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REHABILITATIVE, PSYCHIATRIC, FUNCTIONAL AND AESTHETIC PROBLEMS IN PATIENTS TREATED FOR BURN INJURIES - A PRELIMINARY FOLLOW-UP STUDY

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SUMMARY

Patients consecutively treated for burn injuries for four or more days during 1994 were examined one year after admission by a plastic surgeon, a specialist in rehabilitation medicine and a psychiatrist. Of thirty-nine such patients treated, two were dead, 11 did not present and six thought they had no remaining problems. Aesthetic and functional problems were present in 16 patients, in 11 reconstructive surgery given in one or more sessions was judged to have improved the condition. Of eighteen patients referred to a rehabilitation medicine specialist, 14 were assessed. Nine of these had functional impairments in the burn-injured body regions. A majority had functional impairments, persistent decrease in range of upper extremity motion, reduced muscle force, altered sensibility and itch. One patient suffered from pain. Three patients had occupational handicaps. Work disability occurred in two patients and further two were in need of vocational counselling due to the burn injury. In a subgroup of 11 patients four fulfilled criteria for one or more personality disorders, and two of these also suffered from major depression. Quality of life assessed with the SF-36 was lower than in a normal population. Some of the patients had psychiatric disease and personality disorders. Although rehabilitation started early in the acute phase of treatment, rehabilitation medicine function-increasing measures were needed in several cases. Individual rehabilitation programmes based on the patient's particular features and needs are recommended. The findings support the idea of a multidisciplinary approach for patients with burn injury and indicate that a subgroup of burn injury patients have functional impairments and/or disabilities which can probably be improved with reconstructive surgery and rehabilitation.

ZUSAMMENFASSUNG

Die psychiatrischen, funktionellen, ästhetischen und Rehabilitationsprobleme bei den nach der Verbrennungsverletzung behandelten Patienten: die vorläufige Studie

C.-E. Jonsson, K. Schüldt, J. Linder, V. Björghagen, J. Ekholm

Die Patienten, die wegen der Verbrennungsverletzung vier oder mehrere Tage im Jahre 1994 behandelt wurden, wurden ein Jahr später nach ihrer Aufnahme ins Krankenhaus wieder untersucht, und zwar von dem plastischen Chirurgen, vom Spezialisten in der Rehabilitationsmedizin und vom Psychiater. Von 39 auf dieser Weise behandelten Patienten starben 2, 11 kamen nicht zur Untersuchung und 6 hatten keine Beschwerden. Die ästhetischen und funktionellen Probleme erschienen bei 16 Patienten, davon bei 11 Patienten verbesserte die rekonstruktive Chirurgie nach dem ersten oder zweiten Operationseingriff die Ausgangsbedingungen. Der Spezialist in der Rehabilitationsmedizin referiert über 18 Patienten, bei 14 wurde der Schaden gesetzt. 9 von ihnen hatten eine funktionelle Beschädigung im durch die Verbrennung behinderten Bereich. Die meisten Patienten litten an der funktionellen Beschädigung bestehende aus der verminderten Stufe der Beweglichkeit, der beschränkten Muskelstärke, der veränderten Sensibilität und aus dem Prickeln. Ein Patient litt an Schmerzen. Drei Patienten wurde die verminderte Arbeitsfähigkeit anerkannt (Handicap). Die Arbeitsunfähigkeit erschien bei 2 Patienten, die weiteren 2 verlangten die fachliche Behandlung infolge der Verbrennung. In der Untergruppe von 11 Patienten erfüllten 4 die Kriterien für ein oder mehrere Symptome, die die Persönlichkeitsstörung verursachen und 2 von diesen Patienten litten an einer schweren Depression. Die anhand der SF - 36 bewertete Lebensqualität war niedriger als bei der normalen Population. Einige von diesen Patienten litten an einer schweren psychiatrischen Erkrankung oder an einer Persönlichkeitsstörung. Obwohl die Rehabilitation früh eingeleitet wurde (in der akuten Phase der Behandlung) waren in einigen Fällen die Rehabilitationshilfsmittel nötig, die die Funktion erhöhten. Es wird ein individuelles Rehabilitationsprogramm empfohlen, das auf den persönlichen Zügen des Patienten und seiner Bedürfnisse basiert. Diese Befunde unterstützen die Idee über den multidisziplinären Zugang zum verbrannten Patienten die funktionelle Beschädigung oder die körperliche Unfähigkeit haben, die durch die rekonstruktive Chirurgie und durch die Rehabilitation verbessert werden kann.

Key words: burn injury, rehabilitation, functional impairment, disability, handicap, quality of life, psychiatry, one-year follow-up

The treatment of patients with burn injuries in Sweden has for the past 20 years been centralised. In the Stockholm area with a population of 1.8 millions, most adults with burn injuries are treated - both in the acute and in the rehabilitative phase - at the Burns Centre of Karolinska Hospital, where total and continual burn care is provided by an interdisciplinary team. Despite this centralisation and tradition there is presently no follow-up of a consecutive series of patients. In individual cases, however, we have long follow-ups. In a study of burn patients treated in the unit 1971-75 predisposing medical factors were found in 40 percent of the patients (Jonsson et al. 1980). Social factors were also common.

This paper is a preliminary follow-up report on patients consecutively treated during one year. The patients were examined and evaluated by a plastic surgeon, a specialist in rehabilitation medicine and a psychiatrist.

One widely used questionnaire about quality of life is a health-related quality-of-life instrument (SF-36) originally developed by Ware and co-workers (1992, 1993) and adapted to Swedish population by Sullivan and co-workers (1995).

A concept which is closely related to life quality is the concept of handicap defined in the World Health Organisations' International Classification of Impairments, Disabilities and Handicaps (ICIDH) (WHO 1980). Handicap here relates to the disadvantage for a given individual - resulting from functional impairments and/or disabilities - that limit fulfilment of a role that is normal (depending on age, sex and social and cultural factors) for that individual. Handicaps in this sense are due to functional impairments and disabilities, and in the ICIDH classification there is a difference between these two concepts. Functional impairment reflects reduced function at the level of the „organ“, „organ system“, or „body segment“, while disability is concerned with abilities in the form of composite activities and behaviours principally at levels above the function of the „organ“ and sometimes involving the „whole“ individual (WHO 1980, Ekholm 1995).

METHODS AND MATERIALS

Treatment routine

Most patients are admitted on the day of injury. The patients are treated with warm dry air (Liljedahl et al. 1979) and early excision and skin grafting is done whenever indicated and the patient's condition permits (Jonsson and Dalsgaard 1991). Physiotherapy and occupational therapy are started as soon as possible. When indicated the patients are investigated by a social worker. Splints and pressure garments are provided early and checked by an occupational therapist. The patients are controlled after discharge from the hospital by a plastic surgeon.

Burn score

The Abbreviated Burn Score Severity Index (ABSI) was used. This is based upon a statistical model consisting of age, sex, presence of full thickness burn, presence of inhalation injury and percent of the total body surface area burned (Tobiasen and Hiebert 1982).

Patients

During 1994 71 patients were treated for burn injuries (Table 1). Of these, 39 were treated for 4 days or more. Their medical records were reviewed and a letter was sent to each patient asking him or her to participate in the present study, which was approved by the local ethical committee.

Methods

The patients' functional impairments, disabilities, handicaps, indications for rehabilitative treatment and other measures were investigated by a specialist in rehabilitation medicine, using structured interview and physical examination. The ICIDH (WHO 1980, Ekholm 1995) served as a basis for part of the categorisation of the consequences of injury. Afterwards the patients answered the questionnaire about health-related quality of life (SF-36).

After the visit to the department of rehabilitation medicine, questionnaires for screening psychiatric symptoms were given to the patients. The three questionnaires used were the Karolinska Scale of Personality (KSP) (Schalling 1978, Schalling et al 1983), a questionnaire for a structured clinical interview for diagnosis (SCID screening) (Spitzer et al 1992), and also a comprehensive psychopathological self-rating scale (the CRPS-SA) developed at the Karolinska Hospital (Svanborg & Åsberg 1994). The scales help in diagnosing psychiatric disease and personality disorders, and in reporting symptoms.

RESULTS

The characteristics of the patient groups treated in 1994 with respect to sex, age, total burn surface area, burn score, type of burn, inhalation injury and death are shown in Table 1. At follow-up one year after discharge from the burn unit two patients had died and four had psychiatric disease or dementia. Eleven patients did not attend. The remaining 22 patients were examined by a plastic surgeon. Of these 18 accepted referral for examination by a specialist in rehabilitation medicine: fourteen of these were assessed and 4 failed to attend for interviews and examination.

Evaluation by plastic surgeon showed that 16 patients had problems of function or appearance. In 11 patients, it was judged that reconstructive surgery in one or more sessions would improve the condition. Six patients were without problems from the burn injury (Table 2).

Table 1. Burn patients treated in 1994 at Karolinska Hospital

	All patients	Treated 4 days or more	1-year follow-up	
			plastic surgeon	rehab med
Number	71	39	22	14
Sex, n M/F	47/24	25/14	13/19	7/7
Age years median min/max	40 10/90	47 18/90	48 18/84	48 21/71
Burn area TBSA, % median min/max	5 0.5/38.5	8 0.5/38.5	8.5 0.5/38.5	10.7 5/38.5
Burn score ABSI, 1-13 median min/max	4 1/7	5 2/7	5 2/7	6 3/7
Burn type, n flame/scald contact/other	43/14 8/6	28/3 6/2	16/2 2/2	11/1 1/1
Inhalation injury, n	2	2		
Death, n	2	2		

Table 2. Reconstructive surgery indicated at 1-year follow-up (n=22).

Problems	Yes	No
Function 11	8 face 2 hand 2 arm 3 trunk 1	3
Function and appearance 3	2 face	1
Appearance 2	1 arm	1

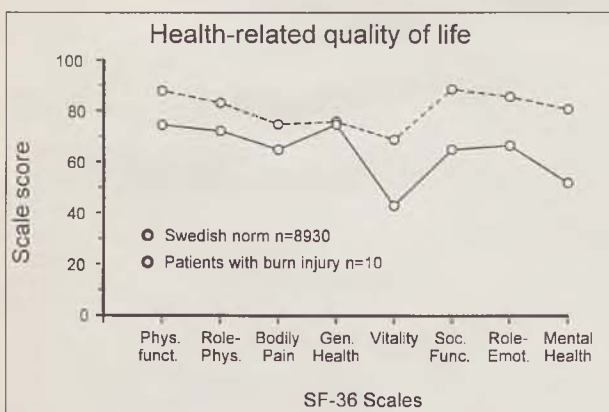


Fig. 1. Health-related quality of life (SF-36) (Sullivan et al. 1995). Comparison between patients with burn injuries and normal Swedish population. The scales are: Physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health.

The preliminary results of the quality of life questionnaire SF-36 when 10 of 14 patients, or 71 %, had been analysed are shown in Figure 1. The norm of a healthy Swedish population is also shown for comparison. The patients with burn injuries had lower life quality scores in all scales. The lowest score was for mental health. The other low scores were for physical functioning (phys

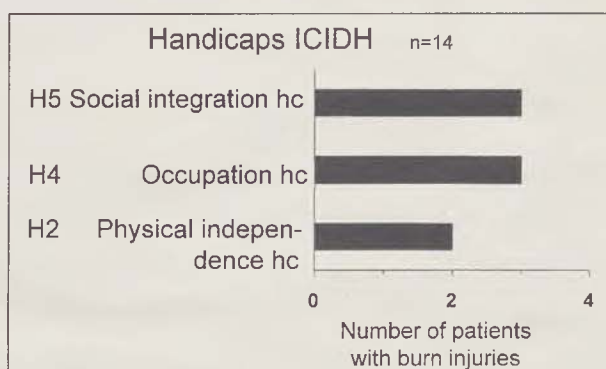


Fig. 2. Handicaps according to ICDH definition in patients with burn injuries. Numbers according to ICDH (WHO 1980).

func), physical role (role phys), bodily pain, general health (gen health), social functioning (soc func), emotional role (role emot) and vitality.

The handicaps due to burn injury (Figure 2) were in three patients social integration handicap, which here means a restriction in their relation with other individuals. Three patients had an occupational handicap and two had a physical independence handicap, related to dependence on technical aids or on other persons (personal assistants).

What disabilities underlay the lowered quality of life and the existence of handicaps? Figure 3 shows the frequency of disabilities in these patients. Few had personal care disabilities or problems with food and eating. Four patients had work disabilities. Six of the patients had environmental disabilities in the form of intolerance to cold, five to heat, and two to sunlight. Return to work was not relevant for four patients who had already retired before the burn injury (Figure 4). Seven patients had returned to work and of those two had modified work tasks. One was sick-listed

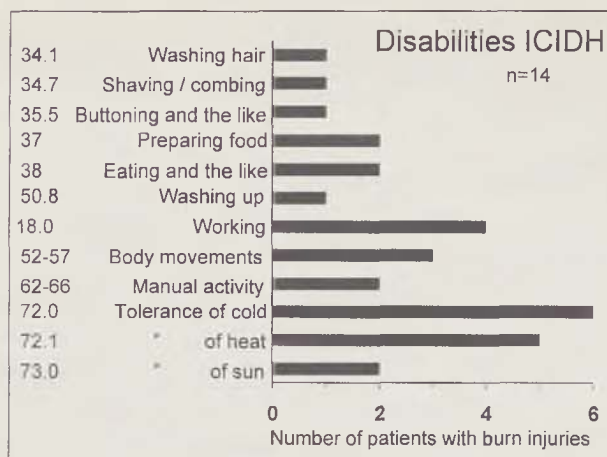


Fig. 3. Disabilities in patients with burn injuries according to ICDH definition and numbers.

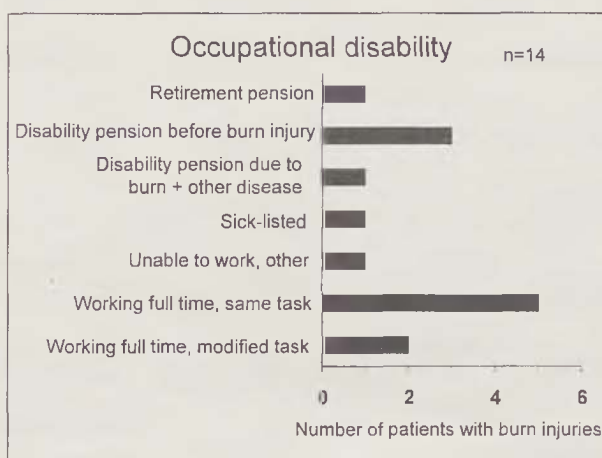


Fig. 4. Occupational disabilities in patients with burn injuries.

