Urological Complications in Relation to the Treatment of Cervical Cancer

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The increasing radicalism of the treatment for cervical cancer—the operation as well as the irradiation—has made therapy increasingly serious for the patient in general, but especially for the organs near the uterus, mainly the urologic system. The care for the patient does not start with the treatment but begins before, with a thorough examination. One of the most important parts of this examination is the checking of the urologic system. Ever since radical operations have been performed, one has thought of the danger to these organs. Nevertheless, in the earlier days, preoperative examination was not done because cystoscopy was in its beginnings and it did not seem particularly necessary to know the condition of the urinary tract, since the operation had to be done anyway if technically possible. There were only two alternatives: to be operated on with a very limited chance of a cure, or to die; thus, any risk was accepted. Now cystoscopy has been done routinely for about 40 years, and we realize that we need to know more about the urinary system than cystoscopy can tell us.

There should be a law never to operate for cervical cancer unless the urinary tract is normal. The diagnostic measures to be used are cystoscopy (or perhaps chromocystoscopy) and intravenous pyelography. Of course, the urine should also be examined for albumin and sugar, and the sediment should be tested for signs of inflammation. Pyelography shows the condition of the upper urinary tract, mainly if there is dilatation of the ureter or hydronephrosis as a possible sign of a compression of the ureter by the cancer. Cystoscopy can detect encroachment of the tumor into the bladder wall, as evidenced by bullous edema or transverse broad folds on the fundus or even the tumor itself. The type of operation we have to perform depends on this primary examination. We will consider only the routine radical operations or irradiation of cervical cancer, and disregard the situations in which the problem of the urinary system is different.

The principle must be to achieve normal conditions in the urinary system if possible before starting with the treatment. It is to be understood that in the treatment of cervical cancer the lower parts of the ureters and the bladder are most exposed to damage. This damage may be due to inflammatory conditions, to surgical trauma, or to the γ-rays. Very often we find a combination of some of these factors as, for instance, in a radical operation which is followed by irradiation.

In the presence of a normal urological system, there is no obstacle to a radical operation. The higher the degree of radicalism, the better; maybe we have already reached the limit. Are the results better? Yes, of course, but there are some dangers too: dangers to the urologic system. We check our results by looking at the statistics. Let us take operative therapy because it allows the most exact check. We cure 80% of our patients of the cancer; there are 20% who are not living any more or are not free from cancer after five years. What happened to these? Twelve of them (according to our statistics, which probably is very similar to most of the others) died of the cancer, the others due to other reasons among which urinary complications were the most important (in our case material 5%).

How to Reduce Urological Complications During Surgery

What can we do to reduce the urological death rate and to eliminate minor urological complications?

We will mainly discuss the operative cases. Theoretically the intervention brings danger to all parts of the lower urinary tract. In practice the urethra is never injured, not even in cases of total extirpation of the vagina.

The bladder may be endangered if the vesicovaginal or vesicouterine septum is infiltrated and parts of the muscle layer have to be removed. Even then, fistulae due to necrosis rarely occur. It might happen, of course, that unfortun-

ately the bladder is opened with knife or scissors. If carefully sewed up a primary healing of the wound occurs.

For the ureter, the danger of a direct lesion is very small, even smaller than in a simple hysterectomy because we expose the ureter and see it. In a radical operation it might be ligated and cut by an unfortunate accident if the ureter runs very high on the pelvic wall near the infundibulic ligament with which it might then be ligated. Thinking of that possibility and looking at the parametrium in translucent light helps to avoid this accident. Difficulty arises only when the parametrium contains much fat, making vessels and ureter invisible; exact preparation protects the ureter from a lesion. However, it is not only the ureter itself which has to be protected from any lesion, but also the concomitant vessels which guarantee a good blood supply. In some technics of radical operations the ureter is entirely isolated running through the pelvis like a telegraph wire. Fortunately, the blood supply of the ureter is a very good one. In the region which is of interest to the surgeon, i.e., in the pelvis, there are five branches going to the ureter. All of them are connected through the vessels which accompany the ureter. Experience shows then when up to three of these arteries are ligated, the blood supply of the organ is not impaired. However, this is only the case if the concomitant vessels are intact and able to compensate for the loss of this part of the blood supply. Meigs was absolutely right when he warned that in radical surgery it is almost impossible not to injure the blood and nerve supply, but that care must be taken to preserve as much of it as possible.

Prevention of Ureteral Fistulae

The danger to the ureter is the fistula due to necrosis. There are three important factors predisposing to fistula formation: 1) The isola-

tion of the ureter, which means the loss of contact with the tissues that normally send some capillaries into the ureter; 2) The location of the ureter in a definitely unfavorable pool of pus; and 3) The formation of extensive scar tissue.

