

## Analytical study of advantages of harmonic scalpel in thyroid surgery

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### Abstract

**Background:** Thyroid surgery is known to its complications post operatively. In recent times this complications are reduced due to expertise in techniques and technologies. One of this is harmonic scalpel in hemostasis proven to reduce blood loss and operative time in various gastrointestinal surgeries. Meticulous hemostasis has and will always be an essential prerequisite for a successful outcome in thyroid surgery. In last twenty years, many reports have evaluated the effectiveness of the Harmonic Scalpel for thyroid surgery and the greater part of these studies have been carried out at European Hospitals. The purpose of this study was to determine the advantages of harmonic scalpel in thyroid surgery in our setup. Now harmonic scalpel is very useful tool in thyroid surgery to minimize operative time, blood loss and post operative complications. **Methods:** From September 2018 to September 2019 our study has been conducted which includes 33 successive patients undergoing (Hemi/Total) Thyroidectomy procedures and meeting the inclusion criteria in our surgical ward at Government Stanley Medical College, Chennai, India. **Results:** In our study, mean duration for Hemi thyroidectomy was 63.5 min and for Total thyroidectomy 101.1 min. Mean post operative pain score  $1.45 \pm 1.43$  in which 14 patients had No pain and 14 patients had Mild pain, 5 patients had score 4 or more. Post operative drainage fluid volume in 1st 24 hrs was 25.4ml and 2nd 24 hrs was 14.4 ml, and 12% patients had transient post operative Hypocalcemia. **Conclusion:** Harmonic Scalpel is a reliable and safe tool in thyroidectomy. The total drainage fluid volume and surgical operative time is reduced. In addition, the postoperative pain is less and the rate of Post operative transient hypocalcemia is lower.

**Keywords:** Harmonic Scalpel, Thyroidectomy, Complications.

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### Introduction

Thyroid surgery is one of the most commonly performed surgeries for benign and malignant conditions of the thyroid gland worldwide. The thyroid gland is closely related to many vital structures and hence poses a unique challenge to the surgeon. Kocher and Billroth developed the approach to the thyroid gland; both revolutionized the understanding of treatment of thyroid disease. In rapid succession, the understanding of altered physiology, advances in imaging, minimally invasive

diagnostic and surgical techniques have taken place. Harmonic scalpel is one such advance which is now extensively used in all surgeries including thyroidec-tomies. There is well documented usefulness of harmonic scalpel by means of reduced blood loss in modern surgical practice. The gold standard technique for feeding vessel is being hemostasis by means of non absorbable suture tie ,But even though this technique was followed for quite a long time, now a days the ultrasonic Harmonic scalpel has been emerging as the safe tool since it is proved in reducing post operative pain, drainage and transient hypocalcemia. This study aimed to analyse the advantages of harmonic scalpel over conventional hemostasis is by means of duration of surgery, postoperative , drainage fluid volume, pain , transient hypocalcemia and RLN Injuries

### Methodology

This study include all patients admitted in General surgical wards of Govt Stanley Medical College,

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Chennai with SNG,MNG thyroid in Euthyroid status and thyroid lobe size less than 5 cm (greatest dimension) included in the study. This study also excluded patients with carcinoma thyroid, toxic nodules and recurrent thyroid swelling. For the duration of one year, 33 patients underwent thyroidectomy (Hemi / Total) performed using Harmonic Scalpel for vessel control included in the study. All patients had routine preoperative workup for their disease and comorbidities evaluation and the same anesthetic and hospital care regardless of the surgical technique performed. A complete preoperative assessment was obtained for all patients. A 3-7 cm skin incision was made. The flaps were raised and then strap muscles were separated in the midline and laterally reflected. The superior thyroid vessels and inferior thyroid vessels and middle thyroid vein, were divided with the HS. For total thyroidectomy the same steps were repeated for removal of the contra lateral lobe. Finally, the wound was irrigated and closed using interrupted 3-0 vicryl sutures to approximate the strap muscles and the platysmal layer. The skin was closed subcutaneously. The operative time was calculated by measuring time taken from skin

