Neurogenic Bladder: Selected Treatments

Number: 0852

Policy

*Please see amendment for Pennsylvania Medicaid at the end of this CPB.

Aetna considers enterocystoplasty (augmentation cystoplasty) medically necessary for the treatment of neurogenic bladder that is refractory to medication.

Aetna considers the following interventions experimental and investigational for the treatment of neurogenic bladder because their effectiveness for this indication has not been established (not an all-inclusive list):

- Acupuncture (CPB 0135 - Acupuncture (../100_199/0135.html))
- Beta-agonists (e.g., mirabegron)
- Biofeedback (CPB 0132 - Biofeedback (../100_199/0132.html))
- Deep brain stimulation (CPB 0208 - Deep Brain Stimulation (../200_299/0208.html))
- High frequency nerve block
- Periurethral bulking agents (CPB 0223 - Urinary Incontinence (../200_299/0223.html))

Policy History

Last Review 10/13/2016
Effective: 07/19/2013
Next Review: 10/12/2017

Review History

Definitions

Additional Information

Clinical Policy Bulletin Notes
Background
A neurogenic bladder is the loss of normal bladder function caused by damage to part of the nervous system. It may result from a disease, an injury, or a birth defect affecting the brain, spinal cord, or nerves leading to the bladder, its outlet (the opening into the urethra from the bladder), or both.

Intravesical transurethral bladder stimulation is a diagnostic and rehabilitative technique for the neurogenic bladder. The ultimate goal of the treatment is to create conscious micturition control. The technique combines direct electrical stimulation of bladder receptors with visual biofeedback using patient observance of a water manometric representation of the detrusor response. The bladder is catheterized, and a slow-fill cystometrogram is performed. At the end of the cystometrogram, the bladder is emptied. This emptied volume is defined as the bladder capacity. The measured pressure at the end of the cystometrogram when bladder capacity is reached is defined as the bladder capacity pressure. Following the initial cystometrogram, the bladder is filled to half capacity. An initial 15-minute bladder observation period is followed by a 90-minute therapy session. Observations during the first treatment are used in setting initial parameters for future stimulation. Patients are usually treated with 20 out-patient sessions (a series) during which periodic adjustments are made depending on the response of the bladder to stimulation. Following the first series, a cystometrogram is performed, and
the bladder is allowed to rest for approximately 3 to 6 months. At the next visit, a cystometrogram is repeated, and a subsequent course of stimulation sessions (5 to 15) is administrated for 1 to 2 weeks. Medications that may affect bladder dynamics are routinely discontinued a few days before urodynamic studies and during bladder stimulation therapy. The program is multi-staged, and not all patients require full therapy. Once the training process is completed, no additional therapy is usually necessary, and the results are permanent.

Boone et al (1992) conducted a prospective, randomized, sham controlled and blinded study on the efficacy of intravesical transurethral electrotherapy in treating urinary incontinence in the myelodysplastic child. A total of 31 children completed the protocol. Of the patients completing the study, 13 were randomly selected to serve as an internal sham control having the electrocatheter placed without activating the stimulator. These patients were subsequently treated with a 3-week course of electrotherapy. The remaining 18 patients completing the study were randomly selected to undergo 2 3-week courses of intravesical bladder stimulation. Urodynamic studies were performed before and after each treatment series. Detailed daily questionnaires were submitted to each participant covering subjective improvement in urinary continence and any development of bladder sensory awareness. Analysis of urodynamic data and questionnaires failed to reveal any statistically significant increase in bladder capacity, development of detrusor contractions, improvement in detrusor compliance, or the acquisition of bladder sensation allowing timely intermittent catheterization and preventing urinary incontinence.

