

---

# Family Practice Grand Rounds

---

## Acute Surgical Abdomen in an Elderly Patient with Hypertension and Previous Myocardial Infarction

Gerald R. Gehringer, MD, Kenneth E. Bray, MD, Joseph A. Pellecchia, MD,  
Ezechiel Zilka, MD, Tim Ewing, MD, and Rodney Vickers, MD  
Baton Rouge, Louisiana

DR. GERALD GEHRINGER (Chairman, Department of Family Medicine): Today's Family Practice Grand Rounds concerns a 65-year-old man with an acute abdomen who is hypertensive and three years post-myocardial infarction. This case will point out several important considerations of which the family physician should be acutely aware.

1. The differential diagnosis of an acute abdomen is different for different age groups.
2. Morbidity and mortality increase with age in emergency surgery.
3. Post-myocardial infarction patients undergoing surgery require special attention.
4. Hypertensive and antihypertensive agents pose serious problems to the anesthesiologist during surgery and to the family physician postoperatively.
5. Emotional support and proper counseling provided by the family physician to the patient and his family

during any crisis not only sustains them but probably provides the best insurance available against malpractice claims.

6. This case points out the value and necessity of the team approach in providing the patient and his family with the best possible care.

Dr. Tim Ewing, a senior resident in Family Medicine at Earl K. Long Memorial Hospital, will present today's case.

DR. TIM EWING (*third-year family medicine resident*): This patient is a 65-year-old white man who presented to the Family Practice Clinic on July 23, 1975, with a two-day history of suprapubic pain which was associated with a complaint of feeling the need to pass his bowels, but being unable to do so. He stated that the pain began as a heaviness in his lower abdomen two days prior to admission. On the first day the pain developed it would come and go, but on the second day it became more persistent. The patient also stated that on the second day the pain not only remained in the suprapubic region, but also moved into his right lower abdomen. He complained of vomiting several times on the day prior to admission and he gave no

history of hematemesis, dysuria, pyuria, hematuria, fever, diarrhea, or melena. This gentleman had a past history of atherosclerotic cardiovascular disease with an anterior lateral myocardial infarction in November 1972. He recovered from this infarction without any significant complication, such as congestive heart failure or cardiac arrhythmias. He stated that at the present time he was having angina attacks at the rate of one or two per month. These were of short duration, usually less than two minutes, and were relieved with sublingual nitroglycerin. He also has a history of hypertension which has been controlled with the following medications: (1) Ismelin (guanethidine sulfate), 40 mg daily, (2) Aldomet (methyldopa), 500 mg three times daily, and (3) Diuril (chlorothiazide), 500 mg twice daily. These were the medications he was on at the time of admittance, in addition to his nitroglycerin sublingual tablets grains 1/150 p.r.n. chest pain. On arrival at the Family Practice Clinic he was noted to have a temperature of 101.2 F and his blood pressure was 120/80. His pulse was 92 beats per minute and regular; his respiratory rate was 24 per minute.

---

From the Family Doctor Clinic, Earl K. Long Memorial Hospital, Baton Rouge, Louisiana. Requests for reprints should be addressed to Dr. Gerald R. Gehringer, Chairman, Department of Family Medicine, Louisiana State University School of Medicine, New Orleans, La 70112.

He appeared as a well-developed, well-nourished 65-year-old white man and he was in no acute distress. The pertinent physical findings on examination of his abdomen revealed a slightly obese abdomen with rigidity on the right side and marked tenderness to palpation in the right lower quadrant with rebound pain present. His bowel sounds were present and were noted to be hypoactive. Examination of his rectum revealed a prostate gland of approximately 25 gm size. The gland was not tender. The stool was brown in color and hematests were negative. There was no rectal tenderness on palpation. The remainder of the physical examination was essentially noncontributory and was within normal limits. An electrocardiogram was taken and it was noted to be within normal limits. There were no acute changes present, and no ischemic changes present. Complete blood count revealed a hematocrit reading of 47 percent, white blood count was 16,400/cu mm, differential cell count revealed 59 percent polymorphonuclear neutrophils, 29 percent band cells, 9 percent lymphocytes, and 4 percent monocytes. His electrolytes included a sodium of 148 mEq/L, potassium of 3.6 mEq/L. Urinalysis revealed one to two red blood cells per high powered field, and zero to one white blood cells per high powered field. Otherwise, the urinalysis was negative. My initial impression was that this gentleman had a possible acute appendicitis and at that time I requested surgical consultation.

