



Re: Evaluation of Parathyroid Glands with Indocyanine Green Fluorescence Angiography After Thyroidectomy

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Hypoparathyroidism remains the most common complication after thyroidectomy with reported rates of about 30% for transient hypoparathyroidism and over 5% for definitive hypoparathyroidism in population-based registries [1].

Until very recently, the prevention of post-thyroidectomy hypoparathyroidism was based on anatomical knowledge of the possible locations of the parathyroid glands and their vascularization, careful dissection and visual evaluation of their perfusion after thyroid resection (sometimes with an incision of the parathyroid gland), allowing auto-transplantation of visually non-well-perfused glands. As evidenced by the high rate of transient and definitive hypoparathyroidism, the performance of these procedures was rather poor.

New tools have become available to help decrease the risk of hypoparathyroidism.

1. A team from Vanderbilt University discovered that parathyroid glands were more auto-fluorescent than the surrounding tissues in the near infrared (NIR); when excited at a given wavelength, they emit a light at another specific wavelength [2]. Two commercially available devices using these properties were accepted in November 2018 by the FDA to “help detect parathyroid tissue in real-time during thyroid and parathyroid surgery” (PTEye[®] from AI BioMed and Fluobeam[®] from Fluoptics). These tools can help detect the parathyroid glands, but do not assess their function.

2. We and others [3, 4] developed NIR angiography of the parathyroid glands with the fluorescent dye indocyanine green (ICGA) to evaluate the perfusion (and therefore the function) of the parathyroid glands after thyroid resection. In our hands, we obtained 100% positive predictive values in 170 patients (zero hypoparathyroidism in patients with at least one well-perfused parathyroid gland) [3].

In this issue, Rudin et al. [5] describe a retrospective analysis of patients operated with or without ICGA (86 and 124 patients, respectively). The authors report that ICGA modified the management of 36/281 parathyroid glands. (7% would have been auto-transplanted without ICGA, and 6% were visually evaluated as well-perfused, but were auto-transplanted based on ICGA.) They, however, failed to replicate previous results regarding the prediction of parathyroid function with ICGA. This underscores the need to standardize the evaluation of the perfusion with ICGA. As suggested by this study, visual evaluation of the shades of grey during ICGA is not sufficient to reliably predict the perfusion of parathyroid glands. Technical developments are underway to apply numerical criteria (such as Hounsfield units for the radiologists).

This study was retrospective and lacked some long-term follow-up data. However, it suggests that most patients with at least some perfusion of the parathyroid glands (ICG score ≥ 1) have regained their parathyroid function after a few weeks or months and this is also an exciting area of research; the ultimate goal of these new technical developments, auto-fluorescence to detect the parathyroid glands and ICGA to evaluate their perfusion, is to reduce (to nearly 0%) the rate of definitive hypoparathyroidism. There is still a long way to go, but there is hope to achieve it.

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