WebLog Journal of Anesthesiology

Case Report
Published: 01 Jan, 2026

Scarless Trans-Umbilical Wedge Resection of a Prolapsed Vitellointestinal Duct Under Rectus Sheath Local Anesthesia Block in an Infant: A Case Report

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WebLog Open Access Publications
Article ID : wjan.2026.a0104
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Received Date: *23 Dec 2025*
Accepted Date: *30 Dec 2025*
Published Date: *01 Jan 2026*

Citation:
Govani DR, Mehta AR, Midha PK, Govani ND, Panchasara NG, Patel RR, et al. Scarless Trans-Umbilical Wedge Resection of a Prolapsed Vitellointestinal Duct Under Rectus Sheath Local Anesthesia Block in an Infant: A Case Report. WebLog J Anesthesiol. wjan.2026.a0104. https://doi.org/10.5281/zenodo.18211587

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Abstract

This manuscript describes a rare and clinically significant case of a prolapsed vitellointestinal duct (VID) in a 6-week old-old infant, successfully managed using a scarless trans-umbilical wedge resection performed entirely under local anesthesia. While VID anomalies are well documented, the use of a minimally invasive, awake surgical approach in an infant is exceptionally uncommon. Our report highlights a safe and effective alternative to general anesthesia in selected infants, a cosmetically superior trans-umbilical technique, a rapid postoperative recovery with same-day discharge and practical, reproducible method that may benefit centers with limited access to pediatric anesthesia Trans-umbilical natural orifice surgery (e.g., trans-umbilical wedge resection, umbilical hernia repair, laparoscopic umbilical port entry) relies heavily on effective somatic analgesia of the periumbilical region. The rectus sheath block (RSB) is uniquely suited for this because it targets the anterior cutaneous branches of T9–T11, which supply the umbilical area.

Keywords: Patent Vitellointestinal Duct; Umbilical Anomalies; Prolapsed Vitellointestinal Duct; Natural Orifice Surgery; Trans-Umbilical Wedge Resection; Minimally Invasive Paediatric Surgery; Rectus Sheath Block; Neonatal Surgical Techniques; Scarless Surgery; Umbilical Reconstruction; Congenital Gastrointestinal Anomalies

Introduction

Prolapsed vitellointestinal duct (VID) remnants are uncommon congenital anomalies that typically present in the neonatal period [1]. Standard management involves surgical excision under general anesthesia [2]. The vitellointestinal duct normally obliterates between the 5th and 9th weeks of gestation. Failure of involution results in a spectrum of anomalies, including Meckel's diverticulum, umbilical fistula, sinus, cyst, or fibrous band. A prolapsed patent VID presenting as an umbilical mucosal mass is uncommon and often prompts urgent surgical intervention [3].

Conventional treatment involves excision of the duct and closure of the ileal defect under general anesthesia [4]. However, in selected stable infants with a small prolapsed segment, a trans-umbilical approach under local anesthesia may offer a safe, cosmetically superior alternative. We report a rare case of an infant with a prolapsed VID successfully treated with a scarless trans-umbilical wedge resection performed entirely under local anesthesia. This approach avoided general anesthesia, provided excellent cosmetic results, and allowed rapid recovery. To our knowledge, such minimally invasive management in an awake infant is rarely documented.

Case Report

A 6-week-old male infant born at term following uneventful pregnancy and spontaneous vaginal delivery presented with a bright red, mucosa-covered umbilical mass that intermittently discharged enteric fluid. The parents reported progressive enlargement since birth especially during straining, couching crying, etc. but no vomiting, abdominal distension, or feeding difficulties. The infant was otherwise thriving.

