Editorial

New techniques and technologies for the treatment of surgical endocrine diseases

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It is with a great pleasure that we present the Readers with another issue of the *Gland Surgery*, which is this time dedicated solely to new techniques and technologies for the treatment of surgical endocrine diseases. Owing to the close international collaboration we are presenting in this issue 12 reports from leading experts in the field focused on selected hot topics in endocrine surgery: intraoperative neural monitoring (IONM) in thyroid surgery (1,2), safety of energy based devices (EBD) for hemostasis in thyroid surgery (3), utility of *BRAF V600E* mutation for prognostication of papillary thyroid cancer (PTC) recurrence (4), rare cases of PTC associated with thyroid Langerhans cell histiocytosis (5), management of thyroid cancer with tracheal invasion (6), utility of indocyanine green-enhanced fluorescence to assess parathyroid perfusion during thyroidectomy (7), value of iPTH assay for early prognostication of postoperative hypocalcemia (8), risk factors for perioperative hemodynamic instability in patients undergoing laparoscopic adrenalectomy for pheochromocytoma (9), utility of laparoscopic sleeve gastrectomy (LSG) for the treatment of diabetes mellitus type 2 (10), innovative solutions in bariatric surgery (11), including new endoscopic procedures for diabetes mellitus type 2 and obesity treatment (12).

Recurrent laryngeal nerve (RLN) injury remains a significant morbidity associated with thyroid and parathyroid surgery. In the past decade, surgeons have increasingly used IONM as an adjunct technique for localizing and identifying the RLN, detecting RLN injury, and predicting the outcome of vocal cord function. In recent years, many animal studies have investigated common pitfalls and new applications of IONM. For example, the use of IONM technology in animal models has proven valuable in studies of the electrophysiology of RLN injury. The advent of animal studies has substantially improved understanding of IONM technology. Lessons learned from animal studies have immediate clinical applications in establishing reliable strategies for preventing intraoperative RLN injury (1).

Reoperative thyroid surgery remains most challenging even for skilled surgeons, and is associated with a higher incidence of complications, such as hypoparathyroidism and RLN palsy (2). Despite lacking hard evidence that IONM can diminish prevalence of permanent vocal fold's palsy as many as 95.7% of the respondents of the most recent International Survey on the Identification and Neural Monitoring of the EBSLN During Thyroidectomy expressed their confidence in IONM and listed reoperative thyroid cases as the top indication far ahead all other clinical situations for utilization of this technique during thyroid surgery (13). Considering the wide availability of EBD more nerve injuries caused by thermal spread are expected in the near future if a strict standardized use is not applied. EBDs are unsafe in the close proximity the RLN. It is important not to directly touch the nerve with EBS immediately after the latter has been used. RLN must be well visualized before the activation. Experimental histological studies of vessel sealed with EBD demonstrated 1.5 to 3.3 mm thermal spread, beyond the tissue within the forceps' jaws. Hence it was suggested not to use the device closer than 3 mm to the RLN (3).

Despite excellent prognosis PTC involves a risk of

persistent or recurrent disease is up to 30% of patients. Currently, *BRAF V600E* mutation was evaluated in many studies as a possible prognostic marker for recurrence. However, outcome of these studies are conflicting, and prognostic significance of *BRAF* mutation was confirmed in some single center studies, a few meta-analyses and a large multicenter retrospective international study. At present, it seems that *BRAF* mutation is one of the factors influencing the prognosis and it should be analyzed in correlation with other prognostic factors. The most recent ATA recommendations do not indicate a routine application of *BRAF* status for initial risk stratification in differentiated thyroid cancer due to a lack of evident confirmation of a direct influence of mutation on the increase in relapse risk. However, ATA demonstrates the continuous risk scale for the relapse risk assessment, considering *BRAF* and/or *TERT* status. At present, researchers are working on determining the role of *BRAF* mutation in patients from a low-risk group and its correlations with others molecular events. Currently, BRAF mutation cannot be used as a single, independent predictive factor. However, its usefulness in the context of other molecular and clinicopathological risk factors cannot be excluded. They may be used to make modern prognostic scales of relapse risk and be applied to individualized diagnostic and therapeutic strategy for PTC patients (4).

With increasing utilization of total thyroidectomy there is increasing risk of transient and permanent hypoparathyroidism, which is considered to be one of the most common but still underestimated morbidity following thyroid surgery. Visual identification and preservation *in situ* of all parathyroid glands with intact vascular supply during surgery remains the standard preventive measures. However, few recent reports turn our attention to indocyanine green-enhanced fluorescence as a technique both facilitating parathyroids identification and their viability assessment intraoperatively due to its potential for evaluation of tissue perfusion in real-time intraoperative angiography (7). In addition, the correlation of low iPTH serum level few hours after surgery and risk of hypocalcemia was repeatedly reported in the literature. Hence, iPTH serum level ≥10 pg/mL can be considered as an important criterion allowing for a safe and early hospital discharge following total thyroidectomy (8).

Hemodynamic instability is one of the most commonly diagnosed adverse event in patients undergoing laparoscopic adrenalectomy for pheochromocytoma. Although it occurs mostly during surgery, a significant proportion of patients require vasopressor agents also in the postoperative period. There are several risk factors associated with increased incidence of hemodynamic instability. They are directly related to the tumor size and its hormonal activity. Appropriate preoperative assessment and treatment with antihypertensive drugs significantly reduces the incidence of hemodynamic changes during and after surgery, thus minimizing serious complications and mortality. Moreover, operative factors seem to play crucial role. Meticulous dissection and gentle and minimal tumor manipulation and early adrenal vein ligation lower their incidence. Laparoscopy in the case of pheochromocytoma is safe and feasible. It is not associated with higher risk of hemodynamic instability. Such approach does not carry additional risk also in larger tumors. To minimize morbidity and mortality a close cooperation between the surgeon and anesthetist is mandatory in every patient with suspected or confirmed pheochromocytoma (9).

The main answer to the worldwide obesity epidemic is the increase in the number of performed bariatric procedures. Type 2 diabetes and glucose metabolism abnormalities are one the most important effects of morbid obesity which lead to severe and chronic reduction in quality of health. High effectiveness of bariatric therapy for weight reduction and treatment of comorbidities has been proven in numerous studies. But it is yet still unclear which bariatric procedure should be chosen for diabetic patients in order to achieve the best results in diabetes remission. Surprisingly, even LSG leads to significant improvement in biochemical glucose homeostasis and can be considered as a method of treatment in morbidly obese patients with glucose metabolism abnormalities. However, LSG as a method of treatment for patients with clinical type 2 diabetes still needs some further observation (10). In addition, new endoscopic devices are emerging in bariatric surgery, such as intragastric balloon, endoscopic vertical gastroplasty, duodenal-jejunal bypass sleeve, or aspire assist system, but the long-term results are not satisfactory. Endoluminal methods are an intriguing strategy for weight regain after bariatric surgery, however, they require highly skilled and experienced endoscopists to obtain good results. Many devices are no longer commercially available, due to long validation procedures. New promising technologies are emerging on the horizon, including neuromodulation and esophageal stents. They must be vigorously studied and improved before implementation in the clinical practice (11). New endoscopic treatments for obesity are promising techniques for selected patients but each procedure should be individually tailored to the specific

patient in a multimodal personalized approach (12).

The papers presented in this issue illustrate only a tip of the iceberg of the new techniques and technologies for the treatment of surgical endocrine diseases. It is quite clear that progress in the field will shift our current practice from conventional surgical techniques to more sophisticated minimally invasive approaches and utilization of intraoperative quality control measures in order to improve quality of life of our patients.

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Footnote

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