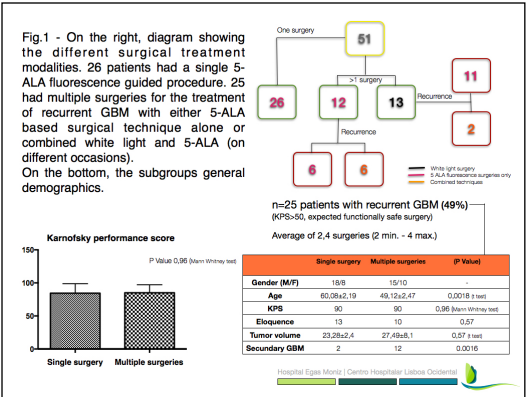


## Introduction

Malignant gliomas (MG) have a bad prognosis. Gold standard treatment with the combination of surgery, radiotherapy and temozolomide allow an average survival of 15 months. Extent of tumour resection is a known positive prognostic factor, however, the role of an aggressive surgical attitude when facing tumour recurrence is not well established. We aim to access the impact on survival of an aggressive surgical attitude in the treatment of recurrent MG with the use of 5-amminolevulinic acid, fluorescence guided surgery (5-ALA-GS).

## Methods

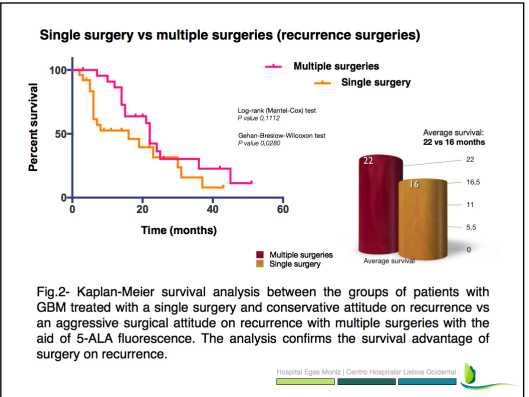
Retrospective study of all consecutive MG patients treated under 5-ALA-GS from December 2008 to December 2013. The aim of all surgeries was gross total resection of the MRI, TI/gadolinium identifiable tumour. Age, Karnofsky Performance Status prior to surgeries, tumour location, histology, number of gross total resection surgeries and the volume of residual tumour were accessed. All patients were submitted to the same radiotherapy and temozolomide standard protocol.



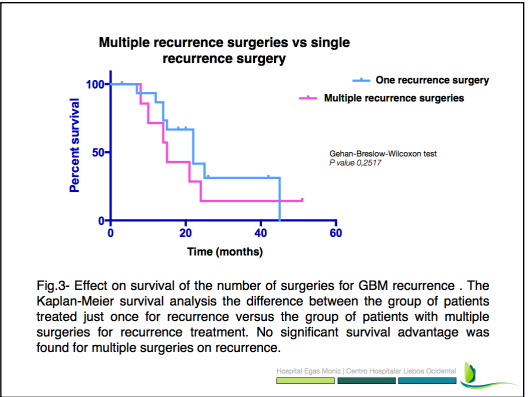
Average overall survival was correlated with the number of gross total resection with 5-ALA-GS. Statistical analysis was calculated with Prism6 v.6.0 for MacOS-X.

## Results

A total of 66 5-ALA-Guided surgeries were preformed on 51 patients, followed for 38,3±17 months. The average age of the population was 54,5±12,8 (min.26-max.79).



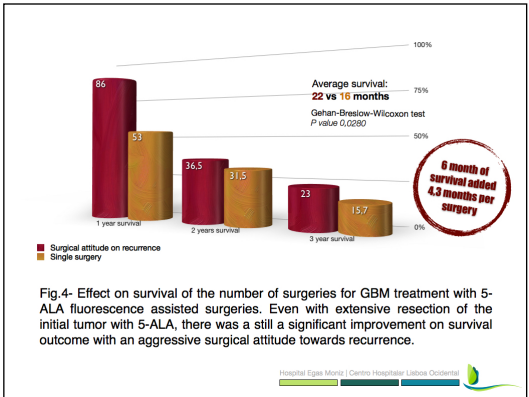
Half on the patients (49,0%) were re-operated for the treatment of tumour recurrence with an average of 1,4 surgeries per patient (min.1-max.3). Those had an average survival of 22 months compared with 16 month for the patients who had only one 5-ALA-GS for



the treatment of the inicial tumor (G-B-Wilcoxon; p<0,05). After 4 years of follow-up, 11,4% of the multiple surgeries patients were still alive. A average of 6 months of survival were gained with recurrence surgical treatment (average of 4,3 months per surgery). No other statistical significant differences were found between both groups regarding the other prognostic variables studied. Surgical complications rates were similar in both groups.

## Discussion

Goldstandard GBM treatment with surgery, temozolomide and radiotherapy allow a 14,6 month median survival. Stummer et al, showed that optimizing surgical tretment with more extensive tumor resection with the aid of fluorescence guided techniques (5-ALA-GS) we can improve the survival to 16,7 months comparing to 11,8 months when using standard white light surgical techniques. In our serie, with the use of 5-ALA-GS, we achieved a 22 months median survival. This result might be explained by an agressive surgical attitude facing tumor recurrence. A recurrence surgery was indicated on patients with KPS>50, with tumors in a expected functionally safe area of the brain. In fact, almost 50% of our patients had one or more surgeries for recurrence treatment (1,4 surgeries per patient treated for recurrence). In this subgroup of patients the median survival was 22 months comparing with 16 month for the single surgery group. Multiple recurrence surgeries, however, added few to the outcome (fig.3). We did not find a improvement on survival in the patients



with more than one surgery for recurrence treatment.

## Conclusions

An aggressive surgical attitude for the treatment of malignant glioma and its recurrence, with the use of 5-ALA-GS, had a positive prognostic impact on average survival. We found an average gain in survival of 6 months with the surgical treatment of recurrence (4,3 months per surgery), with no relevant increase in surgical morbidity or mortality.

## Learning Objectives

Access the impact on survival of an aggressive surgical attitude in the treatment of recurrent malignant glioma with the use of 5-amminolevulinic acid fluorescence guided surgery.