Ryan Score as a Mortality Predictor in Burns Patients In a Tertiary Care Centre

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Research

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Abstract

Burns is a global health problem with an estimated mortality of 1,80,000 annually with a majority from the low- and middle-income countries. A dearth of resources in establishing dedicated burn centers and providing recent advancements in managing burns patients results in higher mortality rates in developing countries. Predicting mortality of burns patients is of utmost importance in channeling the limited resources for better outcomes. Several scoring systems have been tested over time in developed countries. Hence an attempt is made in this study to test Ryan Score in our population.

Key Words: Burn, Ryan Score, mortality.

Introduction

An estimated 1,80,000 deaths occur globally due to burn injury even after recent advancements in understanding the pathophysiology of burns and intensive care[1]. Lack of implementation of advanced techniques and sparsity of dedicated burns centers made low socioeconomic countries the major contributor of mortality in burns. Non-fatal burns can cause significant morbidity by prolonged hospitalization, disability, and disfigurement leading to stigma and rejection. Around 1,00,000 in India suffer from burn injury leading to high morbidity and mortality [2].

Assessing the severity of the condition and determining prognosis at the time of presentation helps in risk stratification both numerically and scientifically. Mortality predicting scores like Revised Baux score [3], Abbreviated Burn Scoring Index (ABSI) [4], Ryan et al. [5], Belgium Outcome of Burn Injury (BOBI) [6], Smith et al [7], McGwin et al. [8] .Are of paramount importance in guiding clinical judgment and counseling patient's attenders. The exigency of an appropriate scoring system that can assess risk at presentation accurately is soaring in developing countries. In this study, the Revised Baux score has been applied to predict mortality in burns patients.

Materials and Methods

Case 1

A 30-year-old female with no known comorbidities, presented with thermal burns over bilateral lower limbs, genitals, and anterior abdomen. In emergency, patient was conscious, pulse=120/min, BP=106/70 mmHg, RR= 22/min, O2 saturation=94Per Cent. On initial assessment, about 43Per Cent of burns were superficial 2nd degree. At presentation, Ryan score 1 (age-30, inhalational injury-0, Per CentTBSA>40) with a predicted mortality of 3Per Cent. The patient expired on day 6 of burns injury.

Case 2

A 65-year-old male with no known comorbidities, presented with thermal burns over the scalp, back, bilateral upper limbs, left thigh and singeing of nasal hair. At presentation, the patient was conscious, oriented, pulse=112/min, BP= 90/64 mmHg, RR= 28/min, SpO2=

94Per Cent at room air. On initial assessment, about 5Per Cent burns were superficial 2nd degree and 25Per Cent burns were deep 2nd degree. At admission, Ryan score 2 (age-65, TBSA-30, inhalational injury-1) with a predicted mortality of 33Per Cent. The patient expired on day 10 of burns injury.

Case 3
A 45-year-old female with no known comorbidities, presented with thermal burns over bilateral lower limbs and back. In emergency, patient was conscious, pulse=110/min, BP=96/60 mmHg, RR= 24/min, O2 saturation=96Per Cent. On initial assessment, about 25Per Cent of burns were superficial 2nd degree. At presentation, Ryan score 0 (age-45, inhalational injury-0, Per CentTBSA<40) with a predicted mortality of 0.3Per Cent. The patient expired on day 13 of burns injury.

Results
Ryan score used in our patients underestimated the mortality risk.

Discussion
A burn is an injury to the skin or other organic tissue mainly caused due to heat or radiation, radioactivity, friction, electricity, or contact with chemicals. Burns injury is a major risk factor contributing to mortality and morbidity worldwide. Advancements in the intensive care system and a better understanding of the pathophysiology of burns significantly decreased mortality in developed countries. But due to a lack of resources, the mortality in developing countries is egregious[9]. Hence to improve the outcome and amortize the mortality, a predictor of survival helps in guiding treatment, resource management, and counseling family. The survival or mortality predicting scores play a paramount role in resource-dependent developing countries. But most of the scores are formulated in developed countries which fail to serve in developing countries due to variations in the study population, the standard of care, and the ability to recognize and implement advanced methods (Figure 1-3).