DR. GEHRINGER: Dr. Vickers, the patient was referred to you at that time, and you saw him as a surgery consultant and later took him to surgery. Would you please comment on what your findings were preoperatively and at surgery?

DR. RODNEY VICKERS (*second-year surgery resident*): On examination of the abdomen, the patient demonstrated some voluntary guarding, as well as right lower quadrant direct and rebound tenderness. With the elevated white blood count and the positive physical examination referable to the abdomen, we were convinced that the patient had an acute surgical abdomen. The diagnosis of acute appendicitis was a first consideration. However, we could not exclude the possibility of diverticulitis, particularly in this 65-year-old man.

After adequate preoperative preparation, the patient was taken to surgery. It was our opinion that with a temperature of 102 F immediately preoperatively, and an elevated white count of 16,000/cu mm with a marked shift to the left that he probably had a perforated appendix. He was taken to the operating room and explored through a McBurney-type incision and was found to have a considerable amount of inflammatory reaction in his right lower quadrant. The inflammatory reaction was so severe that it made the surgical procedure very difficult and we had to extend our incision across the midline to obtain adequate exposure. Having done this, we were then able to expose the cecum and appendix. The appendix was markedly edematous and had indeed perforated. There was a small amount of exudate in the right lower quadrant with leakage of some fecal contents in that area. The appendectomy was performed with some difficulty and the wound was then thoroughly irrigated with two liters of saline with one percent Kantrex (kanamycin sulfate) solution. The area was drained with several large penrose drains, one in the area of the inflammatory reaction, one in the pelvis, and one along the right gutter. The wound was then closed; however, the skin was left open since the patient had a contaminated wound. Postoperatively, the patient was kept on antibiotics for approximately one week and he did quite well. The drains were gradually removed by the third post-operative day, and he was tolerating a regular diet and his wound was healing with no problems by the tenth post-operative day.

DR. GEHRINGER: What antibiotics did you use postoperatively and why did you decide on these particular drugs?

DR. VICKERS: We used Cleocin (clindamycin phosphate) and Kantrex. Cleocin was to cover the possibility of bacteroides and the Kantrex, of course, to cover *E. coli* and other gram negative organisms from the bowel.

DR. GEHRINGER: An elderly patient with an acute surgical abdomen presents a somewhat different problem in differential diagnosis as opposed to the younger patient. I am certain the morbidity and mortality are also quite different. Dr. Zilka, will you comment on this please.

DR. EZECHIEL ZILKA (*Assistant Professor, Department of Surgery*): It is accepted by many surgeons that the presentation of appendicitis in the elderly patient is different than in the teenager or young adult. In the elderly patient treatment usually is late for two reasons: (1) the patient is not too symptomatic from the appendicitis and (2) the physician at times is not aware of possible appendicitis in this age group. The reason is that the presentation is different from the classical acute appendicitis, and at times there are minimal signs or no signs at all. Another important factor is that elderly patients often have concomitant disease. In some series as many as two thirds of these patients have diabetes or significant pulmonary or cardiovascular problems.

