

Organ Donor Management Intensivist's role

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Step wise approach

- ◆ Early identification of patients with devastating brain injury
- ◆ Early referral to OPO (within 1 hr of meeting the clinical triggers)
- ◆ Process of diagnosing Brain death.
- ◆ Approaching family and obtaining consent for organ donation (through collaboration with OPO personnel and PICU team)

Goal : Optimum organ physiology with aggressive donor management policy

- ◆ To improve :

- ◆ 1) the number of potential donors
whose organs are suitable

- ◆ 2) number of organs transplanted
per donor

- ◆ 3) graft function and survival in
recipient

🏆 Institution of aggressive donor management policy at hospitals have shown to increase the donor pool.



J.Trauma.2005;58:991-994

- ✦ In this LAC+USC study , records of all patients referred to OPO for possible organ donation over the period of 8 yrs were reviewed
- ✦ Comparisons were made between before(95-98) and after(99-02) implementation of ADM policy.

Study cont.

- ◆ The period after ADM showed increase in :
 - ◆ Total referrals by 57%
 - ◆ Potential donors by 19%
 - ◆ Actual donors by 82%
 - ◆ Organs recovered by 71%
 - ◆ Decrease in the no. donors lost to hemodynamic instability by 71%

Study cont.

- ◆ The protocol of ADM that was instituted were as follows :
- ◆ 1. Hemodynamic monitoring and tissue perfusion
- ◆ 2. Aggressive fluid resuscitation
- ◆ 3. Vasopressors for $MAP < 70$
- ◆ 4. Hormonal Tx(steroids, insulin, glucose and T4)
- ◆ 5. TX of. brain death complications i.e., DI, DIC, electrolyte derangements.

Cardiovascular instability

- ◆ Manifestation of cardiovascular events during transition to Brain Death:
- ◆ Stepwise changes : ↑ ICP → vagal activation → bradycardia → involvement of Pons → sympathetic stimulation → Cushing's response.
- ◆ Extension of ischemia to vagal nucleus in Medulla causes unopposed sympathetic stimulation (storm) , characterized by hypertension ,tachycardia and increased cardiac output.

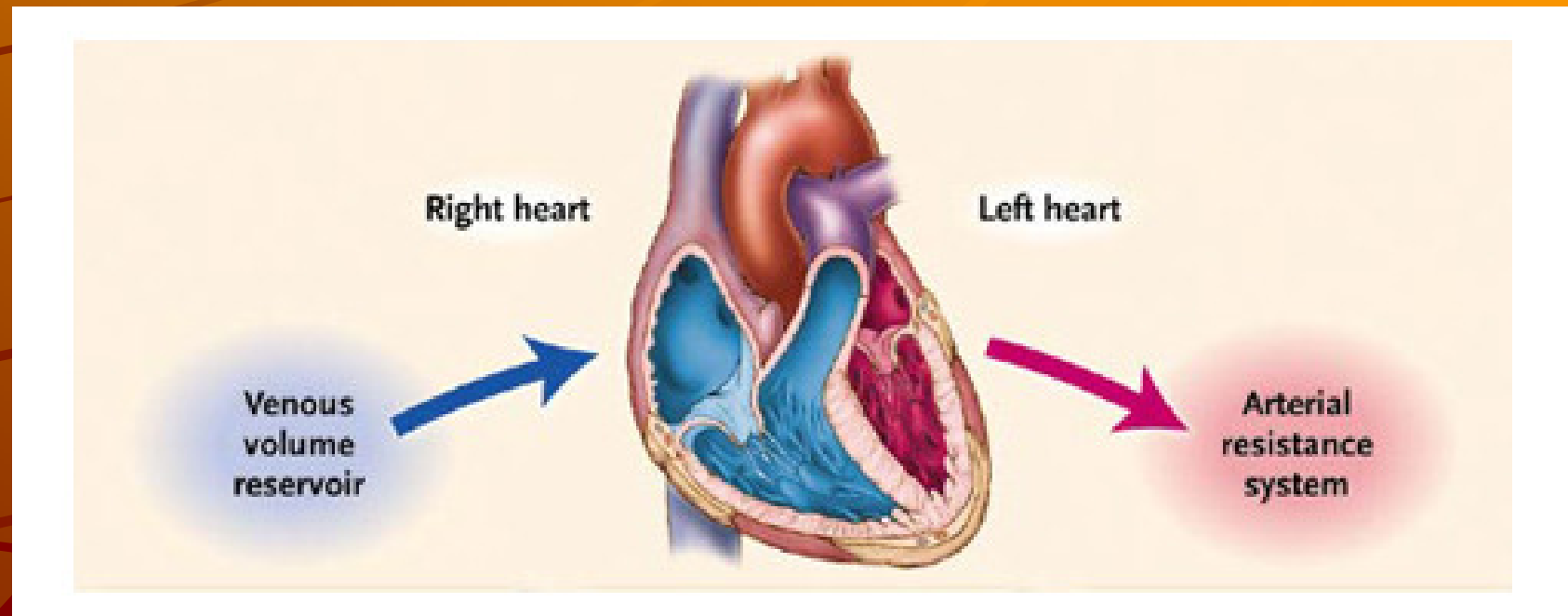
Cardiovascular instability con't

- ✦ Increased SVR as a result of ↑ catecols will lead to ↓ CO elevated L atrial pressure and eventually neurogenic pulmonary edema (ARDS).
- ✦ This hyperdynamic phase may cause ischemic injury to the myocardium, which has been largely responsible for postop heart failure and fatal dysrhythmias in heart transplant recipients.

