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Advanced Training in Pediatric Urology: A Global View

FROM THE GUEST EDITOR

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Globally, pediatric urology falls between the cracks. Whereas in industrialized countries pediatric urology fellowships exist, in the developing world, they do not. Urologists trained in adult hospitals have relatively little interest in pediatric issues. Pediatric surgeons receive little training in urological endoscopy, and in general have less experience with the lifelong issues of children growing to adulthood with urological problems such as stones, urinary continence, neuro-urological problems and sexuality. Common conditions like hypospadias receive the bulk of attention in most regions of the world first, because, penile deformities are immediately visible. And second, they directly impact the family's hopes for future generations. And lastly, they have a dismal success rate for surgery where fine technical skills and specialized resources are lacking. For these reasons, and others, hypospadias is often the entry point for collaborative training by visiting urologists in countries where formal training does not exist. Introductions are often made by plastic surgeons because international humanitarian programs have historically encountered these patients in their clinics and have established working relationships with the local hospitals and medical teams. These introductions have opened doors for collaborations among other types and specialties of surgeons.

More recently with the advent of the internet and search engines, hosts are making contact directly, and individuals and professional urological associations are beginning to reach out

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FROM THE EDITOR

Anthony A. Caldamone, M.D.

Maybe it is the complexity of the subspecialty or as Catherine deVries says, the fact that pediatric urology is often the poor orphan of adult urology, pediatric surgery and even plastic surgery, but I have been impressed by the numbers of our colleagues who are regularly involved in medical mission work. Equally impressive is the number of parts of the globe that have been touched by pediatric urologists and pediatric surgeons from the western world. While there are many models that can achieve successful outcomes, those that have a goal of sustainable efforts will likely have the best long-term results. This involves establishing long-term objectives for a given mission that are achievable, given the resources and cultural characteristics of a given locale. I am reminded of a quote from Paracelsus:

"Give heed to the region in which a patient lives ... for one country is different from another; its earth is different, as are its stones, wines, bread, meat, and everything that grows and thrives in a specific region ..."

Being able to assess these differences and having the flexibility to accommodate them are the keys to success.

Catherine deVries and Carmine DelRossi present different models of successful and sustainable medical mission work in this issue. They demonstrate how much can be done if one chooses to set mission work as a regular focus of one's career.

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beyond their primary constituencies to engage with surgeons in developing countries.

As these relationships are being sorted out, we often see an evolution in group dynamics and a shift in surgical responsibilities at the host hospitals. While more senior surgeons may make the initial connections, it is often the younger surgeons who adopt the new technology and techniques while the senior surgeons allow them protected time to advance their skills. In many developing countries, the most durable and sustainable training appears to be in the context of pediatric hospitals, or in hospitals with at least several pediatric surgeons, specialists in pediatric anesthesia, and a referral community of pediatricians or general medical doctors.

So, how can we who live in well-resourced countries share our knowledge and resources with our colleagues in the developing world? Among the many models are overseas visiting professors, States-side international fellowships and sister-schools. I have offered some of my own thoughts gained from a 17 year experience with a team teaching model for advanced pediatric urology. I have also asked two surgeons who have been the recipients of on-site training to weigh in with their experience and insights. Le Tan Son and Enrique Tome have received visiting teams sponsored by Interplast, International Volunteers in Urology/IVUmed and Physicians for Peace. Lastly, Carmine Del Rossi has set up a long-term multispecialty collaboration with a hospital in Bangladesh.

The IVUmed Pediatric Urology Program

Catherine R. deVries, MD, FACS, FAAP, Primary Children's Hospital, University of Utah, Salt Lake City, Utah, President, IVUmed

The first of IVUmed's global education programs, Pediatric Urology, began as a collaboration with Interplast and Physicians for Peace in 1992. At the time, Interplast had developed almost 25 years of experience in cleft lip and palate surgery in Honduras and elsewhere and volunteer surgeons had encountered many patients with hypospadias. Interplast's founder, Don Laub M.D, invited Charlie Horton, M.D. and Chuck Horton, M.D of Physicians for Peace and me to initiate the first workshop for pediatric genital reconstruction. To everyone's surprise, the work was fraught with complications stemming from difficulties of doing complex surgery in a new environment without educated nurses, adequate pain management, and other services taken for granted in the USA. The next year, having analyzed the problems and having devised a strategy for more effective care, Don Laub and I returned along with Pat Cartwright and an anesthesia team from the Hospital for Sick Children in Toronto. The solutions involved developing more effective intra- and post-operative pain management, better catheter drainage, dressing management and nursing education. With substantial creativity, the anesthesiologists re-formulated the anesthesia and pain management to be more effective in tropical climates and to be consistent with skills of local surgeons and anesthesiologists. Initially, we had begun working with local plastic surgeons and general urologists, but over 17 year history of the program have evolved a more sustainable relationship with pediatric surgeons. The local and the visiting surgeons have changed over the years, but the friendships have remained both during and beyond the visits over the many years of collaboration. A critical element both at the beginning and up to the present time, has been the Ruth Paz Foundation, which is central to coordination of patient transport, follow-up, and workshop logistics.

