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**Preoperative Evaluation of the Surgical Patient\***

*Moderator:* NEIL W. SWINTON, M.D.

*Panelists:* ROBERT E. WISE, M.D., F. WARREN NUGENT, M.D., JOSEPH B. DOWD, M.D.,  
SIDNEY ALEXANDER, M.D., MORRIS J. NICHOLSON, M.D.

The discussion was begun by the moderator, Dr. Swinton.

DR. SWINTON

As a colon and rectal surgeon I like to assume full responsibility for the preoperative diagnosis, preoperative evaluation of patients, arrangement for consultants, as needed, to work closely with the patients to prepare them for operation, performance of surgery, and follow-up of the postoperative course, with the objective of achieving the lowest possible mortality and morbidity. The men on this panel are from the Lahey Clinic Foundation. They have been at this work for a long time, and they will present certain phases of the preoperative evaluation of the surgical patient as it is practiced in our group. The first speaker is Dr. Robert E. Wise, Chief of the Department of Diagnostic Radiology. I have asked him to point out some of the errors that can be made in roentgenologic diagnosis. Frequently patients come to us with films which have been taken elsewhere. The question arises—do we need to repeat them? How can our service best work with radiology in the preparation of these patients for

roentgenograms and in their interpretation, perhaps by eliminating barium after such studies, or by other means that I know he will emphasize.

FIRST SPEAKER: DR. WISE

Dr. Swinton has just changed the ground rules here in asking me to talk about films that have been sent to us for evaluation. As far as films from the outside are concerned, I think this can be handled very simply. We have a serious moral obligation in two respects: 1) not to repeat the films if it is unnecessary, and 2) to repeat them if they are necessary—no holds barred on either side. These are the criteria on which we base our decision. If the films are adequate, in our judgment, we simply do not repeat them. There is no need for it. If they are inadequate, we forthrightly say so and the examination is repeated.

I think this will give me a good chance to speak for eight or ten minutes to my colleagues here, without being interrupted, and say a few of the things that I've been saying to them for the last 16 years.

Dr. Swinton has alluded to cleansing. This is probably the greatest problem—one of the significant problems that we face in the examination of the colon and the de-

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tection of diseases of this organ. The evidence that the incidence of missed lesions rises with poor preparation is probably incontrovertible. It doesn't really matter why the preparation is poor. Our job is not to blame; our job is to prepare the colon. Whether this is a matter of sympathy for his patient on the part of the referring physician, whether it's inadequacy on the part of the radiologist to insist on it, whether it's the reluctance of the patient to make the preparation, whether it's negligence of physicians—really, it makes not the slightest bit of difference, in the last analysis, for it remains true—the poorer the preparation, the higher the incidence of missed lesions. There is, therefore, a dual responsibility here. There is a responsibility on the part of the clinician to *act* responsibly and to prepare the patient to the best of his ability. There is a responsibility on the part of the radiologist to guide and to insist that the preparation be as good as is humanly possible under the circumstances.

It is obvious that all patients cannot be prepared ideally. Many times it's dangerous to prepare the patient; many times it's inconvenient; many times the patient refuses to cooperate; but, whatever the reasons, our aim must be to prepare the patient.

As to the technic, there probably is no really good form of preparation. I will not get into the various types of laxatives, but I do firmly believe that a laxative should be given whenever possible. Unfortunately, we're limited by the physiology of the patient many times. I have some very good control studies where we have clinicians who have religiously followed our advice with the various types of preparation, with the various laxatives, and I have clinicians who have rigorously resisted all recommendations toward this end. Without any question the preparation in the patient who is cooperative is better, but it is far from perfect. I recognize this and, of course, I am sure that you do, as well.

I would like to make one point about the philosophy of doing a barium enema, in addition to and beyond preparation. Many times the excuse is used that, "Well, he really doesn't have anything, I'm quite sure. I'm just doing this to please the patient." I leave the judgment of the honesty of this approach to the audience, but I think the implications are clear.

What are the other reasons that we might miss lesions? Failure to obtain the proper views; there is no question about this. If we don't do the job properly—if we don't have the technical know-how—and if we don't have the will and drive to do it, we are simply going to miss lesions. If we have a poor radiographic technic, we're going to miss lesions. If we select our kilovoltage improperly, for instance, we're going to miss lesions. If we have inadequate equipment, we are going to miss lesions. There is no question in my mind but what image intensification is here to stay. I realize that there are a few radiologists who do not share this opinion, for one reason or another, but the vast majority of radiologists today insist that image intensification is the *sine qua non* of proper examination of the colon. I cannot recommend it too highly.

As far as our technic in selection of procedure is concerned, I think we might say that the routine barium enema generally is inadequate for the detection of small lesions—that is, the polyps of the colon. However, a combination of routine barium enema with a high-kilovoltage technic will obviate some of this deficiency. Beyond that, it is my conviction that the air-contrast study is probably best in the long run, considering the fact that the colon cannot be adequately prepared for the detection of polyps many times.

Dr. Swinton and I have long held to the principle that a single air-contrast examination which shows a small, rather atypical possible polyp is inadequate indication for surgery. We insist that unless the appear-

ance of the polyp is absolutely classical, with a stalk, etc., a single air-contrast examination is inadequate. This is our means of eliminating, insofar as possible, the false-positive diagnoses.

Now that I have berated my colleagues, I will sum up my position as to where the responsibility lies, and then touch upon something that Dr. Swinton alluded to. I would like to leave this message with you: regardless of the poor preparation of the patient, regardless of why it occurs, regardless of the improper films (whether they be made by a technician or not), responsibility for the radiologic examination lies with the radiologist. The competence of the radiologist, in the last analysis, will make the diagnosis. Now, Dr. Swinton said that, in his Section of Proctology, they wish to assume the responsibility for this. It is interesting that both disciplines want this responsibility, and I think that perhaps out of this cauldron will finally come the answer of what we feel is the proper way to do this—that is, the team practice of medicine.

I would like to show a few slides. Here we see a combination of the routine barium enema and a high-kilovoltage technic. At the arrow, I think you can see, very clearly outlined, what could represent a polyp or a bit of fecal material. This does not end the examination, and it is inadequate evidence for surgery. (Next slide.) The mucosal pattern is also important, and in the same patient you can see, at the arrow, some alteration in mucosal pattern. This is a second clue to the nature of this lesion. The odds are that we would not have retained fecal material in precisely the same position, so that we are now beginning to approach what may be considered almost mathematical certainty in the diagnosis of a polyp. (Next slide.) If that evidence is not adequate, we go to the air-contrast study. Now, I mentioned earlier that the evidence must be entirely classical, and here

you can see that the evidence is classical. Here you have a stalk; here you have a slightly irregular polyp and, as far as I am concerned, this then is adequate as an indication for surgery.

