Time to Abandon Nonionic Contrast?

Every year, over 10 million intravascular contrast examinations are performed in the United States. A typical dose of 200 mL of high-osmolality ionic radiographic contrast costs approximately $8 (e.g., diatrizoate, iohalate, and others). In comparison, low-osmolality nonionic contrast costs up to $170 for equivalent volumes (e.g., iopamidol, ioxeal, and others). If nonionic contrast were to be used exclusively for radiographic examinations in the United States, the cost of the contrast alone would amount to $1.2 billion (1,2). In this era of limited health care funding, we must determine if this significant extra expense is justified.

In this issue of JASN, Barrett has outlined our current understanding of radiographic contrast-induced nephrotoxicity (3). The reported risk of developing some degree of contrast-induced renal impairment is between 2 and 6% in unselected patient populations. These differences in reported risk are largely based on the definitions used to define contrast-induced nephropathy (4). Increments in serum creatinine of 0.5 mg%, although important in research studies, are clinically unimportant. The risk of clinically significant contrast nephrotoxicity characterized by oliguria or need for dialysis (as determined by pooling the results of the larger clinical trials) after contrast exposure is much lower, on the order of 7 patients per 10,000 in unselected study populations. The leading and perhaps the only significant risk for the development of contrast nephrotoxicity is underlying renal impairment, and the risk of nephrotoxicity increases exponentially as renal function declines. In patients without preexisting renal impairment, clinically important contrast nephrotoxicity is rare.

In a study from our institution in which 443 patients undergoing diagnostic cardiac catheterization were randomly assigned to the nonionic agent iopamidol or the ionic agent diatrizoate, there were no differences in mean serum creatinine concentrations 48 h after contrast exposure between the two groups (5). Several authors have come to similar conclusions (3). A short-coming of these studies is that less than 10% of patients enrolled had significant preexisting renal insufficiency. Barrett et al. specifically addressed the issue as to whether nonionic contrast material has an advantage in preventing contrast-induced renal dysfunction over ionic contrast mate-

rrial in patients with known renal disease and were unable to find a difference (6). Subsequently, Barrett and Carlisle performed a meta-analysis of studies involving ionic and nonionic contrast media and found a statistically significant difference in nephrotoxicity; however, this difference was extremely small and probably of little clinical relevance (7). Rudnick and associates (8) recently presented the results of a large, multicenter trial that compared ionic and nonionic contrast media used during cardiac catheterization and specifically selected a large group of patients with preexisting renal impairment (8). Slight but significantly greater increases in serum creatinine concentration were seen in patients receiving ionic contrast media who had preexisting renal impairment, especially among diabetics with renal impairment. However, there were no differences between the two groups in the number of patients requiring dialysis after contrast media exposure.

Steinberg, Hlatky, Powe and coworkers have performed elegant cost analysis of the relative benefits of using ionic and nonionic contrast media for coronary angiography (2,9,10). Steinberg et al. noted no difference in the occurrence of severe adverse effects among 505 patients randomized to either ionic or nonionic radiographic contrast media during diagnostic coronary angiography. However, they noted a significantly increased number of what they classified as moderate adverse reactions among the patients receiving ionic contrast media. These moderate adverse reactions included bradycardia and exacerbation of chest pain requiring medications to treat. If nonionic contrast media were used exclusively, they projected that it would cost $45,842 to avoid one moderate adverse reaction. Hlatky et al. came to a similar conclusion, noting that the average cost per patient was $183 higher among patients studied using nonionic contrast material compared with those given ionic contrast media.

Given the enormous cost difference between ionic and nonionic agents, rational cost containment judgments need to be made. If the cost of the nonionic agents does not decrease significantly, then their use should reasonably be restricted to situations in which they may offer an advantage beyond limiting minor reactions. Thus, a prudent policy for the time being would be to restrict these agents to patients with a known contrast or iodine allergy, those who are hemodynamically unstable or at significant risk of instability, or those with renal impairment characterized by a serum creatinine level of more than 1.5 mg%. In this manner, less than 15% of patients would receive nonionic agents, resulting in signifi-
cant cost savings. We as physicians must start making recommendations to thoughtfully allocate health care dollars. Failure to do so will result in others who are not responsible for patient care making these decisions for us.

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REFERENCES

4. Davidson CJ, Hlatky M, Morris KG, et al.: Cardiovascular and renal toxicity of a non-ionic radiographic contrast agent after cardiac cathe-