incision to skin closure. Post operative drainage fluid volume was calculated by redivacsuction drain over period for 24 hours. Post operative pain was calculated by using Visual Analogue Scale. We used pain during initial deglutition and early feeding and pain from operative field as our end point excluding cervical distress. Post operative Transient HypoCalcemia was measured by serum calcium levels were obtained during the 1<sup>st</sup> POD, and 3<sup>rd</sup> POD and once in every 4 weeks. Serum calcium level below 8mg/dl is considered Hypocalcemia. RLN injury assessed by vocal cord status post operatively after extubation by direct laryngoscopy by anesthesiologist and clinically in post operative ward.

**Results**

Totally 33 Patients underwent thyroidectomy ( Hemi / Total ) using Harmonic Scalpel for vessel control and following conclusions were drawn.

**Age wise distribution**

In our study totally 33 patients was studied, out of it 11 patients are age less than 30 yrs, only two of them more than 60 yrs, others or in between.(Figure 1)

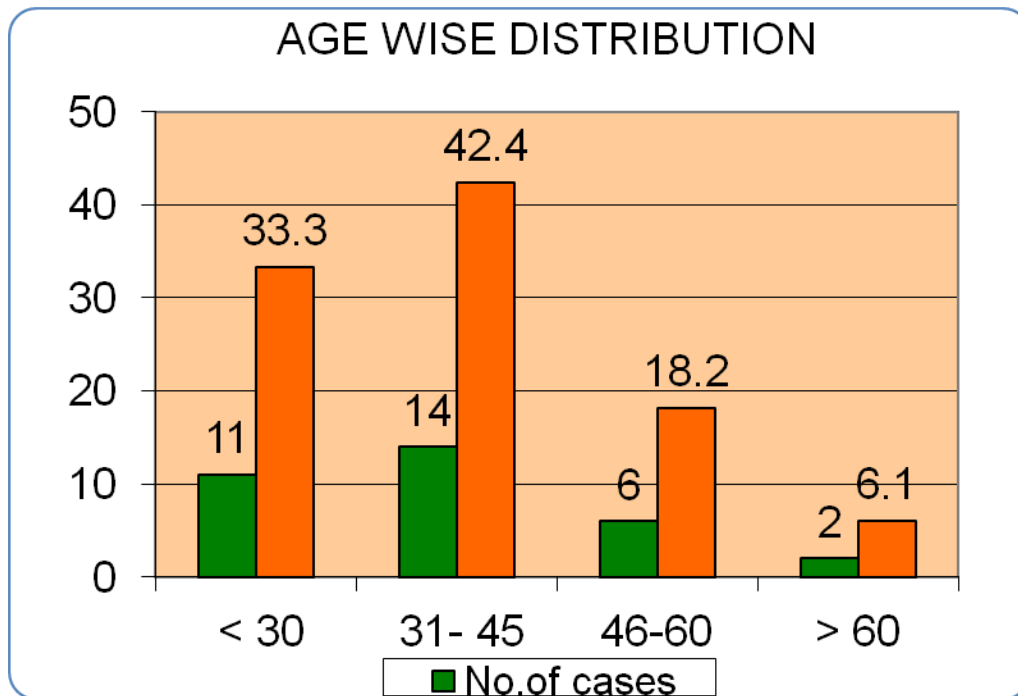
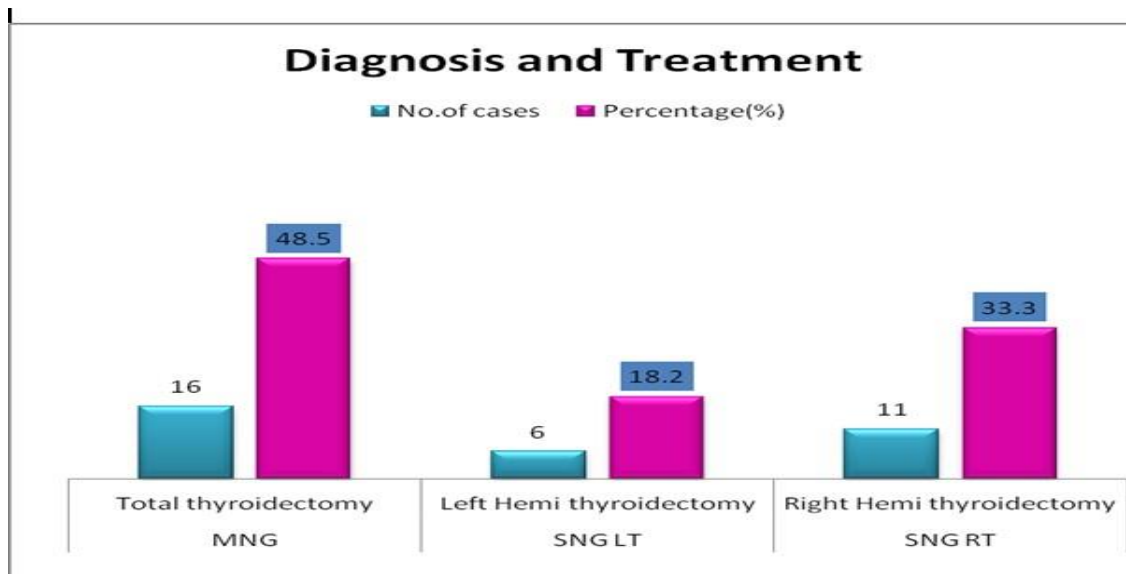


