My name is Barry Feig. I am a Professor of Surgical Oncology at The University of Texas MD Anderson Cancer Center in Houston, Texas. I am going to talk to you today about the role for surgery in the treatment of patients with oncologic diseases.

The objectives of this session [are] to be able to discuss the role for surgery for both solid tumors and hematologic malignancies; to describe the various biopsy techniques, which are used including incisional biopsy, excisional biopsy, open biopsy, core biopsy as well as fine needle aspiration; and to discuss the complications of surgical intervention as well as the role for surgery in palliation and in patients with metastatic disease.

So, traditionally surgery is the main modality for treatment of patients with solid tumors. It can be used both as a diagnostic means, a curative means and a palliative means, and we will discuss all those individually. For hematological malignancies, surgery is not traditionally a curative modality. It is more of a supportive modality. Surgery is used for venous access, not infrequently for decreasing the burden of disease by doing splenectomies in patients with leukemia or lymphoma, as well as doing biopsies in order to obtain diagnoses for patients with these disease processes.

So, from a diagnostic standpoint, traditionally surgical biopsy was done by either incisional or excisional biopsy. Nowadays, open biopsies like incisional or excisional biopsy are much less common. We much more commonly use fine needle aspiration or FNA, core biopsies, or image-guided needle biopsies.

Surgery has also traditionally been an important part of staging the patient. Laparoscopic staging was initially a --- was an initial use of laparoscopy in patients with cancer, most commonly in patients with gastric cancer or pancreatic cancer. However, as imaging modalities like CT scan, PET scan, and MRI have markedly improved over the last several years the use for --- the need for surgery in staging has decreased. And it is fairly uncommon that we do staging even using laparoscopic methods in patients with cancer nowadays.

So, again the main purpose for surgery in patients with solid tumors is curative treatment. Most patients --- even patients understand that the best way to cure a tumor is to take it out. It is the only treatment modality that independently is able to provide cure for a large variety of solid tumors. The basic principles of surgical resection for cancer include the removal of all of the gross visible tumor. And this should be done with surrounding margin of normal tissue with a general rule of 2 cm being the accepted or the ideal amount of normal tissue around the tumor that we would like. In order to get that normal tissue around the tumor, it may require resection of adjacent organs.

Not infrequently we have to evaluate margins at the time of surgery to be sure that not only all the macroscopic tumor is removed, but the microscopic tumor as well. We fairly liberally use intraoperative assessment, but depending --- but there are some restrictions that may help guide whether to use intra-operative assessment, because it
is time consuming and expensive. An intra-operative assessment is not going to be helpful if there is no more tissue that can be taken to improve the margin or if that additional tissue would cause --- would inflict significant morbidity or potentially even mortality on the patient. So if you can’t get any more margin, there is no reason to assess the margin. If you can get more tissue, then it makes sense to assess the margin while the patient is still asleep and in the operating room.

The immediate pathologic evaluation may be required to be sure that the margin is free of tumor, and I think the most frequent setting we use this in is breast cancer, because, if we are doing a partial mastectomy, there is many times that we can take more tissue to be sure that there is a true microscopic negative margin. This can be difficult for the pathologist, because, if patients have gotten preoperative treatment either chemotherapy or radiation therapy, it can be much more difficult for them to be able to evaluate normal tissue from scar tissue from tumor tissue. Additionally, if patients have had previous surgeries, scar tissue can make frozen section more difficult to evaluate. So, it’s not always easy for the pathologist to evaluate margins while the patient is asleep. Again, it can be very time consuming and also very expensive.

The other important role for surgery, which falls into staging, is evaluation of the lymph node basins. That frequently is required as I said for staging, but sometimes is required for local control and in some cases even for cure of the patient when removing lymph nodes will improve the outcome. For intra-abdominal tumors like the stomach, the colon, or the pancreas, the normal resection falls along according to the vascular supply and drainage of that organ.

For trunk or extremities, tumors in the trunk or extremities like, for example, the breast, there is an orderly drainage pattern, as you see here, from the area of the tumor to the lymph node basin.

