Current Status and New Trends in Videoscopy

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Minimal access surgery using the video laparoscope is turning the world of surgery on its head. Pediatric urology is no different in that regard. As a surgeon untrained in these techniques, I have followed these developments with interest and sometimes with dismay. Our meetings and journals are increasingly replete with descriptions of surgeries being completed using non-invasive techniques. These are the very surgeries that most of us currently do with perhaps old-fashioned hand-held forceps and scissors… and now by robots, no less! Upon hearing this initially I felt as if I’d received Samuel Morse’s initial telegram and read “What hath God wrought?” or perhaps more fittingly “What else could God possibly wrought?”

Unfortunately, as one who finds the phrase “paradigm shift” an overapplied tiresome description included in most current articles on virtually every aspect of medicine, it certainly appears that minimally invasive surgery is gradually affecting just such a shift in our practices. Fearing being left behind, I called upon some old friends, Steve Docimo and Craig Peters, to provide an update of videoscopy. I wanted their perspective of where this new technology now stands and where it might be heading. Each is an advocate of their particular area of expertise but each is also an honest reporter, as shown by their responses. Their message is clear. Videoscopy is here to stay. And, like any new technology that shows promise, it will improve, probably in logarithmic fashion. Operating with scopes, rather than with a direct view and feel of the internal organs, does not require us to relearn surgical principles. It does, however, require that we learn a different way of doing surgery from past practices. The laparoscopic approach presents a new world that, for most pediatric urologists, must be viewed differently. Seeing, interpreting and moving within that new world is different from the open surgical fields of the past. But, as Rick Ehrlich points out, it is a world that we can adapt to… as long as we keep an open mind.

From the Editor

Anthony Caldamone, M.D.

This issue of the Dialogues in Pediatric Urology represents a rebirth of a publication which served the pediatric urology community for more than 25 years. Due to the untiring efforts of Rick Ehrlich and Bill Miller, this publication provided not only academic interchange, but also a collaboration among pediatric urologists, which fostered congeniality. At the time the format was quite unique. It was a publication that everyone not only enjoyed receiving but also enjoyed as an opportunity to voice their opinion as a contributor. It was a format that was well received by the authors and the readers.

Through the efforts of The Society for Pediatric Urology and with the encouragement and endorsement of Rich Ehrlich and Bill Miller, we hope to recreate that informal academic exchange that was the hallmark of the Dialogues. Our intention is to continue to reach out to the international community by broadening our editorial board.

This first issue edited by Mike Keating is indeed a true dialogue, which was one of the formats of the original publication. It represents an exchange with people who are on the edge of technology in pediatric urology. It not only provides information of new technological advances in laparoscopic and robotic surgery, but also tries to place them in perspective and attempts to establish their role in our technological armamentarium. Congratulations to Mike Keating for taking on the mission of this inaugural issue and also to his contributors Steve Docimo, Craig Peters, and our founding editor Rick Ehrlich.
Laparoscopy

with Steven G. Docimo, M.D., Children’s Hospital of Pittsburgh

DPU: How about a little background. Did you do laparoscopy during your residency?

SD: Very little. I think I saw two diagnostic procedures. But after finishing my residency I became interested in endourology during my stint in the Navy. I extended that interest to laparoscopy after going to Hopkins where Lou Kavoussi was. It was a matter of being in the right place at the right time.

DPU: Like many things. So, for our colleagues in their fifties who were not trained in these techniques, the transition from open surgery is still possible?

SD: Absolutely. Urologists work well with scopes and virtually any one of us can pick it up. The common operations that we do laparoscopically aren’t tremendously difficult. Most can be done without suturing which is really the most difficult maneuver.

DPU: Please comment on the advantages of laparoscopy versus open surgery.

SD: The advantages of laparoscopy are very diagnosis- and procedure-specific. Let’s look at an example - ureteral reimplantation. People will disagree with me but I am not convinced that laparoscopy offers any advantage. The open operation can be done through a very small incision, results in an overnight stay, using no drains and with minimal morbidity. The results are similar with laparoscopy and the laparoscopic procedure, at least in my hands, is more difficult. In contrast, I am a proponent of laparoscopy for the intraabdominal testsis, for nephrectomy and for pyeloplasty.

To be a good pediatric laparoscopist it obviously helps to have a very solid foundation in what we have done in the past with open surgery. Doing something laparoscopically is merely substituting one approach for the other. The principles of the operation are absolutely the same and the indications for surgery are unchanged. This is where a solid foundation in pediatric urology is key, whether you approach the problem with a scope or a scalpel.

DPU: Good comment. What about its disadvantages versus open?

SD: Laparoscopy takes longer for most procedures. If it takes five hours to do an operation laparoscopically that you routinely do open in an hour it has an economic impact for all the parties involved. That’s changing as people get more experience. But, at least for me, the laparoscopic approach is always going to be a bit slower because I tend to be more careful. Kids have so little margin for error. Technically you lose several degrees of freedom when handling instruments unless you are using a robot. As a result you have to adapt the operation to the approach, especially when suturing.

