**Intra-operative Hemodynamic Monitoring**

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It has become clear, over the past decade, that fluid and hemodynamic management in the operating room can have important effects on postoperative patient outcome. The concept of early "Goal Directed Therapy" (GDT), successfully used in the emergency room management of septic patients by Dr. Rivers (1), has been applied with great advantage to patients undergoing major surgery (2). It has been well shown that giving the "right" amount of the "right" fluid at the "right" time leads to shorter hospital stay and earlier return of bowel function. The question, of course, is what is "right" for each patient and circumstance.

GDT, which encompasses both fluid and hemodynamic management, is an attempt to optimize (or at least provide sufficient) tissue perfusion and oxygenation through individualized support of cardiovascular function. The bowel is at particular risk for "subclinical" ischemia during major surgery. Postoperative gastrointestinal function is a major factor in postoperative course, and it can be improved by aggressive, early maneuvers to improve cardiovascular function. Such maneuvers most often involve fluid and/or inotrope administration, It is likely that other tissues, such as renal and neural, benefit from these maneuvers as well.

GDT requires hemodynamic information beyond simple pulse rate and blood pressure. Additional information useful in GDT may include preload parameters (e.g. corrected flow time by Doppler, dynamic parameters such as stroke volume variation by arterial pulse), cardiac output parameters (e.g. stroke index), global oxygenation (e.g. SVC oxygen saturation), and peripheral oxygenation/perfusion assessment (e.g. thenar eminence near infra-red spectroscopy). Dynamic paramaters, in particular, are of interest because of their value in predicting fluid responsiveness (3). Because intraoperative Goal Directed Therapy is still in its infancy, there are still numerous questions and controversies surrounding its implementation. What should the hemodynamic goals be? What parameters are most useful? What fluid should be used?

It is clear that of thoughtful fluid/hemodynamic management based upon individual patient data can improve outcome. Data suggests that the use of colloid as part of the regimen is beneficial. Future research will show us how to use tissue oxygenation and perfusion indices to drive fluid and hemodynamic management, allowing us to target specific hemodynamic parameters, and use specific types of fluids tailored to the needs of individual patients.

1. NEJM 2001;345:1368-1377
2. Anesthesiology 2002;97:820-6