

# Reconstructive urology in the tropical and developing world: a personal perspective

J.H. NAUDÉ

Department of Urology, University of Cape Town and Groote Schuur Hospital, Western Cape, South Africa

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## Introduction

Urology in the developing world and certain tropical areas differs from that in the developed world in the incidence of certain conditions, the availability of instrumentation, urological services and associated medical and social infrastructure. Some conditions, e.g. schistosomiasis and filariasis, occur exclusively in well-defined geographical areas; others of universal occurrence have a markedly higher or lower incidence in particular developing countries. Ever present in the background is a shortage of healthcare funding of varying degrees, which in the worst cases prevents the purchase of the most basic facilities, intravenous fluids, antibiotics and surgical sutures.

This review is concerned largely with the situation in Africa, being the only continent of which I have any significant experience. A survey by the International Society of Urology of the distribution of urologists shows a very strong polarization, with North Africa having many urologists (Egypt seems over-supplied, with > 1500 urologists for a population of 60 million); South Africa has ≈160 for a population of 45 million and the countries between have some, a few or none at all.

Well-trained European or North American urologists might find their experience inappropriate and their skills lacking in the African context. Nephrolithiasis is very rare in tribal African people of Negroid extraction, as are germ cell tumours of the testis. Because prostate cancer is diagnosed in the later stages, radical prostatectomy is rare in this situation. Conditions encountered with greatly increased frequency include urethral strictures, obstetric vesicovaginal fistulae (VVF), complications of schistosomiasis, complications of tribal circumcision, blunt and penetrating urological trauma, and carcinoma of the penis, as well as urological complications of carcinoma of the cervix. Some aspects of a few of these conditions are discussed.

## Urethral strictures

The ability to carry out successful urethroplasty would be a great asset to the African urologist, but this skill

is not widely available. Most strictures are still being treated by periodic clinic dilatation. There are so many African patients with urethral strictures that if all the urologists were masters of urethroplasty and spent all their time carrying out this procedure, they would still have little impact on the total numbers afflicted. The solution to this problem is clearly with public health and sociological factors, with safe sex and the early treatment of urethritis being instituted. Well performed single-stage urethroplasty is clearly the best option for most patients, with a cure rate of 90% being a reasonable expectation. Neither the skill to do this nor the required operating time are freely available in most developing countries.

To address this problem I developed a system of performing endoscopic tissue graft urethroplasty [1–3] with the use of penile skin or buccal mucosa. Over a period of 15 years many such procedures have been undertaken, with good results. Unfortunately, the endoscopic urethroplasty stent set (Cook Urological, UK) is expensive by African standards and the procedure requires some degree of endoscopic expertise.

Optical urethrotomy does not provide a permanent solution. Steenkamp *et al.* [4] showed that a first optical urethrotomy provides urethral patency in half the patients at the 2-year follow-up, a second procedure in 20% and a third in none. Overall, they also showed that optical urethrotomy was no better than simple urethral dilatation in securing urethral patency in the longer term. To reduce congestion in stricture clinics, reduce staff exposure to patients' blood and for the convenience of the patient (some have to travel long distances to reach the nearest clinic) we developed an integrated filiforme/follower (Cook Urological) for self-dilatation after optical urethrotomy. A week after clinic dilatation or optical urethrotomy, CISC is instituted with an 18 F round-tipped catheter. CISC is used three times per week for 1 month, to allow healing of the strictured area before the use of the filiforme/follower dilator is introduced.

Self-dilatation with a round-tipped catheter is very successful if used frequently. As soon as the stricture narrows to less than the outer diameter of the catheter, the catheter will stick and a clinic dilatation will be needed. Because of the very acute angle (gradual taper)

of the filiforme/follower self-dilator, a significant dilating force is available and the intervals between self-dilatations can be extended to every 1 or 2 months after the first 6 months of treatment. This should always be gradual as there is no way of predicting the rapidity of stricture recurrence. None of the patients who have adhered to the recommended regimen of self-dilatation have needed a subsequent clinic procedure. The self-dilator is re-useable in the long term, but even its modest price might be beyond the average African health service budget. Our current treatment policy for urethral strictures is:

- Short, simple strictures in an otherwise healthy urethra are treated by optical urethrotomy once. Recurrence (unless it is after many years) qualifies the patient for urethroplasty.
- Penile urethral strictures are treated by pedicled island flap urethroplasty, dorsally applied to prevent sacculation or diverticulum formation.
- Bulbar urethral strictures are treated by dorsal onlay urethroplasty with the use of penile skin or buccal mucosa, or by endoscopic tissue graft urethroplasty with the use of penile skin or buccal mucosa. (For the latter procedure there are too few cases using buccal mucosa to compare it with penile skin.)
- Bulbar urethral strictures caused by 'falling-astride' injuries are treated by spatulated anastomotic urethroplasty.
- Membranous strictures and distraction injuries are treated by anastomotic urethroplasty.
- Recent rupture of the urethra associated with fracture of the pelvis (2–3 weeks since injury) is treated by endoscopic tissue graft urethroplasty.
- Optical urethrotomy and intermittent dilatation are used to treat the frail and elderly.
- Centres not expert in urethroplasty are advised to perform optical urethrotomy or clinic dilatation, followed by intermittent self-dilatation, in a regimen of gradually decreasing frequency up to, but not beyond, 3-monthly dilatation.

### Vesicovaginal fistulae

Most VVF seen in developing countries, and certainly in Africa, are related to obstructive neglected/prolonged labour. A frequently encountered scenario is of an immature girl, given or sold into marriage in a remote rural area. She experiences obstructed labour and after a few days the fetus dies or she suffers rupture of the uterus. If she is fortunate she might survive, if she can reach a hospital where Caesarean section will deliver the dead fetus and her uterus is either repaired or removed. Within a few days she starts leaking urine vaginally,

a large VVF having developed. A significant number will also have developed a rectovaginal fistula, and be incontinent of faeces as well as urine. She is returned to her parents and often blamed for the death of her child. Her father regards her as completely ruined and will neither accept her back nor return the money paid by the husband. Her urinary and faecal incontinence make her a social outcast and she is obliged to build a little hut outside the village and eke out a living as best she can.

The magnificent work done at the fistula hospital in Addis Ababa in the surgical cure and rehabilitation of thousands of such girls, with minimal equipment and resources, is a glowing tribute to the spirit of selfless service that occasionally manifests itself in our profession.

The successful repair of obstetric VVF is technically difficult and requires lengthy training and experience. In fistulae proximal to the bladder neck, where the continence mechanisms have been spared, the competent surgeon should maintain a primary closure rate of >90%. This can be accomplished by the vaginal, abdominal or combined route. The interposition of healthy, well vascularized tissue, e.g. a Martius graft [5] or interposition of omentum, is strongly recommended and contributes greatly towards ensuring primary success [6].

Loss of the trigone, bladder neck and proximal urethra presents a formidable problem, as closure of the fistula with no successful reconstruction of the continence mechanisms is a futile exercise. The patient leaking all her urine urethrally is no better off than when it leaked vaginally. Numerous procedures have been described for managing this situation but none is associated with a consistently high success rate. In this situation and if there is complete loss of the bladder neck and proximal urethra, then an acceptable solution is to close the bladder outlet and construct a continent catheterizable stoma, using the native bladder as a reservoir [7,8]. If excellent anal continence has been preserved (which is often not the case) one of the modern uretero-sigmoidostomies, e.g. the Mainz II pouch [9], could be considered. Conduit urinary diversion is not a good choice, as those areas that offer a poor obstetric service are very unlikely to have any kind of stoma-therapy service. Furthermore, most of these patients are still teenagers and a near-normal body image is important.

The lack of follow-up for those patients having undergone continent catheterizable vesicostomy or continent catheterizable pouch surgery would inevitably lead to disaster. It is the responsibility of the surgeon to ensure follow-up and open the lines of communication between the local healthcare facility to which the patient returns and the centre in which the reconstructive surgery was carried out.

Some of these patients, in addition to a VVF, also have a rectovaginal fistula and almost complete loss of the vagina. By using colovaginoplasty and a colonic pull-through procedure in addition to closing the VVF and constructing a continent catheterizable vesicostomy, we have obtained excellent results, including a few pregnancies [10]. In view of this we strongly advise preserving the uterus in the emergency management of the ruptured uterus. The current bowel segment of choice for vaginal reconstruction is the caecum. Obviously those patients who become pregnant are delivered by Caesarean section, at which we prefer to be present because of the much altered pelvic anatomy. In any event, a classical Caesarean section is advised, as this avoids the area of reconstruction.

If it was possible to measure the value of the service rendered in terms of the restoration of quality of life over time, this must surely be one of the most gratifying fields in which a urologist could work. Thanks to the development of community obstetric services over the past 15 years, these cases are now infrequent in South Africa; unfortunately, this is not yet the case in many other African countries.

