Trial of thyroid auto-transplantation after total thyroidectomy in benign thyroid diseases

Original Article

Mohamed Salah El-din, Hesham Adel Alaa, Ayman Hossam Eldin and Ahmed Saeed Saad

Department of Endocrine and General Surgery, Faculty of Medicine, Ain Shams University, Egypt.

ABSTRACT

Background: Thyroid auto transplantation was introduced after the success of parathyroid auto transplantation. Heterotopic thyroid autotransplantation is a technique that preserves viable thyroid tissue in the body after total thyroidectomy, which may revascularize and restore thyroid function.

Thyroid autotransplantation can help avoid lifetime thyroid hormone replacement therapy, which may have some drawbacks such as disruption of lipid metabolism, coronary heart disease, non-compliance, and malabsorptionThyroid autotransplantation can also preserve the inner auto-regulatory mechanism of thyroid hormone production, which can adjust to the body's needsThyroid autotransplantation can prevent reoperation at the site of previous neck surgery in cases of recurrent goiters or hyperthyroidism, which can be associated with a high rate of complications. heterotopic thyroid autotransplantation is still not a popular technique and there is limited data on its long-term outcomes and safety. Some studies have reported satisfactory results in terms of survival and function of the thyroid implant, but the number of patients and the follow-up periods were very low. There are also some challenges and controversies regarding the optimal site, size, and number of the grafts, as well as the indications and contraindications of this procedure.

Aim & Objectives: To ascertain the efficacy of auto transplantation of thyroid graft after total thyroidectomy (TT) for benign simple multi nodular goiter.

Study period: 24 Months from January 2022 to January 2023 (including 12 months postoperative follow up).

Patients and Methods: The study will enroll 30 patients with benign nodular goiter who will undergo total thyroidectomy and heterotopic thyroid autotransplantation in the vastus lateralis muscle of the thigh. The follow-up protocol includes measurement of serum levels of T3, T4, and TSH and thyroid scintigraphy using 99mTc-MIBI.

Results: The study population consisted of 73.3% females and 26.7% males with a mean age of 33 years. . The mean duration of surgery was 133.47 min. One month after surgery, duplex ultrasonography showed positive graft uptake in 73.3% of patients and negative uptake in 26.7% of patients. Radioactive iodine scintigraphy showed positive graft function in 80% of patients after 12 months. Euthyroidism was achieved in 80% of patients 12 months after surgery, while 6.6% of patients had poor outcomes and required full-dose hormone replacement therapy and 13.3% of patients had partial outcomes and required low-dose levothyroxine supplementation to attain euthyroidism. (levothyroxine 50).

Conclusion: Heterotopic thyroid autotransplantation is a feasible, effective, and efficient procedure after total thyroidectomy for benign thyroid disorders.

Key Words: 99mTc scan, auto transplantation, dublex us and, free T3, T4, thyroid benign diseases, TSH.

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Corresponding Author: Mohamed Salah El-din, Department of Endocrine and General Surgery, Faculty of Medicine, Ain Shams University, Egypt. **Tel.:** 01009008333, **E-mail:** mohamedsalah2731991@gmail.com

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INTRODUCTION

The concept of endocrine glands auto transplantation was initially introduced by Halsted in 1909. Parathyroid autotransplantation is a well-established technique to avoid hypoparathyroidism after total thyroidectomy for thyroid malignancies, but there is scarce evidence of successful thyroid autotransplantation trials in the literature.

However, clinical thyroid autotransplantation remains less common, and long-term follow-up is crucial to monitor potential complications and changes in the implanted tissue over time.

While parathyroid autotransplantation has demonstrated objective biochemical function, thyroid autotransplantation remains an area where further research and clinical trials are needed to establish its efficacy and safety.[1]

Heterotopic thyroid autotransplantation serves a strategic purpose in thyroid surgery. Preserving Thyroid Tissue: In cases where patients are at risk of

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postthyroidectomy hypothyroidism, This residual tissue may continue to produce thyroid hormones, albeit at a reduced level, helping to mitigate the severity of hypothyroidism. It's particularly relevant for patients who may not adhere strictly to thyroid hormone replacement therapy.