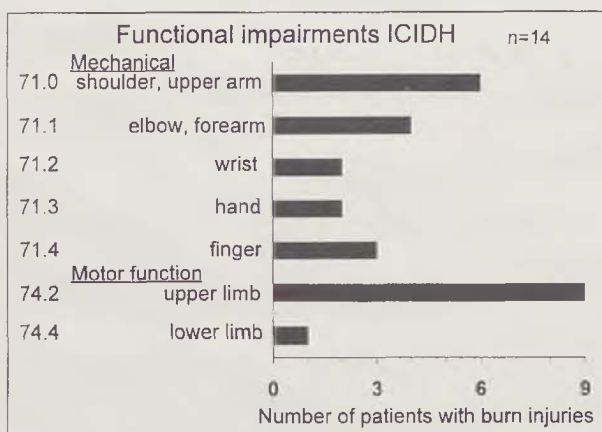


Fig. 5. Functional impairments in patients with burn injuries according to ICDH definition and numbers.

and one was unable to work but was receiving private economic support. One patient had received disability pension due to the burn injury in combination with other previous disease.

The functional impairments due to burn injury are shown in Figures 5-8. Reduced range of motion due to contractures - here classified as

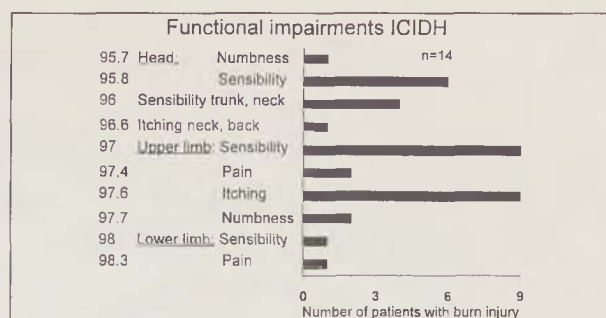


Fig. 6. Sensory functional impairments: pain, itching, numbness and sensibility change in patients with burn injuries in: lower limb; upper limb; neck, trunk, back; and head.

mechanical impairments- was found, e.g. in the shoulder and upper arm in six patients, elbow and forearm in four patients, wrist in two patients and finger in three patients (Figure 5). In the lower extremity, reduced range of motion due to contractures was found in only one patient. Most of the motor impairments were due to muscular weakness.

Sensory impairments in the form of itching and numbness were common. Pain was not common (Figure 6). Disfigurement due to scars occurred in 14 of 14 patients (Figure 7). Unstable scars because of thin and vulnerable skin with undue susceptibility to formation of wounds were reported by three patients. Among the psychological impairments, sleep problems dominated (Figure 8).

Seven patients needed rehabilitation medicine function-increasing measures (Figure 9). Four needed work-oriented rehabilitation measures and nine could benefit from individual ergo-

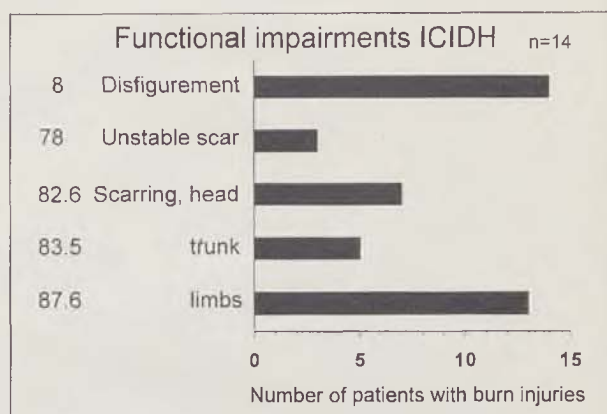


Fig. 7. Functional impairments in patients with burn injuries according to ICDH definition and numbers.

nomic measures due to muscular weakness and reduced range of motion. Several patients could benefit from transcutaneous electrical stimulation due to pain and itch. Two patients still needed pressure treatment.

With the help of the KSP, SCID screening and CRPS-SA questionnaires, eleven patients were

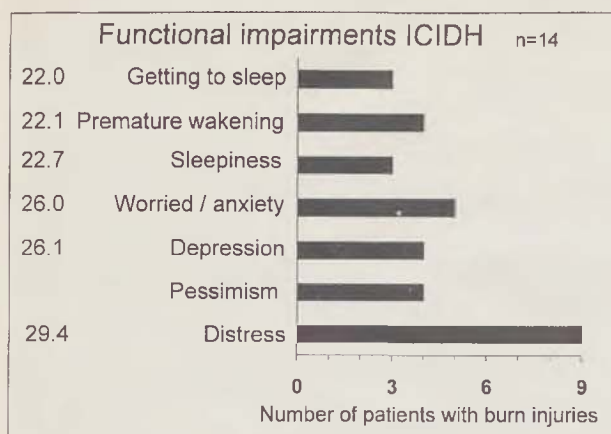


Fig. 8. Psychological functional impairments in patients with burn injuries according to ICDH definition and numbers.

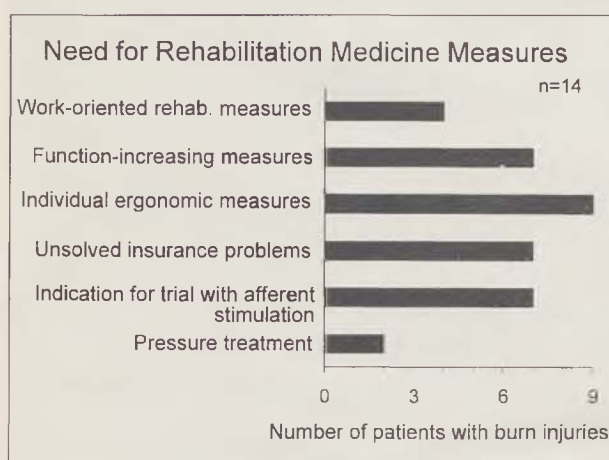


Fig. 9. Need for rehabilitation medicine measures at one-year follow-up in patients with burn injuries.

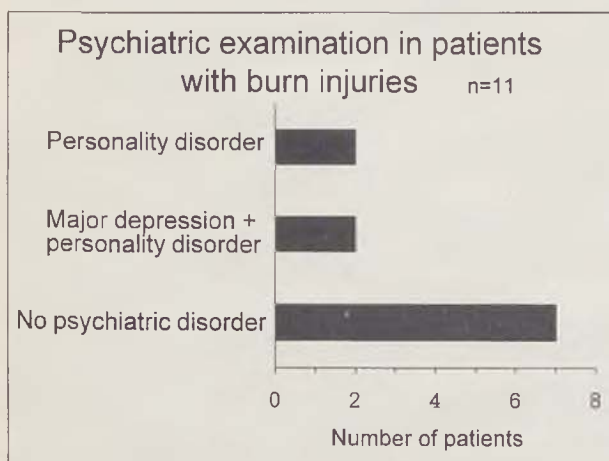


Fig. 10. Psychiatric examination in patients with burn injuries.

examined by the psychiatrist. Seven patients had no psychiatric diagnosis (Figure 10). Four fulfilled criteria for one or more personality disorders according to DSM-IV. In addition, two of these patients also suffered from major depression. Among the seven patients without psychiatric diagnosis, increased T-scores were observed

for monotony avoidance and impulsivity. T-scores for socialisation were lower than for a normal population. In an ongoing study borderline personality disorder was the most common diagnosis among patients with burn injuries and personality disorders. The three patients suffering from schizophrenia and the one from senile dementia before the injury were not examined.

DISCUSSION AND CONCLUSIONS

This is a preliminary report of a consecutive series of adult patients from a Northern European, urban area, focusing on problems related to rehabilitation medicine, psychiatry and reconstructive surgery about one year after injury. The catchment area is about 2 million inhabitants. About 10 per cent of burn patients admitted need reconstructive surgery for one or more sessions. Decreased sensibility in patients after burn injury has previously been studied in our group (Hermansson et al 1986). Although rehabilitation starts early in the treatment of burn injuries, and continues after discharge from the hospital, still about 10 percent of the patients need rehabilitation medicine measures one year after treatment. Quality of life is lower than in a normal population. To what extent this difference is due to the burn injury per se or the possible pre-injury morbidity respectively, cannot be judged since no such specific comparison data exists. Some of the patients have psychiatric disease and personality disorders. Reconstructive surgery and rehabilitation medicine function-increasing measures are needed in several cases. Individual rehabilitation programs based on the patient's particular features and needs are recommended. The findings support the idea of a multidisciplinary approach to patients with burn injury.

ACKNOWLEDGEMENTS

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Physician and technology

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RATIONALE FOR EARLY TANGENTIAL EXCISION AND GRAFTING IN BURN PATIENTS

E. Kisslaoglu, F. Yüksel, C. Uccar, E. Karacaoglu

Gata Haydarpassa Teaching Hospital Department of Plastic and Reconstructive Surgery & Burn Center, Istanbul, Turkey

SUMMARY

Early excision and grafting of the burn wound in the first 9 days remain the keys to survival for patients with major burn injuries.

In the last 7-year-period, 54 major burn cases were treated in our burn facility, the only Burn Center in Istanbul. Early excision and grafting were performed to 32 of them, admitted in the first week. Others were admitted later and managed conservatively. Their follow-up results in terms of mortality and morbidity rates were compared.

In addition to improvement in the prognosis, early excision and grafting procedures decreased the duration of hospitalization and cost of burn treatment.

ZUSAMMENFASSUNG

Die Begründung der frühen tangenzialen Exzision und der Hautspaltungen bei den verbrannten Patienten

E. Kisslaoglu, F. Yüksel, C. Uccar, E. Karacaoglu

Die frühe Exzision und die Spaltung der Brandwunden in den ersten neun Tagen bilden den Schlüssel für das Überleben der Patienten mit ausgedehnter Brandverletzung. In der letzten 7-jährigen Periode wurden in unserem Zentrum für Verbrennungen (einzigem dieser Art in Istanbul) 54 Fälle mit der schweren Verbrennung behandelt. Die frühe Exzision und die Spaltung wurden bei 32 Patienten, die man zur Behandlung in der ersten Woche aufnahm, angewandt. Die übrigen Patienten wurden später aufgenommen und die Behandlung war konservativ. Die Ergebnisse wurden mit Rücksicht auf die Mortalität und das Mortalitätsprozent verglichen. Für die Verbesserung der Prognose ist die frühe Exzision und die Spaltung bedeuted, was zugleich setzt die Dauer der Hospitalisation und die Kosten auf die Verbrennungsbehandlung herab.

Key words: burn, early excision

Burn is not only the injury and pathology of skin but also a factor that influences and disturbs all the systems and the balance of the body. Additionally, it is also a three dimensional complicated pathological chain of events.

Burn management with the width as well as with the depth, the accompanying pathologies in the patient, respiratory status, inhalation injury and systemic influences all added to basic pathology and so gain a mortal character. In such a patient, acute surgical approach to the burn wound as soon as the patient is hemodynamically stable remains the keys to survival for the patients with major thermal injuries (Briggs, 1990; Monafu 1992). Bacteria and fungi, colonized on the non-viable and necrotic burn wound, make a great risk of infection in burned individuals.

Early excision and grafting of a small burn was first described by Lustgarten in 1891, but the concept did not gain widespread acceptance until

Janzekovic in 1970 reported excellent results with early excision and coverage of burns of varying depths (Janzekovic, 1970).

PATIENTS AND METHODS

This study included 54 major burn cases in the recent 7 years and they were treated in our burn facility - which was the only Burn - Center throughout the western part of Turkey, including Istanbul, the biggest city of the country.

Patients' ages were ranging from 3 months to 68 years. They all had full thickness TBSA of 40 to 80 per cent. The ones who had more excluded from the study because this ratio increased the mortality rate significantly. 32 of them who had a mean TBSA of 58 per cent had admitted in the first week (Fig. 1) following burn while others with a mean TBSA of 54 per cent were transferred later from other facilities (Table 1).



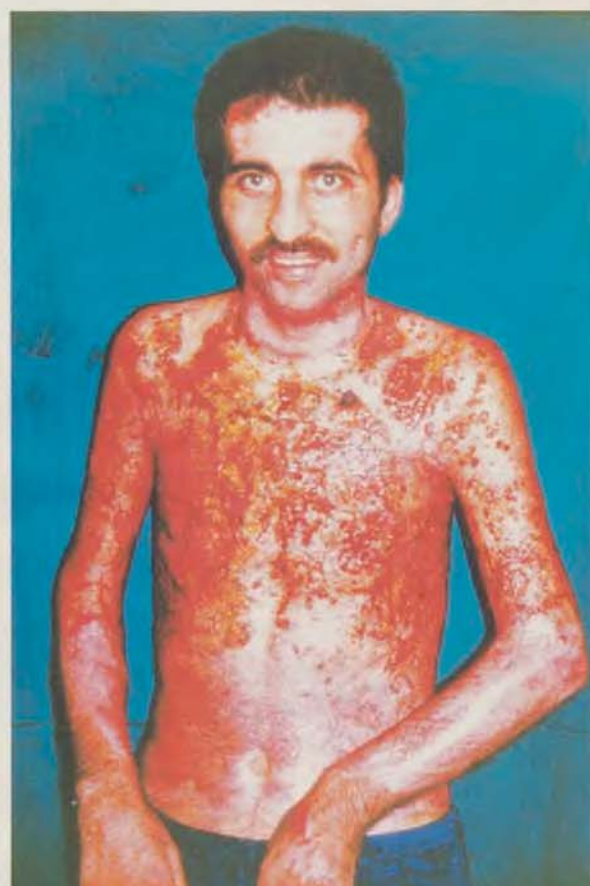
1a)



1c)



1b)



1d)

Fig. 1. A - Patient, 32 years old, with 75 per cent TBSA, viewing escharotomy sites, b - Early tangential excision, c - covering with 1:4 expanded skin graft, d - Appearance on the end of second month following burn.

Table 1. Patient distribution according to the time of admittance and their mean TBSA per cent.

	Early admittance	Late admittance
No. of patients	32	26
Mean TBSA	58 %	54 %

Immediately admitted patients were taken to Intensive Care Unit and escharotomy or fasciotomy were performed if necessary (Fig. 1). They

were resuscitated by using modified Brooke formula for adults and Parkland formula for children after estimation of TBSA by using Berkow Chart. 2X500 mg IV ranitidin was given and burn wounds were covered with silver sulfadiazine cream.

Hyperbaric oxygen treatment was applied to patients once a day under 2 atm. pressure from the second day. It was continued for 20 session with a 2-day interval during surgery.

As soon as early admitted patients were hemodynamically stable, they were taken to surgery for tangential excision and grafting. All the full thickness burned areas (even it was 80 per cent) were excised with knives or electrical driven dermatome and covered with sheet or mostly 1:4 expanded (meshed) autografts. The uncovered raw areas were temporarily covered with homografts harvested from their relatives, or if this was impossible, with omiderm.