Then as now, the team model depended on volunteer specialists from the States and other countries who chose to share their expertise and time with colleagues in under-resourced settings. These surgeons, anesthesiologists, pediatricians, radiologists and in some cases, orthopedists, worked side by side with nurses and host colleagues to train a system of care, rather than just a particular operation or technique. The types of cases have evolved to include the full range of

Pediatric Urology. But the most challenging issues have been with endourology and the treatment of posterior urethral valves due to the difficulty in acquiring cystoscopes and the fact that children's hospitals rarely have such basic necessities on hand as irrigation tubing and sterile water or saline in bags. Other challenges include a lack of radiology services. Interventional radiology is practically nonexistent in most countries. Fluoroscopy is not available for voiding cystourethrograms, and nuclear medicine is in its infancy. CT scanners may be available in the community but are too expensive for most pediatric patients. MRI is rarely available. Even ultrasound, the basis for much of urological diagnosis, is rarely given the generous imaging we see in the States. Patients often arrive with two cloudy photos, one of each kidney, and none of the ureters or bladder.

Supplies, such as diapers or CIC catheters are inconsistently available to patients. In some countries, like Nepal and Peru, patients must purchase all supplies for their operation, such as gloves, suture, medication and IV supplies before they can come for their surgery. One essential component of IVUmed's program is that we bring all necessary supplies in order to not burden the host doctors, the hospital, or the patients with that aspect of the care, and we also attempt to bring surgical loupes and instruments to leave with the surgeons so that they can continue with the operations after they have learned them.

IVUmed was founded as an independent nonprofit organization in 1995 and has collaborated in the development of sustained Pediatric Urology training at children's hospitals in the following countries in Asia, Latin America and Africa (Table 1).

(continued on next page)

Table 1

Honduras (San Pedro Sula)	Ghana (Kumasi, Accra)
Vietnam (HCMC, Long Xuyen, Danang)	Mozambique (Maputo)
Cuba (Havana)	Nepal (Dharan)
Mongolia (Ulaan Baatar)	Palestine (West Bank)
India (Vellore, Jaipur, Ahmadabad)	Senegal (Dakar)
Peru (Lima)	

In most cases, IVUmed commits to a minimum of 3 - 5 years of team collaboration, but at some sites, we have sponsored visiting professors for limited workshop goals. Sometimes, a collaboration is put on hold or cancelled due to politics or even a colleagues' moving to a new location. We have found that the most sustainable programs—those that “take root and thrive” are those where there are a minimum of two to three local colleagues and strong buy-in from the hospital

administration. The programs which are themselves training hospitals for residents and students remain motivated to bring new learning to their trainees. A new approach that we are just now instituting, addresses the dearth of pediatric surgical care in subSaharan Africa. We are beginning regional collaborations to support training of surgeons from many countries in a few training centers in Francophone and Anglophone West Africa.

Pediatric Urology in Honduras Today

Enrique Tome, M.D., Hospital Escuela Universidad Nacional Autonoma De Honduras Unah, Honduras
Catherine R. deVries, MD, FACS, FAAP, Primary Children's Hospital, University of Utah, Salt Lake City, Utah, President, IVUmed

Guest Editor's Note: *Over 17 years of international collaborations for Pediatric Urology in Honduras, many North American urologists have volunteered their time and expertise. Recently, pediatric surgeons have been moving toward a specialty in pediatric urology.*

C. deVries: What is the usual path to a specialty in pediatric urology in Honduras?

E. Tome: In Honduras, the recognition of the specialty in pediatric urology can be achieved with two options: 1) by being a pediatric surgeon and completing two additional years of pediatric urology training, or 2) by being a urologist with one additional training year in pediatric urology. At the moment, the pediatric urology patients are being tended by pediatric surgeons or by urologists since we don't have any registered pediatric urologists in the country. Most children are cared for by pediatric surgeons.

