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Uncontrolled Hemorrhagic Shock Outcome Model in Rats: Limits for Fluid Resuscitation in the Field

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Objective: Recent acute studies in animals challenged current guidelines which aim for normotension during fluid resuscitation (FR) attempts from uncontrolled hemorrhagic shock (UHS) in the field. This study developed an outcome model in rats and compared different FR regimens.

Methods: Lightly anesthetized rats, breathing spontaneously, were insulted with UHS by standard tail amputation. After a one hour simulated field phase of UHS (with or without FR), a hospital phase began with hemostasis and all-out FR, including blood intravenously (IV) to restore Hct = 30%. Survival was recorded to 3 days. Rats were randomized into four groups ($n = 4 \times 7$): Group I, untreated controls (no FR, no hemostasis); Group II, no field FR for 1 hour (h), but hospital hemostasis and all-out FR at 1–3 h; Group III, normotensive field FR for 1 h (lactated Ringer's IV to MAP 90 mmHg), followed by hospital hemostasis and all-out FR at 1–3 h; and Group IV, hypotensive field FR for 1 h (lactated Ringer's IV to MAP = 45 mmHg), followed by hospital hemostasis and all-out FR at 1–3 h.

Results: In Group I, 7/7 rats died at 2–12 h. In Group II, 7/7 rats survived three days functionally normal. In Group III, 3/7 rats survived normal, 2/7 survived with disability, and 2/7 died at 3 h and 12 h post-UHS. In Group IV, 7/7 rats survived 3 days functionally normal. Group III had "washout anemia" (Hct 4–12%) at one h and persistent tissue edema. Neurologic deficient in Group III was worse than in Groups II or IV ($p = .02$).

Conclusions: A new UHS rat model achieves reproducible outcomes. In UHS, FR with plasma substitute in the field should prevent cardiac arrest, but it is not necessary to aim for normotension. Critical MAP and Hct levels need experimental evaluation.

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External Plate Fixation: Experiences of the UNTAC Field Hospital, Pnomh Penh

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On behalf of the United Nations Transitional Authority in Cambodia (UNTAC), the German Armed Forces are operating a field hospital in Phnom Penh with two container theaters. The task of this hospital is to provide medical care for the 12,000 UNTAC delegates and for serious emergencies of the Khmer population.

Of special importance are the numerous compound fractures, in addition to war injuries and traffic accidents. Wound debridement and stabilization by external fixation were the preferred procedures. Excellent results were gained by the external Stuhler-Heyse and by external plate fixation by means of the Altifix systems. The results show that these procedures are performed easily and quickly, treat post-traumatic osteitis, and are well-accepted by the patients.