Post-hospital course and complications following coronary bypass surgery

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Intraoperative and early postoperative problems and complications following coronary bypass surgery have been well described. The team approach by the surgeon, anesthesiologist, cardiologist, nurse, and respiratory therapist can prevent most complications or they can be quickly corrected, and most patients discharged 10 days after surgery. At this point the average patient is improving rapidly, but 6 to 8 more weeks of recuperation are required for total recovery. During this time the care of the patient generally reverts to the referring physician. The unique problems and complications which may arise during this recovery phase are the subject of this review.

Clinical material

The clinical course of 100 consecutive patients was reviewed during the 6- to 8-week recovery phase after hospital discharge following coronary revascularization surgery at the Cleveland Clinic Hospital. The study group consisted of 94 men and 6 women aged 30 to 72 years. All received at least one saphenous vein coronary bypass graft between July 1969 and July 1974. Of the 100 patients, 40 received two vein grafts, 45 received three vein grafts, and eight received a left internal mammary artery bypass graft.

Seven received mammary artery implants, and three had mitral valve replacement in addition to coronary artery surgery. One patient had ventricular aneurysmectomy in addition to a single bypass graft.

Results

The average patient was discharged on or about the 10th postoperative day. The status at this time was generally one of rapid improvement, but with considerable weakness, moderate anemia, occasionally slight fever from hematomas, and lessening incision discomfort. All patients attended a homegoing class at which general aspects of recuperation at home were discussed. Each patient was also instructed specifically regarding medication, diet, activity, and any other special precautions to be taken following hospital discharge. A booklet highlighting these instructions was given to each patient. Routine anticoagulation was not used except after valve replacement.

At the time of hospital discharge the electrocardiogram generally showed diffuse S-T and T wave changes of resolving pericarditis which cleared within a month. Recurrent acute pericarditis may occur as part of the postpericardiotomy syndrome, but there have been no instances of chronic constrictive pericarditis. Cardiac tamponade did not occur later than 10 days postoperatively in this study group.

During the 6 to 8 weeks of convalescence following hospital discharge, the average patient progressed rapidly. Most could safely walk up and down stairs without difficulty immediately. There was no need for prolonged bed rest in the absence of congestive heart failure, but fatigue persisted about 1 month. Incision discomfort gradually subsided after about 4 weeks. Most patients could walk 1 mile by 6 weeks and were encouraged to build up to this. Most patients were feeling well and returned to work about 8 weeks following hospital discharge. However, some morbidity persisted or developed during this recovery phase.

Minor complications (*Table 1*)

In the follow-up of this series of 100 patients during this period, 38 had no significant problems, 45 suffered transient minor complications, and 17 suffered major complications, although most were transient and cleared completely. Two of the 100 patients died during this period: one, a 60-year-old man died of massive pulmonary embolus 4 days after hospital discharge; the other patient, a 69-year-old man, suddenly collapsed with an apparent arrhythmia 2 months following discharge.

Incision problems were infrequent. Four patients had late wound infection, and one required repair of a rupture of the infected femoral artery cannulation site 3 weeks postoperatively. Nonincisional neuromuscular chest pain was very common the first 2 months following hospital discharge. Twenty-six patients had

Table 1. Minor complications, 45 patients

Complications	No. of patients
Neuromuscular chest pain	26
Minor psychiatric problems	20
Pedal edema	12
Wound infections	5
Hoarseness	5
Peripheral nerve damage	4
Periarthritis of the shoulder	4

significant neuromuscular chest pain, and most of these patients had significant anxiety or depression before or after surgery. Many of these had neuromuscular chest pain prior to surgery. Most responded well to reassurance, increased activity, heat, analgesics, muscle relaxants, and sedatives.

Hoarseness secondary to endotracheal intubation was common in the immediate postoperative period, and usually cleared within a few days. In five patients it persisted after hospital discharge, and in four of these it cleared within 1 month. In one patient hoarseness was still present 1 year later. The usual cause was vocal cord irritation, and no specific therapy was required.

Mild pedal edema in the donor leg persisted in 12 of the 100 patients at 8 weeks. This was not a significant problem and usually responded well to elevation of the leg and wearing elastic stockings.

Peripheral nerve damage due to traction or pressure persisted in four of the 100 patients. Two patients had ulnar nerve trauma; one patient had median nerve trauma, and one patient suffered hypoglossal nerve damage. Resolution occurred gradually in all.

Periarthritis of the shoulders occurred in four patients after hospital discharge and was most common in fearful or inactive patients. This can be prevented by range of motion exercises and early ambulation immediately postoperatively. Established periarthritis of the shoulders later responded to range of motion exercises, local steroid injections, and anti-inflammatory drugs.

Twenty patients had significant emotional problems during the 6- to 8-week post-hospital recovery phase, but all eventually recovered. Anxiety or depression or both were the commonest manifestations of emotional problems and occasionally they were difficult to manage. No psychotic breaks were observed, but some patients were temporarily disabled by their emotional symptoms, despite an excellent surgical result. Reactive depression was especially common and several patients adopted the sick role. Most had preoperative emotional problems as well. Some of these patients expected the operation to solve their emotional problems, and were disappointed if it did not. The vast majority of patients were delighted and relieved upon recovery from coronary artery surgery.

Major complications (*Table 2*)

Seventeen patients experienced major complications in the post-discharge recovery period. Most problems were transient, but two resulted in death.

Acute myocardial infarction was a very rare complication the first 2 months after hospital discharge. Only 1 of the 100 patients reviewed suffered a nonfatal myocardial infarction during this period.

