

Innovative laparoscopic technique for #ENZIAN C3 intestinal endometriotic nodule and concurrent uterine fibroids: NOSES

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ABSTRACT

Background: Deep infiltrating endometriosis (DIE) is a severe condition which requires innovative surgical approaches to address complex anatomical distortions, reduce operative risks, and enhance outcomes.

Objectives: To demonstrate the effectiveness of integrating three advanced surgical techniques—reverse laparoscopic technique, natural orifice specimen extraction surgery (NOSES), and advanced intraoperative bleeding control strategies—in managing a complex case of DIE.

Participant: A 29-year-old nulligravida patient presented with hypermenorrhea, dysmenorrhea, urinary symptoms, and bowel dysfunction. Magnetic resonance imaging revealed a 3.3 cm #ENZIAN C3 intestinal endometriotic nodule, bilateral ovarian endometriomas and multiple uterine fibroids.

Intervention: Advanced techniques reverse laparoscopic technique, associated with intraoperative bleeding control strategies such as vasopressin injection, temporary ligation of uterine arteries, and infundibulopelvic ligaments; combined with NOSES for specimen extraction. Patient included in this video gave consent for the publication of this video article and its online posting, including social media, journal's website, scientific literature websites, and other applicable sites. Operative time, estimated blood loss, preservation of anatomical structures, postoperative recovery time, symptom resolution, and complications were assessed. Surgery was completed in 180 minutes, with minimal blood loss (40 cc). The patient tolerated a general anti-inflammatory diet by postoperative day two and was discharged without complications. One month postoperatively, the patient showed significant symptom improvement.

Conclusions: The combination of different techniques in the same surgery can clearly lead to favourable results and outcomes, ensuring optimal recovery with superior cosmetic and functional outcomes, particularly in fertility-preserving surgeries.

What is New? The combination of NOSES, the reverse laparoscopic technique, and advanced bleeding control strategies ensures optimal management for complex procedures in DIE surgeries with fertility preservation.

Keywords: Natural orifice specimen extraction surgery, deep infiltrating endometriosis, infundibulopelvic ligament, magnetic resonance imaging, estimated blood loss, operative time, rectal endometriosis, uterine fibroids, laparoscopic colorectal resection

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Received: 13.01.2025 **Accepted:** 14.03.2025 **Epub:** 27.05.2025 **Publication Date:** 30.09.2025

Cite this article as: Chaul L, Cabrera Carranco R, Sierra Brozon AG, Rivera Rosas EG, Menocal Tavernier A, Kondo W, et al. Innovative laparoscopic technique for #ENZIAN C3 intestinal endometriotic nodule and concurrent uterine fibroids: NOSES. Facts Views Vis Obgyn. 2025;17(3):285-288



Introduction

Deep infiltrating endometriosis (DIE) is a severe form of endometriosis characterised by the invasion of endometrial-like tissue into structures such as the bowel, bladder, and uterine ligaments. An #ENZIAN C3 nodule, according to this classification, describes endometriosis involving the lower rectum, often causing significant anatomical distortion and intestinal obstructive symptoms. Surgical management requires advanced techniques to mitigate risks, such as nerve injury, excessive blood loss, and long operative time (OT).

Unlike the traditional technique, which involves identifying and removing the diseased areas first, the Reverse Technique begins with the separation of healthy from affected tissues, moving toward the diseased.¹ The final step in the reverse technique involves dissection of the affected tissues and rectal nodules, allowing the surgeon to establish clean surgical planes and minimise trauma to critical structures.

Additionally, advanced intraoperative bleeding control strategies, such as vasopressin injection into the uterine muscle, temporary ligation of uterine arteries during myomectomy, and temporary ligation of the infundibulopelvic (IP) ligaments during endometrioma cystectomy, significantly reduce blood loss and the need for extensive coagulation, preserving ovarian and uterine integrity.^{2,3} Together, these methods increase surgical precision and optimise patient outcomes. When combined with natural orifice specimen extraction surgery (NOSES), which utilizes natural orifices for specimen extraction, this approach reduces operative time and enhances recovery by avoiding large abdominal incisions.⁴⁻⁶

Methods

This case involves a 29-year-old nulligravida patient presenting with severe hypermenorrhoea, dysmenorrhea, urinary symptoms (hesitancy, incomplete voiding), and bowel symptoms (severe constipation). Magnetic resonance imaging (MRI) findings revealed:

- A 3.3 cm ENZIAN C3 endometriotic nodule located 14.5 cm from the anal verge, infiltrating 40% of the circumference of the rectum.
- Bilateral ovarian endometriomas (7 cm on the left and 2.9 cm on the right).
- Uterine fibroids (UF) (largest measuring 4.3 cm, FIGO 2-5).

- Obliteration of the rectouterine septum with associated uterosacral ligament thickening.

- #ENZIAN (2021): P0, O3/2, T3/3, A2, B1/1, C3, FA.

Patient included in this video gave consent for the publication of this video article and its online posting, including social media, journal's website, scientific literature websites, and other applicable sites.

Main Outcomes

1. OT.
2. Estimated blood loss (EBL).
3. Preservation of critical anatomical structures.
4. Postoperative recovery time.
5. Symptom resolution and cosmetic results.
6. Immediate and mediate postoperative complications.

Results

The surgery was completed in 180 minutes (Video 1). EBL was minimal at 40 cc. The patient was monitored during hospitalisation with procalcitonin and C-reactive protein levels as a parameter of colorectal anastomosis dehiscence, and the comparison curve at 24, 48, and 72 hours remained stable without significant increases. She was discharged from the hospital and resumed a general anti-inflammatory diet after the second day of hospitalisation, with no further complications. The patient showed significant improvement of symptoms one month after surgery.

