Supplementary Material

The distribution of the variables "age" and "BMI" was tested for normality. The empirical distribution of the data histogram was used to compare to a normal probability curve (Supplementary Figures S1 and S2).

**Figure S1.** Histogram and normal probability curve for age distribution.

**Figure S2.** Histogram and normal probability curve for BMI distribution.

We also tested the normality with normal quantile plots (Figures S3 and S4), looking at the data set to see if it seemed plausible that it may be a sample of normal distribution. The data were plotted against a theoretical normal distribution in such a way that the points should form an approximate straight line.
In both cases, the distribution was not well-modeled by a normal distribution, so the use of median and interquartile range as measures of central tendency and dispersion was appropriate.

Proportional hazard assumption – evaluation

The Cox model is used for analyzing survival data, when the output was time to event of interest, adjusted for one or more variables. This model is known as a proportional risk model because rate of failure of two different individuals must be constant in time. This is a condition to use the proportional hazard Cox model – the rate of failure must be proportional during the time as well as the cumulative proportional rates of failure.

There are three approaches for evaluating the proportional hazard (PH) assumption of the Cox model – a graphical procedure, a goodness-of-fit testing procedure and a procedure that involves the use of time-dependent variables.

We used the log-log survivor curves over different categories of variables. A log-log survival curve is simply a transformation of an estimated survival curve that results from taking a natural log of an estimated survival probability twice, plotted as a step function. The parallelism of log-log survival plots for the Cox PH model provides a graphical approach for assessing the PH assumption – empirical plots of log-log survival curves for different individuals will be approximately parallel (1).
Another statistical test to evaluate proportional hazard assumption was the goodness of fit (GOF) testing approach.

The GOF provides a test statistic and P value for assessing the PH assumption for a given predictor of interest. It is more objective than the graphical approaches. The principal of this test is if the PH assumption holds for a particular variable, then the Schoenfeld residuals for that variable will not be related to survival time. Rejection of the null hypothesis leads to a conclusion that the PH assumption is violated.

**Analysis of the covariables of the study**

The covariable BMI was categorized as < or ≥50 kg/m². Log-log graph – by this graph approach, the PH assumption was accepted. Expected plots for log-log survival rates are shown in Figures S5 and S6.

**Figure S5.** Survival rate – all cause mortality, by BMI.

**Figure S6.** Survival rate – mortality rate related to surgery, by BMI.
The Schoenfeld residuals statistic shows that the covariable violated the PH assumption considering the all cause mortality, but the PH assumption is accepted for the mortality related to surgery, as presented in Supplementary Table S1.

**Table S1.** Goodness of fit testing proportional hazard (PH) assumption for all cause mortality and mortality related to surgery, by body mass index (BMI).

<table>
<thead>
<tr>
<th>Covariable</th>
<th>rho</th>
<th>GL</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (all cause mortality)</td>
<td>-0.27481</td>
<td>1</td>
<td>6.50</td>
<td>0.001</td>
</tr>
<tr>
<td>BMI (mortality related to surgery)</td>
<td>-0.03954</td>
<td>1</td>
<td>0.07</td>
<td>0.79</td>
</tr>
</tbody>
</table>

The covariable age was categorized by < 50 or ≥50 years. Log-log graph – by this graph approach, the PH assumption was accepted. Expected plots for log-log survival rates are shown in Figures S7 and S8.

**Figure S7.** Survival rate – all cause mortality, by age.

**Figure S8.** Survival rate – mortality rate related to surgery, by age.

The GOF P value did not reject the null hypothesis. So, the PH assumption was accepted.
**Table S2.** Goodness of fit testing proportional hazard (PH) assumption for all cause mortality and mortality related to surgery, by age.

<table>
<thead>
<tr>
<th>Covariable</th>
<th>rho</th>
<th>GL</th>
<th>X^2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (all cause mortality)</td>
<td>0.04404</td>
<td>1</td>
<td>0.16</td>
<td>0.69</td>
</tr>
<tr>
<td>Age (mortality related to surgery)</td>
<td>-0.19240</td>
<td>1</td>
<td>1.66</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Figure S9 shows the cumulative hazard estimate for all causes of death during 120 months of follow-up.

**Figure S9.** Cumulative hazard estimate – all causes of death.

Figures S10 and S11 show the cumulative hazard of death, by age and by BMI. As expected, patients with higher age and BMI are more likely to die.

**Figure S10.** Age cumulative hazard.

**Figure S11.** Body mass index (BMI) cumulative hazard.