Dr. BobbieJean Sweitzer: Hello. I’m BobbieJean Sweitzer, Professor of Anesthesiology at Northwestern University and an Associate Editor for Anesthesiology and you are listening to an Anesthesiology podcast designed for physicians and scientists interested in the research that appears in our journal.

Today we are speaking with two authors of publications that appear in the April 2019 issue of the journal. With us is Dr. Peter M. Schulman. Dr. Schulman is a lead author of an article titled “Electromagnetic Interference with Protocized Electrosurgery Dispersive Electrode Positioning in Patients with Implantable Cardioverter Defibrillators.” Dr. Schulman is an Associate Professor in the Department of Anesthesiology and Perioperative Medicine, Oregon Health & Science University in Portland, Oregon. Welcome, Dr. Schulman.

Dr. Peter M. Schulman: Thank you for the opportunity and it’s a privilege to be here.

Dr. BobbieJean Sweitzer: And then joining Dr. Schulman is Dr. Rooke who wrote an accompanying editorial “Intraoperative Electrosurgical Electromagnetic Interference in Patients with Implantable Cardioverter Defibrillators.” Dr. Rooke is from the Department of Anesthesia and Pain Medicine, University of Washington in Seattle, Washington. Welcome, Dr. Rooke.

Dr. G. Alec Rooke: Thank you, Dr. Sweitzer, this is certainly great fun to be here.

Dr. BobbieJean Sweitzer: So, Dr. Schulman, let’s start with you. Was your goal to determine the impact of the electromagnetic interference based on the placement of the dispersive electrodes or the site of the surgeries?

Dr. Peter M. Schulman: During surgery, the function of an ICD can be disrupted by electromagnetic interference, or EMI, from monopolar electrosurgery. The goal of our study was to quantify the risk of EMI from monopolar electrosurgery in patients with ICDs undergoing surgery.

Dr. BobbieJean Sweitzer: So, to clarify, you only studied patients with ICDs and not pacemakers. Why did you choose to only study ICDs? And were some of these patients with ICDs also pacemaker-dependent?

Dr. Peter M. Schulman: That’s correct. We could have included patients with pacemakers, but we opted to just study patients with ICDs because we wanted a homogeneous patient population and because the consequences of EMI tend to be more serious for patients with ICDs as compared with pacemakers.

In our study, some patients undergoing surgery below the umbilicus were pacing-dependent. We excluded pacing-dependent patients undergoing surgery above the umbilicus because these patients needed asynchronous pacing and asynchronous pacing precludes being able to monitor for EMI.

Dr. BobbieJean Sweitzer: So, I think we’re going to touch on that significance of the belly button a little bit later. So, even though your study was only with ICDs, can you tell us what EMI does to an ICD versus a pacemaker? Are they different? Is it the same?

Dr. Peter M. Schulman: So, in patients with a pacemaker or ICD, consequences of EMI include pacing inhibition and direct damage to the device. More specifically, with respect to patients with an ICD, EMI can also cause inappropriate antitachycardia therapy which includes both antitachycardia pacing and shocks.

Dr. BobbieJean Sweitzer: Dr. Rooke, what are the clinical or patient consequences of electromagnetic interference with CIEDs? And I’m using that term, I think it stands for cardiovascular implantable electronic devices which include both ICDs and pacemakers. Is this really something that anesthesiologists need to worry about?

Dr. G. Alec Rooke: Absolutely. Electromagnetic interference is detected by these devices as intrinsic activity at the heart. As Dr. Schulman points out, if the device thinks the heart is beating on its own, no pacing will occur.

So, if the patient has no rhythm in the absence of the pacing, then, of course, the patient is in asystole. It may not necessarily be asystole, but it may be a heart rate that is so low as to generate an inadequate blood pressure.

In addition, if the device is an ICD, as Dr. Schulman said, the device might see that interference as a high heart rate and that would trigger the antitachycardia therapies.

Dr. BobbieJean Sweitzer: So, Dr. Schulman, you had three different groups of patients, I recall, in this study. What were these different groups?

Dr. Peter M. Schulman: So, we included patients undergoing any surgery at or below the level of the umbilicus. Second, we included patients undergoing noncardiac surgery above the umbilicus. And third, we included patients undergoing cardiac surgery. All cases involved the use of monopolar electrosurgery.