The main factor is the isolation of the ureter, which in some methods is extreme. Amann proposed at the beginning of this century to fix the isolated ureter with some stiches to the connective tissue of the side of the pelvic wall. This was, of course, only possible if no lymphadenectomy was added in the course of which the respective connective tissue was removed. This procedure carried the risk of causing a kink in the ureter. Others partially imbedded the ureters in the sides of the rectum. To obtain the contact with the adjacent tissue —first of all in the most endangered region near the bladder—F. Novak leaves a part of the covering connective tissue in this region. At my clinic Palmrich tried another way to prevent the complete isolation of the ureter. It is possible to preserve an extremely thin layer of tissue which leads from the ureter to the pelvic floor like a mesentery (we call it therefore the mesoureter). It is intimately adjacent to the peritoneum of the Douglas pouch, but in most cases it can be separated from it very easily. At first we thought that it was the preservation of the fine vessels in this tissue which was the important factor, but later we found that it was the preservation of the concomitant vessels of the ureter. But even this method cannot prevent the ureter from being surrounded for many days by pus, and healing is all the more delayed as we remove the pelvic lymph nodes, making the cavity still greater. Here, too, we have various ways to counter this difficulty. The most radical way was that used by F. Novak, who transferred the isolated part of the ureter into the peritoneal cavity. The peritoneum was closed underneath the ureter

which entered and left the peritoneal cavity through small holes. With this method the ureter was removed from the purulent operative field in an ideal way, yet it was lying unprotected in the peritoneal cavity. Novak had excellent results with that method, but others who tried it had complications with the free ureter.

Another way to avoid the difficulties arising from the unfavorable position of the ureter is to drain the respective areas so that the ureter lies in relatively dry surroundings. Everybody drains the big pelvic wound through the vagina. Since we use rubber drains (Penrose), drainage is very good, something we could not claim as long as we used gauze. However, even the Penrose drain is not ideal, because it cannot drain the spaces created by the lymphadenectomy. Here we get retention of a serosanguinous exudate and lymph. The Japanese drain through the buttocks. We use another way, namely the method of Redon which works with a slight suction. A thin perforated plastic drain is inserted in the region of the bifurcation of the iliac vessels. It is brought out subperitoneally on the iliac fossa, and we perforate the skin with an instrument like a larding needle in the region of the iliac spine. A mild suction is exerted by a special rubber stopper closing the evacuated bottle which collects the secretion. The serosanguinous secretion lasts from three to seven days. The total amount of fluid which is sucked off ranges between 20 to 80 cc. When there is no more secretion, the drain is removed. The idea of this drainage is to prevent the exudate from collecting in the pelvis. This could cause a solid scar tissue which occasionally could compress or kink the ureter, leading to severe complications. Extensive and hard scar tissue is the main enemy of the urinary tract. Guided by the same idea we close the peritoneum not in the ordinary way by uniting the rims of the

peritoneum, but by peritonisation with the sigmoid colon. Being mobile, the latter sinks in the pelvis helping to bring the surfaces of the big wound together.

Post-Operative Care

Care of the Bladder

This is at least as important as the operative technic for the future of the urinary tract. The conditions here are much more complex. First, it is nearly impossible to carry a patient through the post-operative phase without any inflammatory reactions of the urinary tract. In addition, the care of the patient is more complicated. During the operation it is the surgeon who is the only one responsible; afterwards, many nurses and doctors take part in the care, a fact which provides many more possibilities for mistakes. If during the operation it is the ureter which needs attention, it is now the bladder which needs the greatest care. We must never forget that we are not dealing with a normal organ but one which is damaged in its blood supply and innervation. The bladder has no tendency to contract. A generally accepted idea now is to use an indwelling catheter, but this is not an ideal solution. It is true that the danger of an infection from frequent catheterisations is avoided, but there is no doubt that even with a self-retaining catheter cystitis often sets in.

One question is which type of catheter should be used. The material most commonly used is rubber or, if the patient is allergic to rubber, plastic. Many different types are available. We use a Foley catheter which, I think, is one of the best. I have no experience with the Ellis catheter recommended by Stallworthy, but it seems to be very good. The ideal catheter for the bladder would be a simple Nelaton catheter fixed on the vulva. However, after a radical operation the slight pressure of the bag in the Foley catheter in the bladder does not do any harm. It is to be understood that all catheters should be of the disposable type. Another question is where to drain the catheter. One may put it in a urinal between the patient's legs. It is absolutely necessary to put an antiseptic into the urinal to prevent an ascending infection. In general, the method is not good because of the inconvenience to the patient due to the bottle in the bed. It is better to drain the catheter into a plastic bag hanging on the bedside. The danger of an infection arises in spite of the sterile material when the patient gets out of bed and has to plug the catheter. We have had the best experiences with these plastic bags.

