

Intraoperative, Self-Made Knot Pusher “Ney-Pusher” for Ultra-Fine Suture Materials



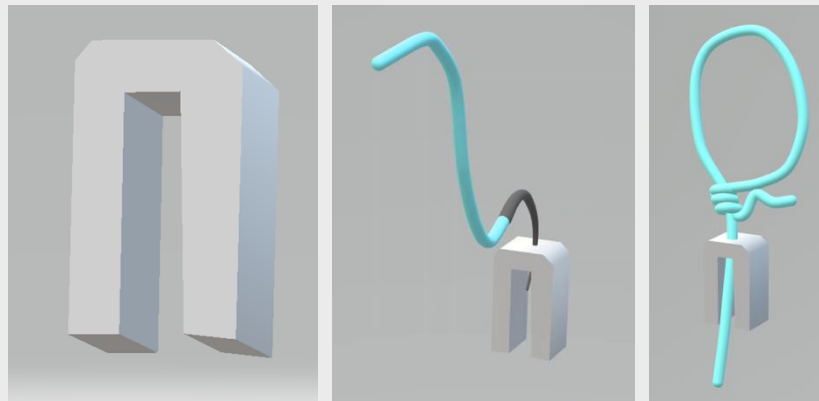
Training Programme
“Pelvic Floor Surgeon”
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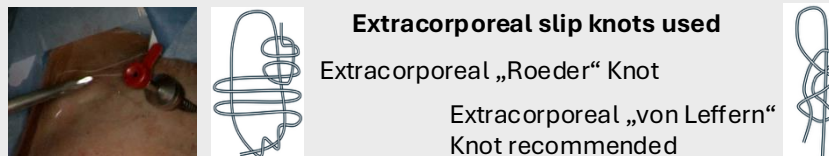
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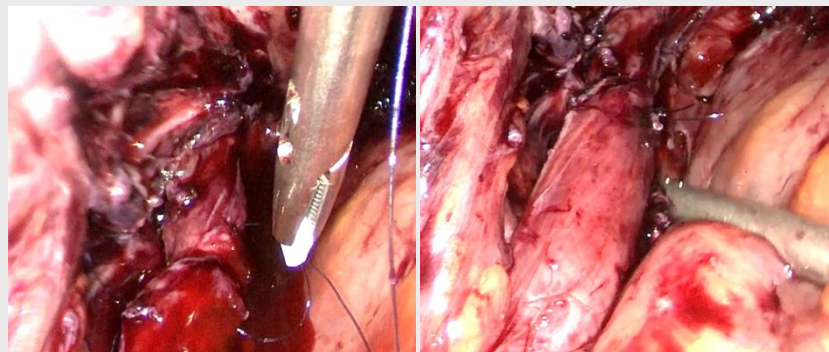
1. Cut a 4x10mm plastic strip from the thread package. Bend it into a V-shape.
2. Pierce it vertically with the needle.
3. Clamp the plastic strip into the needle holder. Note: The suture must be able to glide smoothly so that the slipknot can be tied properly.



Extracorporeal slip knots used

Extracorporeal „Roeder“ Knot

Extracorporeal „von Leffern“
Knot recommended



HYPOTHESIS / AIMS OF STUDY

Ultrafine suture materials (4-0 to 7-0) are essential in reconstructive urogenital surgery, nerve repair, and tubal procedures due to their minimal tissue trauma and precise approximation. However, handling these delicate sutures intraoperatively poses significant challenges, particularly in minimally invasive and NOTES (Natural Orifice Transluminal Endoscopic Surgery) procedures, where operative space is severely limited and only 5 mm laparoscopic instruments are available. Commercially available knot pushers are typically designed for suture sizes $\geq 3-0$, limiting their applicability in ultra-fine suture scenarios and often requiring improvisation. To address this gap, we developed a simple, self-made knot pusher, the “Ney-Pusher,” which allows secure placement of slipknots with sutures as fine as 7-0.

STUDY DESIGN, MATERIALS AND METHODS

Between March 2018 and March 2026, 164 patients underwent urogenital procedures using ultra-fine suture materials (3-0 to 5-0). Procedures included laparoscopic ureteral reconstructions, ureteral neointestations, pyeloplasties, bowel and vascular sutures, and transurethral or transanal NOTES interventions for fistula repair. The Ney-Pusher was constructed from a 4×10 mm strip of suture packaging, bent into a V-shape, and secured within the laparoscopic needle holder. The suture was guided medially through the V, enabling precise positioning of slipknots, including von-Leffern and Roeder loops, directly onto target tissues.

RESULTS

All targeted anatomical structures were securely approximated without suture breakage, tissue trauma, or loose knots. The mean time per individual knot placement was 2 minutes. The device is immediately available intraoperatively using commonly present materials, reducing the need for additional instruments and simplifying workflow.

INTERPRETATION OF RESULTS

The Ney-Pusher demonstrates that ultra-fine sutures can be handled safely, efficiently, and reproducibly in restricted operative environments. Its use allows precise knot placement while minimizing material waste, potentially lowering complication rates related to knot failure or tissue tearing. The device's simplicity and adaptability make it particularly valuable in laparoscopic and NOTES procedures, where standard instruments may be insufficient.

CONCLUDING MESSAGE

By providing full control over suture placement, the Ney-Pusher facilitates time-efficient, secure knotting of sutures from 3-0 to 7-0. Compared to traditional intracorporeal knotting, it offers superior handling, material conservation, and operative reliability, representing a practical and cost-effective solution for ultrafine suture applications in minimally invasive surgery.