TREATMENT OF PALM BURNS IN CHILDREN

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SUMMARY. The timing and methods of treatment of palm burns in children vary widely. From January 2002 to November 2004, 492 children with burns - 125 of them with hand burns or other body burns - were hospitalized and treated at the N.I. Pirogov Clinic for Burns and Plastic Surgery in Bulgaria. Fifty-four children (for a total of 73 burned hands) presented isolated palm burns. Twenty-two hands were operated on. In this review we present the incidence, causes, treatment methods, functional results, and evaluation parameters of these patients.

Introduction

Isolated palm burns are typical in childhood and particularly in early childhood. Children are prone to sustaining deep burns because of their specific anatomy and behaviour - they are driven by curiosity to explore the environment, they have slower withdrawal reflexes, and they possess a thinner palmar epidermis than adults.

This type of burn poses a considerable challenge to the team treating a child in view of the function of the burned part. After assessment in a burns centre, most such children can be treated in an outpatients department, where competent treatment and possible monitoring are available. A significant number of these burns epithelialize within about two weeks. Taking into consideration the incidence of burns of the hand and the upper limb, as well as the significance of hand function, the aim is maximum functional recovery and minimal complications, regardless of the chosen method of treatment.

The objectives of the present study are to analyse causes, to determine treatment methods, and to assess sequelae and risk factors that influence long-term results. It is important to propose preventive measures for prophylaxis. We present and analyse our experience of the treatment of this kind of burn in the above-specified period. The data presented include the manner of burning, the timing of burn healing, treatment methods, type of sequelae, and the need of reconstructive surgery.

Materials and methods

From January 2002 to November 2004, 492 children with burns - 125 of them with hand burns or other body burns - underwent treatment in our clinic. Fifty-four of the children, for a total of 73 burned hands, presented isolated burns on the palm of the hands, corresponding to 7.28% of the children treated. Thirty-five children had one hand affected (20 in the right hand and 15 in the left), while 19 children had burns in both hands. Twenty-two hands were operated on.

The commonest type of burn was by contact (67%), followed by burns due to low-voltage electricity (23%), flame (6%), and hot liquids (4%) (Fig. 1). The causes of contact burns were as follows: oven door, 42.60%; iron, 24.07%; hot-plate, 14.82%; radiator, 12.96%; fireplace, 5.55% (Fig. 2).

![Fig. 1 - Types of burns that caused injury to the hand palmar surface.](image1)

![Fig. 2 - Causes of burns in hand palmar surface.](image2)
Burns caused by electricity and flame occurred in older children (over 5 years old), while contact burns occurred in toddlers and children younger than 3-4 years of age. Forty-three of the 43 children monitored were under 4 years of age.

Thirty-seven children (68.52%), for a total of 51 burned hands, had superficial second AB-degree burns, while 17 children (31.48%), for a total of 22 burned hands, presented deep burns.

All the burns were initially treated conservatively, using everyday hydro-procedures and dressings with silver sulphadiazine until the wounds were clear of non-vital tissue. A clinical assessment was scheduled every 24 h. Superficial burns epithelialized in 14 ± 3 days, while deep dermal burns took longer. Burns that did not heal within this period (maximum 21 days) were subjected to surgery.

Microbiological wound testing was carried out regularly during the treatment process. MRSA infection occurred in two children, delaying epithelialization of the wound beyond day 14. Contact and flame burns induced deeper damage, leading to a longer healing period than in other types of burn.

Twenty-two hands were operated on, all with the use of free autoplasty of full-thickness skin (full-thickness skin autograft). As donor part, we used the hypogastrium and the inguinal region, depending on the area burned. The subcutaneous tissue and adjoining fat were meticulously removed from the elliptical piece of skin. The donor site was closed primarily, leaving a thin linear incision. The autograft was applied over the excised volar surface, without meshing, and fixed with single sutures. A bolster dressing was put on and left in place for 7 days. All the autografts had full survival, and rehabilitation procedures began after removal of the dressing.

Most of the healed burns that were monitored did not develop any sequelae and presented normal function. Monitoring continued for one year after injury. In 17.39% of cases we observed sequelae, which included hypertrophic scars and normotrophic scars with flexion contracture of the fingers and shortening of the thenar-hypothenar distance. All of these underwent reconstructive surgery: Z-plasty, transposition of a flap from a neighbouring surface, or scar excision followed by a full-thickness autograft.

