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Research Article

**A QUASI-EXPERIMENTAL RESEARCH STUDY FOR THE  
COMPARISON OF PARATHYROID GLAND PRESERVATION  
IN SITU AND PARATHYROID GLAND AUTO  
TRANSPLANTATION IN THE PATIENTS OF TOTAL  
THYROIDECTOMY (MAYO HOSPITAL, LAHORE)****Dr. Laiq, Dr. Rameez Ahmed, Dr. Sebghat Ullah**  
Al- Tibri Medical College, Isra University**Abstract:**

**Objective:** The aim of the research was the comparison of the auto transplantation of parathyroid gland with the preservation of the parathyroid gland in situ keeping in view the parathyroid gland function preservation in total thyroidectomy patients.

**Methods:** Research design was quasi-experimental which was carried out in the time span of July, 2015 to June, 2017 at Mayo Hospital, Lahore with a sample of 388 patients experienced total thyroidectomy for numerous disorders of thyroid gland. The sample of the research was divided in to two groups A and B respectively having 97 cases of parathyroid glands who were preserved in situ and 291 patients underwent at least one auto transplant of parathyroid gland in ipsilateral sternocleidomastoid muscle. Six months follow-up was carried out for the parathyroid function assessment. We used Fisher's exact test for the comparison of both the groups.

**Results:** Mean age of group A and B was respectively  $(42.46 \pm 15.30)$  years and  $(39.16 \pm 18.91)$  years. An overall proportion of male to female was (1:3.5). In the population of Group "A", permanent hypocalcemia was developed in 3 cases (3.09%); whereas, "B" group had only 1 permanent hypocalcemia case (0.34%).

**Conclusion:** At least one parathyroid gland auto transplantation after total thyroidectomy is a process that has always predictable outcomes linked with the lowest risk of the permanent hypoparathyroidism.

**Keywords:** Total thyroidectomy and Parathyroid auto transplantation.

**Corresponding author:****Dr. Laiq,**  
Al- Tibri Medical College,  
Isra University

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**INTRODUCTION:**

To deal with the disorders of thyroid a preferred interventional procedure is total thyroidectomy [1 – 3]. Post-operative hypocalcemia is considered among the thyroid surgery complications. It is also evident that majority of the cases do recover but still the range of the permanent hypoparathyroidism is still observed as 1 – 32 percent who experienced thyroid surgery [4, 5]. An injury of the parathyroid gland can bring an inadvertent removal, blood supply interruption and formation of hematoma. For the prevention of this careful gland precarious blood supply dissection, thyroid gland less radical resection and intracapsular dissection total thyroidectomy is preferred [5 – 8]. However, a reliable lacking technique which helps in the preservation of the parathyroid gland in situ. Auto transplantation of the parathyroid gland was described in human in 1926 by Lahey [9].

Host tissue takes well the parathyroid gland which results in the shape of a very predictable result [6, 12]. The process was carried out in the participants an experienced re-implantation and parathyroid excision in forearm and it was later assessed through electron microscopy and histology, also in the patients ready to experience thyroidectomy and parathyroidectomy [8]. In the light of these facts, it seems that parathyroid function preservation by auto-transplantation has predictable results when compared to the outcomes of glands preservation in situ.

The aim of the research was the comparison of the auto transplantation of parathyroid gland with the preservation of the parathyroid gland in situ keeping in view the parathyroid gland function preservation in total thyroidectomy patients.

**PATIENTS AND METHODS:**

Research design was quasi-experimental which was carried out in the time span of July, 2015 to June, 2017 at Mayo Hospital, Lahore with a sample of 388 patients experienced total thyroidectomy for numerous disorders of thyroid gland. Informed consent from the participants and ethical permission from the hospital administration was secured before the commencement of the research. Every case above eighteen years and total thyroidectomy scheduled was made a part of this research. Patients with converted subtotal thyroidectomy, diagnosed pre-operatively hypocalcemia because of the because of hypoparathyroidism and all the case of scheduled for complete total thyroidectomy or re-do surgery were not included in this research.

Total thyroidectomy policy was adopted back in 1998 for the general thyroid pathology including Graves' disease, multinodular goiter and thyroid malignancy which needs total gland removal. Research participants were extensively examined for the function test of thyroid and levels of serum calcium and for the scintigraphy of isotope, levels of serum parathyroid hormone (PTH), ultrasonography, fine needle aspiration cytology, neck X-rays, computed tomography (CT) scans and thoracic inlet.