DPU: Since you brought it up, talk a bit more about reimplantations.

SD: I have every respect for the people who are doing it with scopes. Leo Fung has had good success with the extravesical approach. He has a large series and has gotten terrific results. In his hands it may be the best operation because of his experience. Like other surgeries in our field, every laparoscopic surgeon may not need to be facile with every operation. C. K. Yeung’s transvesical approach does a beautiful job and goes fairly quickly. We did a similar though less refined operation in pigs a number of years ago. It was difficult. I’ve also tried trigonoplasties but, again, found it difficult operating in such a tight space. In my hands an open reimplantation is such a straightforward thing. The morbidity is low and the hospital stay is usually less than 24 hours. I don’t think the outcome could be better, and I am not sure that I see any advantage, cosmetically or from the recovery standpoint.

DPU: So what is the biggest advantage of laparoscopy? Small incisions?

SD: Probably from the patient and family’s point of view. We hate to use that as the only advantage of any surgery. However, it is a big deal to the adolescent if you can do a pyeloplasty without leaving a visible scar on the trunk, or complete a bladder augmentation leaving a scar that can be concealed by a bikini. These psychosocial concerns are difficult to quantify but they may be the most important thing to many patients.

DPU: What about recovery time?

SD: Recovery time is more important for adults, who need to get back into the workforce. Here laparoscopy is shown to have a demonstrable economic impact. Recovery times for children, especially the younger ones, are not that different when compared to open surgery. Recovery in adolescents is similar to adults.

DPU: And the major drawbacks of laparoscopy?

SD: There is a major difference in teaching laparoscopy to residents during their training. It is fairly simple, when teaching open surgery, to direct trainees during portions of the case. In contrast, with laparoscopy you hand over your instruments, change places and seem to give up more control. It is cumbersome and you worry more. The tendency is to let the residents do less. It is harder to teach laparoscopy, especially in the pediatric setting.

DPU: Do you need to have two surgeons for your cases?

SD: You need someone to hold the camera but it does not need not to be a surgeon. A capable technician or nurse can fill this important role. The camera must be steady since visualization is all you have. A laparoscopic robot (the AESOP) that holds the camera can also be used.

DPU: How many and what kind of cases are you doing now?

SD: I looked at my database, which unfortunately goes back only five years, and there were easily more than 200 lap cases. Many of those, of course, are diagnostic laps and orthiopexies like everyone else’s at this stage of the game.

DPU: Talk about laparoscopy and urinary reconstructions.

SD: Straight lap augmentations are difficult. We did the first one, a gastrocystoplasty, more than ten years ago. That was a lengthy and challenging operation. I’ve not done one since. It would be easier now because the equipment has improved and we have a better idea of what we are doing.

I do find laparoscopy extremely helpful with bladder reconstructions though. A trocar is placed through an umbilical flap proposed for the stoma. Another is appropriately positioned if a second stoma is planned. Otherwise additional access is made along the line of an eventual Pfannenstiel incision. By using a 2 mm trocar in the epigastrium, it becomes a simple matter to mobilize the sigmoid or cecum or harvest the appendix. The more complex components of the case, ureteral reimplantation, bladder neck repairs and augmentation, are completed through a remarkably small Pfannenstiel incision similar to that of a standard reimplant. It provides a big cosmetic advantage without loss of your technical abilities. At our current level of technology these portions of the reconstruction are better off left for an open approach.
DPU: So this is basically a prep that allows you to minimize the incision. What if we told you that we’ve done these operations without scopes entirely through a Pfannenstiel?
SD: You can make the argument but I would suggest that you are not doing them through the same Pfannenstiel that we are using. In addition, this approach saves a lot of manipulation within the peritoneum, probably decreasing adhesion formation.

DPU: Sounds like an interesting approach. Is there anything that you anticipate doing in the future that you have not had the chance to do?
SD: I’ll leave that a bit open-ended and reply that many of the things I now do open, we will eventually be able to do laparoscopically.

DPU: Such as?
SD: Such as portions of a lap assisted reconstruction. It seems logical to complete a continent stoma or appendicostomy initially and place it out of the way of the remainder of the procedure.

DPU: Anything else?
SD: I could see myself gradually moving toward infant pyeloplasties, which I have not done laparoscopically. Each year the children get a bit younger and smaller in terms of what I am willing to do. The results have been commendable in the hands of a pioneer like C.K. Yeung. However, they are probably not as good as open pyeloplasty. I have always believed that any laparoscopic procedure can only be rationalized if its results are as good as those of its open counterpart, unless there is a major offsetting improvement in morbidity.

DPU: And are you getting comparable results with lap pyeloplasties in older kids to those you got with open repairs?
SD: Yes and, knock on wood, we have not had a failure.

