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Bronchial thermoplasty; its long-term efficacy in severe asthma

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Rationale

- Severe asthma is characterized by airway wall remodelling which includes thickening of the airway smooth muscle (ASM)
- Bronchial Thermoplasty (BT) is a bronchoscopic treatment for severe refractory asthma and targets airway remodelling.
- Previously we published the data of the TASMA RCT (Goorsenberg AWM et al. AJRCCM 2021; 203:175-184), which showed clinical benefit and reduction of 53% in ASM 6 months after BT.

Aim

To investigate the clinical outcomes and changes in ASM on long-term.

Methods

- The Amsterdam cohort (n=22) from the TASMA RCT were followed for 30 months after BT.
- Main clinical outcome parameters were the Asthma Quality of Life Questionnaire (AQLQ), the Asthma Control Questionnaire (ACQ) and annualized exacerbation rate.
- Biopsies were taken at baseline, 6 months and 30 months after BT.
- ASM mass (% positive desmin area in the total biopsy) was calculated with automated digital analysis software.
- Statistical analysis was done by ANOVA for repeated measures and Bonferroni post-test.

Results

- A repeated measures ANOVA showed that mean AQLQ (p<0,001), ACQ (p<0.001) and exacerbation rate (p=0,004) all differ significantly between time points.
- Post hoc tests using the Bonferroni correction revealed that after 30 months AQLQ improves by an average of 1,1 (p=0,003), ACQ improves by an average of 0.9 (p=0,02) and annualized exacerbation rate reduced with an average of 2,8 (p=0,09) **(Figure 1)**.
