

Case Report

REHABILITATION OF THE CHILD WITH POST ELECTROCUTION BURN INJURY SEQUELAE – A CASE REPORT

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ABSTRACT

Burn injuries always have devastating sequelae irrespective of the demographic profile. It can leave a patient with severely debilitating and deforming contractures, which can lead to significant disability when left untreated. Despite the medical advancements, care of the burn patient lags behind in developing countries. Rehabilitation is an essential and integral part of burn treatment and should be initiated early to prevent the complications and minimize the disability. This is a case of pediatric burn injury sequelae where we are highlighting the problems encountered in his rehabilitation due to various post-burn complications.

Keywords: *Pediatric Burn, Burn Rehabilitation*

INTRODUCTION

Burns are a significant cause of morbidity and mortality worldwide with highest incidence in Southeast Asian countries (Peck and Pressman, 2013). Estimates of incidence of burn injuries in India vary from 100,000 to 2 million annually (Keswani *et al.*, 2000). Burn injuries remain a leading cause of injuries in children and constitute a major concern with respect to morbidity and mortality, particularly among children in developing nation (Khatri *et al.*, 1998).

It causes severe pain in early stages and the impact of physical disfigurement due to burns is far reaching, as social stigma may lead to isolation and other psychological impairments limiting one's productivity (Organization WH, others 2008).

The cornerstone of burn management lies in an integrated team approach for treatment of burns, scar and contracture prevention. However, in South Asia, issues such as the large burden of injury, lack of advanced burn care facilities and trained professionals create difficulties in prevention of post burn complications.

Rehabilitation particularly becomes important due to the enormity of post burn complications encountered in clinical practice. It begins on day one of the injury and is geared toward maximizing an individual's independent functioning and optimizing quality of life. In this case report, we would like to discuss about the difficulties we faced in the rehabilitation of this child and emphasize on early post burn rehabilitation.

CASES

A 7 year old male child suffered accidental electric burns following which he developed deep dermal burns on neck, left arm, bilateral foot, right leg & lateral aspect of left leg \approx 26% TBSA. He underwent left arm fasciotomy in the subsequent week with split skin graft of raw area of neck and left arm over the next 3 weeks.

As a consequence of unsalvageable condition of his right foot, right below knee amputation was also performed. Thereafter, the patient was referred to the Physical Medicine and Rehabilitation (PMR) Department of Dr. Ram Manohar Lohia hospital.

At the time of presentation to PMR department patient had multiple post burn scar marks over left side of neck & lower jaw, anterior aspect of chest (left side), left shoulder & lateral aspect of arm, lateral aspect of left leg extending from lower 1/3 thigh to upper 1/3 leg and left foot.

He had right transtibial amputation and condition of the residual limb was good. There was a 30° plantar flexion deformity of left ankle. Range of motion (ROM) of neck and left shoulder was also restricted (Figure 1 & 2).

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Figure 1: Restriction in Range of Motion of Neck



Figure 2: Restriction in Range of Motion of Left Shoulder

An intensive and phased rehabilitation plan was tailored according to the clinical presentation. A detailed psychological assessment and counselling of patient and his parents was done. Exercise program comprising of Range of motion exercises of neck and all limbs; Stretching exercises of neck, left shoulder and left ankle; Strengthening exercises of both upper limbs, hip and knee; exercise to improve trunk balance and strength was started. Patient was educated regarding prevention of contractures, cracks and hypertrophic scar for which deep friction massage, application of coconut oil, pressure garment was advised.

A simultaneous program for ambulation was also started. Initially therapeutic standing with support (walker) was advised. Gait training of the patient was begun with pylon prosthesis and compensatory shoe raise for right limb (Figure3) and surgical shoe with equinus raise for left limb initially with walker and later without support.

However, he could not walk properly due to left foot inversion during stance phase. Hence, polypropylene ankle foot orthosis (AFO) with equinus shoe raise was prescribed. Subsequently, gait training was given with right Patellar Tendon Bearing (PTB) prosthesis and left polypropylene AFO with equinus shoe raise (Figure 4).

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Figure 3: Gait Training of the Patient with Pylon Prosthesis and Compensatory Shoe Raise for Right Limb; Surgical Shoe with Equinus Raise for Left Limb, with Walker

Patient was regularly followed up and there was gradual improvement in the range of motion of neck and left shoulder within a week of starting rehabilitation program. However, no improvement was observed in left ankle (Table1).

