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The T-incision: A Practical Approach to Initiating Apical Dissection in Prostate Enucleation

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Abstract

Holmium:YAG laser enucleation of prostate (HoLEP) and thulium fiber laser enucleation of prostate (ThuFLEP) are advanced surgical techniques for treating benign prostatic obstruction, both being forms of Anatomical Endoscopic Enucleation of Prostate. These procedures have evolved to provide enhanced efficacy, reduced operation times, and improved continence outcomes. One key factor for preserving continence is early apical release (EAR), a delicate technique that involves releasing the apical mucosa to prevent damage to the external urethral sphincter. This video-article explores a practical and safe technique involving a T-incision-combining anterior commissurotomy and anterior plane dissection-performed at the beginning of the enucleation process. Two cases, one using ThuFLEP and the other HoLEP, were edited to emphasize the T-incision's role in facilitating EAR. Results demonstrated that both techniques utilized the T-incision to ease the dissection of the external sphincter complex, improving enucleation and connecting the lateral to anterior planes. The study found differences between the two lasers, with ThuFLEP offering better coagulation and precision, and HoLEP excelling in dissection and tissue preservation. Both patients had short hospital stays, rapid catheter removal, and full continence by postoperative day 10. The T-incision, especially during the learning phase of the procedure, aids in smoother dissection, facilitates easier alignment of enucleation planes, and may accelerate a surgeon's learning curve. This video-article highlights the replicability and benefits of the T-incision in both HoLEP and ThuFLEP surgeries.

Keywords: HoLEP, ThuFLEP, early apical release, T-incision, enucleation, benign prostatic obstruction, external urethral sphincter, learning curve

Introduction

Holmium:YAG (Ho:YAG) laser enucleation of prostate (HoLEP) and Thulium fiber laser enucleation of prostate (ThuFLEP), which are subtypes of anatomical endoscopic enucleation of prostate (AEEP), are the most versatile and efficient surgical techniques for the treatment of benign prostatic obstruction (BPO) due to the latest developments in surgical and laser technologies. The surgical technique has evolved throughout the years to provide the best outcomes possible in terms of efficacy, operation duration, and continence. There are different approaches to enucleation of the adenomas, such as en-bloc, two-lobe, or three-lobe techniques. Although the choice mainly depends on the surgeon's preference, there are studies showing advantages of the en-bloc technique over the others (1,2).

The most important step for the preservation and early recovery of continence is the apical dissection during AEEP. Early apical release (EAR) at the beginning of the enucleation process has been shown to reduce incontinence rates to a great extent (3). Regardless of the enucleation technique, EAR should be carried out to preserve the external urethral sphincter.

EAR is a technique that is delicate and hard to master. With this video-article, we aim to describe a technique that is both practical and safe which combines anterior commissurotomy and anterior plane dissection using a T-incision.

Materials and Methods

For this video article, two prostate enucleation videos are edited and combined. In both surgeries, EAR is performed to preserve

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the external sphincteric complex and thus maintain continence. In the first video, a ThuFLEP surgery is depicted where the T-incision is performed before marking and detachment of the apical mucosa. In the second video, the T-incision is performed after marking of the apical border of the enucleation and detachment of the apical mucosa (Figure 1). The videos are edited for content and speed to better emphasize the T-incision effect on the EAR process.

Although the videos are anonymously edited and prepared, informed consent is taken from the patients for the use of video recordings for scientific purposes and for publishing in scientific journals.

Results

Both patients underwent en-bloc enucleation of prostatic adenomas. In both patients, the EAR technique was used, with a T-incision performed at the beginning. The effect of different lasers on dissection, cutting, and coagulation of the tissues showed marked differences, which is an expected outcome due to the different wavelengths of the lasers used. The Thulium fiber laser showed better coagulation and more precise cutting, while Ho:YAG showed better dissecting properties of the enucleation plane and lower charring of the prostatic tissues. In both patients, the T-incision was useful to lower the apical part of the prostate, and to make it easier to connect the lateral planes to the anterior plane.

