

# Durable Results of Mitomycin C Injection with Internal Urethrotomy for Refractory Bladder Neck Contractures: Multi-institutional Experience

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## Abstract

**Introduction:** We evaluated our intermediate term experience with radial urethrotomy and intra-lesional mitomycin C injection in patients with recurrent bladder neck contractures. Recurrent bladder neck contractures in which previous endoscopic treatment failed pose a difficult management dilemma.

**Methods:** Prospectively collected data were reviewed in a retrospective manner of patients presenting with recurrent bladder neck contractures from January 2007 to June 2014. All patients had at least 1 prior failed incision of a bladder neck contracture and many had additional dilations or catheter dependence. Radial cold knife incisions of the bladder neck were performed followed by injection of 0.3 to 0.4 mg/ml mitomycin C at each incision site. All surgeons performed the incision technique and injection in a reproducible fashion.

**Results:** A total of 40 patients underwent urethrotomy with mitomycin C injection. At a median followup of 20.5 months 30 patients (75.0%) had a stable bladder neck after 1 procedure. An additional 5 patients required 2 procedures to obtain a stable patent bladder neck (87.5%). Of the 40 patients 14 (35.0%) presented in retention on catheter drainage and all had a stable, patent bladder neck. No recurrence was detected in the original 18 patients in the pilot study with patent bladder necks. Rigorous followup revealed no long-term complications.

**Conclusions:** Urethrotomy with mitomycin C injection for the management of recurrent bladder neck contractures is safe and efficacious. The addition of an antifibrotic agent in conjunction with internal urethrotomy offers a definitive solution to a problem that would otherwise be managed with repeat urethral incision/dilation, catheter dependence or open bladder neck reconstruction.

**Key Words:** mitomycin, urinary bladder neck obstruction, contracture, urethral stricture

## Abbreviations and Acronyms

BNC = bladder neck contractures

DVIU = direct vision internal urethrotomy

MMC = mitomycin C

RP = radical prostatectomy

Submitted for publication October 22, 2014.

Study received institutional review board approval.

No direct or indirect commercial incentive associated with publishing this article.

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The reported incidence of bladder neck contractures after open RP ranges between 0.5% and 25.7%.<sup>1-4</sup> BNC have been linked to a wide range of factors related to surgical technique, patient comorbidities and perioperative complications. The majority of these contractures are successfully managed with urethral dilation or urethrotomy. Although

uncommon, recalcitrant bladder neck or anastomotic contractures are challenging to manage. Treatment options include self-catheterization, repeat endoscopic dilation or urethrotomy, stent placement and open bladder neck reconstruction.

Although numerous studies have evaluated the efficacy of urethrotomy,<sup>3,5,6</sup> most reports have limited followup and lack long-term results demonstrating sustained efficacy despite multiple endoscopic treatments. In 1 series 22 of 52 patients (42%) required multiple endoscopic procedures.<sup>7</sup> Bladder neck reconstructive surgery is complex, and requires an experienced, skilled surgeon familiar with abdominal and perineal approaches. Urethral stents were previously a management option but are no longer commercially available in the United States for BNC.<sup>8</sup> In the most severe cases of BNC, secondary to a distraction defect or extensive radiation damage, patients and/or surgeons may abandon the lower urinary tract and opt for urinary diversion.

We previously described the first experience of our novel approach with urethrotomy and intralesional mitomycin C injection, and demonstrated that the technique is a safe and efficacious method of treating recurrent BNC.<sup>9</sup> MMC is a well studied agent used for its antifibrotic properties. It has been reported in the ophthalmology literature for several decades with proven success and was first described for pterygium surgery in the 1960s. Randomized trials have shown a dramatic decrease in the rate of recurrence with the adjunctive use of MMC.<sup>10</sup> In clinical studies across many medical disciplines MMC has increased the success rate for the treatment of recurrent strictures and scar formation, including trabeculectomy for glaucoma, laryngeal and tracheal stenosis, and myringotomy for otitis media.<sup>11–15</sup> We report our intermediate and long-term safety and efficacy outcomes for a large experience of patients with recurrent BNC treated with radial urethrotomy and intralesional MMC injection.

## Subjects and Methods

After approval was obtained by the respective institutional review boards, a retrospective review was conducted of consecutive patients with recurrent BNC during a 7-year period (January 2007 to June 2014). Diagnosis of BNC was suspected based on clinical history, symptoms, voiding difficulties and urinary retention, and confirmed with cystoscopy (inability to pass a 17Fr flexible cystoscope). Preoperative urine cultures were treated and preoperative antibiotics were given to all patients. Data collected included presenting complaints, catheter or clean intermittent catheterization dependence, surgical history, use of adjuvant

ablative therapy and prior attempts at treating BNC. All surgeons performed the incision technique and injection in a reproducible, consistent fashion. Patient privacy and confidentiality are protected according to HIPAA guidelines.

### *Inclusion Criteria*

All patients included in the study had clinically obstructive urinary symptoms and BNC as precisely defined, and at least 1 prior failed incision of BNC. The majority of patients had undergone multiple procedures, including incision and dilation, or were catheter or procedure dependent. All patients were counseled and they understood that MMC was being used as an antifibrotic agent in an off label manner.

### *Exclusion Criteria*

Patients were excluded from analysis if they had complete anastomotic obliteration due to a distraction defect, strictures involving the entire prostatic urethra and de novo bladder neck contracture, and had not been offered standard therapy.

### *Operative Technique*

The details of the technique have been previously published.<sup>9</sup> DVIUs (3 to 4, preferably 4) are performed with a cold knife at 2, 4, 8 and 10 o'clock. A cold knife incision technique is used to avoid thermal damage and the propagation of further scar that can be seen with energy based incisions. Incisions were carried through the complete thickness of the scar to the level of a vascular bed to a minimum opening to 26Fr (fig. 1). Injection of 0.3 to 0.4 mg/ml MMC (7.5 cc MMC/25 cc normal saline) was performed using a Sidekick needle (Boston Scientific, Natick, Massachusetts) at the base of each incision site (fig. 2). For strictures less than 1 cm, 1 cc MMC was injected into the groove of the incision. For strictures 1.5 to 2 cm in length, 2 cc MMC were injected into each groove, delivering 1 cc proximal and 1 cc distal.

### *Postoperative Evaluation*

Postoperative evaluation included voiding history, uroflow, post-void residual and flexible cystoscopy at 3, 6, 9 and 12 months. If the bladder neck remained stable at 12 months, patients were then followed on a yearly basis. Success was defined as a bladder neck patent to a greater than 17Fr flexible cystoscope without the need for any additional catheterizations or procedures (fig. 3). Patients in whom

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