Dr. BobbieJean Sweitzer: So, what is the significance of the umbilicus in this context?

Dr. Peter M. Schulman: The significance of the umbilicus in our study was to try to stratify patients based on high or low risk of EMI and we used above or below the umbilicus as a cutoff towards that end.

Dr. BobbieJean Sweitzer: If I understand correctly, it’s the distance away from the device; like, if the electrocautery is far enough away, then that risk of it actually affecting the device is much lower or nonexistent and the closer it is to the device, the more likely it is to actually have an impact. Is that correct?

Dr. Peter M. Schulman: Yes, that’s correct.

Dr. BobbieJean Sweitzer: So, the umbilicus is just a good marker on the body as the typical distance since these devices are in the heart and often the battery or canister is implanted up in the subclavian area.

Dr. Peter M. Schulman: The umbilicus or the waist, for that matter, is a good general cutoff to use in that. Even if the surgery involves the use of monopolar electrosurgery; if the surgery is limited to below the umbilicus, it’s possible that the risk of EMI is sufficiently low enough that CIED reprogramming might not be necessary. And that is one of the things that we were interested in trying to get a better handle on in carrying out this study.

Dr. BobbieJean Sweitzer: Perfect. Can you explain what you mean by protocolized positioning of the dispersive electrodes—or perhaps as our listeners may be more familiar with the term cautery pads—if they don’t know how accurate that really is? And give us some examples of where these pads or dispersive electrodes should be placed in relation to different types of surgeries.

Dr. Peter M. Schulman: Absolutely. So, as you point out, I first want to make sure everyone is on the same page by stating that the dispersive electrode is more commonly referred to as the Bovie pad. The ASA and Heart Rhythm Society both recommend positioning the dispersive electrode, or the Bovie pad, so that the current return pathway is directed away from the device’s pulse generator and leads.

However, this recommendation has been based on expert opinion since no one had ever evaluated dispersive electrode positioning in a clinical trial. So, for our study, we created a protocol to prespecify the position of the dispersive electrode based on the site of surgery and location of the patient’s pulse generator with the goal of diverting the current return pathway away from the device to minimize the risk of EMI. The protocol we used is shown in our manuscript in both table and figure forms.

Dr. BobbieJean Sweitzer: Yes. I would urge our listeners to look. I think you have a very nice figure in a table there to actually show the correct positioning.

I find this is just really amazing. I guess common things that we do every day we just assume that they’re grounded in some kind of science. It just seems kind of crazy that we do this hundreds and thousands of times a month, I would assume, maybe a week in the United States and millions of times over all around the world and we never really based it on any kind of actual science? It just seems kind of crazy.
Dr. Rooke, I know a lot of circulating nurses place these pads on the patient’s thigh regardless of the location of the surgery. Does it matter where the dispersible electrodes are placed, do you think? Is that why they have never been studied below?

Dr. G. Alec Rooke: Well, we do not entirely understand exactly how the current flow from the cautery is generating electromagnetic interference at the leads—which is what has to pick it up—in order for the device to interpret that electrical activity as intrinsic activity of the heart.

So, the reality is we have very little data, very little actual science, on what the factors are that influence whether or not that interference will be detected by the device.

As far as your question is concerned, much of the time placing the pad on the thigh or buttock is fine because if you’re operating above that spot but below where the leads are, that will indeed direct the current from the cautery to the pad in a way that it’s not traversing either the device or the leads or, in particular, the lead tips.

Where it gets more complicated is when the surgery will be generating current that is close to the device or the leads and it’s very difficult to place a pad. My favorite example is you’ve got a device in the left pectoral region and you’re doing left shoulder surgery. Well, where do you put the pad in that case? Ideally it would actually be out on the arm on the forearm, but most of the time they won’t let you do that. So, you have to be a little creative as shown in Dr. Schulman’s diagram.

Dr. BobbieJean Sweitzer: So, Dr. Schulman, I think you also used a group of your patients—and I think it was the cardiac surgery patients, had the use of underbody electrodes. This was news to me and I don’t know how many of our readers or listeners are familiar with these underbody electrodes, but this is a type of dispersive pad, as I understand, from your study. What are these exactly and when are they used?