C. deVries: How many pediatric surgeons/urologists practice pediatric urology in Honduras?

E. Tome: In Honduras there are 12 pediatric surgeons distributed in 2 cities—8 in the capitol city, Tegucigalpa, and 4 in San Pedro Sula for a country population of 7 million approximately. Three surgeons are over 65 years and retired from public service. Five of the eight pediatric surgeons operate on pediatric urology cases actively. Four of these are in Tegucigalpa.

C. deVries: What has been the value of training with foreign visitors. Have you also received urological training in another country?

E. Tome: Alex Gomez did one year of formal training in pediatric urology department of Hospital Federico Gomez in Mexico. I did a three month rotation in pediatric urology in Chile at Clinica Santa Maria with Dr. Mario Varela, a pediatric urologist in Santiago. The other three, learned in their 3 year training program in pediatric surgery and workshops with IVUmed and the US military.

Since we do not have formal training programs accessible in-country, the most important part of urological training is done with formal programs that have established a continuous visit program that allows us to keep up with the advancements and actual recommendations in the approach to a pediatric urology patient. In Honduras, IVUmed and brigades through the US military have been the mainstay for this kind of training.

C. deVries: What was the skill level with pediatric urology prior to collaborations with foreign colleagues, and how has it changed for the following types of cases: hypospadias, epispadias, exstrophy, posterior urethral valves, neurogenic bladder, ureteral anomalies, stones, renal anomalies?

E. Tome: Its difficult to assess the skill level that one achieves. In my personal experience in hypospadias I would say that my grades on a 10 scale have arisen from a level 5 to a level 8.5. I have done one case of epispadias, two cases of exstrophy. For PUV, the level has risen from a 4 to 8. Regarding kidney and ureteral stones, I feel I am at a level 5 to an 6, mostly because we still do not have the technology that is best recommended in modern times and we do not have access to metabolic studies for special cases.

C. deVries: Do you have statistics for these types of cases, such as number of operations, complications such as fistulas, etc.

E. Tome: Cathy, this is really difficult because the hospital does not provide this sort of information and we have all not been gathering them ourselves (which is the only way).

C. deVries: Do you have interventional radiology available at your hospital?

E. Tome: There is no interventional radiology in any of the hospitals, public or private.

C. deVries: Which of the following radiological modalities are available: ultrasound, nuclear renal scan, voiding cystogram (fluoro or nuclear), CT scan, MRI?

E. Tome: Locally we have US, classic x-ray voiding urethrocytogram, excretory pyelography, and CT scan. MRI and nuclear renal scans are available in private practice at a high cost for the patient (MAG3 is around \$450 US dollars). Minimum wage here is \$175 US dollars/month.

C. deVries: What is the most pressing need for education, equipment or ancillary service at your hospital and in Honduras in general?

E. Tome: In education, the most important need is the availability of scholarships to train pediatric surgeons for the development of more personnel that can eventually complete a pediatric urology training. For the actual residing surgeons, the needs are mainly to continue training with formal work groups like IVUmed that collaborate with us and bring their expertise and some of the available technology to continue upgrading our knowledge and practice. The reflection is in better care for the pediatric urology patients. In equipment, we still don't have a resectoscope for resection of posterior urethral valves, a system for endoureteral lithotripsy, an interventional radiology team. Of course, we still struggle to get basic needs like sutures, catheters and instruments for the best treatment of our patients.

C. deVries: Enrique, thanks so much for sharing your insight, and for working on behalf of children with urological problems in Honduras.

Pediatric Urology in South Vietnam

Le Tan Son, M.D., PhD, Children's Hospital #1,
Ho Chi Minh City, Vietnam

The first pediatric hospital in Vietnam, Children's Hospital #1, was established in 1957 in Saigon, now known as Ho Chi Minh City. It provided treatment to the children over all of South Vietnam. Since its inception it has been the teaching hospital of the Medical Education Center, now known as the University of Medicine and Pharmacy. Prior to 1994, the Department of Surgery referred all patients with urological diseases to the adult urology hospital. Common problems, such as hypospadias and ureteropelvic junction obstruction were transferred to Binh Dan hospital to the adult urological service. The only pediatric urology dissection implemented at Hospital for Children #1 was for undescended testis. In 1994, a team of pediatric urological specialists sponsored by Interplast, Inc. came for a surgical workshop with the intention of "technical transfer" of urological skills. With this visit, the specialty for Pediatric Urology was born in South Vietnam. In 2007, the hospital underwent a major renovation, and since then the annual number of urological cases continues to increase

