The Role of MR urography in follow up of urinary diversion patients

THESIS

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List of abbreviations

3D	*Three dimensional*
GFR	*glomerular filtration rate*
MRU	*Magnetic resonance urography*
MRI	*Magnetic resonance imaging*
MIP	*Maximal intensity projection*
MPR	*Multi-planar reformat*
SIU	*Société Internationale d'Urologie.*
TCC	*Transitional cell carcinoma*
SCC	*Squamos cell carcinoma*
VR	*Volume rendering*
I.V.	*Intravenous*
CT	*Computed Tomography*
FSE	Fast spin echo
FOV	*Field of view*
TR	*Time of repetition*

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Abstract

The principal methods of urinary diversion entail fashioning a segment of intestine into a conduit or reservoir to which the ureters are anastomosed. Methods of urinary diversion are commonly differentiated according to whether the functional result is urinary incontinence or continence: either incontinent cutaneous diversion or continent diversion may be performed, with the latter method involving either orthotopic bladder replacement with attachment to the intact native urethra or creation of a reservoir with cutaneous diversion.

MRU is an accurate method for evaluating patients with cancer bladder that underwent radical cystectomy & urinary diversion, especially with patients with renal impairment & repeated short term follow up. Comprehensive MRI study including conventional sequences and MRU are useful for achieving an accurate and prompt diagnosis of complications and obtaining information that is essential or adequate surgical management.

Early complications (complications that occur less than 30 days after surgery) include alterations of bowel motility, small-bowel obstruction, urinary leaks, collections, infections, and fistulas. Late complications of urinary diversion (complications that occur 1 month or more after surgery) include urinary tract infection, ureteral stenosis, herniation, lithiasis, and tumor recurrence.

In our study, the aim was to evaluate those patients whether symptomatic or asymptomatic for detection of post-operative complications.

KEY WORDS

Urinary diversion-MRU-complications-bladder cancer-radical cystectomy.

INTRODUCTION

&

AIM OF WORK

INTRODUCTION

Urinary diversion is any one of several surgical procedures to reroute urine flow from its normal pathway. It may be necessary for diseased or defective ureters, bladder or urethra, either temporarily or permanently **(Hautmann, 2003).**

The frequency distribution of urinary diversions performed by the World Health Organization (WHO) and the Société Internationale d'Urologie (SIU) in >7000 patients with cystectomy reflects the current status of urinary diversion after cystectomy for bladder cancer: neobladder, 47%; conduit, 33%; anal diversion, 10%; continent cutaneous diversion, 8%; &incontinent cutaneous diversion, 2% **(Hautmann et al, 2007).**

Numerous surgical procedures have been developed for urinary diversion in patients who have undergone a radical cystectomy for bladder cancer. Because urinary diversion procedures are complex, early and late postsurgical complications frequently occur. Possible complications include alterations in bowel motility, anastomotic leaks, backpressure changes, fluid collections (abscess, urinoma, lymphocele, and hematoma), fistulas, peristomal herniation, ureteral strictures, calculi, and tumor recurrence **(Catala et al, 2009).**

The goals of urinary diversion after cystectomy have evolved from simple diversion and protection of the upper tracts to functional and anatomic restoration as close as possible to the natural preoperative state. This evolution of urinary diversion has developed along 3 distinct paths: incontinent ; cutaneous diversion (conduit) , continent ; cutaneous diversion (pouch); and, most recently, continent, urinary diversion to the intact native urethra (neobladder, orthotopic reconstruction) **(Steinberg and Curti, 2010).**

In the early postoperative period, imaging studies are necessary to detect surgical complications such as anastomotic urine leak, fluid collection, urinary tract infection or abscess. Furthermore, tumour recurrence and complications such as stone or anastomotic stricture are also depicted and evaluated on delayed follow-up studies. **(Battal *et al*. 2011)**

Magnetic resonance urography is a non-invasive imaging technique that does not require ionizing radiation or iodinated contrast medium and therefore has become the technique of choice in patients with frequent follow-up requirement, iodine allergy or poor renal function. **(Battal *et al*. 2011)**

MR urography (MRU) can be used to thoroughly evaluate the renal parenchyma, the pelvicalyceal system, and the rest of the urinary tract in a single imaging study. **(O'Connor et al.2010)**

Aim of work

The purpose of this study is to evaluate the patients underwent urinary diversion whether symptomatic or asymptomatic for detection of postoperative complications using the different capabilities of Magnetic resonance Urography to evaluate the whole urinary system including renal parenchyma, ureters, reconstructed urinary bladder.

REVIEW OF LITERATURE

Anatomical changes induced by different surgical processes of urinary diversion.