The incidence of sequelae was directly proportional to the time of burn epithelialization. Of the hands operated on, 13.63% (three children) developed small scars in the region of the first and/or second commissure, which were corrected by small Z-plasties. The children were examined every week for the first month after discharge and then every month. Parallel to the conservative treatment, the hand was splinted in position, which included slight hyperextension of the wrist and hand, regardless of burn depth.

Discussion

This review of 54 children, presenting 73 hands burned on the volar surface within the period considered, showed that the conservative approach - including treatment with silver sulphadiazine and splinting - proved to be extremely good and efficient. Only two of the children had local infection. Superficial burns healed within 14 ± 3 days, and surgical operations (full-thickness skin autograft) for deep burns were carried out between the second and the third week. One hundred per cent of the children whose wounds did not heal within 21 days developed scars and contractures, with poor functional results. A small percentage of children with operated hands developed scars in the region of the first or second commissure, which were corrected by small Z-plasties. We did not carry out early excision and autografting.

Comparative studies of results between early excision with autografting and excision with autografting after the second week showed the superiority of the latter method with regard to functional results. Factors determining the risk of sequelae and complications included involvement of the first commissure, particularly in cases of concomitant burns in the dorsal surface of the hand, and low social status.

Children under 3 years of age received special rehabilitation procedures because of the difficulty of splinting and children’s lack of co-operation in such procedures. Correct splinting of the hand kept the wrist and hand in slight hyperextension and provided prophylaxis for anti-deformation positions. After healing of the wound or autograft stabilization, splinting continued until the second month with combined use of silicone plates, according to special schemes, and a pressure glove. The children were encouraged to use their injured hands as much as possible.

Healing time was a factor with a major impact on the development of sequelae - scars and contractures. The parameters for evaluating the results were as follows: colour of autograft (degree of colour match with unburned skin); degree of autograft rising; overall appearance; degree of maturity of autograft (lack of soreness and necessity of pressure garment); and degree of recovery of hand function.

We present two cases of operated patients who were operated on. Fig. 3 shows patient N.I.V. (age 2 years) - diagnosis, third-degree burns of the two volar surfaces of the hands, pre-operative treatment, and result one year after full-thickness skin autograft.

Conclusion

The method of treatment described led to good prognosis in this type of burn. Conservative treatment gave ex-
Excellent results. Wounds that did not heal within two weeks were operated on between the second and third weeks. Full-thickness autografts gave excellent functional and aesthetic results. Maximum recovery of hand function was a priority in treatment as this permits a child’s normal development.

BIBLIOGRAPHY


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G. WHITAKER INTERNATIONAL BURNS PRIZE – PALERMO (Italy)
Under the patronage of the Authorities of the Sicilian Region for 2007

By law n. 57 of June 14th 1983 the Sicilian Regional Assembly authorized the President of the Region to grant the “Giuseppe Whitaker Foundation”, a non-profit-making organisation under the patronage of the Accademia dei Lincei with seat in Palermo, a contribution for the establishment of the annual G. Whitaker International Burns Prize aimed at recognising the activity of the most qualified experts from all countries in the field of burns pathology and treatment.

Law n. 23 of December 2002 establishes that the prize becomes biannual. The next prize will be awarded in 2007 by the month of October in Palermo at the seat of the G. Whitaker Foundation.

The amount of the prize is fixed at Euro 20,660.00.

The Adjudicating Committee is composed of the President of the Foundation, the President of the Sicilian Region, the Representative of the National Lincei Academy within the G. Whitaker Foundation, the Dean of the Faculty of Medicine and Surgery of Palermo University or his nominee, a Representative of the Italian Society of Plastic Surgery, three experts in the field of prevention, pathology, therapy and functional recovery of burns, the winner of the prize awarded in the previous year and a legal expert nominated in agreement with the President of the Region as a guarantee of the respect for the scientific purpose which the legislators intended to achieve when establishing the prize.

Anyone who considers himself/herself to be qualified to compete for the award may send by January 31st 2007 a detailed curriculum vitae to: Michele Masellis M.D., Secretary-Member of the Scientific Committee, G. Whitaker Foundation, Via Dante 167, 90141 Palermo, Italy.