The first two years of this program were devoted to the operations *not needing diagnostic imaging* such as hypospadias and epispadias. In the third year, problems and deformities *requiring imaging diagnosis* such as PUV, VUR, UPJO, megaureter were taken on. In 1996, 84

operations were performed during the surgical workshop despite a motor vehicle accident during the trip which severely injured many of the team members. In 1997, the team from Interplast/IVU demonstrated and instructed treatment of complex cases requiring integrated surgical service for bladder exstrophy with a team consisting of pediatric urologists and a pediatric orthopedist. Later trips emphasized complex surgery such as cloaca. By 2005, Dr. Catherine. de Vries, president of IVUmed, was confident that the Children Hospital #1 itself was capable of handling all the complex cases.

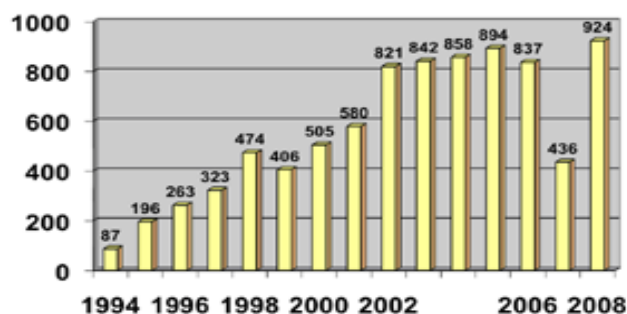
Since 1997, at Children Hospital #1, we have utilized all techniques for treatment of the

hypospadias such as Thiersch-Duplay, Snodgrass, onlay flaps, onlay tubes, grafts, and repair of severe chordee. In addition to these, the Vietnamese pediatric urology team at Children Hospital #1, has independently operated on 10 cases of bladder exstrophy and 11 cloacal malformations and the full range of open urological cases. We have recently received new endoscopes, and the department of pediatric surgery is also performing laparoscopy. In 2007, the hospital underwent a major renovation, and since then the annual number of urological cases continues to increase.



Figure 1. Drs. Pat Cartwright, LeTan Son, and Le Cong Thang examining a patient, 1997.

Figure 2. Number of urological cases at Children's Hospital #1.



In addition to the help of pediatric urology, the practice of pediatric anesthesiology was enhanced by the anesthesiologists of Interplast, who also provided technical instruction on the procedure of epidural anesthesia. This was the first time that this technique has been applied in Vietnam for children. With the model of "hands-on training" as IVUmed, Interplast, and Friendship Bridge for help, we are now able to successfully apply all surgical operations from simple to complex cases. Presently, the Children's Hospital #1 is proud to be the only institution in Vietnam that can provide treatment for the most complex cases, including bladder exstrophy and cloacal malformations. Besides the technical training, IVUmed has also donated cystoscopes, instruments and textbooks, and sponsored a visit to the United States for two of our surgeons to see the Primary Children's Hospital in Salt Lake City, and Boston Children's Hospital and to attend the Society of Pediatric Urology meeting in Los Angeles. After working side by side with us in Vietnam, the members belonging to Interplast and IVUmed have also followed up in providing instructions on how to handle difficult cases through email; this practice has still been continued even since IVUmed formally "graduated" the Children's Hospital #1 program. We have often joked among ourselves that this is the "Continuous Medical Education".

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Figure 3. New Hospital Building, Children's Hospital #1



With reference to academic training, from 1999, Pediatric Urology has occupied one fourth of the official program of Division of Pediatric Surgery (University of Medicine and Pharmacy of Ho Chi Minh City), to train Pediatric Surgeons who came from the provinces and residents of Pediatric Surgery. Since the inception of the pediatric urology program, we have trained 3 junior pediatric urologists working in Ho Chi Minh City, 56 pediatric surgeons and 19 residents in Pediatric Surgery. The Division of Pediatric Surgery is also charged with training the adult urologists and adult urologic residents of Department of Urology of University of Medicine and Pharmacy of Ho Chi Minh City.