The most frequent indication for radical cystectomy is a muscle-invasive (stage T2 or higher) bladder tumor or high-risk high-grade non invasive muscle disease with no evidence of distant metastasis. Less frequently, radical cystectomy may be performed to treat benign conditions such as bladder neuropathy, damage from irradiation, or interstitial cystitis. Numerous surgical procedures have been developed for urinary diversion after radical cystectomy. The type of surgical procedure to be used is decided after the patient is informed about the possible advantages and disadvantages of each surgical technique. Relevant criteria for selecting the most appropriate technique include the patient's age, overall physical condition, and intestinal, hepatic, and renal function; the tumor stage; and whether the patient previously underwent abdominal radiation therapy **(Catala et al, 2009).**

More than 50 surgical procedures for urinary diversion have been described. Because these procedures are complex, early and late postsurgical complications are frequent. The diversity of the surgical procedures and of the resultant postoperative anatomic changes makes image interpretation difficult. Familiarity with the normal postoperative anatomy is essential to achieve correct diagnosis **(Chang et al, 2002).**

The principal methods of urinary diversion entail fashioning a segment of intestine into a conduit or reservoir to which the ureters are anastomosed. Methods of urinary diversion are commonly differentiated according to whether the functional result is urinary incontinence or continence: either incontinent cutaneous diversion or continent diversion may be performed, with the latter method involving either orthotopic bladder replacement with attachment to the intact native urethra or creation of a reservoir with cutaneous diversion **(Siegel, 2005).**

Normally, when urinary diversion is performed, ureteral stents are positioned to extend from both renal pelves through the ureteral–urinary reservoir anastomoses to the distal en d of the reservoir. The use of ureteral stents is beneficial for avoiding urinary leakage. Other potential advantages are less-frequent early postoperative dilatation of the excretory system, earlier resumption of bowel activity, and reduced incidence of metabolic acidosis. **Mattei et al, 2008** stated that the surgeons at their institution prefer to leave ureteral stents in place for 7–10 days after urinary diversion. Likewise, hypogastric drainage catheters are left in place for 3–5 postoperative days to avoid postsurgical fluid collections. In addition, a urethral catheter is positioned in the reservoir for 2 weeks and then removed if warranted by findings at cystography **(Mattei et al, 2008).**

The evolution of lower urinary tract reconstruction has developed along these distinct paths:

I- Incontinent cutaneous forms of urinary diversion to the skin, ileum or colon:

A) *Cutaneous Ureterostomy procedure.*
B) *Ileal Conduit Creation (Bricker procedure).*

II- Continent cutaneous forms of urinary Diversion:

A) *Mitrofanoff.*
B) *Indiana pouch.*
C) *Kock's pouch.*
D) *Mainz III Pouch.*
E) *Continent cutaneous ileal pouch using the serous lined extramural valves (Mansoura pouch).*

III- Non-orthotopic continent diversion, relying on the anal sphincter for continence:

A) *Ureterosigmoidostomy.*
B) *Mainz II pouch.*
C) *Folded rectosigmoid bladder.*

IV-Orthotopic bladder replacement to the native, intact urethra (neobladder):

A) *Camey I.*
B) *Camey II.*
C) *Hautmann.*
D) *Studer ileal bladder substitute.*
E) *Orthotopic Kock ileal reservoir.*
F) *T-Pouch ileal neobladder.*

I- Incontinent cutaneous forms of urinary diversion to the skin, ileum or colon:

A) Cutaneous Ureterostomy procedure:

Cutaneous ureterostomy is the least desirable form of urinary diversion, but despite its disadvantages it is a valid option in selected cases, e.g. after palliative cystectomy in elderly frail patients, in patients with incurable malignancies or pelvic complications, as (temporary) diversion in situations when gastrointestinal diversion is not possible or whenever the bladder needs to be diverted because of fistulae or hemorrhage.
(Nagele et al, 2005)

The procedure is performed by anastomosing the ureters directly to the anterior abdominal wall. Stomal stenosis, subsequent urinary tract infection, and compromise of renal function are the most frequent complications and limit the use of this technique **(Hautmann et al, 2007).**

B) Ileal Conduit Creation (Bricker procedure):

In this commonly performed procedure, a 15 to 20-cm-long ileal segment is isolated, and the ureters are implanted at its proximal end. A 10- to 15-cm-long ileal segment proximal to the ileocecal junction is preserved to maintain adequate absorption of bile salts, vitamin B12, and fat-soluble vitamins. The ileal stoma is usually located in the right flank (Fig. 1). This procedure is technically easier to perform than continent reconstruction, however, continence and voluntary voiding are not possible afterward, and the body image is not preserved. **(Madersbacher et al, 2003)**