It is very frequent that these tumors will spread through the regional lymph nodes like in breast and melanoma. But there are some tumors that never --- very rarely metastasize to the lymph nodes, such as sarcoma and hepatocellular carcinoma and those tumors, because they rarely, so rarely metastasize to the lymph nodes, do not require a lymph node evaluation.

How else can we evaluate lymph nodes if we know there are abnormal lymph nodes preoperatively? You can do a fine needle aspiration. You can do a core biopsy. You can do an excisional biopsy of the lymph node. You can do lymphatic mapping and sentinel lymph node biopsy, or you can do a formal lymph node dissection, and we will talk about each of these individually.

So, fine needle aspiration is appropriate for evaluating abnormal appearing lymph nodes that are either present on physical exam, ultrasound, or other imaging methods. The problem with fine needle aspiration is it gives you only individual cells. So it can’t tell you anything about the structure of the organ or whether there is invasion or not. It can help you to rule out metastatic disease. One other problem is that often you do not
have adequate amount of tissue for a complete pathologic evaluation of patients that have hematologic malignancies, so you may be able to get a preliminary evaluation, but not enough information to be able to do a definitive treatment plan. Again, it may not be enough tissue, because you are only getting individual cells, to get a complete histologic diagnosis.

An excisional biopsy provides more tissue for pathologic evaluation. An excisional biopsy is a complete removal of the gross tumor. It is helpful in cases that are difficult to diagnose by needle biopsy, and for many hematologic malignancies, it is necessary to have the complete structure of the lymph node, for example, to be able to get a full pathologic evaluation.

Lymphatic mapping and sentinel node biopsy is a procedure that now has been in practice for about 10 years. It is based on the fact that there is a reproducible orderly drainage of lymphatics in almost all cases from the primary tumor. And the first lymph node in that regional chain is called the sentinel lymph node. Because of this orderly drainage, the sentinel lymph node is that tumor --- that lymph node that is most likely to harbor metastatic tumor cells.

It was originally described for patients with carcinoma of the penis, but has really become the standard of care for melanoma and invasive breast cancer. It is an extremely accurate staging tool. If there is no tumor in the sentinel lymph node then there is no need to do further nodal removal in those diseases. On the other hand, if there is a tumor in the sentinel lymph node, then it may be necessary to perform further evaluation of the remainder of the lymph node basin.

That evaluation will be done by a formal lymph node dissection. And a lymph node dissection is removal of the majority of a lymph node basin. There are several purposes to a lymph node dissection. It provides local control for patients with --- that have metastases that have been documented in the sentinel lymph node. It gives more accurate staging, so you know the number of lymph nodes that are involved when --- or if a sentinel node biopsy does not work. There are times about 10% of --- less than 10% of the time that sentinel lymph node biopsy is not successful, where you cannot find the sentinel lymph node. So, you may need to do a lymph node dissection in order to be able to get an accurate lymph node evaluation. The difference between a sentinel lymph node biopsy and a lymph node --- a formal lymph node dissection is that there is a significant increase in the morbidity in post-op recovery with a formal lymph node dissection. The recovery is significantly longer and more morbid.

Another area that we use surgery is after patients have received neoadjuvant treatment. Both chemotherapy and radiation therapy are often used in the neoadjuvant setting, sometimes even together. Initially, there was concern that the use of surgery after neoadjuvant treatment would increase morbidity and mortality, and in some cases that is true, especially after neoadjuvant radiation therapy. However, most studies have shown that, for the diseases that we use neoadjuvant radiation therapy, that risk --- that increase in morbidity is not prohibitive.
The purpose of neoadjuvant treatment is to reduce the tumor size and bulk. This tumor cytoreduction may allow for some patients to go from being unresectable to resectable. And we see that with chemoradiation for rectal cancer; we see it for patients with metastatic colorectal cancer to the liver, as two examples of diseases that, not infrequently we see good responses to neoadjuvant treatment and enough tumor cytoreduction to allow a change in surgical strategy. It also can reduce the extent of surgery, and this is a way that we increase organ preservation. And again, very classically this has been done in breast cancer. And it has allowed us to do breast conservation in patients who have large tumors by giving them pre-operative chemotherapy --- neoadjuvant chemotherapy. We can reduce the size of tumors and allow them to have partial mastectomies as opposed to total mastectomies. Additionally, it has been very clearly shown in a number of studies that we can increase the sphincter preservation rate in rectal cancer with neoadjuvant chemoradiation therapy, and that is solely because we decrease the bulk of the tumor, which allows the surgery to be a little easier and more readily accomplished in terms of being able to save the sphincters.