Examination revealed a 1.5 cm tubular, moist, reddish prolapsed mucosal structure protruding

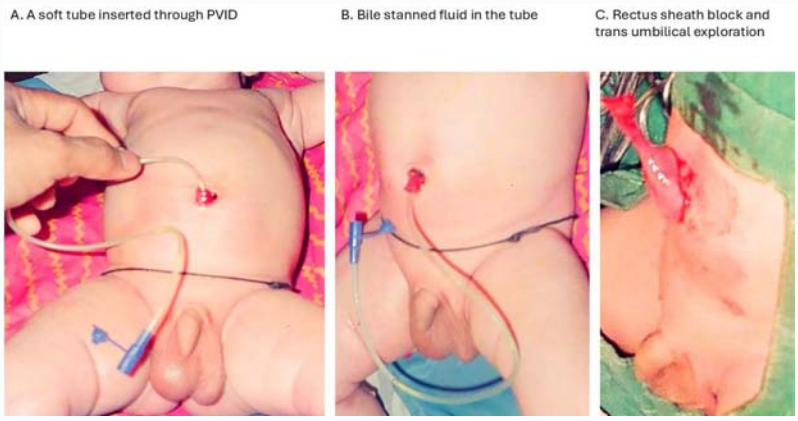


Figure 1: Preoperative appearance of prolapsed vitellointestinal duct. **A)** Bright red, mucosa-covered tubular structure protruding through the umbilicus in a 6-week-old infant. The prolapsed segment measured approximately 1.5 cm and discharged minimal serous fluid. Surrounding skin was healthy with no signs of infection. **B)** Bile and blood stained contents clearly visible in the tube. **C)** Trans-umbilical exposure under local anaesthesia following rectus sheath block 1% lignocaine, the umbilical ring was gently opened to allow complete exteriorisation of the prolapsed vitellointestinal duct. The duct appeared narrow, viable, and non-gangrenous.

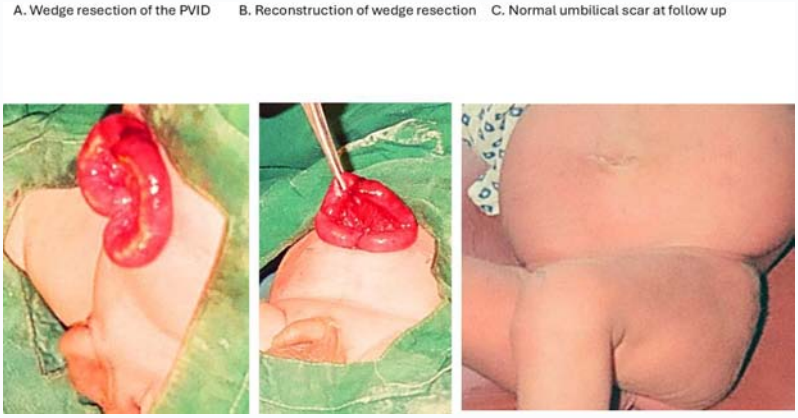


Figure 2: A) Wedge resection of the prolapsed duct The prolapsed segment was excised at its junction with the ileum using a wedge resection technique**. B)** The ileal defect was closed transversely with fine absorbable sutures to prevent luminal narrowing. C) Scarless umbilical reconstruction. The umbilical skin was approximated to restore a natural contour. At 2-week follow-up, the umbilicus demonstrated excellent healing with no visible scar and no evidence of recurrence.

from the umbilicus, consistent with a patent VID. Gentle pressure produced minimal serous discharge. The abdomen was soft and non-tender. The soft tube could be passed easily without any resistance (Figure 1A). Upon gentle aspiration bile and blood tinged fluid came out (Figure 1B).

Baseline blood tests were normal. Ultrasound confirmed a tract connecting the umbilicus to a small segment of distal ileum without intra-abdominal complications.

Given the infant's stability, small prolapse, and parental preference to avoid general anesthesia, a decision was made to perform a trans-umbilical wedge resection under rectus sheath local anesthesia block.

Procedure

The infant was swaddled and given oral sucrose for comfort. Local infiltration with 1% lignocaine was administered circumferentially around the umbilical base using rectus sheath block technique under direct ultrasound guidance at four points.

A circumferential trans-umbilical incision was made, allowing complete exteriorisation of the prolapsed VID. The mucosal segment was inspected and confirmed to be a narrow, non-gangrenous duct (Figure 1C).

