Catheterization without foreskin retraction

Adrienne Carmack MD **Marilyn Fayre Milos** RN

Over the past century, numerous boys born in Canada and the United States have been circumcised.[1] However, this trend is changing, with neonatal circumcision being performed less commonly than in years past.[2,3] Because of these historical practices, many physicians and nurses have limited experience treating patients with intact foreskins and engage in ill-advised procedures such as premature foreskin retraction for purposes of "hygiene" or catheterization. Premature retraction of the foreskin can lead to tearing of healthy tissue, which is painful and increases the risk of preputial scarring and infection.[4-6] We describe a method for catheterization in which premature retraction of the foreskin is not necessary.

Technique

The foreskin should first be gently manipulated to determine if the meatus can be easily visualized. Pressure used for this should be gentle to avoid tearing of tissues, similar to the amount of pressure that would be used when spreading the labia to visualize the meatus of a girl. If the natural attachments of the foreskin to the glans (head of the penis) remain, the foreskin should not be forced back to expose the meatus.

If the foreskin can be gently moved such that the glans and meatus can be seen, catheterization can be performed under direct vision using a sterile technique. The foreskin should never be retracted past the point where it has already naturally separated.[7]

If the meatus cannot be seen, the genitals can be prepared and draped in a sterile manner without retraction. The catheter can then be lubricated and gently inserted through the foreskin opening and guided into the meatus, much like an intravenous catheter is guided into a vein by feel. Gentle pressure with the thumb along the dorsal aspect and the fingers along the ventral surface of the penis can keep the catheter from slipping between the glans and inner lining of the foreskin into the preputial space (**Figure 1**).

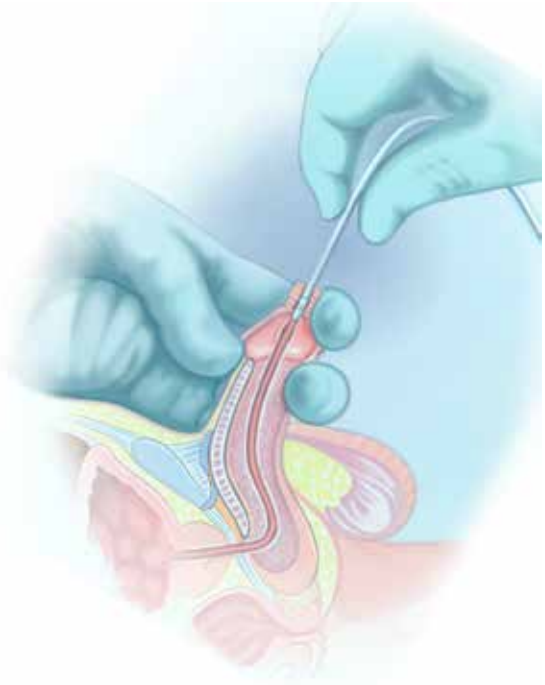
When catheterization is being performed for the purpose of collecting a urine specimen, the foreskin should also not be forcibly retracted. In both boys with an intact prepuce and girls, the initial urine obtained during catheterization should be discarded, as this will contain preputial and periurethral flora. The latter urine should be saved for culture.[8]

Discussion

An understanding of the normal anatomy and development of the foreskin illustrates why the technique of catheterization without retraction is an important skill for health care practitioners. Physiologic phimosis is the normal state of young boys.[9] This finding is characterized by a closed preputial outlet with the inner mucosa of the foreskin beginning to evert through the preputial opening, which is healthy with no scarring. The glans cannot be seen without retraction. This is in contrast to pathologic phimosis, in which the glans and meatus can often be seen, as the scarred ring of the preputial orifice is held open and no mucosa is visible at the preputial outlet.[10]

In a Danish study, 8% of healthy boys aged 6 to 7 still had complete physiologic phimosis preventing visualization of the meatus, and only 23% of boys this age had fully retractable foreskins.[11] In a Japanese study, 84.3% of boys aged 6 months to 1 year had a tight ring preventing any retraction, and this decreased gradually with time to 40% at ages 1 to 2 years, 28% at ages 3 to 4 years, 20% at ages 5 to 7 years, 16% at ages 8 to 10 years, and 8.6% at ages 11 to 15 years.[12]

Figure 1. Technique for catheterization without retraction: *The thumb is used to stabilize the penis, while the index and middle fingers are used to occlude the preputial space and guide the catheter through the preputial opening into the urethral meatus.*



The term *phimosis* is Greek and means "a muzzling." Physiologic phimosis simply means the foreskin cannot be retracted and the glans is "muzzled." Ballooning during urination is a common finding and part of the normal developmental process of foreskin separation.[10] It occurs because the opening of the immature foreskin is not yet lax enough to accommodate a full urine stream or passage of the glans through it. The foreskin and glans separate naturally as the child develops, has erections, and manipulates his foreskin. When a young boy manipulates his foreskin naturally, he tends to pull his foreskin away from his body, not toward it, as is done with retraction. As he gets older and more curious, he begins to pull his foreskin toward his body as well.[10] In most boys, physiologic phimosis resolves naturally by the end of puberty.[11]

