



Sutureless Thyroidectomy using Bipolar Diathermy and Hypocalcaemia- A Comparative Study In a Tertiary Care Centre

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Abstract

Background: *total thyroidectomy is a common elective surgical procedure in a surgery department. Postoperative complications like hypocalcaemia are relatively common due to hypoparathyroidism. The primary objective of our study was to find the incidence of hypocalcaemia in patients who underwent total thyroidectomy using sutureless technique, using bipolar diathermy, and classical thyroidectomy done in our department.*

Materials and Method: *study was conducted in our department during 2013-2014 after getting clearance from institutional ethics committee, as per declaration of Helsinki. Participants were patients undergoing total thyroidectomy in our institution.*

Inclusion criteria: *All adult patients with benign or malignant thyroid disease admitted for total thyroidectomy in our department*

Exclusion criteria: *with history of previous neck surgeries and with extra-thyroidal invasion present pre-operatively. Patients with history of radiation treatment or radioiodine ablation, thyroidectomy cases with any other surgery planned adjunct to total thyroidectomies were also excluded.*

Results: *there was no statistically significant difference between the two groups. There was no association between temporary hypocalcaemia and sutureless thyroidectomy.*

Discussion: *the rate of temporary hypocalcaemia was about 25 percent and 20 percent respectively for the two groups, but the difference was not statistically significant.*

Keywords: *total thyroidectomy, sutureless thyroidectomy, bipolar diathermy, hypocalcaemia.*

Introduction

Total thyroidectomy is a common surgical procedure for thyroid diseases of benign as well as malignant nature ⁽¹⁾. The classic approach to haemostasis during thyroidectomy involves dissection of vessels and individual ligation and division ⁽²⁻⁶⁾. This is time consuming. Moreover

this introduced foreign body in the form of suture materials ⁽⁷⁻¹⁰⁾. The suture materials used for the ligation are nonabsorbable materials like black silk or absorbable materials like vicryl. Another method reported in literature for haemostasis is the use of clips ⁽¹¹⁾.

Post thyroidectomy hypocalcaemia is a relatively common complication due to hypoparathyroidism (approximately 5%) and most often they are temporary and resolves within a period of 12 months⁽¹²⁻¹⁴⁾. Its presentation is very dramatic and appears within 2-5 day. However it may be delayed for 2-3 weeks⁽¹⁵⁾. When the hypoparathyroidism is severe symptoms develop early in the post-operative period⁽¹⁵⁾. Symptoms of hypocalcaemia range from mild paresthesia to painful tetany. Some patients develop life threatening complications like laryngospasm or arrhythmia and patients must be warned about this⁽¹⁶⁾. The incidence of permanent hypoparathyroidism should be less than 1 per cent⁽¹⁷⁾. Permanent hypocalcaemia requires lifelong calcium and Vitamin D3 supplementation and follow up⁽¹⁸⁾. It is not only an embarrassing condition for the patient but also a nightmare for every thyroid surgeons.

Causes of post thyroidectomy hypocalcaemia are accidental removal of the parathyroid gland, injury or devascularisation of the parathyroid glands or even contusion or hematoma in the gland⁽¹⁹⁾. However the accepted explanation for hypocalcaemia was challenged by some due to the high frequency of hypocalcaemia in lobectomy patients.⁽²⁰⁾ One controversial hypothesis suggested was sudden post operative uptake of calcium to bones⁽²¹⁾.

A successful thyroid surgery depends on the adequate removal of the thyroid pathology at the same time preventing the complications like hypocalcaemia and recurrent laryngeal and external laryngeal nerve injury. The amount of thyroid tissue removed directly correlates with the risk of parathyroid injury. Patients who undergo a thyroid lobectomy are virtually guaranteed not to have hypoparathyroidism. So extend of thyroidectomy must be determined by the fine balance between risk of complication and underlying thyroid pathology.

Age old method of hemostasis during thyroidectomy was clamp-and-tie technique for ligation of the vessels. But, it is time consuming, carries the risk of knot slippage and introduction

of foreign body especially non absorbable sutures. Electro cautery particularly using bipolar lead is a safe and less time consuming method for hemostasis in thyroidectomy. In this study we are comparing the occurrence of hypocalcaemia in suture less thyroidectomy and classical suture ligation method and its significance.

Lack of careful haemostasis results in potential damage to important nerves like recurrent laryngeal nerve, external laryngeal nerve and parathyroid glands. Among these, parathyroid gland injury is the most debilitating complications. Another off shoot of the lack of haemostasis is increased operative time

This observational study was aimed to compare the suture-less thyroidectomy with classical thyroidectomy with hypocalcaemia as the primary outcome. This study aims to compare the use of bipolar diathermy in haemostasis vs. classical suture ligation in terms of occurrence of various clinical signs and hypocalcaemia.

