

# Ultrasound Clarifies Unexplained Hypotension

*Search for fluid in the peritoneal cavity or around the heart; rule out gross cardiac abnormalities.*

BY TIMOTHY F. KIRN  
Sacramento Bureau

SOUTH LAKE TAHOE, CALIF. — Bedside ultrasound should be used in the emergency department for patients with undifferentiated hypotension, Dr. John S. Rose said at an emergency medicine conference sponsored by the University of California, Davis.

The device can help identify three major physical causes of hypotension: fluid in the peritoneal cavity, fluid around the heart or gross cardiac abnormalities, and an abdominal aortic aneurysm, said Dr. Rose of the department of emergency medicine at UC Davis Medical Center, Sacramento.

"Ultrasound really will change your practice, not just in the trauma setting," said Dr. Rose who described some hypothetical situations in which ultrasound

might be used. They included a 24-year-old female who might have a ruptured ectopic pregnancy, a cancer patient undergoing treatment who could have pericardial effusion, and a 60-year-old patient with a systolic blood pressure of 70 mm Hg who might have an aortic aneurysm.

Because unexplained hypotension is potentially life threatening, one doesn't usually use restraint in ordering tests and studies in these cases, Dr. Rose said. And often there is no time to trundle the patient off to some other department for imaging studies.

"We do a lot of empiric things when they come in sick, so why not add [an ultrasound exam] on top of it?" he said.

"You can still do a comprehensive evaluation. The purpose behind the exam is just to think about the three reversible causes that you can find with ultrasound."

Dr. Rose's proposed exam consists of

three ultrasound views: a right upper quadrant view, the same as is used for a focused assessment with sonography for trauma, or FAST, examination; a cardiac assessment with a subxiphoid or parasternal long axis view; and an abdominal view.

The right upper quadrant view—which looks for fluid in the peritoneal cavity, in Morison's pouch between the liver and kidney—is not always sensitive in a trauma patient with limited bleeding. But it will be in the pa-

tient who has lost enough blood from the circulatory system to be hypotensive, and evidence bears this out, Dr. Rose said.

The cardiac assessment, which Dr. Rose calls a "limited echo," is practical because it does not require extensive expertise, he said. It is a procedure that could be taught to an emergency physician in half an hour. One is simply looking to see that the heart

is beating vigorously, that the left ventricle appears to be filling, and that there is no pericardial effusion.

The abdominal view follows the aorta all the way down, from substernum to the bifurcation, he said. As with the intraperitoneal findings, evidence shows that most abdominal aortic aneurysms associated with hypotension are apparent on ultrasound, and they are almost never missed in the emergency department.

Each of these assessments can be accomplished extremely quickly, and none needs a special transducer, he added.

"If you find free fluid, an effusion, or an [abdominal aortic aneurysm], I guarantee you are going to change the course on that patient," Dr. Rose said. "You are going to do something different. This is not just for 'I'd like to know.'"

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## CPR Guidelines Specialized for Lone Rescuers of Children and Adults

BY KATE JOHNSON  
Montreal Bureau

CHICAGO — The American Heart Association's renewed emphasis on compression versus ventilation in its latest cardiopulmonary resuscitation guidelines folds children and adults into the same category when only one rescuer is present.

In the hands of a lone rescuer, regardless of whether it is a layperson or a health care provider, children of all ages (excluding newborns) should be treated using a 30:2 compression-ventilation ratio, said Dr. Robert Hickey, one of the authors of the guidelines, past chair of AHA's pediatric subcommittee, and chair of the Emergency Cardiovascular Care Committee of the AHA.

A ratio of 15:2 is advised if there are two trained (not lay) rescuers present. "In children, rescue breaths are more important partly because they largely have asphyxial arrest," he said in an interview at a meeting sponsored by the American College of Emergency Physicians.

Another pediatric specification of the guidelines is that cuffed endotracheal tubes are as safe as uncuffed ones for infants (except newborns) and children in the hospital setting—as long as rescuers use the correct tube size and inflation pressure, and verify tube position, he said. In fact, cuffed tubes may even be preferable under certain circumstances, such as poor lung compliance, high airway resistance, and large glottic air leak, he said.