Lyne and Bellinger (1993) reported on a study of patients with neurovesical dysfunction that were treated with transurethral electrical bladder stimulation. A total of 17 patients (2.5 years to 20 years) completed the series. All patients demonstrated detrusor contraction during therapy, and 88 % had sensation of contractions, usually developing later in therapy.
Decter et al (1994) published a follow-up report on the use of transurethral electrical stimulation in patients with neurogenic bladder. Since 1989, they performed 64 series in 25 patients with neurogenic bladders. A cystometrogram was performed before each series of stimulation to monitor progress, and impressions of the stimulation were obtained by a questionnaire. The initial evaluation cystometrogram before stimulation revealed that 18 patients (72 %) had bladder contractions. After electrical bladder stimulation, 24 patients (96 %) manifested contractions. Before stimulation, only 3 children sensed the contractions, while during stimulation 50 % of the patients perceived the contractions. A cystometrogram performed before each series demonstrated a greater than 20 % increase in the age adjusted bladder capacity in 6 of the 18 patients (33 %) with serial studies. Improvements in the end filling pressure defined by clinically significant decrease were observed in 5 of these patients (28 %). The authors concluded that transurethral electrical bladder stimulation is a time-consuming, labor intensive technique, and the limited urodynamic benefits the patients achieved did not materially alter the daily voiding regimen. As a result, the authors were not enrolling any new patients into the program.

Cheng et al (1996) published the results of their continuing study (since 1984) on the use of intravesical transurethral bladder stimulation in children with neurogenic bladder. The authors examined data from multiple institutions and compared it to their own experience. A total of 335 patients had adequate and accurate pretreatment and post-treatment urodynamic studies, and were reviewed in the study. Bladder capacity and bladder capacity pressure were determined for each patient before and after therapy. Overall, 53 % of patients had increased bladder capacity of 20 % or greater after treatment, which represented a 63 % increase from pretreatment values. The increase occurred in an average of 1.9 years. Further analysis of the patients revealed that in 90 % intravesical storage pressures were decreased or maintained within a safe range (less than 40 cm. water). Evaluation of patients who did not respond to bladder stimulation with a 20
% or greater increase in bladder capacity revealed that they had nearly normal bladder capacity before therapy. According to the authors, bladder stimulation is effective in increasing bladder capacity without significantly elevating storage pressure in a majority of patients. The technique is safe and effective in improving bladder compliance, and the program can be reproduced elsewhere. However many other institutions have conducted similar trials with mixed regard to the efficacy of the treatment modality, and that, to date, clinical experience with bladder stimulation has been too limited to permit identification of the cases that will succeed or fail with the therapy.

Hagerty et al (2007) evaluated their 22-year experience with intravesical electrotherapy in patients with neurogenic bladder. The charts of 405 patients who received intravesical electrotherapy were reviewed. Cystometrograms were performed at the start of each treatment series. Bladder capacity and pressure were determined for each patient before and after therapy. Patients were also questioned regarding the sensation of bladder filling. From 1985 to 2006, a total of 372 patients with an average age of 5.5 years (range of 0 to 43) had follow-up information available and were included for evaluation. Patients received a median of 29 treatment sessions (range of 2 to 197). Mean patient follow-up was 6.6 years (range of 0 to 19.7). Of the 372 patients, 286 (76.9 %) had a 20 % or greater increase in bladder capacity after treatment. In this subset of patients bladder storage pressure at capacity was normal (less than 40 cm water) in 74.4 % (213 of 286). Of the 17.2 % of patients (64 of 372) who had no change in bladder capacity 81.21 % (52 of 64) had normal bladder storage pressures after treatment. Bladder sensation was developed and sustained in 61.6 % of patients (229 of 372), including 33.6 % in the first series.

It is written in the 2011 textbook Wein: Campbell-Walsh Urology, intravesical electrotherapy, an old technique, which has been has been resurrected with some interesting and promising results is certainly controversial.
Enterocystoplasty, also called augmentation cystoplasty, is an enlargement of the bladder with a patch of small or large intestine or stomach. Clean intermittent catheterization is necessary after the procedure.