SPU: Length of time?
SD: Early in our experience a few took six or seven hours. A straightforward pyeloplasty now takes as little as 2½ hours. But it doesn’t take a lot to make the case take longer... high insertion, intrarenal pelvis, just like any open case. I would say the average is about 3½ hours. I leave a stent but no penrose drain.

DPU: Any problem with doing repeat procedures in patients?
SD: No concerns, especially in kids. There is good data to suggest that laparoscopic surgery results in minimal adhesions, even at the access sites, where you usually find a clean operative field. Physiologically, there have not been any significant issues so far.

DPU: What percentage of your cases are being done laparoscopically?
SD: I estimated it at about ten percent last year. The busiest laparoscopic pediatric urologists do a handful a month or something on that order. In comparison some of the better known adult urologists are doing ten or twelve cases a week.

DPU: What’s on the horizon? Has laparoscopy as you now practice it tapped out and is robotics the next best thing?
SD: Laparoscopy will always have a role. There are more improvements to come in terms of instrumentation and visualization but robotics is probably the next quantum leap in technology. The problem with robotics is that the machine is quite cumbersome and very expensive. You’re talking about more than a million dollars for a good system. That’s a significant sum, especially when you realize that the robot is unnecessary for the vast majority of what we do with scopes. The question with robotics is this. Will it ultimately allow us to do things we are currently unable to do with standard scopes? The answer to that is probably yes. One example is lap pyeloplasty. The robot would probably make the procedure attractive to more surgeons since it levels the learning curve for suturing, the most difficult part of the case.

DPU: Is laparoscopy cost effective?
SD: It depends on the case, the alternative options in management and, probably like any statistics, who is doing the math and what is being included in the cost. The costs straightforward orchietomy are not significantly different from an open orchietomy. Savings after nephrectomy and donor nephrectomies in adults become cost effective by shortening recovery times. I don’t know of any such studies in children for renal surgery.

DPU: How about the surgeon? Have the economics of laparoscopy hamstrung its development in our country.
SD: It is interesting to note that the employment of most newer technologies have not offered any benefit to pediatric urologists as far as relative value. These procedures take longer than open surgery but their fees are very similar. When you think about it, each of us is asked to embark on the laparoscopic learning curve at essentially our own expense. Naturally, we will still decide on the approach that is best for the patient but time investment by the surgeon could become a factor.

DPU: What about your learning curve with pyeloplasties. Getting faster?
SD: Absolutely. One of the problems with pediatric laparoscopy is that we don’t do the number of cases that our adult counterparts do. I now do more lap pyeloplasties than open ones. However, I still feel like each time we are doing it a little bit differently, a little bit better, a little bit faster. It seems that we spend our careers on the learning curve to a certain degree.

SPU: As you continue to push the envelope, what are your age or size limits?
SD: We may not have a size limit ultimately. Our pediatric surgeons are very aggressive and do almost all their pyelomycotoses laparoscopically. We’ll not argue about its benefit here but they’ve shown the ability to apply the technology in even the smallest infants. My self-imposed limitations are determined by my impression of the likelihood of success, just like they would be with any other type of surgery. When the success rate with a scope is probably going to be less than that with the open approach, I’ll go with the tried-and-true method. The youngest pyeloplasty I’ve done is in an eighteen months old.

DPU: Any other limitations. What about prior surgeries or shunts?
SD: Dix Poppas wrote an interesting article documenting increased shunt pressures during laparoscopy. We reviewed the anesthesia records of a fairly large number of cases in children with shunts. There were no significant alterations in vitals to suggest increased intracranial pressure or signs of Cushing’s syndrome. We concluded that VP shunts were not a contraindication to laparoscopy.

DPU: How about prior surgeries?
SD: Past abdominal surgery is not a contraindication as long as you use open access (the Hassan method). We use open access for every child. If you find that you are unable to proceed you simply back out and open. Every family is prepared for this possibility.
DPU: Centers of excellence. Do we need them for laparoscopy to generate the numbers to shorten the learning curve?

SD: If we look ten to twenty years in the future, everyone will be doing minimally invasive surgery. It will be the standard. To try to limit these kinds of techniques to centers of excellence would be a mistake. I think it would be anti-progress.

DPU: Let’s talk about robotics. Although you aren’t using the robot yet, what do you see as its major advantage?

SD: There are a number of things in addition to its technical advantages with suturing. I was involved with some of the initial studies looking at robotic tele-mentoring at Hopkins. This was early in my laparoscopic experience. Back then we were controlling the camera from a remote location and taking a fellow through a case. By controlling the surgeon’s visual field you were, hopefully, able to move them in the direction you might want them to go. Believe me, that approach could provide some excitement for a young attending. Robotics will have an impact upon more than the operating surgeon. We will see changes in surgical teaching, improvements in instrumentation and perhaps more applications of surgery being done totally by surgeons from remote locations, of which I am not a proponent by the way. In 20 years we will look at pictures of a DaVinci and laugh about this huge monster that takes up half of the operating room.