Avoiding neck recurrence

By placing the transplanted thyroid tissue in a location outside the neck (heterotopic), the risk of recurrence is minimized, If the thyroid cancer were to recur. The heterotopic site would prevent compression of critical neck structures such as the trachea. This approach reduces the need for subsequent neck surgeries, which can be complex and carry inherent risks. In summary, heterotopic thyroid autotransplantation aims to strike a balance between preserving thyroid function and minimizing risks associated with recurrence and re-operation. As with any surgical technique, individual patient factors and careful evaluation play a pivotal role in decision-making[2].

The survival and functional adaptation of the heterotopic thyroid autograft are the main challenges of this technique[3].

Total thyroidectomy is a frequent surgical procedure for patients with bilateral benign thyroid disorders[4].

Surgery may be a viable option to avoid long-term medication use in some cases. However, total thyroidectomy often necessitates lifelong levothyroxine replacement therapy, which has been associated with coronary heart disease and lipid metabolism disruption[5,6].

Postoperative L-T4 replacement treatment may seem simple, but it can also pose some challenges for patients. Some of the challenges are:

(1). Finding the optimal dose of L-T4 that restores normal thyroid function.

(2). Compliance and Following up regularly with the doctor.

(3). Coping with the psychological and emotional aspects of having a chronic condition that requires lifelong medication and surveillance.

Noncompliance can lead to poor thyroid control and increased risk of complications and mortality. In addition to Some medications, such as antacids, proton pump inhibitors, can cause malabsorption to oral treatment[7].

PATIENTS AND METHODS:

This prospective study was conducted at Ain Shams University Hospital from January 2022 to January 2024, including one-year follow-up of the transplanted cases. The study enrolled 30 adult patients with simple multinodular goiter who were scheduled for total thyroidectomy at the general surgery outpatient clinic.

Ethical approval

This study received ethical approval from the Ain Shams University Ethics Board and written informed consent from all participants. The study objectives and procedures were clearly explained to each participant individually and they were encouraged to ask questions to ensure their comprehension. This study adhered to the ethical principles for medical research involving human subjects as stated in the World Medical Association's Code of Ethics for human researches.

Inclusion criteria

patients proved to have benign thyroid SMNG. All patients in our study have FNAC Bethesda 3 or less, to avoid risk of malignant transformation in the transplanted graft, Operable patients with no chronic diseases, anesthetic-safe (ASA scores of 1 and 2) and candidate for total thyroidectomy, Aged between 18 and 45 years… agreement and consented to do the procedure.

Exclusion criteria

We excluded patients that shows suspicious of malignancy, Those who had any clinical ,ultrasound (tirade 4 or more), or pathological suspicion of malignancy (Bethesda 4 or more by FNAC), a family history of thyroid cancer and history of neck irradiation were excluded because they constitute a high risk of developing thyroid cancer. Also exclude any unfit for surgery or with chronic disease (HTN, DM, Ischemic heart dis, autoimmune diseases) and patients that refused the procedure or did not show cooperation and compliance for follow up.

Study tools

All patients included in the study will be candidates for:

Clinical assessment: (Detailed medical, surgical and family history.General examination. and Local neck examination).

Investigations: (routine preoperative laboratory investigations,thyroid function tests FT3 FT4 TSH, antithyroid peroxidase Abs. antithyroglobuline Abs (any hashimotos case diagnosed laboratory or radiologically preoperative, was excluded from our study to avoid high incidence of graft failiure), neck ultrasound, Fine-needle aspiration cytology of a dominant or suspicious nodule).

Surgical technique

In our study we transplanted the fresh healthy thyroid tissue that in form of thin slices from 5 to 10 gm according to the available thyroid graft away from any nodules (in our study any patient shows thyroid gland studded with fine noduels discovered intraoperative despite preopearative neck us showing one lobe almost free of any nodularity ,we abort the transplant procedure and only do total thyroidectomy) using intraoperative fine scale, each slice weigh 1 to 2 gm in the same session of total thyroidectomy, in the vastus lateralis muscle of quadriceps muscle in the rt midthigh beneath the illio tibial tract marked by prolein stitchs to allow demarcation of the transplanted tissue for possibility to need resection later on after several years if recurrence ocured or malignant transformation.or even removing the transplanted tissue in short term after the procedure if any histopathological surprise occurred postoperative by the paraffin technique Thanks god ,all patients in our study had post operative final parrafine technique histopathology showing colloid multinodular goiter without surprising malignant tissue

Fig. 1: Sterilization and preparation of the surgical field of the recipient site (Rt thigh).

