

Clinical Epidemiology and Management of Postburn Breast Deformities Among Pakistani Women

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ABSTRACT

Objectives: To document the clinical epidemiologic profile of women with postburn breast deformities and determine the various surgical treatments employed for their correction.

Methodology: This descriptive case series study was carried out at the National Institute of Rehabilitation Medicine, Islamabad over a period of five years. All women who presented with breast deformities secondary to burn injuries were included. The exclusion criteria were male patients with postburn breast deformities and those women who had sustained acute burn injuries to the breasts. Convenience sampling was performed.

Results: There were 37 women in the study. Their age ranged between 9-27 years with a mean age of 13.27 ± 5.33 years. The commonest form of breast deformity was the presence of diffuse constricting scars that hindered the development of the underlying breast buds either bilaterally 17(45.94%) or on one side 7(18.91%). This was followed by pole contracture with partial breast development 8(21.62%), Nipple-areola complex (NAC) deformities 4(10.81%), associated abdominal scar contractures ($n=7$; 18.91%), associated axillary contractures 6(16.21%) and amastia among 1($n=1$; 2.70%) patients.

The various procedures undertaken are presented in descending order of frequency as follows: Breast scar contracture releases and coverage with split thickness skin grafts (STSGs) 32(86.48%); autologous fat grating of the breasts 11(29.72%); release of various associated contractures followed by resurfacing with STSGs 10(27.02%); NAC reconstructions 4(10.81%); Z-plasties for releasing linear scar contractures 3(8.10%); balancing procedures on the opposite normal breasts 3(8.10%); and breast reconstruction with local fasciocutaneous flaps 2(5.40%).

Conclusion: A variety of postburn breast deformities were observed among our patients. All of them had sustained the initial burn injuries in their prepubertal life. All of them had a history of initial burn injury management with dressings instead of the standard excision and grafting. Majority of them had developed the deformities after sustaining flame or scald burns to the anterior chest wall. Adequate scar-contracture release followed resurfacing with split thickness skin grafts were successfully employed among the majority of patients. Majority of procedures yielded favorable outcomes by adhering to the established principles of contracture management and breast reconstruction.

Key words: Burn injuries; Breast burns; Postburn breast deformities; Release of contracture; Split thickness skin graft.

Authors' Contribution:

¹Conception; Conception of the work idea, data collection, analysis and interpretation, drafting the manuscript, ³reviewing and final approval.

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Article info:

Received: July 2024
Revised: September 2024
Accepted: September 2024

Cite this article. Saaq M. Clinical Epidemiology and Management of Postburn Breast Deformities Among Pakistani Women. J Fed Med Coll. 2024; 1(2): 57-63.

Funding Source: Nil
Conflict of interest: Nil

Introduction

Burn injuries to the anterior chest wall region and breasts are not uncommon among females of all ages. These injuries pose variable degrees of functional and aesthetic threats to the underlying developing

mammary glands or the breast buds. When the burn insults occur before the onset of puberty, the normal breast development is often affected. The spectrum of the resultant problems ranges from diffuse scarring to the more sinister repercussions in the forms of distortion of the nipple-areolar complex (NAC), blocked



nipple, breast hypoplasia, breast asymmetry or total failure of breast development (i.e., amastia).¹⁻⁴

Burn injuries to the breasts among females carry significant psychological repercussions. Since breast constitutes an important organ of female gender identity, its deformity or total loss results in serious psychosocial issues or potential loss of the sense of femininity among the affectees.⁵⁻⁷

The surgical treatment of the postburn breast deformities is tailored according to the degree of affliction of the organs. The goals management are to ensure adequate release of the scar contractures, allow unrestricted growth of the suppressed mammary gland or breast bud, restore normal anatomy as much as possible including restoration of symmetry on the two sides.^{1, 8-11}

This study was undertaken to document the clinical epidemiologic profile of female patients presenting with postburn breast deformities and document the various forms of treatment options employed in their management.

Methodology

This descriptive case series study was carried out at the Department of Plastic surgery, National Institute of Rehabilitation Medicine (NIRM), Islamabad over a period of five years. Written informed consent was taken from the patients for inclusion in the study. The study followed the principles of the Helsinki's declaration of 1975, as revised in 2008. Anonymity of the included patients was ensured. Convenience sampling was done. All female patients who presented post burn breast deformities were included. The exclusion criteria were male patients with postburn breast afflictions and deformities. Also excluded were women with acute burn injuries to the breasts. These latter patients were managed with standard early excision and grafting.

The patients underwent initial evaluation with complete history and physical examination. Baseline investigations were performed to assess the general health and fitness for local or general anesthesia. The demographic profile of the patients, data regarding whether one or both breasts were affected by deformities, type of initial burn injuries (such as flame, scalds or other types of burns), surgical procedures instituted (such as the use of skin grafts or flaps) were all recorded.

