



From Complexity to Clarity: Fellows' perspective on Comprehensive Canopy Concept-'The 3 Step Technique' of Total Laparoscopic Hysterectomy

Jain Nutan¹, Sureddi Priyanka², Srivastava Sakshi², Gulati Divyaneer², Sareen Shweta³, Jain Vandana⁴, Mann Sonika³, Agarwal Chetna³, Singh Shalini³, and Bayya S Prasanna³

¹Director, Department of Obstetrics and Gynecology, Vardhman Trauma and Laparoscopy Centre Pvt. Ltd., Uttar Pradesh, India.

²Fellow in Gynae Endoscopy at Vardhman Trauma and Laparoscopy Centre Pvt. Ltd., Uttar Pradesh, India.

³Ex fellow in Gynae Endoscopy at Vardhman Trauma and Laparoscopy Centre Pvt. Ltd., Uttar Pradesh, India.

⁴Consultant, Department of Obstetrics and Gynecology, Vardhman Trauma and Laparoscopy Centre Pvt. Ltd., Uttar Pradesh, India.

Correspondence

Nutan Jain

Director, Department of Obstetrics and Gynecology, Vardhman Trauma and Laparoscopy Centre Pvt. Ltd., 3rd KM, Jansath Road, Muzaffarnagar, Uttar Pradesh, India. Pin code-251001.

Tel: +91 9837082637

E-mail: jainnutan@gmail.com

- Received Date: 13 Mar 2024
- Accepted Date: 25 Mar 2024
- Publication Date: 30 Mar 2024

Keywords: 3 Step Technique, Comprehensive Canopy Concept, Cotton Candy Space, Posterior Approach to Uterine Artery, Total Laparoscopic Hysterectomy (TLH), Ventrifixed Uterus

Copyright

© 2024 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Abstract

Total Laparoscopic Hysterectomy (TLH) is pivotal in gynecological surgeries, offering advantages like decreased blood losses, faster recovery, shorter operative time and reduced hospital stays.

The Comprehensive Canopy Concept: 'The 3 Step Technique' emerges as a three-step strategy for streamlining TLH procedures in complex cases, characterized by extensive bladder adhesions and ventrifixed uterus.

As fellows under the guidance of a distinguished gynaecology laparoscopic surgeon, we recount the evolution of this approach. The first step challenges conventional norms by advocating for a posterior approach to uterine artery, dissection and ligation before bladder dissection. The second step involves meticulous dissection to create a bloodless uterovesical space creating a bladder canopy. The culmination of this technique lies in the third step, employing an anterior approach to dissect and coagulate the contralateral uterine artery.

As fellows, we share our experience in adopting the Comprehensive Canopy Concept: 'The 3 Step Technique' emphasizing its positive impact on surgical outcomes in densely adherent bladder and patient care in cases of complex TLH. This technique not only transcends traditional approaches but also addresses persistent challenges, offering a systematic approach that ensures safety and reproducibility.

A large proportion of women require hysterectomy for indications such as heavy menstrual bleeding due to fibroids, adenomyosis, polyps or malignancies. The overall prevalence of hysterectomy in India was around 11.35% [1]. Total laparoscopic hysterectomy (TLH) has been reported to result in shorter procedure duration [2], lower blood loss, and shorter hospital stay [3]. Thus, in this era, gaining proficiency in laparoscopy is not merely an additional skill, but rather a bare minimum requirement for all gynaecologists to effectively meet the demands of modern surgical standards and patient expectations.

TLH in cases of previously operated abdominal or pelvic surgery such as previous caesarean sections and conditions with dense adhesions as seen in deep infiltrating endometriosis presents unique challenges that significantly impact the approach, technique, and outcomes of the procedure.

Over the years, global CS rates have significantly increased from around 7% in 1990 to 21% today [4]. This trend is projected to increase continuously over the current decade where both unmet needs and overuse are expected to coexist with the projected global rate of 29% by 2030 [4,5].

Following a previous cesarean section (CS), patients typically present with a filled-in anterior cul-de-sac and substantial adhesion between the uterus, bladder, and anterior abdominal wall, causing alterations in normal anatomy, and thus rise in potential complications during surgery.

Patients with previous surgeries pose a higher risk of intraoperative complications during TLH, primarily due to obscured surgical field, making dissection and identification of critical structures more challenging. Current literature reports indicate an incidence of 0.7–4.0% for urinary tract injuries during minimally-invasive hysterectomy [6].

Citation: Jain N, Sureddi P, Srivastava S, et al. From Complexity to Clarity: Fellows' perspective on Comprehensive Canopy Concept-'The 3 Step Technique' of Total Laparoscopic Hysterectomy. Arch Clin Obs Gyn Res. 2024;3(1):1-3.

Often in such cases one finds, increased operative time, higher blood loss, and a greater likelihood of conversion to open surgery. Additionally, the risk of injury to the bladder, ureters, and intestines is elevated in these cases due to the distorted anatomy and difficulty in distinguishing adhesions and fibrosis from normal tissue planes.