Blood transfusion during or just after surgery, was 4 to 8 units for each patient. Following grafting, wounds were dressed with nitrofurazon impregnated gauzes and left untouched for 3 days. In that group, 10 patients necessitated secondary grafting procedures.

For the late admitted group, a considerable time elapse was waited until the full thickness burned areas demarcated from healthy tissues. These areas were too stiff and hard to be excised with dermatomes so it was realized with scalpel. 14 patients necessitated secondary and 2 patients tertiary grafting procedures.

RESULTS

6 of early excision and grafting and 10 of the other group died due to sepsis. Their ages were above 50 in the former, but in the latter, younger patients were also involved (Table 2). The mean hospitalization day was 45 in early excision group and 62 in the other. As this time becomes higher, so the cost do.

Table 2. The age and their TBSA per cent of cases ended to death.

Patient No.	Early admittance		Late Admittance	
	Age	TBSA %	Age	TBSA
%				
1	62	56	42	80
2	54	60	64	78
3	50	78	48	64
4	58	64	56	62
5	64	68	64	68
6	56	74	72	74
7			42	76
8			58	68
9			64	66
10			70	74
Mortality rate	19 %		% 38	

All patients were followed-up at least for 6 months after discharge. The morbidity emerged at last was evaluated. Deformities were classified as minor, moderate and major. Those limiting the patients' overall daily activities were considered major, awful appearance noticed by other at the first look considered moderate and deformities not limiting daily activities and noticed only by patients themselves were considered minor. So, the distribution of morbidities to the groups oc-

curred at the end of treatment was presented (Table 3).

Table 3. Distribution of deformities to the groups.

	Deformity (No of patients)			
	Minor	Moderate	Major	Death
Groups				
Early admitted	18	6	2	6
Late admitted	4	8	4	10

DISCUSSION

Sequentially layered excision of the burn eschar to viable bleeding points, even to subcutaneous fat, is the preferred method of excision in major burn victims. The major benefit of it is cosmetic, as the technique allows preservation of all unburned tissue. In particular, the goal of tangential excision of burn eschar is to preserve unburned subcutaneous fat, which provides contour and form to the human body (Briggs, 1990).

Deaths on the first week due to burn shock or acute renal failure has been minimized under dynamic approach to the patients. Up to 75 per cent of critically burned patients who survive the initial resuscitation period but develop a burn wound infection subsequently die from sepsis despite intensive local and systemic antibiotic therapy (Goodw'M, 1980).

Bacterial colonization on burn wounds occurs for a number of reasons. First, there is the loss of epithelium and mucous membranes, which are integral physical barriers to the proliferation and systemic invasion by microorganisms. Second, burn wound eschar is dead tissue, an ideal medium for microbe growth. Finally, burn wounds are often covered by dressings and kept warm, moist, and dark, thereby providing optimal conditions for bacterial proliferation. The combination of these factors supports rapid microorganism replication within the burn wound (Seligman, 1990). Hence, excision of burn eschar as soon as possible is essential in the management of sepsis in burns. Additionally, late excision or spontaneously removed burn eschar results in more hypertrophic scars, contractures and even crying granulation tissues, all causing major disabling deformities. Early excision and coverage with autograft or whatever available can limit all of these complications (Herndon, 1989).

In the study, it is emphasized to excise all devitalized tissue in the first session and cover the raw areas with autografts as much as possible. The rest was grafted with homografts harvested from their relatives. The technique required considerable surgical experience, transfusion of large amounts of safe blood, getting the donor individuals and an instrument to mesh the grafts.



Fascial excision is another technique which can alternate tangential excision (Boswick, 1987; Heimbach, 1988). Although it has some advantages such as technical easiness, dramatic loss in blood loss, it usually causes awful appearance cosmetically. Tangential excision is always superior to that technique as enough blood resources are available.

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THE EFFECTS AND USES OF HEPARIN IN THE CARE OF BURNS THAT IMPROVES TREATMENT AND ENHANCES THE QUALITY OF LIFE

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SUMMARY

Burn care has been mostly surgical, difficult, and expensive. The use of adequately large doses of heparin administered both parenterally and topically improved burn treatment and quality of life (1-20). Burn pain was relieved. Patients were not toxic. Tissue swelling, resuscitation fluids, and healing time were reduced. Pulmonary and intestinal pathology were notably absent. The new skin was smooth, comfortable, and contracture free. More than anticoagulating effect were seen. Antiinflammatory effects, active at acidic pHs but not at alkaline pHs, stopped burn pain, inflammation, and extension. Neoangiogenic effects revascularized ischemic tissue. Reepithelializing effects were evident. Nonburn and recent burn studies confirmed that heparin had these strong properties and effects (7-13, 21-34). Medical and surgical procedures were reduced. Burn care became simpler and easier. Precautions to prevent bleeding were used. Current use of heparin is limited. Wider use is warranted.

ZUSAMMENFASSUNG

Der Effekt und die Verwendung von Heparin in der Betreuung der Verbrennten und sein Einfluß auf die Verbesserung der Behandlung und auf die Erhöhung der Lebensqualität

M. J. Saliba, Jr.

Die Verbrennungsbehandlung war vorwiegend chirurgisch, schwierig und aufwendig. Die Verwendung der genügenden Heparindosis führt sowohl zur parenteralen als auch zur lokalen Verbesserung der Behandlung (1 - 20). Der Verbrennungsschmerz trat zurück. Der Patient war nicht toxisch. Die Gewebeanschwellung, die Flüssigkeitserneuerung und die Heilungsdauer wurden verkürzt. Die Lungen- und Darm-pathologie fehlte. Die neue Haut war glatt, genügend und ohne Kontraturen. Man merkte mehrere Effekte als nur den Antikoagulationseffekt. Der Antientzündungseffekt, der bei saurerer pH Skala aktiv ist (nicht bei alkalischer pH Skala), die Beschränkung der Verbrennungsschmerzen, der Entzündung und der Extension. Die neoangiogenischen Effekte des revascularisierten ischämischen Gewebes. Die Reepithalisierungseffekte waren deutlich. Die Nichtverbrennungsstudien und die neuartigen Studien über die Verbrennungen bestätigen, daß Heparin diese bedeutenden Eigenschaften und Effekte hat (7 - 13, 21 - 34). Die medizinischen und chirurgischen Prozesse wurden reduziert. Die Verbrennungsbehandlung wird einfacher und leichter. Es wurden Maßnahmen getroffen, die der Blutung vorbeugen. Die Heparindosis ist limitiert. Die breite Verwendung ist berechtigt.

Key words: heparin in burns, topical use on burns, topical use of heparin, anticoagulation

Burns are painful, cellular-destructive, ischemic, body surface injuries with high morbidity and mortality. Burns often healed with contracture scars. Because medical means that would repair severely ischemic tissue were previously unknown; doctors assumed third-degree burns required surgical removal and grafting to heal. The aggressive, prompt, nearly total excision of the burns did reduce the mortality. But blood loss was large. Skin grafting was mandatory. Cosmetic revision of scars was usually necessary. Skin banks, artificial skins, and epithelial cell cultures were developed. Resuscitation fluids, antibiotics, nutritional infusions, and pulmonary as-

sistance measures were improved. In spite of these great advances and skilled surgical performance, the surgical treatment was still difficult, onerous, expensive and often suboptimal.

The use of heparin, administered parenterally and topically in burn studies (1-6, 14-20, 25-34) produced significant beneficial new modifications of burn pathophysiology; effects which were confirmed in nonburn studies (7-13, 21-24). Heparin was proven to have multiple antiinflammatory, pain relieving, neoangiogenic, tissue restoring, and reepithelializing effects, in addition to strong anticoagulating effect. The evidence for the use of heparin in burns is compelling.

Heparin, the most negatively charged biochemical, discovered in 1916, has been used as a strong anticoagulant since 1935. Between 1941 and 1960, parenterally-administered heparin sodium in small anticoagulating doses produced significant favorable alterations in experimental thermal burns in dogs, rabbits, rats (1-6), and a few humans (6). Collectively, heparin increased the blood flow subjacent to burn, enhanced the speed and effectiveness of repair mechanisms, shortened the healing time by several days, reduced the edema slightly, delayed the onset of dry gangrene two day, diminished tissue loss 12%, improved renal function, and doubled survival time. However, these beneficial effects did not appear to carry over into thermal burns in humans treated with similar relatively small doses of heparin administered only parenterally.

Heparin's antihistaminic, antiserotonin, and antiproteolytic enzyme properties at acidic pHs were uncovered (7-9) before 1963, and these anti-inflammatory and anti-allergenic effects were used in nonburn studies, administered parenterally (10-13) or applied topically (14). Parenteral use of heparin to prevent thrombophlebitis with small doses, and to treat pulmonary emboli and DIC with larger doses was being established. A study based on all the then known properties of heparin and utilized large heparin doses parenterally and topically early and then only topically into final healing produced multiple significant favorable changes in humans with first, second, and third-degree burns (15) before 1967. Testing large parenteral dose in guinea pigs (16) and more humans (17) produced similar results by 1970. Day one, in the guinea pig study, the surface of the burns treated with heparin looked more normal. Then (16) the control and sodium chloride treated burns increased in size for 9 and 11 days. The heparin treated burns decreased in size. Heparin prevented extension of the burn and limited full-thickness burn tissue slough later. Heparin treated burns healed faster, by 8 to 11 days, and with less contracture. In the 1951 study (5), untreated control dogs with lethal third-degree burns died in 36 hours average, but dogs treated with relatively small parenteral doses of heparin survived for 72 hours. In 1978, in a repeat of the dog survival study (5), but using large parenteral doses of heparin, heparintreated dogs did not die, but were put to sleep after 120 hours at the end of the experiment (20). Surprisingly, control dogs allowed to exercise, which they did continuously, including loud incessant barking, did not die within 36 hours as they had (5). They also survived, in poor condition, for the 120 hours of the study. This was evidence of the benefit of exercise in the modification of burn pathophysiology and mortality. The number of patients, with burns which were treated with heparin, who were reported (15, 17-20) and are reported here, is over a thousand.

PARENTERAL AND TOPICAL USE OF HEPARIN IN HUMAN BURNS: METHODS, FINDINGS, MECHANISMS, AND RECOMMENDATIONS

When the patient was initial seen, promptly postburn, a history of familial or personal bleeding diathesis was obtained. Heparin can not be used in patients who have active bleeding, trauma where bleeding may be a problem, a personal or family history of bleeding, thrombocytopenia, or an active peptic ulcer.

Since 1963, over a thousand patients, ages 1-98, with first-, second-, and third-degree thermal burns, 1-60 % size, have been treated safely with heparin. Sodium aqueous heparin solution, 5,000 International Units per milliliter (IU/ml) dilution, within a 5 or 10 ml syringe with a number 30 needle attached, was used topically. This solution was slowly dripped or sprayed on denuded areas, two or three times a day, starting promptly postburn and continuing into the nearly healed stage. Also, after blisters were opened and burn fluid within had drained out, the heparin solution was placed within the blisters, rinsing out the blisters slowly for several minutes, and leaving heparin within the space. Blisters were not removed. Blisters were often treated a second time, one day later, especially if burn fluid had reaccumulated. Blisters were not removed or debrided. Blisters collapsed onto the underlying burn surface, did not become infected, and they functioned as skin grafts. The burn surface pain and erythema was stopped and pain relief was a indicator of adequate initial dose. The pain did not reappear. Coagulation times were not altered by topical use. Total heparin dose used topically the first day averaged 100,000 IU per 15 % body area burn size. The dose used diminished rapidly and it was only a few drops applied each time, when discontinued.

Sodium aqueous heparin solution, 20,000 or 40,000 IU/ml, was used parenterally. A subcutaneous, intrafat, injection in areas that were not burned, specifically not under the burn, was given initially, promptly postburn, and repeated once daily, monitored by bedside or laboratory coagulation values that were determined each morning before the injection. Those values were maintained in the usually safe high therapeutic range. On the day, which varied widely, coagulation times suddenly increased to higher levels, subcutaneous injection of heparin was stopped. This was an indication that the parenteral heparin dose was then producing mostly anticoagulating effects. Pain relief with the initial subcutaneous injections was slower. But once relieved it did not reappear.

When heparin was administered intravenously, it was given after the subcutaneous dose, on the first two postburn days only, when a burn tissue ischemic acidosis would presumptively be present, and the need for heparin's multiple anti-

inflammatory effects would be maximum. The entire, large dose, was infused within ten minutes. Relief of pain and blanching of initial burn erythema were indicators of adequate dose, and coagulation times were in acceptable ranges. Once the deep pain was relieved, it seldom reoccurred, and then it responded to less infused heparin. No patient treated with these large initial parenteral doses and then progressively diminishing doses had a bleeding problem. No other injections were given as they were contraindicated.

Heparin treated burns become smaller. So initial burn size was always maximum size. On day two, 24 hours after initial topical use, there was evidence of early revascularization. Regranulation with richly vascular tissue then replaced lost burned tissue, and progressed into reepithelialization.

Only dry sterile nonadhering pads were used to cover the burns. Pads were taped to each other over the burns and only taped to normal skin at the burn edges. One layer of gauze was wrapped loosely over pads that covered the burns and around the normal body parts early in treatment course, and not at all when healing was in advanced stages. Pads and bandages that were stuck to the healing burn surface, were sprayed with sterile water, and gently removed after a time sufficient to loosen the adhering part. No water baths were used. During showers, burns were covered with thin saran wrap plastic so no water containing bacteria from the anal or other skin areas contaminated the burns.

Burns treated with heparin do not, or rarely, become infected. No topical antibiotics or any other medication was used on the burns, as a rule. The pain, common with topical antibacterial creams was thus avoided. Antibiotics, penicillin or erythromycin were given orally. Orally given antibiotics were assumed to be delivered to the burn via neoangiogenically derived capillaries. A few patients with large severe burns, who were treated in collaboration with plastic surgeons, were given some topical antibacterials; and oral antibiotics.

No pain mediation was used or was needed. Because no narcotic medication was used, depressed respirations, constipation, and addiction were not complicating factors. The burn patients were comfortable, eat well, were active, cooperative, and able to participate in their burn care. Their increased activity and physical exercise were factors considered to improve results. Medical and surgical procedures were reduced. As a rule no escharotomies or fasciectomy were done. A few patients had skin grafts. Heparin treated burns do not have the massive shift of fluid or cellular-breakdown, that contributes to edema formation, which compromises blood flow. The amount of infused resuscitation fluid needed to maintain renal function, and prevent circulatory shock, was significantly less (18, 20).