It has been said that in any acute abdominal problem, appendicitis should never be lower than second place in the differential diagnosis. It can certainly mimic many abdominal problems and you should always think about it. This particular patient did not really fit in the category of appendicitis in the elderly patient. He was elderly, but his symptoms were more or less common as we see in the young adult or teenager. Usually the pain starts in the mid epigastrium and several hours later, four to six on the average, the pain migrates to the right lower quadrant. At times, the pain does start in the right lower quadrant and remains there. In this patient the pain started in the lower abdomen or suprapubic region, and migrated to the right lower quadrant and remained there. This is not unusual. The second symptom that this patient presented with is common in acute appendicitis in general, that is what we call the "gas stoppage syndrome." By this I mean the patient has the urge to pass flatus through the rectum or to have a bowel movement, but usually he cannot do it. As a result, many of them administer laxatives or enemas and this may cause a rupture of the appendix. We see this usually in children and in elderly patients. His vomiting is another symptom that is seen in about 75 percent of patients with acute appendicitis. The accepted range of temperature in uncomplicated appendicitis is less than 102 F, and this patient did have less than 102 F, which is not unusual. The elderly patient usually has minimal pain; the



"gas stoppage syndrome" is more or less a chronic problem with elderly patients and they tend to neglect it because it is not unusual for them. The signs they present to the doctor are also usually not that significant. They might have minimal tenderness or no tenderness at all. Abnormal abdominal distension is a very important sign in this age group and it might be the only clue for possible appendicitis.

It is widely accepted that many elderly patients with acute appendicitis come to the doctor with perforated appendices. The reasons are that the symptoms are minimal and that there is possible atherosclerosis of the splanchnic vessels causing early ischemia. As a result, the mortality is high in this age group. It is estimated that the mortality rate is about 15 percent in the elderly patient with perforated appendicitis.<sup>1</sup> The younger age group with perforated appendicitis has a mortality rate of about 0.1 to 0.2 percent. Since 60 to 90 percent of elderly patients come to the doctor with perforated appendicitis,<sup>1</sup> it is much safer to operate on the patient when you are in doubt than to observe him. The reason for the high mortality rate in perforated appendicitis is probably sepsis which can cause multi-organ failures. By that I mean pulmonary, cardiovascular, and renal failure.

It has been shown that appendicitis in this age group is increasing.<sup>2,3</sup> The rate has risen about sevenfold in the last 30 to 40 years, with one of the reasons being greater longevity. As a family physician you should be aware that one out of 50 patients above the age of 50 is likely to have appendicitis at some time. In the general population, the rate is about seven percent,<sup>4</sup> so it is really something to think about.

DR. GEHRINGER: As a practicing physician, one of the questions that always bothered me in dealing with a patient with a past history of myocardial infarction was just how dangerous was it to submit him to surgery, realizing fully that the time since the myocardial infarction is an important factor. How do cardiologists feel about surgery in post-myocardial infarction patients and in elderly patients with cardiovascular disease in general? Dr. Pellecchia?

DR. JOSEPH A. PELLECCIA  
(Chief of Cardiology, Department of

*Medicine*): There are a host of studies that have attempted to review this problem going back 12 to 15 years or more, and unfortunately they approach the problem of the acute myocardial infarction and the effect of surgery and the postoperative coronary occlusion from a number of different viewpoints and different measurements. Basically, I am going to confine my comments to abdominal surgery in the patient with myocardial infarction so as to exclude those people who are going for coronary bypass and primary myocardial or intrathoracic operations. We are dealing with a situation where multiple factors need consideration. The age factor alone, without any statement as to the presence of coronary artery disease, must be considered and we can separate this group into those who have elective surgery and those who have emergency surgery. When we take those patients over 60 but under 70 years of age, the mortality rate for elective abdominal surgery seems to be about five to eight percent overall mortality.<sup>5</sup> However, if it is an emergency procedure, as may be seen with the abdomen, mortality rises to somewhere between 16 and 20 percent. If the patient is over 70 there is about a 10 to 12 percent overall mortality from elective surgery, and a 30 percent plus mortality for emergency surgery, so that elderly patients have an increased mortality during an emergency surgical event.<sup>5</sup> These patients frequently have multiple disorders, such as diabetes or general vascular disease, so that higher mortality rates often relate to the cardiovascular system and other systems at the time of surgery. With regard to coronary artery disease and specifically myocardial infarction, the most risky period to operate on a patient is within six months after an acute myocardial infarction, either as an elective or emergency procedure. The statistics of reinfarction are over 75 percent in patients who have had an infarction less than six months prior to surgery<sup>5</sup> — the earlier, the higher. Some studies have quoted 100 percent in a series operated on less than six months after infarction. Between six months and one year (and it is almost the same from one year to two years), reinfarction is somewhere between 30 and 40 percent. The mortality of those who reinfarcted ranged around 58

