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Effects of intervention for physical activity promotion before and after surgery among lung cancer patients

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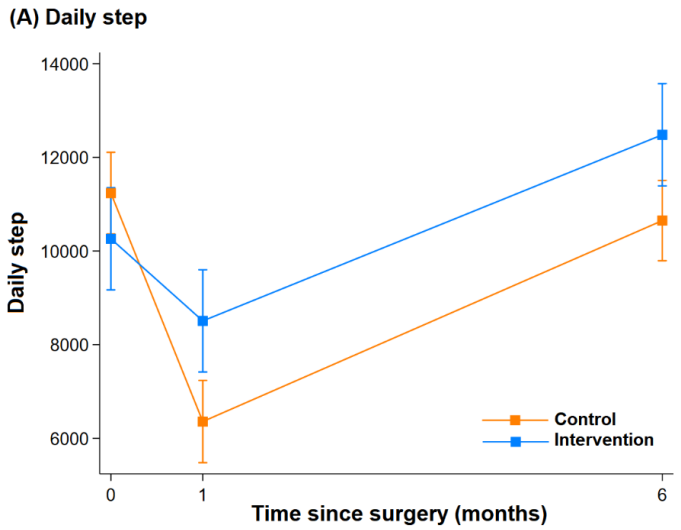
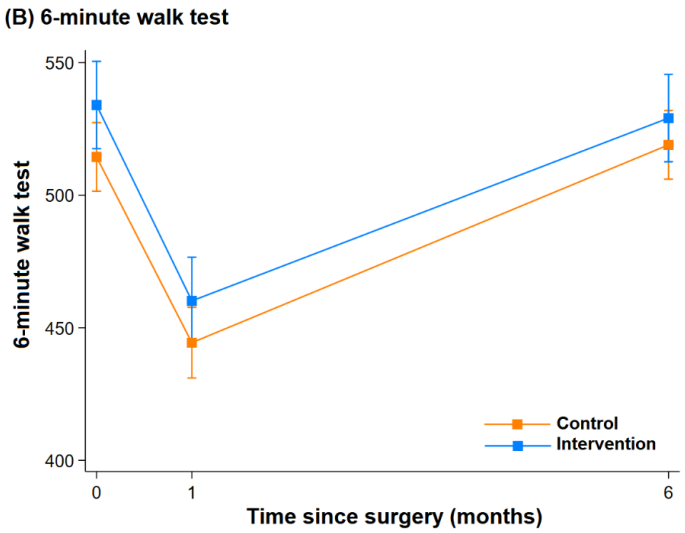
Purpose

- We conducted a prospective interventional study to assess the effectiveness of a wearable device intervention before and up to 6 months after surgery in promoting physical activity (PA) and physical function while reducing symptoms in Non-small cell lung cancer (NSCLC) patients scheduled for lobectomy, comparing it with usual care.

Results

All baseline characteristics were not significantly different between groups.





- 6MWD, daily steps and MVPA were decreased at 1 month postop and increased thereafter.
- The difference in 6WMD was not significantly different at 1 and 6 months after surgery between groups.
- Significant increase in daily steps were observed in the intervention groups at 1 and 6 months after surgery

	Baseline	p value	1 month	P value	6 months	P value
VPA time (m)		0.66		< 0.001		0.003
Control	18.5 (5.9-37.5)		6.2 (0.3-16.9)		18.5 (5.7-40.8)	
Intervention	16.3 (5.1-33.8)		17.1 (6.2-37.7)		33.6 (13.5-59.8)	
MPA time (m)		0.43		< 0.001		0.24
Control	19.4 (9.2-37.2)		10.1 (2.4-23.3)		19.8 (9.7-35.0)	
Intervention	17.4 (8.6-27.2)		21.2 (10.2-33.4)		23.9 (12.7-34.8)	

- Additionally, postoperative MVPA levels were also higher in the intervention group.

Methods

Open-label historically controlled trial

Patients aged <75 years old who were diagnosed cT1-2N0M0 lung cancer and expected to received lobectomy with curative intent

Period 1 (2017.9-2018.9)
n = 169

Excluded (n=10)
Refused (n = 10)

Allocation to control
n = 159

Loss of FU (n = 39)
Adjuvant Tx (n = 25)
Refused (n = 14)

Analysed
n = 120

Period 2 (2018.10 – 2019.5)
n = 104

Excluded (n =4)
Surgery cancelled (n =1)
Refused (n = 3)

Allocation to intervention
n = 100

Received allocated intervention
n = 93

Loss of FU (n = 19)
Adjuvant Tx (n = 19)

Analysed
n = 74

Intervention

From diagnosis to POD 6 mos

General education
Personalized exercise program
(5 days per week)
- 5 min warm-up
- 30-60 min endurance exercise
- Respiratory muscle training
- 5 min cool down

Monitoring PA
: wearable device
(Versa, Fitbit, Inc)

Methods

The primary outcome : cardiopulmonary function using 6 min walking test (6MWT) at 6 mos after surgery.