A wedge resection of the prolapsed segment was performed at its junction with the ileum (Figure 2A). The ileal defect was closed transversely with fine absorbable sutures (Figure 2B). The umbilical skin was approximated to create a natural umbilical contour.

No intraoperative complications occurred. Total procedure time was 30 minutes.

Outcome and Follow-Up

The infant breastfed immediately post-procedure and was discharged after 4 hours of observation.

At 2-week follow-up, the umbilicus had healed with an excellent cosmetic result and no visible scar. The infant remained asymptomatic with normal feeding and growth. At 3 months, there was no recurrence, infection, or bowel symptoms (Figure 2C).

Treatment

The patient underwent urgent laparoscopic appendicectomy. Intraoperative findings included a large fecalith occupying the proximal two-thirds and distal one-third of the appendix, with inflamed and oedematous distal appendix. No perforation or

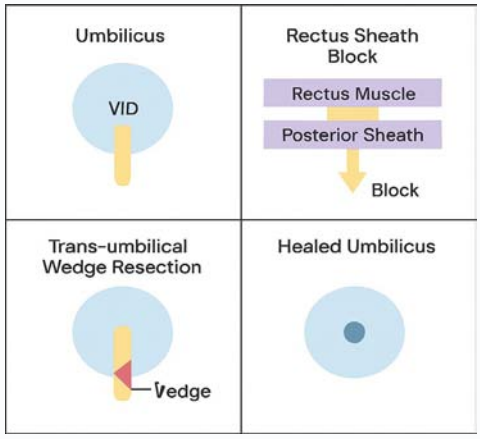


Figure 3: Conceptual schematic illustrating the key steps in scarless trans-umbilical wedge resection of a prolapsed vitellointestinal duct (VID) under local anaesthesia.
• **Panel 1: Umbilicus**
A central circle represents the umbilicus, with a tubular extension labelled "VID" indicating the prolapsed vitellointestinal duct.
• **Panel 2: Rectus Sheath Block**
Two horizontal rectangles depict the rectus muscle and posterior sheath. A downward arrow labelled "Block" symbolises the administration of local anesthetic between these layers to achieve somatic analgesia of the umbilical region.
• **Panel 3: Trans-Umbilical Wedge Resection**
The prolapsed VID is shown with a triangular segment removed, representing wedge excision at its junction with the ileum. This abstract panel illustrates the surgical correction performed through the umbilicus.
• **Panel 4: Healed Umbilicus**
A clean circular shape with a central depression symbolises the postoperative cosmetic outcome—restoration of a natural umbilical contour with no visible scar.

mechanical obstruction was noted. The postoperative course was uncomplicated, and the patient was discharged on day.

Outcome and Follow-Up

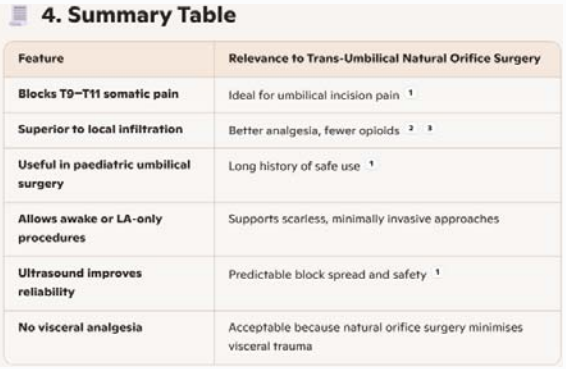
Given the conservatively treated hypoganglionosis , the child was referred to paediatric gastroenterology. Further evaluation included:

At 6-month follow-up, she remained well with improved bowel habits on a structured bowel regimen. No further surgical intervention was required.