Angina pectoris was relieved completely in 80 of the 100 patients. How-

Table 2. Major complications, 17 patients

Complicatons	No. of patients
Fever	17
Arrhythmias	
Nonfatal	9
Fatal	1
No improvement in AP	3
Postcardiotomy syndrome	3
Postperfusion syndrome	2
Hepatitis	2
Acute MI	1

ever, in a few of these patients angina pectoris developed later with increased activity. Angina persisted but was reduced in 17 patients in the group. Two of these 17 patients experienced a change in the location and character of the angina pectoris, suggesting that a different area of the myocardium was giving rise to the symptoms following successful relief of ischemia in the primary symptomatic area. In three patients angina pectoris was unchanged following bypass surgery. Repeat coronary arteriography 1 year later in these three patients showed occlusion of five of their six grafts. Arrhythmias were seldom a problem. Early postoperative arrhythmias are common and are treated vigorously, so many patients return home on a regimen of digitalis or antiarrhythmic drugs. Seven of the 100 patients reviewed had persisting premature beats 8 weeks postoperatively, but in six they caused no symptoms or complications. One patient with premature ventricular contractions on discharge was taking procainamide hydrochloride (Pronestyl) and suffered a fatal arrhythmia without infarction 2 months postoperatively. Two patients suffered paroxysmal atrial fibrillation with spontaneous reversion to sinus rhythm.

Seventeen patients had late fever from a variety of causes following hospital discharge (*Table 2*). Three patients had late infection in the leg incision. One patient had an infection in the chest incision. Four patients had late urinary tract infection. Two patients had intercurrent viral infections during the 6- to 8-week recovery period. One patient had persistent hemothorax, and fever cleared after thoracentesis. Three patients had thrombophlebitis with fever, and two of these suffered pulmonary infarction, one fatal. Two patients had clinical hepatitis after hospital discharge. One patient suffered drug fever due to propoxyphene hydrochloride (Darvon).

The postcardiotomy syndrome occurred in three patients in the study group 2 to 6 weeks following surgery. The commonest time of onset is usually about 2 weeks after surgery in reported series. It is also called the postpericardiotomy syndrome and may be equivalent to the postmyocardial infarction syndrome (Dressler's syndrome). The postcardiotomy syndrome is thought to be due to an immune reaction against antigenic pericardial and myocardial proteins released into the general circulation at the time of the cardiac surgery. These patients have anti-heart antibodies. The clinical picture consists of fever, cough, chest pain, and dyspnea. Pericarditis with rub and effusion are characteristically present.

Pleurisy with pleural rub and effusion commonly occur and an element of pneumonitis with rales and pulmonary infiltrates on the chest film may also occur. The white blood cell count is characteristically elevated and the eosinophil count may be increased. The clinical picture may resemble pulmonary infarction. It is a self-limited reaction, but symptoms are frequently severe and require treatment. It usually responds well to salicylates, and other anti-inflammatory drugs may also be effective. Occasionally, steroid therapy may be required which provides dramatic relief; the pain usually clears within 24 hours. Two patients in the study group responded promptly to prednisone, and one responded well to indomethacin.

The post-perfusion syndrome, also

known as the post-pump syndrome, occurred in two of the 100 patients 3 1/2 and 4 1/2 weeks after surgery and was characterized by fever, splenomegaly, and lymphadenopathy. Rarely, hepatomegaly and a macular papular rash have been described with this syndrome. Atypical lymphocytes were present in the peripheral blood smear and are characteristic of the syndrome. The heterophile agglutination reaction was negative. This syndrome generally appears 3 to 7 weeks following cardiopulmonary bypass and spontaneously resolves over a period of 1 to 3 months. The course is characteristically benign with spontaneous resolution. Clinically, it resembles infectious mononucleosis or infectious hepatitis. It is thought to be due to the Ebstein-Barr virus or the cytomegalovirus from transfused blood. Immunofluorescent studies, complement fixation studies, and recent viral culture techniques are now available to identify the causative organism. This complication is commoner in patients who receive several transfusions or who are debilitated by chronic illness or immunosuppressive drugs.

Clinical postoperative hepatitis occurred in two of the 100 patients. The clinical picture was transient jaundice and impairment of liver function with spontaneous resolution. Neither patient suffered permanent liver damage. Posttransfusion hepatitis may be due to hepatitis A or hepatitis B virus, and results of recent studies suggest that other similar, poorly defined viruses can give this picture. New antibody studies including Australia antigen and surface antigen may be helpful in diagnosis. Treatment is symptomatic and supportive. The two patients suffering postoperative hepatitis in the group studied responded completely to conservative therapy. This complication can be minimized by the use of volunteer donors, and careful screening of donors to detect hepatitis antibodies, and by the use of frozen blood.

Conclusion

Our experience with more than 9,000 coronary bypass operations indicates that patients tolerate coronary revascularization surgery well. Following hospital discharge, recovery is generally rapid, and serious complications are rare. The complications and sources of morbidity during this recovery period have been reviewed in a follow-up of 100 patients. The majority of problems were self-limited or responded well to therapy. Eighty patients were free of angina pectoris during this early convalescent period, and an additional 17 experienced reduced angina pectoris. Most were ready to return to work 8 weeks after hospital discharge. We know that the majority of graft closures and major complications occur soon after coronary surgery. Patients doing well 6 to 8 weeks following successful coronary bypass surgery have successfully weathered the major source of morbidity, and the majority can look forward to a return to normal activity, a full and active life, and a good prognosis.