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Organ specialists coping with geriatric patients

Burns in older people. Epidemiology, surgical management and outcome in a university hospital referral burn unit, 1994–2004

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ABSTRACT

Background: Burn injuries in older people are becoming more frequent as the population ages. Burn management in older people remains controversial.
Objectives: The aim of this retrospective study was to describe the epidemiologic profile of older people in our university hospital burn unit, to report their surgical management, and to identify factors associated with the risk of death.
Methods: We included all patients aged 70 years and over who were admitted between January 1994 and December 2004.
Results: There were 84 men (43%) and 111 women (57%), with a median age of 79.0 (IQR 75.0–85.0) and a median total body surface area (TBSA)% of 12.3% (IQR 5.0–23.5). Most injuries occurred at home (85.1%). Most patients had pre-existing co-morbidities (78.5%). Conservative treatment was performed in 74 (37.9%) patients, while 121 (62.1%) patients underwent surgery. Early excision was performed in 17 (14.0%) patients, who were both significantly younger ($P = 0.02$) and more severely burned ($P = 0.004$). Forty-seven (24.1%) patients died in hospital. Factors associated with death were TBSA% ($P < 10^{-4}$), full-thickness TBSA% ($P = 0.0016$), inhalation injury ($P = 0.02$) and conservative treatment ($P < 10^{-4}$). The overall median length of hospital stay was 29.0 days (IQR 11.0–54.0, range 0.0–375.0). One-third of the 148 discharged patients were able to return home alone.
Conclusion: Burn prevention in older people, by adapting their daily living environment, is a major public health issue. Treatment modalities, i.e. conservative versus surgical, must be evaluated and planned specifically for each patient, depending on overall health status, which should ideally be assessed in collaboration with a geriatrician.

1. Introduction

As the age profile of the population increases, older people are being admitted to burn units [1–3]. As of 1 January 2011, people aged 70 years and over (more than 8 million people) represented nearly 13% of the French population [4].

Age is a well-known adverse prognostic factor in burn patients [5–9], but the concept of "old age" has evolved. Indeed, in the 1970s and 1980s, "elderly" patients admitted to burn units were those over 50 or 60 years of age, few of whom survived burn injuries greater than 30% total body surface area (TBSA) [10]. More recently, in 1998, Ryan [11] identified three risk factors for death after burns: age over 60 years, burns covering more than 40% of the TBSA, and inhalation injury. Thanks to advances in burn care, some studies have described series of octogenarians [12].

The fact remains that older people have a higher mortality rate compared to younger groups when considering equal burn surface areas, probably due to their atrophic skin and altered physiological or mental status [13,14]. Since the 1980s, early excision and grafting became the standard of care in young patients, because surgery, when performed within the first post-burn week, gave a significant survival advantage [15–17]. In contrast, the timing of surgery in older people is controversial [18]. Although early excision and grafting had been used with success in this population [19–22], other teams consider that conservative procedures are less traumatic in older people, given their frequent pre-existing co-morbidities and lesser tolerance of surgery [23–25].

Our burn unit, at the Cochin university hospital, admits an annual average of 200 acute burned patients. It is one of three adult referral centers in the Paris area, and is also an adult referral center

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for provincial patients with major burns. On admission, fluid resuscitation and topical management are standardized according to the surface area, depth and location of the burns, irrespective of age.

Here we reviewed data on patients aged 70 years and over admitted to our burn unit between January 1994 and December 2004. The aim was to describe the epidemiologic profile of older people in our burn unit, to report their surgical management, and to identify factors associated with the risk of death.

2. Patients and Methods

2.1. Patients

This retrospective study included all records of patients aged 70 years and over who were hospitalized between January 1994 and December 2004 among the 1691 patients admitted to our burn unit at Cochin university hospital.

All patients received standard fluid resuscitation (Parkland or Evans formula), topical antimicrobial agents (silver sulfadiazine), systematic anticoagulant treatment (low molecular-weight heparin) and enteral nutritional support based on the patient's estimated caloric requirements. The burn injuries were always assessed by a senior physician on admission. When inhalation injury was suspected, fiber-optic bronchoscopy was systematically performed. In case of death, autopsy was required only when the burn injury occurred in suspicious circumstances.

