ChiCTR Chinese Clinical Trial Register
SSC surviving sepsis campaign

Declarations

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Competing interests

The authors declare that they have no competing interests.

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RTS and RTS-A have equal value in mortality prediction of patients with severely trauma

To the Editor,

The article by Seong Chun Kim et al. is really interesting [1]. We agree that serum albumin is indeed important for trauma patients. While serum albumin is one of the most available biomarkers worldwide, and is almost always included in initial routine work-up for major trauma [2], it is easy for us to get this parameter on trauma patients.

As a suggestion, Seong et al. concluded that RTS plus serum albumin (RTS-A) performed better than RTS in predicting the in-hospital mortality of trauma patients. But the author enrolled patients regardless of the severity of trauma and the average of ISS score is 9. We have a hypothesis that RTS-A performed in patients with severe trauma (ISS ≥ 16) as good as in patients with mild trauma. We would like to use our severe trauma (ISS ≥ 16) data in order to validate the discriminatory power of RTS-A.

This is a retrospective analysis. We collected patients with severely trauma (ISS ≥ 16) admitted to West China Hospital of Sichuan University from May 1st, 2016 to August 31th, 2016. A total of 9 variables were collected for this analysis including age, sex, systolic blood pressure (SBP), respiratory rate (RR), PTpercent, PTINR, base excess (BE), serum albumin, GCS, ISS score. The missing values included the PTINR (8%), PTpercent (8%), albumin (5.3%). Then we calculated RTS, RTS-A, BIG and EMTRAS for every patient, which was similar with Seong.

Firstly, a univariate analysis was conducted using all the variables (age, sex, SBP, RR, PT, INR, BE, serum albumin, GCS). A P value < 0.05 was considered statistically significant (Table. 1). Then we compared the RTS, RTS-A, EMTRAS and BIG score with in-hospital mortality by receiver operating characteristic curve (ROC curve) [3].

There were 113 cases were enrolled in the study, among which 76 were male and 37 were female. Other basic data could be found on Table 1. The AUC (Area under ROC Curve) of these scores (RTS, RTS-A, BIG and EMTRAS) were respectively 0.914($P = 0.000$, CI 0.845–0.959), 0.923($P = 0.000$, CI 0.871–0.976), 0.937($P = 0.000$, CI 0.881–0.993) and 0.833 ($P = 0.762$, CI 0.747–0.920) (Table 2), but there was no statistically difference between RTS-A and RTS (Table 3). RTS, RTS-A were negatively correlated with the death ($P = 0.000$, $P = 0.000$). While BIG and EMTRAS was positively correlated with mortality ($P = 0.000$ and $P = 0.000$) (Fig. 1).

Table 1
Baseline characteristics of severe trauma patients ($n = 113$).

	Mean	Standard deviation	Median	P_{25}	P_{75}	p value
Age (years)	45.7	19.341	–	–	–	0.312
SBP (mm Hg)	–	–	123	106.5	134	0.05
RR	–	–	21	20	23.5	0.009
GCS	–	–	15	8.5	15	0.000
PTINR	–	–	1.05	0.97	1.13	0.000
PTPERCENT (%)	–	–	106	84	134	0.000
Base excess (mmol/L)	–	–	3.78	1.31	6.40	0.000
Albumin (gram/deciliter)	3.665	0.716	–	–	–	0.000
ISS	–	–	25	17	36.50	0.000
RTS	–	–	12	10	12	0.000
RTS-A	–	–	48.40	42.35	52.85	0.000
EMTRAS	–	–	8	7	9	0.000
BIG	–	–	7.6575	4.8125	13.305	0.000
Mortality (%)	18.4					

P_{25}, 25% percentile; P_{75},75% percentile; SBP, Systolic Blood Pressure; RR, Respiratory Rate; GCS, Glasgow Coma Scale; ISS, Injury Severity Score; RTS, Revised Trauma Score; RTS-A, Revised Trauma Score plus serum albumin; EMTRAS, Emergency trauma Score; BIG, Admission base deficit, International normalized ratio, and Glasgow Coma Scale.

