

FIGURE 8-38

Analysis of the severity and mortality in acute renal failure (ARF) patients needing dialysis. This figure is an example of the uses of a severity index for analyzing the effect of treatment on the outcome of ARF. Looking at the mortality rate, it is clear that it is higher in patients who need dialysis than in those who do not. It could lead to the sophism that dialysis is not a good treatment; however, it is also clear that the severity index score for ARF was higher in patients who needed dialysis. Severity index is the mean of the individual severity index of each of the patients in each group [36]. (Data from Liaño *et al.* [1].)

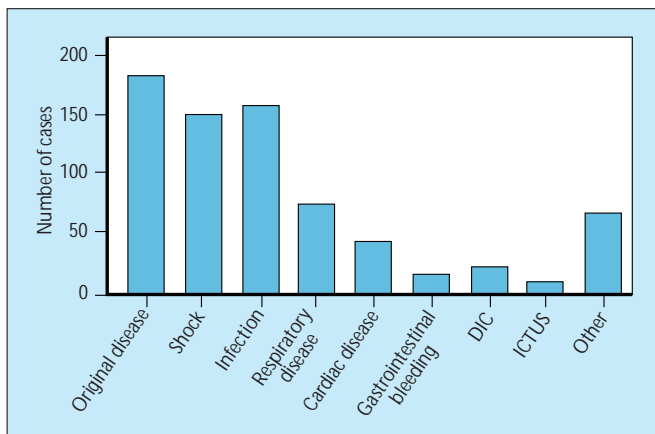


FIGURE 8-39

Causes of death. The causes of death from acute renal failure (ARF) were analyzed in 337 patients in the Madrid ARF Study [1]. In this work all the potential causes of death were recorded; thus, more than one cause could be present in a given patient. In fact, each dead patient averaged two causes, suggesting multifactorial origin. This could be the expression of a high presence of multiple organ dysfunction syndrome (MODS) among the nonsurviving patients. The main cause of death was the original disease, which was present in 55% of nonsurviving patients. Infection and shock were the next most common causes of death, usually concurrent in septic patients. It is worth noting that, if we exclude from the mortality analysis patients who died as a result of the original disease, the corrected mortality due to the ARF episode itself and its complications, drops to 27%. GI—gastrointestinal; DIC—disseminated intravascular coagulation.

## References

- Liaño F, Pascual J the Madrid ARF Study Group: Epidemiology of acute renal failure: A prospective, multicenter, community-based study. *Kidney Int* 1996, 50:811–818.
- Brivet FG, Kleinknecht DJ, Loirat P, *et al.*: Acute renal failure in intensive care units—causes, outcome and prognostic factors of hospital mortality: A prospective, multicenter study. *Crit Care Med* 1995, 24:192–197.
- Pascual J, Liaño F, the Madrid ARF Study Group: Causes and prognosis of acute renal failure in the very old. *J Am Geriatr Soc* 1998, 46:1–5.
- Eliahou HE, Modan B, Leslau V, *et al.*: Acute renal failure in the community: An epidemiological study. Acute Renal Failure Conference, Proceedings. New York 1973.
- Abraham G, Gupta RK, Senthilvelan A, *et al.*: Cause and prognosis of acute renal failure in Kuwait: A 2-year prospective study. *J Trop Med Hyg* 1989, 92:325–329.
- McGregor E, Brown I, Campbell H, *et al.*: Acute renal failure. A prospective study on incidence and outcome (Abstract). XXIX Congress of EDTA-ERA, Paris, 1992, p 54.
- Sanchez Rodriguez L, Martín Escobar E, Lozano L, *et al.*: Aspectos epidemiológicos del fracaso renal agudo en el área sanitaria de Cuenca. *Nefrología* 1992, 12(Suppl 4):87–91.
- Feest TG, Round A, Hamad S: Incidence of severe acute renal failure in adults: Results of a community based study. *Br Med J* 1993, 306:481–483.
- Lunding M, Steiness I, Thaysen JH: Acute renal failure due to tubular necrosis. Immediate prognosis and complications. *Acta Med Scand* 1964, 176:103–119.
- Lachhein L, Kielstein R, Sauer K, *et al.*: Evaluation of 433 cases of acute renal failure. *Proc EDTA* 1978, 14:628–629.
- Wing AJ, Broyer M, Brunner FP, *et al.*: Combined report on regular dialysis and transplantation in Europe XIII-1982. *Proc EDTA* 1983, 20:5–78.
- Gerrard JM, Catto GRD, Jones MC: Acute renal failure: An iceberg revisited (Abstract). *Nephrol Dial Transplant* 1992, 7:458.
- Kleinknecht D: Epidemiology of acute renal failure in France today. In *Acute Renal Failure in the Intensive Therapy Unit*. Edited by Bihari D, Neild G. London:Springer-Verlag; 1990:13–21.
- Chugh S, Sakhuja V, Malhotra HS, Pereira BJC: Changing trends in acute renal failure in Third-World countries—Chandigarh study. *Q J Med* 1989, 272:1117–1123.
- Seedat YK, Nathoo BC: Acute renal failure in blacks and Indians in South Africa—Comparison after 10 years. *Nephron* 1993, 64:198–201.
- Hou SH, Bushinsky DA, Wish JB, *et al.*: Hospital-acquired renal insufficiency: A prospective study. *Am J Med* 1983, 74:243–248.
- Shusterman N, Strom BL, Murray TG, *et al.*: Risk factors and outcome of hospital-acquired acute renal failure. *Am J Med* 1987, 83:65–71.