The prostate volume was 60 g for ThuFLEP and 90 g for the HoLEP surgery. The overall time spent on the total dissection of the external sphincteric complex was comparable between the two different surgeries, being 12 min for ThuFLEP and 10 min for HoLEP, with the total enucleation duration being 40 min for ThuFLEP and 45 min for HoLEP. In both patients, the catheter was removed on postoperative day 2, and the patients were discharged without any complications. Both patients were continent on postoperative day 10.

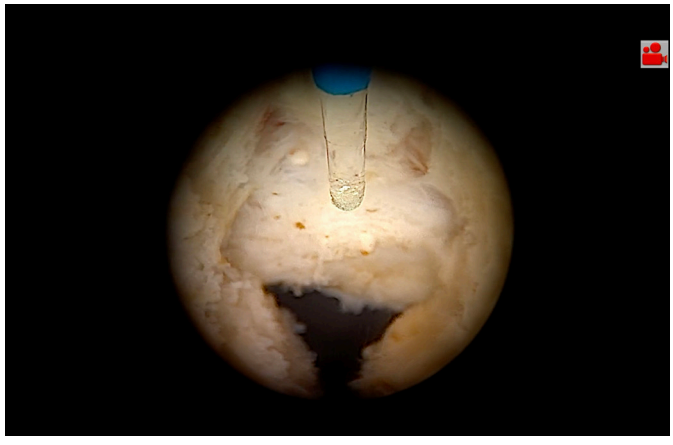

Figure 1. The T-incision

In these videos, the HoLEP procedures begin with apical mucosal incisions, which circumferentially separate the apical prostatic mucosa from the sphincteric mucosa. Subsequently, a T-incision is performed by making a full-thickness incision at the 12 o'clock position, starting from the bladder neck and extending to the apex. The anterior plane is then expanded horizontally with lateral incisions from the midline toward the lateral walls. This maneuver creates an empty space shaped like a "T," where the horizontal space is formed by the lateral incisions and the vertical space is defined by the urethra. After completing the T-incision, the dissection of the posterior and lateral planes is undertaken. The posterior plane is accessed through laser incisions made on both sides of the verumontanum. The verumontanum is carefully dissected away from the adenoma with a proximal incision. The posterior plane is then developed, and the incision is extended laterally toward the 1 o'clock and 11 o'clock positions. Since the anterior plane has already been created with the T-incision, the apical part of the prostate drops downward, facilitating the connection between the anterior plane and the lateral incisions. The apical release is finalized by incising the remaining connections using an approach from the anterior plane toward the lateral wall. The residual connections between the prostate and the capsule are gradually incised until the bladder neck fibers are encountered. The final attachments are severed, and the prostate is removed and extracted from the body. Following thorough coagulation to ensure a clean field for morcellation, it is performed until all tissues are removed. A final inspection is conducted to confirm effective hemostasis, intact ureteral orifices, an undamaged sphincteric complex, and the integrity of the capsule (Video 1).

Discussion

Among the surgical approaches for BPO, AEEP is becoming the new gold standard surgical approach because the removal of the entire benign prostatic hyperplasia component of the prostate is performed. For men with either lower urinary tract symptoms or urinary retention, regardless of prostate volume, detrusor contractility, and age, AEEP can provide safe and effective treatment for a wider range of patients than any other BPO procedure (4). Tan et al. (5) published in 2003 that HoLEP is superior to transurethral prostate resection (TURP) in terms of removed prostate tissue, and provides faster catheter removal times and shorter hospital stays. With all the new advances in the field, technology, and techniques, the enucleation techniques have consolidated their position. In recent publications, AEEP was demonstrated to provide more tissue retrieval, showed stronger symptom improvement, compared to TURP with similar and low complication rates for both techniques (6,7).

