Cardiac Surgery for Chronic Renal Dialysis Patients*

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Twenty-two open-heart operations have been performed on 21 patients receiving chronic renal dialysis. These cases include 16 aortocoronary bypasses and six valve replacements. The average time on dialysis prior to surgery was 26 months; 18 of 21 patients were in NYHA grade 3 or 4. Twenty-seven postoperative complications occurred, with six requiring further surgery and 21 treated nonsurgically. Two perioperative deaths occurred, both due to sepsis. Long-term follow-up was achieved on all hospital survivors.

A very aggressive approach to open-heart surgery—coronary artery bypass and valve replacement—has been accepted in our institution for patients on chronic renal dialysis. This form of therapy is also supported by other contributors to the literature. With over 98,432 patients on dialysis nationally and the known accelerated rate of atherosclerosis in coronary arteries and increased risk of bacterial endocarditis, the volume of patients on chronic renal dialysis presenting for surgery will increase. At Loyola University Medical Center, we have performed 22 operations in 21 patients (16 aortocoronary bypasses and six valve replacements) in the ten-year period of 1978-1987. The patients operated, results and long-term follow-up will be presented.

MATERIALS AND METHODS

Twenty-two cases of cardiac surgery have been performed on 21 patients in the ten-year period from 1978-1987 (0.17 percent of our total experience). The group includes 11 females and ten males with an age range of 22 to 72 years (mean, 60.6 years). The length of time on dialysis ranged from one to 60 months, with a mean of 26 months. Twenty patients were on hemodialysis and one patient was on home peritoneal dialysis.

Presenting symptoms for the patients with coronary artery disease were angina only in 13, heart failure and angina in two, and one with heart failure. Four patients with valve disease presented with failure and two had angina. Eighteen of 21 patients were in NYHA grade 3 or 4.

Pulmonary artery pressures were a mean of 47/22 mm Hg for the patients with coronary artery disease and 73/34 mm Hg for the patients with valvular disease. Electrocardiographic findings demonstrated old myocardial infarction in ten, left ventricular hypertrophy in six, active ischemia in five, atrial fibrillation in two, and an acute infarction in one. Chest x-ray films revealed increased heart size in 14, heart failure in four, and an increased aortic shadow in one.

Twenty-two procedures were performed in this group of 21 patients. Sixteen patients had bypass only (average, 2.8 bypasses), three had mitral valve replacement, and two had an aortic valve replacement. One patient presented six months after coronary artery bypass with evidence of an ascending aortic dissection necessitating an aortic valve conduit. All patients were dialyzed the day before surgery, and then starting on the second postoperative day, they were dialyzed according to their indicated needs.

RESULTS

Twenty-seven total complications occurred in this group of patients, with six patients having no problems (complication rate, 71.4 percent). Six problems resulted in more surgery and the other 21 were nonsurgical. The surgical complications included bleeding (OR) in two, clotted fistula in two, perforated peptic ulcer in one, and sacral decubitus in one. Among the nonsurgical complications were infections in six, arhythmias in four, heart failure in two, seizures in two, heart block in one, foot drop in one, phrenic nerve injury in one, metabolic encephalopathy in one, perioperative myocardial infarction in one, postpericardiotomy syndrome in one, and deep vein thrombosis in one.

Two patients died of sepsis (9.5 percent mortality) in the hospital. The first death was in a patient who had a postoperative perforated peptic ulcer and died of continued abdominal sepsis 14 days after cardiac surgery. The second patient succumbed to continued sepsis from aortic valve endocarditis five days after valve replacement. It should be noted that this patient was in profound heart failure, secondary to aortic insufficiency, and was the only patient who had the...
operation on an emergency basis.

The number of days confined to the hospital ranged from seven to 105. A patient who had bilateral phrenic nerve paralysis after an aortic valve replacement experienced the longest hospital stay. The mean stay for the group was 22.8 days.

Long-term follow-up of the 19 hospital survivors shows that only ten patients remain alive (53 percent). There were six cardiac-related problems for the entire group—three with ischemic pain, two new myocardial infarctions, and one with heart failure. One patient with angina did have an angioplasty for an occluded graft 22 months postoperatively. The complications in the survivors are noted here: cardiac in two, noncardiac in two (gastrointestinal bleeding in one and sepsis in one). The causes of death are noted: cardiac in two, noncardiac in four (sepsis in two and gastrointestinal bleeding in two), and unknown in three. The deaths occurred in a range of three to 37 months after surgery with a mean of 16.5 months to the time of death.

