MANAGEMENT OF URINARY DRAINAGE TUBES AND DRAINS
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**PRINCIPLE:** Urologists are called upon to ensure that urinary flow is ongoing, uninterrupted and, if not, to make it flow as normally as possible.

The etiology of the various abnormalities that impede urine flow are too numerous to enumerate in this presentation. However, obstructive uropathy including anatomic, secondary to renal, ureteral and bladder calculi, tumors, etc., are the main reasons.

We will list the various drains and their management.

**A. KIDNEY - Nephrostomy tubes.**
These are either placed percutaneously and are of a smaller caliber or placed open surgically or after percutaneous lithotripsy and these are usually of a larger caliber.

**NEPHROSTOMY TUBE REMOVAL PRINCIPLE:** There has to be unimpeded flow of urine from the kidney and out the urethra prior to removal of the nephrostomy tube. Caution should be exercised even if there is an indwelling ureteral stent, because an outlet obstruction such as an enlarged prostate or neurogenic bladder can impede healing.

*In case of doubt*, perform a nephrostogram and check for bladder emptying problems, if any.

**B. URETER -** The ureter is drained with a ureteral stent. This is placed antegrade by a percutaneous approach or traditionally and classically, the urologist places this in a retrograde manner using a cystoscope.

An antegrade nephro-ureteral stent is also placed, usually percutaneously. The nephro-ureteral stents are of 2 kinds.

i) They traverse the skin, curl in the renal pelvis and go down all the way into the bladder with a curl within the bladder.

ii) Alternatively, the nephro-ureteral stent may be designed so as to end in the ureter and not in the bladder. In some instances, this has been found to decrease patient discomfort because of the fact that the stent does not irritate the bladder mucosa.

**Caution:** these stents, especially those placed with more invasive / means, need to be removed using the same principles in that there I should be no distal obstruction.

*In case of doubt* perform a nephrostogram, especially if a nephro-ureteral stent is in place

**C. BLADDER -** The bladder is drained with a suprapubic cystostomy tube. These are placed:

1. Percutaneously and usually of a smaller caliber.

2. Open surgically - usually of a larger caliber.

**Caution:** these tubes are also removed after ensuring that there is no extravasation or no distal obstruction and after the healing process is completed.

In case of doubt, perform cystogram to ensure that there is no extravasation or no distal obstruction.

**INDICATIONS FOR PLACING THE ABOVE-MENTIONED INTRA-URINARY DRAINAGE TUBES:**

1. Drain urine distally or promote its drainage distally. In some instances, antegrade drainage through a nephrostomy tube could be life saving.

2. To unblock an obstructed kidney in the face of obstruction and especially so in the face of obstruction and associated infection. This again, is a life-saving procedure.

3. Promote healing following endoscopic procedures and open surgical procedures.

4. Decreased adverse events (such as in post ESWL, etc.).

**USE OF EXTRA-URINARY TRACT DRAINAGE TUBES:**

1. **Closed suction drains** (Jackson-Pratt, etc.). These have a suction component to it, so as to ensure that any urinary extravasation is promptly drained out of the abdominal cavity.

2. **Non-closed drainage tubes** (Penrose drains).

   The advantages of closed suction system is the fact that one can quantitate the amount of urine collected and it can also collect urine for checking a creatinine level prior to removal.

**INDICATIONS FOR THE DRAINS:** When the integrity of the urinary tract has been compromised either surgically, secondary to trauma or iatrogenically.

**PRINCIPLES OF DRAIN MANAGEMENT:** Drains are a source of infection. The longer the external drainage tubes are present, the greater the chances of infection. The longer the tube remains, the multiplicity of organisms increase.

Prior to removal of any long term externally draining urinary drainage tubes check the following:

Ensure that the patient is clinically ready for the drain removal. This means that the purpose for which the drain has been placed has healed, the patient is clinically stable, there are no p.o. intake issues, no nausea and vomiting, no fever, chills, or flank pain.

Once this has been established and the drain is ready to be removed:

A. Obtain a sterile aspirated urine for culture.

B. Culture-specific antibiotics are given for at least 24 to 48 hours prior to removal of a longstanding drainage or externally draining tube.