As a fellow under the mentorship of a renowned gynaecological laparoscopic surgeon, we have had the privilege of observing varieties of TLH from simple cases to complex procedures with obliteration of anterior and posterior cul-de-sac. We have observed the shift from the routine way of doing TLH to delving into the intricacies of Comprehensive Canopy Concept - The '3 Step Technique' of TLH.

In our journey as fellows, we have also witnessed the transformative impact of this concept on surgical outcomes and patient care. In cases of previous caesarean section with extremely ventrified uterus, we used to try multiple approaches, central, lateral and try to find whatever plane was available. At every step, we had the risk of opening up the bladder and had to confirm by retrograde filling the bladder or using a bougie. Even after multiple attempts, there were times when we felt like giving up. A lot of time was consumed in this procedure. Moreover, there was risk of bladder and ureteric injury. This prompted us to think of alternate ways to tackle such cases.

Since the turn of the century, many researchers have tried to follow the concept of knocking off the blood supply before finally harping upon the steps of removal of that particular organ. Similarly during the removal of uterus, they tried to cut off the blood supply of uterine artery before proceeding with further steps. However this idea was not openly accepted by gynecologists owing to the fear of bladder and ureteric injury. Even our mentor while presenting this technique in conferences and live surgery workshops in patients of multiple previous surgeries initially faced a lot of antagonism, citing that she was doing away with surgical and anatomical wisdom. It was difficult to convince the audience of this concept, but eventually the neatly dissected away bladder gave a resounding response to their apprehensions and queries.

While we found a publication as early as the 1950s [7] suggesting the posterior approach, however, there was a huge gap in scientific activity directed towards this approach, owing to the apprehension of increased incidence of thermal injury to bladder if uterine artery is coagulated before dissecting away the bladder adhesions. On further search, hardly few mentions of this technique could be found [8,9] where the approach was only limited to the posterior exposure of the uterine artery.

Gradually improving upon our surgical skill and persisting through several cases with ventrified uterus, under the guidance of our mentor, the technique has finally taken shape with the rationale that, anatomically and physiologically tackle the circulation first [10]. First step is dissection of the uterine artery and vein from the posterior aspect instead of the conventional coagulation of the artery after bladder dissection. There have been many hurdles and proponents who have believed that approaching the uterine artery prior to bladder dissection can cause bladder and ureteric injury as stated earlier; however contrary to this, we have found, that by sticking to the principle that, the plane of the uterine artery is same as that of bladder dissection, we have easily negotiated the space and not found an increase in incidence of injury. In fact, contrary to the anatomical dictum, it is the uterine artery that holds the ureter to the uterus and hence tackling it first has proven to be effective in our experience.

After the posterior approach, the evolution of this technique has been of creation of the bladder canopy and using it as an underpass and finally into 3 anatomical steps.

Next development was with a single sweep of opening the posterior leaf of broad ligament, we continued this approach into dissecting the uterovesical space and creating a blood less bladder canopy similar to making an underpass. We found immense advantage of following this technique as we found an avascular plane for dissection. Then we proceeded to the 'anterior approach of uterine artery', that is continuing dissection right up to the anterior aspect of the uterine artery beside the manipulator cup rim to transect the contralateral uterine artery in the same action. This is done without changing sides during the uterine artery transection.

Comprehensive Canopy Concept - 'The 3 Step Technique' is as follows:

1st Step: The initial step of the Comprehensive Canopy Concept involves the posterior approach to uterine artery dissection and ligation prior to bladder dissection. By transecting the posterior leaf of the broad ligament widely from the uterosacral ligaments to the Arcus taurinus, we expose the uterine artery and vein first. The posterior approach helps in the easy skeletonization of the uterine artery. Coagulating it there and then, allows for a bloodless field. Moreover, the transverse cervical ligament gets cut along with it, thereby causing lateral and inferior movement of ureter, minimizing ureteric injury.

This method challenged our preconceived notions, introducing us to a plane of surgery that not only facilitated easier access to the uterine artery but also significantly reduced the risk of ureteric injuries. As the saying goes anatomy is the mother, and surgical exposure is the father of surgery.

2nd Step: We have observed that the bladder flap is adherent at the top at the body of uterus but free down below at the level of cervical isthmus. This observation lead to persistence of dissection for another 1 to 1.5 cm just anterior to this coagulated uterine artery can easily open up the 'cotton candy' uterovesical space. We have observed that this step is crucial as it sets the foundation for the subsequent formation of the bladder canopy. This step also requires both patience and steady fine dissection. The aim here is to gently dissect the bladder away from the uterus without initiating a full-scale adhesiolysis, which can lead to complications. By creating a canopy, we effectively navigate beneath the roadblock of adhesions, using the uterovesical space as a safe pathway to continue the dissection. This method not only preserves the integrity of the bladder but also ensures an avascular and precise separation of the adherent tissues. Persisting at this step with grasper strokes opens up the uterovesical space completely, and the dissection continues, till the opposite side uterine artery is visible. Once the uterovesical space is opened completely, the bladder flap is cut staying close to the uterus. This helps in easy avascular downward movement of the bladder.