**Discussion**

It is clear that an increasing number of chronic dialysis patients will have cardiac surgery with ten of our patients having operations in the last two years of this retrospective study. When dialysis is performed the day before and then the normal dialysis routine is resumed on the second postoperative day, the renal management of these patients is reasonably straightforward. The only problem directly related to the dialysis in our patients was the thrombotic occlusion of a fistula in two patients. Both of these patients were managed with temporary access by a subclavian catheter with later revision of the fistula. These occlusions occurred despite avoiding the arm for venous access. It is imperative that the arm be well padded during the operation and no pressure applied (including a blood pressure cuff) to the fistula.

All operative survivors were symptomatically improved with nine of the ten long-term survivors remaining in NYHA grade 1. One patient is in NYHA grade 2 after having an angioplasty 22 months postoperatively.

The fact that there were 27 complications in these patients is consistent with other groups of similar patients in the literature. Only two patients returned to the operating room for bleeding, and this is considered excellent because of known platelet dysfunction and coagulation problems in renal failure patients. Both patients had diffuse bleeding consistent with a coagulation problem. Nearly all patients did receive platelet transfusions.

Sepsis was the cause of death in the two patients who expired and was the leading nonsurgical complication. Again, this is consistent with the Vanderbilt experience and that of others. Infectious complications are known to be more common in chronic renal failure patients due to a decreased cell-mediated immunity and macrophage function. Based on this fact, emphasis is placed on the need to remove central lines and chest tubes as soon as possible and to use great care in wound closure. Our policy has not been to extend the use of prophylactic antibiotics beyond our standard 48 h. The other perioperative complications are not unique to this population and were easily treated conservatively.

The mean stay of 22.8 days is considerably longer than our usual stay of 9.5 days for patients without renal failure, but it is similar to that of other centers. The only patient who remained hospitalized for more than 36 days was the patient with a bilateral phrenic nerve injury. This problem is probably secondary to thermal injury secondary to topical cardioplegia, and this patient did recover diaphragmatic movement.

Our policy has not been to repeat cardiac catheterization on any patients unless there are significant problems. Only one patient with angina had a repeat study performed at 22 months for angioplasty of an occluded vessel. The other two patients with angina were treated effectively with medication. Finally, the two patients with new postoperative myocardial infarctions were subendocardial infarctions and neither had post-infarction angina so no further workup was performed. Due to the diffuseness of coronary disease in this population complete revascularization may not always be possible and medical therapy may be necessary.

The most disturbing fact concerning this group of patients is that nine of 19 hospital survivors have expired at a mean of 16.5 months after surgery. Noting Comty's figure of 25 percent mortality per year for people with known coronary artery disease on chronic dialysis, we have not significantly altered the long-term mortality of this group even with surgery. Only two deaths could be documented to be cardiac-related—heart failure in one and prosthetic valve endocarditis in the other. The patient with prosthetic valve endocarditis expired when the mitral valve disrupted as he was urgently being prepared for reoperation. The endocarditis occurred several months after surgery and was probably not a perioperative infection. It is assumed this happened secondary to a bacteremia during dialysis. The dialysis nurses are instructed to use extreme care during the antiseptic preparation of a fistula for dialysis in a patient with a prosthetic valve. While antibiotic coverage has continued to be recommended for this group of patients only for dental and minor surgical procedures, our policy has not been to use antibiotics prophylactically during dialysis. Lavelle and Dentino suggest prophylactic antibiotics are not necessary during dialysis, but this
policy may change as more patients in chronic dialysis receive valve replacement.

Two of the hospital survivors died of sepsis—one after a kidney transplant—and two patients died as a complication of gastrointestinal bleeding. Again these two problems persist in this population. The remaining three patients expired at home and no cause of death could be documented. It should be noted that this long-term experience is much different from the centers reporting over ten patients (42 of 48 long-term survivors).\(^2\) Several points need to be raised concerning this difference in long-term survival. First of all, the total experience in the literature consists of just over 100 cases, and only one medical center has reported over 20 cases! Although our group consists of only chronic dialysis patients, other centers include patients who previously had a kidney transplant. This group definitely has an improved long-term survival over patients remaining on chronic renal dialysis.\(^1,2,6\)

Thirdly, as evidenced by the causes of death after cardiac surgery, this group can and does continue to have other multiple medical problems despite successful cardiac surgery.

In conclusion, it is clear that this group of patients has the indications and that cardiac surgery can be performed with a reasonable morbidity and mortality. The quality of life is better as evidenced by the improvement in NYHA classification of the survivors. However, the long-term survival of our group due to multiple medical reasons remains dismal. While cardiac surgery can be performed satisfactorily, chronic hemodialysis patients require intensive medical therapy to assure long-term survival. And the small number of cases reported in the literature to date makes it very difficult to decide which patients will do well on a long-term basis.

REFERENCES

14. Health Care Financing Administration. 1987 Facility Survey Table (to be published)