Dr. Peter M. Schulman: As you pointed out, I’m sure all of our readers are familiar with a conventional dispersive electrode that is applied to the patient’s skin and used to complete the electrical circuit.

An underbody electrode is a newer alternative to a conventional dispersive electrode. Rather than having an adhesive, this electrode is incorporated into a pad that’s placed directly on the operating table and underneath the patient’s body. These underbody electrodes are reusable, they don’t require a skin prep and they have a much larger surface area than a conventional electrode.

The interesting issue with regard to our study is that the risk of EMI associated with the use of these underbody electrodes had not previously been evaluated, so we thought it would be interesting to incorporate the use of the underbody electrode in our study.

Dr. BobbieJean Sweitzer: And I also recall something else that was somewhat new to me. I think you differentiated outcomes between occurrences of EMI and “clinically meaningful EMI.” Can you explain that difference to us?

Dr. Peter M. Schulman: Absolutely. For the three groups of patients, we determined both the overall rates of EMI and the rates of what we called “clinically meaningful EMI.” We defined clinically meaningful EMI as EMI that would have resulted in the delivery of inappropriate antitachycardia therapy and for cardiac surgery.

Dr. BobbieJean Sweitzer: And did your study include patients with devices from all of the US-approved manufacturers of ICDs?

Dr. Peter M. Schulman: So, there are five cardiac rhythm device manufacturers in the United States. Our study included devices from four of these five; one of the manufacturers wasn’t included because we don’t ever encounter patients with these particular devices at our center and this particular manufacturer has a relatively small market share in the United States.

Dr. BobbieJean Sweitzer: Dr. Rooke, do you think there are significant differences among these different devices currently by manufacturer? Because I know I would do a lot of work in preop and it’s always we’ll get the information about the device. Is that important or not?

Dr. G. Alec Rooke: Well, it is important to know which company is making the device because each company has their idiosyncrasies with regard to the response to a magnet or the programming features. But for the most part, it doesn’t make a big difference because the basic features of these devices is common to all manufacturers.

Dr. BobbieJean Sweitzer: So, Dr. Schulman, what did you conclude based on this investigation of yours?

Dr. Peter M. Schulman: So, with protocolized dispersive electrode positioning, the overall risk of EMI in our study was high for patients undergoing noncardiac surgery above the umbilicus and negligible for patients undergoing below the umbilicus surgery.

We also found an exceedingly high risk of EMI for patients undergoing cardiac surgery with an underbody dispersive electrode. The risk of clinically meaningful EMI in our study was substantially lower than the overall risk of EMI but still relatively high for both noncardiac above the umbilicus surgery and for cardiac surgery.

Dr. BobbieJean Sweitzer: So, can you tell us a bit more about the conservative programming strategies? You mentioned how if the devices had been programmed this way, with less interference, I suspect, though, that this is somewhat new information for many of our listeners.

Dr. Peter M. Schulman: This is quite an interesting topic. In the early days, ICDs were programmed to shock as quickly as possible. More recently, however, it’s come to light that ICD shocks, while sometimes lifesaving, might actually have adverse effects on myocardial function and increased mortality.

For example, in two of the largest studies that established a mortality benefit for ICDs in preventing sudden cardiac death, there was a paradoxical association between shocks and a subsequent two-to-fivefold increase in risk of death.

And in a subsequent large study, investigators demonstrated a mortality benefit when more stringent criteria were used for ICDs to detect arrhythmias and administer therapy. So, as a consequence, these more stringent or conservative programming strategies are now being used with increasing frequency, especially when the indication for an ICD is primary prevention.

Dr. BobbieJean Sweitzer: So, essentially it allows patients who perhaps have some arrhythmias that maybe then will self-correct and wait a little bit before administering the therapy. Is that the essence of this?

Dr. Peter M. Schulman: That’s exactly right. The goal is to delay the administration of the therapy to try to prevent inappropriate therapy and, in some cases, allow for the spontaneous resolution of arrhythmias.