C. Avoid long-term culture specific antibiotics since this will lead to resistant organisms.
D. Prior to removal of the drain, ensure that the creatinine level is normal and matches the serum levels. For example, if the patient's serum creatinine is 2.4, one would expect that the fluid in the JP drain is also around 2.4, but not higher.

**COMPLICATIONS OF EARLY REMOVAL OF DRAINS:** The primary problem with premature removal of urinary drains (i.e., JP or Penrose) are urinoma formation. A urinoma, especially if significant, can lead to a closed collection of fluid or it could be diffusely spread within the abdomen causing urinary ascites and peritonitis.

Management of urinomas then involves further intervention which increases the management issues, cost, medical, legal, etc.

**PRINCIPLES OF DRAIN MANAGEMENT FOLLOWING INCISION IN THE URINARY TRACT:**

1. In a surgically incised procedure such as nephrolithotomy, pyelolithotomy, ureterolithotomy for stone disease.

2. Also, pyeloplasty, ureteral surgery such as end-to-end anastomosis, ureteral reimplantation, cystotomy, etc., or for reconstructive procedures.

**The factors for removal depend on the following:**

1. Was the procedure intra versus extraperitoneal?

2. How secure was the closure? Was the closure done using continuous sutures or interrupted?

3. How is the distal drainage, i.e., does the patient have a lower urinary tract obstruction or is a Foley catheter present?

4. What is the nutritional status, age, and systemic diseases that could impede the healing process?

**RECOMMENDATION:**

A. Record the daily JP output.

B. Since there was incision into the urinary system, one has to ensure that the healing process is complete and thus the JP drain should not be removed for 4 to 5 days.

C. Check creatinine levels, especially if the procedure was intraperitoneal since the JP may be suctioning out peritoneal fluid. D. Of course, the patient should have a negative abdominal exam and has normal appetite and no abdominal symptoms prior to the decision to remove the JP drain.

**DRAIN REMOVAL FOLLOWING RADICAL PROSTATECTOMY:**

A. Recall the status of the anastomotic suturing.

B. Recall the bladder irrigation after the anastomosis. Was there any extravasation of the irrigation fluid?

C. Were there any unusual events such as a rectal excursion?

D. Has the patient ambulated, appetite normal, no nausea, no abdominal signs, no fever, no chills.
In case of doubt, check the creatinine level in the JP fluid. If in doubt or any concerns, leave the JP in for removal in the clinic in 48 to 96 hours.

Patients discharged with JP drains should record daily output.

**MANAGEMENT OF DRAINS INVOLVING BOWEL SURGERY:** Usually, the bowel is used for an ileal conduit, neo-bladder and for augmentation cystoplasty.

The management of the JP when there is a bowel interface is totally different from those mentioned above, especially with complex procedures such as a neo-bladder and cystoplasty.

**PROBLEMS WITH BOWEL USAGE:** Mucous production is a major problem with using intestinal segments, especially with colonic segments. Procedures such as a neo-bladder using the small bowel where there is a significant length of small bowel used, modified Indiana pouch where the large bowel secretes a larger amount of mucus, does present a challenge for management of drains.

**CAUTION:** Since the neo-bladder and modified Indiana pouches require irrigation immediately after surgery, the integrity of the single layer running sutures can be easily compromised.

Even if the intraoperative irrigation did not show any extravasation of fluid, it is very likely that the irrigation process immediately postoperatively can compromise the suturing sites.

Caution, do not remove these JP drains for a minimum of 1 week. Ideally in these patients, it is not unusual to perform a cystogram prior to removal of the last JP drain.

The consequences of premature removal of drains are significant. Though the adverse events overall are low, when a patient does have a urinoma or urinary extravasation because of a non-healing of a bowel segment, the replacement of a JP tube could become a major production.

**MANAGEMENT OF DRAINS POST PARTIAL NEPHRECTOMY:**

- This JP drain measures urine output and any bleeding.

**CAUTION:**

- Check creatinine levels
- Ensure that patient's H & H are stable and that patient is stable and ambulating.
- Leave drain for at least 48 hours, in case of doubt, leave it in longer, and remove in urology clinic.

**CONCLUSION:** Be aware of the basic principles and indication for placement of a urinary drain both within the collecting system and outside the collecting system.

1. In case of doubt, leave it in for a longer period of time.
2. Ensure there is no distal obstruction.
3. Bowel segments surgery need a minimum of at least a week of drainage.