Dr. Hickey said the most important overall message in the new guidelines (Circulation 2005;112 [24 Suppl.]:IV1-203)—for both children and adults—is the renewed focus on cardiopulmonary resuscitation (CPR). "Not enough people get CPR, and not enough people who get CPR get good CPR," said Dr. Hickey, professor of pediatrics at the University of Pittsburgh and attending physician in the division of pediatric emergency medicine at Children's Hospital of Pittsburgh.

The new guidelines stipulate that either one or two hands can be used for chest compressions in children.

However, he said studies show that most efforts at CPR—even when given by health care professionals—are still inadequate, involving too few chest compressions, compressions that are too weak, too many ventilations, and too many interruptions.

There is strong evidence pointing to the importance of optimizing chest compressions, even at the expense of ventilation, he said. In fact, some studies suggest that excessive ventilation might actually be leading to life-threatening hyperventilation-induced hypotension. A recent paper suggested that unrecognized and inadvertent hyperventilation could be contributing to the currently dismal survival rates from cardiac arrest (Circulation 2004;109:1960-5).

"Even if you do it right, there is a loss of coronary perfusion pressure each time you stop to do a ventilation," Dr. Hickey said. "This is what fuels arguments for chest compression only."

Chest compressions should take priority even over defibrillation, he added. One study showed an improved survival rate of 22% in patients when defibrillation was delayed until after the initiation of chest compressions, compared with a 15% survival rate among patients whose chest compressions followed defibrillation (JAMA 2003;289:1389-95). The same study showed that among patients with more than a 5-minute delay in rescue response following cardiac arrest, immediate defibrillation resulted in only a 4% survival rate, compared with a 22% survival rate in those who had chest compressions before defibrillation.

Dr. Hickey added that high-dose epinephrine is not recommended in children, based on a study showing that it did not improve return of spontaneous circulation and resulted in worse 24-hour survival (New Engl. J. Med. 2004;350:1722-30).

In neonatal resuscitation cases, current recommendations no longer advise intrapartum oropharyngeal suctioning for infants born after meconium staining of amniotic fluid, he said. Endotracheal suctioning immediately after birth for infants who are not vigorous is now recommended, Dr. Hickey added. ■

## Pyridostigmine Raises Standing BP in Orthostatic Hypotension

Pyridostigmine significantly improves standing blood pressure in patients with orthostatic hypotension, and it does so without worsening supine hypertension, reported Dr. Wolfgang Singer and his associates at the Mayo Medical Center, Rochester, Minn.

Midodrine is the only drug previously shown in a blinded trial to improve orthostatic hypotension. But midodrine and other adrenergic agonists aggravate supine hypertension, "a major problem" in these patients because their blood pressure fluctuates widely throughout the day. Adrenergic agonists also raise the risk of intracerebral hemorrhage, the investigators said.

Dr. Singer and his associates assessed the effects of pyridostigmine, an anticholinesterase agent, in a study of 58 patients with neurogenic orthostatic hypotension. The 30 men and 28 women had associated multiple system atrophy (17 patients), pure autonomic failure (15), diabetic autonomic neuropathy (11), autoimmune autonomic neuropathy (9), or unspecified neurogenic orthostatic hypotension (6).

On sequential days, the subjects took either oral placebo, 60 mg of pyridostigmine alone, pyridostigmine plus a subthreshold dose of midodrine (2.5 mg), or pyridostigmine plus low-dose midodrine (5 mg).

Pyridostigmine alone or with midodrine alleviated orthostatic hypotension, compared with placebo. The blood pressure fall upon standing was 27.2 mm Hg with pyridostigmine plus 5 mg midodrine, compared with a fall of 34.0 mm Hg for placebo.

Although the mean improvement in standing blood pressure was modest, a small increase appears to suffice in alleviating symptoms. "Symptomatic improvement in some individuals was dramatic," the researchers said (Arch. Neurol. 2006;63:www.archneurol.com [doi.10.1001/archneur.63.4.noc50340]).

Most patients chose to continue taking pyridostigmine. Of the 29 patients who were available for follow-up 1-2 years later, 20 (69%) were still taking it. And of those 20 patients, 17 (85%) "were extremely satisfied" with the medication and rated their orthostatic symptoms as moderately to markedly improved. Ten patients reported an increased energy level, said Dr. Singer.

—Mary Ann Moon