Mauritius

Paediatric Urology/Surgery and Paediatric Anaesthesia
Training and Service Mission

26th September - 4th October 2002

Professor Paddy Dewan and Dr Richard Horton

A project of the Mauritius Department of Health and Quality of Life,
the Society for Children Inoperable in Mauritius,
and the Kind Cuts for Kids Foundation

Overview

SACIM is an organisation founded to allow for children with conditions for whom there have not been the resources available in Mauritius for their surgical treatment in-country. Therefore, over the last few years a small number of children have been treated by Professor Dewan, in Australia. From previous experience working with the Kind cuts for Kids Foundation by both Professor Dewan and Dr Richard Horton, it was felt that a larger number of children could be treated, while skills would be more effectively transferred to the local doctors by a Paediatric Surgical visit to Mauritius.

With the efforts of both the Australian and the Mauritius components of SACIM, the Minister of Health and Quality of Life was able to appreciate that a Paediatric Surgery and Urology visit, focussed on the treatment of Anorectal Anomalies was appropriate. Also, it was expected that the more complex cases would be able to be undertaken if the team included an Anaesthetist with sub-specialty Paediatric Anaesthetic skills.

With 14 patients having had major surgery for which they would have needed to leave the country, the visit has indeed been successful. In addition to the service provided there appears to have been established a firm base on which to provide further education, training and service.

The members of SACIM, the agents of the Minister and the medical and nursing staff should feel proud of their magnificent contribution to the care of a significant number of children, at little cost, and to the great enjoyment of Professor Dewan and Dr Richard Horton.

A view of the islands of Ile Plate and Le Coin de Mire, which are to the north of Mauritius

History of Mauritius

It is always interesting to reflect on the history of a country in which a training visit in Paediatric Surgery is launched. Mauritian history is, indeed, rich and colourful.

The island for a long time remained unknown and uninhabited. It is probably visited by Arab sailors during the Middle Ages, and on maps of about 1500, it is shown by an Arabic name "Dina Arobi". In 1598, a Dutch squadron, under the orders of Admiral Wybrand Van Warwyck, landed at Grand Port and named the island Mauritius, in honour of Prince Maurice Van Nassau, "Stathouder" of Holland. However, the Dutch had little interest in settling the island. Abandoned by the Dutch, the island became a French possession when, in September 1715, Guillame Dufresne D'Arsel landed and took possession of this precious port of call on the route to India, but it was only in 1721 that the French started their occupation. However, it was only from 1735, that the "isle de France" started developing effectively, when La Bourdonnais established Port Louis as a naval base and a shipbuilding centre.

During the Napoleonic wars, the isle of France had become a base from which French corsairs organised successful raids on British commercial ships. The raids continued until 1810 when a strong British expedition was sent to capture the island. By the Treaty of Paris in 1814, the isle de France that regained its former name "Mauritius" was ceded definitely to Great Britain. In the act of capitulation, the British guaranteed that they would respect the language, the customs, the laws, and the traditions of the inhabitants. One of the most important events under the British was the abolition of slavery in 1835. Thus, the planters turned to India, from where they brought a large number of indentured labourers to work in the sugar cane fields. The Indian immigrants, who were of both Hindu and Muslim faith, were to change rapidly the fabric of the society. They were later joined by a small number of petty Chinese traders.

In 1965 the way was paved for Mauritius to achieve independence. After general elections in 1967, Mauritius adapted a new constitution and independence was proclaimed in 12th March 1968. Mauritius achieved status of Republic 24 years later on 12th March 1992.

The various immigrant populations have made Mauritius a unique blend of different races, cultures, and religions. People of European, African, Indian and Chinese origins have created a multiracial society where the various cultures and traditions flourish in peace and harmony. During the last ten years the population has grown at average rate of 1.1% annually. At the end of 1996, the population of the Republic of Mauritius was estimated at 1,142,513. With such a considerable population there is obviously a need to not only provide Paediatric Surgical services, but to embark on education, training and service planning for Paediatric Surgery.

Some of the beautiful scenery in Mauritius

Consultation Clinic

The team commenced with an outpatient clinic on the 26th September in which the visiting Anaesthetist and Surgeon worked with the local staff, both medical and nursing, to review previously treated patients, evaluate those in need of surgery, and to arrange the operating time accordingly.