We have realized that besides Vietnam, IVUmed has provided assistance to many countries in South America and Africa. We believe that these programs will successfully achieve their objectives as we have done. This program is very effective and also inexpensive. Through this article, we would like to express our deepest appreciation to the Drs. C. deVries, L. Baskin, P. Cartwright, M. Cendron, D. Coplen, B. Kogan, R. Hurwitz, M. Packer, R. Sutherland, E. Reda, S. Perovic, M. Djordjevic and the other members of Interplast, IVUmed, Friendship Bridge who came to Vietnam, from a country far from ours half a globe away, to help us and the Vietnamese children enthusiastically.

A Sustainable Model for Pediatric Urology in Bangladesh

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Bangladesh is one of the poorest countries in the world with a population of 150 million people, living in a territory that is less than one-half the size of Italy. The population is relatively young with the 0-25 age group comprising 60%, while 3% are 65 or older. The maternal death ratio is still high with over 300 deaths per 100,000 live births. Most Bangladeshis live in rural settings, relying on subsistence farming with nearly half of the population surviving on the equivalent of less than 1 U.S. dollar per day.

Medical resources are scarce, with one physician available for every 5,000 people (compared with Italy 1:180). The Dhaka Shishu Hospital is the only paediatric hospital in the country, however, in 1993 the Association of Pediatric Surgeons of Bangladesh was established. At the moment, 15 hospitals provide pediatric surgical services.

The missionary Hospital Santa Maria Sick Assistance in Khulna (Figure 1-2) was built with the financial help of the Italian Red Cross and provides treatment of congenital anomalies. For 8 months a year

(September to April), different teams of plastic surgeons, maxillo-facial surgeons, orthopaedic surgeons, paediatric surgeons, and adult general surgeons alternate to repair congenital anomalies in the different fields of competence.

During the summer, from May to September, the temperature exceeds 40°. The high humidity and daily rain makes the situation unsuitable for delicate surgery, since working in a non air-conditioned environment increases the potential risk of wound infection.

Figure 3



Figure 1



Figure 2



Sponsored by a non-governmental organization (Operare per), and with help of the University Hospital of Parma, from 1991 to 2008 an Italian paediatric surgical team performed 17 missions of five weeks each. Our typical team consists of 2 or 3 surgeons, 2 anesthesiologists, one pediatrician, 2 scrub nurses, and 2 ward nurses (Figure 3).

The Italian nurses work in a strict collaboration with the local nurses. The chief surgeon, the chief anesthesiologist and head nurse have been the same for all missions. During the 17 missions, 19 pediatric surgeons have participated, in addition to 12 residents in pediatric surgery, 17 anesthesiologists, 13 scrub nurses and 14 ward nurses. A pediatric surgery resident stays in the hospital one or two weeks longer than the remainder of the team to provide the discharge and the follow-up care of the patients still hospitalized.

(continued on next page)

The continuity of the missions allows us to obtain follow-up data on the major malformations. A total of 1556 patients underwent surgery, mostly for severe congenital anomalies (Table 1).

Table 1 Types of surgical procedures in the 17 missions

Anorectal malformations	134
Vaginal atresia	41
Abdominal surgery	148
Hirschsprung's disease	37
Hypospadias	288
Epispadias	48
Urological disorders	243
Posterior urethral trauma	47
Inguinal canal disorders	260
Tumors	47
Thoracotomy	8
Labioplastosis	60
Myelomeningocele	4
Miscellaneous	191

During each mission about 120 operations were carried out with a per unit cost of approximately \$200. The infection rate is very low at 2-3%. The mortality rate is 0.4% (6 of 1556 patients). Four of them died in the postoperative period after laparotomy for terminal cancer or for terminal intestinal tuberculosis. One child, 8 years old, died on the fifth postoperative day after splenectomy for thalassemia Major; one child died from a cardiac anomaly after repairing an inguinal hernia.

Conferences in the medical University of Khulna were organized and few local doctors interested in paediatric surgery were involved.

UROLOGICAL PROCEDURES

703 of 1556 patients were operated on for urological anomalies

Table 2 Urological Procedures

Major urology surgery	243
Hypospadias	288
Bladder exstrophy	36
Epispadias	48
Posterior urethral trauma	47
Vaginal atresia	41

There are few patients without a visible urinary anomalies who are brought to our attention with a diagnosis. Ultrasounds and cystographies are expensive exams and few Bangladeshis can afford the cost. If a urinary anomaly is suspected, radiological exams are ordered and the patient is accompanied by one of our team to an outside private laboratories.