(Next slide.) This, perhaps, is where the radiologist really comes in, and his training comes to the fore. Myriad types of examinations and views have been developed, but if the radiologist is cognizant of his responsibility, he will ferret out and be sure, before he certifies a colon to be normal, that he has covered every flexure as well as he possibly can. Here, of course, you see a routine anteroposterior view of a barium enema. We may see a few minor changes in here, but nothing really very significant—that is, not until we've turned the patient up, high into the left lateral position; then we are able to see the sigmoid adequately (next slide). The image intensifier has probably been the greatest boon in this particular area. When I began radiology, it was almost impossible to see the rectosigmoid junction in the lateral view, but today, with proper image intensification, we can see the rectosigmoid junction at fluoroscopy almost as well as we can on the film.

I would like, for a moment, to touch on what the future holds in the way of examination of the colon and perhaps improving our diagnostic accuracy. We radiologists should have more control, in some fashion or other, over patient preparation. Perhaps there has been too much individualism in the preparation of these patients; I would recommend that in the future we exert some form of group control over these patients.

We must have adequate histories, and I cannot stress this too strongly. The history will improve the diagnostic reliability of this study, beyond any question. It is improper to say, we are only playing games with the radiologist—why should we help him? Whatever the excuses are, "I am too busy,"—you name your own excuse—I think

we can find them all invalid. Proper histories tell us where to look, which not only saves us time, but assures that we will search out the area in question. This, too, is a *sine qua non* of good examination of the colon.

Now, aside from all of this—once all of this has been done—proper enemas, good radiologists, good cooperation on the part of our colleagues—what does the future hold? I think it holds the promise of better diagnosis through angiography. If we are unable to detect the source of melena, there is good enough evidence now that the patient should be subjected to angiography, for many lesions can be found today by angiography that simply cannot be found either by the radiologist doing conventional procedures or by the surgeon with the abdomen open. Here (next slide) we have a case in point—chronic melena—and I think you can see the ileocolic artery leading down to a mass of new vessels. This turned out to be a hemangioma which could not be detected at surgery, and on the faith that the surgeon had in the films, and perhaps the radiologist, the right colon was resected. This was, in fact, a large hemangioma, and the patient's bleeding has stopped. If one cannot find the source of the melena, angiography should be done.

On the next slide we have the same case, showing the rather large venous return. In the next case (next slide), that of a 32-year-old woman who had had chronic melena since the age of 12, we again see the same situation. The woman had been explored three months previously, without a positive diagnosis, and in the same patient, on the next slide, with an air-contrast study combined with the angiogram, we proved this to be in the cecum.

So here are two cases in which the surgeon initially did not find the cause of bleeding and I, therefore, strongly recommend, for the future, angiography in cases of obscure bleeding.

#### DR. SWINTON

The next speaker, Dr. F. Warren Nugent, is from the Department of Gastroenterology. He will discuss blood volume and problems of steroid therapy and antibiotics, among other matters.

#### SECOND SPEAKER: DR. NUGENT

As the internist or gastroenterologist approaches the patient who is being prepared for colon and rectal surgery, he must take into account a number of factors, most of which you have heard discussed on a number of occasions. Time will not allow us to go into all of them, so I will limit my comments to two or three areas that perhaps are not as frequently discussed in depth.

In order to make this discussion a little simpler, with our time limitations, I have conjured up a patient, a 45-year-old man with chronic ulcerative colitis in acute exacerbation. He is febrile and has lost 30 pounds in the past three months. The hematocrit is 33 per cent. The first step we're going to take is to think about his blood volume. If we were to transfuse this gentleman with a unit of blood, we would expect a rise in the hematocrit in the range of 3 to 4 per cent. We would then have a hematocrit of 37 to 38, which is borderline or actually a little low for a 45-year-old man, who might be expected to be more in the range of 43 or 44, or better. If the patient goes to surgery in that state, we can anticipate a much greater morbidity and mortality than we would see if he had not lost 30 pounds in the preceding three months.

There is a good deal of experimental evidence, both in animals and in human beings, that a contraction of the blood volume accompanies weight loss, and this is in direct relationship to the acuteness of the weight loss. You have all experienced a situation where you would transfuse such a man and see a unit of blood bring his

hematocrit to 37, and then give him another unit, and it's still 37, and give him a third unit and it's still 37—much to your surprise. Then you might even pursue this and give him a further unit and, all of a sudden, it jumps to 45. This is simply another way of doing what I am going to suggest a formula for this morning. (Slide.)

What we have done is to transfuse these patients to a low normal hematocrit—in other words, to the range of 36 to 38 per cent. We then estimate the blood volume deficit, and this, if you wish to check by doing blood volume studies, you will find is really quite accurate. The patient is given 40 ml of blood per pound of weight loss below his estimated ideal weight. Then we take into consideration the time relationship. If the weight has been lost in the previous three months, we give 100 per cent of the estimated deficit. If it was lost three to six months prior to surgery, we give 50 per cent; for six to 12 months, we give 25 per cent. We might be dealing with combinations of these if the patient has been sick for a period of six months or so, so you have to sit down beside the patient for a minute and decide his ideal weight, over what period of time he has lost this weight, etc. Our hypothetical patient had a 30-pound weight loss below his ideal weight. Therefore, we would assume that, after we had given him the first unit of blood and brought his hematocrit to 37, we would then give him 30 times 40 ml, which would be 1,200 ml, of whole blood, and our practice is to play this just a little light and give him the two units; then we feel that he is ready, blood-volume-wise, for operation.

I will repeat that there is adequate evidence, both in laboratory animals and in humans, that this is necessary, and that the incidence of shock under anesthesia, with all of the complications that go with it, such as invasion of the blood stream with bacteria, is remarkably lower in patients

who have adequate effective circulating blood volumes when you take them to surgery. (Next slide.)

Now all of the patients that we see that have been taking corticosteroids (and our patient with ulcerative colitis had been) are "hooked." If we see the patient as a new referral, and he has to have his colon resected, if he's been taking steroids within six months, or perhaps even 12 months (depending upon the dose and the length of treatment), then we must prepare him adequately with steroids. Cortisone acetate is probably the best if one has a little time. Our plan is to use 100 mg every 12 hours the day prior to surgery, 100 mg every eight hours the day of surgery, and 100 mg every 12 hours the day following surgery. Then we taper it off, depending upon the course of the patient and the stress he is under. If it's a smooth course, one can cut down very rapidly. If it's a complicated, febrile, infected course, we have to be a little more cautious.