DPU: Just like the first generation ESWL machines?

SD: Exactly. Just like everything else. Ever see pictures of the first computers? You will continue to see significant advances in microtechnology. Robotics are here to stay in the operating room. It is not going away.

DPU: Any other advantages?

SD: The 3-D visualization of the Da Vinci makes a big difference but it’s there by necessity. Laparoscopy obviously relies much more on visualization than open surgery. You lose some of your tactile feedback with free-hand laparoscopy. You can feel with the end of the instrument but not with your fingers, as we’ve all been trained to do. Once you start operating robotically you lose that last strand of tactile feedback. Robotics relies entirely on visual cues. That’s why 3-D visualization is so crucial to the robot. In contrast, you have enough tactile feedback with standard laparoscopy that you make up for the lack of 3-D vision. That said, 3-D visualization would probably make a big difference when doing free-hand laparoscopy. There are 3-D systems available for standard laparoscopy but the good ones are 10 or 12 mm in size. Most of us don’t want to use a trocar that big, especially in an infant. So we continue to work with our standard 5 mm 2-D scopes.

DPU: How about returning some of the tactile feedback? Are you doing any hand-assisted laparoscopy?

SD: If the patient is big enough and the problem warrants, I’d probably send the case to one of my adult colleagues. Hand-assisted is ideal for large renal tumors and difficult nephrectomies, giving the surgeon a degree of control that they wouldn’t have otherwise. Its most important contribution is probably bringing a number of surgeons into the laparoscopic fold who would not have been comfortable doing straight laparoscopy initially. Many ultimately convert. In most kids, once you make the incision for the hand port, you might as well just do the operation, so I have never used it.

DPU: Are we hearing a death knell for open surgery in our field?

SD: One point I always make when discussing this topic is that minimally invasive surgery does not necessarily mean laparoscopy. There are a number of open operations we can do in a minimally invasive way. Take urachal cysts, for example. You can remove a urachal cyst through an incision in the umbilical lip no bigger than that of a laparoscopic port. The patient is left with virtually no scar. Now people have removed the urachus laparoscopically. What’s the advantage? Open surgery is not going anywhere. It will be a while before we remove a Wilms tumor or routinely complete complex urinary reconstructions using only laparoscopy. Regardless of advancements in the world of scopes and robots, we need to continue to work on reducing the morbidity, recovery and cosmetic impact of open surgery. The role of laparoscopy is evolving and remains poorly defined for many problems in pediatric urology. We will, however, eventually modify our open surgeries to match the new technology. Both are going to be here for a long time to come.

DPU: Is there any other area that you’d like to get into or perhaps a final comment?

SD: I do have one point of contention. We need to change the perception that laparoscopy is a separate specialty. You’ll go to a national meeting and listen to a presentation on open bladder reconstruction during one pediatric session. The following day, we’ll present our lap-assisted bladder reconstructions during a different session on laparoscopy. These should be presented together so we can discuss the pros and cons of one approach versus the other. What we are doing is not a laparoscopy per se, it is a bladder reconstruction. Minimally invasive techniques should not be isolated academically just because they offer solutions to problems in a different fashion. Textbooks are no different. Thankfully there is always a separate chapter on laparoscopy because otherwise I wouldn’t write any chapters. But those techniques should be included in chapters as part of the spectrum of surgery done for a particular disease. Academic consolidation would be best for both surgeons and their patients.

DPU: How do you respond to those who feel that laparoscopy is still a gimmick?

SD: Smile and nod.

Robotics

DPU: How about a little background. After your initial experience with laparoscopy, how did you get interested in robotics?

CP: About 16 years ago we decided to assess the usefulness of diagnostic laparoscopy for nonpalpable testes by comparing its findings to those on exploration. During that early period it became increasingly clear that laparoscopy was going to emerge. We were fortunate to have Lou Kavoussi next door at the Brigham, who gently pushed me beyond diagnostics into urinary reconstructions. One of my frustrations with free-hand laparoscopy was its reconstructive limits. I was never convinced we could do the same kind of precise suturing expected of us during open surgery, when doing things like pyeloplasties. However, the patients did better; especially the older ones.
DPU: But you’re now convinced that we can do as well with robotics?
CP: Yes. The precision that the system can deliver with its freedom of movement and superb three-dimensional visualization allows you to be as precise and careful with surgery as you would be open, perhaps even more so. The magnification and control offered by robotics is very impressive. I became quickly convinced that it was clearly better than conventional laparoscopy and at least equal to or better than open surgery, although this may not prove without large comparative series.

DPU: And do you have some numbers? Relate your experience with robotics so far.
CP: We have done over 80 cases with 24 or 25 pyeloplasties in children ranging in age from 5 months to 19 years. We’ve also done about two dozen ureteral reimplants, both intra- and extravesical, and a variety of other procedures. But it is clearly pyeloplasty that provides an interesting comparison with hand laparoscopy.