Fig. 2: Creation of small incision in the anterolateral aspect of midthigh opposite to iliotibial tract and vastus lateralis muscle.

Fig. 3: Opening of iliotibial tract and blunt creation of small pockets in vastus lateralis muscle.

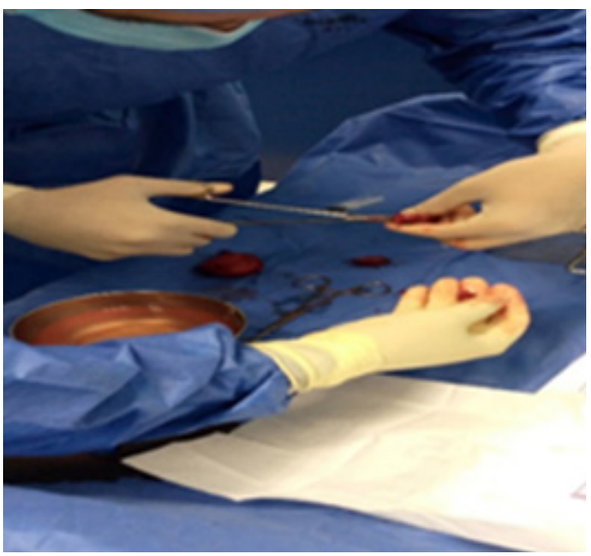


Fig. 4: Preparation of the specimen by cutting it into thin slices using scissor then placement in warm saline.

Fig. 5: Small slices of the thyroid tissue for transplant.

Fig. 6: Transplanting the thyroid sclice into the pockets created in the vastus lateralis muscle

Discharge instructions

Every other day dressing for both wounds, prophylactic low dose of calcium and vit d (eg : cal-mag tabs ond 1 alpha 0.5 microgram) for the first month postoperative.

Postoperative follow up

Two weeks postoperative follow up at hospital clinic for stitchs removal and clinical assessment of both neck and thigh wounds to ensure absence of any wound complications like hematoma or wound infection, one month postoperative follow up by thigh us (to ensure adequate ubtake and viability of the transplamted tissue), Thyroid function tests FT3, FT4, TSH. And serum calcium total and ioized. Three ,six months postoperative follow up was done by Thyroid function tests FT3, FT4, TSH only. 12 moths post operative follow up was done by Thyroid function tests FT3, FT4, TSH and Tc m99 scan were done.

To prevent the onset of hypothyroidism until the graft uptake, all patients received a relatively low substitution dose (50 µg of levothyroxine daily) to maintain a high serum TSH level, which would facilitate graft survival and function. Substitution therapy was withdrawn two weeks prior to the evaluation of graft function. This allowed sufficient time for the clearance of exogenous thyroid hormones from the circulation (the elimination half-life of lT4 being approximately one week and that of T3 approximately one day, while the half-life of TSH in plasma is only about 1 h).

RESULTS:

This research involved thirty studied cases. The personal and post operative histopathology are shown in (Table 1).

The study included 30 patients, 22 (73.3%) females and eight (26.7%) males. The age extended from 18 to 45 years with mean±SD=32.77±8.78 (Table 1).

Table 1: Demographic characteristics among the study population

	Total number=30
Age	
Mean±SD	32.77±8.78
Range	18–45
Sex	
Female	22 (73.3%)
Male	8 (26.7%)
Postoperative histopathology	
Multinodular goiter	30 (100%)

P value > 0.05: Non-significant *P value<0.05*: Significant *P value<0.001*: High significant.

Postoperative thyroid function was assessed at one, three, six, and twelve months after total thyroidectomy without hormone replacement therapy. There was a significant increase in serum T3 and T4 levels, which normalized after six months. Serum TSH levels decreased gradually and returned to normal after twelve months. (Table 2).

