POSTOPERATIVE Oliguria

Susan Garwood, M.B.ChB, B.Sc., FRCA

Urine flow is an indicator of blood flow to the kidneys. Oliguria is defined as urinary output <0.5 ml/kg/hour. Postoperative oliguria is a bad prognosticator when it indicates perioperative acute renal failure (ARF) (Table 1). Perioperative ARF has a poor outcome, with up to a 90% mortality rate in some series. Perioperative ARF accounts for 50% of all new dialysis patients. Postoperative oliguria must be aggressively pursued. It is better to prevent postoperative oliguria and perioperative ARF than to deal with it once it has become established. Recognize patients at risk and procedures liable to be associated with this problem.1 Review patient data and establish baseline renal function. Monitor renal performance vigilantly from the outset; measure urine output half hourly and act aggressively in managing a falling output. Recognize what is "normal" for each patient.

A. Traditionally, postoperative oliguria is divided into pre-renal, renal (parenchymal), and postrenal etiologic classifications. Prerenal causes are the most common and result in reduced renal perfusion. These problems need to be immediately addressed; renal hypoperfusion can rapidly result in renal parenchymal damage and established ARF. Under most circumstances, renal perfusion is better preserved by increasing cardiac output than by increasing blood pressure with vasoconstrictors.2 Postrenal causes are usually the most easily remedied and need to be corrected; urinary tract obstruction can also lead to renal parenchymal damage.

B. Renal causes of oliguria are the most difficult to diagnose and treat. If oliguria persists after exclusion of, or meticulous correction of, pre- and postrenal causes, then assume there is renal parenchymal damage. First, establish the patient's baseline, preoperative renal function. Review the chart for ischemic periods (hypotension, hemorrhage, hypoxia), nephrotoxic exposure, and patient history of renal insufficiency. (A patient with poor renal reserve may be tipped into ARF by even small perturbations.) Call for a nephrology consult early. It has been known for 25 years that the sooner therapy commences, the better the outcome.3 The conversion of oliguric to nonoliguric renal failure with the help of drugs (furosemide, mannitol, dopamine) is very controversial. Their mechanisms of action are not yet fully understood, and treatment is not always beneficial.4 Do not initiate this therapy without (1) first measuring baseline serum and urine parameters for derived renal indices,5 (2) careful consideration of the effect of these drugs on the cardiorespiratory system, and (3) advice from a nephrologist.

References


| TABLE 1 Indices Differentiating Prerenal from Intrinsic Renal Failure |
|------------------|------------------|
|                  | Prerenal failure | Intrinsic renal failure |
| Osmolality       | —                | <400 mOsm/kg H2O        |
| U/P osmolality   | —                | <1.5                     |
| U/P creatinine   | >40              | <10                      |
| U/P urea         | >14              | <10                      |
| Urinary sodium   | <20              | >40                      |
| Renal failure index | <1           | >1                       |
| FENa             | <1%              | >1%                      |
| Free water clearance | ≤20 m/hr     | ≥20 m/hr                 |
| Creatinine clearance | >25 ml/min  | ≤25 ml/min               |

U = urine; P = plasma; FENa = fractional excretion of sodium.
Patient with POSTOPERATIVE Oliguria
Urine output < 0.5 ml/kg/hr

A. Check for and correct:

Prerenal causes
- Review perioperative fluid balance
- Calculate and replace fluid deficits
- Blood loss/third spacing
- NPO/insensible losses/NG aspirate
  (Note blood loss and third spacing continues postop)
- Check for occult bleeding

Postrenal causes
- Foley kinked/blocked/disconnected
- Bladder/ureter blocked or disrupted
  (KUB film with contrast)

No response to replacement therapy

Optimize filling pressures and cardiac function
- CVP/PAC/echo as appropriate
- Check CXR for failure (pulmonary edema,
  Kerley-B-Lines)
- Inotropes/vasodilators as appropriate

Excluded or corrected
Still oliguric

B. Assume parenchymal damage and look for causes

Patient with increased risk
- Elderly
- Diabetic
- Poor cardiac function
- PVD
- Renovascular disease
- Sepsis
- Other organ failure (especially hepatic)
- Extensive burns

Increased risk from procedure
- Aortic reconstruction
- Cardiopulmonary bypass
- Trauma surgery
- Liver transplant
- Kidney transplant

Renal Insults
- Hypoxia
- Hypotension
- Taminoglycosides
- Sepsis
- Pigmenturia
- Radiocontrast dye
- TBilirubin

Send urine and serum for osmolality/NA/creatinine
Do 2-hour creatinine clearance
Call nephrologist

Information for nephrologist to review
- Patient history and current status
- Current hemodynamic status
- Current therapy
- Information regarding risks and exposure to renal insult
- Hourly/daily fluid balance
- Baseline/trend/current BUN and creatinine