18. Lauzurica R, Caralps A: Insuficiencia renal aguda producida en el hospital: Estudio prospectivo y prevención de la misma. *Med Clin (Barc)* 1989, 92:331-334.
19. Liaño F, Solez K, Kleinknecht D: Scoring the patient with ARF. In *Critical Care Nephrology*. Edited by Ronco C, Bellomo R. Dordrecht:Kluwer Academic; 1998; Section 23.1: 1535-1545.
20. Kierdorf H, Sieberth HG: Continuous treatment modalities in acute renal failure. *Nephrol Dial Transplant* 1995; 10:2001-2008.
21. Knaus WA, Draper EA, Wagner DP, Zimmerman JE: APACHE II: A severity of disease classification system. *Crit Care Med* 1985, 13:818-829.
22. Knaus WA, Wagner DP, Draper EA, *et al.*: The APACHE III prognostic system: Risk prediction of hospital mortality for critically ill hospitalized adults. *Chest* 1991, 100:1619-1636.
23. Le Gall JR, Loirat P, Alperovitch A, *et al.*: A simplified acute physiology score for ICU patients. *Crit Care Med* 1984, 12:975-977.
24. Le Gall, Lemeshow S, Saulnier F: A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicenter study. *JAMA* 1993, 270:2957-2963.
25. Lemeshow S, Teres D, Pastides H, *et al.*: A method for predicting survival and mortality of ICU patients using objectively derived weights. *Crit Care Med* 1985, 13:519-525.
26. Lemeshow S, Teres D, Klar J, *et al.*: Mortality probability models (MPM II) based on an international cohort of intensive care unit patients. *JAMA* 1993, 270:2478-2486.
27. Knaus WA, Draper EA, Wagner DP, Zimmerman JE: Prognosis in acute organ-system failure. *Ann Surg* 1985, 202:685-693.
28. Marshall JC, Cook DJ, Christou NV, *et al.*: Multiple organ dysfunction score: A reliable descriptor of a complex clinical outcome. *Crit Care Med* 1995, 23:1638-1652.
29. Vincent JL, Moreno R, Takala J, *et al.*: The SOFA (sepsis-related organ failure assessment) score to describe organ dysfunction/failure. *Intensive Care Med* 1996, 22:707-710.
30. Liaño F, Pascual J: Acute renal failure, critical illness and the artificial kidney: Can we predict outcome? *Blood Purif* 1997, 15:346-353.
31. Douma CE, Redekop WK, Van der Meulen JHP, *et al.*: Predicting mortality in intensive care patients with acute renal failure treated with dialysis. *J Am Soc Nephrol* 1997, 8:111-117.
32. Viviani X, Gouvernet J, Granthil C, Francois G: Simplification of the SAPS by selecting independent variables. *Intensive Care Med* 1991, 17:164-168.
33. Bion JF, Aitchison TC, Edlin SA, Ledingham IM: Sickness scoring and response to treatment as predictors of outcome from critical illness. *Intensive Care Med* 1988, 14:167-172.
34. Chew SL, Lins RL, Daelemans R, De Broe ME: Outcome in acute renal failure. *Nephrol Dial Transplant* 1993, 8:101-107.
35. Liaño F: Severity of acute renal failure: The need of measurement. *Nephrol Dial Transplant* 1994, 9(Suppl. 4):229-238.
36. Liaño F, Gallego A, Pascual J, *et al.*: Prognosis of acute tubular necrosis: An extended prospectively contrasted study. *Nephron* 1993, 63:21-23.
37. Bonomini V, Stefoni S, Vangelista A: Long-term patient and renal prognosis in acute renal failure. *Nephron* 1984, 36:169-172.
38. Turney JH: Why is mortality persistently high in acute renal failure? *Lancet* 1990, 335:971.
39. Verde E, Ruiz F, Vozmediano MC, *et al.*: Valor predictivo del APACHE II en el fracaso renal agudo de las unidades de cuidados intensivos (Abstract). *Nefrología* 1996, 16(Suppl. 19):32.
40. Schaefer JH, Jochimsen F, Keller F, *et al.*: Outcome prediction of acute renal failure in medical intensive care. *Intensive Care Med* 1991, 17:19-24.