Table 2: Postoperative follow-up of thyroid function test (n= 30)

	1 month	3 months	6 months	12 months			
Postoperative follow up of patients	Number=30	Number=30	Number=30	Number=30	Test-value	*P* value	Sig.
TSH (miu/l)							
Median(IQR)	67 (56–78)	58.5 (54–68)	41.5 (34–45)	4.5 (3.4-5.5)	77.584‡	0.000	HS
Range	34–90	43–79	22–66	0.6–65			
Free t3 (pg/ml)							
Median(IQR)	0.3 (0.2-0.34)	0.7(0.49-0.78)	1.2 (1.1-1.4)	2.45 (1.7-3.4)	81.685‡	0.000	HS
Range	0.12–0.54	−0.2–0.89	0.8–12	0.21–4.3			
Freet4 (ng/dl)							
Mean±SD	0.14±0.03	0.3±0.08	0.62±0.17	1.21±0.37	208.139	0.000	HS
Range	0.1–0.24	0.14–0.44	0.15–0.88	0.28–1.61	•		

P value > 0.05: Non-significant *P value<0.05:* Significant *P value<0.001:* High significant

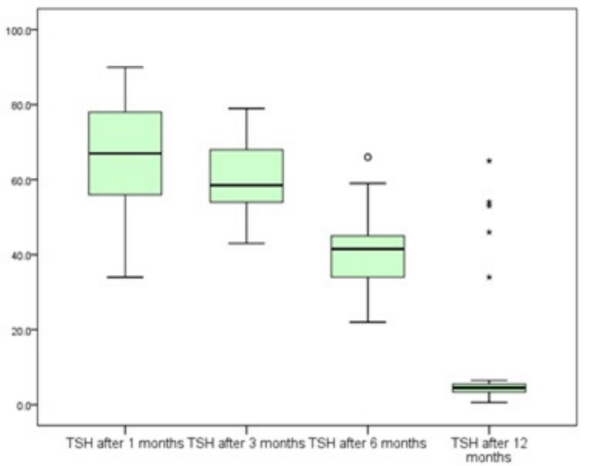


Fig. 9: Comparison of TSH 1 month, 3 month, 6 months and 12 months postoperative follow up of patients.

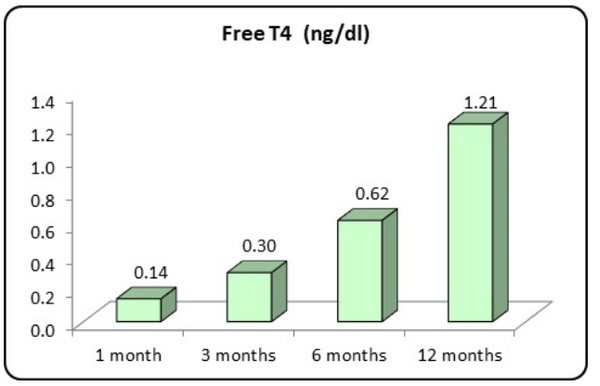


Fig. 10: Comparison of free T4 1 month, 3 month, 6 months and 12 months Postoperative follow up of patients.

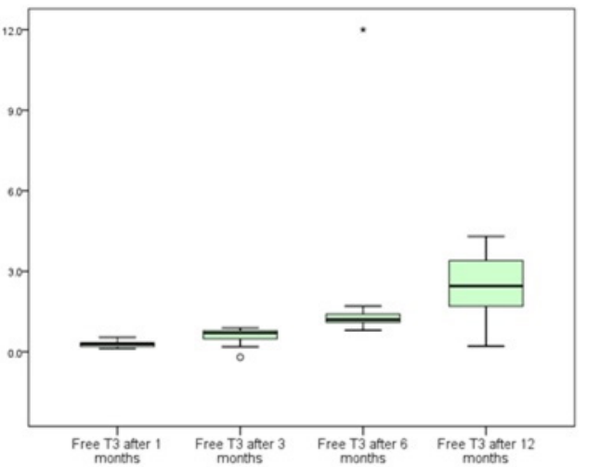


Fig. 11: Comparison of free T3 1 month, 3 month, 6 months and 12 months Postoperative follow up of patients.

Operative time and Post operative radiological follow up.

Shows that about 73.3 percent of cases shows success of transplanted heterotropic thyroid tissue confirmed by thigh ultrasound that matches with TC scan that shows 80 percent of cases shows good uptake after 12 ms and there was inverse relationship between the operative time speicailly ischemic time (time between harvesting and preparation of the graft and transplanting it into the recipient site intramuscular) and success of the transplant procedure.as shown in (Table 3).

In our study, the demographic data did not show significant influence on the the final results that assessd by the radio active isotop scanning uptake after 12 months as shown tn (Table 4).