Neoangiogenesis and revascularization were reported (15, 17, 18, 20) without stating mechanisms because none were then known. In areas of bloodless, ischemic, third-degree burns, small red scattered, comma-shaped, entities appeared, became more numerous in number, and closer in proximity, until they formed a system of rudimentary capillaries which subsequently were perfused with blood and then the entire ischemic third-degree burn area was totally replaced with granulation tissue. Then, in 1980 and 1984, significant findings in non-burn studies (21, 22) showed that heparin stimulated the capillary endothelial cells to migrate into ischemic tissue and then to proliferate to form rudimentary capillaries which resulted in revascularization of the ischemic burn tissue.

The reepithelialization of burns with smooth, contracture- and scar-free new skin with the use of topical heparin used into almost final healing, was regularly seen and reported (15-20). No mechanism were then known. Then, a 1986 study (23) showed that heparin consistently inhibited the in vitro formation of contractures in cultures of bovine vascular smooth muscle cells and in cultures of human dermal fibroblasts. An effective heparin concentration was 200 IU per ml. Without heparin the cytoplasmic stress fibers were distributed peripherally under the cell wall membranes in a chaotic clumped pattern, and contractures were the common finding. With the addition of heparin, those same stress fibers in the cytoplasm were aligned in regular linear parallel pattern uniformly throughout the length of the cell. Therefore, compared with identical controls, heparin effectively inhibited cell-mediated lattice contractures.

Interestingly, the parenteral dose of heparin needed to produce the optimal initial modification of burn pathophysiology was the same at 15 % body size, but was significantly different depending on the type of burning agent, with burn size greater than 15 %. Flame, fire, and explosion induced burns required a significantly larger (geometric) amount of parenteral heparin, compared to the (arithmetic) amount for steam, or hot water burns (18, 20). Thus the historically known difference in severity between the burns was mathematically shown in this study. Another conclusion was that the functional endogenous heparin produced by humans was a favorable but limited factor in the healing of human burns.

Heparin treated burn patients did not have pulmonary problems (15, 17-20), so this number one cause of death was notably absent. The scientific reason was reported in 1994, at The First International Meeting on The Effects of Heparin In Burns. Two studies that tested the effects of heparin in the fatal smoke-inhalation ovine model, demonstrated that heparin significantly altered the pathophysiology favorably and protected lung tissue (25, 26).

Heparin treated burn patients did not have intestinal problems. At the 1994 burn meeting the favorable effects of heparin on gut integrity and bacterial translocation (27) was presented. Heparin preserved intestinal mucosa integrity and reduced translocation.

The effects of heparin on hundreds of severely burned patients in India: on the pathophysiology of burns (28); on collagen synthesis (29); clinical uses of heparin in burns (30); and on facial burn edema (31) was also presented in 1994. The authors used a treatment protocol, similar to the one in this report. The thousands of burn patients in India represents the largest known controlled experience testing heparin in burns.

A study (32) in the USA of 51 large major burns treated with heparin topically and parenterally, utilizing large infusions of heparin via a subclavian vein indwelling catheter for many days, monitored with coagulation studies, produced good results.

Effects and safeguards when heparin is used in burn medicine (33) and the effects of carafate, on stress ulcer bleeding in patients (Czech Republic) was presented (34).

CONCLUSION

Heparin has multiple effects on burn pathophysiology that improve burn treatment and quality of life that warrant use.

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Commentary by R. Königová page 36.

PREVENTION AND THERAPY OF POSTBURN SCARS

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SUMMARY

The cosmetic and functional result in postburn scar deformities is influenced by following factors:

1. The type of patient's central nervous system and his response to burn injury.
2. Depth and site of burn areas.
3. Early excision and grafting.
4. Infection complications, their severity and location.
5. Fixation of dressings should be done using elastic materials and applied for so long until stabilisation of scars is completed. Elastic materials should be combined with rigid pressure and pressure massage.
6. Congenital predisposition of the patient to hypertrophic scarring.

ZUSAMMENFASSUNG

Die Vorbeugung und Therapie der Narben nach der Verbrennung

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Der resultierende kosmetische und funktionelle Zustand der Narben nach den tiefen Verbrennungen wird von folgenden Faktoren beeinflusst:

1. Die psychische Reaktion und insgesamt psychische Reaktibilisation auf das Verbrennungstrauma.
2. Das Ausmaß und die Gefährlichkeit der Infektionskomplikationen, hauptsächlich der lokalen.
3. Die Tiefe und Lokalisation der Verbrennungen.
4. Die frühzeitige chirurgische Untersuchung der tiefen Verbrennungen.
5. Die frühzeitige Applikation von den elastischen und rigiden Rehabilitationshilfsmitteln, die zur Kompression der Narben nach der Verbrennung verwendet werden.
6. Die angeborene Disposition des verbrannten Patienten zur Bildung der hypertrophischen oder optimalen Narben.

Key words: postburn scar, compressive therapy, psychology in burns

The final cosmetic and functional properties of scars, that develop after deep dermal burns are influenced by several factors. This fact is known generally.

As skin originates in neuroectoderm, in studying skin changes one must not forget the existing relationship between skin and the central nervous system.

In the Prague Burn Centre we concentrated our attention during the past thirteen years on the dynamic character of scars developing after deeper thermal skin damage in relation to the personality type of the specific patient.

A group of 360 patients was followed regularly for thirteen years and a smaller group of 28 patients was selected. In this group a whole battery of psychological tests was carried out (Luscher's test, Rohrschachs's test, Raven's test, Grinker's, etc.).

The evaluation of the results showed that none of the tests offered satisfactory information as far future development of the scars and possible complications in each particular patient are concerned.

Nevertheless, the results combined with clinical findings indicate that there is one denomination which is included in all factors involved and that there is a **temporary loss of natural skin firmness** in a deep burn scar. The information about the absence of normal skin tonus arrives in the central nervous system via peripheral and vegetative spinal nerves. These information are then processed according to the particular type of higher nervous activity and transmitted back to the wound, giving thus the necessary information for the reparative process.

The progression of the reparative process is consequently influenced by:

A) Amount of information from the wound - greater tension in the wound base and in the edges of the wound in direct relation to the length of time following injury. The older the defect, the more information and central nervous system activation.

B) Type of information processing in the central nervous system - an adequate or inadequate reaction - hyperactivity - may lead to the following combination of resulting scars:

1) Optimal CNS reactivity - results in favourable scars.

2) Hyperreactivity of the CNS results in unfavourable scars.

3) Low CNS reactivity (overloaded with other problems) results in very favourable scars.

After evaluation of the psychologic experiments with direct observation of the patients and according to the psychologic tests we may declare that the patients orientated intensively to survive, the biofil extroverts, or the patients with emotional lability with expression of regrets - mainly females - tolerate the therapy better and therapeutic results are therefore better.

The patients with expression submissivity, suppression, hypochondria, depression, delirants with apatia or abulia and with resignation and necrofil orientation tolerate the therapy worse and the results are bad and their cooperation after healing is finished in the rehabilitation period is not satisfactory.

Individual types of the reaction after burn injury depend upon the premorbid state of an individual patient. Our experiences have proved that psychological condition need not always contribute to excellent healing and scarring and vice versa. There exist receptive and non receptive persons who answer or do not answer to good or bad conditions.

Apart from this psychologic examination the whole group of 360 patients was followed up from many other aspects. There was used a technic of indirect measurement of scar height in relation to the unburned surrounding skin. Next there was examined course of increasing oedema in the scars, its maximum and progress of stabilization of the scars with the differentiation of the structures and the functional restitution of the scars. In these cases there were used several types of elastic and rigid pressure and their therapeutic effect was evaluated.

Our results of deep dermal burns scars in grafted or spontaneously healed areas may be compared on the basis of the following graphs.

Figure 1 - Manifest beginning of hypertrophic scarring shows the moment when the first symptom of the hypertrophic scars developed. This moment correlates with the beginning of the elastic compressive therapy, in some cases combined with rigid pressure. Irregular scarring and oedema begins in 48% of cases already at the end of

the first month after burn trauma, that is the moment, when the burn is already healed. In 88% of cases this process begins at the end of the second month. Single findings of hypertrophic scars after six months or later.

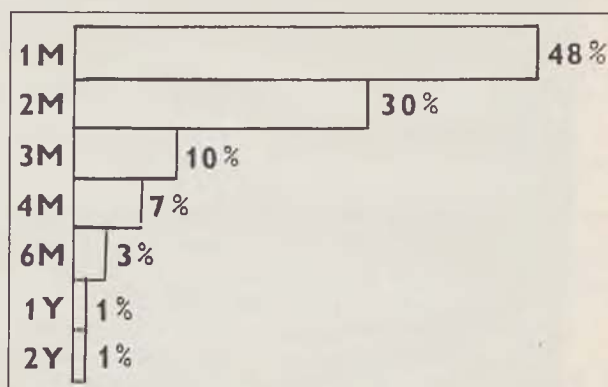


Fig. 1. Manifest beginning of hypertrophic scarring

Figure 2 - compares stabilization of the scarring process in spontaneously healed area (interrupted line) and grafted area (full line). The time-shift nearly 1 year is obvious.

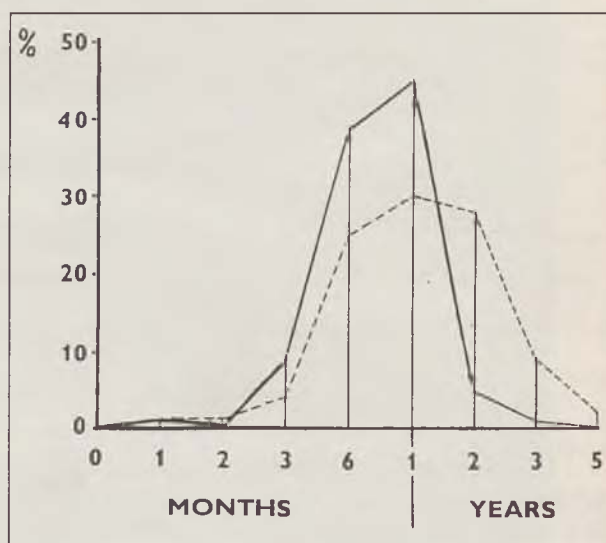


Fig. 2. Comparison of stabilization of scarring process in spontaneously healed area (dashed line) and grafted area (full line)

Figure 3 - presents maximum of oedema in grafted (3a) and spontaneously healed (3b) areas. The maximum is from 2 to 4 months, when the scars are most sensitive, the contractures are increasing and physiotherapy demands the maximal effort. After 6 months the activity of the process is appeased and scars become stabilized. The growth of oedema depends mainly on intensity of the pressure and compressive therapy and upon the patient reactivity.

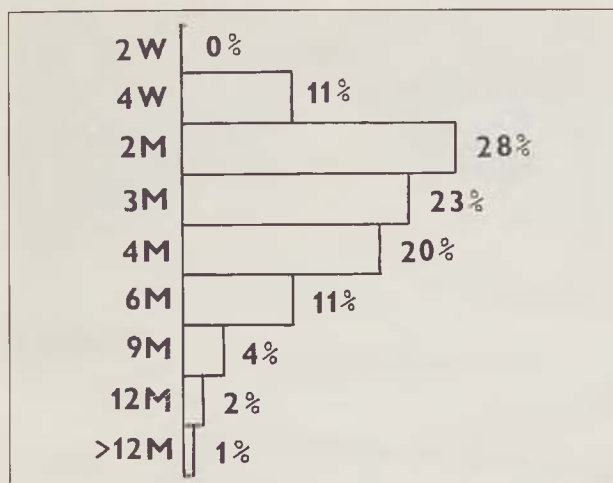


Fig. 3a. Maximum of oedema in grafted area

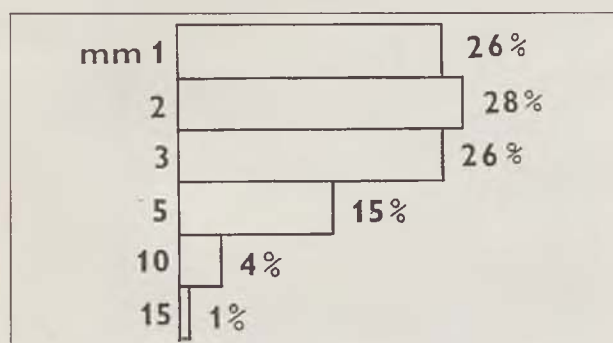


Fig. 3b. Maximum of oedema in spontaneously epitelised area

Figure 4 - To achieve a permanent effect it is necessary to use the elastic compressive garments and equipment approximately 1 to 2 years, which depends on the quality of the stuff and on the way of application of these aids.

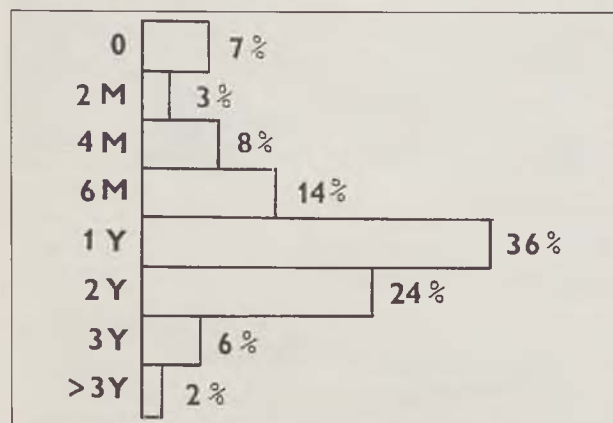


Fig. 4. Duration of using physiotherapeutic equipment to achieve permanent effect

Figure 5 - demonstrates the effect of our physiotherapy. There has been discovered that in 9% of cases of deep dermal burns there was not

necessary to apply elastic aids and still an excellent effect was obtained (column A). Column B represents a good effect in 52% cases, which is more than half of the whole group. Column C shows a satisfactory effect - when the scars did not require any cosmetic repair. 6% of cases represent poor effect of physiotherapy (column D). The principal cause was a low interest of the patients and their relatives in any physiotherapy. The other causes were poorly made or insufficiently used both - elastic and rigid aids. Congenital disposition may be an important cause of developing hypertrophic scarring.

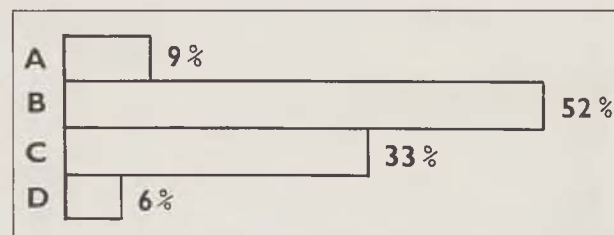


Fig. 5. Effect of physiotherapy:

- A - physiotherapy was not necessary
- B - good effect
- C - satisfactory effect
- D - poor effect



Fig. 6



Fig. 7

Fig. 6-7. The use of polypropylene-foam splint for compression of scars on the forearm.