**Acupuncture:**

Zhang et al (2014) stated that neurogenic bladder is one of the most common complications following spinal cord injury (SCI). In China, acupuncture therapy is a common treatment for neurogenic bladder due to SCI, but its safety and effectiveness remain uncertain. These researchers described a protocol for a systematic review to investigate the safety and effectiveness of acupuncture for neurogenic bladder due to SCI. A total of 8 databases will be searched from their inception: the Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, Embase, the China National Knowledge Infrastructure (CNKI), the VIP database, the Wanfang database, the China Doctoral Dissertations Full-text Database (CDFD) and the China Master's Theses Full-text Database (CMFD). Any clinical randomized controlled trials (RCTs) and the first period of randomized cross-over studies related to acupuncture for neurogenic bladder due to SCI will be included. Outcomes will include change in urinary symptoms, urodynamic tests, clinical assessment and quality of life (QOL). The incidence of adverse events will be assessed as the safety outcome. Study selection, data extraction and quality assessment will be performed independently by 2 reviewers. Assessment of risk of bias, data synthesis and subgroup analysis will be carried out using Review Manager software. The authors noted that ethics approval is not required since this is a protocol for a systematic review. They stated that the findings of this systematic review will be disseminated via peer-reviewed publications and conference presentations.

**Tibial Nerve Stimulation:**

Schneider et al (2015) stated that tibial nerve stimulation (TNS) is a promising therapy for non-neurogenic lower urinary tract
dysfunction (LUTD) and might also be a valuable option for patients with an underlying neurological disorder. These investigators systematically reviewed all available evidence on the safety and effectiveness of TNS for treating neurogenic lower urinary tract dysfunction (NLUTD). The review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement. After screening 1943 articles, 16 studies (4 RCTs, 9 prospective cohort studies, 2 retrospective case series, and 1 case report) enrolling 469 patients (283 women and 186 men) were included; 5 studies reported on acute TNS and 11 on chronic TNS. In acute and chronic TNS, the mean increase of maximum cystometric capacity ranged from 56 to 132 ml and from 49 to 150 ml, and the mean increase of bladder volume at first detrusor over-activity ranged from 44 to 92 ml and from 93 to 121 ml, respectively. In acute and chronic TNS, the mean decrease of maximum detrusor pressure during the storage phase ranged from 5 to 15 cm H2O and from 4 to 21 cm H2O, respectively. In chronic TNS, the mean decrease in number of voids per 24 hours, in number of leakages per 24 hours, and in post-void residual ranged from 3 to 7, from 1 to 4, and from 15 to 55 ml, respectively. No TNS-related adverse events have been reported. Risk of bias and confounding was high in most studies. The authors concluded that although preliminary data of RCTs and non-RCTs suggested TNS might be safe and effective for treating NLUTD, the evidence base is poor, derived from small, mostly non-comparative studies with a high risk of bias and confounding. They stated that more reliable data from well-designed RCTs are needed to reach definitive conclusions.

Other Electrical Stimulation Therapies:

McGee et al (2015) noted that electrical stimulation (ES) for bladder control is an alternative to traditional methods of treating NLUTD resulting from SCI. These investigators discussed the neurophysiology of bladder dysfunction following SCI and the applications of ES for bladder control following SCI, spanning from historic clinical approaches to recent pre-clinical studies that offer promising new strategies that may improve
the feasibility and success of ES therapy in patients with SCI. Electrical stimulation provides a unique opportunity to control bladder function by exploiting neural control mechanisms. The understanding of the applications and limitations of ES for bladder control has improved due to many pre-clinical studies performed in animals and translational clinical studies. Techniques that have emerged as possible opportunities to control bladder function include pudendal nerve stimulation and novel methods of stimulation, such as high frequency nerve block. The authors concluded that further development of novel applications of ES will drive progress towards effective therapy for SCI. The optimal solution for restoration of bladder control may encompass a combination of efficient, targeted ES, possibly at multiple locations, and pharmacological treatment to enhance symptom control.