In India, over 10,00,000 people are moderately or severely burnt annually. This amounts to significant mortality and morbidity including post-burn disability and disfigurement requiring well-staffed specialized burn centers, burn intensive care units, and trained health professionals. Owing to limited personnel and resources available, the need for a mortality predicting scoring system is at its zenith.

The research done in the major fire disasters of the Rialto fire and Coconut Grove nightclub in 1921 and 1942 respectively laid the foundation in understanding burn pathophysiology in detail[10]. Professor Serge Baux developed his thesis by quantifying the relationship between burn size and age in predicting mortality [11]. Age,

total body surface area, and inhalational injury turned out to be the well-known significant independent risk factors for predicting mortality over years. According to a study done by Ryan et al. in 1998, age greater than 60 years, presence of inhalational injury, and TBSA more than 40 percent were found to be the significant factors in predicting death post-burn injury [5].

In this study, the Ryan score was applied to predict mortality as it is a simpler scale to calculate bedside with good specificity. Our patients had Ryan scores of 2,1, and 0 with a probability of death of 33Per Cent, 3Per Cent, and 0.3Per Cent respectively. But all three patients have expired, suggesting that Ryan's score underestimates the mortality in developing countries (Table 1,2).

Limitations of the study
It is a case report in a single-centre, with an underestimation of mortality prediction. A multicentre, Randomized control study is required to validate the efficacy of the Ryan score in predicting mortality in burn patients.

Conclusion
This study shows that Ryan's score underestimates mortality in a developing country like India. Hence a large study is required to standardize for the resource variability and population.

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Tables & Figures

Table 1: Ryan Score

Name of Score	Individual Factor		Individual Score	Total Score	Probability in percent
RYAN et al. Probability of Death = $1/1 + e^{\log it}$ logit = -5.89+2.58n n=Number of risk factor (Age, % TBSA, Inhalational Injury)	Age	>60years	1	0	0.3
	TBSA	>40%	1	1	3
	Inhalational Injury	yes	1	2	33
		no	0	3	90

Table 2: Summary of Cases

S. No	Age	TBSA	Inhalational Injury	Score at admission	Percentage of predicted mortality	Outcome
1	30	40%	No	1	3%	Expired
2	65	30%	Yes	2	33%	Expired
3	45	25%	No	0	0	Expired

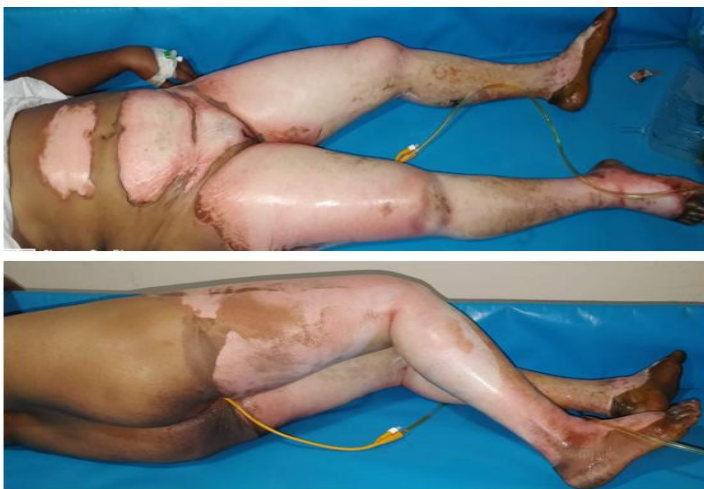**Figure 1: 30-year-old female with 40% burns**

Figure 2: 65-year-old male with 30 % burns.

Figure 3: 45-year-old female with 25% burns