The secondary outcomes

Physical activity (PA) using wearable activity tracker - steps per day and moderate to vigorous PA (MVPA) time

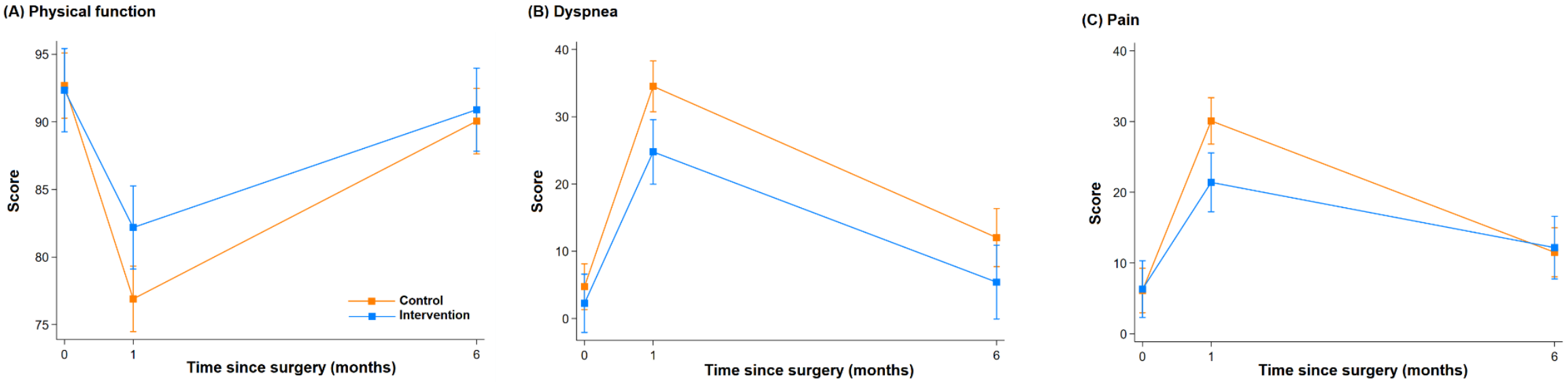
Patients reported outcomes : validated Korean version of the EORTC QLQ-C30

Primary and secondary outcomes were measured 3 times (before surgery, at 2 weeks and 6 mons after surgery)

Statistical analyses

- We aimed to compare the reduction of the 6MWT at 6 months after surgery between the intervention and control group, with a medium effect size (cohen's d = 0.5) of a=0.05 and 90% power
  To achieve this, we would need 64 participants per group
- intention-to-treat approach for all analyses.
- We utilized mixed-effects linear models to compare outcome changes between the scalp cooling and control groups. The models included visit effects and interactions, along with random intercepts to account for baseline outcome variations among study participants

Results



- In terms of patient-reported physical function, the intervention group had a smaller decrease of -10.2 (95% CI -13.9, -6.5) compared to the control group, which decreased by -15.7 (95% CI -18.6, -12.9) 1 month after surgery.
- For symptom changes, dyspnea increased by 29.8 (95% CI 25.1, 34.5) and 22.5 (95% CI 16.5, 28.5) in the control and intervention groups, respectively, at 1 month after surgery. At the 6-month postoperative visit, dyspnea decreased in both groups, but the intervention group still had fewer symptoms than the control group (12 vs. 5.4; P = 0.01). Pain also showed similar patterns in both groups

Conclusion

- Drawing from our open-label historical comparison study, it's evident that the integration of a perioperative intervention exercise program can lead to profound postoperative benefits for patients. The intervention group, in contrast to those receiving standard postoperative care, demonstrated increased physical activity and patients-reported physical function and, reduced dyspnea and pain after surgery.

- The use of wearable devices in our study went beyond mere data collection, serving as a enhancer for patients to actively engage in their recovery. Our findings highlight the synergy of traditional therapy and modern technology in optimizing postoperative outcomes. With wearable tech, we can customize recovery plans, enriching patients' physical function and quality of life.