

## Reply

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We very much appreciate the comments of Dr. Machens and Dr. Dralle regarding our article “Extended resection for thyroid disease has less operative morbidity than limited resection” [1] and thank them for their critical remarks. However, we do not concur with the commentators concerning the interpretation of our data for the following reasons:

We agree with the commentators that the only statistically significant difference in the indications for thyroid surgery between the two observation periods was surgery for recurrent disease (stated in Table 2 and marked as  $p = 0.002$ ). This is why patients who had surgery for recurrent disease were analyzed separately and were not included in the baseline population. Despite mentioning in the text (see Results section, “Injury of the inferior laryngeal nerve,” first sentence) and in the corresponding table (Table 3, “primary surgery” and “resection for recurrence”) that analysis for primary thyroid disease and for recurrent thyroid disease was performed separately, we have to blame ourselves that we obviously did not stress this important point enough.

Indeed, the odds ratio for the rate of postoperative nerve palsy after surgery for recurrent disease in our cohort was similar to the one found in the study conducted by the commentators (OR = 5.2). We completely agree with Drs. Machens and Dralle that operations for recurrence are burdened with highly increased risk of injuring the laryngeal nerve. Hence, it is of utmost importance to avoid recurrent disease.

One of the conclusions of our study is that extended resection leads to a significant ( $p = 0.002$ ) reduction in the number of operations for recurrent disease over time.

Even though we cannot exclude a confounding effect over time, we addressed this issue by performing a subgroup analysis (Fig. 3). Because the rate of nerve lesions remained similar within the two observation periods, advances in surgery and technique, other than extending the resection, are less likely to be the cause of the improved nerve palsy rate. Indicative for a significant time bias would be a more or less continuous (or at least multistepwise) decrease of palsy rates also within the observation periods, which was not evident in our study. In addition, there is no evidence in the literature that surgical technology and technique (magnifying glass, bipolar forceps coagulation, nerve monitoring) could explain a four- to fivefold decrease in surgical morbidity (in contrast, findings of the study by the commentators showed no advantageous effect of nerve monitoring).

Even though the assumption of Drs. Machens and Dralle that extending the resection would “logically” enhance the risk of hypoparathyroidism seems intuitive, our data do not confirm this hypothesis. Indeed, a proficiency bias might have led to our findings, as in centers where thyroid surgery is performed meticulously and regularly, visualization and preservation of the parathyroid glands is routinely done. However, rejection of findings that are based on data just because “it seems logical” does not fulfill the quality standards we are seeking by evidence-based medicine. It could be argued that in partial resection, where parathyroid glands are not visualized and, hence, not controlled, accidental devascularization could occur more often.

In addition, the commentators were concerned about the validity of the study findings due to the lack of quantifi-

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cation of the remaining thyroid tissue. This is an interesting issue and we would be very interested in how they would suggest reliably quantifying the volume of the remnant tissue. In the second study period, a remnant of 2–4 ml was left in only 15% of all interventions for primary thyroid disease. In 85%, either total or one-sided thyroidectomy was performed. Hence, it is unlikely that quantification of thyroid tissue left in place would significantly alter the conclusion based on the available data.

In summary and after correction for misinterpretation, the comments made by Drs. Machens and Dralle are not contradicting our conclusions and rather underscore the

importance of avoiding recurrent disease to prevent laryngeal nerve lesions. One way to avoid recurrence is by extended resection, as it has less operative morbidity than limited resection, at least at specialized centers.

### Reference

1. Seiler CA, Vorburger SA, Burgi U, Candinas D, Schmid SW (2007) Extended resection for thyroid disease has less operative morbidity than limited resection. *World J Surg* 31:1005–1013