The data studied included age, gender, pre-existing co-morbidities (determined both at admission and during hospitalization), burn etiology, burn size, i.e. TBSA%, full-thickness TBSA%, inhalation injury, recorded causes of death, length of hospital stay and final outcome.

Skin burn management was analyzed in detail, distinguishing two sub-groups: a conservative group, i.e. spontaneous wound healing, and a surgical group. For patients who underwent surgical treatment, the timing of surgery after burn onset and the number of stages were recorded.

To quantify burn severity, the ABSI (abbreviated burns severity index) [7] and the Baux formula [6] were calculated for all the patients.

2.2. Statistical analysis

Categorical data are described as counts and relative frequency (%) and quantitative data are summarized as the median and InterQuartile Range (IQR). Kruskal-Wallis tests were used to compare burn characteristics according to gender and treatment (conservative or surgical). Spearman's correlation was used to establish the correlation between burn size (percentages of TBSA and full-thickness TBSA) and age.

Kaplan-Meier survival curves were used to analyze the time to death since burn onset and were compared with the Log-rank test. Multivariate Cox proportional hazard models were used to identify independent factors associated with death. Multivariate models included only those variables with *P*-values below 0.1 in univariate analyzes. Either the variables contributing to the ABSI score (Model 1), if statistically significant in univariate analysis, or the ABSI score (Model 2) were included separately. Final multivariate models were adjusted for TBSA% ($\geq$ 20% vs. $<$ 20%), full-thickness TBSA% ($\geq$ 5% vs. $<$ 5%), inhalation injury (yes vs. no), burn treatment (conservative vs. surgical) for Model 1, and for the ABSI score ($\geq$ 8 vs. $<$ 8) and burn treatment for Model 2. All tests were two-sided, and *P*-values below 0.05 were considered to denote statistical significance. Statistical analyses were done with SAS software package version 9.2 (SAS Institute, Cary, North Caroline, USA).

Table 1
Characteristics of the study population. Causes of burn injury (n = 195 patients).

	Total n = 195	Men n = 84	Women n = 111	*P*-value Kruskal-Wallis test
Age				
Median (IQR)	79.0 (75.0–85.0)	79.0 (75.0–84.0)	80.0 (74.0–87.0)	0.34
TBSA%				
Median (IQR)	12.3 (5.0–23.5)	12.5 (5.0–26.5)	12.3 (5.0–22.3)	0.67
Full–thickness TBSA%				
Median (IQR)	3.3 (0.0–10.0)	3.0 (0.0–9.0)	4.0 (0.0–10.8)	0.41
ABSI				
Median (IQR)	8 (7–9)	8 (7–9)	7 (6–8)	$P < 0.0001$
Baux's formula				
Median (IQR)	93.0 (85.0–105.3)	91.8 (85.3–105.3)	93.5 (84.0–105.3)	0.94
Etiologies n (%)				
Flame	122 (62.6)	60 (71.4)	62 (55.9)	–
Scald	54 (27.7)	14 (16.6)	40 (36.0)	–
Other thermal injuries	12 (6.2)	7 (8.3)	5 (4.5)	–
Chemical burn	2 (1.0)	1 (1.2)	1 (0.9)	–
Electrical burn	1 (0.5)	1 (1.2)	0 (0)	–
Unreported	4 (2.0)	1 (1.2)	3 (2.7)	–
Circumstances n (%)				
Cooking	71 (36.4)	25 (29.8)	46 (41.4)	–
Bath, shower	30 (15.4)	12 (14.3)	18 (16.2)	–
Lipothymia	28 (14.4)	7 (8.3)	21 (18.9)	–
House fire	27 (13.8)	20 (23.7)	7 (6.3)	–
Barbecue	16 (8.2)	7 (8.3)	9 (8.1)	–
Gas explosion	8 (4.1)	6 (7.1)	2 (1.8)	–
Immolation	4 (2.1)	2 (2.4)	2 (1.8)	–
Other domestic activities	5 (2.6)	2 (2.4)	3 (2.7)	–
Traffic	1 (0.5)	1 (1.2)	0 (0)	–
Unreported	5 (2.6)	2 (2.4)	3 (2.7)	–

IQR: inter quartile range.