Table 1: Range of Motion of Neck, Left Shoulder and Ankle at Baseline and Follow Up

	ROM	Day 1	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12
Neck	F	40°	60°	Full	Full	Full	Full	Full
	E	10°	20°	25°	45°	60°	70°	70°
	LF [R]	10°	20°	30°	30°	30°	45°	45°
	LF [L]	20°	30°	45°	45°	45°	45°	45°
	RT [L]	30°	60°	60°	60°	60°	80°	80°
	RT [R]	25°	50°	60°	60°	80°	80°	80°
Left Shoulder	F	80°	85°	100°	120°	145°	165°	180°
	E	30°	35°	60°	60°	60°	60°	60°
	ABD	80°	85°	100°	100°	120°	140°	180°
	ER	85°	90°	90°	90°	90°	90°	90°
	IR	Full	Full	Full	Full	Full	Full	Full
Left Ankle	PF	30°	PF					
	DF	deformity	Same	Same	Same	Same	Same	Same

Patient was compliant with the gait training program and hence he was able to walk with right PTB prosthesis along with compensatory shoe raise and left propylene AFO with equinus shoe raise at 4 weeks of training (Figure 4). One major difficulty in ambulation was due to left ankle deformity which could not be operated due to unhealthy skin condition which would have interfered with the healing of post surgery

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scar. Over a period of time he was able to do his activity of daily living. He is now a community ambulator and has resumed his studies. Surgery for left foot contracture would be planned after the healing of skin. Due to the complications in left lower limb a long rehabilitation program and follow up was advised to the patients further adding to stress of the caregivers. In addition absenteeism of father from the work to take care of the child added to the financial burden to the family.



Figure 4: Independent Ambulation with Right PTB Prosthesis Along with Compensatory Shoe Raise and left Propylene AFO with Equinus Shoe Raise

DISCUSSION

Burns are a global public health problem and are among the leading causes of disability-adjusted life-years (DALYs) lost in low- and middle-income countries (Organization, no date). The morbidity associated with a burn injury is varied and often leaves both hypertrophic and psychological scars.

Survivors of high-voltage electrical injuries account for a large number of amputations in the burn unit, as well as longer lengths of stay (Arnoldo *et al.*, 2004). Electrical injuries leading to post burn complications causes tremendous stress, are associated with impairments in function which can complicate return to work and other functional tasks (Mazzetto-Betti *et al.*, 2009).

Development of post burn complications, frustration and stress of a pediatric burn patient and parent(s) could be substantially improved by adopting an aggressive approach towards managing such cases with rehabilitation beginning from day one. Patient-centered care, though being a recognized goal in burn care is still one of the greatest challenges.

Mobilization and exercise should be initiated early in the burn patient (Whitehead and Serghiou, 2009). In the acute stages only passive therapies, including splinting and positioning, should be initiated to minimize the risk of burn scar contracture. As soon as the patient is stable, active exercise should be started to help maintain function and to address the hypermetabolic state. We also followed the similar protocol along with stump care program for the residual limb. Care was also taken to prevent the development of hypertrophic scarring, the most common complication after burn injury (prevalence of 67%) (Bombaro *et al.*, 2003). By following this intensive rehabilitation program we were able to improve the range of motion of patient's neck and shoulders and prevent development of further complications.

A major hurdle encountered was in dealing with the left foot contracture which developed before the rehabilitation was started, thus, underlining the importance of early rehabilitation. Despite stretching exercises for left ankle and planter fascia no improvement was noticed in left foot deformity. Hence, we had to develop an ambulation plan accommodating it along with right PTB prosthesis. Absence of

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deformity would have made the child ambulate much earlier and easily with the prosthesis during rehabilitation. This resulted in frequent visit to the hospital further adding to the stress and financial burden of the family.

The aim of this report is to highlight the importance of timely rehabilitation intervention in prevention of post burn complications and also the paucity of trained health professionals equipped to treat such conditions. Not to forget is the psychological assistance which should be provided not only to the patient but caregivers in early stage as well.

Conclusion

A significant burn injury may lead to functional and aesthetic limitations along with psychosocial issues affecting the patient's quality of life. Rehabilitation is an essential and integral part of burn treatment. Timely rehabilitation intervention is very important for prevention of post burn complications. Rigorous approach is required for the management of post burn amputation and deformities which are often associated with complications.

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Author's Declaration of Interest

Authors report no declaration of interest.

Abbreviation

ABD-Abduction,
DF-Dorsiflexion,
E-Extension,
ER-External Rotation,
F-Flexion,
IR-Internal Rotation,
LF-Lateral Flexion,
L-Left,
PF-Plantar Flexion,
R-Right,
RT-Rotation

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