Materials and Methods

This study was conducted in the Department of Surgery Medical College, Trivandrum during 2013-2014. We obtained clearance from the institutional ethics committee before starting the study. We conducted the study as per the declaration of Helsinki. The study participants were patients undergoing total thyroidectomy in our institution. This hospital based cohort study involved 500 cases of suture less thyroidectomies and classical thyroidectomies in 1:1 ratio. Both these were followed up for the outcome variables. We followed a systematic sampling methodology for the selection of both cohorts. We had done a formal sample size calculation before conducting the study. All adult patients with benign or malignant thyroid disease admitted for total thyroidectomy in our department were included in the study. We excluded those cases with history of previous neck surgeries and with extra-thyroidal invasion present per-operatively. Those with history of radiation treatment or radioiodine ablation were not included in the study. Moreover thyroidectomy cases with any other surgery

planned adjunct to total thyroidectomies were also excluded. The variables studied were type of surgery, age, sex, post-operative calcium, Chvostick's sign, trousseiers sign, muscle spasm, neurovascular defect, anxiety and histopathology reports. A standard operational definition for each was fixed and we collected data on these parameters. Post operative calcium at 24 hrs and other defined clinical signs mentioned above were the outcome measures.

Thyroidectomies were done by the concerned consultants as described by Delbridge et al. For the sutureless thyroidectomy, first the cricothyroid space was dissected. Then the external laryngeal nerve was dissected and identified. If the nerve could not be identified even after 10 minutes of searching, we went on to the next step. The next step involved skeletonization and identification of individual branches. Each of these branches was tackled with bipolar diathermy set at 25w close to the thyroid tissue proceeding from anterior to posterior. Thereafter recurrent laryngeal nerve was identified, parathyroid with its blood supply safeguarded. All vessels were diathermised with bipolar diathermy flush to surface of the thyroid.

Post operatively patients were monitored for clinical signs of hypocalcaemia and postoperative calcium level at 24 hrs measured. All data were entered into a pretested case report form by junior residents properly trained in data abstraction procedures. These data were then entered into access database. Confidentiality of the patients was maintained by not including any patient's identifiers in the case report forms.

Statistical analysis was done in R statistical environment. Descriptive statistics were summarized with mean and standard deviation for normal data and median and interquartile range for non normal data. Group wise summaries for various outcome measures were calculated. The comparisons of outcome measures were calculated with chi-square test for categorical variables. Associations between the categorical variables were explored with relative risk.

Results

Our study involved 500 patients; 421(84%) were females and 79 (16%) males. Suture less thyroidectomy group comprised of 250 patients. The largest subset in our study belonged to 51-60 age group. Other 250 patients underwent classical thyroidectomy with suture ligation of vessels. Twenty two percent of the patients had temporary hypocalcaemia; the details of post op manifestation of hypocalcaemia and other baseline characteristics are given in the table1.

Table 1: post op manifestation of hypocalcaemia and other baseline characteristics

	Overall
n	500
sex = Female/Male (%)	421/79 (84.2/15.8)
age (%)	
<20	26 (5.2)
20 - 30	18 (3.6)
31 - 40	134 (26.8)
41 - 50	183 (36.6)
51 - 60	103 (20.6)
>60	36 (7.2)
surgery = Suture less/Suture ligation (%)	250/250 (50.0/50.0)
PostOpCalcium = Hypocalcemia/Normal (%)	112/388 (22.4/77.6)
ChodvicSign = Absent/Present (%)	421/79 (84.2/15.8)
TrousiersSign = Absent/Present (%)	460/40 (92.0/8.0)
MuscleSpasm = Absent/Present (%)	454/46 (90.8/9.2)
neuromuscularDefect = Absent/Present (%)	498/2 (99.6/0.4)
anxiety = Absent/Present (%)	422/78 (84.4/15.6)

The baseline variables were comparable between the sutureless thyroidectomy and classical thyroidectomy groups except for the 20-30 and 50-60 age groups and patients with thyroiditis (table2).