percent. The patient who is over three years since a previous infarction and has not had significant active coronary disease at the time of surgery, has a reinfarction rate approaching zero.

The patient who has a rather stable cardiac status without congestive heart failure, frequent angina, hypertension, or any other complicating factors has a reasonably good risk comparable to the risk to be expected for his age for elective surgery. For emergency surgery, he has the higher risk of someone of that age. In this instance, our patient did have one other complicating feature in that he was hypertensive and was taking several antihypertensive drugs. His coronary artery disease seemed to be fairly stable but I don't know what his activity was. In patients who have low incidence of angina we are never sure whether this is due to a reasonably stable situation regarding their angina or whether they have restricted their physical activity so much that they don't produce angina. I don't recall whether this patient had cardiomegaly on chest x-ray. There is no mention of left ventricular hypertrophy on his electrocardiogram, which would be considered unusual for someone who had significant hypertension of the magnitude requiring Ismelin, Aldomet, and Diuril. The patient who has had a myocardial infarction and who is not in heart failure has a better outlook for surgery than the person who obviously is in heart failure.

The interesting point of the normal electrocardiogram two years post infarction is not unusual. We would expect that a large number of patients, somewhere between 16 to 18 percent, will have a normal electrocardiogram at the end of two years from infarction, and that almost 20 to 25 percent will have a normal electrocardiogram five years after infarction.<sup>6</sup>

Many have attempted to solve the problem of postoperative or intraoperative myocardial infarction by taking preoperative electrocardiograms and enzyme studies. The enzyme studies have the problem of being elevated when muscle tissue has been incised by virtue of the surgery.<sup>7</sup> The advent of isoenzyme both on the CPK and LDH enzymes may be helpful in assessing myocardial from peripheral skeletal muscle injury in the future. The postoperative electrocardiogram has had variable capacity to pick up

infarction, and this may again be a factor of the population being studied and when surgery is being done. Fortunately, at this hospital we have not had a large number of patients who have had recent myocardial infarctions who have required emergency surgery prior to six months from infarction. In our current experience and in a very brief review of data last year, assessing pre and postoperative infarction of those who had history of heart disease, we just happen to have no patients who had a myocardial infarction post-operatively.

**DR. GEHRINGER:** Dr. Pellecchia, knowing that this type of patient is a little more likely to have a myocardial infarction at the time of surgery or immediately postoperatively, is there anything that can be done that would lessen the odds of such an occurrence? What about the use of long-acting nitrates?

**DR. PELLECCIA:** As you know, the long-acting nitrates are now under review for their efficacy.<sup>8</sup> There has been a continuing dialogue over the years concerning the extent of their efficacy. I certainly don't think that when you are dealing with an anatomically rigid coronary artery that the administration of nitrates would have any beneficial effect on the patient in the operative state.

**DR. GEHRINGER:** Another thing that concerns me is having a patient on antihypertensive medication require an emergency anesthetic. Dr. Bray, what are the risks for these patients and what can the family physician do to assist the anesthesiologist in their management?