Utilization of this uterovesical space while performing vaginal hysterectomy in cases of previous surgeries has been mentioned in order to avoid bladder injury, as early as 1996 [11]. Another technique [12] described in literature, involved dissection bilaterally in the uterovesical space and then connected inferiorly. However in this 3 step technique, the creation of the bladder canopy is made with one single sweep from one side only. So we do not have to combat adhesions on both right and left sides and then reach the center of the bladder in order to mobilize it. Thus, making the technique most

feasible in navigating cases of bladder adhesions to the anterior abdominal wall, finishing by starting from one side only

Still the adoption of this plane and its application in practice hasn't been taken up by most gynecologists.

3rd Step: Involves an anterior approach to dissect and coagulate the contralateral uterine artery. As the contralateral uterine artery is already visible, it is easily skeletonized, coagulated and cut. By extending the dissection to the contralateral side, we can achieve a thorough control of the blood supply, further reducing the risk of bleeding and facilitating a clean separation of the bladder from the uterus. So in this manner the TLH begins on the left side and with single sweep reaches over to the contralateral side finishing it practically in one single movement.

This comprehensive concept has surgical benefits because it has eased the fear of bladder dissection from novice minds, like us. Over time, as we have witnessed the Comprehensive Canopy Concept unfolding, we feel more and more confident in performing even complex TLH with densely adherent bladder. The concept unfolds in three clear and distinct steps, each meticulously designed to address the challenges beyond the conventional lateral approach for bladder dissection.

This concept represents a technique that allows for ease of performing TLH particularly in cases marked by extensive adhesions. The need of understanding this technique is more than ever before with the consistently rising rates of cesarean section, leading to other associated conditions like cesarean scar ectopic, cesarean scar niches, and other conditions affecting the anterior cul-de-sac leading to a ventrified uterus.

We hope others take up this concept for easy bladder dissection, improving patient safety and avoid prolonged morbidity to the patients.

In conclusion, Comprehensive Canopy Concept, 'The 3 Step Technique' for bladder dissection in TLH represents a paradigm shift in the management of complex gynecological surgeries. Through a systematic and synchronized approach, this technique offers a safe, effective, and reproducible solution to the challenges posed by extensive bladder adhesions and ventrified uterus. As fellows, we are grateful for the opportunity to learn and contribute to the advancement of this concept, and we look forward to applying these insights to enhance patient care and surgical outcomes in our practice. We hope that the collective ongoing effort of previous researchers and our endeavour of simplifying total laparoscopic hysterectomy finds acceptance, wider reach and understanding and helps our fellow colleagues take on such cases confidently.

Conflicts of interest

The author declares no conflicts of interest that are relevant to the content of this article.

Ethical approval

Informed consent was obtained from individual participants and patient regarding publication and documentation without disclosing their identity.

References

1. Rout D, Sinha A, Palo SK, et al. Prevalence and determinants of hysterectomy in India. *Sci Rep.* 2023;13:14569.
2. Lee PI, Lee YT, Lee SH, Chang YK. Advantages of total laparoscopic hysterectomy. *J Am Assoc Gynecol Laparosc.* 1996;3(4, Supplement):S24-S25.
3. Hasson HM, Rotman C, Rana N, Asakura H. Experience with laparoscopic hysterectomy. *J Am Assoc Gynecol Laparosc.* 1993;1(1):1-11.
4. WHO. Caesarean section rates continue to rise, amid growing inequalities in access; 2021. <https://www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access>
5. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. *BMJ Glob Heal.* 2021;6(6):e005671.
6. Matsuo K, Hom MS, Machida H, et al. Incidence of urinary tract injury and utility of routine cystoscopy during total laparoscopic hysterectomy for endometrial cancer. *Eur J Obstet Gynecol Reprod Biol.* 2017;213:141-142.
7. Musgrove F. Abdominal Total Hysterectomy: A New Technique: The Posterior Approach [Résumé]. *Proc R Soc Med.* 1955;48(9):692.
8. Chamsy DJ, Lee T. Posterior Approach to Uterine Artery Ligation for Anterior Cul-de-Sac Obliteration. *J Minim Invasive Gynecol.* 2012;19(6):S10.
9. Marwah V, Dasgupta S, Mittal P. Total Laparoscopic Hysterectomy with Bilateral Salpingectomy with Sutures using Posterior Approach for Uterine Artery Ligation. *J Minim Invasive Gynecol.* 2016;23(S1):S252.
10. Jain N. Posterior Approach for Uterine Artery Ligation in TLH (Tackling the Uterine Artery First Before the Bladder Dissection). *J Minim Invasive Gynecol.* 2022;29(11 Supplement): S135-S136.
11. Sheth SS. An Approach to Vesicouterine Peritoneum Through a New Surgical Space. *Journal of Gynecologic Surgery.* 1996;12(2):135-140.
12. Nezhat C, Grace LA, Razavi GM, Mihailide C, Bamford H. Reverse Vesicouterine Fold Dissection for Laparoscopic Hysterectomy After Prior Cesarean Deliveries. *Obstet Gynecol.* 2016;128(3):629-633.