Fig. 8



Fig. 9



Fig. 10

Fig. 8-10. The method of construction of compressive aid for improvement of scars on the upper lip.



Fig. 11



Fig. 12

Fig. 11-12. The use of rigid-pressure splint for compression therapy of scars after electrical burn on the back.

Some examples of our **elastic** and **rigid** aids are demonstrated on Figures 6 - 15.

In cases where the contracture develops in areas of joints, we are using the **stretching** techniques of physiotherapy.

Smaller scarred areas and hypertrophic scars are treated with **pressure massage** using tip of fingers. We press the scar throughout 20 - 30 seconds without any other movement and then we advance the finger to the adjoining place. We pro-



Fig. 13



Fig. 14



Fig. 15

Fig. 13-15. Individually constructed Duracryl splints for compressive therapy of scars on the face.

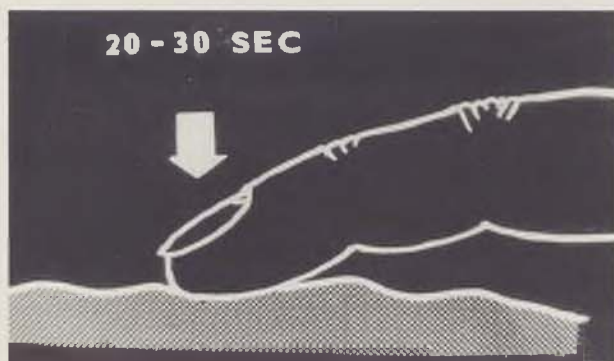


Fig. 16. Principle of local compressive therapy with the finger.

ceed from periphery to center - to the heart. This technique helps mainly express oedema, which speeds up differentiation of vessels and speeds up reinnervation in the scar. (Fig. 16).

We start the surgical solution of the scar deformities after stabilization of the scars when any other techniques are no more successful. That is about 1/2 or 1 year after burn accident.

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BURNS AND EPILEPSY

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SUMMARY

This is a report of the first descriptive analytic study of a group of 183 burn patients, treated in the Burn Unit at the University Hospital of Cartagena, Colombia during the periode since January 1985 until December 1990.

There is presented experience with the selected group of 24 patients in whom the diagnosis of burn was associated with epilepsy.

There is also analysed and described the gravity of the scars sequels, neurological disorders, the complication of the burn and an impact of this problem on the patient, his (her) family and the community.

It is very important to report that there was found Neurocisticercosis in 66.6% of the group of burn patients with epilepsy, and it is probably the first risk factor of burn in this group.

ZUSAMMENFASSUNG

Die Verbrennungen und die Epilepsie

M. Berrocal

Dies ist die Nachricht über die erste analytische Studie, die eine Gruppe von 183 Patienten beschreibt. Diese Patienten wurden im Verbrennungszentrum des Universitätskrankenhauses in Cartagena in Columbia in der Zeitperiode vom Januar 1985 bis Dezember 1990 behandelt.

Es werden präsentiert die Erfahrungen mit der ausgewählten Gruppe von 24 Patienten, bei denen zur Verbrennung mit der hinzugetretenen Epilepsie kam.

Es werden analysiert und beschrieben die Gefährlichkeit der Narbenfolgen, die neurologischen Störungen, die Komplikationen infolge der Verbrennung und ihre Auswirkungen auf den Patienten, seine Familie und die Gesellschaft. Es ist sehr wichtig mitzuteilen, daß bei 66,6% Fällen dieser Gruppe von den verbrannten Patienten mit der Epilepsie das Neurocisticercosis gefunden wurde, was wahrscheinlich bei den Verbrennten aus dieser Gruppe einen bedeutenden Risikofaktor bildet.

Key words: neurological complications in burns, burns and epilepsy

Today, in our community as well as in many undeveloped countries, burns occupy an important place as a cause of morbi-mortality. This is usually a consequence of the lack of prevention education of burns, and also of the violence and high accidentality of modern society (1, 2).

Many burn victims receive the burn during an epileptic seizure which aggravates the prognosis of the result and increase the sequelae, which are recently starting to be published by some authors since 1975 (3, 11).

We considered as important and necessary to initiate this research, due to the large amount of patients with burns and epilepsy that were admitted at the Burn Unit of the University Hospital of Cartagena, Colombia since January 1985 to December 1990; having into account the 50,000 patients with epilepsy registered in Epilepsy League of Cartagena (12, 13); and aware of the few publications about epidemiology of neurocisticercosis in Colombia (14, 19).

HISTORY

The first found reference of burn was made by Hippocrates in 480 BC. There are references on epilepsy registered in the code of Amurabi 2080 BC, and by Hippocrates in 430 BC (12).

STATISTICAL ANALYSIS

The frequency of occurrence of epilepsy registered today in developed countries is 5 to 6/1000 population. In underdeveloped countries, the number is increased to 12 to 24/1000 population. At the moment, Colombia has epileptic occurrences of 19.5/1000 population.

In developed countries, epidemiologic studies show that 1/100 persons, suffer from burn during their lifetime. In underdeveloped countries, studies about epidemiology of burn were not found.

OBJECTIVES

1. To determine frequency of incidents by: age, sex, part of body injured.
2. To evaluate the critical results of the scared tissue.
3. To determine the more common etiologic factors of burn in our community.
4. To determine if epilepsy is a risk factor in burn victims.
5. To determine the type of seizure of the patient with epilepsy.
6. To determine the level of anticonvulsant level in blood.
7. To evaluate the educational level of the study group.

MATERIALS AND METHODS

STUDY GROUP

This is the first descriptive analytical study made with a select group of patients admitted at the Burn Unit of the University of Cartagena Hospital, during the period of January 1985 to December 1990.

The study group includes 182 burn patients, 24 of which had both diagnosis of burns and epilepsy.

ANALYSIS OF STUDY GROUP

All the patients included in the study were tabulated according to the age, sex, body area injured, etiologic factor of burn, degree of burn, evaluation for plastic surgery, neurology and social work.

The following tests were made to the 24 patients with burn and epilepsy:

- Anti-convulsant serum blood level.
- Immunity absorbent Assay-Elisa's Test in blood and Cerebro Spinal Fluid Test.
- Cerebral CAT-SCAN.

RESULTS

From the study group of 182 burn patients, the following aspects were analyzed:

Twenty four (13%) out of study group of 182, had diagnosis of burn and epilepsy. (See Fig. 1).

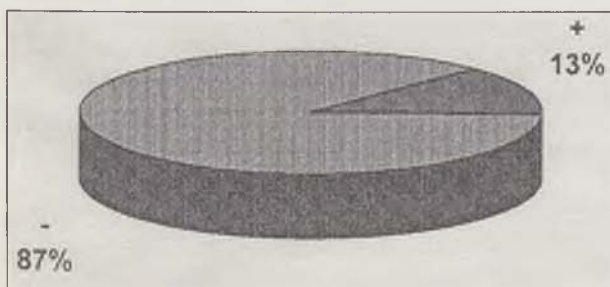
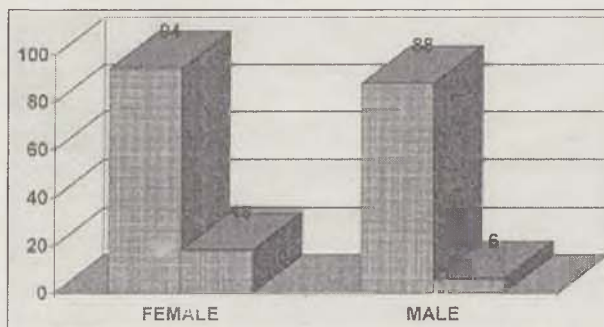


Fig. 1. Results of study. Classification - burns and epilepsy.

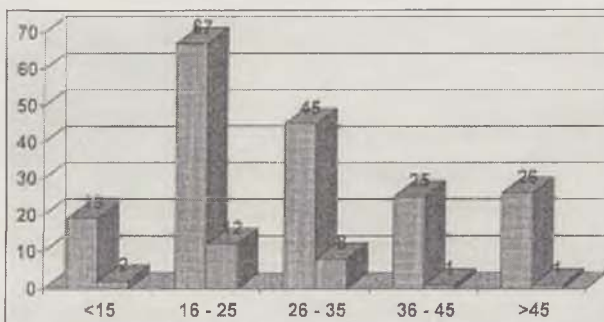
The distribution between sex in the study group was similar 94 (51.6%) were female and 88 (48.3%) were male. Most of the burn patients with epilepsy were female 18 (75%) and 6 (25%) male. (See Fig. 2).



52 % Women

Fig. 2. Results of study. Classification - sex.

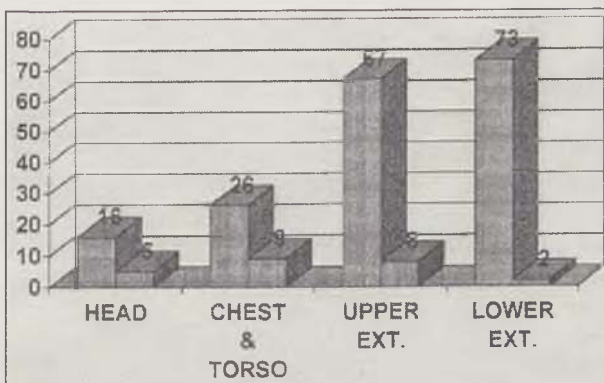
The mean age was 23.8 years. 50% in the group of (16-25) yrs. (See Fig. 3).



50 % Between 16 and 25 yrs. old

Fig. 3. Results of study. Classification - age.

In relation of the burn, the Body Surface Area in all the burn patients with epilepsy was under 20% BSA. 15 (62.5%) patients, and affected principal the chest 9 (37.5%) and upper extremity 8 (33.3%) in this group. (See Fig. 4).



33 % upper extremities and chest

Fig. 4. Results of study. Classification - body area injured.

The second and third degree of burn were the most frequent in both groups. (See Fig. 5).

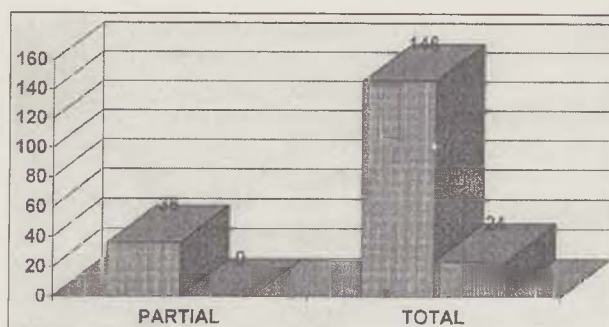
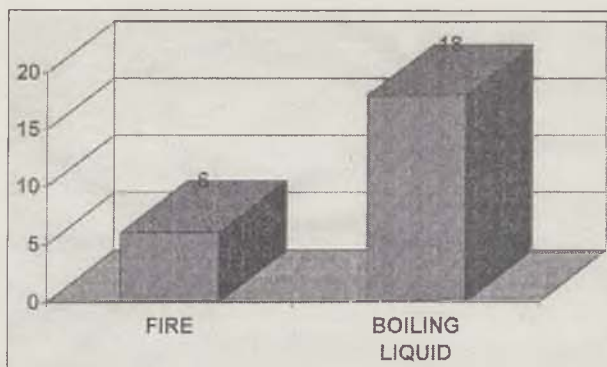


Fig. 5. Results of study. Classification - degree of burn.

In 18 (75%) patients with burn and epilepsy the principal etiology agent of the burn was boiling liquid that fell accidentally over the skin during the seizure while they were cooking the food. 6 (25%) were flame burns. (See Fig. 6).



75 % cause of burn - boiling liquid

Fig. 6. Results of study. Classification - etiology factor.

According to the scars sequelae due to burns 41.6% of the burn patients with epilepsy had slight scars, 28.4% moderate scars and 25% scars. (See Fig. 7).

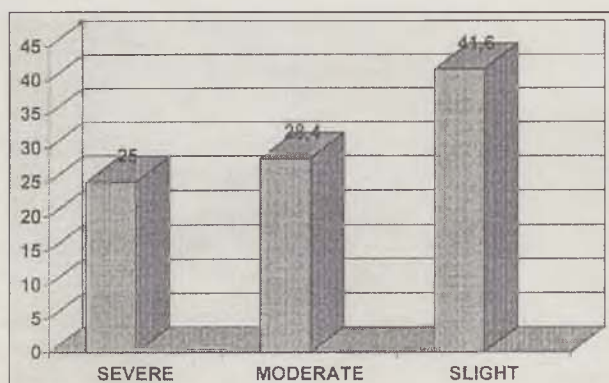


Fig. 7. Results of study. Scars due to burns.

Most of the burn patients with epilepsy are over protected by the family before the burn. They don't know anything about the problems, and the risk of their disease. The 90% of the patients and their relatives are uneducated.

The evaluation made by the neurology reported the analysis of seizure. 62% were tonic-clonic, 25% partial complex and 13% absences. (See Fig. 8).

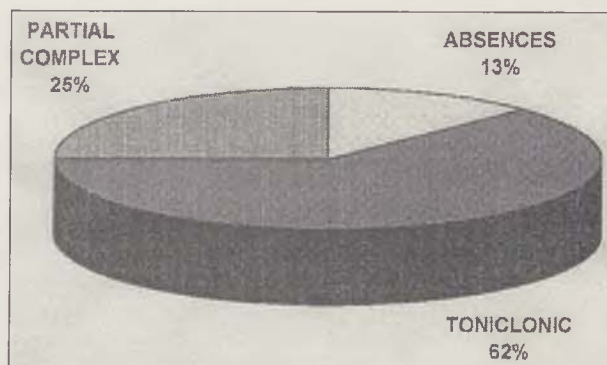


Fig. 8. Results of study. Classification - burns and epilepsy. Analysis of seizure.

The 92% of them had below anticonvulsant drug level in blood and only 8% had therapeutic level. (See Fig. 9).

The cat scan revealed microcalcifications compatible with neurocysticercosis in 66% of patients with corroborated with Serum Elisa Test. 17%

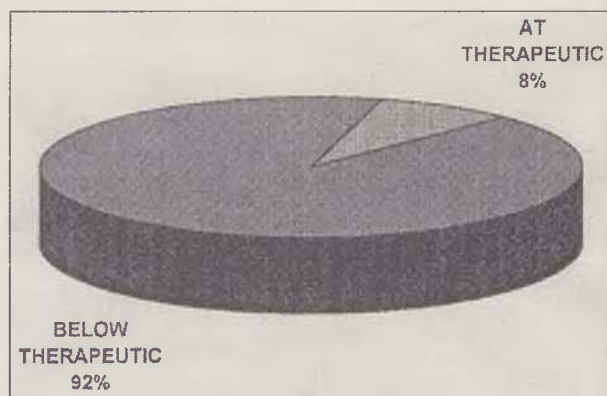


Fig. 9. Results of study. Classification - burns and epilepsy. Anticonvulsant level in blood.