**DR. KENNETH E. BRAY** (*Chief of Anesthesia, Department of Surgery*): These elderly patients with a history of atherosclerotic cardiovascular disease and hypertension requiring antihypertensive drugs for control, are an increased risk for anesthesia and may pose quite a problem. Along with this patient's hypertension, one has to consider his history of myocardial infarction and severe current angina. If I may, I would like to add a short comment to Dr. Pellecchia's excellent discussion of this.

With regard to myocardial infarction, there seems to be general agreement that the more recent the infarction, the more dangerous it is and the more likely reinfarction will occur. The first two weeks or so can

be set aside as absolutely the most dangerous but most of us in anesthesia feel that, if at all possible, anesthesia and surgery should be postponed for at least six months following the infarction. By this time it should be well healed and, assuming no severe complications occurred, the risk is very markedly decreased. The risk after two to three years appears to be no greater than the risk in other patients of comparable physical status and age without a history of myocardial infarction. This patient had his infarction three years previously and without any significant complications, so in my opinion his infarction added minimal if any risk for his current anesthetic. However, this patient does have anginal pain which requires sublingual nitroglycerin for relief and this does increase his anesthetic risk.

Patients on antihypertensive medication, as is the case here, may pose quite a problem and there is an increased risk during anesthesia for surgery. In evaluating such a patient prior to anesthesia, we try to determine the degree of risk, the antihypertensive treatment, and the care the patient has received in order to conduct our anesthesia as safely as possible.

A hypertensive patient is a greater risk for anesthesia than the normotensive patient and if on antihypertensive drugs, these drugs in themselves can pose additional anesthetic problems. I would like to point out here, however, that the moderately severe or severe hypertensive patient who is taken off his antihypertensive drugs prior to anesthesia because of this danger, may become an even greater risk during anesthesia if lack of blood pressure control has resulted. Bear in mind that several of the antihypertensive drugs such as guanethidine and the rauwolfia alkaloids must be discontinued for about two weeks prior to anesthesia to effectively eliminate their undesirable effects during anesthesia. This may permit a patient's blood pressure to go way out of control.

There is ample evidence that untreated moderately severe or severe hypertensive patients under anesthesia suffer much more dramatic fluctuations in blood pressure and organ perfusion than those patients well maintained with effective antihypertensive drugs and regimen. I think it is

very important in elective surgery that the hypertensive patient be delayed long enough to maximally control the disease.

What, then, is our approach during anesthesia knowing in advance that the patient is receiving antihypertensive drugs to control his hypertension as is the case with this patient? First of all, it is very important for us to know exactly what drugs the patient is receiving. These drugs drop the blood pressure by decreasing the function of the post-ganglionic adrenergic nerves in various ways and at various points along their course to the smooth muscle of the blood vessels. The sympathomimetic amines that we use to treat blood pressure drops also act in various ways and at different points along the course of the adrenergic nerves to the smooth muscle. Therefore, we must know the antihypertensive drug used in the patient in order to be prepared to give the appropriate vasopressor. For instance, guanethidine sulfate (Ismelin) reduces the activity of sympathetic nerves directly. It interferes with the active transport of norepinephrine across the membrane, the norepinephrine pump and also its storage, thus markedly decreasing its release on stimulation. An indirect acting vasopressor would be ineffective here in correcting blood pressure drops as it depends for its action on releasing stored epinephrine or norepinephrine. A direct acting vasopressor would be indicated, such as Neosynephrine (phenylephrine), or Vasoxyl (methoxamine) both of which act directly by combining with receptors in the same way as epinephrine and norepinephrine do. My preference is to have a Neosynephrine drip (10 mg of Neosynephrine in 250 cc of D<sub>5</sub>W), immediately available and titrate this with blood pressure drops. An interesting complication of Ismelin treatment is a post sympathetic sensitivity to the end organ and an exaggerated response to vasopressors even in normal doses. I feel this can be best prevented by careful use of the Neosynephrine drip. Bradycardia, which may occur, can be treated with atropine.