We also have to keep available, at all times, 100 mg of hydrocortisone to be given intravenously. If the patient who has intramuscular steroids goes into shock, he may not have adequate absorption.

Perhaps the one rule that should be followed in treating the patient who has been on steroids, to whom you have to give steroids, is that you can never give too much over this short period of time. It's possible to give too little, but it is almost impossible to give too much, if we're dealing with the period of two or three days in the operative area.

Now this patient is also febrile, which means that, with his ulcerative colitis, he not only has mucosal inflammatory change, but probably also has what amounts to cellulitis of the bowel wall. In other words, we have here infection that cannot be reached by intraluminal antibiotics. It is our practice to give all of these patients systemic antibiotics. I realize that there

will be arguments on this score but, in our hands, we have had much more success with decreasing the morbidity due to infection, and the mortality (which is very serious in these patients), by using some type of antibiotic regimen and beginning it about 24 hours before surgery.

Our present choice of an antibiotic for the patient with an infected colon is Keflin. We give 2 gm every six hours, which is a total of 8 gm a day, "piggy-back" in the IV, beginning about 24 hours prior to surgery. To this we usually add ampicillin, 500 mg four times a day, intramuscularly, again beginning the day prior to surgery. Ampicillin covers a range of anaerobes that Keflin does not cover.

There are alternate programs. Some people use large doses—20 to 30 million units—of penicillin, and I have no objection to this. We feel that the one thing you must do is avoid doing harm to the patient and, second, you must try to control the problem of infection. We have found Keflin to be uniquely free of side-effects, particularly as far as the kidney is concerned, and we have found ampicillin to be an extremely helpful adjunct.

I think it is important, for all of these patients, to get a culture from the peritoneal cavity at the time of surgery. You can always get .5 ml of fluid of some kind so that, in the immediate postoperative period, you are able to manage the bacterial problem with much greater accuracy with bacterial cultures and sensitivities.

Many other factors must be considered in treating this hypothetical patient of ours. Many of these patients have had oral antibiotics; they have had malabsorption of one degree and another; they have not eaten adequately; one has to think of such things as adequate vitamin K absorption in the period prior to surgery and, every once in a while, we are shocked to find our patient bleeding from hypoprothrombinemia, so the prothrombin time should be

checked routinely and intramuscular vitamin K given if it is low.

I'll not get into the problem of fluids, electrolytes, proteins, etc., except to say that, as you replace their blood volumes, you are also replacing, in part, the protein deficits that they have.

DR. SWINTON

The next speaker is a member of the Department of Urology, Dr. Joseph B. Dowd. I am certain that all of you, whether you perform anorectal surgery or colonic surgery, encounter patients with genitourinary complications after operation. We have learned that with proper preoperative evaluation of the genitourinary tract and its relation to the disease involved, a great many of these complications can be prevented.

THIRD SPEAKER: DR. DOWD

Surgeons, in general, tend to disregard the urogenital tract. They disregard it, at least, until it is a problem, and then they usually want a prompt and total solution.

Most undergraduate textbooks of surgery today, like their predecessors, barely mention the urogenital tract in the preoperative evaluation of the patient coming to colonic surgery. Since urogenital problems commonly coincide with or are consequences of colonic and rectal surgery, it is well to ascertain certain urologic information prior to surgery.

In examining the patient, it is well to find out, by history, factors in three categories: 1) symptoms related to the colonic and rectal disease; 2) symptoms that may reflect obstruction; 3) symptoms that are chance findings.

Among factors related to colon and rectal disease, was there pneumaturia? How often we forget even to ask! Are there suggestive paracolic inflammations that give irritable bladder symptoms, or are there sphincter problems—anal or urinary—for these are

most apt to accompany very low-lying ano-rectal lesions.

What is the site of the patient's pain, flank, abdomen, thigh, penis? Penile pain is commonly the first symptom of an eroding vesicocolic fistula. Has there been a fever; has it responded to treatment?

The obstructive symptoms are pertinent primarily in men—whether they have hesitancy, whether the stream is decent in force and size, whether they have a sense of decent emptying, whether they get up at night or whether it's just nervous daytime frequency. What has happened to them as regards urination if they've had anesthesia or enforced bed rest in the past?

The chance findings, in general, could be well covered by a few questions relating to whether the patient has ever had blood in the urine, or been told he had a stone, or a significant fever; whether he has chronic back pain, whether he's ever had to be catheterized in the past, or been told in a physical or insurance exam whether the urine or kidneys were abnormal.

On physical examination, can you find a mass, incision, or tenderness in the flank, groin, suprapubic region, or perineal area? Examine the external genitalia; a phimotic foreskin or stenotic meatus may preclude a necessary catheterization. Is there a hernia? Take a testis count! If possible, for those who don't have the bashful bladder syndrome, observe the voiding stream.

On rectal examination of the male, record the relationship of any mass to Denonvilliers' fascia that covers the rectal-prostatic barrier, particularly noting the size of the prostate, its resilience, whether there are nodules and, if possible, making a simple sketch of the area.

As for pertinent laboratory information, the urine sediment is important. Is there albumin or hematuria—a herald of significant renal disease? It is basic that we record blood urea nitrogen or, preferably, serum creatinine. Obtain a urine culture—

if it's positive, it suggests 1) related colonic and rectal disease, or 2) some obstructive phenomenon, or 3) purely a chance finding no less significant. In case there is bacteremic shock immediately postoperatively, bacteriologic information is needed very urgently and the urine culture is a great help. We suggest an intravenous pyelogram—certainly for all men over 45—particularly if they're going to have abdominoperineal resection. If facilities for reliable evaluation of Papanicolaou smears are available, we would certainly get them 1) from anybody with a history of hematuria, or even a few erythrocytes in the urine; 2) if there are any urinary symptoms related to the colonic and rectal disease; and 3) if there have been any positive physical findings in the flank or suprapubic area.

Do you have to delay your operations just to get an intravenous pyelogram? A few months ago, Dr. Janowitz and his group from Mount Sinai in New York made a very worthwhile contribution to the literature (March 1969, *New England Journal of Medicine*) in their provocative paper about the abnormalities of excretory urography in people with granulomatous disease of the colon. We don't, of course, suggest that you get an intravenous pyelogram for everybody. Often surgical intervention is urgent, and to delay it for an intravenous pyelogram without some other significant reason is unnecessary. Allergy may preclude intravenous pyelogram; or you may be unable to get a half-decent bowel preparation, for some of these people are distended, occasionally they are obstructed, and often they are barium-impregnated. But if there are no signs or symptoms or abnormal laboratory findings, and the patient is not a man who is going to have a Miles resection, it is not absolutely essential that you get an intravenous pyelogram, though we're always happy to see it.