- Post hoc tests using the Bonferroni correction revealed that after 30 months the mean ASM mass is still significantly reduced (p=0,001) **(Figure 2)**.
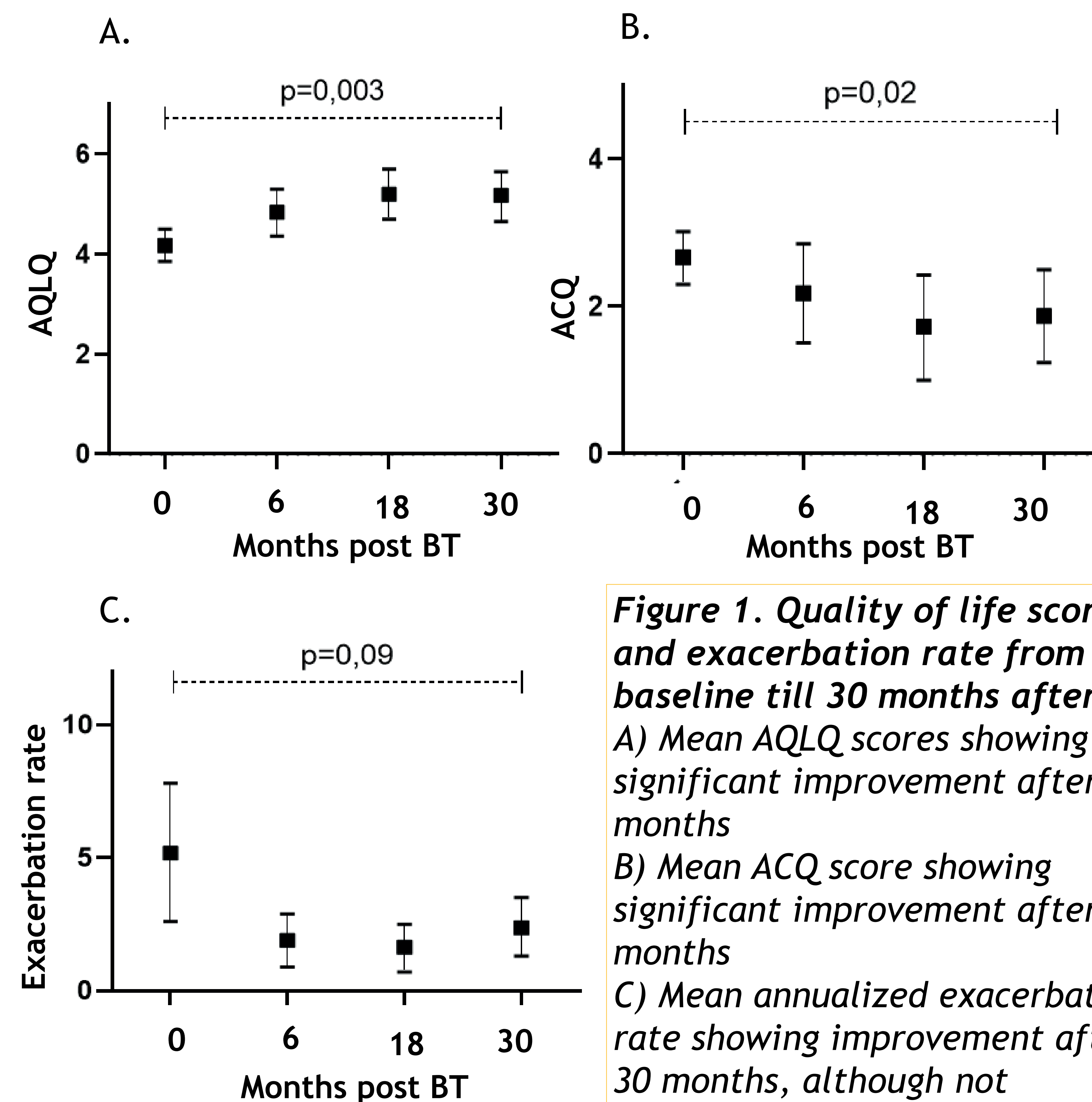
Figure 1. Quality of life scores and exacerbation rate from baseline till 30 months after BT
A) Mean AQLQ scores showing significant improvement after 30 months
B) Mean ACQ score showing significant improvement after 30 months
C) Mean annualized exacerbation rate showing improvement after 30 months, although not significant.
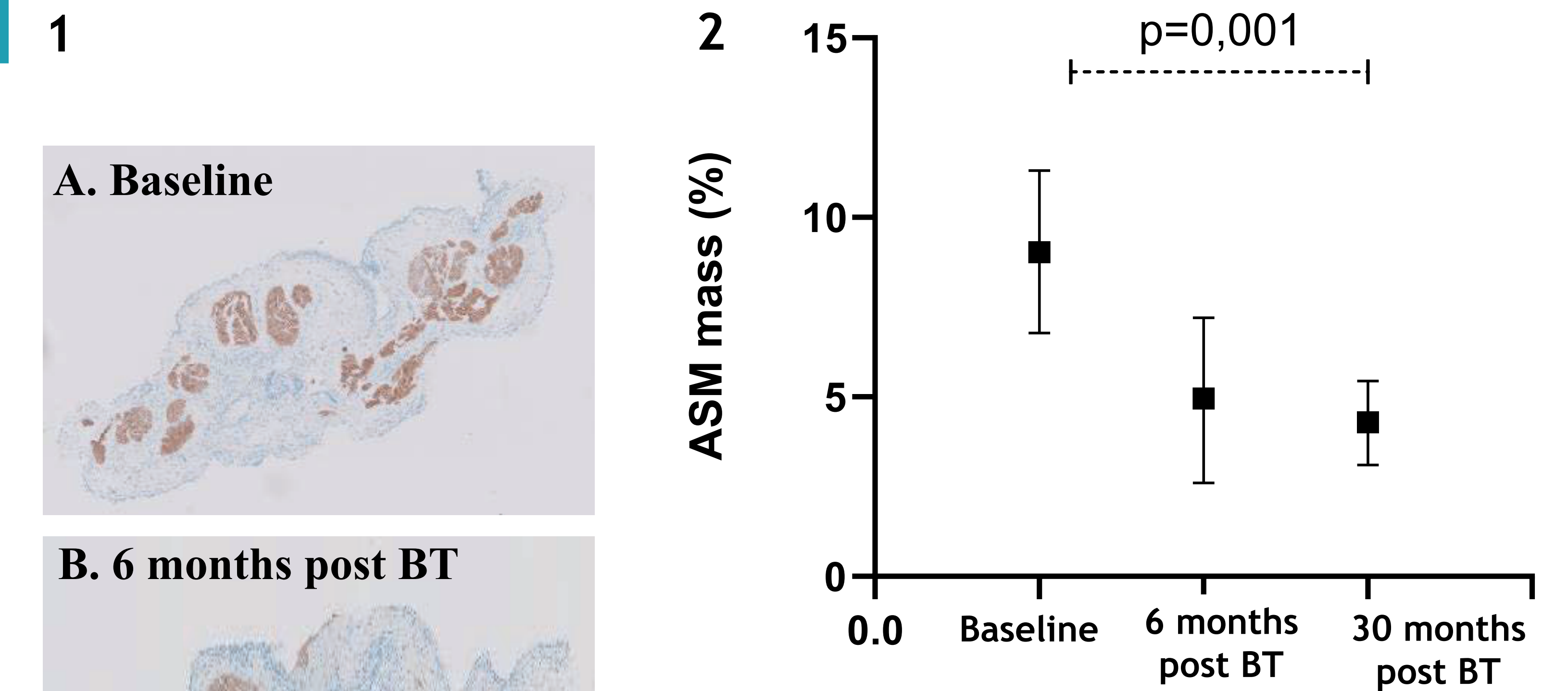
Figure 2. ASM is reduced 6 months and 30 months after BT as compared with baseline.
1.(A) ASM percentage assessed with desmin staining at baseline (B) 6 months after BT (C) 30 months after BT
2. ASM mass percentage before and after BT showing the mean ASM mass percentage of 9,03% before BT versus 4,96% 6 months (45% reduction) and 4,3% (52% reduction) 30 months after BT

Conclusion

1) 30 months after BT, improvement in quality of life, asthma control and reduction in exacerbation rate persists.
2) The airway smooth muscle (ASM) remains reduced (52%) at 30 months after BT as compared to baseline.

Implication

Data of this study mirror the results on AQLQ, ACQ and exacerbation rate of previous RCTs and large registries. In addition, ASM remains reduced till at least 30 months after BT. BT should be considered as a valuable treatment for severe asthma with favourable long term outcomes.

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