The patients underwent the surgeries under local or general anesthesia. The surgery among patients with diffuse restricting scars was aimed to achieve adequate release of the scar contracture and provide favorable environment for the development of the budding breast. The surgical procedure was tailored according to the degree of affliction of the breast and adjoining anatomic regions. The goals of the surgical management included ensuring adequate release of the scar contractures, allowing unrestricted development of the mammary glands, and restoring normal anatomy and regional harmony to the best possible extent. Restoration of the symmetry on the two sides was also ensured.

Meticulous surgical technique was employed. Adequate contracture release was performed and the resultant defects were resurfaced with STSGs. Tie-over dressings were applied and the first dressings changed after 7-days. The STSGs were harvested from the thighs. The dressings of the STSGs donor sites were changed after 2-weeks. In case of hypoplastic or absent breast various complex reconstructive strategies were employed for reconstructing the absent breast.

Figures 1 through 5 show some illustrative cases of the patients included in the study.



Figure 1(A-F): These clinical photographs represent the most common presentations of postburn breast deformities among women, manifesting as the aftermath of sustaining burn injuries to the anterior chest wall or breasts areas during their prepubertal life: A) Diffuse restricting postburn scars on the front of chest wall that prevented optimal development of the growing breast buds at the time of puberty. The burns were encountered when she was a child. B) Failure of development of the left breast in a girl aged 17-years.

She had sustained flame burns in early childhood. C) Restricting scars around the preserved breast bud in a girl aged 9-years. D) Deformed and partially developed asymmetric breast (right side) in a girl aged 17-years. She had sustained burn injury during her childhood. E) The 9-years old girl had sustained flame burns to her left breast including the nipple areola complex (NAC). The repercussions of such injuries are serious and the woman often ends up with amastia. F) Amastia of the right sided breast in a woman aged 27-years. She had sustained flame burns in her early childhood.

The data were analysed through Statistical package for social sciences (SPSS) version 22. Various descriptive statistics were used to calculate frequencies, percentages, means and standard deviation. The numerical data such as age of the patient was expressed as Mean $\pm$ Standard deviation whereas the categorical data such as the breasts affected were expressed as frequency and percentages.

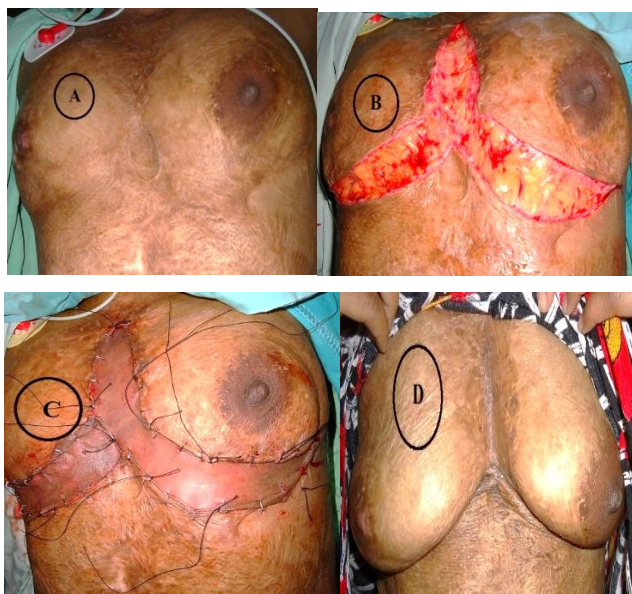


Figure 2. These clinical photographs show a woman aged 25-years. She presented with diffuse scars on the front of chest wall that prevented optimal development

of the growing breast buds at the onset of puberty. She had sustained the burns during childhood. She underwent incisional release and resurfacing of the resultant defects with split thickness skin grafts (STSGs). At 3-months follow up (Fig. D), she had remarkable development of the previously underdeveloped mammary glands.