The paper by Janowitz and his group

from Mount Sinai was certainly interesting to us. I think it reflected more their sick-patient population than a little bit of an unusual experience—at least from our point of view. Although we did have, in our group, a few extrinsic obstructions, Dr. Chen and I have reviewed two sizable groups of people who had pyelograms. In the first group, those who had granulomatous disease of the colon, only two of 48 people, or about 4 per cent, had sufficient retroperitoneal inflammation to cause extrinsic ureteral obstruction. In these two patients it was certainly no surprise. They had fever and flank pain.

The next four slides show a sequence in a patient who had a long history of loose, frequent bowel movements (four to seven a day) but who recently had had fever and flank pain. This was two and a half months before operation and he had, in essence, a normal-appearing upper tract. Then four and a half weeks later, the flank pain got worse, the diarrhea got worse, the patient had some mucus and a lot more abdominal cramps. (Next slide.) At this time we see some changes on the right side, with apparent extrinsic ureteral obstruction. This fellow was explored and had a local resection for what appeared to be granulomatous ileitis. There was a great deal of retroperitoneal inflammation.

You would imagine, despite the difficulties with this kind of surgery, that with alleviation of the inflammation and the relief of periureteral edema the pyelogram would return to normal. In Janowitz's group they had rather prompt returns to normal for those who had definitive surgery. Many of theirs were bypass operations and so the inflammation probably hung on for a bit. Here is a film, three weeks later, when the patient still had some flank pain. (Next slide.) His abdominal cramps were gone, and his diarrhea was under control with medications. But here we have, perhaps, even more inflammation.

And then, just five days later, he was completely free of flank symptoms and pyuria.

(Next slide.) I think you can see that he's better. In this instance, the pyelogram reflects what the patient was telling us and, unlike the New York experience, there was no mystery about what was happening in this fellow's right kidney.

Now, in the second group of 100 people for whom we had preoperative pyelograms, folks from Dr. Swinton's service, we had a significant number of other findings. This series is probably a little bit loaded because we only did pyelograms of those who had histories of physical or laboratory abnormalities that suggested that pyelograms would be helpful, and also everybody coming for a Miles resection—at least every man. This next slide shows what we found in 100 patients. In 24 per cent there were changes in the pyelogram related to the primary colonic or rectal disease—a ureteral distortion, or a bladder displacement, or inability to fill the bladder completely, etc. Significant obstructions were found in 19 per cent. This figure seems tiny, but it really isn't for, remember, half of these people were women, and obstruction is rarely a major factor in their courses, so 19 per cent is probably closer to 38 per cent of men who had (coming for Miles resection) significant obstructive stigmata in their preoperative studies. The chance findings were present in 27 per cent, and usually were anomalies that might have been significant. But there was a high incidence of oxalate and uric acid stones, past trauma that might not have been significant but caused distortion in the pyelogram, etc.

The next three pyelograms are "look-alikes." Yet they're not really, for although there's overlap between the related colonic and rectal disease, the obstruction, and the chance findings, here are three men who have similar findings but from different causes. The primary disease in this first



fellow was a huge rectal carcinoma that caused hydronephrosis with some shadowing and incomplete filling of the bladder. That isn't air in the bladder—it's displacement and inability to fill out the globe. In the next slide, a fellow coming for a Miles resection had rather significant, pre-existing urinary-tract obstruction. In the final slide which certainly again "looks alike," there is prostatic obstruction, but the patient had a uric acid stone down low in his distal ureter.

This is the kind of information we'd like to have in advance. We can do more to support and assist you and your patients when these data are available.

DR. SWINTON

I have been very impressed in recent years with the interest that has been taken in these genitourinary problems. In the preoperative studies we have made, particularly in patients more than 45 years old, as Dr. Dowd has suggested, perhaps routine intravenous pyelography before all colonic resections has resulted in discovering much unexpected disease.

The next speaker, Dr. Sidney Alexander, is from the Department of Cardiology. It is obvious how important a proper preoperative cardiac evaluation is, and Dr. Alexander will tell us some of the pitfalls and things to look for.

FOURTH SPEAKER: DR. ALEXANDER

I want to discuss particularly the problem of surgery in the patient with arteriosclerotic or coronary heart disease. I want to emphasize the preventable causes of death in such patients and also pass along some information regarding surgical risk.

How often have you asked an internist what he thinks the surgical risk is in a given patient? The internist usually comes up with some answer, but I must emphasize that much of what he says is based on his subjective opinion rather than any really

good data. Because I have been asked this question so often in my role as a cardiac consultant, I attempted to review what reasonable data do exist in the literature regarding surgical risk in cardiac patients. I have summarized studies which attempt to define surgical risk in large series of both cardiac and, in some studies, control patients. There is a distinct and definite trend: patients with heart disease have higher surgical mortality, in fact, several times higher in some studies. We actually know surprisingly little about why these patients die, but have always thought it reasonable to assume that this increased mortality rate must be related in some way to the reaction of the damaged heart to the stress of surgery.

There are a limited number of ways that the heart can cause death: arrhythmias, congestive heart failure, and cardiogenic shock. We have learned that lethal arrhythmias, in particular, can be prevented in myocardial infarction patients who are continuously monitored in coronary care units. We think that cardiac patients after surgery also die of arrhythmias and that it is absolutely imperative that they have electrocardiographic monitoring which starts prior to the induction of anesthesia and continues well into the postoperative period. Since most surgical deaths in cardiac patients seem to occur in the first 48 hours postoperatively, we monitor patients with arteriosclerotic heart disease for at least this period.

The patient with arteriosclerotic heart disease is the one you must be very careful about because the disease confers an appreciable risk, often without producing many symptoms. Risk is relatively easy to assess in rheumatic, congenital, and even hypertensive heart disease; it is reasonably proportional to the functional status of the heart. However, in arteriosclerotic heart disease this is not the case. A cardiac diagnosis may be harder to substantiate.

There are fewer objective criteria for diagnosis, yet these patients must be identified before surgery.

How can we do this? Obviously a good general history and physical examination are important. We then look very hard for the characteristics which we know can identify the coronary-prone individual. Is there chest pressure or pain, a strong family history of early vascular disease or diabetes, or heavy smoking? Carbohydrate metabolism and serum cholesterol should be evaluated routinely. An exercise electrocardiogram may also be very helpful.

