

Is there a relationship between cognitive decline, surgical interventions and general anesthesia?

A pilot retrospective observational study based on neuropsychological assessment

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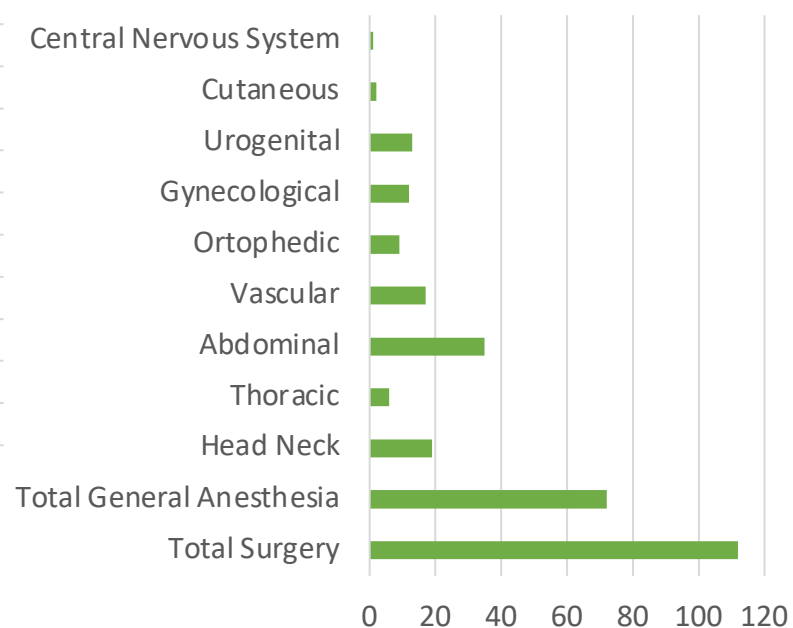
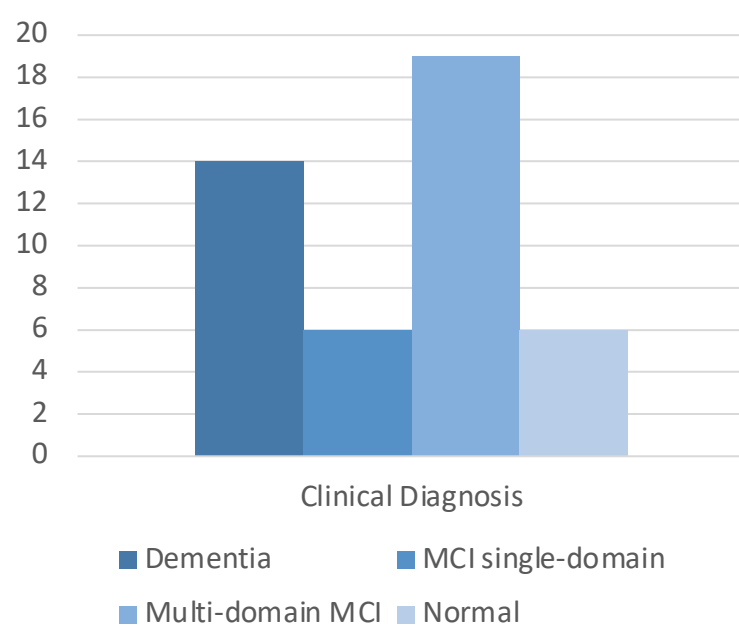
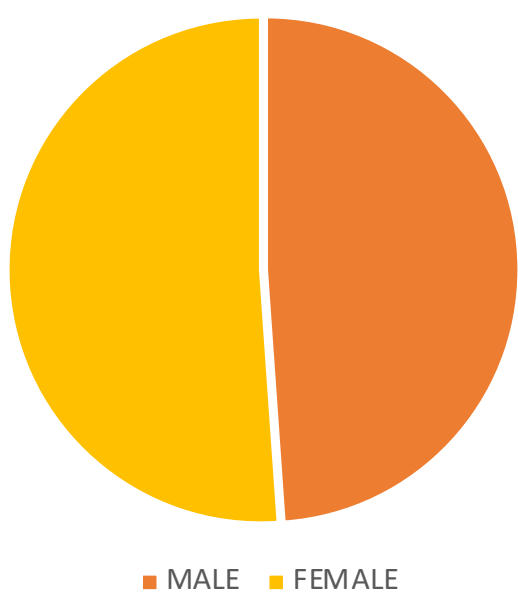


Objectives

To investigate the relationship between lifetime surgical history and anesthesia exposure with long-term cognitive performance in patients with normal cognition, single- and multi-domain Mild Cognitive Impairment (MCI), and dementia.

Materials

Forty-five patients (mean age 69.0 ± 10.2 years; education 10.6 ± 4.5 years; 22 males, 23 females) were included. Clinical diagnoses: 14 with dementia, 6 with single-domain MCI, 19 with multi-domain MCI, and 6 with normal cognition. A total of 114 lifetime surgical interventions were recorded (mean 2.8 ± 2.4 per patient; 63% under general anesthesia) across nine anatomical districts.



Methods

This retrospective observational pilot study collected demographic, clinical, neuropsychiatric (NPI), functional (ADL, IADL), and cognitive data (MMSE, FAB, CDT, RAVLT, Corsi Span, Digit Span, Stroop, TMT, Raven's Matrices, Constructional Apraxia), corrected using Italian normative standards. Surgical history (number, site, anesthesia type) was correlated with clinical diagnosis and neuropsychological scores. Analyses included Kruskal-Wallis H and Spearman's rank correlation tests ($\alpha = 0.05$).

Results

No significant differences in total or district-specific surgery counts were observed across clinical diagnosis groups (all $p > 0.05$). However, Spearman correlations revealed:

- **positive** associations between total surgical interventions and MMSE, RAVLT total, and Raven's Matrices ($r_s = 0.018, 0.029, 0.160$)
- District-specific **positive** correlations, in detail:
 - head-neck surgeries with bisyllabic word repetition ($r_s = 0.455, p = 0.02$);
 - abdominal surgeries with MMSE ($r_s = 0.437, p = 0.003$), RAVLT delayed recall ($r_s = 0.304, p = 0.047$), constructional apraxia ($r_s = 0.315, p = 0.038$), Raven's Matrices ($r_s = 0.359, p = 0.018$), and Clock test ($r_s = 0.373, p = 0.027$);
 - orthopedic surgeries with RAVLT ($r_s = 0.369, p = 0.015$) and delayed recall ($r_s = 0.343, p = 0.024$);
 - gynecologic surgeries with IADL and multiple memory tests ($r_s \approx 0.30, p < 0.05$)

Negative correlation for vascular surgeries with bisyllabic word repetition ($r_s = -0.307, p = 0.043$).

Discussion and Conclusions

Although no group differences were observed by diagnosis, weak-to-moderate correlations suggest potential links between surgical experiences, particularly abdominal and orthopedic procedures, and cognitive performance, potentially reflecting postoperative lifestyle changes. Vascular surgeries correlated negatively. The positive correlation with general anesthesia exposure raises hypotheses of selective neuroprotective or metabolic effects warranting further study.

This study suggests a complex relationship between surgery, anesthesia, and cognition. Limitations include small sample size, retrospective design, and limited anesthetic data. Further prospective studies and experimental research are warranted.



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