Cardiovascular cont.

- ✦ As ischemia progresses down the cervical medulla the sympathetic storm diminishes and the spinal sympathetic pathways gradually become paralyzed.
- ✦ This will lead to heart rate and CO. similar to high output cardiac failure further decreasing the perfusion pressure and myocardial damage.

Hydraulic model of circulation



Hypovolemia

Absolute hypovolemia

Initial injury

Inadequate resuscitation

Fluid leaking into interstitial space

Decreased intravascular oncotic pressure after crystalloid resuscitation

Treatment for elevated intracranial pressure

Fluid restriction

Urea

Diuretics

Mannitol

Hyperglycemia-induced osmotic diuresis

Central diabetes insipidus

Hypothermic "cold" diuresis

Effective hypovolemia

Loss of vasomotor tone and pooling in venous capacitance bed

Hypothermia treated with rewarming

Cardiac dysfunction

Preexisting disease

Initial injury

Myocardial contusion

Pericardial tamponade

Myocardial ischemia or infarct

Process of brain death

Catecholamine damage

Ischemia-reperfusion injury

Metabolic depression

Acidosis

Hypothermia

Hypophosphatemia

Hypocalcemia

Hypoxia

Endocrinopathy

of brain death

Volume overload resulting in congestive heart failure

Arrhythmias

Catecholamines

Ischemia

Hypokalemia

Hypomagnesemia

Vasodilation

Spinal shock

Catecholamine depletion

Loss of vasomotor control and autoregulation

Relative adrenal insufficiency as a result of trauma or critical illness

Endocrinopathy

of brain death

Acquired sepsis

Cardiovascular cont.

- ✦ Sympathetic storm is generally short and transient, but if prolonged and refractory may need TX with short acting agents (Esmolol and Nitoprusside) .



Cardiovascular cont.

- ◆ Hypotension will follow the sympathetic storm.
- ◆ This is much more troublesome and if not treated will lead to cardiac arrest.
- ◆ Guidelines and protocols ask for set level of BP, but as long as perfusions parameters are met (good urine output and low level of lactate) donor will remain stable.

Management of hemodynamically unstable with low BP

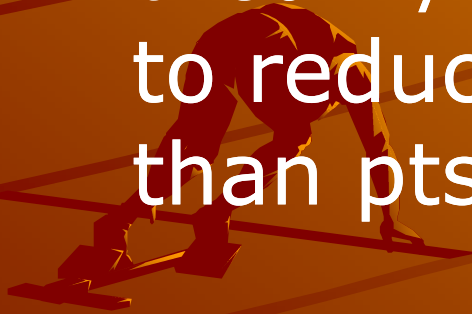
- ✦ Volume loading to the CVP of 8-10
- ✦ Judicious use of dopamine, epinephrine, neosynephrine, norepinephrine to targeted values depending on age
- ✦ Early hormonal replacement therapy with vasopressin, levothyroxine and steroids

The importance of Hormonal replacement therapy

- ◆ Early HR therapy will stabilize and improve cardiac function in brain-death donors, which then will translate in increase in organs transplanted per donor.
- ◆ Of 10,292 consecutive brain death donors analyzed (Transplantation, Feb.03). The no. of organs recovered from 700 donors who received 3 HR was 22% greater than that from nonhormonal resuscitation donors.

The effect of thyroid hormone infusion on vasopressor support

- ✦ (Critical Care Medicine, nov 04)
- ✦ This study showed that peds pts who met the brain death criteria and were txed w/ T4 infusion were more likely to reduce their vasopressor need than pts who were not treated.



Special consideration in the management

- ◆ DI : It is very common and should be suspected if $u_o > 3-4 \text{ cc/kg}$, serum Na > 150 and urine specific gravity < 1.005 .
- ◆ TX in a normotensive donor is continuous infusion of DDAVP and urine replacement cc for cc above $3-4 \text{ cc/kg}$ with $\frac{1}{2}$ NS every hour.
- ◆ In a hypotensive donor use Vasopressin $0.5 \mu\text{u/kg/hr}$ and titrate to the effect and replace urine cc for cc with $\frac{1}{2}$ NS above $3-4 \text{ cc/kg}$

Special consideration

Hypernatremia

- ✦ Another frequent occurrence, generally due to DI ,Mannitol or 3% Saline.
- ✦ May adversely affect postop. Graft function (liver, kidney).



Potential lung donor ,special management

- ◆ Hemodynamically stable donor who are on $< 5 \text{ mc/kg/min}$ of presser with relatively clear chest X Ray and negative bronchoscopic finding for aspiration or pneumonia should be considered for additional TX :
 - ◆ 1) HOB to 30 degree
 - ◆ 2) Early use of T4 if hypotension occurs
 - ◆ 3) Minimize fluids if possible
 - ◆ 4) mannitol for diuresis only if stable.
 - 5) DO NOT risk a cardiac arrest due to under resuscitation

In summary

- ✦ Early recognition of potential donors by implementing the “trigger tools” for the staff, as a way of linking to OPO.
- ✦ Early recognition and diagnosis of brain death based on established national guidelines.
- ✦ Aggressive donor management with early hormonal replacement tx.

Remember

- ✦ That the care for the donor is the natural extension of care for a critically ill or injured patient.