Dr. BobbieJean Sweitzer: So, Dr. Rooke, I assume that the reason—and this translates into this different outcomes with EMI—is because sometimes the cautery is very short and a short burst of it, so then it’s just like a short arrhythmia or lessened time the device doesn’t react to that. Is that the difference why this conservative programming would likely be more favorable?

Dr. G. Alec Rooke: Certainly in the operating room it would be a distinct advantage because the criteria for generating a shock or antitachycardia therapy in general would be harder to achieve. The catch is that even short bursts of cautery, if they are close together, can sum up to the equivalent of a long burst of cautery.

So, just because the surgeon thinks “I’m only giving a couple of seconds of cautery,” if they do it frequently enough those criteria can still be met and you can still generate therapy.

Dr. BobbieJean Sweitzer: Got it. So, Dr. Schulman, is conservative programming what we consider the current standard or is this just something that individual electrophysiologists choose to do?

Dr. Peter M. Schulman: These programming strategies are now considered standard for all new ICDs implanted for primary prevention based on multiple trials showing a lower risk of inappropriate shocks and improved outcomes.

Dr. BobbieJean Sweitzer: So, Dr. Rooke, what does the literature or guidelines say about the preoperative evaluation of CIEDs and what is the best source of information for our listeners?
Dr. G. Alec Rooke: The two primary guidelines that are available to us are the Heart Rhythm Society's Expert Consensus Statement and ASA's Practice Advisory. Both of those were written in 2011, so they're a little old but that's what's current.

As far as the guidelines and the evaluation of CIEDs before surgery, they don't really differ a lot, but they do suggest that at least pacemakers should be checked within a year and ICDs within six months of surgery. There are other guidelines out there that recommend more close to surgery, for example, the United Kingdom society/group/regulatory agency recommends within three months. Actually the ASA Practice Advisory doesn't provide any specific recommendation.

My personal opinion is that within three months is best for all devices unless the device is not very old.

Dr. BobbieJean Sweitzer: So, what does very old mean?

Dr. G. Alec Rooke: It depends on the device, that's the problem. If it's a pacemaker, battery life is pretty well predictable because of the expectation of how much current is being used based on how much pacing is going on.

With ICDs, it's less clear because so much power is used up for delivering a shock that if the patient gets a lot of shocks then it's going to wear out the battery quickly.

But if the patient is being followed by a cardiologist, even if that's remote, that is, they phone in and the device gets checked remotely, that will give information to the cardiologist about the status of the battery. So, as long as that's been going on, then I'm pretty comfortable with knowing that the battery is going to be adequate for surgery.

Dr. BobbieJean Sweitzer: So, you are among a select group of anesthesiologists who function much like electrophysiology-trained cardiologists in the perioperative management of these devices. Can you tell us what you and your colleagues actually do?

Dr. G. Alec Rooke: Our team, as well with Dr. Schulman's team in Oregon, will interrogate these devices, determine whether or not the device is working properly, perform any necessary tests of the device and then program the device for surgery as needed.

Once the surgery is completed, the original device setting need to be restored and perhaps more retesting of the device function will be done depending on whether or not we think it needs to be done.

What is particularly important to our decision-making process for determining how to program the device is to determine what the heart rhythm is if the pacing is suspended.

By doing that, you can see how low the intrinsic heart rate is in the absence of that pacing and use that to determine whether or not you would continue the patient on pacing-dependent or not because if they are pacing-dependent and we think that the cautery is likely to be detected by the device and, thereby, inhibit demand pacing, we would definitely want to convert to asynchronous pacing.

In those situations, we would, of course, also disable the ICD.

Dr. BobbieJean Sweitzer: Dr. Schulman, did you find any problems with these devices in the postoperative period? And did your finding support a need to routinely have these devices interrogated postoperatively or not?

Dr. Peter M. Schulman: We did. When we interrogated the devices preoperatively, we found that 8% of them had some problem. These problems included inadequate safety margins for pacing, high-pacing thresholds, failure of leads to capture, high lead impedance and low batteries.

Dr. BobbieJean Sweitzer: What about postoperatively? Did you re- interrogate them after the study and did you find any problems in that period?

Dr. Peter M. Schulman: We did. When we interrogated the devices postoperatively, we found that they all withstood EMI without malfunction or the occurrence of unanticipated programming changes.