Table 2: sutureless thyroidectomy and classical thyroidectomy groups

	Suture less	Suture ligation	p
n	250	250	
sex = Female/Male (%)	204/46 (81.6/18.4)	217/33 (86.8/13.2)	0.141
age (%)			0.097
<20	13 (5.2)	13 (5.2)	
20 - 30	14 (5.6)	4 (1.6)	
31 - 40	61 (24.4)	73 (29.2)	
41 - 50	85 (34.0)	98 (39.2)	
51 - 60	58 (23.2)	45 (18.0)	
>60	19 (7.6)	17 (6.8)	

With regard to the occurrence of temporary hypocalcaemia, there was no statistically

significant difference between the two groups. There was no association between temporary hypocalcaemia and sutureless thyroidectomy. The risk ratio was 1.15(0.9-1.4) (table 3).

Table 3: association between temporary hypocalcaemia and sutureless thyroidectomy

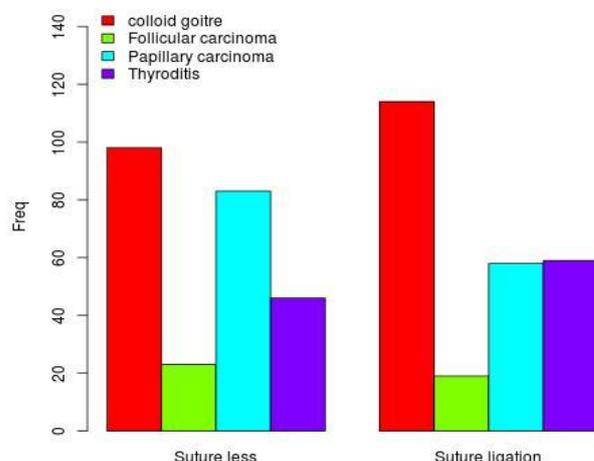
	Suture less	Suture ligation	p
n	250	250	
PostOpCalcium = Hypocalcemia/Normal (%)	62/188 (24.8/75.2)	50/200 (20.0/80.0)	0.238
ChodvicSign = Absent/Present (%)	210/40 (84.0/16.0)	211/39 (84.4/15.6)	1.000
TroussiersSign = Absent/Present (%)	232/18 (92.8/7.2)	228/22 (91.2/8.8)	0.621
MuscleSpasm = Absent/Present (%)	229/21 (91.6/8.4)	225/25 (90.0/10.0)	0.643
neuromuscularDefect = Absent/Present (%)	250/0 (100.0/0.0)	248/2 (99.2/0.8)	0.479
anxiety = Absent/Present (%)	210/40 (84.0/16.0)	212/38 (84.8/15.2)	0.902

The most common histopathological finding is colloid goitre, followed by papillary carcinoma overall. However our data showed more papillary carcinoma cases in the sutureless thyroidectomy group (33%) compared to the classical thyroidectomy group (23%) (Table 4).

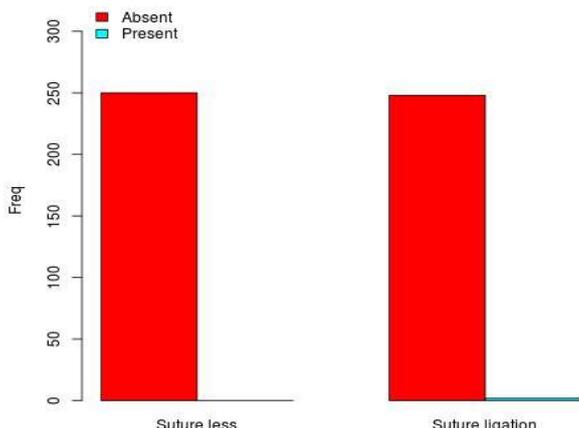
Table 4: histopathological findings

	Suture less	Suture ligation	p
n	250	250	
hpr (%)			0.054
colloid goitre	98 (39.2)	114 (45.6)	
Follicular carcinoma	23 (9.2)	19 (7.6)	
Papillary carcinoma	83 (33.2)	58 (23.2)	
Thyroiditis	46 (18.4)	59 (23.6)	

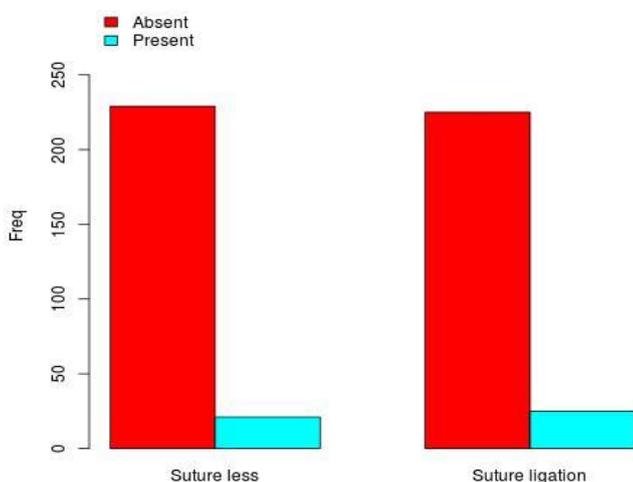
Barplot of 'hpr' by 'surgery'