### Genitourinary schistosomiasis

Many aspects of this disease are still poorly understood and insufficiently investigated. The problem is compounded by regional differences so profound that the disease described in Egypt seems to be completely different from that encountered in Southern Africa. Contracted bladder, bladder neck stenosis, urethral stricture and urethro-perineal fistulae, all caused by schistosomiasis, are reportedly not uncommon in Egypt [11]. In Southern Africa there is also such pathology, but invariably a result of a coexisting condition and not the schistosomiasis which the patient has incidentally.

Active schistosomiasis is rare in people aged >30 years and who have grown up in endemic areas, but it occurs commonly in older people who grew up in other areas and were first exposed at a later age. There is a striking model to illustrate this, as a popular canoe marathon is held in a heavily infested river in Natal. Competitors arrive from all over Southern Africa and return to their non-endemic home area with active disease, regardless of their age. This is strong evidence in support of immunity in older patients in endemic areas. Squamous carcinoma of the bladder occurs with a much greater incidence in endemic areas of schistosomiasis. Large differences in the incidence of squamous carcinoma of the bladder in equally heavily infested communities raise the possibility of important cofactors. Schistosomiasis-related squamous carcinoma tends to occur  $\pm 10$  years earlier in life than TCC. Because it

is impossible urologically to fully investigate all cases of haematuria in an endemic area (particularly in young people) we formulated a policy of investigating those aged >30 years, based on the finding that active schistosomiasis is very rare in this age group in people who have grown up in an endemic area.

Ureteric schistosomiasis has posed a particularly fascinating problem; active disease commonly causes ureteric obstruction in younger people and this generally resolves spontaneously or very rapidly on anti-schistosomal medication. Mechanical obstruction caused by inactive disease is also an interesting problem; many patients have hydronephrosis. They were always considered to be mechanically obstructed and underwent either periodic ureteric dilatation or re-implantation of the ureter. In 1968, Powell *et al.* [12] showed that the vast majority of these ureters drained perfectly well on the post-micturition erect excretory urogram (Fig. 1). This work was repeated by myself [13] using isotope renography and Whitaker's tests; there were only five obstructed ureters in three patients amongst a cohort of 58 with dilated ureters caused by inactive schistosomiasis. A programme was instituted to persuade colleagues to thoroughly investigate bilharzial ureters before operating on them; happily, the incidence of surgical repair of bilharzial ureters has now decreased greatly in Southern Africa.

So ingrained is the perception that ureteric dilatation is synonymous with obstruction that the authors of the chapter on schistosomiasis in a standard textbook [14] were moved to make the quaint observation that: 'Some patients with remarkably obstructed urinary tracts and severe bilateral hydronephrosis properly maintain creatinine clearance'. They would be hard pressed to explain this scientifically, other than the very obvious conclusion that these ureters are not obstructed.

The mystery of this condition continues in the longer term; when excretory urography was used in older men with outlet obstruction, none had evidence of ureteric schistosomiasis. The glib explanation was that affected men had already died from renal failure, but the renal unit and the Department of Anatomical Pathology, who maintained a high postmortem examination rate, had no knowledge of such cases. Calcified ova can be shed and calcification absorbed; can destroyed smooth muscle regenerate and fibrotic stenosis recover? A long-term follow-up study needs to be undertaken; it would have to be an intrepid researcher indeed who assumes this task. In the areas where schistosomiasis is endemic, records are often incomplete or destroyed after a few years; radiographs are frequently lost or sold to recover the silver on the X-ray plates.

There can be no doubt that the urological manifestations of schistosomiasis as seen in Southern Africa differ