The clinical course of the angina should be carefully evaluated. Is the angina predictable and stable? If so, the risk seems to be a good deal less than if the angina becomes unstable, that is, if it has become a little more frequent or prolonged, or is more easily produced. Patients with unstable angina should not be subjected to unnecessary stress until the clinical course straightens out.

Since the patient with heart disease, regardless of etiology, is more prone to ventricular failure, we strongly urge monitoring the central venous pressure. This serves as a reasonable, although indirect, assessment of cardiac function, and is particularly useful in judging fluid therapy. Obviously, intravenous fluid must be administered cautiously.

One word about postoperative myocardial infarction. This dread complication occurs far more often in patients with known arteriosclerotic heart disease and, in fact, is relatively rare in noncardiac patients. Diagnosis may be quite difficult, because postoperative infarction is often silent and the surgery itself may produce electrocardiographic and enzymic changes similar to those of myocardial infarction.

I am often asked when it is safe to perform elective surgery after myocardial infarction. It is generally assumed that after three months surgery should be safe. It

takes about this length of time for most of the pathologic changes in the evolution of an infarction to occur and most patients seem able to return to reasonable activity after this period of convalescence. However, the surgical mortality rate among patients with myocardial infarction seems to remain high for at least two to three years after the infarction. Only then does the mortality rate begin to approach that of noncardiac patients.

Despite what I have said, however, I am continually amazed at how well most cardiac patients do even after extensive surgery. You must remember that my remarks have been directed chiefly toward the problem of elective surgery. Urgently needed procedures should not be postponed unduly merely because the patient has heart disease. Proper management will allow most patients to come through surgery safely.

In summary, then, it seems reasonably clear that patients with heart disease have a higher surgical mortality rate. Many of these deaths can be prevented, and it is often the responsibility of the surgeon to identify preoperatively those patients who have heart disease so that proper care may be instituted.

DR. SWINTON

Our next speaker, Dr. Morris J. Nicholson, is from the Department of Anesthesiology. He is a dedicated physician; I sometimes think his interest in anesthesia is somewhat of an avocation. He is primarily interested in the care of his patients, and I can assure you I do not know of anyone who might join this panel who is better qualified to discuss many of these phases. He will talk about problems that may occur in relation to the respiratory system.

FIFTH SPEAKER: DR. NICHOLSON

This problem of the lungs has been with us for a long while and we're getting so

esoteric and specialized—even on this program—that we're dividing the heart and the lungs. You know this is an impossibility because anything that affects the heart affects the lungs, and most things that affect the lungs affect the heart. So I decry one person's specializing in the heart while another specializes in the lungs. I would like to have a physician take care of me who knows something about both of them and how they work together.

Now this problem of lung disease—if we can isolate it—is certainly increasing. I would like to warn you that chronic bronchitis and emphysema are increasing faster than lung cancer, and these two diseases account for about 25,000 deaths per year. Emphysema deaths are increasing four times as fast as those from cancer, and emphysema is the second leading cause of disability in the United States. In 1967 it was estimated, by Social Security, that disability as a result of this disease would cost about ninety million dollars a year. We have to be cognizant of the fact that even though you are regional anatomic surgeons, all your patients have hearts, as Dr. Alexander tried to point out; therefore, one needs to find out something about the physiologic status of the lungs of his patient before he is subjected to a major operation.

What can we do? I think we must be cognizant of pulmonary complications as a major aspect of both medical and surgical morbidity and mortality. We need, whatever our particular specialty, to establish an awareness and be on the lookout for patients with *cough, sputum, breathlessness*, and those who either wheeze when you listen to the chest or report to you that they "wheeze at times." These are all clear-cut clinical evidences of underlying pulmonary disease. To identify the exact cause, you need x-ray examination and many special studies—certainly, a vital capacity, which is easily done and gives a lot

of information. We have to realize that smoking must be equated with bronchitis. Now, doctors should set an example and stop smoking. We're never going to stop patients from smoking while a big, fat doctor sits in his office, with his belly sticking out, smoking a cigar or a pipe, because the patient says, "What the hell—he smokes, why can't I?"

Now, in contradistinction to what a lot of people think, sex isn't really the great American tragedy. I attest to you, from day-to-day experience, that obesity is the American tragedy; and this, when you have the other things that I mentioned, completes the pulmonary nightmare.

Well, what can we do in our ineffectual way? First, you can stop smoking and then ask the patient to stop. You can reduce the patient. There are very few obese patients that I see who have such things as ventral hernias, that must be operated on before their obesity has been treated. If they won't reduce, let another surgeon operate on them, because he's going to get them into trouble, too.

We can treat their bronchitis—their bronchospasm—we can hydrate them. We can use humidity, even in their homes. We can bring them into the hospital, for it's much more economical to give a patient four or five days of intensive pulmonary preparation before an operation than to rush him into an operation and have multiple complications postoperatively which keep him in the hospital another six weeks while one struggles to reverse these complications.

We have to realize, when we see the obese patient, that his diaphragm is elevated. If his diaphragm is elevated, this means that he's crowding the basal segments of his lung and we have definite areas that are being perfused with blood but not ventilated. This means hypoxia, CO<sub>2</sub> elevation, and it's undesirable. If they smoke, we know we have a problem of chronic bronchitis. And if they smoke, we

also know that they will have thick, tenacious secretions, which they can't cough up very well unless we hydrate them—expose them to superheated atmospheres with water.

There are some very good studies to show that elderly debilitated patients have marked reductions in the normal protective reflexes in the airway, and even the presence of excess secretions in their airways will fail to provoke effective coughs. Most of the postoperative pulmonary complications seem to follow laparotomies, herniorrhaphies and, especially, gastric resections, gallbladder operations, etc. They are about four times as common in men as in women. You know, men quit breathing with their chests very early. If you watch the love scenes in the movies, the camera is always focused on the woman's chest, as the breasts are rising and falling with respiration. They never show you that the man's chest is absolutely stationary and rigid, and he's just breathing with his diaphragm. This is the reason that he has so much postoperative atelectasis.

The type of anesthesia doesn't really make a whole lot of difference, although I think that if there is much misadventure in the anesthesia, it certainly can precipitate respiratory problems. And you say, well, with all of our sophistication and all the monitoring and all the advanced technics in anesthesia, isn't this problem becoming less acute? I say no, it's becoming much more acute, primarily because our patients are getting older, they are coming to us with extensive underlying diseases; frequently they are being rushed into surgery, and you must realize that there is nothing now that contraindicates an operation. Old age, extensive cancer, hypertension, kidney disease—we even take the patients with diseased kidneys or liver, we replace worn-out hearts, we remove lungs—so it's obvious that we're going to get into more and more

trouble. Most of these troubles we cannot treat very well, and our only hope for these patients is to be more aggressive, more suspicious preoperatively, and try to prepare them better.