There are different surgical techniques for performing AEEP: en-bloc, two-lobe, and three-lobe techniques. The enucleation techniques, especially HoLEP, were initially developed as a three-lobe technique. Over time, advancements and modifications led to the introduction of two-lobe and en-bloc techniques. The comparison of these 3 techniques was published by Rücker et al. (1) in their prospective study comprising 600 patients; and the data revealed that all three enucleation techniques showed similar postoperative outcomes; however, en-bloc and two-lobe techniques provided significantly shorter operative times and higher efficiency compared to the three-lobe technique. Enikeev et al. (8) also compared the en-bloc and two-lobe techniques during both HoLEP and ThuFLEP. The authors reported that the techniques with both lasers provided comparable outcomes and complication rates. Practically, the choice of enucleation technique depends on the surgeon's preference and experience.

Surgical experience is one of the keys to a successful enucleation. For this reason, the surgeons should go through a steep learning curve to reach proficiency. The learning curve for HoLEP is notably steep, requiring substantial training and experience. During the initial phase, surgeons may encounter challenges such as prolonged operative times, increased rates of intraoperative complications, and difficulties with tissue morcellation and enucleation techniques. However, as experience grows, surgeons become more familiar with navigating anatomical planes and performing the procedure, eventually resulting in better outcomes, reduced operative times and fewer complications (9,10). Studies indicate that approximately 50 cases are needed to overcome the learning curve, though this can vary depending on prior endourological experience and access to mentorship or proctorship (9,11).

During the learning phase, one of the most important steps to achieve proficiency is the EAR. This step is crucial, especially in the beginning of the surgery, as it spares the continence mechanism and prevents any mechanical, thermal or incisional damage to the external urethral sphincteric complex. EAR facilitates better identification of the surgical plane while preserving the external sphincter's mucosa, resulting in low rates of post-operative stress incontinence . In a recent study by Ericson et al. (12) in 2023, results about EAR and the en-bloc no-touch technique reported that EAR, especially in the learning curve, resulted in longer operation durations. Heidenberg et al. (13) published a comparison of the EAR and non-EAR HoLEP results on postoperative incontinence and quality of life in 2024. In this retrospective analysis of a total of 114 patients, the authors commented that the EAR technique provided an earlier return of continence and improved quality of life.

Although it is crucial, the EAR is important and hard to master. A T-incision made at the start of the EAR in HoLEP or ThuFLEP helps facilitate the lowering of prostatic adenomas and may aid in connecting the lateral and anterior planes, ensuring smoother alignment of these enucleation planes. This maneuver can also help surgeons better understand and identify the trajectory and the concept of the enucleation process, especially when they are enucleation process, especially when they are at their learning curve. With this video-article, we provide a depiction of the T-incision during AEEP and the replicability of this maneuver with both Ho:YAG laser and thulium fiber laser.

Conclusion

The T-incision, which consists of combining the anterior commissurotomy and anterior plane dissection, helps lower the anterior aspect of the external sphincter towards the verumontanum and facilitates the connection of posterior and lateral planes to the anterior plane, thereby providing a fast and safe dissection of the sphincteric complex. T-incision during HoLEP makes it easier to perform the EAR and may also have positive effects on the learning curve.

The T-incision helps lower the apical part of the prostate, facilitating the connection of the lateral planes to the anterior plane. This ensures easier alignment and integration of the separately created enucleation planes. So, as the anatomical planes align correctly, the process of enucleation proceeds effectively.

Video 1.

Ethics

Informed Consent: Although the videos are anonymously edited and prepared, informed consent is taken from the patients for the use of video recordings for scientific purposes and for publishing in scientific journals.

Footnotes

Authorship Contributions

Surgical and Medical Practices: T.E.Ş., L.D., Concept: T.E.Ş., L.D., Design: T.E.Ş., L.D., Data Collection or Processing: T.E.Ş., L.D., Analysis or Interpretation: T.E.Ş., L.D., Literature Search: T.E.Ş., L.D., Writing: T.E.Ş., L.D.

