



ORIGINAL ARTICLE

# Technique and outcome of autotransplanting thyroid tissue after total thyroidectomy for simple multinodular goiters



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## KEYWORDS

multinodular goiter;  
thyroid auto-  
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thyroidectomy

**Summary** *Background/Objective:* Limited animal and human studies have shown function, albeit inadequate, of implanted thyroid tissue in muscles. This work aimed to ascertain results in a larger number of patients, finding practical method for implantation, studying the effect of changing weight of implant and effect of passage of time on its function.

*Methods:* Forty patients had total thyroidectomy for simple multinodular goiters. A piece of the excised gland was finely minced, mixed with saline as emulsion, and injected in thigh muscles. Twelve patients had 5-g implants, while 28 patients had 10-g implants. Four parameters were studied at 2 months, 6 months, and 12 months: technetium isotope uptake by the implant; thyroid stimulating hormone (TSH); free T3 (FT3); and free T4 (FT4).

*Results:* All autotransplanted thyroid tissue survived and functioned. After 12 months, mean values ( $\pm$  standard deviation) of isotope uptake, TSH, FT3, and FT4 of the 5-g implants were  $0.44 \pm 0.16\%$ ,  $27.74 \pm 30.4$  UI/mL,  $3.07 \pm 1.10$  pg/mL, and  $1.01 \pm 0.3$  ng/dL, respectively. Those for the 10 g implants were  $0.71 \pm 0.20\%$ ,  $22.78 \pm 19.7$  UI/mL,  $3.92 \pm 1.2$  pg/mL, and  $1.05 \pm 0.3$  ng/dL, respectively. Ten-gram implants showed significantly higher isotope uptake than 5-g. TSH, FT3, and FT4 significantly improved over the period of 1 year.

*Conclusion:* Injection of thyroid tissue suspension is a simple method for thyroid autotransplantation. TSH was elevated in the majority to maintain normal or near normal thyroid hormones. Ten-gram implants showed higher isotope uptake than 5-g, although this difference

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was not reflected by thyroid hormone profile. The implant seemed to function better with the passage of time from 2 months to 12 months.

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## 1. Introduction

Whenever surgery is indicated for a simple multinodular goiter, the current trend is to do total thyroidectomy.<sup>1,2</sup> Inevitably this makes the patient dependent on replacement therapy for life. Although it seems relatively easy to control hypothyroidism by levo-thyroxine, from the patient's point of view, a daily dependence on it and regular visits to hospital to check hormone levels are burdensome. Other problems that may interfere with reaching a euthyroid status using replacement therapy are malabsorption<sup>3</sup> and noncompliance of patients.<sup>4</sup>

The clinical application of transplantation in the endocrine field, by autotransplantation of endocrine organs for hormone replacement has already been established in the field of parathyroid surgery. Before applying the same principles on the thyroid gland in humans, studies have been done on animals. Autologous transplantations were found to be successful in 70% of cases and histological examinations showed normal thyroid architecture.<sup>5–8</sup> Very few studies have addressed this issue in humans. The number of patients in each study was very small,<sup>9–12</sup> the largest study including only 15 patients.<sup>12</sup> Furthermore, the study methodology was not consistent.

The aims of the current work were to ascertain these results in a larger number of patients, find a practical method of transplanting sizable thyroid tissue, and study the effects of changing weight of implant and passage of time on its function.

## 2. Methods

This case series study was approved by the Research Ethics Committee of the Faculty of Medicine at Cairo University, Cairo, Egypt. It was conducted at Cairo University Hospital and included 40 patients with simple multinodular goiters who were indicated for total thyroidectomy because of compression manifestations, and where nodularity extended to both lobes. Children, unwilling patients, and those who had any clinical or ultrasound suspicion of malignancy were excluded. Similarly, those with a family history of thyroid cancer and history of neck irradiation were excluded because they constitute a high risk of developing thyroid cancer. The study included 36 women and four men. Written informed consent was obtained from all patients, stressing the importance of regular follow up. Preoperative evaluation followed the same standard protocol and included a thorough history, examination, thyroid function tests, neck ultrasound, and fine-needle aspiration cytology of a dominant or suspicious nodule.

Total thyroidectomies were performed under general anesthesia. During postexcision hemostasis and closure a member of the operating team performed the autotransplantation preparation at a side table. The healthiest-looking part of the thyroid was chosen. The slightest gross suspicion of malignancy led to termination of the implantation procedure. Intraoperatively, two patients were excluded from the study on gross picture suspicion of malignancy. Neither showed cancer on histological examination of postoperative paraffin sections.

The initial 12 patients received 5-g implants, while the remaining 28 received 10-g implants. The tissues to be transplanted were very finely divided using a pair of scissors and made into an emulsion by adding them to saline in a 20-mL syringe. This was attached to a 2.4 mm-caliber needle. A 3-mm incision was made in the anterolateral aspect of the middle third of the thigh. Through this incision the thyroid tissue emulsion was injected in 8–10 sites in the thigh muscles by changing the direction and depth of needle introduction. Figure 1 shows the steps of this technique.

Postoperatively, L-thyroxine replacement was given at a dose of 50 µg/d, pending the take of implanted tissues. Thyroid function tests—free T3 (FT3), free T4 (FT4), thyroid stimulating hormone (TSH), and isotope scan were done at 2 months, 6 months, and 12 months after the operation. Replacement therapy was withheld 3 weeks prior to each occasion in order to strictly assess function of the implanted tissues. Scans were done by intravenous injection of 5–10 mCi of radioactive technetium (<sup>99m</sup>Tc). Imaging was done 20 minutes later and the uptake ratio by the implant was obtained.

Data showed parametric distribution; therefore Student *t* test was used for comparisons between the 5- and 10-g groups for isotope uptake by the implant, TSH, FT3, and FT4. Analysis of the significance of the time passage on isotope uptake, TSH, FT3, and FT4 was done using analysis of variance test, as well as a comparison of the different means using paired *t* test. The significance level was set at  $p \leq 0.05$ .

## 3. Results

Apart from minor complications, postoperative courses were uneventful. Temporary recurrent laryngeal nerve occurred in one patient and resolved spontaneously in 4 weeks. Temporary hypoparathyroidism occurred in 11 patients and was controlled by oral calcium and vitamin D. The condition resolved within 3–7 weeks. There were no complications related to the autotransplantation site. None of the excised thyroids showed histological evidence of malignancy.

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