A Prospective Comparative Study to Evaluate the Restoration of Abdominal Wall Dynamics in Patients with Incisional Hernia Following Laparoscopic and Open Repair in a Tertiary Care Centre

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Introduction

- Incisional hernia (IH) impairs abdominal wall function & reduces quality of life (QoL)
- Surgical repair (open/lap) necessary to restore abdominal wall integrity
- Assessing abdominal wall dynamics and quality of life is crucial for evaluating surgical outcomes

Aim

Primary Objective: To measure abdominal wall muscle dynamics using sEMG

Secondary Objectives:

- To compare abdominal wall dynamics following lap/open hernia repair using sEMG.
- To assess improvement in QoL before & after surgery using WHOQoL-BREF.

Study Design

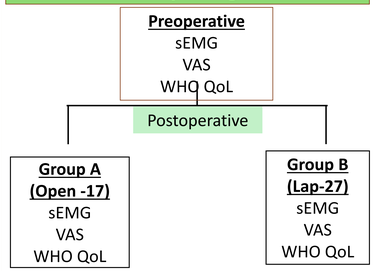
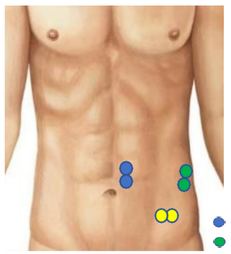


Figure : Surface EMG Measurement



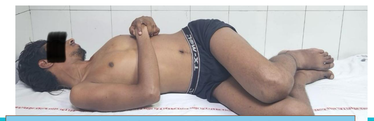


BIOPAC EMG

Rectus Abdominis
External Oblique
Internal Oblique



Rectus Abdominis Activation



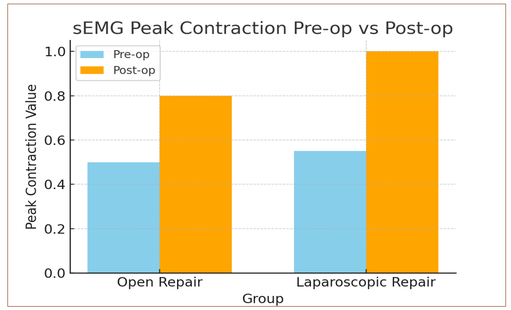
External and Internal Oblique Activation

Methodology

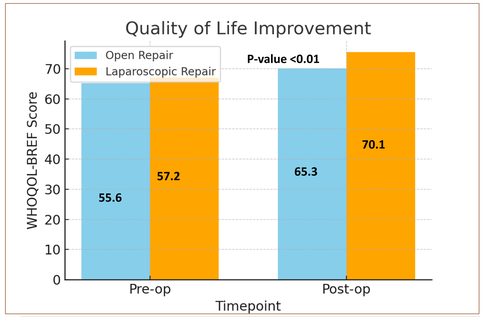
- Prospective study conducted between July 2022 to June 2024 on 44 patients of IH. sEMG performed pre-op & post op @ 6 months to assess rectus abdominis, external oblique, and internal oblique activity.
- QoL & Pain assessed using WHOQOL-BREF questionnaire & VAS

Results

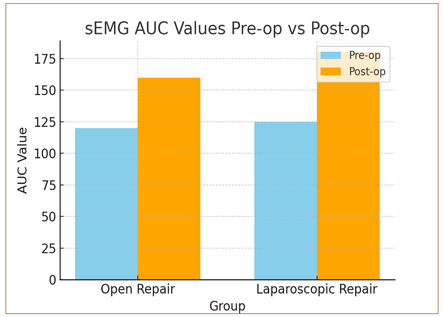
Demographic Details	Value
Mean Age (year)	46.64 ± 11.68
BMI (Kg/m²)	28.25 ± 3.82
Male: Female	10:34
Hernia : EHS Classification	7 (2/3/2)
Lateral(L1/L2/L3)	37
Midline (M1/M2/M3/M4/M5)	(2/2/2/17/15/1)
Width	
W1/W2/W3	15/16/13



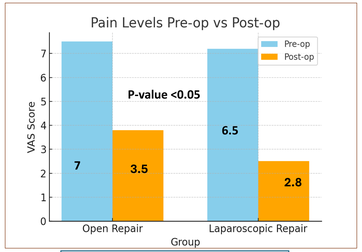
Higher post-op peak contraction values reflect better muscle strength, favoring laparoscopic repair



Significant post-op improvement, with laparoscopic repair leading to better patient well-being



Post-op improved muscle endurance, with laparoscopic repair showing superior recovery



Pain Scores (VAS)

Laparoscopic repair providing better pain relief

- Postoperative sEMG analysis at 6 months showed significant improvement in muscle activity in both groups, indicating better neuromuscular recovery of the abdominal wall
- Laparoscopic group demonstrated superior recovery in muscle function, with higher sEMG values reflecting enhanced muscle activation and strength
- QoL scores significantly improved in both groups at 6 months, indicating better physical and psychological well-being post-surgery

Conclusion

Abdominal wall hernia repairs (open or lap), significantly improve muscle activity, QoL and pain relief.

Lap repair demonstrated superior recovery, with greater improvements in abdominal wall dynamics, muscle activation, lower pain level and improved patient outcomes.

References

1. Roy, N.B Bansal V K et al. A comparative study to evaluate abdominal wall dynamics in patients with incisional hernia compared to healthy controls. Surg Endosc 37, 9414–9419 (2023).