I think you all should be interested in Dr. Francis Moore's book on postoperative respiratory insufficiency. We no longer let patients die from hemorrhage, we are able to treat their peritonitis more effectively, and we keep their kidneys going—so what can they die from? About 35 per cent of the postoperative surgical patients (I'm talking about people who have intra-abdominal and chest operations, etc.) are dying from a progressive type of respiratory disability. As they become weak they can't cough, they use more of the oxygen to breathe, they become distended, and they gradually get so weak that they can't cough at all, and even if you have them in a completely germ-free atmosphere, they will ultimately succumb to an invasive type of bronchopneumonia which antibiotics will not protect them from. Now, sometimes we save some of these patients by doing tracheostomies to relieve them of the work of breathing via a mechanical ventilator, but I think we'll have to face the fact that if we are going to treat people with extensive disease (not only of the lung, but everywhere) we are going to lose a portion of them from postoperative pulmonary sepsis. Even the organism that the patient normally harbors will become a lethal organism and, therefore, you may be discouraged that your recovery room and your intensive care area is not saving all of your patients. It is not *going* to save all of these patients, but we can prevent some of them from getting into this situation by being more aggressive about early preoperative diagnosis and treatment of underlying pulmonary disorders—thus making it possible to avoid some of the currently perplexing postoperative complications.

DR. SWINTON

We will spend our remaining time attempting to answer some of the questions that have been sent up. I have moderated many panels, and I do not believe I have ever encountered more interesting and intelligent questions than those that have been sent in. I wish we had more time to answer them, but we will do the best we can.

(Question)

Is barium preferred, for diagnostic purposes, over angiogram in abdominal angina?

DR. WISE

I think the answer to this must be "No," because obviously you cannot make a diagnosis of abdominal angina with a barium study. On the other hand, I think the answer would, to a degree, depend on our diagnostic accuracy in the estimation of the problem. Abdominal angina is a rather difficult diagnosis to make at times, but if the evidence is reasonably clear-cut, then, in the interest of saving time, I think it probably would be wise, most of the time, to perform the angiogram first. The angiogram today, in proper hands, is not a formidable procedure. Carefully done, it is not unduly time-consuming, and a simple Seldinger procedure with a midstream injection, once the patient has been prepared and is on the table, can really be carried out in less than ten minutes. The incidence of complications is going down, but I must say that the incidence of complications remains still somewhat higher than with translumbar angiography.

(Question)

Has the elimination of the tannic acid-barium mixture affected the barium enema adversely?

DR. WISE

I think it probably has. Our mucosal

patterns simply are not as good today as they were with tannic acid. We are forced, by the FDA, to use some substitute, or nothing. Many people have gone to a compound known as dihydroxyphenylisatin, which is sold as Lavema. It is reasonably effective, but I don't believe it's quite as good as tannic acid.

(Question)

Will you outline the details of the usual preparation for a barium enema?

DR. WISE

There are a number of possibilities here. Any one of the forms of castor oil, or a senna preparation, is quite adequate today. I think, under some conditions, some patients respond reasonably well to Fleet's phospho soda. If these are ineffective, and particularly if we're doing an air-contrast enema, we frequently will then do an enema on our own in the Department of Radiology, and quite frequently under fluoroscopic control. I believe that the usual saline enema, or the phospho soda enema, as far as preparation for the barium enema is concerned, is almost valueless; it simply does not clean out the right colon. It cleans out the sigmoid; if we're looking at the sigmoid—fine, but the right colon—no.

There is one more question about the long redundant colon and my impression of it, and it is: "What is my view of it?" My view is rather dim: it complicates our life, but the diagnosis can be made with care in these patients, as well.

(Question)

How long should a patient have been off steroids before steroid preparation is unnecessary?

DR. NUGENT

Well, I think if I had to pick a time, I would say about a year. However, prob-

ably not all patients who have had steroids within the past year need a steroid prep. If they have had small amounts, and if the time has been longer than six months, for instance. But if you want to be on the safe side, I think you have to consider a year if there's been any significant length of steroid treatment, and one can rapidly decrease the steroids in the postoperative period.

(Question)

How soon do you stop steroids postoperatively in patients with chronic ulcerative colitis who have been taking steroids for more than five years and who are going to have surgery?

DR. NUGENT

That's a long period for steroid therapy. I would first suggest that if you're going to treat patients with steroids (and sometimes you are in a situation where it is necessary for long periods) it is best if you use the medication every second day, and allow a day for the adrenal to escape at least partially. With this method, there is less adrenal suppression. In other words, if you were going to use 15 mg of prednisone a day, you would use 30 mg and give it every second day instead, and I have seen no difference in the control of the disease. Now, patients who have had steroids for long periods must be taken off very, very slowly, indeed. Perhaps these patients should have ACTH stimulation before they are taken off, and perhaps they even should have adrenal function studies, but I think you'd be talking about a period of weeks. I would tend, personally, to take them off very slowly and watch them carefully for many weeks. Perhaps if they were taking 20 mg of prednisone a day I would not cut it down by more than a tablet each month; and if there were any suggestion whatsoever that they were getting into difficulty, I think it would be necessary to

stop and do adrenal function studies and be certain that the adrenal, at this point, was able to respond.

(Question)

When do you use steroids with massive peritonitis—example, a ruptured cecum?

DR. NUGENT

I assume that that means in a patient who has not been on steroids, because otherwise one would follow the same criteria we talked about for the operative preparation. I just asked my friend, Dr. Dowd, how much he uses in the genitourinary business, and his answer was very similar to our experience.

We came back to the principle that if you are going to use steroids, particularly in an assumed desperate situation where the patient is in shock and cannot be supported by blood replacement, etc. (in other words, gram-negative shock), you cannot use too much. We are talking about a period of two to three days. I don't think anybody would feel that you could overdose the patient, and certainly you could use too little. There is real evidence to suggest that doses in the range of 120 mg of Solu-Medrol, three or four times a day intravenously, for two to three days, are not unreasonable. This dose has inched up over the years, but, personally, I am convinced that the mortality in gram-negative shock has been markedly decreased by the use of very high doses of steroids, and I have no hesitation whatsoever to use these doses for short periods of time.