Table 3: Postoperative follow-up of transplanted thyroid tissue by us and tc scan (n=30), the surprise was that the average estimated size of the transplanted tissue was from 15 to 20 mg this proved the there was hypertrophy to the transplanted thyroid graft to cope with the normal body needs

	Total number=30
Thigh ultrasound after 1 month	
Negative	8 (26.7%)
Positive	22 (73.3%)
Radioisotop scanning uptake after 12 months	
Poor	6 (20%)
Good	24 (80%)
Operative time	
Mean±SD	133.47±40
Range	84–263

Table 4: Relation of Radioactive isotop scanning uptake after 12 months with demographic data

	Radio isotop scanning uptake after 12 months				
	Poor	Good			
	Number=6	Number=24	Test-value	*P* value	Sig.
Age					
Mean±SD	29.5±7.09	33.58±9.1	−1.019•	0.317	NS
Range	22–39	17–45			
Sex					
Female	4 (66.66%)	16 (66.7%)	2.727*	0.099	NS
Male	2 (33.33%)	8 (33.3%)			

P value > 0.05: Non significant; *P value<0.05:* Significant; *P value<0.01:* Highly significant.
*: Chi-square test.
•: Independent t-test.

Table 5 shows that the six patients that shows poor radioactive isotop uptake after 12 monthes had also low t3 and t4 levels and high tsh levels in hormonal assay follow up after 1, 3, 6, and 12 ms.

But after 12 ms four patients continued on low dose eltroxine from 50 to 100 life long and only 2 pateins required life long full doe levothyroxine.

Table 6 shows that theres agood relation between thigh us after 1 month and radioactive isotop scaning after 12 ms in follow up of heterotropic transplanted thyroid tissue in addition the decrease in whole operative time speschially the ischemic time (time from harvesting the thyroid graft and implantation in the thigh) shows better results.

Table 5: Relation of Radioactive isotop scanning uptake after 12 months with thyroid hormones

	Poor	Good			
	Number=6	Number=24	Test-value	*P* value	Sig.
Postoperative follow up of pateitns 1 month					
TSH in miu/l					
Median(IQR)	77.5 (77,78)	64.5 (55-76.5)	-1.972‡	0.049	S
Range	76–79	34–90			
Free t3 in pg/ml					
Median(IQR)	0.16 (0.13-0.2)	0.32 (0.27-0.34)	-3.325‡	0.001	HS
Range	0.12–0.22	0.18–0.54			
Freet4 in ng/dl					
Mean±SD	0.13±0.02	0.15±0.03	-1.240•	0.225	NS
Range	0.1–0.16	0.1–0.24			

Postoperative follow up after three months					
TSH in miu/l					
Median(IQR)	72 (67–76)	55.5 (53-65.5)	-3.143‡	0.002	HS
Range	67–79	43–76			
Free t3 in pg/ml					
Median(IQR)	0.21 (0.19-0.3)	0.73 (0.69-0.78)	-2.679‡	0.007	HS
Range	−0.2–0.79	0.41–0.89			
Free t4 in ng/dl					
Mean±SD	0.19±0.06	0.33±0.06	-4.885•	0.000	HS
Range	0.14–0.3	0.21–0.44			
Postoperative follow up after six months					
TSH in miu/l					
Median(IQR)	57.5 (56–66)	38.5 (33.5-43)	-3.741‡	0.000	HS
Range	56–66	22–53			
Free t3 in pg/ml					
Median(IQR)	0.9 (0.9-0.9)	1.3 (1.2-1.45)	-3.768‡	0.000	HS
Range	0.8–0.9	1.1–12			
Free t4 in ng/dl					
Mean±SD	0.38±0.19	0.68±0.1	-5.708•	0.000	HS
Range	0.15–0.65	0.49–0.88			
Postoperative follow up after 12 months					
TSHTSH in miu/l					
Median(IQR)	49.5 (34–54)	4.5 (3.4-4.95)	-2.493‡	0.013	S
Range	0.6–65	2.8–6.5			
Free t3 in pg/ml					
Median(IQR)	0.71 (0.55-0.77)	2.8 (2.3-3.45)	-3.738‡	0.000	HS
Range	0.21–0.9	1.5–4.3			
Free t4 in ng/dl					
Mean±SD	0.59±0.25	1.36±0.18	-8.644•	0.000	HS
Range	0.28–0.87	0.8–1.61			

