Guest Editorial

Microscopic Surgery in Urology

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Surgery of small organs or delicate anatomic structures requiring the use of optical systems as well as adequate surgical materials and skills has been called microscopic surgery. It rests upon basic principles imposed by the intrinsic characteristics of the very fine and precise instruments used, and also by the smallness and fragility of the affected organs and tissues. Until several years ago, the surgeon interested in microscopic surgery had only at his disposal eyeglasses which gave him a two to three times magnification; yet this low magnification was very useful for improving the suturing of the renal pelvis, calices, ureters, and vas deferens as well as in the vascular work of renal homotransplantation.

Obviously, the very low magnification of these eyeglasses limits the usefulness of this type of surgery to some macrostructures and certainly it cannot be applied to microstructures. Furthermore, and because of their short focal distance (25 cm.), these eyeglasses cannot be used in deep operative fields, as is usually the case in urology. Because of the short distance and reduced space between the operative field and the surgeon's eyeglasses, the illumination, which is most important in the performance of this type of surgery, is usually poor. Furthermore, since there is not enough space to move the hands and work comfortably, the strict rules of aseptic surgery are frequently broken.

A good steady illumination of

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the operative field, as well as the capability of obtaining a panoramic view of the whole field and a view in detail of the specific areas, is a strict requirement in order to survey and evaluate any anatomopathologic alterations in capillaries, nerves, and other structures of small organs, and also for the actual performance of microscopic constructive or reconstructive surgery.

Technical advances in the development of the binocular operating microscope have provided the surgeon with the right tool for practicing microscopic surgery. This operating microscope has a stereoscopic view, and the illumination system is in line with the surgeon's vision. The intensity of light is adjustable at will, and the range of magnification is from six to 40 times greater. This instrument, in fact, has contributed to the development and current advances in microscopic surgery. It has expanded considerably the boundaries of surgical interventions of the eye, ear, larynx, and central nervous system.

Owing to the greater amplification of the microstructures provided by the operating microscope, and aided by a perfect illumination set-up, the surgeon can now perform a rather meticulous and accurate microdissection, since he can see very well the boundaries between the pathologic and normal structures within the same organ.

The operating microscope reaches well into narrow and deep anatomic regions and aids the surgeon considerably in achieving detailed anatomic knowledge of great surgical interest. For instance, in neurosurgery, it has been very useful in fine reconstructive procedures such as reanastomosis of cranial and peripheral nerves, or in creating new vascular channels to improve irrigation of ischemic cerebral areas (bypass between the superficial temporal artery and the anterior temporal artery). It has been possible to form micro-anastomosis between arteries measuring from 0.8 to 0.5 mm. in diameter, using the operating microscope along with adequate microsutures and technique.

Undoubtedly, microscopic surgery demands new techniques, new instruments and new surgical materials. The oest suturing material is that used in ocular and otologic surgery. The continuous or running type of suture is best fitted for this type of surgery. On the other hand, the interrupted type of suture is discouraged. The knot is always traumatic and its pressure exerted upon the fine underlying structures results in local injury. Furthermore, a "crown" or line of knots constitutes a great deal of foreign material.

The operating surgeon must have a good idea and understanding of the particular structure or organ upon which he is working. He must recognize that the greater magnification provided by the operating microscope can give him a distorted picture of the reality and that, as a result, he may tend to overestimate the surgical possibilities.

In the field of experimental surgery, the operating microscope is an important tool for precise learning of this technique, for improving conventional surgical methods, and for development of new horizons in surgical research. Microscopic surgery approaches the threshold of physiologic surgery. The operating microscope is also an important tool for teaching and training residents. It is equipped with two lateral tubes for simultaneous observation through which the assistants can follow the surgical intervention step by step. Furthermore, each one of these tubes can be adapted to a photographic or cinematographic camera, as well as television unit or videotape system. Thus, the entire surgical procedure can be registered on film, or the picture can be projected onto a screen and followed by physicians and students.

The technical process of taking movies through the operating microscope, which in the past has been a difficult problem, has been solved by E. Garcia Ibañez, a Spanish otorhinolaryngologist. He has developed a completely automatic set-up composed of a super 8 cine camera adaptable to the ocular part of the Zeiss microscope in either of the lateral tubes used for observation. In this way the camera is always in sharp focus with the microscope or surgical field as visualized by the operating surgeon. This equipment has an automatic diaphragm, a reliable electrical system for illumination, and a simple set-up for refrigeration. To take still pictures or a movie through the operating microscope does not require specialized personnel, as the surgeon himself can control the machinery through a pedal at the foot of the table. As I have already mentioned, several surgical specialties have benefited by the proper use of the operating microscope. Urology also can and should benefit by this technical advance.

To date, I have used the operating microscope in urologic surgery for anastomosing the vas deferens to itself or to the epididymis for ureteral anastomosis and pyeloureteroplasties. I find it particularly useful in children, in surgical correction of megaureter, and in renal transplantation. With this technique I have reanastomosed polar renal arteries with lumina of 1 mm. in diameter, have achieved watertight uretero- and pyelotomies, and have successfully excised small aneurysms of the branches of the renal artery with vascular reconstruction.

As to the urologic applications of this technique in the immediate and distant future, we can foresee the following applications: (1) In autotransplantation of the testis for uncorrectable cryptorchidism or high testicular ectopy, (2) in kidney surgery *ex situ*, (3) in surgery of the nervous system of the bladder, (4) in reconstructive surgery of the sphincteral system of this organ, and (5) in ureteral and vesical allotransplants.

Summary

Many surgical operations performed on macrostructures of the urinary secretory and excretory

systems and genital organs can be now carried out more accurately and safely with the technique of microscopic surgery. It allows a more precise knowledge of the anatomy and pathology of the fine structures of the genitourinary systems.

Microscopic urologic surgery will occupy an important place in our specialty, since it allows a much greater scope and precision in the performance of many of our routine surgical operations with improved results. This will stimulate younger urologists to further the advances of this technique, which no doubt will expand the surgical horizons and achievements of our specialty. □

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