(Question)

Do you find low magnesium in patients with diarrhea and malabsorption states?

DR. NUGENT

Yes, you do. The fall in magnesium usually lags behind the fall in potassium, for instance, or sodium, but in patients with

more chronic malabsorption states, magnesium deficiencies are seen quite regularly, and this is one of the factors that should be checked in such a patient. Magnesium can be replaced by giving 2 ml of a 50 per cent solution of magnesium sulfate every day; this is what we use for patients in the hospital. In other words, a gram of magnesium sulfate intramuscularly each day will usually bring the patient back to normal in rather prompt order, unless he's in a severe depletion state; then you can give four, five, six or more times this dose for a day or two, and then carry him on the 1 gm a day.

(Question)

Do you measure central venous pressure routinely as part of your operative and postoperative care?

DR. ALEXANDER

I urge surgeons to do so in all major procedures but, for reasons I am not clear about, they often forget. At the very least, central venous pressure should be measured in most elderly patients and certainly in those in whom heart disease is suspected. Any patient with a large heart should have a central venous pressure measurement, as well as any patient whom you have reason to believe may be a candidate for congestive failure. The large-bore catheter also may serve as a convenient means to obtain blood samples and give intravenous infusions.

(Question)

Whom do you use digitalis in?

DR. ALEXANDER

There is still strong disagreement among cardiologists about this question. My answer must necessarily be brief and not give a proper hearing to any opposing points of view. Some cardiologists urge prophylactic digitalization for almost everyone with heart disease of any kind. I used to think

this way also, but I have become convinced that the indications in the prospective surgical patient remain the same as for any patient. Digitalis should be used to treat congestive failure (and also to prevent its recurrence in people with prior histories of congestive failure), and to prevent and treat certain arrhythmias. I also use it in asymptomatic patients who have definite cardiac enlargement on x-ray. I do not use it merely because a patient happens to be old or because he has coronary disease with reasonably good cardiac function. I want to emphasize that, in patients with heart disease, digitalis predisposes to certain dangerous arrhythmias whose first clinical manifestation may be sudden death. Rather than prophylactically digitalize these patients, we monitor their electrocardiograms and venous and arterial pressures closely. If indications for digitalization do occur, we can pick them up early and proceed accordingly. I find it hard to justify the prophylactic use of such a dangerous drug, and it is very comforting for the internist to know that postoperative arrhythmias or other cardiac problems could not be due to digitalis because the patient has not received any. Nor do I participate in the current fashion of partial digitalization. People either need the drug or they do not. I do agree, however, with the trend toward lower loading and maintenance doses of the cardiac glycosides.

I think digitalis must be used with utmost respect and, frankly, I doubt that most surgeons have the necessary experience to use it safely. I would like to suggest, somewhat facetiously perhaps, that the mortality rate when surgeons attempt to digitalize patients adequately may be just about as high as that when an internist does appendectomies.

(Question)

Do you recommend insertion of ureteral catheters for men, for large lesions, or as a routine?

## DR. DOWD

The answer to all three of those is "No." We do not recommend insertion of ureteral catheters ever, unless the surgeon really wants them; then we would be happy to put them in. I suppose that in a very active colon and rectal service such as Dr. Swinton has, we average not more than three per year. There are rare times when it is of great benefit and we are happy to put them in, but it certainly is uncommon. The main reason for not recommending them is that urologic studies have shown that injuries to the ureter are more apt to occur when there is an intubated ureter in the operative field—where you pick it up and denude it. When the catheter comes out (anywhere from an hour to ten days later) a devascularized segment becomes a fistula. The ureter is far more likely to be manhandled with a polyethylene catheter in it than if it were left alone. Obviously you should know where the ureters are anatomically, but there usually is too much manhandling if a catheter is in place.

There is a question regarding urinary retention, particularly following an abdominoperineal resection. This is a different situation than we find in any other surgical patient of any specialty, for it isn't just a case of overhydration before anesthesia wears off. After the rectum has been removed, the bladder is tipped over so that there is an angulation and shortening of the posterior, or prostatic, urethra. There is the so-called male cystocele. Of prime importance is the fact that although an intraperitoneal operation cannot totally denervate the bladder motor power, it certainly can obtund it greatly, and so the efferent contraction of the detrusor is inhibited, at least temporarily, for an average of 30 days. Not infrequently it may go along for even three months. But the sensation from the bladder is invariably altered by the abdominoperineal resection, so the patient now has a tipped-over bladder, with

a narrow bladder neck that he may not have had before, and since he has diminished contractions, he isn't aware when his bladder is overfilled. If you add to this a colostomy, pain, bulky dressings, fear, medication, inability of the male to use the accessory muscles of micturition—it is common for a patient with a Miles resection to have a serious postoperative retention problem. This can be overcome in a number of ways, some of which are not terribly successful and are not always predictable but, in general, if in your initial history you find that the patient has any obstructive stigmata, he is likely to have to have a definitive urologic procedure, such as a transurethral resection, after he has recovered from the Miles resection.

We have tried, by cystometrograms, to settle the controversy as to whether there is a true neurogenic bladder after a Miles resection, and we have proved nothing. The literature is as confused about this as we are. Urecholine, a parasympathomimetic, has, as its absolute antidote, all belladonna derivatives, in any dose, so that a few drops of belladonna will inhibit any dose of Urecholine. So if you have any antispasmodic aboard, you can give a ton of Urecholine and get no detrusor contraction. Dr. Swinton has a program—a sort of "wet rule of thumb"—we have tried, which seems to be as practical as any. On the seventh to the tenth day, when the patient is "letting the dust settle" from his major operation, we clamp the catheter until the first urge to void, and then release it and measure. If it is less than 300 ml, the patient hasn't had too much denervation of the bladder, and we remove the catheter the following morning and watch him. If it's more than 300 ml, we start Urecholine and give him one trial off catheter. Then the decision to either leave the catheter in for a month and let him go home and regain his strength and poise and bladder tone, or to go ahead and



resect him, depends on the circumstances of distance, the patient, prognosis, etc.

The other questions seem to revolve about, "How do you prevent urinary retention, or what measures would you do prior to anal surgery to prevent postoperative voiding difficulties?"