DPU: Are the pyeloplasty results similar?
CP: They are not perfect. I’ve had one redo in the first child. I did retroperitoneally with the robot. The seven-year-old had intermittent pain typical of a crossing vessel. However, we did not appreciate a crossing vessel, only a fair amount of reactive fibrosis around the pelvis. The vessel only became apparent when obstruction reappeared and we reapproached him retroperitoneally. I’m not sure how we missed it but have since heard of another laparoscopic missing a crossing vessel in a similar case. Working through a retroperitoneal approach can be difficult. There is less space and the arms are very close together.

DPU: Was that patient also done robotically?
CP: No, it was done with hand laparoscopy. The complicity probably has nothing to do with robotics but represents what may be a weakness of the approach. Many of us have tried to move retroperitoneally with pyeloplasties. These two cases have given me pause to think how hard I look for a crossing vessel regardless of the approach. Laparoscopic pyeloplasties are no different from open repair in this regard. It is sometimes difficult to determine whether a vessel you see has anything to do with the obstruction.

DPU: Could you comment on the visual advantages of robotics versus laparoscopy?
CP: The three-dimensional visualization makes a big difference. It is interesting to watch someone do standard laparoscopy. To reach a point with precision, movements are typically done in almost back and forth trial-and-error fashion. With 3-D you go right to the point.

DPU: How do you get the 3-D effect? Extra ports?
CP: No, we consistently use three ports, one camera and two working ports, for virtually every case. Rarely do we put in a fourth port. The camera is larger than those used with standard laparoscopy. It is 12 mm, which seems somewhat daunting at first. The camera actually has two complete separate lens systems, so you get binocular vision transmitted to the surgeon’s console where you sit. There you look into two separate eyepieces that gives you true 3-D imaging. It’s impressive.

DPU: Sort of like microsurgery through a pretty large incision?
CP: Even better visually. But you can easily put the scope in the umbilicus and nicely hide the scar.

DPU: Talk about the surgeon’s role and feelings after access is completed and he/she departs to control the robot.
CP: Being detached from the patient is an unusual feeling. I’m still uneasy with it. You are also detached from the interactions at the table. It’s not uncommon for the attention of the staff and side surgeon to drift from the operation on hand with the primary surgeon absent from the table. You have to be very explicit in your communication with the staff because your voice is muffled. We have adopted a read-back/feedback system similar to those used in aircraft. The staff repeats what I have requested so that I know they’ve heard it correctly. Any unannounced movement of the robot could potentially strike an assistant. Clear communication is very important.

DPU: Who typically assists you with robotic cases?
CP: On the patient-side team there’s usually a scrub nurse and assistant surgeon. They exchange robotic instruments and sutures through the ports or through the abdominal wall as the case proceeds. Their role is exactly the same as a good scrub nurse during open surgery. If they know the robotics system, are closely involved and anticipate well, the cases can move very quickly. A well-greased team can make all the difference in the world.

DPU: Just like any surgery. But do you really need to have another surgeon at the patient’s side?
CP: We feel you do. I require that a surgeon always be scrubbed. In case there is a problem, they can remove the robot and begin to get access while the other surgeon is being gowned and getting ready to come in. We haven’t had to do this yet but are always ready just in case. For example, if I am doing a case where a fellow will be doing a portion, whoever is controlling the robot has to scrub in before the other one surgeon leaves the patient’s side.

DPU: Interesting. Steve Docimo commented on the loss of tactile ability with the robot when compared to free-hand laparoscopy. Any comment?
CP: You do not have the sense of resistance or tension that you have with free-hand. This is readily apparent in novices who, when tying knots, often break them because they don’t appreciate how much they are pulling. Fortunately, you quickly learn from visual clues how much tension you are putting on either suture or tissue. We call this “feeling with the eyes”. The robot is powerful. Where it becomes risky is in moving an arm right through tissue or an organ and causing damage without realizing it. It is absolutely imperative that the tips of the robot arms always be in view when moving.

DPU: How do you view the relationship between free-hand laparoscopy and robotics when it comes to learning?
CP: Laparoscopy can help minimize the learning curve somewhat but may not be entirely necessary. We’ve seen that in our experience here. But surgeons who have moved on to robotics or have learned initially on the machine are not going to want to go back to free-hand for most procedures, especially when suturing is involved. It would be like returning to open surgery with one hand tied behind your back.