Joussain and Denys (2015) stated that management of LUTD in neurological diseases remains a priority because it leads to many complications such as incontinence, renal failure and decreased QOL. A pharmacological approach remains the first-line treatment for patients with NLUTD, while ES has been proposed as second-line treatment. However, clinicians must be aware of the indications, advantages and side effects of the therapy. This report provided an update on the 2 main ES therapies for NLUTD: (i) inducing direct bladder contraction with the Brindley procedure and (ii) modulating LUT physiology (sacral neuromodulation, tibial posterior nerve stimulation or pudendal nerve stimulation). These investigators stated that ES could be proposed for NLUTD as second-line treatment after failure of oral pharmacologic approaches. Nevertheless, further investigations are needed for a better understanding of the mechanisms of action of these techniques and to confirm their effectiveness. Other electrical investigations, such as deep-brain stimulation and repetitive transcranial magnetic stimulation, or improved sacral anterior root stimulation, which could be associated with non-invasive and highly specific de-afferentation of posterior roots, may open new fields in the management of NLUTD.
Gross and colleagues (2016) stated that transcutaneous electrical nerve stimulation (TENS) is a promising therapy for non-neurogenic LUTD and might also be a valuable option in patients with an underlying neurological disorder. These investigators systematically reviewed all available evidence on the safety and effectiveness of TENS for treating neurogenic LUTD. The review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement. After screening 1,943 articles, 22 studies (2 RCTs, 14 prospective cohort studies, 5 retrospective case series, and 1 case report) enrolling 450 patients were included; 11 studies reported on acute TENS and 11 on chronic TENS. In acute TENS and chronic TENS, the mean increase of maximum cystometric capacity ranged from 69 ml to 163 ml and from 4 ml to 156 ml, the mean change of bladder volume at first detrusor over-activity from a decrease of 13 ml to an increase of 175 ml and from an increase of 10 ml to 120 ml, a mean decrease of maximum detrusor pressure at first detrusor over-activity from 18 cm H2O to 72 cm H2O and 8 cm H2O, and a mean decrease of maximum storage detrusor pressure from 20 cm H2O to 58 cm H2O and from 3 cm H2O to 8 cm H2O, respectively. In chronic TENS, a mean decrease in the number of voids and leakages per 24 hours ranged from 1 to 3 and from 0 to 4, a mean increase of maximum flow rate from 2 ml/s to 7 ml/s, and a mean change of post-void residual from an increase of 26 ml to a decrease of 85 ml. No TENS-related serious adverse events have been reported. Risk of bias and confounding was high in most studies. The authors concluded that although preliminary data suggested TENS might be safe and effective for treating neurogenic LUTD, the evidence base is poor and more reliable data from well-designed RCTs are needed to make definitive conclusions.

Other Experimental Interventions:

*Tissue Engineering*
Zhang and Liao (2014) stated that bladder augmentation with enterocystoplasty is the gold standard therapy for neurogenic bladder. The presence of gastrointestinal segments in the urinary tract has been associated with many complications. These researchers investigated an alternative approach using small intestinal submucosa as scaffold for reconstruction. They selected 8 candidates with poor bladder capacity and compliance for small intestinal submucosa cystoplasty. Candidate age ranged from 14 to 54 years, and included 6 patients with myelomeningoceles and 2 patients with SCI. Serial urodynamics, cystograms, ultrasonography and serum analyses were used to assess the outcomes of surgery. Follow-up range was 11 to 36 months (mean of 12). Compared to the pre-operative findings there were significant increases in maximum bladder capacity ($p < 0.05$) at the 3 and 12-month follow-up (170.1 ± 75.7 ml pre-operatively, 365.6 ± 68.7 ml at 3 months and 385.5 ± 52.8 ml at 12 months), an increase in bladder compliance ($p < 0.01$) at the 12-month follow-up (5.9 ± 4.1 ml/cm H2O pre-operatively and 36.3 ± 30.0 ml/cm H2O at 12 months) and a decrease in maximum detrusor pressure ($p < 0.05$) at the 12-month follow-up (43.6 ± 35.7 cm H2O pre-operatively and 15.1 ± 7.6 cm H2O at 12 months). Bowel function returned promptly after surgery. No metabolic consequences were noted and no urinary calculi were observed. Renal function was preserved. The authors concluded that small intestinal submucosa can be used as a scaffold for rebuilding a functional bladder; tissue engineering technology provides a potentially viable option for genitourinary reconstruction in patients with neurogenic bladder.