P value > 0.05: Non significant; *P value<0.05:* Significant; *P value<0.01:* Highly significant
•: Independent t-test.
‡: Mann-Whitney test

Table 6: Relation of Radio isotop scanning uptake after 12 months with thigh ultrasound and operative time

	Radio isotop scanning uptake after 12 months				
	Poor	Good			
	Number=6	Number=24	Test-value	*P* value	Sig.
Thigh ultrasound					
Negative	6 (100%)	2 (8.3%)	20.625*	0.000	HS
Positive	0 (0%)	22 (91.7%)			
Operative time					
Mean±SD	198.17±34.91	117.29±19.69	7.653	0.000	HS
Range	170–263	84–162			

DISCUSSION

Certainly: Heterotrophic thyroid autotransplantation serves several crucial purposes after a total thyroidectomy:

(1). Euthyroid State: By leaving enough thyroid tissue in the body, the goal is to achieve a euthyroid state-a balanced thyroid function. This means that the patient's thyroid hormones are within the normal range, avoiding the need for lifelong hormonal replacement therapy.

(2). Risk Transfer: The technique strategically relocates the risk of recurrence and re-operation. Instead of deep neck structures, the thyroid tissue is transplanted to the vastus lateralis of the thigh, away from critical neck structures. This minimizes the chances of complications and the need for further surgery.

(3). Autoregulation: One of the remarkable advantages is maintaining the autoregulatory mechanism of thyroxine (T4) production inside the body. Thyroxine levels can adjust according to the body's needs, ensuring optimal function.[11]

Several studies have reported the outcomes of thyroid autotransplantation before our study. Okamoto *et al*.[8] performed thyroid autotransplantation for five patients with Graves' disease after resection of a solitary thyroid nodule. Shimizu *et al*. in Japan[9] described the technique and results of thyroid autotransplantation in four patients in 2002.

Roy *et al*. from India provided more details about the concept of thyroid autotransplantation in 2003. They conducted modified subtotal thyroidectomy and fresh tissue autotransplantation for 15 patients, including seven with Graves' disease, six with simple multinodular goiter, and two with nodular toxic goiter[10].

In our study we involved 30 patients with MNG, achieving a consistent euthyroid status (normal thyroid function) remains a challenge due to various factors:

(1) Implant Preparation Methods: Researchers have explored different methods for preparing the implants. Some studies used frozen tissue, while others used fresh tissue. The choice of preparation method can impact the success of the transplantation. Some previous studies prepared the implanted tissue by finely mincing the thyroid implant into minute fragments and mix them with saline and inject this preparation using wide bore syringe (20 cm syringe) but this shows two drawbacks that we avoided in our study, this technique was to difficult and most of the thyroid tissue cant pass through the syringe bore resulting in insufficient transplanted tissue, b) time consuming leading to increase the ischemic time that affect the viability of the transplanted tissue, c) this injection method cause dissemination of some thyroid tissue all over thigh and quadriceps muscle in addition to possibility of false intravascular injection that may leads to wide spread of the implanted tissue in addition to possibility of intravascular emboli, so after the procedure if the paraffin technique histopathology which is more accurate than the FNAC that done preoperative, if any surprise occurred like papillary carcinoma or even on long term follow up after several years if recurrence of nodularity occur or malignant transformation so reversal of the procedure and to remove the transplanted tissue will be to difficult even to say impossible

While in our study we tried to avoid all this drawbacks by using new technique Slicing the thyroid tissue implant into thin cuts about 1 to 2 mg and marking them by proline stitches and placement these sclices into pockets created in vastus laterakis muscle so if any histopathological surprise occure post operative, the reversal and removal of these tissue will be too easey ,all what we nead to open the wound again and withdraw the prolein stitchs anchoring the throid implant ,even if after several years on long term follow up if recurrence of nodularity or malignant transformation occur ,so removal of the transplanted tissue will be to easy by opening the old wound and recognizing the transplated tissue marked by the proline stitches and enuculation of this tissue with safty margin of the vastus lateralis muscle.

(2) Variability in Implant Weight: The weight of the implanted tissue varies across patients. This variability can influence the outcome, as different amounts of thyroid tissue may lead to varying levels of hormone production.

