Best Practice: Cardiac Function

Forestall ESRD patients’ cardiovascular complications by routine clinical exams supported by hemodialysis cardiac function screening.

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in patients with End-Stage Renal Disease (ESRD). Transonic® Cardiac Function Monitoring provides a way to integrate cardiac function studies into a hemodialysis clinic’s treatment protocol and forestall the devastating effects of CVD.

Transonic® Monitoring identifies:

1) Dangerously high and prolonged levels of access flow (>1,600-2,000 mL/min) stress the heart causing cardiomegaly and heart failure. This can be identified by an access flow to cardiac output ratio (AVF/CO) exceeding 25-30%.

2) Dangerously low cardiac output (CI < 2 L/min/m²) which places patients at high risk for cardiovascular complications and failure.

3) Dramatic 20 - 30% decreases of Cardiac Index during hemodialysis to dangerously low levels due to inaccurate dry weight estimation and/or inadequate medication that places patients at high risk for cardiovascular complications and sudden death following a dialysis session.

4) Dangerous decreases in Central Blood Volume during dialysis that may portend hypotensive episodes.

Transonic® proprietary ultrasound indicator dilution technology measures Cardiac Output and the following derived cardiac function parameters: Cardiac Output; Cardiac Index; Peripheral Resistance; Central Blood Volume; Central Blood Volume Index.

Central Hemodynamic Profiling (CHP) is the periodic assessment of cardiac function during the hemodialysis session in order to track the heart’s response to the stress of a dialysis treatment (Fig. 2). CHP identifies patients who leave hemodialysis sessions with dangerously low cardiac indices (CI ≤ 2.0), that increases their risk for death, stroke or myocardial infarction.

Cardiovascular mortality in ESRD patients, depending on age, is 10 - 500 times greater than the general population.

Special Report: NKF Task Force on Cardiovascular Disease, AJKD 1999; 32(5)
HOW IT WORKS:
ULTRASOUND INDICATOR DILUTION
(Cardiac Output)

With blood lines in the normal line position and no direct recirculation present, cardiopulmonary recirculation represents a measure of cardiac output (Fig. 3). The complete bolus of saline indicator travels into the heart where it is mixed (diluted) into the full cardiac output. Part of this diluted indicator then reappears at the Transonic® arterial sensor. Cardiac output and Cardiac Index are calculated using conventional Stewart-Hamilton analysis.

SELECT REFERENCES*

17. Huu, TC et al, "Non-Invasive Measurement of Access Flow (Qac) and Cardiac Output (CO) in Hemodialysis Patients," Nephrol Hemodialy Transplant 1999; 14(9): A175. (HD34V)

* Numbers in parentheses ( ) are Transonic® reference numbers.

Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells “gold standard” transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides

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