

Preoperative Preparation with Lugol's Iodine in Thyroidectomy of Euthyroid Patients-Is it Really Mandatory?-An Otorhinolaryngologist's View

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ABSTRACT

Objective: To elucidate the necessity of Lugol's iodine in preoperative preparation of patients undergoing thyroidectomy.

Materials and Methods: Hundred and five euthyroid patients who underwent surgery without preoperative preparation of patients with Lugol's iodine were enrolled in this retrospective study conducted during the period May 2009 to August 2013 in Teaching Hospital. Indication of surgery was ranging from suspected malignancy to cosmetic reasons and compressive features like dysphagia, dyspnoea and hoarseness of voice.

Results: All patients were operated by the same surgeon where in hemi, total and subtotal thyroidectomies were performed without any usage of Lugol's iodine preoperatively. During the postoperative period the following events occurred, five patients (4.7%) had incurred recurrent laryngeal nerve palsy (RLNP)

which was confirmed with postoperative indirect laryngoscopic examination and two patients (1.9%) with hypocalcemia (serum calcium less than 8mg/dl) which was managed conservatively and effectively. Among these five patients, three patients had (Right RLNP) and two patients had (Left RLNP) palsies. Of these four RLNP (3.8%) were temporary which improved with conservative management within 3weeks-6months duration and one (0.9%) was a permanent Rt RLNP with no improvement even after six months.

Conclusion: Hence, we conclude that it is not of much importance to use Lugol's iodine preoperatively in patients undergoing thyroidectomy. There does not appear any convincing evidence of advantages of preoperative preparation of patients with lugol's iodine in euthyroid state undergoing surgery.

Keywords: Lugol's iodine, Thyroid surgery

INTRODUCTION

Disease of the thyroid gland is common. For example, in endemic areas, the incidence of goitre is 15-30% of the adult population [1]. Despite improvements in operative techniques and antisepsis, thyroid surgery on hyperthyroid patients still had a high mortality rate, ranging from 8% in the hands of experienced surgeons such as the Mayo brothers to 20% at less proficient centers [2].

It wasn't until Plummer's idea in 1923 [3] to use inorganic iodine preoperatively that the mortality rate was substantially reduced (to less than 1%) in the hands of the most experienced surgeons [2,4]. It causes lowering of basal metabolic rate and heart rate and an increase in body weight [5]. The thyroid glands of patients treated with iodine increased in size, were more distended with colloid and demonstrated decreased vascularity [6].

The next major breakthrough in the preoperative preparation of thyrotoxic patients did not come until the 1940s with Astwood and McKenzie's description of the use of thiouracil [7]. Propranolol, the first adrenergic blocking agent, was introduced in 1964 [8]. This retrospective study is set out to elucidate the necessity of preoperative preparation of patients undergoing thyroidectomy with Lugol's iodine.

MATERIALS AND METHODS

Hundred and five euthyroid patients who underwent surgery without preoperative preparation of patients with Lugol's iodine were enrolled in this study. Indication of surgery was ranging from suspected malignancy to cosmetic reasons and compressive features like dysphagia, dyspnoea and hoarseness of voice. Exclusion criteria were as follows: anticoagulant usage, a previous thyroid operation, and refusal to participate in this study. In all patients, indirect laryngoscopic examination was used to evaluate vocal cord

mobility both before and after surgery. Hypocalcemia was defined as a serum calcium level less than 8 mg/dl after the operation. In cases of dysphonia with vocal cord injury, indirect laryngoscopy was also performed one and six months later. Persistent nerve palsy was defined as persistent dysfunction and clinical dysphonia that lasted for six months postoperatively. The study was reviewed and approved by our institutional ethical committee, and informed consent was obtained for all patients.

RESULTS

All patients were operated by the same surgeon where in hemi, total and subtotal thyroidectomies were performed without any usage of Lugol's iodine preoperatively. Postoperative period was uneventful for all patients except for two patients(1.9%) with hypocalcemia (serum ca⁺⁺ less than 8mg/dl) which was managed conservatively and effectively and five patients(4.7%) had incurred RLN palsy which was confirmed with postop IDL examination. Among these five patients, three patients had (Right RLNP) and two patients had (Left RLNP) palsies and of these four RLNP (3.8%) were temporary which improved with conservative management within 3 weeks 6 months duration and one(0.9%) was a permanent Right RLN palsy with no improvement even after six months [Table/Fig -1].