Rauwolfia alkaloids, the best known of which is reserpine, act by depleting stores of epinephrine and norepinephrine and inhibiting synthesis in the terminal fibers. It takes about two weeks of treatment to



deplete these neurohormones and approximately two weeks for replacement after the drug is discontinued. A direct acting vasopressor would also be indicated for treatment of blood pressure drops with this drug and again I prefer the use of Neosynephrine.

Methyldopa (Aldomet) acts by retarding synthesis of norepinephrine. Here again, a direct acting vasopressor will correct blood pressure drops.

Regitine (phentolamine) and phenothiazines such as Thorazine are alpha blocking agents which reduce blood pressure by occupying the adrenergic receptors. Therefore, neither the direct nor indirect vasopressors will, as a rule, correct blood pressure drops as a result of the action of these drugs. A vasopressor should be used which acts beyond the receptors on vascular smooth muscle itself. It is preferable that a patient be taken off these drugs prior to anesthesia if at all possible. Forty-eight hours is usually sufficient. If a vasopressor is indicated, Hypertensin (angiotensin amide) in an intravenous infusion may be used (2.5 mg in 500 cc of D<sub>5</sub>W or RL) with drops carefully controlled. Ephedrine sulfate also has a mixed action and acts on smooth muscle itself.

In answer to your question as to what the family physician can do to assist the anesthesiologist in the management of the anesthetic, I would say first of all, control any severe hypertension, as maximally as possible, inform the anesthesiologist fully as to the drugs and treatment you have given the patient and how well the hypertension is controlled. Be sure the patient has adequate volume replacement. Hypertensive patients do frequently have a measurable decrease in plasma volume, so correct hypovolemia. This in itself will help to prevent severe blood pressure drops during induction and anesthesia. In the case of elective surgery planned far enough in advance, dietary control and weight reduction should be carefully followed as indicated. A heavy patient is an additional risk during surgery.<sup>9-13</sup>

DR. GEHRINGER: Ten or 15 years ago we were taught to take the patient off of hypertensive medication prior to surgery if possible. How do you feel about this, Dr. Bray?

DR. BRAY: This is true. We did encourage taking patients off hypertensive medication prior to anesthesia and surgery. I believed in this very

strongly myself. Some anesthesiologists still feel very strongly this way. My feeling has changed in this respect to some degree. If the patient is a mild to moderately severe hypertensive, well controlled with medication, and surgery is planned, and of course if time permits, I would have no objection to a trial period off the medication. If the blood pressure remains well controlled throughout the time interval necessary to eliminate this drug's adverse effects with anesthesia, all well and good. On the other hand, I feel that the moderately severe to severe hypertensive patient receiving antihypertensive drugs, whether controlled or not controlled, should be kept on these drugs up to the time of surgery and that counter measures be planned for complications with anesthesia due to their use. As I stated earlier, I feel that there is a greater risk to take them off this medication and probably have much wider fluctuations and less control of blood pressure during anesthesia.

DR. GEHRINGER: Dr. Bray, how would you manage an emergency patient who is discovered to be hypertensive without any other complications just prior to surgery?

DR. BRAY: In answer to this question, much would depend on how severe the hypertension is. I would first urge that the patient not be overpremedicated or depressed prior to coming to the Operating Room. If he is in pain, he would require an analgesic, but otherwise I would merely allay his apprehension with a sedative or tranquilizer. I would also try to correct any hypovolemia. The conduct of anesthesia should be as light as possible and every effort made to prevent drug overdosage. Particular care should be taken during induction. The degree of hypertension could determine the choice of anesthesia. One should be prepared to correct any marked fluctuations of blood pressure immediately.

DR. GEHRINGER: Dr. Ewing, how much counseling did you provide the patient and his family prior to surgery concerning the dangers and possibilities of serious complications?