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References

1. Rücker F, Lehrich K, Böhme A, Zacharias M, Ahyai SA, Hansen J. A call for HoLEP: en-bloc vs. two-lobe vs. three-lobe. World J Urol. 2021;39:2337-2345. [Crossref]
2. Tamalunas A, Schott M, Keller P, Atzler M, Ebner B, Hennenberg M, Stief CG, Magistro G. Efficacy, efficiency, and safety of en-bloc vs three-lobe enucleation of the prostate: a propensity score-matched analysis. Urology. 2023;175:48-55. [Crossref]
3. Saitta G, Becerra JEA, Del Álamo JF, González LL, Elbers JR, Suardi N, Gómez-Sancha F. 'En bloc' HoLEP with early apical release in men with benign prostatic hyperplasia. World J Urol. 2019;37:2451-2458. [Crossref]
4. Aho T, Armitage J, Kastner C. Anatomical endoscopic enucleation of the prostate: the next gold standard? Yes! Andrologia. 2020;52:e13643. [Crossref]
5. Tan AH, Gilling PJ, Kennett KM, Frampton C, Westenberg AM, Fraundorfer MR. A randomized trial comparing holmium laser enucleation of the prostate with transurethral resection of the prostate for the treatment of bladder outlet obstruction secondary to benign prostatic hyperplasia in large glands (40 to 200 grams). J Urol. 2003;170:1270-1274. [Crossref]
6. Westhofen T, Schott M, Keller P, Tamalunas A, Stief CG, Magistro G. Superiority of holmium laser enucleation of the prostate over transurethral resection of the prostate in a matched-pair analysis of bleeding complications under various antithrombotic regimens. J Endourol. 2021;35:328-334. [Crossref]
7. Magistro G, Schott M, Keller P, Tamalunas A, Atzler M, Stief CG, Westhofen T. Enucleation vs. resection: a matched-pair analysis of TURP, HoLEP and bipolar TUEP in medium-sized prostates. Urology. 2021;154:221-226. [Crossref]
8. Enikeev D, Taratkin M, Laukhtina E, Alekseeva T, Snurnitsyna O, Potoldykova N, Gerasimov A, Glybochko P. En bloc and two-lobe techniques for laser endoscopic enucleation of the prostate: retrospective comparative analysis of peri- and postoperative outcomes. Int Urol Nephrol. 2019;51:1969-1974. [Crossref]
9. Ditonno F, Bianchi A, Fumanelli F, Brancelli C, Malandra S, Rizzetto R, Balzarro M, Rubilotta E, Autorino R, Bertolo R, Veccia A, Antonelli A. The learning curve for holmium laser enucleation of the prostate: a single-center analysis of surgical and functional outcomes. J Endourol. 2024;38:1226-1233. [Crossref]
10. Martinez-Salas AJ, Garcia-Rivera OU, Reyna-Blanco I, Jimenez-Garcia AD, Rosas-Hernandez H. Adequate mentorship program for holmium laser enucleation of the prostate (HoLEP) leads to satisfactory short-term outcomes in the early learning curve of young urologists: first-year outcomes of a newly established mentorship training in Mexico. Cureus. 2023;15:e41756. [Crossref]
11. Chavali JSS, Rivera ME, Lingeman JE. HoLEP learning curve-resident perspective: survey of senior residents from high-volume tertiary center. J Endourol. 2024;38:977-981. [Crossref]
12. Ericson CA, Baird BA, Mauler DJ, Lyon TD, Ball CT, Dora CD. Early apical release versus en-bloc no touch technique for holmium laser enucleation of the prostate: a high-volume single-surgeon cohort study. World J Urol. 2023;41:167-172. [Crossref]
13. Heidenberg DJ, Choudry MM, Wymer K, Stagg J, Parker N, Campagna J, Narang G, Humphreys MR, Cheney SM. The impact of standard vs early apical release holmium laser enucleation of the prostate technique on postoperative incontinence and quality of life. Urology. 2024;189:101-107. [Crossref]