Management of Vesicoureteral Reflux (VUR) in Children
兒童膀胱輸尿管反流病的治理

Introduction
Vesicoureteric reflux (VUR) is the abnormal reverse flow of urine from the bladder back into the upper urinary tract. It occurs in 1-2% of all children and in 20-50% of children with recurrent urinary tract infections (UTI).

Management
In majority of patients, VUR may be managed conservatively, but some patients may need surgical procedures to correct the problem. The need for surgical correction will be determined by a number of factors, some of which has to be evaluated with investigations.

Surgical Options
1. Endoscopic Injection (Deflux)
2. Ureteric reimplantation

I. Endoscopic Injection (Deflux)
This refers to endoscopic injection of a bulking agent at the ureteric opening. An endoscope is passed through the urethra into the bladder (cystoscopy). The bulking agent is then injected into the bladder wall along or just below the ureteric opening to create a bulge, setting as an implant and inducing later fibrosis to prevent VUR. It involves no external wound. This procedure is carried out under general anaesthesia.

Currently, the most widely used bulking agent is Deflux which is a dextranomer / hyaluronic acid co-polymer.

Indication
Treatment of Vesicoureteral Reflux.

Pre-operative Preparations
- Fasting for general anaesthesia
- Bowel preparation if needed
- Antibiotic injection before the procedure

Post-operative Care
- There is no external wound for the procedure
- There is usually no need to leave a urinary tube
- Pain killer can be given if needed
- The patient can usually go home after meal and passing urine
- Post-operative investigations will be arranged at about 3 months after the procedure to determine the status of VUR after surgery.

- Prophylactic antibiotics should be continued until the imagings are reviewed.

Risks and Complications

- Bleeding – blood stained urine or blood from meatus
  - generally stops by itself
- Infection – urinary tract infection may be caused by the procedure, and there can be recurrent infection after procedure
- Urethral, ureteric or bladder injury – due to the passage of the cystoscope
- Urine retention – unable to pass urine after the procedure
  - usually temporary, may be due to pain after the procedure
- Persistent VUR
- Newly developed VUR on the opposite side ureter
- Ureteric obstruction at the injection site
- In some patients, the ureteric insertion site may be abnormal so that endscopic injection is not feasible. This can only be confirmed upon cystoscopy

Some of these complications may need further intervention or operations to handle

Outcome

Possible outcomes include complete resolution, downgrading or no change of the status of VUR. Occasionally there may be development of reflux in the previously normal ureter on the opposite side.

The rate of successful resolution by a single injection ranges from 60-90%. It is affected by pre-operative grading, underlying structural abnormality of the ureter and functional abnormality of the bladder. If needed, it is possible to repeat endoscopic injections or other surgery for residual VUR.

II. Ureteric reimplantation

The principle of the procedure is to increase the length of the submucosal tunnel in which the ureter will travel before reaching the internal ureteric orifice in bladder. This tunnel then acts as a valve to prevent reflux. Ureteric reimplantation can be done from extravesical or intravesical approach.

Traditionally, this procedure is performed via an open approach. However, with the advent of minimally invasive techniques, this procedure can also be performed by laparoscopic means which is also known as minimally invasive surgery or keyhole surgery.

Indications

Treatment of VUR, vesicoureteral junction obstruction (VUJO), or in conjunction with other procedures to correct congenital abnormalities of the bladder or ureter.

In some cases, there may be technical difficulty, surgical complications or anaesthetic complications during the operation so that laparoscopic procedures

cannot be safely carried out. Then laparoscopic surgery may be changed to an open procedure at any time. In this case the post-operative care may differ from that below.

Pre-operative Preparations

- Fasting for general anaesthesia
- Bowel preparation
- Intravenous antibiotics on induction

Post-operative Care

- Dressing will be applied to the abdominal wounds and should be left intact until inspection by medical staff
- A urethral tube to the bladder will be in place. For laparosopic procedures this is kept for 1-2 days. For open procedures, this may be kept for a longer time and there may be other tubes and drains.
- Pain killer may be given if needed
- The time to go home would depend on the patient's general condition.
- The patient may have normal daily activities after going home.
- Post-operative investigations will be arranged at about 3 months after procedure to determine the status of VUR after surgery.
- Prophylactic antibiotics should be continued until the radiological imagings are reviewed.

Risks and Complications

- Bleeding – minor bleeding from wounds and blood stained urine may stop by itself. Major bleeds may require intervention
- Wound infection – may cause wound breakdown or require laying open and dressing of the wound
- Recurrent urinary tract infection
- Persistent VUR
- Urethral injury – from insertion of the cystoscope and tubes
- Injury to surrounding organs
- Ureteral obstruction – may occur at the site of new ureteral opening and may require intervention
- Urine leakage at the new junction– usually resolves with urinary drainage, major breakdown may require surgical intervention
- Neurogenic bladder dysfunction – an uncommon but severe complication when extravesical reimplanation is done on both sides.

Some of these complications may need further interventions or operations to handle

Outcome

Possible outcomes include complete resolution, downgrading or no change of the status of VUR. Occasionally there may be the development of reflux in the previously normal ureter on the opposite side.

The rate of successful resolution by this operation ranges from 85-95%. This is affected by any underlying bladder function abnormality.
Persistent VUR after open surgery is usually re-assessed after several months to allow time for the involuntary bladder contractions to resolve.

Remarks
This provides general information only and the list of complications is not exhaustive. Other unforeseen complications may occasionally occur. In special patient groups, the actual risk may be different. One may obtain more information from the doctor.