

MINIMUM NEPHROSTOMY

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ABSTRACT — A new type of nephrostomy is described with the following main characteristics: it uses a small multiperforated Silastic tube; its crosswise location allows perfect drainage of all of the calyces and the pelvis; it does not become obstructed nor move from its position; and it causes minimum traumatization of the renal parenchyma. It has a double purpose: it serves as a drain and safety measure as well as being used for the treatment of renal infection.

The nephrostomy which was created a century ago to drain distended kidneys in a definitive manner has changed its objective with the development of conservative surgery on the kidney and its excretory channels. At the present time it should be used only as a transitory method of diversion.

The general consensus is that permanent nephrostomy and cutaneous ureterostomy inexorably jeopardize the functional value of the kidney and its excretory channel.¹ Infection from the cutaneous orifice is responsible for progressive renal insufficiency. In both cases the social conditions are deplorable. Definitive nephrostomy should never be performed as an elective urinary diversion especially in the young. It has been accepted that good caliber catheters (Malecot, Pezzer, Foley) should be used in this operation, that the operative technique should vary according to whether the kidney is anatomically normal or distended with large pyelocalyceal cavities, and that the nephrostomy tube follows a rectilinear course which will permit easy changing of the catheter, facilitate the evacuation of the intrarenal cavities without residues, and ensure fixation. In my opinion the material being used, the techniques followed, and the objectives of temporary nephrostomy should be revised.

Material

The Malecot, Pezzer, and Foley catheters, except for those manufactured with Silastic, soon become encrusted with mineral salts and

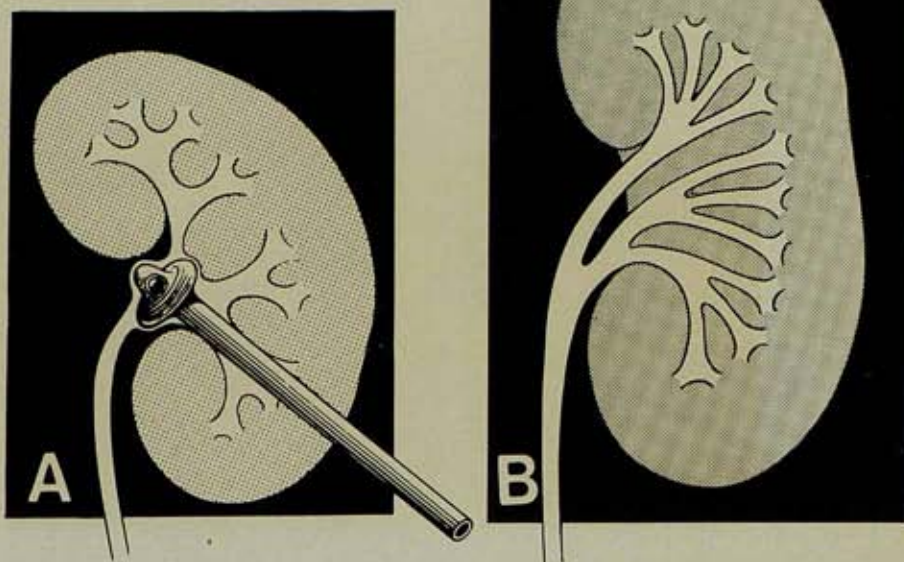
are easily blocked. In placement it is necessary for the end of the catheter to be located in the pelvis (Fig. 1A); the catheter's end could constitute a foreign body and be poorly tolerated or could prevent adequate drainage of the calyces. Its constant friction with the walls of the pelvis can give rise to chronic pyelitis and painful intrapyloric retention. The empty spaces of the ends of the catheters are areas favoring the breeding of germs. The decubitus caused by the catheter on the infundibulum of the calyx through which it passes can give rise to sclerosis and alter its contractability. The removal of a Pezzer or Malecot catheter is in some degree traumatic and may cause bleeding. The greatest and most serious drawback in the use of catheters is that they cannot be situated in a very small pelvis or in those with bifid collecting system (Fig. 1B).

In my opinion the best material for the temporary nephrostomy is a small multiperforated Silastic tube. Its advantages are that it does not become encrusted with mineral salts; it is soft and inert; its smooth surface prevents the nesting of germs; and its removal does not injure the kidney or cause bleeding.

Technique

The nephrostomy can be performed from the outside of the kidney to the inside, or from the inside to the outside. In large hydronephroses in which the thickness of the parenchyma is minimal and fluctuation is present, nephrostomy from the outside to the inside presents no

FIGURE 1. (A) Conventional nephrostomy. Catheter de-cubitus on walls of pelvis is cause of chronic pyelitis and deficient drainage of renal cavities. (B) No renal pelvis, sketch of bifid ureter. In these cases conventional nephros-tomy presents great diffi-culties.



danger or difficulty. On the other hand, it is not always successful because there is never complete assurance that the catheter is correctly situated in the pelvis; it may become lodged in a calyx instead (Fig. 2). Then the nephrostomy does not conduct all of the urine; and even though the retention is slight, it takes away the essential purpose of the operation and rapidly leads to infection.