Previous studies have used different amounts and sites of thyroid autotransplantation for patients with various thyroid disorders. Shimizu *et al*. implanted 2.5–3.5 g of thyroid tissue in patients with Graves' disease, while Roy *et al*. used 3–5 g in the sternocleidomastoid muscle. Mohsen *et al*. performed fresh thyroid autotransplantation on 40 patients with simple multinodular goiter (MNG) who underwent total thyroidectomy (TT). They injected 5 g of thyroid tissue in 12 patients and 10 g in 28 patients. In our study, we aimed to optimize the outcome of thyroid autotransplantation by implanting 5 - 10 g of thyroid tissue, depending on the availability, in all patients who underwent TT for MNG. to gain more benefit and decrease the failure rate.

Current studies strive to enhance the autotransplantation procedure and improve its results. The optimal trade-off between maintaining thyroid function and reducing adverse events remains a key objective in this domain.

(3) The location of heterotopic thyroid tissue transplantation varied across the studies.

We compared different methods of thyroid autotransplantation in patients with thyroid disorders. Shimizu *et al*. transplanted frozen thyroid tissue (sliced and marked with sutures) in the forearm muscles of four patients with Graves' disease. Roy *et al*. transplanted fresh thyroid tissue (3-5 g) in the sternocleidomastoid muscle. Mohsen *et al*. injected emulsified heterotrophic thyroid tissue in the thigh muscles of 40 patients with multinodular goiter who underwent total thyroidectomy. In our study, we transplanted fresh healthy thyroid tissue (5–10 g, sliced) in the vastus lateralis muscle of the right mid thigh beneath the iliotibial tract, during the same session of total thyroidectomy for multinodular goiter marked by prolein stitchs to allow demarcation of the transplanted tissue for possibility to need resection later on after several years if recurrence ocured or malignant transformation.

Transplantation in the mid thigh in the vastus lateralis has several advantages: it is more accessible for examination, it allows for easy detection of early rejection through the subcutaneous rubber drain, and it helps in maintaining the graft viability and freshness. Moreover, if recurrence occurs, it would be easier to deal with a more superficial and accessible lesion that is away from any dangerous neurovascular structures. A novel step that has not been performed before in previous studies is the early one-month duplex ultrasound of the thigh for detection of graft uptake and vascularization or fibrosis. This enables us to select patients who need full replacement therapy and those who can continue with the study. Following up the laboratory investigations in a regular pattern was an important step to guide us that our patients have reached the euthyroid state, or have complete failure, or just need continuation of the initial dose of the supporting replacement therapy.

Shimizu *et al*., involved four patients with Graves' diseases Only one patient developed recurrence of hypothyroidism and had to resume replacement therapy six months after autotransplantation. Roy *et al*.,. involved 15 patients. These included seven with Graves' disease, six with simple multinodular goiter (MNG) and two with nodular toxic goiter. All patients with MNG who had a functional transplant became euthyroid six months postoperatively. Only 1 patient with Graves' disease from the four who had functional transplanted tissue became euthyroid, while the other three required postoperative supplemental therapy for hypothyroidism. Mohsen *et al*., involved 40 patients with simple MNG Follow-up was done after 2, 6, and 10 months postoperatively using 99mTc, FT3, FT4, and TSH. The authors reported survival of all transplants with different degree of function.

In 2016, Saleh *et al*.[11], performed heterotopic autotransplantation of fresh thyroid tissue for 20 patients (13 with simple MNG, 4 with Graves' disease and 3 with toxic nodular goiter). Results confirmed that all implants survived and showed variable degree of function.

In our study: We followed up the thyroid function of 30 patients who underwent thyroid autotransplantation for 12 months. Two patients developed hypothyroidism that did not improve with time and required full-dose replacement therapy. The remaining 28 patients showed gradual improvement of thyroid function, with 24 reaching euthyroid state and 4 requiring low-dose levothyroxine (50 mg once daily).

Thyroid autotransplantation is still novel technique and under research, till now theres no world wide adequate data about fesiability to standardize this protocol in all patients fulfilling the creiteria and candidate for this procedure, and till nowdays theres no researchs results about long term follow up …this is a MD research that shows promsing results with our new technique and we are continuing follow up our patients to get more and more data on long term follow up to be puplished later on in another complementery studies and research 5, 10 and up to15 years follow up post operative as we are planning and looking forward to be the first to document the long term follow up world wide and the feasiability to standardize this protocole in all patients candidate for total thyroidectomy due to multinodular goiter and fulfilling the the protocole inclusion and exclusion creiteria .