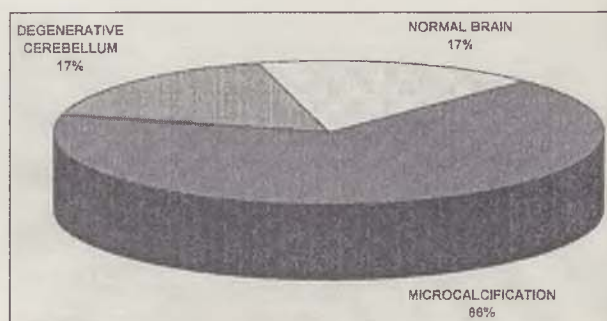
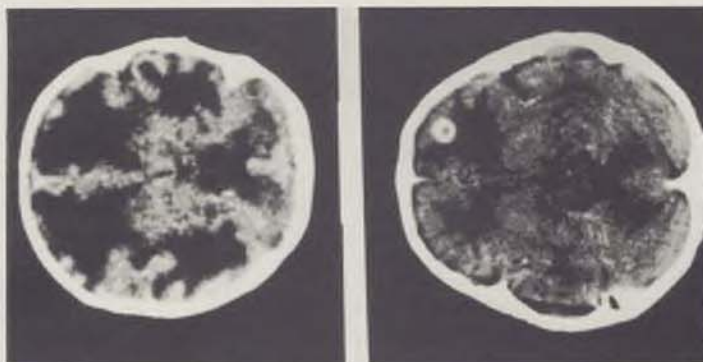


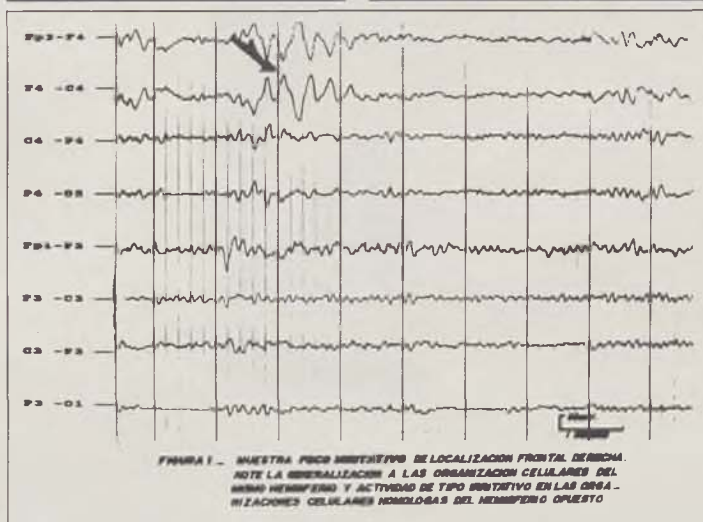
Fig. 10. Results of study. Classification - burns and epilepsy. Cat scan.



11a)



11b)

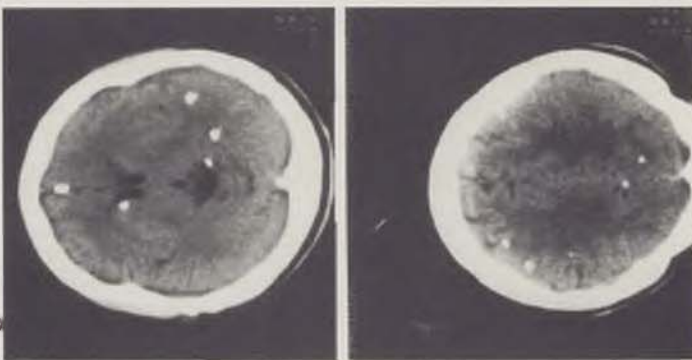


11c)

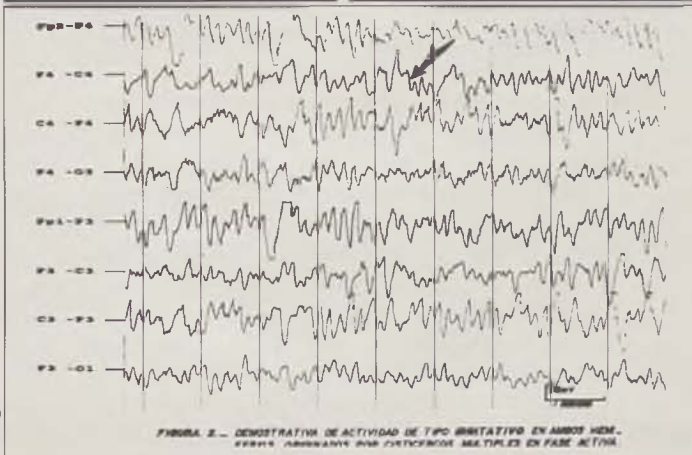
Figs. 11a-c: A 4 year old boy after 6 month of burn accident during a seizure of epilepsy. The CAT-SCAN revealed a neurocysticercus in the frontal lobe of brain. The E. E. G. confirmed the diagnosis of epilepsy.



12a)

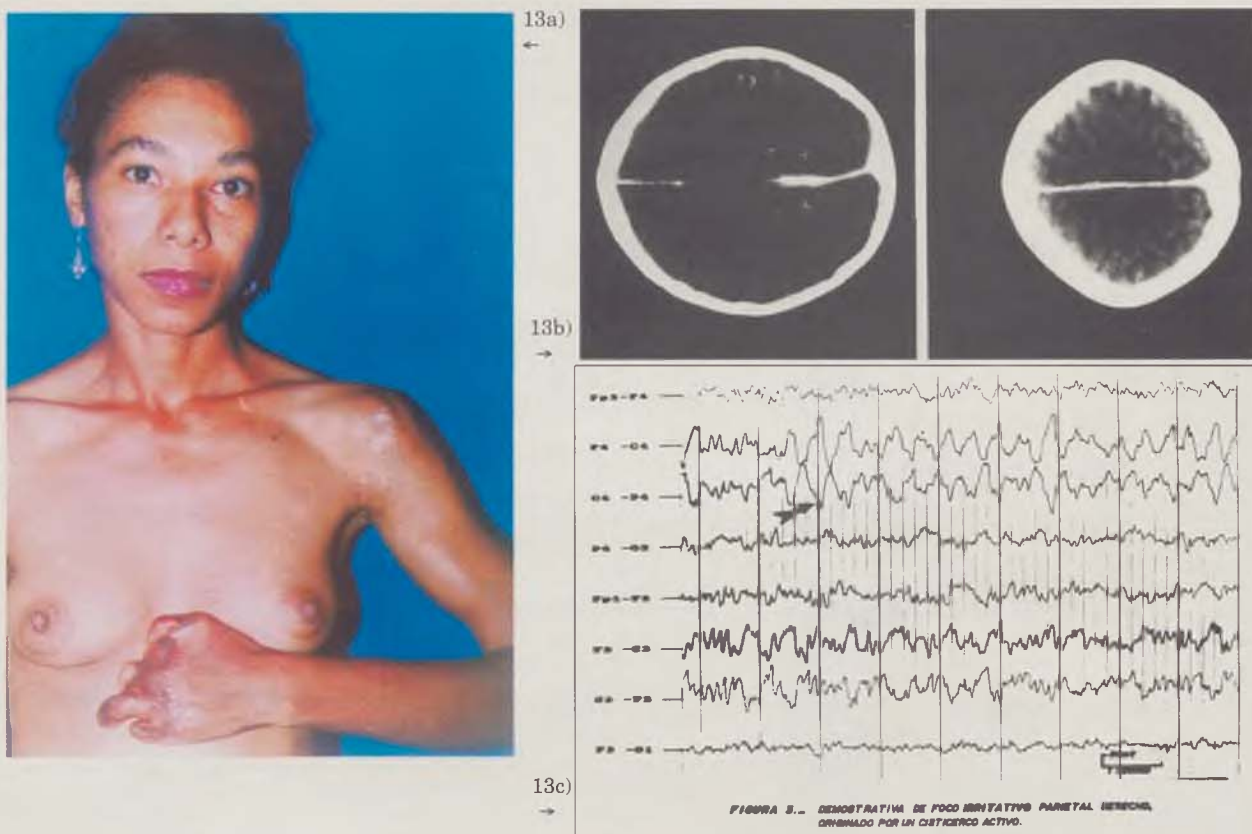


12b)



12c)

Figs. 12a-c: A 25 year old female after 8 month of burn accident during a seizure of epilepsy. The CAT-SCAN revealed microcalcifications compatibles with neurocysticercosis on both sides of brain hemisphere. The E. E. G. confirmed the diagnosis of epilepsy.



Figs. 13a-c: A 34 year old female after 10 month of burn accident during a seizure of epilepsy. The CAT-SCAN revealed microcalcifications compatibles with neurocysticercosis on parietal lobe brain. The E. E. G. confirmed the diagnosis of the epilepsy.

signs of degenerative cerebellum and 17% normal brain. (See Fig. 10).

DISCUSSION

Problems of burn related to epilepsy are of great interest and actuality, not only from the medical point of view, but from the social, and epidemiological aspects. Even though a high frequency of both entities is found associated in our community as well as in other countries few papers have been published in the past decades (20, 24).

From the study group of 182 burn patients we found incidents of burn and epilepsy in 24 patients (13.1 %). This can be compared with the following researches: Barns in New Guinea reported on a group of 21 burn patients, incidents of 23.85% (20); Subianto in Indonesia reported on a group of 157 burn patients, incidents of 57.9% (23); Bhatnagar in 1977 reported on a group of 554 burn patients, incidents of 2.6% (24); Tempest 10% (24); Richards 8.6% (24); and Chari in India reported an incidence of 3.9% in patients of burns and epilepsy (24). The significant variability of incidences in all these studies might be explained by the different etiologies of the epilepsy in distinct regions of the world. We need to take into consideration that epilepsy by itself is to be determined as a high risk disease of burn.

We found greater number of patients with burns and epilepsy among females. This has also been reported by other authors as Barns, De Castro, Bhatnagar (20, 22, 24), and can be explained by the fact that a woman with epilepsy is more vulnerable to receive a burn while cooking.

Subianto is the only author that has reported a majority of male burn victims, and he attributes this to high intake of pork meat with cisticercosis in Indonesia.

All the authors agree that the age group rate most frequent is the youngest, since they are more exposed to accidents during the seizure in their productive years.

The patients with epilepsy usually suffer from severe burns on their extremities, because they are unable to withdraw from the causing agent during the seizure. This has been confirmed by other researches (20, 21, 23, 24); some of these authors also emphasise the infection as a complication in this group of patients (20, 21).

The accidental finding in our study group of neurocysticercosis is 66.6 % in patients with burns and epilepsy is significant. It allowed us to emphasise importance of education in the danger of careless and unhygienic habits during the food processing, in order to prevent this disease.

Epidemiological studies in Colombia - made by Botero in 1985 in the town of El Hato, Santander and by Padilla in 1986 in the town of San Vicente, Antioquia (14, 15, 17) - gave us valuable

data to conclude that the prevalence of cisticercosis for this specific community is 2.7/1000 population.

The fact that 90% of the patients with burn and epilepsy in our study group are illiterate of the elementary concepts of epilepsy and prevention of burns, allow us to emphasise the necessity to educate the community in the proper preparation of food to prevent diseases and looking for a better quality of life for all of them.

CONCLUSIONS

A person with epilepsy is most vulnerable to receive a severe burn. The epilepsy is a great risk.

The future is prevention and prevention is the education of potential victims.

The quality of life in the future depends on the development of preventive program for potential victims more than on the development of new treatments.

ACKNOWLEDGMENT

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To the students of the Faculty of Medicine Diana Alvarez, Arnold Barrios and Nestor Llinás.

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FLUID RESUSCITATION IN THERMALLY INJURED PEDIATRIC PATIENTS

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SUMMARY

More than two-thirds of critical burns in special burn units are children. The burned child continues to represent a special challenge, since resuscitation therapy must be more precise than that for an adult with a similar burn. Children have a limited physiologic reserve and the pediatric fluid replacement therapy is based on the principle of separate calculation of physiological and pathological losses.

We have reviewed the most widely accepted pediatric isotonic fluid protocols. All these protocols calculate for replacement of pathological losses with a need of 2 ml/kg/ % BSAB (body surface area burn) or 4 ml /kg/ % BSAB. We have choosed the formulas of two Shriner's Burns Institutes - the Cincinnati and the Galveston Unit as representatives, and calculated the fluid therapy for model burn children weights of 10 kg, 20 kg, 30 kg with 20, 40, 60, 80 % BSAB. The results of calculations where compared with physiologic parameters of children.

In conclusions we could show, that the 4 ml/kg/ % BSAB formulas do replace all theoretically predicted pathophysiological losses due to burns. However the 2 ml/kg/ % BSAB formulas are more practical as a guideline for resuscitation of pediatric patients because of greater therapeutical range and better clinical response of children threatened by burn shock. It is important to remember that all formulas are only guides to fluid therapy, they should be modified according to individual needs and clinical status of the patient. Only successful restoring and maintaining perfusion pressures leads to optimal oxygenation of injured and noninjured tissues, which promotes spontaneous healing, prevents wound conversion, minimise bacterial colonisation, and prepares the injured areas for early grafting.

ZUSAMMENFASSUNG

Die Flüssigkeitsresusitzitation der termalen Verletzung bei den Kindern

Z. Marinov, K. Kvaltění, J. Koller

Zu den mehr als 2/3 der kritischen Verbrennungen, die in den spezialisierten Verbrennungszentren behandelt wurden, gehören die Kinder. Das verbrennte Kind stellt ein schwieriges Problem dar, denn die Resusitzitationstherapie muß progressiver sein als bei dem gleich verbrannten Erwachsenen. Die physiologischen Reserven sind bei den Kindern limitiert und ihr Flüssigkeitseratz basiert auf der Separatrechnung (Kalkulation) der physiologischen und pathologischen Verluste. Wir revidieren möglichst viele akzeptable pediatriisch - isotonische Flüssigkeitsprotokolle. Alle diese Protokolle rechnen beim Ersatz der pathologischen Verluste mit Bedarf 2 ml/Kg % BSAB (body surface area burn - Ausmaß der Körperverbrennung) oder 4 ml/Kg % BSAB. Von ihnen wählen wir die Formel von Shriners's Verbrennungsinstitut Cincinnati and Galveston Unit aus, die wir für repräsentativ halten und die rechnende Flüssigkeitstherapie für das Modell des verbrannten Kindes mit Gewicht von 10 Kg, 20 Kg, 30 Kg mit 20, 40, 60, 80 % BSAB. Die Ergebnisse der Kalkulation wurden mit den physiologischen Parametern des Kindes verglichen.