Discussion

The NOSE technique offers significant advantages in the management of intestinal endometriosis. By utilizing the anus as the natural extraction site, it eliminates the need for a mini-laparotomy, thereby reducing surgical trauma, postoperative pain, and recovery time. Unlike conventional laparoscopic colorectal resection (CLR), which requires an additional 4-5 cm incision for specimen extraction and anvil insertion, NOSE eliminates the need for abdominal wall opening, avoiding muscle and aponeurosis incision, while also reducing intestinal manipulation, decreases postoperative ileus risk, and allows for faster return of bowel function.⁷ Furthermore, the absence of external incisions lowers the incidence of wound infections and incisional hernias, providing both functional and cosmetic benefits.⁶⁻⁸ Large case series and randomised controlled trials have demonstrated

that NOSE patients require less postoperative analgesia, contributing to an overall better recovery experience. While the technique requires a specific learning curve, when performed by experienced surgeons, it does not increase surgical time and may, in fact, shorten it. With no significant drawbacks, NOSE represents a safe, efficient, and superior alternative to traditional CLR in endometriosis patients requiring intestinal surgery. The only potential limitation is the learning curve associated with mastering the technique. However, in surgical teams proficient in both NOSE and CLR, we have observed that surgical time is reduced, further improving efficiency.

The reverse technique further improves surgical outcomes by prioritising the dissection of healthy tissue planes before addressing the diseased areas.^{1,9} By starting the dissection in less affected areas, the surgeon gains better visibility and access to deeper regions, reducing the risk of injury to vital structures. In contrast, starting from the more severely affected areas, as in standard techniques, can lead to accidental damage due to poor visibility or complex anatomical distortions.^{10,11} Therefore, this approach reduces operative complexity as it improves visibility in affected regions and minimises the risk of injury to critical structures such as the hypogastric nerves and ureters. By preserving these anatomical structures, the Reverse Technique optimises surgical precision and patient safety.

Advanced intraoperative bleeding control strategies significantly contributed to the success of this surgery. Vasopressin injection into the uterine muscle effectively reduced intraoperative bleeding during the myomectomy, limiting the need for blood transfusions and enhancing surgical efficiency by improving visualisation of the surgical field due to reduced bleeding.² Temporary ligation of the uterine arteries provided additional control over blood loss, further decreasing the need for postoperative interventions. Additionally, temporary ligation of the IP ligaments during the endometrioma cystectomy minimised bleeding and reduced the necessity for extensive coagulation energy, preserving ovarian tissue integrity and function.³ In fertility-preserving surgeries like this, these strategies play a pivotal role in ensuring minimal damage to reproductive structures while achieving optimal outcomes.^{3,11}

This case highlights the significance of integrating multiple advanced techniques in one procedure. The fusion of the reverse laparoscopic technique, NOSES, and bleeding control strategies not only optimises surgical time and minimises complications but also

ensures improved cosmetic and functional outcomes. By integrating these advanced techniques, the OT was reduced to 180 minutes, significantly shorter than the conventional approach, which typically averages 4 hours. Additionally, the procedure resulted in minimal blood loss of only 40 cc, and the patient achieved an optimal postoperative recovery, free from complications.

The combination of advanced laparoscopic techniques allows for improved surgical times, reduced blood loss, and lower risk of complications. It highlights the potential for comprehensive management of complex cases of DIE, offering a paradigm shift in the surgical treatment of this challenging condition.

Conclusion

This video article demonstrates three advanced and innovative surgical techniques, combining the reverse laparoscopic technique, the NOSES, and advanced intraoperative bleeding control strategies, for the treatment of DIE involving an #ENZIAN C3 intestinal nodule and concurrent UF. The combination of different techniques in the same surgery can clearly lead to favourable results and outcomes, ensuring optimal recovery with superior cosmetic and functional outcomes, particularly in fertility-preserving surgeries.

Acknowledgments: None.

Contributors: Surgical and Medical Practices: L.C., R.C.C., E.G.R.R., A.G.S.B., W.K., A.M., C.P.J., O.A., Concept: L.C., R.C.C., E.G.R.R., A.G.S.B., W.K., A.M., Design: L.C., R.C.C., A.M., C.P.J., O.A., Data Collection or Processing: L.C., E.G.R.R., A.G.S.B., W.K., C.P.J., O.A., Analysis or Interpretation: L.C., R.C.C., A.G.S.B., W.K., A.M., C.P.J., Literature Search: L.C., R.C.C., E.G.R.R., A.M., C.P.J., O.A., Writing: L.C.

Funding: The authors declared that this study received no financial support.

Competing interests: No conflict of interest was declared by the authors.

Ethical approval: Patient included in this video gave consent for the publication of this video article and its online posting, including social media, journal's website, scientific literature websites, and other applicable sites.

Data sharing: The data supporting the findings of this study are not publicly available due to concerns regarding patient confidentiality and institutional restrictions. However, de-identified data may be made available from the corresponding author upon reasonable request, in accordance with ethical and legal standards.

Transparency: The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. No important aspects of the study have been omitted, and any deviations from the original protocol have been clearly explained within the manuscript.

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Video 1. The Video demonstrates multiple innovative and advanced techniques for laparoscopic pelvic surgery in cases of deep endometriosis with intestinal involvement, while reinforcing critical concepts of pelvic anatomy.

<https://youtu.be/yqaXMWxC3SY>