DR. EWING: Well, I first saw the patient in the clinic. His wife was in the room while I took the initial history and for most of the physical examination. After reviewing the laboratory data I spoke with the wife and

told her my initial impressions. I explained to her at that time, and she understood that he would undergo surgery.

DR. GEHRINGER: I would just like to make a few comments here that I think the family physician, by being close to the family, should go into detail explaining to all members of the family who are available what is likely to occur or what may occur, even the bad things that could occur. If this is done prior to surgery, I believe we would have fewer malpractice cases than we have today. I think one of the main causes of malpractice suits is that people feel they are being left out of the problems that their family faces.

DR. ZILKA: Although it is very important to tell the patient and the family what to expect, I would like to caution against specific and definitive diagnosis. You do not tell the patient that you are going to do an appendectomy even if it might seem obvious, especially in this age group. You cannot really tell for sure that it is appendicitis but you have to get their permission to do whatever is necessary if you do not find appendicitis. You should usually not tell them, "I am going to do an appendectomy."

DR. EWING: When I completed the history and physical examination and the laboratory data was returned, I spoke with the family. I told them what my impression was and told them that we would consult with the surgeon. We would then weigh both opinions and make a definitive decision as to management. This is the way we usually do things at the Family Practice Clinic, especially in a surgical case. The combined opinions would decide whether or not this did truly represent appendicitis and whether or not the gentleman would have to undergo surgery. This patient's family is medically oriented. His wife's sister is a nurse who works in our clinic. The patient's family understood quite well what the risks were of surgery in general, and the extra risks involved with an elderly man who has a history of heart disease and hypertension were explained. This was not discussed with them until after the surgeon had seen the patient and definitive management had been decided. Then the possible risks were discussed with the family and they understood them quite well and

consented to the procedure.

DR. GEHRINGER: I would like to ask all of you what your feelings are about beginning this patient's antihypertensive medication postoperatively. When do you think it should be resumed?

DR. EWING: Dr. Vickers did most of the postoperative care on this patient. I went to see him twice a day and checked his blood pressure. His pressure postoperatively lying down for the first three days was within normal limits. When he started ambulating we recorded his pressure sitting and standing since he was on Ismelin. His blood pressure stayed controlled until about the seventh day. His diastolic then started ranging around 90 to 100 and I started him back on Aldomet and Diuril at that time. We have not yet resumed his Ismelin. His blood pressure is being checked at regular intervals and will be watched closely at the Family Practice Clinic.

DR. PELLECCIA: This brings up a very interesting aspect of the mild to moderate hypertensive patient. It is not unusual to have a patient who is on an antihypertensive agent of some kind who, for some reason, will have much easier control of his hypertension for three to six months after having general anesthesia. The more severe hypertensive would be expected to require some form of antihypertensive therapy. Factors requiring attention at surgery relate to dehydration and volume repletion. Volume over-repletion may occur and the use of diuretics can handle this problem if the patient develops an elevated blood pressure after surgery. It is important that some hypertensive agent be maintained as long as the patient is not having any adverse hypotensive effect.

DR. BRAY: A point that you just brought up about replacement of fluids is extremely important. Patients who are on diuretics prior to surgery may be dehydrated and this is extremely dangerous when they come to surgery. We have really dangerous drops in pressure sometimes with these patients. This should be checked into carefully and corrected preoperatively. Patients should be hydrated and stabilized as much as possible from the start of the surgical procedure, which helps to maintain the blood pressure at a normal status in the immediate post-anesthetic period. If the patient remains hypotensive postoperatively, a

vasopressor drip should be given as indicated and very carefully monitored to prevent a sudden hypertensive episode while bringing the blood pressure back up to a safe level.

DR. GEHRINGER: What about the use of antihypertensive agents immediately postoperatively? Should some specific period of time elapse from surgery before resuming antihypertensive drugs?

DR. BRAY: No. I think that after the patient leaves the recovery room and gets back into the ward, normal care should be restored.