243 patients were operated on for VUR, megaureter, posterior urethral valves, and UPJ obstruction. Diagnostic and operative cystoscopy were done.

47 patients presented with posterior urethral trauma (age range from 5 to 25 years). The causes of the trauma included pedestrian road traffic accidents, rickshaw crushing pelvic trauma or falling from a tree. The procedures ranged from emergency procedure such as temporary suprapubic cystostomy, vesicostomy and primary realignment to delayed treatment such as urethral reconstruction.

From 1995 and 2008, 36 patients were treated for bladder exstrophy (27 males and 9 females). Age at surgery ranged from 2-17 years with only one under 2 years. The first step for male and female patients was bladder closure. One of 36 patients failed bladder closure twice and underwent ureterosigmoidostomy.

To achieve continence, more recently, we have increased our usage of bulking agents, a non-invasive and repeatable procedure that allowed us to obtain good results. Eight of 9 of the female group had endoscopic treatment (Table 3), while 1 underwent an ureterosigmoidostomy. Results in the endoscopically treated group were categorized as good in 5/8, while 3/8 had partial improvement. Three of 5 patients use intermittent catheterization 4-6 times daily with significant dry intervals and 2/5 are completely continent and voiding spontaneously without CIC.

Table 3: Female Exstrophy Continence

8 patients with urinary continence

- ♦ 1 pt: MPQ® bladder neck injection + ureteral reimplantation and uretero-uretero anastomosis
- ♦ 1 pt: Young-Dees-Leadbetter procedure + bilateral ureteral reimplantation
- ♦ 1pt: MPQ® bladder neck injection + ureteral reimplantation and uretero-uretero anastomosis + ureterocystoplasty
- ♦ 3 pts: MPQ® bladder neck injection (1 pt twice)
- ♦ 1 pt: Deflux® bladder neck injection + introitoplasty
- ♦ 1 pt: MPQ® bladder neck injection (twice) + endoscopic treatment with MPQ® for bilateral VUR

MPQ® - Macroplastique

(continued on next page)

As for the male exstrophy complex patients, a staged surgical approach was performed. The first year the bladder was closed, the second year the epispadias repair, and in the following years continence treatment was started. In contrast to the good results obtained in females patients, only in 4 of 27 of the male group achieved complete urinary continence (Table 4). We have been very challenged by the epispadias repair. The most common complication was fistula at the bladder neck that compromised treatment of the continence.

Table 4: Male Exstrophy Continence

4 patients with urinary continence

- ♦ 2 pt after twice MPQ ® bladder neck injection
- ♦ 1 pt after MPQ ® bladder neck injection + Deflux ® bladder neck injection
- ♦ 1pt without any continence procedure

The treatment of congenital urogenital malformations such as hypospadias, untreated until adult age, is particularly difficult. Hypospadias in adults can be socially and psychologically crippling and sometimes causes delayed gender assignment. Therefore, our priority for treatment is for older patients with posterior hypospadias, severe pe-

nile curvature, the hypospadias cripple and for children with severe anomalies. Young patients with milder degrees of hypospadias without curvature are delayed or not treated. 288 hypospadias repairs have been performed. Staged Bracka technique with prepuccial or buccal mucosa free grafts was preferred, while the Snodgrass repair was performed in cases without a severe curvature.

Forty-one females were treated for congenital absence of the vagina (Mayer-Rokitansky Syndrome) with a vaginal colon replacement. All patients presented late in life at an average of 18.4 years. In Bangladesh, societal concerns about the absence of menstruation seems to start during marriage arrangement, or it can become dramatically evident after marriage. In these circumstances the woman may expect a miserable future. She is often abandoned by the original family. Luckily in great contrast with this behaviour, 9 out of 41 married after treatment, began a satisfactory sexual life after vaginal replacement and 5 of them even adopted children.

Besides the humanitarian significance of these surgical missions, it is also very compelling for a western surgeon to observe the natural evolution of untreated congenital malformations. Our experience shows flexibility in successfully treating patients with complex congenital anomalies in Bangladesh, and in guaranteeing adequate and cyclic follow-up as well as a trained surgical team during the operation. The philosophy of our missions can be summarized by the famous words of Mother Teresa of Calcutta, "The whole work is only a drop in the ocean. But if we don't put the drop in, the ocean would be one drop less".



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