The prostate is sort of analogous to a doughnut. Usually, when we feel a small prostate, we assume that the hole in the middle is large; whereas when we feel a large prostate, we assume that the hole in the middle is small. But, just as with doughnuts, there is no federal law that says that a large doughnut can't have a large hole in the middle, or that the small doughnut can't have a small hole in the middle. Your history tells you more than the rectal exam. If the patient has had voiding difficulties with pain, or with his anorectal disease, before he came to surgery, he's apt to have trouble. It is most important, in terms of prevention, to have the patient void prior to the premedication for his anesthesia, so that if he comes to surgery with a relatively empty bladder, then if he's not overhydrated before the anesthesia has worn off, and if there were no obstructive symptoms in the initial history, chances are great that you won't have to use any gadgets to avert urinary retention. But, if you do, there are many of them: keep the patient comfortable, but not too obtunded; help him stand, and run the water faucet.

Urecholine is a great help if the patient has had no obstructive problems before. And, finally, that "evil weapon," the catheter, is probably the nicest thing you could pass on a patient. Far more trouble is avoided by the use of a catheter early than delaying it 12 hours. If a patient has to be catheterized a second time, we use a small, indwelling, Foley catheter.

Urinary obstruction is of many types, but there are two broad types—mechanical and functional. Regarding mechanical ob-

struction, if you look at the lower urinary tract as a funnel, there has to be an adequate opening to the funnel with a decent efferent force, or motor contractility, and an adequate sensation to appreciate filling. Now mechanical obstructions (most of them) refer to a narrowing of the funnel. A functional obstruction had an adequate funnel but inadequate push. It may come, for example, in your hemorrhoidectomy patient, where the patient has no obstruction but you've overfilled the bladder and, like the overstretched elastic, or the overstretched heart, it is inefficient. You have probably given him too much fluid before anesthesia has worn off, or you've so medicated him that he can't void. Another little trick is standing the patient and putting methyl salicylate in the bottom of the urinal. The action of the vesicourethral reflex, irritating the meatus—not directly, but just with the fumes from the bottom of the urinal—will help most people to get by. If they have an urge to void and are not relieved by these tricks, they should be catheterized by a physician.

#### DR. SWINTON

I would like to mention one thing in regard to postoperative urinary retention that took many years to learn. For years I performed most of my surgery in the afternoon, usually beginning about one o'clock, and we had a very troublesome time with postoperative urinary retention. I finally discovered what had been happening. These patients were awakened early in the morning, and they usually voided at that time. They had not had any fluids since midnight. By one o'clock their bladders frequently contained 200 or 300 ml of urine, but they were given preoperative sedation without being asked to void again, so that at the beginning of operation we were faced with patients who had bladders that were almost overdistended. We finally trained our nurses and residents to be cer-

tain that these persons voided at the time preoperative medication was given, whether they had a desire to or not. Most of this postoperative retention problem has now been solved.

DR. NICHOLSON

I have been asked what anesthesia I prefer for rectal surgery. I take this to mean anorectal surgery.

I don't think there's anything better than what I've seen at the Mayo Clinic—namely, the caudal-transsacral. However, I've used the lumbar epidural single injection, and the problem with this is that you have to do it about 20 minutes ahead of time because the onset of anesthesia is slow. Using this, I think we have fewer postoperative voiding difficulties, and we certainly circumvent the post-lumbar-puncture headache, which is a real problem in the patient having an anorectal operation whom you'd like to have up and around as soon as possible after the operation is over. Unfortunately, some of our patients get spinal blocks, because not all of my associates in our department share my enthusiasm for caudal anesthesia. There is no question but that spinal anesthesia knocks out the mural sensibility of the bladder much longer—it knocks it out longer than any other type of anesthesia, so we have to expect more urinary retention problems after spinal block. We know that we are going to get a certain number of post-lumbar-puncture headaches even though we use 22- and 24-gauge needles.

I want to thank Dr. Killingback for asking me a cardiologist's question. He wanted to know, if we have a 60-year-old patient who needs a resection of his sigmoid colon for diverticulitis, how long the surgeon should delay operation if the patient has had a myocardial infarction. Well, a lot of this would depend on whether you're sure it is diverticulitis, whether it's just many diverticula that tie the patient up

for x number of weeks and he has fever, etc., with it, or whether you think that this could also be a malignancy. I don't know whether we're speaking about a patient who has a remote history of myocardial infarction or one who has had a very recent myocardial infarction; certainly, the magnitude of the myocardial infarction is a major consideration. Many people have myocardial infarctions that are well documented by transaminase and electrocardiography and pain, but they never have any hypotension. They don't go through kidney problems, etc.; they're not in shock. I think this would make a great deal of difference as to when you might feel that you could proceed. I think Dr. Alexander has shown, from the available statistics, that we really don't know much about this, but that among those known to have had myocardial infarctions who are subjected—either voluntarily or because of necessity—to operations, we can expect higher mortality. It is true that some patients, while on anticoagulation therapy for acute myocardial infarcts, have survived emergency operations for the drainage of hematoma, acute appendicitis, etc., but these are unusual situations. From my standpoint, I'm very apprehensive about the patient who has had longstanding angina, and then has a myocardial infarction, and after the myocardial infarction he shows (when he's able to ventilate himself normally) a lot of irritability to his heart, with varying types of arrhythmias that have to be controlled by digitalis or quinidine. I think this represents a different type of patient than the one who just simply has had a documented myocardial infarction like the one we're talking about. If the patient is really in serious difficulty, and you feel you have to do something, I see no reason why you can't do an abdominal field block and a transverse colostomy, and let him recover from both things. Put his colon at rest and let his heart try to revascularize itself as

well as it can. I, personally, wouldn't want to make this decision between the surgeon and myself without calling on a cardiologist such as Dr. Alexander, because I think that this is one of the places where these people, working in their specialty, are able to accumulate an awful lot of information, and they can bring the benefits of this clinical acumen to bear on the management of such knotty cardiac problems as the one this question raises.

DR. ALEXANDER

As a general rule, the danger is greater the sooner it is after the myocardial infarction. If the myocardial infarction had occurred in the last few weeks, truly elective surgery should not be performed. Emergency surgery of course must be done. Here, the surgeon should try to do that procedure which is least stressful to the patient, perhaps postponing the more definitive procedure until some future date.

I would rather not be more specific than this, because so many variables make each case unique.

Let me emphasize one last point. While internists and surgeons alike tend to underestimate surgical risk in many patients with coronary heart disease, in my experience the converse is also true: cardiac patients are denied really necessary surgery to relieve symptoms that cause them great discomfort merely because they do have heart disease. We can get most patients through surgery safely.

DR. SWINTON

Gentlemen, we have slightly run over our time. I am asking Dr. Jackman to take over and make a last announcement.

DR. RAYMOND J. JACKMAN

To me, this has been a very educational and worthwhile experience, and I wish to thank all the members of the panel for a very scholarly presentation.