The operation is not so simple when the parenchyma maintains all of its thickness. In such conditions the nephrostomy from the outside to the inside involves serious danger (hemorrhage, infarcts, false channels) and should be deferred. At the present time, I believe there is agreement that with respect to an anatomically normal kidney the nephrostomy should be from the inside to the outside.

The contribution of Couvelaire and Moulon-guet² constitutes considerable progress in that the nephrostomy has thus become more anodyne for the patient and less traumatic for the kidney. The most important principle of their technique is the retrograde perforation of the parenchyma by means of a sharp instrument and the passage of the tube directed to the outside with slight trauma to the kidney. We believe that this principle is basic and applicable at present, but we also believe that it is possible to improve it by updating it in the light of modern advances in materials and techniques, as well as broadening the indications of this operation, which is the purpose of this technical note.

For the drainage material we have substituted for the catheters a small multiperforated Silastic

tube which has a diameter of 3 mm. and a lumen of 1.5 mm. (Fig. 3A). This small caliber has proved to be sufficient when the nephros-tomy is for a short duration (ten to fifteen days) as for example after the extraction of staghorn stones in dilated and infected kidneys, and in plastic surgery for restoration of the excretory



FIGURE 2. Malecot catheter placed at lower calyx. In nephrostomy from outside to inside frequently catheter is not lodged at pelvis, making renal cavities drain improperly.

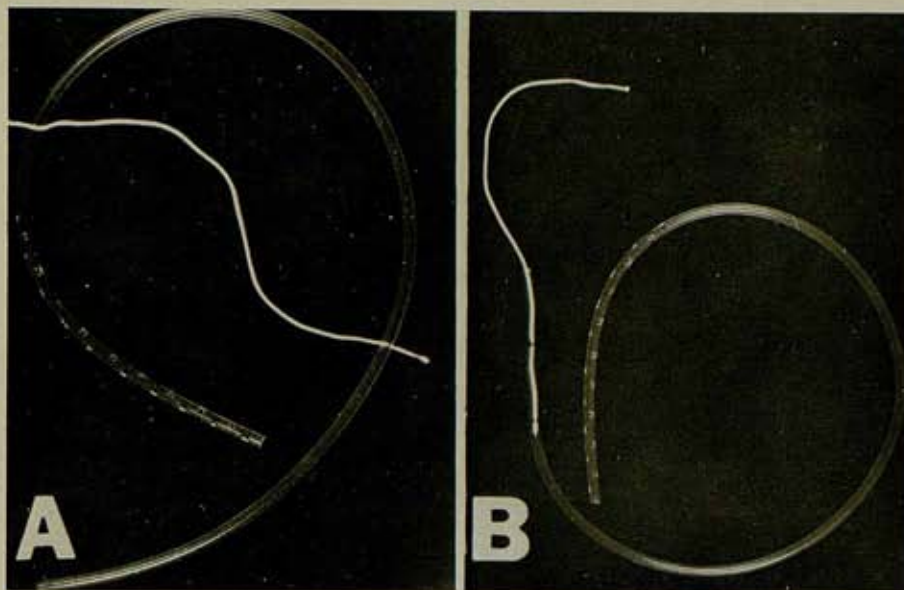


FIGURE 3. (A) Multiperforated Silastic tube used as substitute for conventional catheters and metal stiletto very ductile acting as nephrostomy tube conductor. (B) Multiperforated tube fixed to stiletto with silk thread. Stiletto must be shaped according to lower calice characteristics.

channels, as well as for longer durations (one to three months) in the case of markedly distended kidneys or with first-stage operations.

A larger caliber tube, besides being more traumatic, is unnecessary in our opinion, since the kidney throughout the procedure will have been extensively washed and the Silastic tube remains patent for a long time. It is pointless to insist that a thicker tube will facilitate the evacuation of small forgotten stones or make it possible to dissolve them by adequate solutions. In proper surgery for lithiasis the rule is the complete removal of stones.

The reason catheters should not be used is that not only is the probe not indispensable but also it is counteractive since it is traumatic and has no space for placement when there is no renal pelvis. Besides when removing it, it does not traumatize the excretory channels or the parenchyma, and the small area heals rapidly. Also, it has sufficient consistency to resist bending if situated crosswise along the main axis of the kidney, that is from the upper to the lower calyx, the variation we are proposing with our technique.

Minimum Nephrostomy Technique

Whatever the approach to the kidney may be (vertical, posterior, or classic), the nephrostomy is performed from the inside to the outside. The renal calyces, especially the entrance and course of the lower calyx through which the tube will pass, are explored through a transverse pyelotomy. Multiple perforations are

made in the end of the Silastic tube. To place it in the kidney, we use a thin stiletto or stylet approximately 20 or 25 cm. long and 1.5 mm. thick (Fig. 3A). Its main characteristic is that it is very soft and can be shaped according to the morphology of the excretory channels. The end opposite to the perforations is placed over the stiletto for about 15 cm. To prevent sliding during placement, a silk thread is tied strongly around the mounted end of the tube.