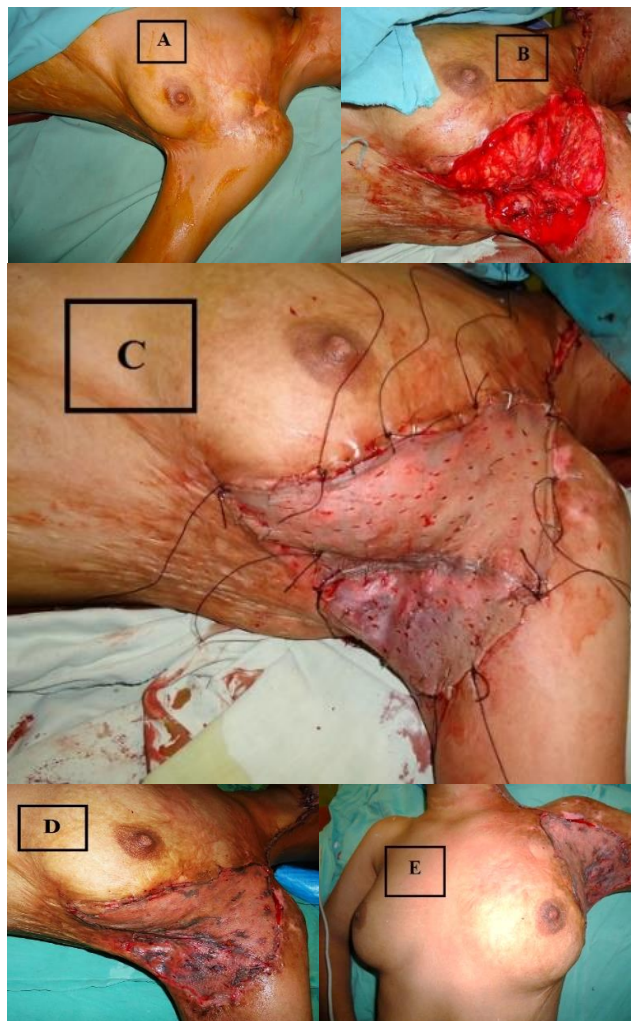


Figure 3. These clinical photographs represent a woman aged 26-years. She had deformity and partial arrest of development of the upper and lateral poles of her left breast. She had sustained flame burns to the affected area in her childhood. Incisional release of the contracture and resurfacing with STSG resulted in remarkable recovery with restoration of normal development and symmetry of the gland.



Figure 4. These clinical photographs represent a woman aged 19-years who had sustained flame burns to her right torso including the right side of the chest wall and adjoining part of the abdominal wall. She presented with diffuse scars that resulted in deformed and partially developed right breast. There was significant asymmetry of the breasts on the two sides. She had suffered an accidental flame burn injury to her affected areas during childhood. Incisional release of the inframammary area was performed and the defect was resurfaced with a thick split thickness skin graft. The diffuse scar on the abdominal wall was excised and resurfaced with STSG. The woman had optimal development of the breast and restoration of symmetry of the two sides.



Figure 5. This clinical photograph shows a woman aged 23-years who had sustained flame burns to her right axilla, right breast and adjoining part of the upper right abdominal wall. She presented with diffuse scars that resulted in deformed and partially developed right breast. Also, she had axillary contracture. Incisional release of the inframammary area was performed and the resultant defect was resurfaced with a thick split thickness skin graft. The axillary contracture was addressed with Z-plasty releases.

Results

There was a total of 37 women in the study. Their age ranged between 9-27 years with a mean age of 13.27 ± 5.33 years. All of them 37(100%) had sustained the initial burn injuries in their prepubertal life. All of them 37(100%) had a history of initial burn injury management with dressings for over 3-weeks duration. Majority of them 24(64.86%) had sustained flame burns whereas 13(35.13%) patients had a history of scald burns.

A variety of postburn breast deformities were observed among our patients. Diffuse constricting scars that hindered the development of the underlying breast buds were found on the two sides 17(45.94%) or on one side 7(18.91%). Pole contracture with partial breast development was observed among 8(21.62%) women. Nipple-areola complex (NAC) deformities were found among 4(10.81%) patients. Associated abdominal scar contractures were found among 7(18.91%) patients whereas associated axillary contractures were present among 6(16.21%) patients. Amastia was found in 1(2.70%) patient.

The various procedures undertaken are presented in descending order of frequency as follows: Scar contracture releases and coverage with split thickness skin grafts (STSGs) 32(86.48%); autologous fat grating 11(29.72%); release of various contractures followed by resurfacing with STSGs 10(27.02%); nipple-areola complex reconstructions 4(10.81%); Z-plasties for releasing linear scar contractures 3(8.10%); balancing procedures on the opposite normal breast 3(8.10%); and breast reconstruction with local fasciocutaneous flaps 2(5.40%).

There was no case of breast contracture recurrence at two years of follow up. There was no mortality in the series.