During the outpatient sessions, discussion took place about:

- Peri-operative planning that catered to local conditions, including;
  - Prioritizing surgical timing
  - Diagnosis and treatment of concurrent medical illnesses
  - Pre-medication
  - Estimation of surgical time
  - Transfusion requirements
  - Post operative pain relief options
  - Need for post operative intensive care
  - Pre-operative assessment

The outpatient consultations included reviewing radiology and making recommendations regarding treatment locally on a total of 53 patients over the 10 days in 5 clinics (most on the first day), and assessing 2 patients who have major anomalies that will be treated in Australia. The patients included 3 with ambiguous genitalia, 20 anorectal anomaly patients, 1 bladder exstrophy boy, one with a buried penis, two boys with urethral obstruction, a baby with a recurrent hernia, one neonate with an undescended hernia, 4 patients with Hirschsprung's disease, two with vesicoureteric reflux, six hypospadias boys, one young boy with hypogenitalism, a girl with labial adhesions, a man with a urethral rupture and a girl with portal hypertension.

Left is shown a radiograph of a child with a renal anomaly and the right is an anomaly similar to having bladder extrophy

Operations and Anaesthesia

Pre-operative anaesthetic assessment occurred during the surgical clinic on the morning of the first day. The general health of the children was excellent, with no child being delayed due to medical reasons. All patient details were recorded into an Access data base (Microsoft Software) on a laptop computer. Having access to the information of all the patients i.e. weight, allergies medical problems and planned induction, provided invaluable assistance in the operating theatre when preparing for each case.

Thirty-two operations were performed on 23 patients, two of whom were adults; the patients ranged in age from 2 to 516 months (mean 67 months), and weighed from 2.5 to 54 kg (mean 16kg). In 5 operative episodes involved patients were 3 months or less. Two adults (one 43 and the other 24 years) were operated on for a Paediatric surgical problem, namely a cloacal and imperforate anomaly. Excluding these patients, the average age was 45 months (3 years 9 months) and weight 14 kg. Four patients had two trips to theatre, 3 for cystoscopy and 1 for nephrostomy.

Classification	Number
Pena procedure for anorectal anomaly (including 1 re-do)	7
Cystoscopy	3
Ureteric re-implant	3
Inguinal hernia repair (including 1 orchidopexy)	2
Hypospadias repair	2
Clitoroplasty	2
Swenson	2
Pyeloplasty	1
Perino-plasty (reconstruction for cloaca)	1
Percutaneous Nephrostomy	1
Lieno renal shunt (for portal hypertension)	1
Closure colostomy	1

There was a total of 70 hours of surgery with an average operating time of 2 hrs 50 min, with a range from 40 min to 6 hours. 11 operations took 3 hours or more. Caudal anaesthesia was combined with general anaesthesia in many cases. 2 patients required blood transfusion and 1 patient was managed in the intensive care post-operatively for correction of hypothermia and fluid management, after a 6 hour procedure. All other patients were normothermic at completion of surgery. Unfortunately, three complications have been noted, one death, one anastomotic leak, and one minor wound infection. Given the conditions in which the work was conducted and the difficulty of the cases, while these adverse outcomes are heartbreaking, lessons can be learnt for the future. Email contact about these events has been a vital link.

Case Report

One case deserves special mention as it highlights many of the issues of paediatric anaesthesia:

> A 17 week old, 28 week gestation male baby, who had episodes of apnoea managed with nasal CPAP, came for surgery with his weight only 2.5kg, and a haemoglobin of 9.5g/dl, with the intention of performing bilateral inguinal hernia repairs and a right orchidopexy. Because of the history of prematurity, his young age and anaemia, he was at significant risk of developing fatal apnoea in the post-operative period, particularly if general anaesthesia was used, and appropriate post anaesthesia monitoring would have meant transfer to a neonatal unit after the surgery. The alternative chosen was for the baby to be awake for the operation with a combination of spinal and caudal epidural anaesthesia.
>
> The operating theatre was warmed, intravenous access obtained, 25 micrograms of atropine given, and a spinal administered at the L4-5 level, and a caudal cannular was also inserted for the administration of further doses of 0.5% Bupivicaine 1/200,000 Adrenaline administered. The baby was comforted with drops of 50% Glucose orally, and kept warm using a forced air warmer. No sedation was required, as is typical with this type of anaesthetic. The operation was performed without difficulty, and the child was able to feed immediately after the operation, and transferred to the Paediatric ward at Jeetoo hospital for post operative care, which was uneventful.