The foreskin and glans are connected by the balanopreputial lamina, a membrane similar to the synechial membrane that connects the nail bed and the fingernail. The balanopreputial lamina is sometimes called the *synechia*. This membrane and the small preputial opening prevent retraction in boys with normal physiologic phimosis. The attachment might be forcefully disrupted, just as the fingernail can be torn from the nail bed, but this causes pain, is unnecessary, and can lead to infection, scarring, adhesion formation, or iatrogenic phimosis. There is no functional need for the glans to be exposed, and there is a protective effect of having the foreskin attached to and covering the glans.

Because the foreskin protects the glans penis and urethral meatus, premature exposure of the glans, as occurs after circumcision, commonly leads to meatal stenosis, in which a substantial part of the circulatory system in the glans penis is damaged (the frenular artery), and the glans tissue is exposed, denuded, and inflamed, which can lead to ulceration and subsequent scarring of the urethral opening. This inflammation and ulceration are caused by disruption of the normal attachment between the glans and foreskin, the absence of the protective foreskin, interruption in the normal circulatory system, or blisters from ammonia burns.[13-15] The blisters and ulceration at the opening of the urethra are caused by contact of urine-soaked diapers with the urethral meatus, which is no longer protected by the foreskin.

Retracting the foreskin of a prepubescent boy with physiologic phimosis, although still a common recommendation by many health care practitioners, has been shown to increase problems such as scarring and infection. These might result in iatrogenic pathologic phimosis and lead to a higher likelihood of circumcision being performed at a later date.[16] If the prepuce is unable to retract, there is nothing to clean under. The foreskin should not be retracted for cleaning until the foreskin has naturally separated and the child can do this himself. In fact, the owner of the foreskin should be the first person to retract his foreskin. Forceful retraction causes microtears that can lead to pathologic phimosis.[10]

An additional danger of premature retraction is paraphimosis, a condition in which the retracted foreskin becomes stuck behind the glans penis, cutting off circulation and leading to ischemia and possibly penile gangrene if not treated promptly. Retracting the foreskin and cleansing with soap, commonly believed to be important for proper hygiene, not only exposes the child to the risks of premature foreskin retraction, but also to the risks of infection such as balanitis, which has been shown to be associated with the use of soap on the delicate mucosal tissues of the male genitalia.[17] Soap dries out mucosal tissue and should never be used on the glans or inner foreskin. The foreskin should be left alone until it demonstrates the ability to retract.[10] Once this is possible, foreskin care is simple: retract (gently and only to the extent possible), rinse, replace. Warm water and fingertips adequately clean the tissue.

Besides false beliefs about hygiene, one of the main reasons boys are subject to premature foreskin retraction is that many health care professionals believe that the foreskin must be retracted to obtain a clean specimen for urine culture. Fortunately, this is not the case. With proper technique, as described above, urine specimens can be obtained from boys with intact foreskins without exposing these patients to the risks of premature foreskin retraction. Although the focus of this article is on a technique for catheterization, it must be remembered that catheterization is an intervention that carries risks. The risks of catheterization include discomfort and introduction of bacteria into the urinary tract, which could lead to infection. Indications for catheterization include the need to monitor urine output for medical management, emptying the bladder in patients who are unable to do so, introducing contrast material for imaging procedures such as a voiding cystourethrogram, and obtaining a urine specimen for analysis in patients who are unable to provide one.

If a patient can reliably void into a collection container, catheterization for monitoring urine output can be avoided. Patients who cannot empty their bladders have the options of clean intermittent catheterization, indwelling urethral catheterization, and suprapubic catheter placement. Other options for collection of a urine specimen for analysis and culture include a midstream voided sample and suprapubic aspiration, and these should be considered when determining the optimal approach for specimen collection.[8] Suprapubic aspiration is significantly more painful than urethral catheterization in premature male infants ($P<.001$).[18] Contamination is possible with catheterized samples as it is with voided samples.[19] This suggests that catheterization for urine specimen culture should be reserved for

those patients who are unable to provide a voided specimen into a clean container, and suprapubic catheterization should only be used if previous efforts to obtain a specimen have resulted in contamination.

Conclusion

In boys with intact prepuces and physiologic phimosis, catheterization without retraction minimizes potential long-term problems and is an effective technique. Understanding how to catheterize without direct vision of the meatus and discarding the initial urine if culture is desired allow this procedure to be performed with high validity and minimal risk of iatrogenic problems for the child.

Dr Carmack is a board-certified urologist practising in Texas. **Ms Milos** is Executive Director of Genital Autonomy America in San Anselmo, Calif.

Competing interests
None declared

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