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## Ultrasound-Guided Morcellation During Difficult Holmium Laser Enucleation of the Prostate (HoLEP)

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### Abstract

**Objective**—To demonstrate how bladder ultrasound can be useful in completing morcellation during difficult Holmium Laser Enucleation of the Prostate (HoLEP). As HoLEP has emerged as a standard of care for the treatment of benign prostatic hyperplasia, multiple studies have reported the potentially catastrophic complication of bladder injury during morcellation. This video aims to assist any urologist performing HoLEP by providing step-by-step instruction for using ultrasound to complete morcellation safely.

**Methods**—Enucleation is performed using a 26-French continuous flow scope, off-set laser bridge with a laser stabilization catheter, and a 550 $\mu$ m holmium laser fiber. Once the median and lateral lobes have been enucleated, the inner sheath is removed and the nephroscope is inserted to facilitate morcellation. Under dual inflow irrigation, the Piranha morcellator (Richard Wolf, Knittlingen, Germany) is introduced and set to the manufacturer's recommended settings of 1,500 rpm. A 3.5-MHz convex abdominal ultrasound transducer (Hitachi Prosound Alpha 7; Hitachi Aloka Medical America, Wallingford, CT) under B-mode is used to visualize the bladder,

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predominantly in the sagittal orientation. Morcellation proceeds under simultaneous ultrasound and direct cystoscopic guidance.

**Results**—The distended bladder is visualized concurrently with the ultrasound and via the nephroscope as the Piranha engages the adenoma and begins morcellation. Once the adenoma is engaged, the operator then drops their hands to place the morcellator in the center of the bladder. Ultrasound provides real-time feedback as to the location of the morcellator in relation to the adenoma and bladder.

**Conclusion**—This video highlights the use of intraoperative bladder ultrasound as a visual aid to assist during the morcellation portion of HoLEP. This proof of concept demonstrates that ultrasound can be an additional tool to utilize during difficult cases when cystoscopic visualization during morcellation is limited.

### Keywords

holmium laser enucleation of the prostate (HoLEP); morcellation; ultrasound

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### Voice-over transcript for:

Ultrasound-Guided Morcellation During Difficult Holmium Laser Enucleation of the Prostate (HoLEP)

- 0:00** Ultrasound Guided Morcellation During Difficult Holmium Laser Enucleation of the Prostate
- 0:05** HoLEP has emerged as a standard of care in the treatment of men with BPH. The operation is comprised of 2 main parts. First, laser enucleation is performed separating prostate adenoma from the surgical capsule. All enucleated adenoma is then placed into the bladder. Numerous studies have described the steep technical learning curve associated with this portion of the operation.
- 0:31** Following enucleation, the 2<sup>nd</sup> portion of the operation involves morcellating all enucleated tissue present in the bladder. Specific to morcellation, it is crucial that adequate endoscopic visualization be present and that the bladder remains distended. Studies have also shown that potentially catastrophic bladder injuries can occur in up to 6% of case series, likely secondary to bleeding resulting in poor visualization.
- 0:58** The aim of this study was to describe the use of bladder ultrasound as a tool available for any Urologist learning HoLEP, to assist in safely completing the morcellation portion of the operation.
- 1:10** Starting in the AP view, approximately 2 finger-breaths above the pubic symphysis, a 3.5MHz abdominal probe is used. Scrolling back and forth, the operator can clearly visualize the enucleated adenoma residing in the bladder.
- 1:28** Continuing with scrolling, one can also usually see the enucleation defect within the prostatic fossa.

- 1:38** We have found the sagittal orientation to be easier to use. Once again approximately 2 finger-breaths above the pubic symphysis, fanning the ultrasound probe first to the patient's right, and then to the left, allows one to see the different areas of the bladder with the contained enucleated prostate tissue.
- 2:00** The scope and morcellator can also be seen quite clearly on ultrasound. In the sagittal view, notice how the tip of the morcellator can be seen entering the bladder beyond the tip of the scope. At this point, the operator can now see the location of the tip of the morcellator in relation to the adenoma and the bladder wall. One can also maintain how much distention is present within the bladder.
- 2:25** In the usual technique of placing the morcellator underneath the adenoma to scoop it into the blades, the morcellator can be seen with the engaged adenoma and the operator can then adjust to the center of the bladder to safely begin morcellation.
- 2:41** We have found this simultaneous bladder ultrasound quite useful in helping trainees develop the proper technique of morcellation. Specifically, ultrasound provides the operator with a concurrent, wider view of the surgical field, thereby showcasing the relative locations of the morcellator with respect to the borders of the bladder and the remaining adenoma.
- 3:05** Moreover the additional visual feedback can be extremely useful in cases where there is poor visualization either from increased vascularity and bleeding, or poor optics from the equipment being used.
- 3:17** Meanwhile, at the conclusion of the case, ultrasound can be used to confirm that there are no remnant pieces of adenoma residing in the bladder.
- 3:25** Since first performing HoLEP in 2017, we have performed 157 cases. A single superficial bladder injury occurred during our 14<sup>th</sup> case. Subsequently we have had an ultrasound available for every HoLEP case and experienced no subsequent bladder injuries. In particular, we had 9 specific cases where ultrasound was essential to completing morcellation safely.
- 3:51** In summary, bladder ultrasound during morcellation helps the operator confirm a distended bladder, the position of the morcellator in the center away from the bladder wall, and that there are no residual pieces of adenoma
- 4:05** Certainly, ultrasound is not necessary for the vast majority of HoLEP cases and a limitation of this is that it requires another person to perform the concomitant ultrasound.
- 4:15** However, in difficult cases where cystoscopic visualization is suboptimal, ultrasound should be utilized as another tool in the Urologist's toolbox, to help minimize the chances of a potential bladder injury.
- 4:27** Thank you for your attention.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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