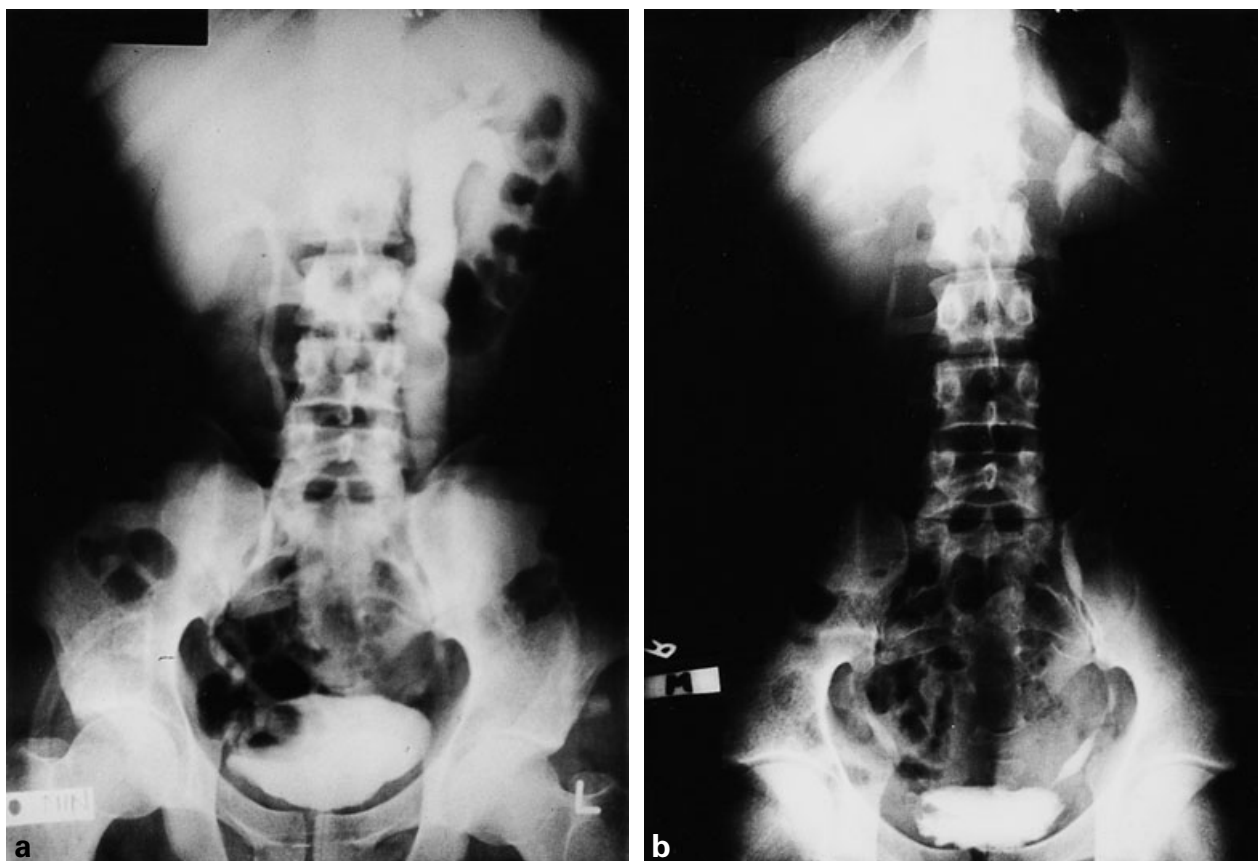


Fig. 1. **a**, Dilatation and apparent obstruction of the left upper tract as seen on the supine excretory urogram. **b**, The post-micturition erect radiograph shows excellent drainage of the left upper tract. The filling defect on the right side of the bladder shows that the radiographs are from the same patient.

significantly from those described in much of the literature (dominated by the Egyptian experience). One proposal is that there are different patterns of infestation, differing intensity of infestation and the possibility of hybridization (in the southern regions) of *Schistosoma haematobium* with a less virulent strain, e.g. *S. matheii*.

### Complications of tribal circumcision

Ritual circumcision is widely practised amongst the indigenous people of Africa. In South Africa it is universal amongst the Xhosa [15] but not used at all by the Zulu, as King Chaka stopped it and substituted military training as a rite of passage.

Amongst the Xhosa, ritual circumcision, and the traditional instruction in tribal lore and the responsibilities of manhood, is taken very seriously. An uncircumcised male is not regarded as a man by his fellows or by the women of the tribe [15]. Circumcision is not regarded as a medical procedure and medical advice or attention is neither sought nor welcomed. The initiate who interrupts his period of secluded instruction to go to

hospital is not regarded as having successfully completed his ordeal. There have been instances of adult male relatives forcibly removing very sick young men from hospital so that they can honourably complete the process. Although certain enlightened tribal surgeons use sterile surgical blades and antiseptic dressings, others still use a sharpened spear, the blade of which is preserved in pork fat. The unsterilized unwashed blade is used on a dozen or more initiates in a single session. The possibility of transmission of HIV and hepatitis B is very real. A dressing of leaves (often of maize) is applied and compression applied with a leather thong. Failure to release this compression dressing not infrequently leads to loss of the glans. In the event of significant haemorrhage, a tourniquet is applied to the base of the penis and failure to release this leads to ischaemic necrosis of the penis.

In the belief that it reduces weeping of the wound, initiates are significantly dehydrated during their 2-week period of seclusion after circumcision. The combination of dehydration and septicaemia produces an annual influx of young men in acute renal failure, with most

being saved by rehydration and antibiotic therapy alone, although the odd patient might need acute dialysis.

It is estimated that 40–50 young men die every year as a result of a complication of ritual circumcision in South Africa. In the finest surgical tradition, the tribal surgeon takes no responsibility for this, blaming it rather on the poor boy having been too weak and unworthy of becoming a man. The family accepts this and prefers not to noise this disgrace abroad. I know of no case that has been taken to litigation.