Wir wollen beweisen, daß 4 ml/Kg % BSAB Formel alle theoretisch vorausgesetzten Verluste, die durch die Verbrennung verursacht wurden, ersetzt. Immerhin 2 ml/Kg % BSAB Formel ist mehr praktisch und bildet die Richtschnur (Direktiva) für die Resusitzitation der Kinderpatienten und für den größeren therapeutischen Eingriff. Diese Formel stellt eine bessere klinische Antwort dar, dort, wo der Verbrennungsschock behandelt wird. Es ist wichtig, nicht zu vergessen, daß alle diese Formeln nur die Richtschnur der Flüssigkeitstherapie bilden, und daß sie nach den individuellen Bedürfnissen und dem klinischen Zustand des Patienten modifiziert werden müssen. Nur eine erfolgreiche Erneuerung und Festhaltung des Perfusionsdruckes führt zu der optimalen Oxygation der gesunden und verletzten Gewebe, was die spontane Heilung unterstützt, der früheren Konversion vorbeugt, die bakterielle Kolonisation minimisiert und den beschädigten Bereich für die rechtzeitige Spaltung vorbereitet.

Key words: severe burn, children, body surface area burn, fluid resuscitation, guidelines

The burned child continues to represent a special challenge, since resuscitation therapy must be more precise than that for an adult with a similar burn. Children have limited physiologic reserves and we have to calculate with these fac-

tors during the time of resuscitation. The absolute indication for fluid resuscitation of burn injured is accepted world-wide and fluid protocols are included in modern therapy of burns. The most widely accepted pediatric fluid protocols in

current use are reasonable to estimate the normal hourly maintenance fluid requirement and then add to this the fluid volume of the Parkland or Brooke formula. The various formulas for determining fluid replacement are estimated and often need modification, depending on clinical and laboratory findings.

The most obvious differences between adults and children are in size and body proportion. Shorter lengths, tighter angles, and smaller diameters of various anatomic structures and spaces make certain manipulations more difficult. These differences also require the provision of special equipment and supplies which reflect the configurations of pediatric anatomy. There are also physiological differences between children and adults which must be considered when treating the pediatric patient.

The metabolic rate of a growing child is significantly higher than in an adult. The infant's daily turnover of water is equal to almost 25% of total body water, compared with 6% in the adult (1). Glycogen stores in pediatric patients are limited. Available stores to support prolonged starvation are critically absent in children. Due to these facts children spend more energy to keep their body temperature.

In childhood there is no linear relationship between weight and surface area. Infants have a larger cranial surface area with smaller area of the extremities. Due to their smaller body sizes, fluid losses are proportionally greater in children. Merrell et al. in his paper from 1986 has demonstrated that burned children require in average 5,8 ml/kg/ % burn during the 1st 24 h postburn (5), see tab. 1. 20% body surface area burn (BSAB) in a 10 kg child causes an evaporative water loss of 475 ml or 60% of the circulating volume, while the same size burn in a 70 kg adult causes a loss of 1100 ml or only 25% of the blood volume (3).

Table 1. Requirements after burns in children and adults

Parameter	Children	Adults
Fluid requirements (ml/kg % BSA burned)	5,8	4,2
Sodium requirements (mmol/kg % BSA burned)	1,1	0,7

BSA: Body Surface Area

Cardiovascular system of children is hyperkinetic, it works with low pressure and has absolutely low volume. Lower vascular pressure is needed to circulate the blood due to the smaller body size. Systolic blood pressures of less than 100 mmHg are common in children younger than 5 years of age. Due to the small circulating volume, delays in resuscitation for periods longer than 30 minutes can result in profound shock (6).

Young children with immature kidneys have less tubular concentrating ability than adults, and urine production may continue also in case of hypovolemia. Fluid administration should be titrated to achieve a urine output of 0,5 - 2 ml/kg/h for children compared to adults where 0.5 - 1.0 ml/kg/h is satisfactory.

In infants we are following different range of parameters of vital signs than in adults. Heart rate and blood pressure do not necessarily indicate the status of fluid volume in the burn patient. Tachycardia is not important symptom of shock in children. Children have a remarkable cardiopulmonary reserve and often they do not exhibit clinical symptoms of hypovolemia until they lose more than 25% of the circulating volume (6). However, low central venous pressure with evidence of adequate perfusion is quite common. The routine clinical signs of hypovolemia for the adult burn victim, such as tachycardia, low blood pressure, and decreased urine output are manifested later in pediatric patients. Mental clarity, pulse pressure, arterial blood gases, colour of distal extremity, capillary return, and body temperature reflect volume status.

Physiological needs of children and clinical experiences lead us to use the specific pediatric fluid formulas. We have reviewed the most widely accepted pediatric isotonic fluid protocols excluding hypertonic formulas. Isotonic protocols calculate the replacement of pathological losses with 2 ml/kg/ % BSAB (body surface area burn) (Galveston - H. F. Carvajal, Praha - I. Novák) or 4 ml/kg/ % BSAB (Salt Lake City - S. W. Merrell, New York - J. L. Finkelstein, Cincinnati, Houston - T. A. Graves). Many authors do not recommend routine administration of hypertonic fluid regimens in children. The overall morbidity, mortality, and incidence of renal failure are the same as after usage of standard isotonic burn resuscitation fluid protocols, but there is a high risk of hyperosmolarity.

MATERIALS AND METHODS

Because pediatric formulas calculate with two variances, it is inadequate to use only one parameter for comparison. We decided to evaluate total fluid load, which is more demonstrative. We have chosen the formulas from two Shriner's Burns Institutes - the Cincinnati (6) and the Galveston (2) Unit for model calculation of the fluid therapy for hypothetical burn children weights of 10 kg, 20 kg, 30 kg with 20%, 40%, 60%, 80% BSAB. We compared the results of calculations to each other.

RESULTS

Both formulas respect the same principles of resuscitation of burn child in initiation, in calculation and in use of isotonic fluids. Children re-

Table 2. Formulas for resuscitation of children

Unit	Burn-related losses	Maintenance fluid	Fluid types
Cincinnati	4 ml x kg x % BSA burn	1500 ml/m ² BSA	1st 8 hours: LR + 50 mg NaHCO ₃ 2nd 8 hours: LR 3rd 8 hours: LR + 12,5 g albumin
Galveston	5000 ml/m ² BSA burn	2000 ml/m ² BSA	Dextrose solution in LR + 12,5 g Albumin

BSA: Body Surface Area, LR: Lactated Ringer

quire intravenous resuscitation for relatively small burns of 10 - 20 % BSAB. Both protocols are calculating separately burn related losses and maintenance fluids, with half of the volume administered during the first 8 hours. Differences of these formulas are in volume of fluid and in components of the fluids during resuscitation period, see on the tab. 2 and tab. 3.

Table 3. Fluid replacement following burn shock resuscitation

Unit	Burn-related losses	Maintenance fluid
Cincinnati	(35 + % burn) x 24/m ² BSA	1500 ml/m ² BSA
Galveston	3750 ml/m ² BSA burn	1500 ml/m ² BSA

BSA: Body Surface Area

On the figure 1 there is the total volume of fluid administered with respect to the weight. The Galveston formula is based on the total BSA and BSAB in square meters and Cincinnati on the total BSA in square meters and % of BSAB. The Galveston protocol achieves relatively the same volume in group with lower % BSAB as the protocol Cincinnati. The Galveston formula supplies maintenance daily needs with higher fluid volume than Cincinnati does. The increase of % BSAB leads to higher differentiation, because Cincinnati formula covers the burn loss with higher fluid volume. On the figure 2 there are

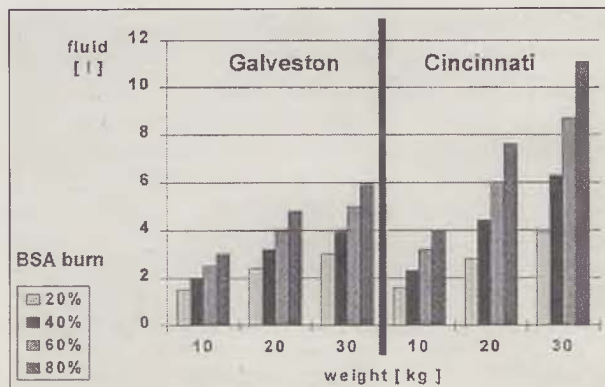


Fig. 1. Total volume of fluid given in 1st 24 hours.

differences in volume of fluids in 24 hours between both formulas.

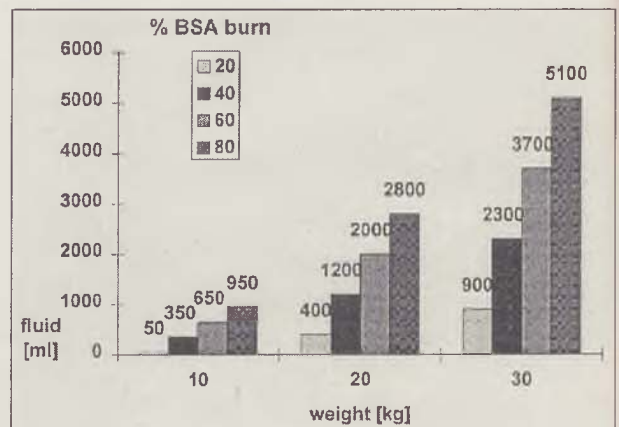


Fig. 2. Differences between Cincinnati and Galveston in volume of fluids in 24 hours.

Both protocols use as well different components of the fluids during resuscitation period. The differences in the administration of Sodium are shown on the figure 3. The gap is so evident because in the Cincinnati formula authors have utilised the regimen of modified hypertonic saline fluid containing 180 mmol Na/l for the first 8 hours. On the figure 4 there are differences in volume of Albumin in 1 st 24 hours. Galveston supplies losses of Albumin with higher volume. In administration of Albumin Galveston uses human albumin in solution from the beginning however Cincinnati uses it from 16-th hour after the burn injury.

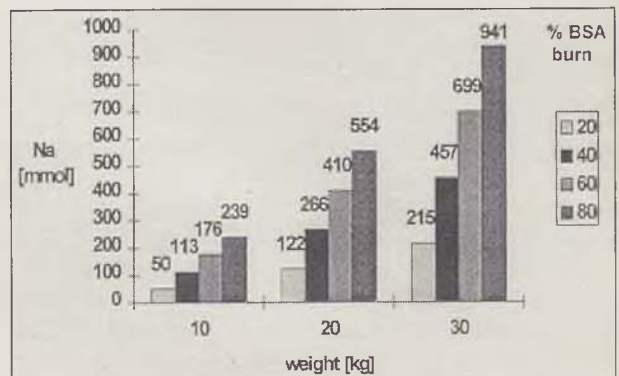


Fig. 3. Differences between Cincinnati and Galveston in amount of Sodium.

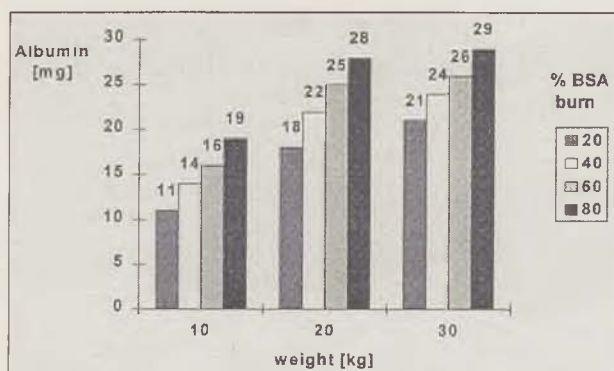


Fig. 4. Differences between Galveston and Cincinnati in amount of Albumin.

DISCUSSION

Lots of datas from literature demonstrate successful fluid resuscitation with usage of both of the protocols, but do not help us by selection of the best formula for our patient. The decision for resuscitation formula depends so on physiologic and pathophysologic response of burn victims as on many other factors.

The history of the burn is one of the most important factor in the choice of resuscitation formula. 80% of burns in infants are scalds (4), which very often do not induce extensive and deeply burns. There are lower needs to replace the volume of fluid and the Galveston formula is fully reasonable in these cases. The BSAB does not respond to the real extent of injured tissue in following cases: delay in beginning of resuscitation, inhalation injuries and high-tension electrical burns. In all these cases calculations according to any formula are insufficient, because more fluids are necessary to administer.

Errors of the first aid significantly modify the protocol of resuscitation. The most usual mistakes are: wrong definition of BSAB and depth of burn, composition of solutions (hypotonic fluids), oral intake of large volumes of fluids and inadequate administration of diuretics. During professional care of acutely burned infants it is important to be aware of stereotypes, which the medical staff has acquired in adult patients. We work with children patients with significantly smaller volumes of fluid. When large boluses of fluids are given, based on wrong estimations, possible complications may occur. In such situations it is better to continue with lower fluid volumes enriched with colloids or with slightly hypertonic fluids. The Galveston formula is in these cases more reliable.

The ultimate goals of all the formulas are expressed not only by adequate diuresis and cardiovascular stabilization, but also by minimalization of local and general oedemas. Children are predetermined to oedema thanks to their physiologic parameters and therefore volume overload must be avoided. In comparison with adults children

have smaller compartments of the body organs. The absolute smaller cranium predetermines the oedema of CNS. Pulmonary oedema is more frequently caused by hydrostatic pressure. If oedema is identified during the early postburn period without the presence of an inhalation injury, it is a sign of overhydration. A 1 mm increases in tissue thickness of a 4 mm diameter pediatric trachea results in a 16-fold increase in resistance with a 75% decrease in cross-sectional area, while the same oedema in an adult airway would increase the airway resistance threefold and reduce airway area by only 44% (6).

Intake of high volume of fluid is dangerous as well for overloading of cardiovascular system. The immature heart is more sensitive to volume and pressure overload. Cardiac output is almost completely dependent upon the heart rate. Fluid boluses should be administered in amounts appropriate for the size of the child and should represent no more than 25% of the total circulating volume. When normal blood volume in children is approximately 80 ml/kg of the body weight, then the speed of administration in the first 8 hours is on the border of infant limits with the Galveston formula from 60% BSAB and with Cincinnati from 80% BSAB. On the figure 5 there is comparison of fluid administration rate per kg of weight in the 1st 8 hours period of resuscitation.

