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Evaluating Single Incision Laparoscopy–Assisted Extracorporeal Biopsy as an Alternative to Frozen Sections in the Management of Hirschsprung Disease

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BACKGROUND

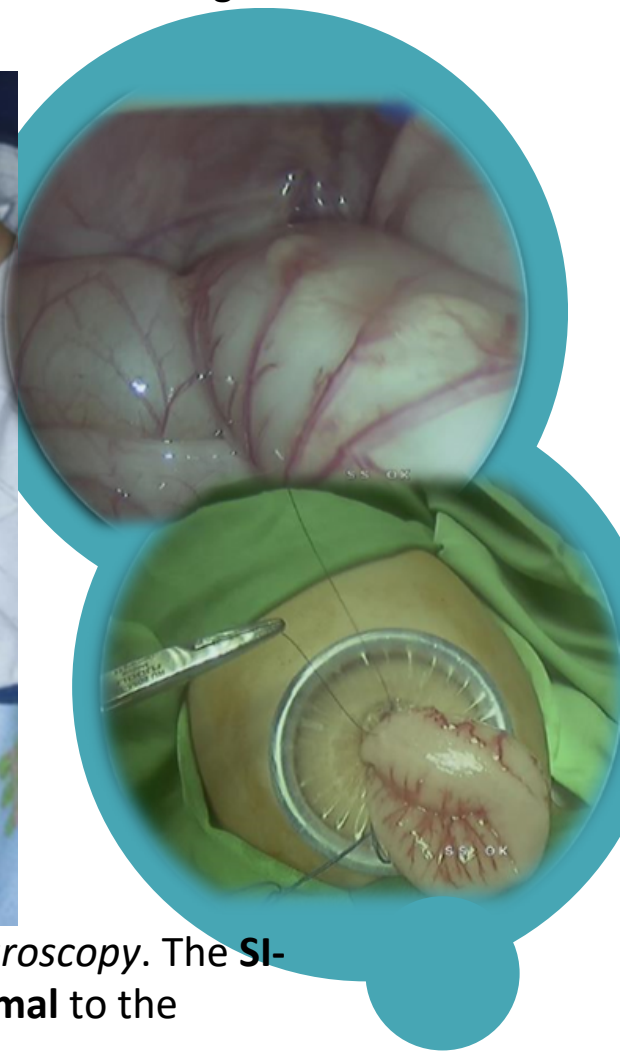
Hirschsprung Disease (HD): absence of enteric ganglion cells → bowel obstruction. **Frozen section** is the **standard tool** to identify the *ganglionic zone* during pull-through surgery. Yet, discrepancies between *frozen* and *IHC* findings may cause residual aganglionosis or over-resection. Limited frozen section facilities in Indonesia highlight the need for a **feasible, accurate, and minimally invasive alternative**.

OBJECTIVE

To evaluate the effectiveness of Single-Incision Laparoscopy–Assisted Extracorporeal (SI-ECo) leveling Biopsy with Immunohistochemistry (IHC) as an alternative to frozen sections in HD management.

METHODS

Three paediatric patients with confirmed Hirschsprung Disease (HD) scheduled for definitive **pull-through surgery**.
Before pull-through, **diagnostic laparoscopy** was performed to identify the **transition zone**.
SI-ECo levelling full thickness biopsy was then conducted to confirm the presence of **ganglion cells** 5–10 cm proximal to the transition zone.
IHC markers: Calretinin, Bcl-2, and S100.
Based on findings, surgeons determined whether **immediate pull-through** or **staged colostomy** was required.



RESULTS

- In all three patients, the **transition zone** was detected during *diagnostic laparoscopy*. The **SI-ECo leveling biopsy** confirmed the **presence of ganglion cells 5–10 cm proximal** to the transition zone using IHC markers (calretinin, Bcl-2, S100).
- There was a **100% concordance** between IHC biopsy results and the final histopathological examination of the resected specimens. No cases of **retained aganglionosis** were observed.
- The mean operative time for the SI-ECo procedure was **45–60 minutes**, with **<10 mL estimated blood loss**. No intraoperative complications occurred, and the **single umbilical incision** resulted in **excellent cosmetic outcomes**.
- Based on the SI-ECo findings, all patients proceeded to **staged Transanal Endorectal Pull-Through (TEPT)** as the definitive operation. None required colostomy, as the ganglionic bowel length was sufficient for pull-through.

DISCUSSION

SI-ECo leveling biopsy with IHC effectively identifies the **ganglionic zone**, providing a **precise and less invasive** method for preoperative planning. **Frozen section** remains the conventional standard, but discrepancies with permanent results are common. **IHC markers** (Calretinin, BCl2, S100) increase diagnostic accuracy and reliability in detecting ganglion cells. The **SI-ECo technique** combines the cosmetic and recovery advantages of **single-incision laparoscopy (SILS)** with the diagnostic precision of **full-thickness biopsy**. Particularly useful in **resource-limited settings** where frozen sections are unavailable — reducing risks of **retained aganglionosis**. In this case series, all patients showed **good functional outcomes** post-TEPT, without complications. **SI-ECo with IHC** is a reproducible, safe, and cost-effective alternative for accurate transition-zone localization.

CONCLUSION

SI-ECo Leveling Biopsy with IHC provides a practical, accurate, and minimally invasive alternative for HD diagnosis and management — especially in facilities without frozen section services.

REFERENCES

Nothing to disclose