DPU: Any examples?
CP: Our initial experience with pyeloplasties is telling. The operative time at the beginning of my robotics experience was about where it was at the end of my learning curve after eight years of free-hand laparoscopy. I have since improved but not significantly. In contrast, my partner, Joe Borer, started robotics having somewhat limited experience with laparoscopy and having never done a lap pyeloplasty. His length of surgery is almost similar to my own.
DPU: So you’d be better off just to jump right to robotics rather than do them laparoscopically?
CP: Not necessarily. It seems that an experienced laparoscopist might adapt to the robot more easily because he/she is used to working with a virtual image. However, I have seen some surgeons without much laparoscopic experience adapt to robotics very quickly. It’s the same way with laparoscopy or any surgery for that matter, isn’t it? Some people adapt easily, while others continually struggle. It must have something to do with spatial orientation or how they look at the world.

DPU: Other than its tying ability, what other advantages does robotics offer?
CP: One of the major advantages is articulation of the arms. This allows you to angulate instruments and approach tissues in any direction desired. Needles can be easily aligned and driven through tissues as correct angles. This is much more difficult to do with a rigid laparoscope, where tissues tend to be dragged and pulled to meet the instruments. In fact, tissue manipulation is even better with the robot than in some open surgeries done through a small incision.

DPU: What about disadvantages other than tactile loss?
CP: The 12 mm camera is bulky but its port site can be hidden in the umbilicus. The other ports are 8mm. New 5mm instruments are being tested in our facility but are not generally available. We have done five cases with them. They are not as good as the 8s yet. It is also inefficient to need to use non-robotic instruments. The harmonic scalpel is non-articulated and acts much like a conventional laparoscopic tool. There is a clip applicator but it is only single fire. However, like any technology, we expect the performance to eventually improve even as the machines become smaller.

DPU: What about cost?
CP: The machine is expensive...some say ridiculously expensive. It costs a million and a half dollars. In addition, each instrument costs between $1200 and $1500 apiece. They are reusable but can be used only 10 to 12 times before they must be changed. You might use three or four instruments to do a pyeloplasty at a cost of about $100 apiece.

DPU: Why is that?
CP: The instruments are driven by a series of tiny pulleys that can generate a significant amount of tension. It’s impressive to see an instrument snap that has been worn down with unlimited training. Those used during surgery have a microchip that measures their usage so that breakage will not occur.

DPU: You expect this too will improve?
CP: Absolutely. The 5mms already allow more usage. But it becomes an engineering issue and exactly how long the improvement will take is unclear. Bear in mind that users are still paying for research and development. This is ongoing and expensive. In addition, Intuitive Surgical (Mountain View, California), which makes the Da Vinci robot we currently use, has not yet turned a profit. Time was lost and capital hemorrhaged during a legal battle over patent infringement with the makers of the Zeus robot, Computer Motion. Intuitive Surgical has since acquired CM. I have no investment in either company by the way.

DPU: Competition is healthy for the development of new technology. Anything else being developed?
CP: Yes, there are a number of companies who have joined the fray. People realize this is a developing area. I recently looked at one prototype that is much smaller. It is not as smooth and potentially powerful as the Da Vinci, but it may be a great middle of the line robot for certain applications.

DPU: Are you using robotics for every case?
CP: I do not use the machine for diagnostic studies. I do not think there is any value in doing an orchiopexy with the robot. Varicoceles are also done free-hand. Robotics does help with simple nephrectomy, but you could argue that it’s not a huge benefit. There is better visualization when working around the renal hilum that strikes me as being safer. But a simple nephrectomy can be done quickly and efficiently with standard laparoscopy.

DPU: Other than its up-front costs, can you provide comparisons of cost between open, laparoscopic and robotic surgeries?
CP: That’s an important question. Financially you cannot justify this kind of an operation if it loses money for the hospital. Our financial group has looked at this and robotics is currently more expensive. We raised the question in an attempt to provide a packaged charge for patients from outside the region who wanted to come for robotics but whose insurance companies refused to pay. There were savings with length of stay. Unfortunately, it was not significant because children don’t stay long to begin with. Robotics cost more because of lengthier operative times. Our focus is now directed at lessening these. This involves training and practice of the entire team. The machine is big and bulky. It takes some getting used to. We are setting up a program for nurses, residents and staff that covers the basics; setting up, draping, which buttons to push, changing and retrieving instruments. Little bits of time add up. Just like setting up for laparoscopy or a cysto. The system must run seamlessly.

DPU: Is there also a fee specifically for using the Da Vinci?
CP: No, we don’t charge an extra fee. The insurance companies won’t buy it, just like they never bought it for laparoscopy. There is also no special fee for the surgeon who charges the same as for laparoscopy. Go figure.

DPU: Does the machine require dedicated space?
CP: No, it’s portable but we use it in a particular room where there’s less risk of damage and loss. Two rooms have been designated in our planned expansion as robot friendly. The robot will move between the two. We are currently the major users but general surgery and cardiac are beginning to do more cases. You know that trend will continue. We have set up a training and research consortium within the interested surgical departments so that everyone can participate.

DPU: Let’s go back to the learning curve issue. Are you still on the learning curve after 25 pyeloplasties or have you planed out?
CP: I think from the surgeon’s viewpoint I have plateaued. From the group’s standpoint though we can do better by making the surgeries faster with more efficient manipulation and retooling of the machine. One of our problems is that these processes are evolving with little input or interchange from other groups, since most are just beginning their robotic experience.