Most patients needing hospital admission have gross local sepsis with or without gangrene of penile skin and/or the glans [16]. The occasional patient loses the entire penis from ischaemic necrosis. In the past year I have seen three patients with septic arthritis associated with septicaemia caused by septic circumcision wounds. The tribal surgeons exonerate themselves from any responsibility, putting the blame entirely on the Western education system that provides a long school holiday only in summer, a season (according to them) notorious for wound sepsis. There might be some truth in this, particularly if the surgeon anoints his knife with rancid pig fat. Reportedly, in pre-colonial days these complications were never seen. No great knowledge of the reliability of oral tradition or selective memory, with which all surgeons are blessed, is needed to explain this 'history'.

Most patients' penile lesions are treated by debridement and dressings, with some requiring a skin graft. Those who lose the entire penis have a serious problem. Although the expertise for phallic reconstruction is available, operating time is at a premium and the health service is overloaded by patients with cancers and serious obstructive uropathy. The inevitable result is that these patients remain at the end of the waiting list.

### Genitourinary tuberculosis

Tuberculosis is rife in Africa, often diagnosed late and inadequately treated because of poor patient compliance. This is compounded by poverty, long distances to clinics and the policy of 'observed ingestion' of medication, all of which place an unbearable strain on the patient who often does not appreciate the importance of full compliance with the therapeutic regimen, might not have much faith in it and whose philosophy freely incorporates 'magic'.

The patient might have irritative bladder symptoms, loin pain, pulmonary or systemic symptoms or the tuberculosis might be remarkably silent while causing significant renal damage. Examination of urine might reveal the classical sterile, acid pyuria or microscopic haematuria only [17]. Bacteriological diagnosis can be

notoriously difficult and there are cases where only the seventh or eighth urine specimen yielded a positive diagnostic result. Epididymal, prostatic and bladder biopsy of clinically abnormal tissue can yield a tissue diagnosis, but is probably best undertaken under cover of anti-tuberculous therapy to prevent the possibility of tuberculous meningitis. However, the pulmonary physicians take pleural biopsies with impunity. Because of the protracted nature of therapy a firm diagnosis is preferable before embarking on treatment, although this is not always possible. Once there is a firm diagnosis the multidrug regimen currently in vogue with the local department of health is introduced.

The rapidity with which obstructive stenosis can occur in the upper tract during treatment is remarkable. Our current recommendation is that renal ultrasonography is undertaken every 2 weeks, followed immediately by excretory urography if any new dilatation of the upper tract is detected. Strictures of the lower third of the ureter are treated with uretero-neocystostomy. In the middle third and upper ureter, a Davis intubated ureterostomy can be used, but for the past few years we have used a buccal mucosal patch graft ureteroplasty, with gratifying results [18]. As noted by others there is no apparent solution for cases of obliteration of the renal pelvis or calyceal infundibuli, and in extreme cases an ileal interposition is placed between dilated calyces and the bladder. The severely contracted tuberculous bladder is treated by augmentation cystoplasty, with good results.

### Carcinoma of the penis

Carcinoma of the penis is more common in Africa, South America and some other developing areas than in the West. In Africa the mean age at presentation is 10–20 years less than in Europe and the USA. Patients often present with very advanced disease and this is a cause for great concern, as it is often not a result of the patient's neglect but rather the physician's negligence.

Primary-care physicians see very many patients with ulcerative penile lesions caused by venereal disease, as well as patients with urethral discharge. These are given standard therapy and not asked to return to the clinic. In the patient with a malignant lesion, the treatment will fail and he will consult another doctor who will give the same treatment. This will continue until he has a huge, foul-smelling lesion that none can mistake. He will lose his entire penis, his inguinal lymph nodes and often his life. The lesson preached with missionary zeal for a lifetime is that patients with penile ulcers should return to the clinic in 2 weeks to confirm that the lesion has healed; if not, a biopsy is mandatory. The patient with a discharge from under an unretractable foreskin

needs a circumcision. These lessons are ignored and thus most patients with penile carcinoma have very advanced disease.

Sadly, the only remedy for this situation lies in high-profile litigation with huge compensation being awarded, to forcibly attract the attention of the primary healthcare physicians to this problem. Treatment for the condition is not discussed here as it is well described in the current literature.

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## Author

J.H. Naudé, MD, Institute of Urology and Nephrology, 48 Riding House Street, London, W1P 7 PN, UK.  
e-mail: jhnaude@onetel.net.uk

Abbreviation: VVF, vesicovaginal fistulae