



6.1.3. A SIMPLE CYSTOTOMY MAY NOT BE SO SIMPLE

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Cystotomy is one of the most common surgical procedures in small animal surgery; it is most often performed for removal of uroliths. However, “cystotomy failure” occurs in up to 20% of cases, meaning stones are left behind in the bladder or urethra. For radio-opaque stones, this can easily be avoided by performing postoperative abdominal radiographs while the animal is still under general anesthesia to ensure stone removal. If stones are visualized, the animal is taken back into the operating room to locate and remove the residual stones. Radiolucent stones are more challenging as obviously postoperative abdominal radiographs would not be helpful. Bladder ultrasound is confounded by significant gas artifact following surgery. Contrast studies (e.g., positive contrast cystourethrogram) are not recommended due to concerns about leakage of contrast from the cystotomy incision. In these cases, and in general, good surgical technique can minimize the risk of leaving stones behind.

Cystotomy is performed from a routine caudal abdominal approach. Exteriorize the urinary bladder and pack off the rest of the abdominal cavity. Place stay sutures at the apex and trigone on the ventral aspect of the bladder; any suture material can be used. Suture ends should be quite long and secured with mosquito hemostatic forceps. An assistant can hold the stay sutures to gently pull the bladder cranially; alternatively, the hemostats can be secured to the surgical drapes if no surgical assistance is available. A stab incision is made into the lumen of the bladder using a fresh #11 or #15 scalpel blade and the urine is removed with suction. Complete the ventral cystotomy using Metzenbaum scissors. Calculi are removed from the bladder using forceps, spoon, or other smooth and blunt instrument. A urethral catheter is passed multiple times both normograde and retrograde to make sure that no stones remain in the bladder neck or urethra.

The urinary bladder is unique in that it regains nearly 100% of its original tensile strength by 14 days. Therefore, synthetic absorbable suture material is most suitable for cystotomy closure. Monofilament suture is preferred as there is some concern that contact between urine and multifilament suture may lead to an increased rate of absorption or may promote urolith formation. Nonabsorbable suture and staples are contraindicated in urinary bladder closure, as they are associated with the formation of urinary calculi.

There are several suture patterns that can be used to close the urinary bladder. The surgical goals are to minimize tissue trauma, create a watertight seal, and avoid promotion of calculi formation. Options for cystotomy closure include:



- Single-layer simple interrupted pattern
- Single-layer simple continuous pattern
- Two-layer appositional continuous pattern
- o Partial thickness simple continuous pattern followed by,
- o Partial thickness Lembert pattern
- Two-layer inverting continuous pattern
- o Partial-thickness Cushing pattern followed by,
- o Partial-thickness Lembert pattern

It has been shown that there is no difference in circular bursting wall tension of urinary bladders closed with single-layer simple interrupted appositional pattern versus a two-layer continuous inverting closure, and clinical outcomes are similar. Luminal compromise may occur if two-layer inverting patterns are used in urinary bladders with severely thickened walls. Most surgical texts state that the lumen of the bladder should not be entered with suture material. Urinary calculi formation has been associated with multifilament absorbable suture, nonabsorbable suture, and metal staples, however, there have been no studies assessing the lithogenic potential of the newer monofilament absorbable sutures. Full-thickness purchase of the bladder wall guarantees incorporation of the submucosal holding layer. Single layer partial-thickness closures of the urinary bladder that miss the submucosa may be inadequate for preventing urine leakage.

For simple cystotomy, a single-layer full-thickness simple continuous pattern is preferred by the author due to increased efficiency and decreased amount of suture material used.

- Start the cystotomy closure at the trigone to improve visualization and avoid suturing to the dorsal wall mucosa.
- Begin a single-layer, full-thickness simple continuous pattern 2 to 3 mm away from the commissure of the incision.
- Place suture bites 3 mm apart and 3 mm from each edge incorporating all layers. (If the bladder mucosa is markedly everted, suture bites should come up in the middle and redirected instead of taking a suture bite across the incision all at once.)
- Trail the suture line cranially you such that the suture material is snug against the bladder wall.
- Finish the suture pattern 2 to 3 mm beyond the edge of the incision. Tie surgical knots securely using 5 to 6 throws.

Once the cystotomy closure is complete, assess and critique the closure for appropriate spacing and tightness. Place additional simple interrupted suture if necessary. Gently



lavage the area, remove the stay sutures, and return the bladder to the abdominal cavity. Once the abdomen is closed, perform postoperative abdominal radiographs to document complete stone removal. The animal is typically recovered without a urethral catheter in place. Pollakiuria and hematuria are expected for 3 to 5 days postoperatively. If not contraindicated, nonsteroidal anti-inflammatory drugs can be very beneficial for pain management in postoperative period.

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