Discussion

Vitellointestinal duct (VID) anomalies represent a spectrum of congenital defects arising from incomplete obliteration of the embryonic omphalomesenteric duct [5]. Although Meckel's diverticulum is the most common remnant, a patent VID presenting with mucosal prolapse through the umbilicus is rare. Early recognition and timely surgical management are essential to prevent complications such as ulceration, bleeding, or bowel obstruction [6]. Traditional management typically involves excision of the duct and closure of the ileal defect under general anesthesia, often through an supra or infra-umbilical or trans-umbilical incision.

In recent years, minimally invasive and cosmetically favorable approaches have gained prominence, particularly in paediatric surgery where parental expectations and long-term aesthetic outcomes are important considerations. The trans-umbilical approach offers excellent exposure while concealing the incision within the natural umbilical contour, resulting in a scarless appearance. In our case, the prolapsed segment was narrow, viable, and easily exteriorised,



4. Summary Table

Feature	Relevance to Trans-Umbilical Natural Orifice Surgery
Blocks T9–T11 somatic pain	Ideal for umbilical incision pain [1]
Superior to local infiltration	Better analgesia, fewer opioids [2] [3]
Useful in paediatric umbilical surgery	Long history of safe use [1]
Allows awake or LA-only procedures	Supports scarless, minimally invasive approaches
Ultrasound improves reliability	Predictable block spread and safety [1]
No visceral analgesia	Acceptable because natural orifice surgery minimises visceral trauma

Figure 4: Summary of relevance of RSB to PVID.

making it ideally suited for a trans-umbilical wedge resection.

A notable aspect of this case is the successful use of local anesthesia alone, avoiding general anesthesia in a young infant. This was facilitated by the anatomical characteristics of the umbilical region and the effectiveness of targeted abdominal wall blocks—particularly the rectus sheath block (RSB).

Role of the Rectus Sheath Block in Trans-Umbilical Natural Orifice Surgery

The rectus sheath block provides focused somatic analgesia to the periumbilical region by anesthetising the anterior cutaneous branches of the T9–T11 intercostal nerves as they traverse the posterior rectus sheath [7]. This makes it uniquely suited for procedures involving the umbilical ring, where somatic pain predominates. Compared with simple local infiltration, the RSB offers more predictable and longer-lasting analgesia, as it delivers local anesthetic directly into the neurovascular plane rather than the superficial tissues.

In the context of trans-umbilical natural orifice surgery—where visceral manipulation is minimal and the primary source of discomfort is somatic—RSB can provide sufficient analgesia to allow awake or minimally sedated procedures [8]. This is particularly advantageous in neonates and infants, in whom general anesthesia carries increased physiological risk and concerns regarding neurodevelopmental exposure. Ultrasound guidance has further improved the safety and reliability of the block by enabling direct visualisation of the rectus muscle, posterior sheath, and inferior epigastric vessels [9].

In our case, the combination of local infiltration and the principles of rectus sheath analgesia enabled a safe, rapid, and well-tolerated procedure without the need for general anesthesia. The infant remained comfortable throughout, fed immediately post-operatively, and was discharged the same day. The cosmetic outcome was excellent, with complete healing and no visible scar at follow-up.

Clinical Implications

This case highlights several important considerations for paediatric surgeons:

- Selected infants with small, uncomplicated prolapsed VID may be suitable for awake trans-umbilical repair.
- The rectus sheath block can serve as an effective primary anesthetic technique for umbilical procedures.
- Minimally invasive, scar-sparing approaches can be safely combined with local anesthesia to optimise both clinical and

cosmetic outcomes.

- Avoiding general anesthesia may be particularly beneficial in resource-limited settings or when paediatric anesthesia expertise is not readily available.

VID anomalies are rare, occurring in approximately 2% of the population, though only a small fraction present symptomatically. A prolapsed patent VID is particularly uncommon and often prompts urgent surgical correction.

This case demonstrates that:

- Local anesthesia can be safe and effective in selected infants.
- A trans-umbilical approach provides excellent exposure while preserving cosmetic appearance.
- Wedge resection is adequate when the prolapsed segment is narrow and healthy.
- Avoiding general anesthesia reduces perioperative risk, especially in young infants.

