Aggressive Management of Fatal Gunshot Wounds to the Head Yields More Organ Donors

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NEW YORK (Reuters Health) Oct 23 - Using a protocol of resuscitation with fluids, blood products, vasopressors and hormone replacement in patients with ultimately fatal gunshot wounds to the head, surgeons from the University of Arizona in Tucson were able to increase the percentage of organ donors to nearly half of those who met donor criteria.

Lead author Dr. Bellal Joseph told Reuters Health, "We aggressively resuscitate all our trauma patients irrespective of their presenting Glasgow Coma Scale score. We found that use of hormonal therapy led to a considerably increased organ procurement rate in patients with non-survivable head injury."

They reviewed the records of 141 patients with head gunshot wounds, of which 98 were fatal, over a 5-year period. Of those with fatal wounds, 69 were deemed eligible for organ donation, 20 were not (due to age, coagulopathy, sepsis, or other reasons), and nine had incomplete data.

Brain death was diagnosed by physical examination with or without brain perfusion scans. Dr. Joseph explained that his group feels brain death is a clinical diagnosis which can be accurately determined by a detailed neuro-physical examination.

As reported online October 14 in the American Journal of Surgery, 34 (49%) of the 69 eligible gunshot wound victims became organ donors, yielding 72 organs: 30 kidneys, 16 hearts, nine livers, eight lungs, seven pancreata, and two small bowels.

Previous papers from other institutions describing organ procurement in fatal head gunshot wounds have shown donation rates of 15% to 35%.

Dr. Aaron Brody is a research fellow in the Department of Emergency Medicine at Wayne State University School of Medicine in Detroit. By email, he said, "The donation rate of 49% represents a significant improvement from our study and previous work. I am glad to see that the work of a dedicated team, which addresses both physiologic and social-legal aspects of organ donation, has the potential to drastically increase the number of organs available for transplant."

Blood transfusions and vasoactive drugs were used in similar numbers of donors and non-donors. Dr. Joseph said in an email that their T4 protocol, consisting of 20 mcg levothyroxine, 20 U regular insulin, 2 g
methylprednisolone, and 1 ampule of 50% dextrose, was used in 21 patients and was associated with a higher rate of organ donation (41% vs. 16% when not used).

The difference in donation rates with the T4 protocol was significant on both univariate (p=0.006) and multivariate (p=0.01) analyses.

"Hormonal resuscitation is widely practiced across centers in the country to restore hemodynamic stability for donor management, said Dr. Joseph. "Although in our center we did not have an established procedure defining the use of T4 protocol, it was consistently used for achieving donor management goals."

Regarding the T4 protocol, Dr. Brody, who was not involved in the study, said, "I don't know what other centers are doing now. In our hospital, a busy community urban center which sees the most penetrating trauma in Detroit, we do not use it routinely."

The use of a retrospective methodology raises the question of association, said Dr. Brody. That is, he said, "it could be that patients who were identified early as potential donors were treated with the T4, and thus the association between T4 and completed organ donation simply reflects that early identification, and not a 'donation benefit' from the protocol."

Characteristics of donors and non-donors were similar in demographics, mechanisms of injury and physiologic parameters. The most common reasons for not donating were lack of family consent (54%) and cardiac arrest (34%).

The T4 protocol, which the authors felt was very important in achieving their high rate of donation, has been recommended by national transplantation societies for use in potential donors with poor cardiac function.

At the University of Arizona, potential donors and those who may survive are treated in the same way. "Clinical outcomes in patients with gunshot wound to the head are not predictable, and early resuscitation can improve survival and delay immediate physiologic death," said Dr. Joseph. They do not alter their approach until it is known that organ donation cannot be done due to consent or other issues.

The authors concluded that although their resuscitation strategy was effective, family consent remains a big problem.

Dr. Brody wished the authors had elaborated on the issue of improved communication with family. "If they have a specific strategy, it would be worthwhile sharing it," he said.