Barplot of 'neuromuscularDefect' by 'surgery'



Barplot of 'MuscleSpasm' by 'surgery'

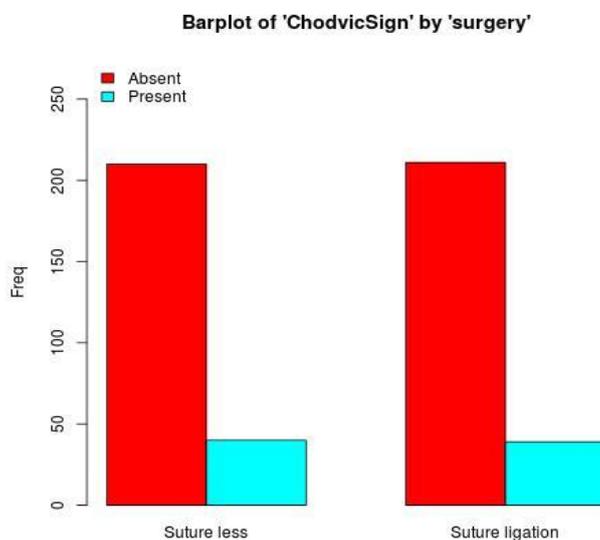
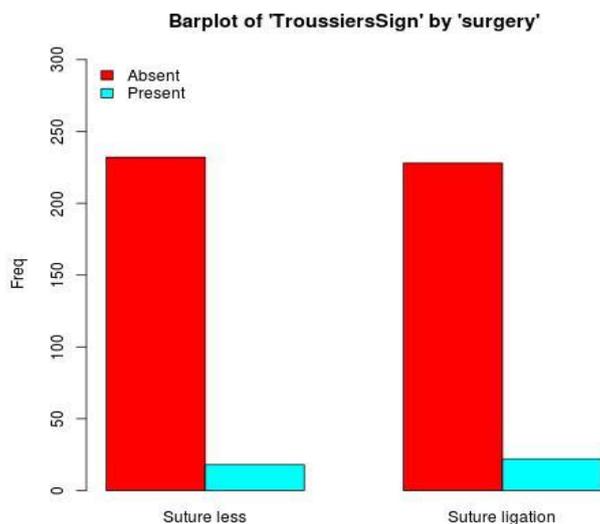


Discussion

We studied the incidence of hypocalcaemia in sutureless thyroidectomy patients and classical thyroidectomy patients. Our study has shown that there is no statistically significant difference in the incidence of hypocalcaemia across the two populations.

In the present study, the rate of temporary hypocalcaemia was about 25 percent and 20 percent respectively for the two groups, but the difference was not statistically significant. The reported incidence of temporary hypocalcaemia varies in different studies. It ranges from 0.3 to 66 percent (14, 22-26). In the present comparative study the overall hypocalcaemia was 22%. This compares with other studies. Chovstek sign was present in 16 percent of patients in our study. The incidence of chovstek sign is more in our study

compared to other studies. Hosseini et al reports very low incidence of chovsteksign. This could be explained by the fact that this sign is not a sensitive or specific test for the clinical manifestations of hypocalcaemia. It is reported that only it is present only in two third of patients with hypocalcaemia. Other manifestations of hypocalcaemia accord with the findings of earlier studies.



One of the important fact about this study is that this is one of the few studies that compares the sutureless thyroidectomies with commonly available diathermy machine in resource poor setting like government hospitals in India. This is to be viewed against the prohibitive cost factor of vessel sealing system and harmonic scalpels. However caution must be applied given the

observational nature of the study design. Further work in the form of a randomized controlled study is suggested. Moreover the outcome measures like operative and long term outcome need to be studied. A further study focusing on economic aspect is also warranted.

Conclusion

This study has shown that there is no clinically relevant difference in the incidence of hypocalcaemia in patient undergoing sutureless thyroidectomy compared to those undergoing classical thyroidectomy. Hence sutureless thyroidectomy with easily available bipolar diathermy is feasible in resource poor setting like government hospitals. The strength of the study lies in the use of a easily accessible instrument that could help do a sutureless thyroidectomy. Hence incorporation of bipolar forceps into the routine surgical workflow will help perform a sutureless thyroidectomy without any increase in the complicate rate compared to the classical thyroidectomy.

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