Few reports describe awake surgical management of VID anomalies. This case adds to the limited literature supporting minimally invasive, scar-sparing techniques in appropriate candidates.

To our knowledge, very few published cases describe this approach, and none provide the combination of local anesthesia, scarless umbilical reconstruction, and successful wedge resection in this context. We believe this case adds meaningful value to the paediatric surgical literature and offers a viable option for clinicians seeking minimally invasive solutions for VID anomalies.

Role of Rectus Sheath Local Anesthetic Block in Trans-Umbilical Natural Orifice Surgery

Trans-umbilical natural orifice surgery (e.g., trans-umbilical wedge resection, umbilical hernia repair, laparoscopic umbilical port entry) relies heavily on effective somatic analgesia of the periumbilical region. The rectus sheath block (RSB) is uniquely suited for this because it targets the anterior cutaneous branches of T9–T11, which supply the umbilical area.

Below is a structured, evidence-based synthesis.

1. **What the Rectus Sheath Block Provides**

Evidence shows that RSB:

- Produces sensory blockade of the abdominal wall in the periumbilical dermatomes (T9–T11).
- Provides superior analgesia compared with simple local infiltration for umbilical surgery.
- Reduces postoperative opioid consumption and delays the need for rescue analgesia.
- Is especially effective for midline and umbilical procedures, including paediatric cases.

This makes it ideal for trans-umbilical natural orifice procedures where the incision is small but highly innervated [10].

2. **Why It Is Particularly Valuable in Trans-Umbilical Natural Orifice Surgery**

A. Provides Targeted Somatic Analgesia

Trans-umbilical surgery involves:

- Stretching of the umbilical ring
- Traction on the rectus sheath
- Manipulation of the anterior abdominal wall

RSB blocks the anterior cutaneous branches as they pass between the rectus muscle and posterior sheath, directly covering this pain pathway [11-14].

B. Avoids General Anaesthesia in Selected Infants

RSB has been used safely in paediatric umbilical surgery since the 1990s.

It enables:

- Awake or minimally sedated procedures
- Reduced anesthetic exposure in neonates and infants
- Faster recovery and same-day discharge

This aligns perfectly with your scarless trans-umbilical wedge resection case.

C. Superior to Simple Local Infiltration

Earlier blind techniques were not consistently effective, but ultrasound-guided RSB now provides:

- Higher success rates
- Lower local anesthetic doses
- Fewer complications
- More predictable spread of anesthetic

Meta-analysis confirms better pain scores and reduced opioid use compared with infiltration alone [15-16].

D. Complements Natural Orifice Techniques

Natural orifice surgery minimises visceral pain, but somatic pain at the umbilicus remains significant. RSB specifically addresses this gap.

Limitations

- RSB does not provide visceral analgesia. (But natural orifice surgery often has minimal visceral trauma.)
- Requires ultrasound guidance for optimal safety and efficacy.
- Must avoid epigastric vessels (visible on Doppler).

Learning Points

Prolapsed VID can be managed without general anesthesia in carefully selected infants.

- A trans-umbilical approach offers excellent exposure and a scarless outcome.
- Wedge resection is feasible when the prolapsed duct is narrow and healthy.
- Minimally invasive, awake procedures may reduce perioperative risk and improve parental satisfaction.

Conclusion

The rectus sheath block provides targeted, reliable somatic analgesia of the umbilical region, making it an ideal adjunct—or even sole anesthetic technique—for trans-umbilical natural orifice surgery, especially in infants and minimally invasive procedures. The successful management of a prolapsed VID using a scarless trans-umbilical wedge resection under local anesthesia demonstrates the feasibility and advantages of combining minimally invasive surgical techniques with targeted abdominal wall blocks. The rectus sheath block plays a pivotal role in enabling such approaches and may expand the range of procedures safely performed without general anesthesia in infants. Scarless trans-umbilical wedge resection under local anesthesia is a safe, effective, and cosmetically superior option for selected infants with prolapsed VID. This approach may be considered when the prolapsed segment is small, uncomplicated, and easily exteriorised.

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