Based on our study, we can't determine whether devices should be routinely interrogated after surgery; however, I think most experts agree that patients undergoing high-risk procedures or procedures in which EMI is likely should, in fact, have their device interrogated in the postoperative period.

Dr. BobbieJean Sweitzer: So, Dr. Rooke, I have heard that there are some devices that can be programmed to ignore magnets and devices that are permanently disabled by a magnet, meaning that even after you've removed the magnetic, the CIED does not return to its baseline functioning. Are these urban myths or are these true?

Dr. G. Alec Rooke: Some of that is urban myth. It is true that some companies make the response to a magnet a programmable function. I'm not aware of any devices where that would be done with respect to the ICD function, but at least in theory it could happen.

In other words, if the magnet response is turned off, then a magnet may not convert a pacemaker to asynchronous pacing or the magnet will not turn off the tachyarrhythmia detection.

In the case of a pacemaker, the response is easily tested. Just put the magnet on the device and watch the rhythm on the monitor for about 15 seconds. If you see asynchronous pacing at the magnet rate of the device, you know that: a) it's a pacemaker; and, b) that the device is responding.

In contrast, placing a magnet on an ICD may not produce any response. ICDs by some companies produce audible tones when a magnet is detected, but ICDs from some other companies do not emit tones, so it is impossible for the anesthesiologist to know for sure whether tachyarrhythmia therapy has been suspended or not.

In the early model ICDs, those could be turned on or turned off with magnet placement. But those are so old that they're all dead and they're no longer in patients. So, nobody has to worry about permanently turning on or off a device with a magnet.

In fact, removal of a magnet from both pacemakers and ICDs immediately restores normal function of the device. The only time magnet placement might be risky is if the device's battery is nearly dead. The increased power drain could cause the device to shut down temporarily and undergo what is known as a power on reset.

Dr. BobbieJean Sweitzer: So, you mention about the magnet rate of the device. Is this a standard rate or is it varying among devices? And does that help you also determine battery life?

Dr. G. Alec Rooke: Well, basically the device turns off because it will not function if the battery is below a certain level. Now, the battery will recover and when it does the device will reboot and start functioning again.

The problem is that the device comes back up with default settings which may be very basic and not anywhere near what the patient needs. This is one of the main reasons we're so concerned that the battery function, the battery status, is checked before surgery.

Dr. BobbieJean Sweitzer: So, you mention about the magnet rate of the device. Is this a standard rate or is it varying among devices? And does that help you also determine battery life?

Dr. G. Alec Rooke: In the old days, placing a magnet on a pacemaker caused the pacemaker to pace at the base pacing rate, say, 60. Now, magnet placement is used by the companies as a test of the battery. In other words, the pacing rate associated with the magnetic placement is a certain rate if the battery is healthy and as the battery loses its charge, the pacing rate will decrease.

So, the placement of the magnet not only confirms that it's a pacemaker and gives you the pacing rate, it gives you information about the battery status. Unfortunately, those rates are different for each company as are the normal rate for the magnet placement. So, you really have to know what that company has as its standard in order to correctly evaluate the pacemaker.

Dr. BobbieJean Sweitzer: Dr. Schulman, your paper also discussed, I think, true bipolar leads and integrated bipolar leads. How do these differ? What are the implications and is this information readily available to non-electrophysiologists who are just reading reports or the interrogation of these devices?

Dr. Peter M. Schulman: There are two main types of configurations for the pacing and sensing electrodes. A true bipolar lead configuration uses two closely spaced electrodes near the distal end of the lead tip for pacing and sensing whereas with an integrated bipolar lead configuration, the electrodes for pacing and sensing are more widely spaced since the distal shocking coil is used instead of one of the dedicated lead tip electrodes.

So, we wondered for our study if closer electrode spacing might reduce the risk of EMI and we investigated this question for each of our three...
groups. And, in fact, we did find that a true bipolar lead was associated with a significantly lower risk of EMI for patients in our noncardiac surgery above the umbilicus group. However, we didn’t find the difference for patients undergoing surgery below the umbilicus or for patients undergoing cardiac surgery.

Dr. BobbieJean Sweitzer: And do you believe that the lessons we have learned from your study of ICDs applies to pacemakers?