Discussion

Pediatric and neonatal burn injuries continue to plague the low-income countries like ours (Pakistan). Anterior chest wall happens to a frequent anatomic locale involved in such injuries. Scald burns are more frequent among children, followed by flame burns. The latter form of burns is more frequent among relatively older children. Owing to the very thin and delicate nature of the skin among children, there is more chance of full thickness skin involvement in any kind of burn injury. When the sufferer is a girl, burns involving the breast bud, NAC and/or the overlying skin of the chest pose serious problems in the future development of the budding mammary glands. The burn injury may be deep enough to destroy the breast bud. When this structure is spared, the scar that results from burn injury may restrict or arrest the development of the underlying mammary gland at puberty.^{4,12-14}

In our series, majority of the patients had sustained the burn injuries during their childhood. Pediatric scald injuries to the chest typically affect the skin only; however, deep scalds may also damage the NAC which is located beneath the skin. In such instances, conservative acute treatment of the burned NAC is recommended because of its remarkable ability to regenerate from the epithelium of the lactiferous ducts. Even full thickness injuries to the NAC may be treated conservatively to allow for spontaneous eschar separation and healing by secondary intent. This treatment approach may result in better outcomes than aggressive surgical treatment. Furthermore, as the breast bud is hidden deep into the subcutaneous tissue, breast mound development may ensue later in

puberty even in the absence of the NAC. As sheet grafts contract less than the meshed grafts and result in better skin texture and appearance, they are preferred over the meshed STSGs in the treating breast burns in the acute care setting.^{1,5, 15-17}

In our series majority of the patients were managed with incisional release of the constricting scars and resurfacing with STSGs. This simple procedure allowed the arrested mammary gland to regrow to its optimal dimension. (Figure 1) Several published studies have reported similar favorable results with this simple surgical technique without resorting to excessive excision of the entire postburn scar tissue.¹⁸⁻²⁰

In most patients, the breast bud is spared; however, the overlying scarred tissue and contracted skin envelope hinders the development of the normal mammary gland. Incisional release should be performed as soon as the signs of restriction of the breast mound under the scar tissue are visible. Once the restriction is undone surgically, the mammary gland grows and the breast mound is restored.^{1, 18-20}

In our study, we found that one third of the patients with breast deformities had associated contractures of the axillae and abdominal walls. The established rules of scar revision and contracture release were employed in managing these cases of post-burn breast deformities. The contractures if linear were released with standard Z-plasties and corrected by local tissue rearrangements. STSGs were employed to the raw areas or areas that resulted from excision of the associated areas or any areas of leukoderma.¹

In our study we didn't use any dermal substitute. Some published studies have reported the use Integra together with tissue expanders in a multi-staged fashion in the reconstruction of post-burn breast deformity in a single case with good results. However, Integra is very expensive for low- and middle-income countries.²¹

In this series one patient needed suppression of lactation in the postpartum period as the nipple had sustained burn injury leaving no draining outlet for the milk to exit. After the delivery of placenta, the mammary glands start producing mature breastmilk within 36-96 hours. If the mother is unable to breastfeed the baby for any reason, the milk accumulates and causes breast engorgement. Lactation suppression was done

to address this problem. As breastfeeding is advocated in all societies, mother's inability to breastfeed is often accompanied by severe psychological distress on part of the mother. These unfortunate mothers need additional psychological support and adequate counselling to alley their distress.²²⁻²⁴

In our series we employed fat grafting in seven breasts. The fat grafting is frequently used for both aesthetic and reconstructive purposes in breast surgery nowadays. The application of fat grafting in breast surgery has steadily increased over the last two decades. Some authorities now routinely use Brava bra expansion before fat grafting of the breasts. The Brava bra expansion before autologous fat grafting leads to significantly larger breast augmentations, with more fat graft placement, higher graft survival rates, and minimal graft necrosis or complications, demonstrating high safety and efficacy for the procedure.²⁵⁻²⁸ In our series we did not employ the Brava bra expansion as the device is not currently available locally.

Strengths and limitations of the study: The current research has certain strengths as well as presents certain limitations. Firstly, the strength included the fact that the study is the first of its kind to document the clinical and epidemiological presentation of postburn breast deformities in Pakistani women. Secondly, it documented the various surgical procedures which are undertaken for correcting these deformities. The study has certain limitations as follows: The main limitation is that it was an observational study was carried out at a single centre. It did not include any comparative groups for drawing more robust statistical comparisons and conclusions. Secondly, patients who presented with acute burns to the breasts were excluded from the study. These latter patients were managed with standard excision and grafting. The results of the study may be interpreted keeping in mind the aforementioned limitations. Future well-designed multicenter studies are recommended to overcome these limitations.

Conclusion

A variety of postburn breast deformities were observed among our patients. All of them had sustained the initial burn injuries in their prepubertal life. All of them had a history of initial burn injury management with dressings instead of excision and grafting. Majority of them had developed the deformities after sustaining flame or

scald burns to the anterior chest wall. Adequate scar- contracture release followed resurfacing with split thickness skin grafts were successfully employed among the majority of patients. Majority of procedures had favorable outcomes by adhering to the established principles of contracture management and breast reconstruction.

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