCTION

Chemical burns account for 4 to 5% of total burns, 25% of which are caused by an alkaline agent. Fifty percent of chemical burns are associated with accidents in the workplace, 30% are related to domestic accidents and 20% are caused by aggression¹. Chemical injuries are more likely to be deeper owing to prolonged exposure to the agent in contrast to thermal injuries, which generally have shorter exposure to intense heat.

Third degree burns are treated by early tangential debridement and dressings, followed by skin grafting or flaps depending on the affected area, for better results². However, complications and deformities such as infections, contractures, and graft hyperpigmentation³ can make the treatment and prognosis of an extensive chemical burn a challenge. Currently, the different strategies to minimize these complications is actively being researched and supported, such as the use of topical heparin in burns⁴ and studies on the use of flaps, which have proven promising⁵.

Reverse abdominoplasty is a procedure developed in 1972 with the purpose of aesthetic resection of skin excesses located in the epigastrium, which causes a single scar line in the inframammary groove. Later, the extended reverse abdominoplasty was developed with the purpose of aesthetic improvement to the entire anterior wall of the abdomen, with ample dissection to the pubis⁶.

Using these concepts, surgery with a reparative concept was proposed for a burn case in the thoracoabdominal region of a patient with excess skin, minimizing healing time, hospitalization, and procedures needed for completion of the treatment.

CASE REPORT

A 33-year-old woman, Caucasian and primigravida, who suffered a burn by a chemical product (sodium hydroxide, "caustic soda") in thoracoabdominal region. On examination, she presented second degree superficial burns in the anterior region of the face, as well as in the back, both breasts, abdomen, and perineal. The deep second degree burns were located in the posterior cervical region, inframammary, and upper abdomen, totaling approximately 14% of the burned body surface (Figure 1). No history of smoking or alcoholism was indicated.

The initial appointment was based on ATLS protocols. It was performed using the emergency hydrotherapy and four-layer dressing. In the first days of admission, surgical tangential debridement to the devitalized tissues and dressings with chemical



Figure 1. Chemical burn in the thoracoabdominal region.

debridement were performed to prepare the wound for definitive treatment.

After improvement of the burn injuries, resection of all burned tissues was performed, followed by supraumbilical detachment of the abdominal flap (Figure 2). The flap was advanced, followed by plane suturing. The operative preparation involved all routine measures, including thromboembolic prophylaxis.



Figure 2. Reverse abdominoplasty flap.

The most severe lesions were found in locations where the chemical agent remained in greater contact with the skin because of impregnation on the clothes, which were in the posterior cervical, inframammary, and upper abdomen regions. After the first debridement, a necrosis process was observed requiring a second complementary procedure.

After the definitive procedure (mammoplasty with reverse abdominoplasty and abdominal grafting of small

areas), the patient recovered with slight dehiscence of bilateral inframammary suture on the 10th postoperative day (PO), and she was treated in the ambulatory with chemical debridement until complete epithelialization. We obtained reduced scars and with a pleasant appearance in the long term (Figures 3, 4, 5 and 6).



Figure 3. Immediate postoperative.



Figure 4. Final appearance after a year.



Figure 5. Final appearance after 1 year.



Figure 6. Final appearance after 1 year.

DISCUSSION

Alkaline burns are the second most common category of chemical burns, with sodium hydroxide (caustic soda) being the most frequent etiological agent in this group. The mechanism of tissue injury by chemical burning by a basic agent comprises three factors: 1) intense cell dehydration, 2) saponification of fat (which generates the loss of the body's thermal insulation) and 3) inactivation of enzymatic proteins, which form bonds in parallel with the alkali, giving rise to proteinate in an exothermic reaction, thereby further aggravating the initial injury⁷. Alkali burns penetrate deeper into the skin compared to thermal or acid burns. Because of this great penetration capacity, there is a tendency for the lesions to become chronic as elimination of the chemical agent is difficult. Thus, there is usually the need for several tangential debridement until the tissue becomes viable⁸.

The patient presented with deep lesions caused by the chemical agent and the location propitiated

the reverse abdomen flap. The choice of a definitive treatment (as graft or flap) should be evaluated on a case-by-case basis.

The surgical choice in this case was due to the severity caused by the chemical burn because of its extension and depth, in addition to the location of these lesions. The region is favorable for the reverse abdomen flap (Figure 3). We saw an opportunity to use the reverse abdominal flap as there was excess abdominal dermis-fat. This option gives aesthetically much better results than partial or total skin grafting and leaves no additional scars. In contrast, with the flap use, there is always the risk of necrosis and dehiscence—this did not occur in our case—which additionally brings the risk of morbidity to the procedure.

Most patients complain about scars and aesthetic quality of grafts after burns. In this case, if we had opted for graft, in the future, we could correct using the reverse abdomen. Although the primary goal was not an aesthetically pleasing result, we did skip a step, and the result was quite satisfactory.

Reverse abdominoplasty is an unusual aesthetic procedure. It has already been proposed for the reconstruction of chronic scars from previous burns⁹, however our proposal differs from other cases in the literature because it involves the reconstruction of the immediate region of the burn, thereby shortening treatment time and preventing future procedures.

The flap vascularization is maintained by three circulatory systems bilaterally: 1) perforating branches of the inferior epigastric arteries, as the main cutaneous source, which emerge from the rectum's sheath; 2) perforating branches formed by anastomoses of lumbar arteries, deep circumflex iliac arteries, remnants of intercostal arteries, and remnants of subcostal arteries, which emerge from the external oblique fascia; 3) superficial inferior epigastric arteries, superficial iliac circumflex arteries, and superficial external pudendal arteries, originating from the femoral arteries¹⁰.

Other types of flaps have already been used for the treatment of a burned patient with fewer complications; moreover, knowledge of an unusual abdomen flap can help in the arsenal of burned area coverage, thereby reducing the exposed area and, consequently, reducing hospitalization time, complications, and number of procedures.

CONCLUSION

Reverse abdominoplasty has recently gained popularity for both aesthetic and reconstructive

purposes. Although unusual, the use of this surgical technique for reconstruction of thoracoabdominal lesions is feasible and safe because it presents good vascularization and excellent aesthetic results. It can become an important tool for the plastic surgeon in the reconstruction of large lesions. In the case of a patient with chemical burns requiring a significant number of procedures and treatment time, the knowledge of different flap techniques can contribute effectively in the prognosis of the burn.

COLLABORATIONS

GGAT	Conception and design study, Conceptualization, Data Curation, Final manuscript approval, Project Administration, Realization of operations and/or trials
BOB	Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Final manuscript approval, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Realization of operations and/or trials, Supervision, Validation, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing
GCT	Realization of operations and/or trials
RBR	Realization of operations and/or trials
RU	Realization of operations and/or trials
ACF	Realization of operations and/or trials
HTR	Realization of operations and/or trials

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