Dr. Peter M. Schulman: I think that in general the answer to that question is yes because pacemakers, like ICDs, can be adversely impacted by EMI from monopolar electrocautery.

Dr. BobbieJean Sweitzer: Dr. Rooke, you wrote in your editorial “There are two options to disable therapy with CIEDs: place a magnet or reprogram the device. Both have their drawbacks.” Please explain.

Dr. Peter M. Schulman: The advantage of using a magnetic is that if VF or VF develops, simply removing the magnet restores full ICD function immediately. So, presumably the ICD would then proceed to treat the arrhythmia.

The disadvantage of a magnet is that it could slip and lose magnetic contact with the device without you knowing it; thereby, leaving the patient at risk for delivery of inappropriate shocks. Programming the device to turn off arrhythmia detection is the most reliable method to prevent inappropriate therapy.

The disadvantage of programming is that a qualified person must be available before and after the surgery, the patient must remain in a monitored setting as long as the ICD is inactivated, defibrillation pads should either be on the patient or at least at the bedside along with an external defibrillator and care must be taken to avoid discharging the patient from the PACU before the ICD is reactivated.

Dr. BobbieJean Sweitzer: So, Dr. Schulman, sometimes there are situations when providers may not have time to have these devices interrogated or reprogrammed and a magnet may not be feasible, perhaps the devices in the surgical field, for example. Do you have advice on how to minimize harms in these situations?

Dr. Peter M. Schulman: This situation does present a bit of a conundrum as emergency circumstances certainly complicate the care of these patients, but I do have some advice. First, it’s important to understand that patients having surgery superior to the umbilicus are at greatest risk for EMI and adverse events, especially if monopolar electrocautery is used.

On the other hand, if the surgery is below the umbilicus or if monopolar electrocautery won’t be used, the risk of EMI and adverse events are probably very low.

Second, it goes almost without saying that in a true emergency it’s more important to focus on the patient and expeditious surgical care than the patient’s device.

That said, once the surgery is underway, I would recommend seeing if someone is available to come to the operating room to interrogate the device and make any necessary programming changes, especially in higher-risk situations.

Finally, I would consider magnet use, if it’s feasible, and strongly consider placing transcatheterous pads on the patient which can be used for backup pacing and defibrillation.

Dr. BobbieJean Sweitzer: So, Dr. Rooke, the American Society of Anesthesiologists and the Heart Rhythm Society, as you’ve mentioned, have recommendations for the management of CIEDs in the perioperative period. As you noted, they were both published, I think, in 2011. Are there any indications that we’re going to get updated reports anytime soon? And if so, what would we sort of expect from that?

And perhaps could you maybe highlight if there are any key differences among those two and do you believe Dr. Schulman’s study finally now supports those recommendations which I guess were just based on expert opinion on the past? Do they actually support the recommendations that we have in the literature?

Dr. G. Alec Rooke: Well, first, with respect to the recommendations, there are several components for management of these devices. The first step is preoperative information gathering to include the type of device, the manufacturer, a copy of the most recent evaluation of the device, if possible, an understanding of why the device was placed and, if possible, how pacing dependent the patient is.

The next step is to communicate the proposed surgery and extended location of monopolar cautery to a device expert in order to obtain suggestions for perioperative management of the device.

On the other hand, if a qualified individual will be available to assess and manage the device at surgery, then this step can be accomplished in the holding area.

In Dr. Schulman’s study, although information on device status was not obtained in advance on every patient, his study followed guidelines from both societies for evaluation and programming of the device by using a qualified provider for every case. The return electrode, or ground pad, was located in a fashion consistent with both sets of guidelines as well.

In short, his study followed the basic principles of both guidelines. The results of this study confirm that technology currently has not advanced to the point where electromagnetic interference no longer constitutes a risk of device dysfunction.

Clearly, monopolar cautery above the umbilicus presents significant risk, but one issue not adequately addressed in either of the guidelines is whether monopolar cautery applied below the umbilicus constitutes risk to device function.

Both guidelines agree that the risk is low and certainly Dr. Schulman’s study strongly confirms that belief. But neither group has committed to stating that no precautions are necessary. Indeed, there have been reports of shocks delivered to patients with distant cautery use and even in Dr. Schulman’s study there was one case of interference detection from cautery use below the umbilicus.