Scheduling was made as and when the next list was available. Same surgeon performed all the surgical interventions through two strategies including glands preservation in situ or to at least one parathyroid gland auto transplant in ipsilateral sternocleidomastoid muscle. In the same way the division of the patient was made into Group "A" and "B".

The strategy of operation in A Group comprised on the identification through visual assistance of parathyroid glands in situ, thyroid gland intracapsular dissection and avoidance of inferior thyroid artery ligation and at the end of visual thyroid gland inspection, in case if an inadvertent removal of parathyroid gland was observed, auto transplantation was carried out after that the patients was removed from the research sample strength. In Group "B", at the time of thyroid specimen removal, the thyroid gland surface and thyroid bed area was inspected visually and identification of one parathyroid gland was made, removed, cold saline slush preserved and divided through surgical blade into mm-thick sections. The parathyroid glands pieces were implanted in the avascular pocket of the sternocleidomastoid muscle after that suture was used to close the pocket of the muscle.

At the completion of the total thyroidectomy, every patient was prescribed an oral dose of calcium and vitamin D supplements for a period of 04 weeks. The follow-up was planned at the interval of six weeks, twelve weeks and six months. On every visit of the follow-up, we measured the level of serum calcium and if observed low we determined the level of serum PTH. The diagnosis of the permanent hypocalcemia was made when the level of serum calcium was (< 9 mg / dl) having an undetectable serum PTH level after the sixth month of surgery. Permanent hypocalcemia means the procedure failure for the preservation of the parathyroid function. Both groups were analyzed for the outcomes in terms permanent hypocalcemia frequency. Comparison was made through Fischer's exact test and p-value was taken as (< 0.05).