Taweel and Seyam (2015) stated that neurogenic bladder dysfunction due to SCI poses a significant threat to the well-being of patients. Incontinence, renal impairment, urinary tract infection, stones, and poor QOL are some complications of this condition. The majority of patients will require management to ensure low pressure reservoir function of the bladder, complete emptying, and dryness. Management typically begins with anti-cholinergic medications and
intermittent catheterization. Patients who fail this treatment because of inefficacy or intolerability are candidates for a spectrum of more invasive procedures. Endoscopic managements to relieve the bladder outlet resistance include sphincterotomy, botulinum toxin injection, and stent insertion. In contrast, patients with incompetent sphincters are candidates for trans-obturator tape insertion, sling surgery, or artificial sphincter implantation. Coordinated bladder emptying is possible with neuromodulation in selected patients. Bladder augmentation, usually with an intestinal segment, and urinary diversion are the last resort. The authors stated that tissue engineering is promising in experimental settings; however, its role in clinical bladder management is still evolving.

**Alpha-Blockers**

Kroll and colleagues (2016) evaluated the usefulness of selective alpha 1-blockers in children with neurogenic urinary tract dysfunctions (neurogenic bladder) and increased leak point pressure (LPP). A total of 14 children aged 6 to 16 years with neurogenic bladder and LPP greater than 40 cm H₂O were enrolled in the study. All patients received a selective alpha 1-blocker, Cardura (doxazosin mesylate), for 6 to 8 weeks with an initial dosage of 0.03 mg/kg. During the observation period the continuation of oral anti-cholinergics, clean intermittent catheterization (CIC), observation of "urinary dryness" and urinary incontinence periods were recommended. Patients were scheduled for a follow-up visit and urodynamic investigation after 6 to 8 weeks after the doxazosin therapy was started. In 4 patients, urine leakage occurred at lower pressures; in 9 patients, no significant changes in urine leak point pressures were detected; in 3 patients, there was a significant increase in the bladder capacity; in 1 patient, deterioration in continence was noted. The differences both in LPP and LPV before and after the treatment were not statistically significant. The authors concluded that their observations were consistent with the conclusions from other studies and showed no evident effectiveness of doxazosin in children with neurogenic bladder.
**Beta-Agonists**

Wollner and Pannek (2016) stated that in patients with NLUTD due to SCI, neurogenic detrusor overactivity (NDO) can cause both deterioration of the upper urinary tract and urinary incontinence. Anti-muscarinic treatment is frequently discontinued due to side effects or lack of efficacy, whereas injection of onabotulinumtoxin into the detrusor is a minimally invasive procedure with risks of urinary retention, infection and hematuria. Myrbetriq (mirabegron), a new beta-3 agonist, is a potential new agent for treatment of NDO. In a retrospective chart analysis, these researchers evaluated the effectiveness of mirabegron in SCI patients with NLUTD. A total of 15 patients with NDO were treated with mirabegron for a period of at least 6 weeks. Significant reduction of the frequency of bladder evacuation per 24 hours (8.1 versus 6.4, \( p = 0.003 \)), and of incontinence episodes per 24 hours (2.9 versus 1.3, \( p = 0.027 \)) was observed. Furthermore, These researchers observed improvements in bladder capacity (from 365 to 419 ml), compliance (from 28 to 45 ml/cm H(2)O) and detrusor pressure during storage phase (45.8 versus 30 cm H(2)O). At follow-up, 9/15 patients were satisfied with the therapy, 4/15 reported side effects (3 × aggravation of urinary incontinence, 1 × constipation). The authors concluded that mirabegron may evolve as an alternative in the treatment of NDO. They observed improvements in urodynamic and clinical parameters. However, these investigators stated that due to the limited number of patients and the retrospective nature of the study, prospective, placebo-controlled studies are needed to ascertain the value of beta-agonists in patient with NLUTD.