DISCUSSION

Hyperthyroidism is associated with hemodynamic changes, including high output state, increased heart rate and cardiac contractility, and decreased peripheral resistance that are related to both direct cardiostimulatory effects of thyroid hormone and increased peripheral oxygen consumption [9,10]. Preoperative preparation of the patient is crucial to avoid intraoperative or postoperative thyroid storms and to decrease the vascularity of the gland [9-12].

Sl No	Complication	No.(n=105)	Percentage %
1	Hypoparathyroidism transient	2	1.9%
2	Temporary RLNP	4	3.8%
3	Permanent RLNP	1	0.9%

[Table/Fig-1]: Complications of thyroidectomy – present study

Hypothyroidism results in depression of myocardial function, decreased spontaneous ventilation, abnormal baroreceptor function, reduced plasma volume, anaemia, hypoglycaemia, hyponatremia and impaired hepatic drug metabolism [13,14].

Lugol's iodine reduces the thyroid hormone synthesis and release and also thyroid cellularity and vascularity and hence used in preoperative preparation of patients for thyroidectomy [15,16]. The common complications encountered during thyroidectomy are bleeding, airway compromise due to bleeding, temporary and permanent recurrent laryngeal nerve palsy, hypocalcemia, wound infection, scarring and thyrotoxic crisis due to sudden release of hormones.

With the advent of iodine in the preoperative treatment of thyrotoxicosis beginning in the early part of the 20th century, some surgeons noted that the iodine treated gland was less vascular and friable than the untreated gland [17]. Attempts have been made to provide more objective evidence of iodine's effect on vascularity. Using swab weighing and colorimetric analysis, Coyle and Mitchell [18] studied 44 patients treated either with Lugol's solution or placebo and found no differences in the two groups. Marigold et al., [15] showed that there was reduced blood flow as measured by thyroid uptake of thallium 201 in Graves' disease patients treated with Lugol's for 10d, though it was not clear if this was an independent effect of iodine on the gland or related to decreased cardiac output because of improvement in thyrotoxicosis.

Chang et al., [16] used duplex US of the superior thyroid artery of Graves' disease patients before and after 10d of Lugol's solution or placebo. All patients had also been on ATD at the time of the study. He showed a statistically significant decrease in blood flow in the iodine treated group, although clinical benefit at surgery was not evaluated. In his retrospective review of 42 Graves' disease patients (20 treated with propranolol alone and 22 with propranolol plus iodine) Marmon and Au [19] found no benefit from iodine at the time of surgery.

Ebril et al., [20] hypothesized that Lugol solution might act through two mechanisms. It probably decreases both angiogenic stimuli (reduced CD-34 expression) and blood flow in GD. The reduction of intraoperative bleeding allows better visualization and preservation of the surrounding nerves, vasculature, and parathyroid glands.

The incidence of temporary unilateral vocal cord paralysis resulting from damage to the recurrent laryngeal nerve is 3-4% [21]. Permanent unilateral vocal cord paralysis occurs in less than 1% of patients [22] and bilateral vocal cord paralysis is extremely rare. In our study, all the thyroidectomies were performed when patients were in euthyroid state without the use of Lugol's iodine preoperatively [Table/Fig-2].

Authors	year	No. of subjects	Transient hypocalcemia	Temporary RLN palsy	Permanent RLN palsy
Lodovico Rosato et al., [23]	2004	14,934	8.3%	2%	1%
Shaha A et al., [24]	1998	200	0.6%	0.5%	0%
JG Filho et al., [25]	1990-2000	1020	13.1%	1.4%	0.4%
Wen TS et al., [26]	1993-2002	60	12%	2.0%	0%
Sudarshanbabu K.G et al., [27]	2013	50	12%	4%	2.0%
Our study	2009-2013	105	1.9%	3.8%	0.9%

[Table/Fig-2]: The complications incurred in our study were compared as follows

CONCLUSION

Hence, we conclude that it is not of much importance to use Lugol's iodine preoperatively in euthyroid patients undergoing thyroidectomy. There does not appear any convincing evidence of advantages of preoperative preparation of patients with lugol's iodine in euthyroid state undergoing surgery.

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