# Urinary Diversion/Reconstruction for Cases of Catheter Intolerant Secondary Progressive Multiple Sclerosis With Refractory Urinary Symptoms

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**Purpose:** We assessed surgical outcomes for patients intolerant of catheters with secondary progressive multiple sclerosis undergoing urinary diversion/reconstruction for refractory urinary symptoms.

**Materials and Methods:** Patients with secondary progressive multiple sclerosis treated with ileovesicostomy, enterocystoplasty and ileal loop surgeries were reviewed for demographic, operative and postoperative data. All patients had attempted maximal conservative therapy, including catheterization options. Evaluated outcome measures included incidence of postoperative urinary incontinence, urinary tract infections and Clavien grade 3 or higher complications.

**Results:** A total of 26 patients (22 female) with secondary progressive multiple sclerosis underwent 15 ileovesicostomy, 7 enterocystoplasty and 4 ileal loop procedures. All patients had significant neurological impairment (mean Expanded Disability Status Scale 7), and the most common indications for surgery were chronic urinary tract infection (77%) and refractory incontinence (77%). Maximum preoperative bladder capacity was 185 cc and mean bladder compliance was 5.7 cc/cm $H_2O$. After a mean followup of 16 months 63% of patients were continent ($p = 0.01$) and 58% had no further urinary tract infections ($p = 0.03$). The type of diversion/reconstruction was not associated with significantly improved continence or urinary tract infection reduction. No new upper tract changes developed in any patients. There were 11 high grade complications, and patients with a preoperative indwelling catheter (HR 5.89, $p = 0.024$), diabetes (HR 5.60, $p = 0.009$) and increasing blood loss during surgery (HR 1.09, $p = 0.014$) were at greatest risk for significant complications.

**Conclusions:** Patients with secondary progressive multiple sclerosis treated with urinary diversion/reconstruction who cannot tolerate catheters had improved continence and fewer urinary tract infections. However, patients with secondary progressive multiple sclerosis with preoperative indwelling catheters, diabetes, increased body mass index and increasing operative blood loss were at greatest risk for postoperative morbidity.

**Key Words:** urinary bladder, neurogenic; multiple sclerosis, chronic progressive; urinary diversion; urinary incontinence; urinary tract infections

**Abbreviations and Acronyms**

BMI = body mass index

EDSS = Expanded Disability Status Scale

HG = high grade surgical complications

MS = multiple sclerosis

SPMS = secondary progressive multiple sclerosis

UTI = urinary tract infection

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**Editor's Note: This article is the fifth of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 2436 and 2437.**

MULTIPLE sclerosis is the most common neuroinflammatory disease of the central nervous system,[1] and patients with the disease commonly experience urinary pathology such as incontinence, hesitancy and retention.[2] Of patients with relapsing-remitting MS, secondary progressive disease may develop in 50%,[3] and more than 70% of those with progression will

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report increasing urinary symptoms as their neurological and functional status deteriorates. Although the natural history of urinary symptoms for patients with SPMS is not well studied, a small number of those with significant neurological and functional decline will become intolerant of catheters and will experience refractory urinary incontinence, chronic UTIs or catheter related urothelial complications despite maximal conservative interventions. Although a United Kingdom consensus panel on MS bladder management recommended urinary diversion surgery for patients with MS who become intolerant of catheters,[4] there are little data examining the effectiveness of surgical intervention for this patient group. Outcomes must be extrapolated from small patient series[5,6] and mixed pathology surgical technique studies.[7,8] Thus, we evaluated the effectiveness of urinary diversion/reconstruction for refractory urinary symptoms in a catheter refractory SPMS cohort.

## METHODS AND MATERIALS

### Patients/Procedures/Postoperative Care

An institutional review board approved retrospective chart review identified 26 patients with SPMS who underwent urinary diversion/reconstruction for refractory urinary symptoms by a single surgeon between July 2005 and July 2009. Preoperative EDSS scores from documented neurological assessments were used to determine MS disease related disability, mobility and functional status for each patient.[9] Per convention, we used the definition that EDSS score greater than 4.0 heralded the beginning of secondary progressive disease.[10] Additional demographic, operative and postoperative data were extracted from chart review.

Patient indications for reconstructive surgery/urinary diversion included treatment of refractory urinary incontinence, chronic symptomatic UTIs and/or catheter related complications. All patients had attempted multiple pharmacological and conservative regimens. In addition, all patients had attempted catheterization therapy before surgery but were not candidates for continued clean intermittent or indwelling catheterization because of refractory symptoms, unfavorable physiology/anatomy and patient unwillingness to continue with this modality.

Surgeries were classified as ileovesicostomy, enterocystoplasty/continent stoma and ileal loop procedures. Patients with bladder capacity less than 100 cc underwent diversion with an ileal loop. All other patients were treated with ileovesicostomy or enterocystoplasty/continent stoma depending on hand dexterity and treatment goals. Surgical procedures followed a standardized template as previously described in other studies.[7,11–15] An autologous rectus fascia suburethral sling was also placed in female patients without significant detrusor external sphincter dyssynergia to increase urethral outlet resistance.

All patients were seen by a urologist at 3 weeks, 3 months and every 6 months postoperatively. Renal ultrasounds were obtained starting 3 months after surgery. All patients underwent multichannel urodynamic studies with concomitant voiding cystourethrograms before surgery, and all studies conformed to International Continence Society good urodynamic technique recommendations and definitions.

### End Points/Outcome Assessment

Surgical effectiveness was determined through assessments of postoperative urinary continence, incidence of urinary tract infections and postoperative high grade complications. Urinary continence was determined by assessing daily pad use, as reported by patient or caregiver, in the last week before a clinic visit. Patients were considered continent per urethra if he/she used 1 pad daily or less for urinary protection. A significant UTI was defined as any symptomatic, positive urine culture requiring antibiotic treatment. Patients with more than 3 symptomatic urinary tract infections in a consecutive 6-month period or on chronic suppressive antimicrobial therapy were classified as having chronic UTIs. Postoperative complications were graded according to the Clavien classification system.[16] A complication grade 3 or higher was defined as HG surgical morbidity. Since all patients had similar demographics and were treated with technically similar surgeries, outcomes were analyzed as an aggregate cohort and by an individual procedure type.

### Statistics

Analysis was based on retrospective data from patient records and patients lost to followup were censored from analysis after the last encounter. T or Wilcoxon rank sum testing was used to compare continuous variables. Chi-square and McNemar testing was used for categorical and paired variables. Time to HG complication was evaluated with the nonparametric Kaplan-Meier method and the log rank statistic was used to assess differences between these survival curves. Cox proportional hazards regression was used to estimate the hazard ratios. All hypothesis testing was 2-tailed and $p < 0.05$ was used to indicate statistical significance. All statistical analyses were performed using SAS® v. 9.2.

## RESULTS

### Demographics

A total of 26 patients with SPMS (22 female) underwent 15 ileovesicostomy, 7 enterocystoplasty (6 with continent stoma) and 4 ileal loop procedures. Of these patients 5 had robotic assisted procedures and 10 (9 ileovesicostomy, 1 enterocystoplasty) underwent concomitant suburethral sling placement. Patients had been symptomatic with multiple sclerosis before surgery for a mean of 24 ± 10 years, and all had significant neurological and functional impairment from secondary progressive disease (mean EDSS 7). The most common indications for surgery were chronic UTIs (77%) and refractory incontinence (77%). Mean maximum cystometric bladder capacity was 185 ± 148 cc and mean bladder compliance was 5.7 ± 3.3 cc/cm $H_2O$. Additional demo-