Well, since we can make tumors smaller, the question often arises does it make sense to debulk tumors and take out part of tumors. In general, it is felt that tumor debulking is not indicated. It is unlikely to alter patient outcome in any solid tumor malignancy. And it is frequently associated with significant morbidity and mortality, because it is hard to define tissue planes when you are cutting through tumor or you are only taking out parts of tumor.

The only disease where it has been shown to be beneficial to do tumor debulking is in patients with pseudomyxoma peritonei. In those patients, neoadjuvant --- I’m sorry, tumor debulking has been shown in combination with intraperitoneal chemotherapy to both prolong survival and decrease ascites.

There have been questions about the role for tumor debulking in ovarian cancer and carcinomatosis. In ovarian cancer, it is the other disease that has been really frequently evaluated, the role and the benefit of debulking surgery and intraperitoneal chemotherapy in ovarian cancer really remains controversial at this time. In patients with multifocal sarcomas throughout the abdominal cavity, so called sarcomatosis, there really has been no proven role of benefit in those patients to debulking tumors. In patients with carcinomatosis, for example, from gastric cancer and pancreatic cancer as well as colorectal cancer, again there has been no good proven role or benefit for debulking those patients and/or using intraperitoneal chemotherapy.

Another important role for surgery is the palliation of patients with cancer. We really feel pretty strongly that surgical treatment should be reserved for the alleviation of symptoms. Reducing the bulk of tumor does not improve outcome or increase survival. So, the surgical dogma is you can’t palliate something if there is nothing to palliate. So, if the patient is asymptomatic, you cannot improve that. You can only improve on somebody --- a patient’s symptoms. So, if there are no symptoms, you can’t palliate
them. It is probably one of the most difficult decisions to make in surgery, deciding whether the benefit of intervening palliatively from a surgical standpoint outweighs the cost and benefit of an invasive procedure. You have to take into account, there’s pain that you introduce from a surgical procedure. Most likely, they will require a hospitalization. And the worse scenario is, if a patient develops a complication when you are doing palliation and has the ultimate worse outcome, even a death. So, though all of those are very difficult things to measure and predict, making it much more difficult --- making it a much more difficult decision as to when to do palliative surgery.

Again, alleviating symptoms is the main role for palliation, and we feel strongly that we should use the least invasive methods possible to be able to alleviate those symptoms. So, for example, if you can do something endoscopically, it is better than doing something even laparoscopically, which is better than doing something with open surgery. The least surgery the better. So, for example, if a patient has an obstructing colon cancer, a stent placed endoscopically may relieve the obstruction and avoid a laparotomy or laparostomy or avoid a colostomy. Most patients would prefer not to have a colostomy bag even if they know it’s terminal --- you know, part of their terminal event. It is very a difficult thing to convince a patient that a colostomy bag would be in their benefit. If patients are having pain, sometimes things like nerve blocks or regional anesthesia can be used for local control as opposed to resecting the tumor. Again, if you are not going to change the survival, putting a patient through a large operation that could have a large morbidity due to blood loss, functional debility, etc., would not be as big a benefit as if you could control the pain with either pain medication, nerve block, regional anesthesia, or some other less invasive procedure. Frequently, we are asked to help patients who have blockages of their intestinal tracts by placing gastrotomy tubes or feeding jejunostomy tubes. If those tubes can be placed percutaneously, either by endoscopic techniques or interventional radiology --- radiologic techniques, that’s better than having the patient have to have an open laparotomy, which again requires more anesthetic time, possibly a hospitalization and the risk of more --- higher risk of complications. We have to understand that sometimes the best intervention may be no intervention. It may be that doing nothing may be the best thing in the palliative setting.