The boy who successfully had bilateral inguinal herniotomies and a left orchidopexy with a combined spinal and caudal anaesthetic.

Surgical Education and Training

The surgical staff of the Jeetooo Hospital participated actively in the education program, as coordinated by Dr Fakim. Most operations were assisted by two surgeons, and watched by more than one other surgeon.

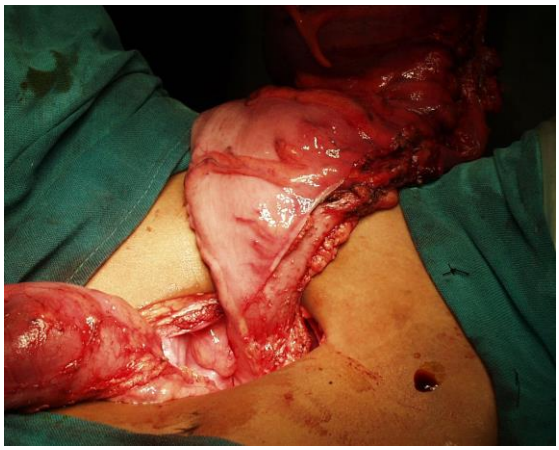
As many of the cases were anorectal anomalies, the principle focus of the training was on initial treatment and the decision making related to the conduct of "redo" surgery: the particular aspects of the teaching about this condition were:

1. The role of cut-back procedures for intermediate lesions.
2. Indications for redo surgery.
3. Surgery without the use of a nerve stimulator.
4. Management of the ectatic rectosigmoid segment.
5. Colostomy formation and revision.
6. Nixon anoplasty flaps.
7. Post-operative dilatation.

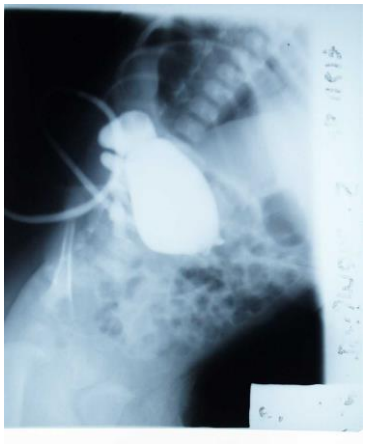
General principles were also discussed, for a large range of Paediatric Surgical and Urological topics, such that the operative surgical time (apart from being an enjoyable work environment for all) was filled with discussion of cases and treatments of the patient on the table and many other subjects. It was of great value to have the opportunity to discuss cases with Paediatricians and the surgeons who had previously cared for the children undergoing operative treatment.

In particular we discussed:

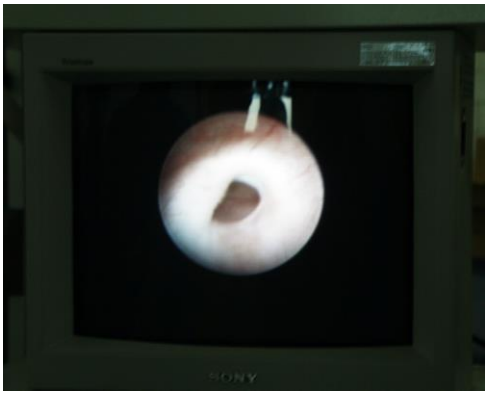
1. Intraoperative wound care.
2. Would closure with subcuticular sutures.
3. Abdominal incisions in children.
4. Vesicoureteric reflux.
5. Undescended testes.
6. Medical management of phimosis.
7. Medical management of the neuropathic bladder.
8. Urothelial lined bladder augmentation.
9. Foreskin reconstruction.
10. Urological investigations in Children
11. Prune belly syndrome.
12. Urinary tract obstruction.
13. Hirschsprung's disease.