DPU: How many cases would it take me to broach the curve?
CP: My guess would be about ten cases of any one case, especially once the technical nuances are iron out by groups who have worked out the kinks.
DPU: Tell us about your experience with robotic ureteral reimplants.
CP: We’ve done both types. We started with the extravesical because the technique was already being done laparoscopically. However, despite what the literature on lap reimplants reports, we had some problems with voiding dysfunction with bilateral cases. As an alternative we adopted C.K. Yeung’s laparoscopic transvesical Cohen. The visualization during the dissection is excellent and suturing with the robot goes nicely. The main thing though is that CO2 doesn’t leak out of the urethra. We use a urethral catheter for suction. We’ve done five cases. It’s a little difficult to get access to the bladder and to get the puncture sites closed in anybody who is chubby where you can’t get down to the bladder and you have to close it.

DPU: What’s the youngest child you’ve done?
CP: Five months for an extravesical unilateral, and two years with the transvesical approach. We’ve also done two megaureters.

DPU: How did you do those?
CP: Excisional extravesical. It’s challenging to approach the ureter since it’s not sitting up there in the breeze like in open surgery. Traction sutures brought through the peritoneum are needed for immobilization during the taper. I usually use hitch stitches during pyeloplasties as well.

DPU: Our open surgery colleagues are going to wonder why this is such a great advantage.
CP: I’m not going to be able to argue with them too much. Discharge times may be shorter than with open surgery but you can probably get the kids out the next day if you really wanted with either approach. The cosmetic benefits of three small incisions as opposed to one larger one can also generate some friendly conversation. I am still not sure whether robotics is the way to go for some of the less invasive techniques. And it all may be blown out of the water with the coming of Deflux.

DPU: Let’s save that for another Dialogues. Any concerns about converting extraperitoneal operations (standard reimplant/nephrectomy) into intraperitoneal ones by using laparoscopy or robotics?
CP: Absolutely none. Arnold Colodny would sometimes browbeat me for this and I understood his initial concerns. However, bowel injuries are rare if you’re careful. And remember, you can also do intraperitoneal damage from the retroperitoneum if you’re not paying attention and lose orientation. The working space within the peritoneum is terrific. Adhesions have not been a problem. We wrote a paper a few years ago looking at second-look orchioepxyes. Even when we tore the peritoneum apart to mobilize the testis at the first stage, it looked essentially normal a few months later with few, if any, adhesions. We don’t know whether this phenomenon is specific to children or to laparoscopy.

DPU: Interesting.
CP: We’re also seeing some preliminary reports suggesting that immunological responses are different to laparoscopic surgery than to open surgery although the mechanisms aren’t clear.

DPU: Any problems with shunts?
CP: We’ve done a few and have not had any problems. Our neurosurgeons are also not too concerned. Steve Docimo published a paper on several myelo patients with shunts that did well. I don’t think you have to take any special precautions.

DPU: What about Centers of Excellence? Do we need them for robotics?
CP: Initially perhaps. It may be that early development should be done in a few centers that can afford it. They could figure out where robotics fit in to the grand scheme of things, let the industry evolve and produce second and third generation robots that are going to be more affordable. On the other hand, the only way that these companies can afford the development is by widespread use. They will never survive if more people don’t use their technology. It’s a Catch-22. We actually struggled with this concept within our own department. Who should be doing robotics? Everybody wanted to be included and everyone has now been trained. But is fragmenting the institutional experience, at least in these early stages of development, really best?

DPU: Any other major drawbacks for robotics?
CP: None that I have yet seen. However, the place of robotics in pediatric urology is not yet defined. You cannot translate procedures done by open or standard laparoscopy directly to robotics. Different algorithms in management will have to be worked out once its place is better defined. There is a lot of room for development and exploration although cost and time will undoubtedly limit us.

DPU: You mentioned more complex urinary reconstructions. Any experience?
CP: I’ve also done a few Mitrofanoff’s but my next hurdle is an augmentation. We did a bladder neck sling in a boy recently. The visualization with an angled scope in the deep pelvis is amazing. We had the scope well below the vesical insertions, were able to push the rectum down and nicely define where to correctly place the sling. But you could do that with free-hand laparoscopy too.

DPU: How long does it take you to do a pyeloplasty and compare it to the time of your open repair?
CP: All told, three hours. I’ve looked at my open times and find the average to be between 2 and 2 1/2 hours.

DPU: Your response to our colleagues who think this is a gimmick?
CP: Hmm. Perhaps there is an element of gimmick involved, no question. It does work for marketing, no doubt. And as much as we’d like to deny it, marketing isn’t trivial in today’s world. More importantly though, robotics is just like any other new technology in its early stages of development. Like the computer, it’s going to take some time to see what it really can do. And, just like the computer, I think that at some point, hopefully in our professional life, robotics will be something you won’t think twice about using during surgery…the cystoscope of the future.

