



Fluorescence imaging, an emerging tool for preserving the parathyroid glands during thyroidectomy

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With vocal cord palsy, hypoparathyroidism is one of the two major complications after thyroid surgery. Traditional approaches to preserving the parathyroid glands during thyroid surgery include identifying the glands precisely and preserving their vasculature with the naked eye, which mainly depend on the experience and skill of the surgeon. Recently, a relatively new technique, fluorescence image-guided surgery, has been widely researched and is becoming increasingly popular. The authors present a video clip of transoral robotic total thyroidectomy, which shows the three typical statuses of the parathyroid glands after thyroid surgery (well-perfused, poorly or non-perfused, and congested) and explains how to deal with each status of the parathyroid glands.

Keywords: Parathyroid glands, Perfusion, Indocyanine green angiography, Robotic thyroidectomy

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The most frequent complication after thyroid surgery is hypoparathyroidism, which lowers not only serum calcium levels but also the quality of life. To avoid hypocalcemic symptoms, patients with hypoparathyroidism need to take oral calcium and vitamin D three or four times a day, which often causes annoying gastrointestinal issues.

Recently, fluorescence image-guided thyroid surgery is being increasingly performed for preserving the parathyroid glands. According to a systematic review published in 2021, fluorescence-guided surgery is useful for preventing post-thyroidectomy hypoparathyroidism [1]. Furthermore, the National Evidence-based Healthcare Collaborating Agency (NECA) of Korea acknowledged “near-infrared autofluorescence for parathyroid gland detection” as a new health technology after a thorough and strict literature review, and thus, this technique can be reimbursed by the national medical insurance system.

Fluorescence used in image-guided surgery can be divided

into the following two types: contrast-enhanced fluorescence and autofluorescence. For contrast-enhanced fluorescence, indocyanine green is most commonly used as the contrast medium owing to its low cost and high safety [2]. On the other hand, autofluorescence uses intrinsic biomolecules that act as endogenous fluorophores [3]. These two types of fluorescence have similar effectiveness for intraoperatively identifying the parathyroid glands [4]. While autofluorescence has the advantage of not needing additional time to inject an exogenous dye, perfusion of the parathyroid glands can only be visualized with contrast-enhanced fluorescence.

In the current study [5], the authors assessed the perfusion of the parathyroid glands using indocyanine green angiography in transoral robotic thyroidectomy. They have presented a video clip of transoral robotic total thyroidectomy, which shows the three typical statuses of the parathyroid glands after thyroid surgery (well-perfused, poorly or non-perfused, and congested)

and explains how to deal with each status of the parathyroid glands. They have shown that intraoperative indocyanine green angiography has the potential to lower the risk of permanent hypoparathyroidism after thyroid surgery by supporting auto-transplantation of devascularized parathyroid glands detected by the technique [5].

Although the accuracy of indocyanine green angiography for predicting postthyroidectomy hypoparathyroidism has been consistently reported in several studies [6], there still exist conflicting data regarding its effectiveness in reducing postthyroidectomy hypoparathyroidism [7,8]. Further investigations with large-scale randomized controlled studies are necessary to elucidate if this technique can reduce postoperative hypoparathyroidism. Future studies need to also address the lack of standardization of the optimal dose of indocyanine green and the timing of its administration.

NOTES

Conflict of interest

The author has no conflicts of interest to declare.

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