Once the tube has been prepared, it only remains to shape the already mounted stiletto in accordance with the characteristics of the lower calyx; the most appropriate curvature is that of the classic spindle (Fig. 3B). The free end of the stiletto is passed through the lower calyx, and with little pressure the parenchyma is perforated at the lower pole. The stiletto is pulled until the end of the tube surfaces to the skin where it is fastened with silk stitches and adhesive tape. The tube should remain in an anterolateral position to facilitate supination of the patient. The multiperforated end is inserted toward the bottom of the upper calyx, while the nephrostomy remains in a crosswise position always, no matter what the morphology of the pelvis may be (Fig. 4A).

The tube is fastened by a 5-0 catgut stitch to the fibrous capsule of the kidney to prevent movement. A rectilinear course from the kidney to the skin to assure easy changing of the tube is not important because it is unlikely the tube will obstruct and require changing.

The introduction of about 5 cc. of physiologic solution and its aspiration through the tube and

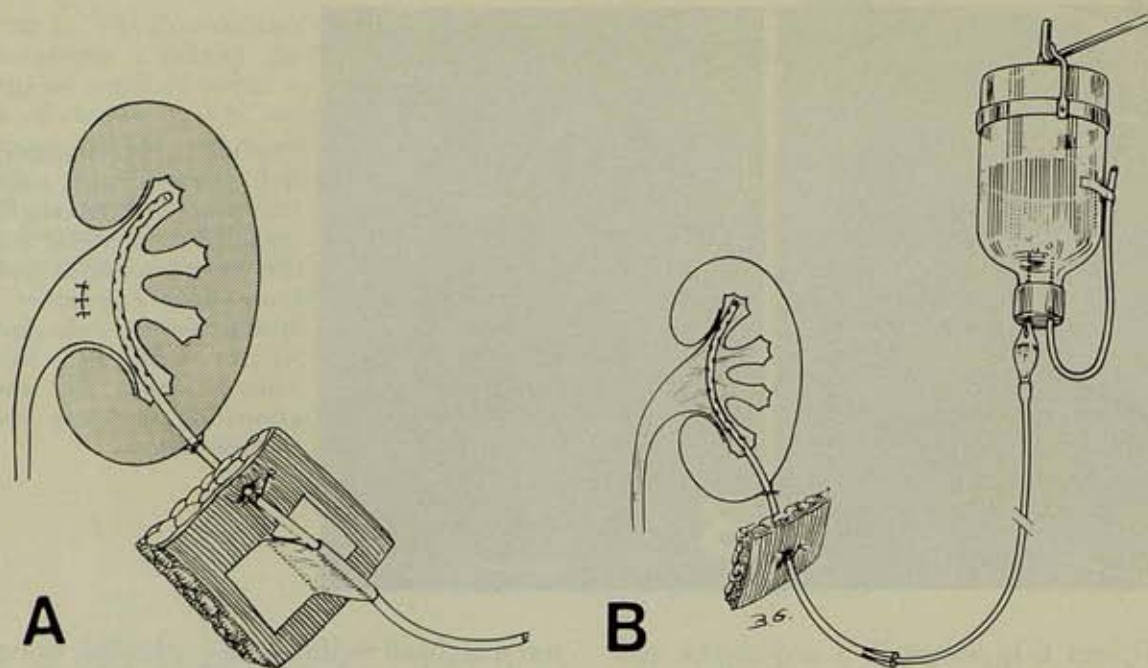


FIGURE 4. (A) Nephrostomy in crosswise position; fixing with catgut suture to fibrous capsule. (B) Multiperforated Silastic tube that we use as substitute for conventional catheters.

an inspection of the fixation suture to the skin are required only once per day.

Comments

This technique has been used in 186 cases of temporary nephrostomy. No complications (hemorrhage, intolerance, or obstruction) have been observed.

The advantages of this type of nephrostomy are as follows: (1) its retrograde placement directed by the stiletto does not cause bleeding; (2) because of its small caliber it traumatizes the renal parenchyma to a minimum; (3) its crosswise situation and multiple orifices allow perfect, total drainage of the pelvis and all the calyces; (4) it does not alter the motility or obstruct the calyx through which it passes; (5) it does not cause trauma by friction or decubitus by virtue of its shape and location; (6) it does not move out of position; (7) its removal does not cause even a minimum of trauma; (8) its multiple perforations allow the washing out of the renal cavities in the post-operative period; and (9) it has perfect adaptation to variations in the morphology of the pelvis and calyces.

This minimum nephrostomy has a double purpose: as a complementary safety measure and as a therapeutic measure (Fig. 4B). We believe that the latter aspect is most important,

particularly when the multiple pyelocalyceal lithiasis or the staghorn stones are accompanied by infection of the renal cavities; in such cases it is absolutely necessary to conclude the operation leaving a minimum nephrostomy tube for as long as is needed to control the infection which is so important as an etiologic factor in some relapses. Starting on the sixth or seventh day after the operation the nephrostomy tube is connected to a drip system containing physiologic and antiseptic solutions. This will allow passage of 5 or 10 L. daily through the excretory channels of the kidney, with the consequent carrying away of germs, cellular detritus, or sand to the bladder. Nephrostomy is maintained until urine culture becomes negative.

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