CONCLUSION

Auto transplantation of heterotrophic thyroid tissue provides survival and function of the thyroid graft, leading to a postoperative euthyroid state for most selected patients-all without the need for further replacement therapy (Figs. 1–11).

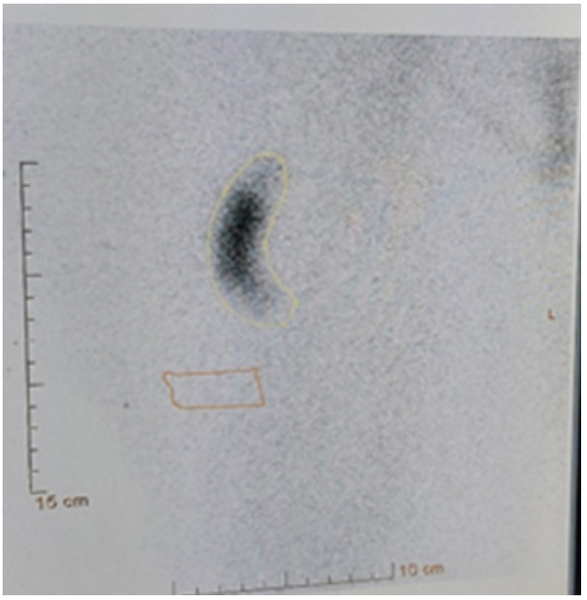
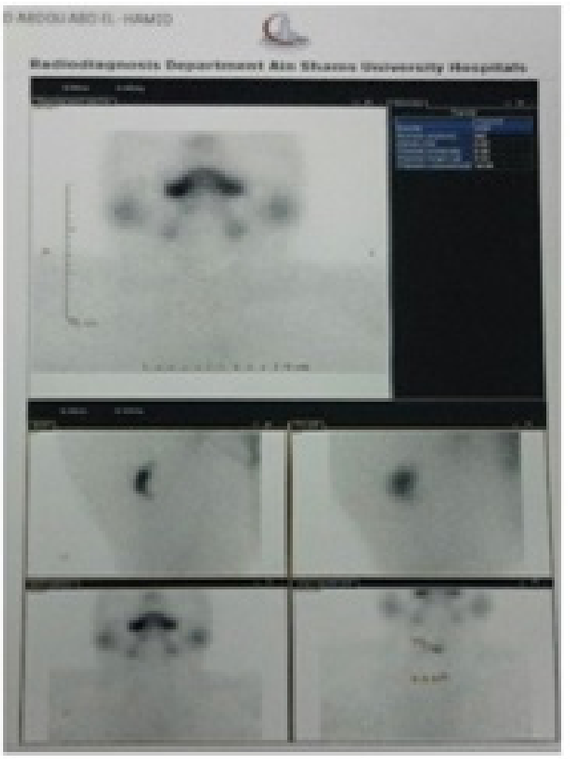


Fig. 7: Thyroid scan m99Tc with spot view on lower limbs showing m99Tc uptake by the implant (arrow).



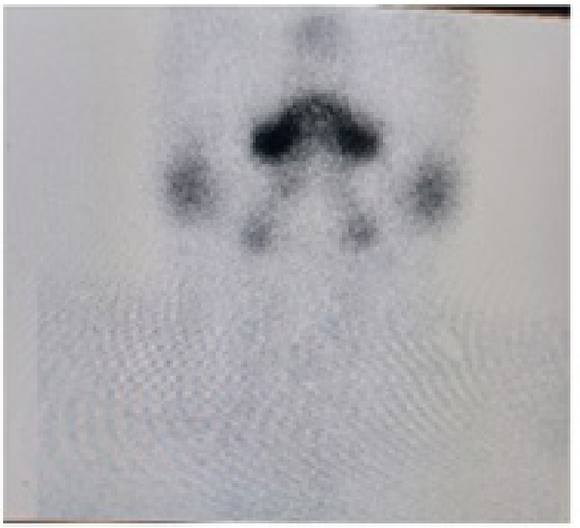


Fig. 8: thyroid scan on neck 12 months postoperative shows that neck free from any residual thyroid reminant which confirms that the thyroid hormone was released from implant only and not from any thyroid reminant in the neck.

CONFLICT OF INTEREST

There are no conflicts of interest.

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