The second question is for how long we should leave the catheter. The sooner we take it out, the longer the patient will have residual urine. We found the optimal length to be 12 or 14 days. From the tenth day on we plug the catheter for a few hours to get the bladder used to different volumes. It is a fact that at that time the patients have no bladder consciousness as yet. The bladder can only be voided with the help of the abdominal muscles. Many patients have retention while lying in bed but are able to void normally if allowed to sit on a toilet. Depending on the radicalism of the operation the patients learn to urinate sooner or later after removal of the catheter. With the ability to pass the urine spontaneously—even when it needs a great effort—bladder consciousness returns slowly and the patient feels the urge to void and does not do it from a sense of duty. For a longer period, however, the patients have a certain amount of residual urine. This residual urine, if not emptied by a catheter, is the best culture medium for any kind of germs, thus leading to a cystitis. Therefore, the bladder has to be meticulously controlled, and the patient should not be dismissed from medical care if she is not free of residual urine for three consecutive days. The indwelling catheter is superior to repeated catheterisations because of a lower risk of infection. Whatever catheterisation is applied it has to be done under the strictest adherence to the principles of asepsis. Everybody knows that, but how does it work in practice? Many young doctors and nurses, tired by the routine work—which is what catheterisation is in fact—perform catheterisation not as cautiously as they should; and, as a matter of fact, sometimes in very fat or uncoöperative patients it is very difficult to find the external urethral orifice without touching some surrounding tissue. The indwelling catheter is introduced by the surgeon at the end or better at the beginning of the operation with the patient in the lithotomy position or at least with legs spread and under anesthesia.

Post-Operative Complications

As we can readily see, the principal care after radical operations is to be applied to the urologic system. We have to try to restore the bladder to a spontaneous motility and we have to *control* the infection. We can hardly say that we can *avoid* the infection, but we should try. We control infection with sulfonamides, antibiotics, and Furadantin preparations. Sometimes we see that even two weeks after removal of the catheter the patient still has a remarkable amount of residual urine. Frequently we also find a rigidity of the vesical sphincter. In most of these cases conservative treatment fails. We got excellent results with the resection of the sphincter by cautery; immediately after this the patients could empty the bladder entirely.

When the catheter is removed, another pyelogram is obtained to see whether there is a block, stenosis, or kinking of the ureters. Postoperative X-ray treatment should never be applied if the X-ray pic-

ture is not normal. If it is abnormal we should rather wait with the irradiation because otherwise damage to the ureters through scar tissue is fairly sure to occur.

For months after the operation there is danger of a stenosis of the ureter. This might happen through compression by excessive scar tissue or distorsion of the ureter towards the pelvic wall. Stenosis always means dilatation of the upper part of the ureter and later of the pelvis. Long-lasting pyelonephrosis damages the kidney and the patient dies of renal insufficiency. However, most frequently an infection develops in the retained urine. Unless intensive therapy is applied the patient dies of phylonephritis. Effective modern chemotherapy postpones the fatal outcome. To know the condition of the ureters, pyelography has to be repeated at least before every new series of irradiation. If the stenosis becomes more severe and cannot be stopped, surgery must be decided upon. In some cases it is possible to dig out the ureters from the scar tissue, but this is not easy. If it is impossible, the ureter must be resected and implanted either into the rectum or in an ileal bladder. It is rarely possible to implant the ureter into the bladder; this is particularly the case whenever the ureter primarily is firmly imbedded in an infiltration of the cardinal ligament due to the cancer. If we see that the blood supply will not be sufficient, we resect the suspicious part and implant the proximal part in the bladder.

Post-Irradiation Complications

Up till now we have been talking about the complications in operative cases, but what about the irradiated ones? In principle, the situation is the same. We can only say that the tendency towards hard scar tissue is greater after irradiation. Therefore, in both cases (operation or irradiation) control cannot be too strict. Control measures must include pyelography, examination of urinary sediment, and measurement of residual urine. Unfortunately, many surgeons and radiologists are only looking for the possibility of recurrences and forget to check the urinary tract. The patients suffering from urinary troubles very often do not go to the gynecologist but to the urologist. They thus disappear from the sight of their doctor who may conclude that his results were far better than they actually were.

In summary, today as ever before it is our main task as physicians to cure the cancer; however, we must not forget that we have to fight all other causes of death of our patients. Among these primary causes are the urological complications which are all the worse because they are iatrogenic. We have to be aware that most of the urologic complications can be avoided or eliminated if we *think* about them. Our task is not achieved by killing the cancer and saving the life of the patient; this life must be rendered worthwhile too.