In other words, even with distant surgery, there’s rare but nonzero events and, at least in my opinion, constitute strength to the opinion that ICD activation should occur for any surgery with monopolar electrocautery, even ones far away especially because, generally speaking, just placing a magnet will take care of it.

Now, if magnet placement is difficult, then it becomes a judgment call. But it also states in the guidelines, and I would agree, that even with distant surgery on the body, it’s still a wise idea to pay close attention to pulse monitoring during cautery use. In other words, follow the pulse oximeter trace or A-line trace on the monitor screen during cautery use.

Dr. BobbieJean Sweitzer: So, at least, probably one should have a magnet readily available, even if you chose not to prophylactically place it, but for any surgery have it in the room.

Dr. G. Alec Rooke: Yes. A magnet is always a good safety precaution. My personal opinion, and I’m not sure Dr. Schulman completely agrees, but I think placing a magnet on an ICD is minimal risk and it can be removed quickly and easily.

With regard to a pacemaker, I don’t recommend putting a magnet on until cautery use is demonstrated to lower the patient’s heart rate to an unacceptable level.

Dr. BobbieJean Sweitzer: Why the difference?

Dr. G. Alec Rooke: Well, if you put a magnet on a pacemaker without thinking about it, you may end up with competing rhythms. In other words, the pacemaker will be pacing asynchronously because that’s what a magnet does.

But if the patient has their own heart rate that’s going on in the background as well, then both sources of rhythm are active and that’s not good; it doesn’t help with the blood pressure and, in theory, could put somebody at risk for R-on-T though I think the risk of that is low.

On the other hand, if you want to see what the cautery does and maybe the heart rate slows down a little, so what? What the heart rate, if it’s reasonable and maintaining a good blood pressure for the patient, there’s no reason to place a magnet in that circumstance and run the risk of competing rhythms.

Dr. BobbieJean Sweitzer: Isn’t it true also that some of those magnet rates are relatively high? I think Boston Scientific is 100 beats per minute, if I’m not mistaken.

Dr. G. Alec Rooke: Yes.
Dr. BobbieJean Sweitzer: And some of my patients are elderly with ischemic heart disease and I’m not sure I want them to routinely have a heart rate of 100 during surgery.

Dr. G. Alec Rooke: I completely agree. If the risk of needing a magnet is high for that surgery, then I believe serious consideration in that circumstance should be given to programming the device to asynchronous pacing assuming the patient is pacing-dependent and then picking a rate that’s appropriate for the patient and the stress of the surgery.

Dr. BobbieJean Sweitzer: Dr. Schulman, do you have anything that you disagree with?

Dr. Peter M. Schulman: In general I concur with everything that Dr. Rooke just stated.

Dr. BobbieJean Sweitzer: And so, Dr. Schulman, what are the key take-away points from your study that you want our listeners to utilize in their clinical practices?

Dr. Peter M. Schulman: Our study was the first to determine the overall risk of EMI and the risk of clinically meaningful EMI with protocolized positioning of the dispersive electrode and with the use of an underbody dispersive electrode.

Despite protocolized dispersive electrode positioning, we found a high risk of EMI for above the umbilicus surgery, supporting recommendations to suspend antitachycardia therapy whenever monopolar electrosurgery is used above the umbilicus.

With protocolized dispersive electrode positioning, the risk for EMI we found for below the umbilicus surgery was negligible, implying that it might not be necessary to suspend antitachycardia therapy in these cases.

With an underbody dispersive electrode, the risk of EMI in cardiac surgery we found was very high and I think it would be instructive to see a future study comparing the rates of EMI with a conventional or underbody dispersive electrode.

Dr. BobbieJean Sweitzer: So, I wanted to acknowledge Marc Rozner. I think we all knew Marc. He was an anesthesiologist who was very passionate about CIEDs and the perioperative management of those and Marc sadly passed away in January of 2017.

But I hope today’s discussion will interest many of our listeners and lead you to read this important article to learn more. Thank you, Drs. Schulman and Rooke for discussing your work with us today. I wish you well as you continue your efforts to enhance the practice of anesthesiology and strive to improve the care of our patients.

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