Another frequent expanded role for surgery has been the role for surgery in patients with metastatic disease. And traditionally surgery was not felt to be indicated and certainly was not the first line of treatment for patients with metastatic disease, because it was felt that surgery alone, once the tumor has spread from its primary site, was not going to be curative. So why put a patient through a large, potentially painful, difficult recovery if you are not going to be curing the patient? And it was always felt that non-operative treatment modalities should be considered before doing an operative intervention.

When patients have multiple sites of disease, we really think that it is extremely rare that surgery could be of benefit in those patients. So, surgery should be limited to again palliation, as we already discussed. So, for example, if somebody has a bowel obstruction, relieving that bowel obstruction, surgery may be the only way to do that.
Patients with symptomatic brain metastasis, again surgery might be the only, or the best potential mechanism for treating those symptoms.

On the other hand, when the patients have isolated metastatic disease, it is possible that a subset of those patients can be cured by resecting the metastatic disease. So, how do we know who to resect and who not to resect when there is metastatic disease? There is no good scientific data to say who should be resected and who should not be resected. We think that, if there is a period of stability or response while the patient is on systemic treatment, that might help predict who is going to benefit from resection. So, again with metastatic disease the best primary treatment is systemic treatment, chemotherapy or biologic therapy. If we see a response or the stabilization of tumor in those cases, then it may be that those patients have a favorable biology and will benefit by taking out the tumor then. So, some examples of situations where we use selective surgery for isolated metastatic disease are in patients with sarcoma who we see respond to chemotherapy. We might do resection of their lung metastasis. One of the most common things that we see is patients with colorectal cancer and liver metastasis. We used to say that the limit for a liver resection was for metastasis, and now we have kind of expanded that limit to we don't know what the upper limit should be. We think that, if patients are responding and their tumors are respectable, that they potentially could benefit from resection. There have been several studies to show that there is even a survival benefit in those --- that group of patients. So, if you see a response, or even a stabilization, because stabilization is a response, tumors don't necessarily just have to shrink. If the tumor stops growing that means it has responded to the treatment. So, if there is some sign of response to systemic treatment, resecting those tumors may be reasonable. And, again, in patients with brain metastasis for melanoma, another disease where we may be able to show benefit in both survival and outcome in those patients [is] by resecting that disease.

One issue that I have alluded to several times is that surgery comes with potential downsides, and you can't do surgery without the potential of having complications. We really define surgery --- surgical complications into acute and chronic. Acute surgical complications are defined as those that occur within 30 days of the operation. They could be related to the anesthesia and the surgery, such as pneumonia, urinary tract infections, or venous thrombosis are some of the more common complications that we see in the early postoperative period. They may be related to surgery itself, like an abscess, a fistula, or bleeding. All of these are problematic, delay recovery, and even more significantly can potentially delay systemic or adjuvant systemic treatment or radiation treatment.

Chronic complications are defined as those that occur or continue for more than 30 days after surgery, and some of the more common things we see are, for example, lymphedema after a lymph node dissection in the extremity. Not uncommonly we can see patients with pain syndromes when there is neurologic involvement of a tumor that has been resected. And then bowel and bladder dysfunction can happen after pelvic surgery, not uncommonly. There is not --- very frequently a change in bladder and
bowel habits after both bladder or rectal surgery, and those can be for the patient’s entire lifetime, a different change in their bowel patterns or urinary patterns.

So, in summary, surgery plays an important role in both the diagnosis, the staging, and the treatment of cancer, more so in solid tumors but also an important role in hematologic malignancies as well. In addition to rendering a patient disease free from their tumor, surgery may be beneficial in providing effective palliation for selected patients. Surgery can result in both acute and chronic complications. I would like to thank you for your time, and please do not hesitate to contact us if there should be any questions regarding this lecture. Thank you very much.