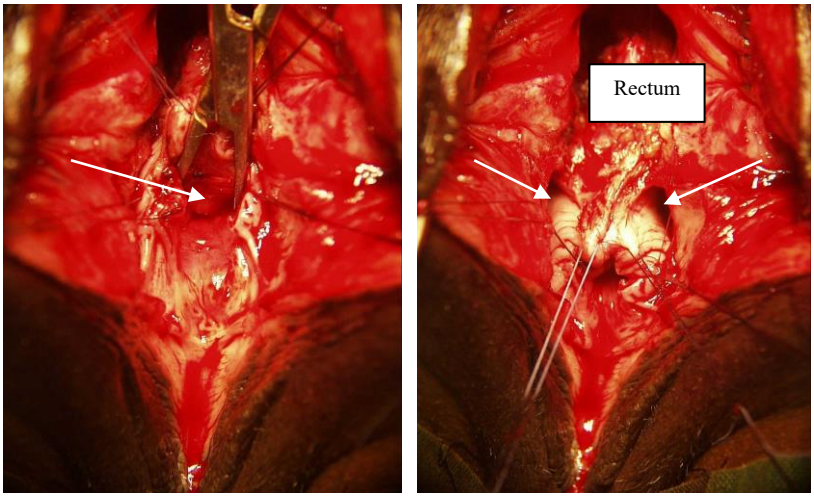
The above boy has the typical chest deformity that comes form the chronic bowel obstruction that occurs with Hirschsprung's disease, the transition zone of which is shown in the bowel seen on the left.



The above radiograph shows an obstructed left kidney, a study which followed from the insertion of a nephrostomy tube as an emergency, and preceded bilateral pyeloplasties; the right sided wound is shown.



The newly donated paediatric cystoscope was used to identify open ureteric orifices (left), which lead to ureteric reimplants; the boy was discharged after one day with the wound shown above (right).



These intraoperative pictures are of a 43 yo women who had a cloaca (a single perineal opening). The left image has an arrow where the urethra enters the front wall of the rectum. The arrows on the right image point to the double vaginas, after the rectum has been moved behind them.

Anaesthetic Education and Training

Topics covered in theatre included:

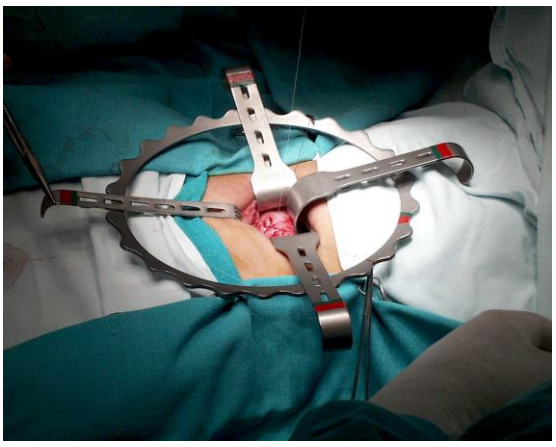
1. Paediatric Anaesthesia
    - Differences in airway management
    - Fluid therapy
    - Regional anaesthesia and Caudal anaesthesia in particular
    - Normal values of vital signs
    - Pre-medication
    - Paediatric ventilators
    - Neonatal spinal anaesthesia

2. Difficult intubation
3. Pre-eclampsia and eclampsia management
4. Complications of Scoline
5. Hypothermia, causes, significance and prevention
6. Capnography
7. Pulse oximetry

Again the laptop computer in theatre allowed presentations to be made in theatre to further the education provided. Those in attendance were residents Drs Limalia and Emritte, and Specialist Anaesthetist Dr Carrimbacor. In addition a paper titled "Epidural abscess complicating acute post operative pain management" was delivered to the Association of Anaesthesiologists of Mauritius at the Gold Crest Hotel on October 1st 2002. Dr Horton is shown below demonstrating the setting up of the anaesthetic for a baby, with a number of enthusiastic on-lookers.