DR. GEHRINGER: I believe I am hearing two different opinions. One opinion holds that the patient who is hypertensive preoperatively should have his antihypertensive treatment restarted on the basis of blood pressure determinations postoperatively. The other view holds that his antihypertensive regimen should be restarted as it was preoperatively on the first postoperative day.

DR. BRAY: The point I wanted to make was only that the patient should be started on the antihypertensive therapy he had before to prevent a rebound. Dosage can be altered or regulated subsequently.

DR. GEHRINGER: The general opinion seems to be that, if no hypotension is present, the patient should be restarted on his blood pressure medications on the first postoperative day to prevent rebound hypertension. I would personally either start one medication at the time or start the medications at a lower dosage than preoperatively and monitor the patient's blood pressure very closely. Then I would gradually increase the medications or dosages to the preoperative level depending on the patient's response.

DR. BRAY: I agree with this and I do not think there should be a delay just because the patient had anesthesia and surgery.

DR. GEHRINGER: I think this case points out several things. First is the need for the team approach in medicine. Family physicians, cardiologists, anesthesiologists, and surgeons all worked together and provided this patient with better care and management than could have been provided by any one discipline alone. I think the family physician's role was very important in making an early diagnosis and in the fact that he had the

advantage of knowing the long-term history of the patient and his family. This enabled him to provide valuable information to the surgical team, including the anesthesiologist, so that all precautions were taken to provide for proper management of the patient. I also see the family physician's role as being supportive to the patient as well as the family in this period of crisis. All of us are less likely to be involved in some sort of medical liability procedure, if we handle this role properly. In addition, I believe that the family and the patient will undergo the surgical procedure much better as a result of this emotional support. The follow-up management again revealed a good team approach between Surgery and Family Medicine. Although Surgery had the primary responsibility during the surgical period, the Family Medicine resident made daily rounds on his patient suggesting antihypertensive management postoperatively in concurrence with the surgical team. This demonstrates the team approach and the proper function of medical personnel in the management of this case. It also points out that residents can be taught practical consultation and referral techniques in a university hospital.

## References

1. Storer EH: Appendix. In Schwartz SI, Lillehei RC, et al (eds): Principles of Surgery. New York, McGraw-Hill, 1974, p 1174
2. Maylard AE: Sex and age incidence in appendicitis. *Br J Surg* 8:189, 1920
3. Campbell JA, McPhail DC: Acute appendicitis. *Br Med J* 1:852-855, 1958
4. Peltokallio P, Jauhainen K: Acute appendicitis in the aged patient. *Arch Surg* 100:140-143, 1970
5. Mattingly TW: Patients with coronary artery disease as a surgical risk. *Am J Cardiol* 12:279-285, 1963
6. Kaplan BM, Berkson DM: Serial electrocardiograms after myocardial infarction. *Ann Intern Med* 60:430-435, 1964
7. Mauney FM, Ebert PA, Sabiston DC Jr: Postoperative myocardial infarction. *Ann Surg* 172:497-503, 1970
8. Logue RB: Surgery in patients with heart disease. In Hurst JW (ed): *The Heart, Arteries and Veins*, ed 3. New York, McGraw-Hill, 1974, pp 1443-1445
9. Adriani J: Anesthetic implications of drugs that act on adrenergic alpha and beta receptors. *J Am Assoc Nurse Anesthetists* 39:33-42, 1971
10. Wylie WD, Churchill-Davidson HC: *The Practice of Anaesthesia*, ed 3. Chicago, Year Book Medical Publishers, 1972, chap 24
11. Goodman L, Gilman A: *Pharmacological Basis of Therapeutics*, ed 4. New York, MacMillan, 1970, chaps 26, 33
12. Aviardo DM: *Sympathomimetic Drugs*. Springfield, Ill, Charles C Thomas, 1970
13. Lee JA: *A Synopsis of Anesthesia*, ed 7. Baltimore, Williams and Wilkins, 1974, chap 27