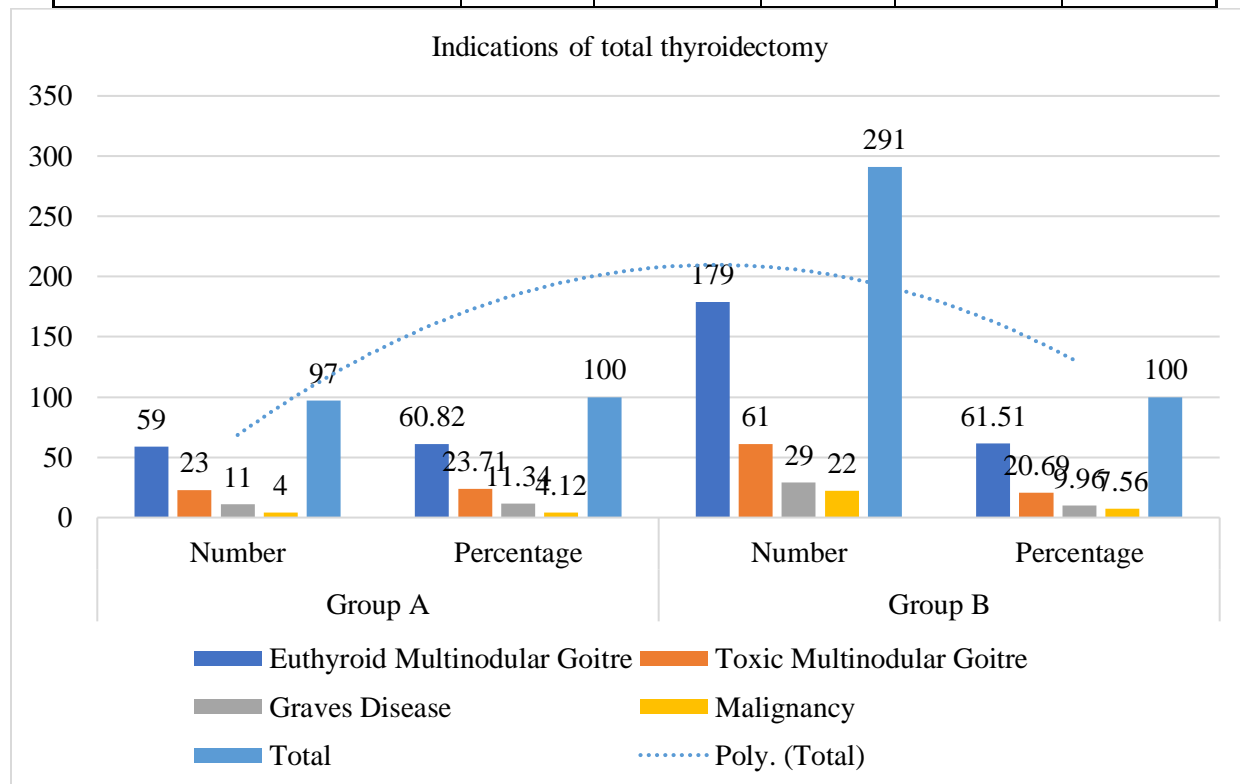
**RESULTS:**

Mean age of group A and B was respectively ( $42.46 \pm 15.30$ ) years and ( $39.16 \pm 18.91$ ) years. An overall proportion of male to female was (1:3.5). In the population of Group "A", permanent hypocalcemia was developed in 3 cases (3.09%); whereas, "B" group had only 1 permanent hypocalcemia case (0.34%). Total thyroidectomy as indicated in two groups was Euthyroid multinodular goiter (MNG), next was toxic multinodular goiter, malignancy and Graves' disease as shown in Table – I. After thyroid gland removal and alert specimen inspection,

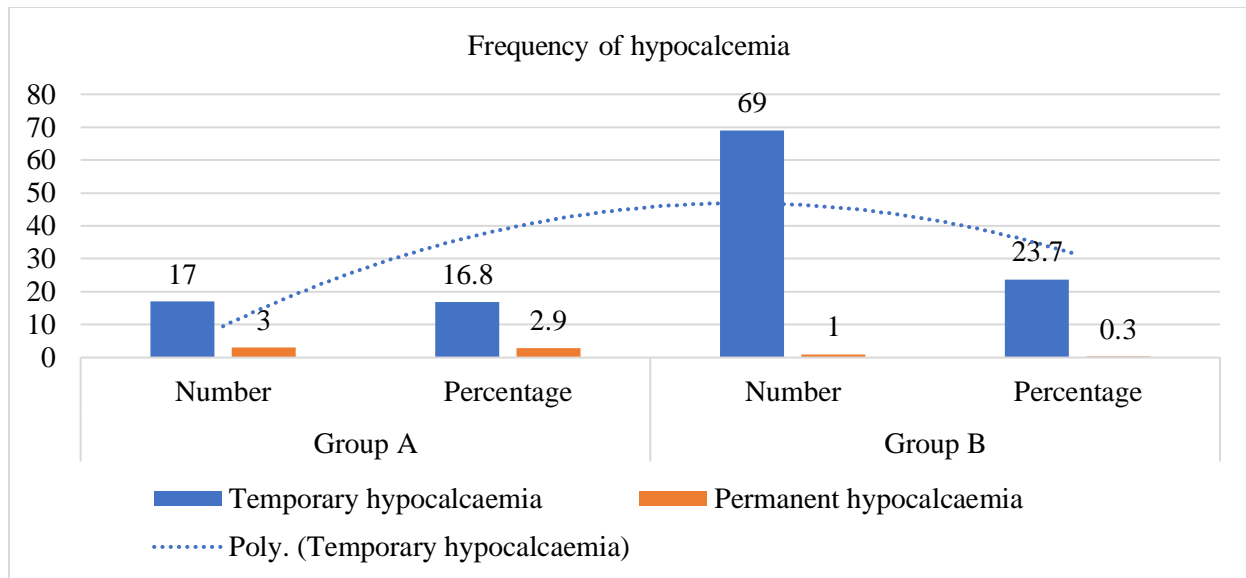
accidentally removed parathyroid glands with thyroid gland included; 52 cases of single gland removal (53.6%); 19 cases with removal of two (19.58%) and 6 cases with removal of three (6.18%). Whereas, in "B" transplantation of single-gland was carried out in 203 cases (69.5%); 57 cases in two glands (19.5%) and 29 cases in three glands (9.9%). Post-operative hospital stay in A and B Group was respectively observed as ( $1.9 \pm 1.64$ ) days (in the total range of 1 – 13 days) and ( $1.8 \pm 1.56$ ) days (in the total range of 1 – 11 days).