Donated Items

Item	*Number*	*Item*	*Number*
Betadine, 100 mL bottles	64	Gloves, Boxes of 50	2
Elastoplast, boxes -	3	Guide-wires – Sterile	7
Sheath Dilators	23	Sutures – boxes	40
Hypafix dressing – sterile	40	Steristrips – box	1
Tape - alluppore – rolls	8	Nelaton caths - 6 FG	24
Nelaton caths - 10 FG	12	Dennis Brown Ring	1
Cliney nephrostomy Tubes	5	Urethral Catheters	30
Anal dilators – set	1	Uriplan Bed Bag	8
Cystoscope	1	Drainage Bags	3
Diathermy Pads	135	Dover type with sampling port	2
Ostomy Bags	10	Syringes (60ml)	6
Stents	14	Foleys catheters	36
Nelaton Catheters (3 sizes)	18	Silicone Malecot catheters (10 Fr)	6
Swan Norton surgical blades No.15	50	Ureteric catheters (2 sizes)	12
Povidone-Iodine100/500mls	59	Crepe bandages (2 sizes)	17
Swabs (2 sizes)	25	Face Masks (3 types)	400
Latex gloves Derma Clean	200	Sutures/Dexon/Surgipor/Polysorb	37 × 3 Dozen



Dennis Brown Ring

Cystoscope

Observations of Current Service Delivery

Importantly, some of the previous reports recommendations for anaesthetic changes had been implemented, plus other services were in place that were additional improvements on the facilities experienced during the last visit. In particular:

1. The use of forced air blankets for patient warming.
2. Paediatric sized blood pressure cuffs.
3. Alternative oximeter probes for paediatric use.
4. A temperature probe for routine temperature monitoring.
5. Arterial blood gas analysis and haemoglobin measurement using a portable machine from the ICU.
6. Paediatric bellows on the ventilator.

From the surgical perspective, the nursing staff in theatre and the ward were extremely enthusiastic, enabling the large amount of work to be completed, with expert assistance. Many of the procedures, they were unfamiliar with, both in theatre and the ward, but good processes were in place to ensure that the instructions to ward staff were acted on, and the appropriate equipment was always available for surgery. New concepts taken on by the ward included intermittent catheterisation for the neuropathic bladder, catheter bag elevation to facilitate the early removal of catheters, and the administration of local anaesthetic into the bladder for the management of bladder spasms.

Generally the ward facilities were adequate, except for the lack of hand washing facilities. In the theatre however, the following should be attended to:

1. The instruments are generally poor.
2. Sharps containers are not used appropriately.
3. The instruments are not always properly sterilised, as they are usually boiled.
4. The theatre is small, and not adequately ventilated.

The crowded but adequate children's ward.

Recommendations for future Development

Improvements in the future need to be focused on the development of a National plan for Paediatric Surgery with the acceptance of the population size and distribution and the manpower needed to provide a high level of service. A model of two hospitals with four surgeons, with each institution having its own neonatal unit would work well. To achieve success the surgeons would need to work as a team and with a team of Anaesthetists, and in conjunction with visitors who would be involved in some of the rarer conditions such as the cloacal anomalies.

The steps from here should include:

1. Nomination of the two hospitals to become the Paediatric Surgical Centres.
2. Identification of a ward nurse, theatre nurse, surgeon and anaesthetist from each for a 3 month attachment in Melbourne in 2003.
3. Selection of a second such team latter in the 2003.
4. Select a surgeon and anaesthetist to be the "future" head of the Paediatric Service, and arrange training in Melbourne for two years.
5. Continue to have teaching visits of two weeks, twice per year for five years, involving surgeons with Urologic and Thoracic skills.
6. Maintain a database of the cases operated on and a record of the outcomes.
7. Encourage the skill development for Paediatric Radiology.

Conclusion

The visit to Mauritius has come from the initiative of SACIM, with strong support from a wide range of people including the Mauritian Minister of Health and Quality of Life, and the Prime Minister, resulting in a second very successful trip, with 23 patients having surgery on this occasion. The way forward needs to involve a focus on training of Surgeons, Anaesthetists and nurses, facilitated by both visiting teams to Mauritius, and people coming to Australia.

Professor Dewan and Dr Horton would like to thank all the staff of the Ministry, SACIM, the Jeetoo Hospital, plus all the Surgical and Anaesthetic staff who helped make the time in Mauritius so productive. Thank you also to Dr Fakim (Surgeon) and Dr Rajkomar (Paediatric Consultant) who provided enormous assistance with the overall coordination of the visit.