Table 2
Area under receiver operating characteristic curves (AUC) of the four trauma scores.

	AUC	SE	95% CI	*p* value
RTS	0.914	0.037	0.842–0.986	0.000
RTS-A	0.923	0.027	0.871–0.976	0.000
BIG	0.937	0.0285	0.881–0.993	0.000
EMTRAS	0.833	0.044	0.747–0.920	0.000

Table 3
Differences between ROC curves of four trauma scores.

	BIG and RTS-A	RTS-A and RTS	RTS and EMTRAS
Difference between areas	0.0139	0.00917	0.0808
P value	0.6732	0.7296	0.1123

RTS is a physiological score for predicting in-hospital mortality and outcome of traumatic patients and is used widely over the world. Moreover it can correctly identified > 97% of nonsurvivors as requiring trauma center care [4] [5]. In our study we use RTS, RTS-A, BIG and EMTRAS to evaluate in-hospital mortality of patients with severely trauma. It's showed that the value of the RTS plus serum albumin (RTS-A) and the original RTS have equal value in predicting the in-hospital mortality of severe trauma patients. Given more simple and cheap than other scores, we think RTS is better. Of course, our pilot study was restricted by its retrospective study design, missing data and small sample size. Next, we will do more works on all.

In conclusion, RTS plus serum albumin (RTS-A) can indeed predicts the in-hospital mortality of trauma patients. But to those severely injury patients, the RTS has the same discriminatory power compared with the RTS-A. Due to the easy availability and low-cost, we recommend to using the original RTS to triage patients with severe trauma.

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Conflict of interest

The authors declare no conflicts of interest.

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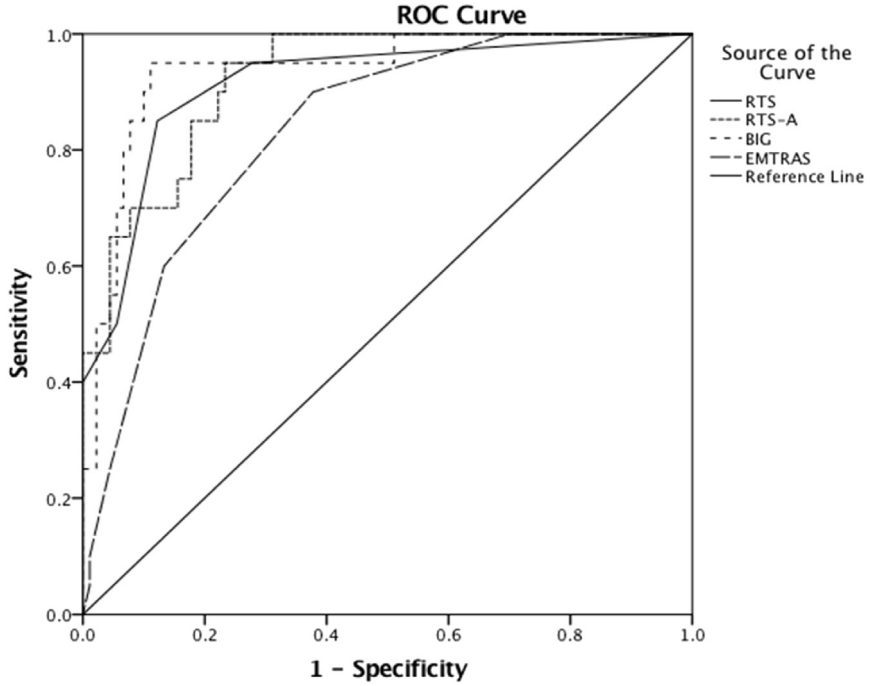

Fig. 1. ROC curve of these 4 scores (RTS, RTS-A, BIG, EMTRAS) predicting mortality of severe trauma patients.