**Table – I: Indications of total thyroidectomy**

Detail	Group A		Group B		P-Value
	Number	Percentage	Number	Percentage	
Euthyroid Multinodular Goiter	59	60.82	179	61.51	0.9
Toxic Multinodular Goiter	23	23.71	61	20.69	0.57
Graves' Disease	11	11.34	29	9.96	0.7
Malignancy	4	4.12	22	7.56	0.35
Total	97	100	291	100	

**Table – II: Frequency of hypocalcemia**

Details	Group A		Group B		P-Value
	Number	Percentage	Number	Percentage	
Temporary hypocalcemia	17	16.8	69	23.7	0.2586
Permanent hypocalcemia	3	2.9	1	0.3	0.0417



Transient hypocalcemia frequency in the cases of post operation were defined as symptomatic hypocalcemia in the early six months at the end of the surgical intervention was found in seventeen cases of A group; whereas, in group B it was found in 69 cases (23.7%) as shown in Table – II. Non-statistical variation was visible in both the groups of this research study. Most vivid outcome was observed about the permanent hypocalcemia frequency, as observed in A group as 3 cases (2.9%); whereas, in B group observed as 1 case (0.3%). This variation was significant statistically.

### DISCUSSION:

Since in the routine adoption of the total thyroidectomy for various disorders of the thyroid gland, parathyroid gland function preservation has been among the major concerns. The outcome of this research reflects that at least one parathyroid gland auto transplantation in the total thyroidectomy course results in the shape of permanent hypoparathyroidism minimum risk factor. Previously, for the advocacy of the subtotal thyroidectomy the reason was make it ensure that blood supply to parathyroid glands is continuous and intact to eliminate the permanent hypocalcemia risk factor.

In the historical perspective total thyroidectomy is bound to few of the real dangers. Initially total thyroidectomy for thyroid surgery was pioneered by Theodore Kocher, but it was abandoned at a later stage in the subtotal thyroidectomy favor due to the fact that patients suffered from “strumipriva” (a state of the patients). It can be said that probable suffering of the patients was because of hypothyroidism. The practice of the subtotal thyroidectomy was seen

throughout the century to address the long-term issues [13]. Numerous issues are bound to be the reason behind the subtotal thyroidectomy such as excised MNG recurrence and carcinoma development during remnant and hyperthyroidism recurrence in Graves’ disease significantly in number of patients [2, 14] This gland issue is also a point of concern and a re-do in the surgery is accompanied by the various complications causing patient’s morbidity [1, 2]. In the light of these facts thyroid surgeons were encouraged to rethink for the bygone interventions of total thyroidectomy to treat the benign and malignant thyroid gland diseases.

To treat the disorders of the thyroid total thyroidectomy is the first option for the surgeons. According to Wheele, “Total thyroidectomy for the disease of benign thyroid has become an accepted endocrine surgeon's armamentarium component.” [15]. There is a risk to the parathyroid glands of damage in the course of total thyroidectomy primarily because of an inadvertent removal, blood supply interruption and formation of hematoma [4, 16]. The objective is the parathyroid glands careful preservation in situ and outcomes are also reported as unpredictable. In situ a parathyroid gland which seems normal may stops its function after the operation. In this perspective, auto transplantation was adopted by the thyroid surgeons as an interventional technique.

In the current scenario there are two schools of thought; former advocates the selective auto transplantation; whereas, the later is of the view that routine auto transplantation is better. Selective auto transplantation refers to an auto-transplantation of the

parathyroid glands whenever gland viability in situ is questioned. Routine auto transplantation refers to during auto transplantation removal of at least one parathyroid gland [17, 18]. Our outcomes support the second option.

There is no damage to the glands during the routine auto transplantation, the function of the transplanted gland will be resumed after few weeks of auto transplantation. In the meantime, patient may experience transient hypocalcemia, this risk is abolished as the normal gland function is resumed. An intake of vitamin-D and calcium is recommended to the patients in the transient time. Supplements were prescribed to the patients as a routine [19, 20]. In a careful literature study, it was revealed about the one gland transplantation has predictable results when compared to the outcomes of all glands in situ. In the light of this fact, all the major thyroid surgery centers all over the world have made it a policy in their centers for at least one parathyroid gland auto transplantation and frequent total thyroidectomy [1, 3, 7, 16]. For the shorter span of time hypocalcemia risk will increase; whereas, it can potentially reduce the iatrogenic incidence of permanent hypoparathyroidism to zero [18].

### CONCLUSION:

At least one parathyroid gland auto transplantation after total thyroidectomy is a process that has always predictable outcomes linked with the lowest risk of the permanent hypoparathyroidism.

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