DPU: An honest man. That sounds very exciting. Tell us about training residents and fellows. Can they learn by watching you do the procedure or do they have to do it themselves.
CP: It’s difficult and we have struggled with it. Unfortunately, you cannot learn robotics by watching someone else do it. Our fellows do progressively more bits and pieces of the operations during their training. The residents enjoy seeing the cases for their novelty. But it is hard for them to be directly involved without being formally trained. After a few cases the thrill is often gone. We’re still trying to figure out how to get them more involved while still developing our own skill sets. Like most surgeons, they’d rather do open surgery right now.

DPU: Are we see the end of open surgery in our field?
CP: (chuckles) Not for some time. I’m not going to do hypospadias with a robot.
A Peek Through the Retrospectoscope

with Richard M. Ehrlich, M.D., UCLA Medical Center, Los Angeles

DPU: Remember the early days of laparoscopy?
RE: Sure. The first cases were diagnostic laps for undescended testes about 20 years ago. What I remember best was that the lighting was terrible, the instruments were poor and they weren’t pediatric. Based on the initial experience we didn’t carry through on our interest for a few years until the laparoscopic cascade started with Clayman and the adult urologists. It seemed obvious that with improved instruments this could be logically applied to pediatrics. Those types of technological advances continue to improve, although probably at a faster pace. You can bet on it.

DPU: We remember your presentation at one of the national meetings many years ago, a telling statement that generated a fair amount of controversy.
RE: Get on the steamroller or get out of the road (chuckles).

DPU: Still believe it?
RE: Even more so. No one in 1990, for example, could have foreseen the advancements in laparoscopic surgery that are exploding around us in 2004. Laparoscopy is here to stay. It’s patient driven as much as doctor driven. You hear this in your office every day. “Can you do this with that non-surgical surgery, doc?” And, as the techniques and instrumentation have improved, the question for us is no longer whether we can do it but should we do it.

DPU: What cases are you now doing?
RE: We did the first three laparoscopic reimplants in children using the Lich technique. I found them to be very difficult. The patients did well but it didn’t seem to provide an advantage over the open approach. It’s great for pyeloplasties. We’ve done about twenty, mostly in the older children but we’ve done them as young as 18 months of age. Again, instrumentation is the issue when it comes to the little babies. You can’t do the same delicate surgery in smaller infants with the laparoscope that you can open.

DPU: Craig Peters tells us you can using robotics.
RE: Really?! Well I like that he’s forward thinking about it. Let me give you a good quote from Sulzberger, publisher of the New York Times. “I believe in keeping an open mind but not so open that my brains fall out.” It’s really important that we all keep an open mind and be receptive to new things. But we should never compromise someone’s safety to prove we can do an operation laparoscopically.

DPU: Any experience with robotics? Is this the new steam roller?
RE: Very little but I find it fascinating. Robotics seems to smooth out the learning curve, especially when it comes to suturing. After three months in practice, one of our residents was doing radical prostates with the robot and, I’m told, doing them quite well. Laparoscopy remains an effective bridge to the next generation of video surgery though. I think the important thing here is that you need to have a receptive mind. You have to be open to new things, regardless of your age. Just because you’re not doing something doesn’t mean it isn’t worthwhile. Let Craig and his friends keep rolling. If it looks good, I plan to jump on board.

DPU: Finally, any comments about the continuation of the Dialogues?
RE: I heard that Marty Koyle and Tony Caldamone planned to spearhead the effort and I thought it was great. At one point in time the Dialogues was really a fine publication. It will take some effort but I’m optimistic it can still find a place among the many educational materials now have available to peds urologists.

Guest Editor’s Afterword

I agree with Rick. Dialogues in Pediatric Urology was a fine publication. I’ve bound my old copies and still find them a valuable resource. When asked to edit this inaugural edition I was tentative at first. There were a number of unanswered questions. What did I like about the original Dialogues? Could the publication be kept relevant for today’s audience? And, if so, what would be a good way to present the material to keep it stimulating? Finally, how could busy clinicians with other academic deadlines be enticed to come on board and commit to the project?

After perusing the bounds, it seemed that some of my favorite editions of the Dialogues were just that…dialogues. These appeared more often in the early years. They allowed for an exchange of unfootnoted ideas by many of the most influential pediatric urologists of their time.

Along these lines, each of our contributors was given a series of queries to ponder. This was followed by a recorded phone call that was subsequently transcribed and edited. Conference calls with more contentious topics could be coordinated and published in the same way. While this leaves a bit more work for the editor, it mimizes the time investment for the contributors and generally leaves the onus of burden on only one person. Naturally, this format may not work for every guest editor or be applicable to every topic but I enjoyed the exchange with these contributors and hope you have too.

MAK