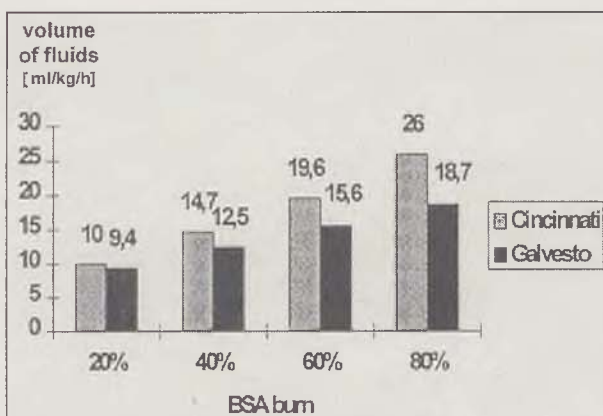


Fig. 5. Fluid administration rate in the 1st 8 hours of resuscitation in 10 kg child.

The totally administered fluid volume at the end of resuscitation may differ with calculated volumes quite often. It is important to remember that all formulas are only guides to fluid therapy, they should be modified according to individual needs and clinical status of the patient.

CONCLUSION

Merrell and all have demonstrated that the requirements of fluid in burned children during shock period are at the level of 5.8 ml/kg/% BSAB which is approached by the Cincinnati formula. However we recommended the Galveston formula



for resuscitation of infants with weights from 10 to 30 kg. This formula is according to our experience, more reliable as a guideline for resuscitation of pediatric patients in specialised burns care units. The Galveston formula has greater therapeutical range and better clinical response in children treated during burn shock, when the clinical status is thoroughly monitored. This formula respects physiologic parameters of children in volumes of fluid and in metabolic needs with administration of sugar and albumin. This formula has also a better reserve of fluid volume if administration of bolus is needed.

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REHABILITAČNÍ, PSYCHIATRICKÉ, FUNKČNÍ A ESTETICKÉ PROBLÉMY U PACIENTŮ LÉČENÝCH PRO POPÁLENINOVÉ TRAUMA: PŘEDBĚŽNÁ STUDIE

C.-E. Jonsson, K. Schüldt, J. Linder, V. Björghagen, J. Ekholm

Pacienti léčení pro popáleninové trauma po čtyři nebo více dní během roku 1994 byli následně vyšetřováni po dobu jednoho roku po přijetí do nemocnice: plastickým chirurgem, rehabilitačním specialistou a psychiatrem. Z 39 takto léčených pacientů 2 zemřeli, 11 se k vyšetření nedostavilo a 6 nemělo žádné přetrvávající potíže. Estetické a funkční problémy byly přítomny u 16 pacientů, z čehož u 11 pacientů rekonstrukční chirurgie v jednom nebo dvou operativních zákrocích zlepšila stav pacienta. Z 18 pacientů doporučených specialistou v rehabilitační medicíně bylo 14 vyšetřeno. 9 z těchto pacientů mělo funkční poškození, přetrvávají snížený rozsah pohyblivosti horní končetiny, omezení svalové síly, změněnou senzibilitu (citlivost) a svědění. Jeden pacient trpěl bolestí. Tři pacienti měli pracovní omezení (hendikep). Pracovní neschopnost se vyskytovala u dvou pacientů

a další dva vyžadovali odborné porady v důsledku popálení. V podskupině 11 pacientů čtyři splňovali kritéria pro jeden nebo více příznaků způsobujících poruchu osobnosti a dva z těchto pacientů trpěli výraznou depresí. Kvalita života hodnocená pomocí SF-36 byla nižší než u normální populace. Někteří z těchto pacientů měli psychiatrické onemocnění a poruchu osobnosti. Ačkoliv rehabilitace byla zahájena záhy, v akutní fázi léčby, bylo v několika případech třeba užít rehabilitační pomůcky podporující funkci. Je doporučován individuální program, založený na jednotlivých vlastnostech pacienta a jeho potřebách. Získané výsledky podporují koncepci multidisciplinárního přístupu k popálenému pacientovi a dokazují, že podskupina popálených pacientů má funkční poškození a/nebo fyzickou schopnost, která může být zlepšena rekonstrukční chirurgií a rehabilitací.

ODŮVODNĚNÍ ČASNÉ TRANSGENCIÁLNÍ EXCIZE A TRANSPLANTACE U POPÁLENÝCH PACIENTŮ

E. Kisslaoglu, F. Yüksel, C. Ucar, E. Karacaoglu

Včasná excize a transplantace popálených ran v prvních devíti dnech zůstává klíčovým momentem pro přežití pacientů s rozsáhlým popáleninovým úrazem. V posledním sedmiletém období bylo v našem popáleninovém zařízení, jediném popáleninovém centru v Istanbulu, léčeno 54 rozsáhlých popáleninových traumat. Časná excize a transplantace byly použity u 32 pacientů při-

jatých v prvním týdnu. Ostatní pacienti byli přijati později a ošetření bylo konzervativní. Výsledky jejich sledování byly srovnány z hlediska úmrtnosti a procenta morbidit. Pro zlepšení prognózy má význam časná excize a transplantace, což zároveň zkracuje délku hospitalizace a snižuje náklady na popáleninovou léčbu.

VYUŽITÍ HEPARINU V PÉČI O POPÁLENÉ A JEHO VLIV NA ZLEPŠENÍ LÉČBY A ZVÝŠENÍ KVALITY ŽIVOTA

M. J. Saliba, Jr.

Popáleninová péče byla většinou chirurgická, obtížná a nákladná. Užití adekvátní dávky heparinu podané jak parenterálně, tak i lokálně vede ke zlepšení léčby popálenin a tím i ke zvýšení kvality života (1 - 20). Popáleninová bolest ustoupila. Pacient nebyl toxický. Edém tkání, náhrada tekutin i doba hojení byly redukovány. Plicní a střevní patologie nebyly shledány. Nová kůže byla hladká, bez kontraktur. Bylo patrně více efektů než pouze antikoagulační. Protizánětlivý efekt, zřetelný při kyselém phs,

nikoliv při alkalickém phs, omezil popáleninovou bolest a zánětlivé projevy. Neoangiogenický účinek revaskularizoval ischemické tkáně. Bylo zřejmé reepitelizační působení. Nepopáleninové studie a nedávné studie popáleninové potvrzují, že heparin má tyto význačné vlastnosti a efekty. Chirurgické výkony byly zredukovány. Popáleninová péče se stává jednodušší a snazší. Byla učiněna opatření bránící krvácení. Běžné používání heparinu je limitováno, ale širší užití je oprávněné.

PREVENCE A TERAPIE JIZEV PO POPÁLENÍ

J. Bláha, I. Pondělíček

Na výsledný kosmetický a funkční stav jizev po hlubokých popáleninách má rozhodující vliv několik faktorů:

- 1) Psychická reakce a celková psychická reaktivita na popáleninové trauma.
- 2) Hloubka a lokalizace popálenin.
- 3) Časnost chirurgického vyřešení hlubokých popálenin.

4) Rozsah a závažnost infekčních komplikací, hlavně místních.

5) Včasná aplikace rehabilitačních elastických a rigidních pomůcek užívaných ke kompresi jizev po popáleninách.

6) Vrozené dispozice popáleného pacienta k tvorbě hypertrofických nebo optimálních jizev.

POPÁLENINY A EPILEPSIE

M. Berrocal

Toto je zpráva o první analytické studii popisující skupinu 183 popálených pacientů, léčených na popáleninové jednotce Univerzitní nemocnice v Cartageně v Columbii v průběhu období od ledna 1985 do prosince 1990.

Jsou uvedeny zkušenosti s vybranou skupinou 24 pacientů, u nichž bylo diagnostikováno popálení s přidruženou epilepsií. Je analyzována

a popisována závažnost jizevnatých následků, neurologické poruchy, komplikace v důsledku popálení a jejich zpětné působení na pacienta, jeho rodinu a společnost. Je velmi důležité sdělit, že u 66,6 % případů této skupiny popálených pacientů s epilepsií byla nalezena neurocysticercosis, což je pravděpodobně u této skupiny popálených význačný rizikový faktor.

RESUSCITACE TEKUTINAMI U POPÁLENÝCH DĚTSKÝCH PACIENTŮ

Z. Marinov, K. Kvaltény, J. Koller

Více než 1/3 kriticky popálených léčených ve specializovaných popáleninových jednotkách tvoří dětské pacienti. Popálené dítě představuje složitý klinický problém, protože resuscitační léčba musí být progresivnější oproti léčbě stejně popáleného dospělého pacienta. Děti mají limitované fyziologické rezervy a jejich tekutinová náhrada je založena na principu odděleného výpočtu fyziologických a patologických ztrát. Posoudili jsme obecně přijaté pediatrické izotonické tekutinové protokoly. Všechny tyto protokoly kalkulují při náhradě patologických ztrát s potřebou 2 ml/kg hmotnosti/ % BSAB (body surface area burn - rozsah popálení těla) nebo 4 ml/kg hmotnosti/ % BSAB. Z nich jsme zvolili jako reprezentativní formuli pracoviště Schrinera popáleninového institutu v Cincinnati a Galvestonu a kalkulovali jsme tekutinovou léčbu pro modelově popálené

děti s hmotností 10 kg, 20 kg, 30 kg a s 20%, 40%, 60%, 80% BSAB. Výsledné výpočty byly porovnány s pediatrickými fyziologickými parametry.

V závěrech chceme poukázat na to, že formule s hrazením 4 ml/kg hmotnosti/ % BSAB hradí všechny teoreticky předpokládané patofyziologické ztráty způsobené popáleninou. Nicméně formule s hrazením 2 ml/kg hmotnosti/ % BSAB jsou praktičtější vodítkem při léčbě popáleninového šoku u dětských pacientů pro větší terapeutický rozsah a dobrou klinickou odpověď. Pouze úspěšná obnova a udržení perfúzního tlaku vede k optimální oxygenaci poraněných i neporaněných tkání, což podporuje spontánní hojení, předchází rané konverzi, minimalizuje bakteriální kolonizaci a připravuje poškozenou oblast pro včasné krytí.

Professor MUDr. Vojtěch Kubáček, DrSc. - 80 years old

One of the most prominent representatives of plastic surgery - Professor Vojtěch Kubáček, celebrated his 80th birthday in January 1997.

He was born on January 20, 1917 in Nové Hvězdlice, a small village near Vyškov. After his family had moved to Brno he started to attend secondary school in Poříčí, Old Brno. Shortly before the Second World War he began his medical studies in Brno, however they were interrupted by the German occupation. Because of his anti-fascist position he was arrested in 1941 by the secret police and imprisoned for 25 months. After the end of the war he resumed his studies and graduated in 1947. He immediately started working as a junior researcher at the First Surgical Clinic of Professor Podlaha where he worked for 18 months. He then spent four years in Hybeš surgical hospital where he was concerned mainly with general surgery as well as traumatology. He left in 1951 to join Professor Karfík at the Clinic of Plastic Surgery and became one of his closest collaborators. In 1961 he was nominated reader and awarded the Brno Prize for his work on corium grafts. From 1963-1983, after Prof. Karfík's retirement, he was head of the Clinic of Plastic Surgery. In 1975 he became professor at the university. From 1973-1983 he acted as chancellor of the Brno J.E.Purkyně University.

Professor Kubáček's interests were very wide due to his extensive knowledge and longstanding practice in general surgery and traumatology. He published more than 80 original papers which deal with many areas of plastic surgery and which had major influence on the development of the discipline in our country. After his original work on corium grafts he published a new method on the reconstruction of the sphincter of the urinary bladder by means of the musculus gracilis.



Another problem Professor Kubáček was engaged in was surgery of clefts, where he introduced the closure of the oronasal communication with a vomeral flap. However, his greatest attention was devoted to the surgery of the hand. This was the subject of his doctoral thesis *„Reconstruction of the thumb by transporting of other fingers“*, and the monograph *„Surgery of the Hand“* was prepared under his supervision at the Brno Clinic of Plastic Surgery. He was a prominent specialist in the sur-

gery of clefts and in particular in the surgery of the hand and helped our plastic surgery to attain a world standard. He was not only a good surgeon but also excellent teacher who has trained many plastic surgeons and thus the Brno Medical Faculty owes him much for its good reputation.

Consistent with the intentions of Professor Burian and Professor Karfík, Professor Kubáček enforced a broad concept of plastic surgery throughout his life, not just organ-centered surgery. In 1969 - 1973 he was on the committee of the Czech Society of Surgeons and he implemented his concept of plastic surgery by founding the Czech Society of Plastic Surgeons and acted as its first chairman in 1973 - 1986. He was also a chairman of the federal committee of this society in Czechoslovakia.

Dear Professor Kubáček, we wish to thank you on behalf of your pupils and former co-workers for your lifelong work and convey to you our best wishes on the occasion of your birthday, we wish you good health and happiness in future years.

Jiří Veselý
Jan Válka
Pavel Brychta

Commentary

We have read with interest the article by Saliba, as Heparin has been used in Prague Burn Center during the last three decades for prevention of thrombosis, in extensive burns and in electrical injuries.

We must dispute Saliba's assertion that „Heparin increased the blood flow subjacent to burn enhanced the speed and effectiveness of repair mechanisms, shortened the healing time by several days, delayed the onset of dry gangrene two days, diminished tissue loss 12%, improved renal function and doubled survival time...” atc.

The advantages that we see with parenterally-administered Heparin have been documented in the records of patients in intensive cure, but

the „multiple antiinflammatory, pain relieving, neoangiogenic, tissue restoring and reepithelializing...” have not been proven in clinical studies.

Saliba's article is published as one of the papers presented at the Prague Conference in September 1996 without editorial correction.

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Účinná látka: Articainhydrochlorid. *Charakteristika:* Lokální anestetikum s rychlým nástupem účinku a s výrazným analgetickým působením. *Indikace:* Infiltrační a svodná anestezie pro chirurgické a diagnostické výkony, pooperační analgezii, analgezii v porodnictví a při léčbě bolestivých syndromů (2% roztok), subarachnoideální anestezie (5% hyperbarický roztok). *Kontraindikace:* Přecitlivělost na přípravek, srdeční nedostatečnost, výrazná vagotonie, AV blok. K okrskové anestezii periferních tkání je Ultracain 2% - Suprarenin nevhodný. *Nežádoucí účinky:* Vzácně se vyskytující toxická reakce s příznaky, jako jsou zmatenost, bezvědomí, křeče, bradykardie, tachykardie, hypotenze, poruchy dýchání až náhlá zástava oběhu. *Balení:* Ultracain 2% inj, 5 x 5 ml, Ultracain 2% - Suprarenin inj, 5 x 5 ml, Ultracain 5% hyperbar inj, 10 x 2 ml. *Výrobce:* Hoechst AG.

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