**Bulking Agents**

In a review on “Management options for sphincteric deficiency in adults with neurogenic bladder”, Myers et al (2016) stated that bulking agents have a very poor success as either a primary or secondary treatment of neurogenic intrinsic sphincteric deficiency.
Radiofrequency Ablation of Sacral Nerves

Jo and colleagues (2016) noted that little research has been expended on the use of bipolar radio-frequency (RF) ablation of sacral nerves in SCI patients with NDO, and no study has been undertaken to demonstrate its long-term effect. In a prospective, randomized controlled feasibility study, these researchers examined the effect of bipolar RF ablation of the 2nd and 3rd sacral nerves over 2 years in SCI patients with NDO. A total of 10 SCI patients with NDO were recruited. These patients were randomly assigned to 2 groups: (i) the intervention group (n = 5), and (ii) the control group (n = 5). Control group members received optimized conventional treatment. International Consultation on Incontinence Questionnaire (ICIQ), 3-day voiding diary, and the urinary incontinence QOL scale (I-QOL) data were obtained at baseline and at 6, 12, and 24 months after intervention. Urodynamic study (UDS) was performed at baseline and 24 months after intervention. In the intervention group, percutaneous bipolar RF neurotomy was performed on both S2 and S3 nerves in each patient. Frequency of urinary incontinence and ICIQ and IQOL scores showed significant effects for time and for the group x time interaction (p < 0.05). Daily mean volume of urinary incontinence showed only a significant group effect. In UDS parameters, comparisons of values at baseline and at 24 months revealed all variables showed significant intergroup differences (p < 0.05). The authors concluded that percutaneous bipolar RF ablation of sacral nerves S2 and S3 effectively reduced urinary incontinence and improved QOL in SCI patients with NDO and the effects lasted over 2 years. The main drawback of this study was its small sample size (n = 10).

Temporary Urethral Stents

Matillon and colleagues (2016) stated that temporary prosthetic sphincterotomy is a possible treatment for neurologic detrusor sphincter dyssynergia (DSD). In a prospective, non-comparative, single-center study, these researchers verified the feasibility and effectiveness of the
urethral stent (US) Temporary ALLIUM BUS "BULBAR URETHRAL STENT". This study included patients over 18 years, with a neurologic DSD proved urodynamically for which medical treatment was not indicated or failed. The primary end-point was the percentage of patients who had a voiding method considered as improved or much improved at 1 month and the feasibility of the procedure. From January to June 2015, a total of 7 patients, (mean age of 47.9 years [24 to 76]) were prospectively enrolled. One patient was lost to sight at 1 month and therefore excluded. The median follow-up was 8.1 months (1 to 10). All procedures were technically successful. At 1 month, there were 57 % of grade 2 complications (Clavien-Dindo), 1 of 6 patients had a migration of the US. At 1 month, QOL and the urologic situation was considered good in 3 patients, unchanged in 2 patients and decreased in 1 patient. The study was stopped after the inclusion of 7 patients. At the date of the latest news, 5 of 6 patients had a migrated or an explanted US. The authors concluded that the temporary urethral stent ALLIUM BUS did not appear to be a possible surgical alternative for the treatment of DSD.

<table>
<thead>
<tr>
<th><strong>CPT Codes / HCPCS Codes / ICD-10 Codes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Information in the [brackets] below has been added for clarification purposes. Codes requiring a 7th character are represented by &quot;+&quot;:</td>
</tr>
<tr>
<td><strong>ICD-10 codes will become effective as of October 1, 2015:</strong></td>
</tr>
<tr>
<td><strong>CPT codes covered if selection criteria are met:</strong></td>
</tr>
<tr>
<td>S1960</td>
</tr>
<tr>
<td><strong>ICD-10 codes covered if selection criteria are met:</strong></td>
</tr>
<tr>
<td>G83.4</td>
</tr>
<tr>
<td>N31.0 - N31.9</td>
</tr>
</tbody>
</table>
The above policy is based on the following references:

**Enterocystoplasty**


**Transurethral Electrical Bladder Stimulation**


Other Experimental Interventions:


Amendment to
Aetna Clinical Policy Bulletin Number: 0852
Neurogenic Bladder: Selected Treatments

There are no amendments for Medicaid.

www.aetnabetterhealth.com/pennsylvania
Revised 04/2017