Fig 1: Age wise distribution versus number of cases

**Diagnosis and Treatment**

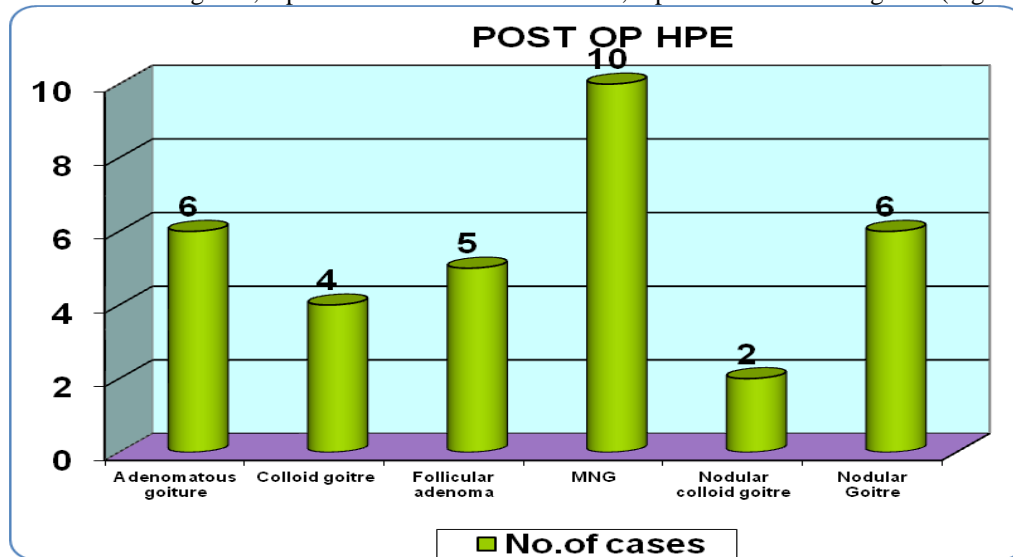
In our study 16 patients underwent total thyroidectomy, 6 patients underwent Left hemithyroidectomy and 11 patients right hemithyroidectomy was done. (Figure 2)



**Fig 2: Diagnosis and treatment**

**Postoperative H P E**

In our study carcinomas are excluded. The same was proved by post operative HP. Out of 33 Adenomatous Goitre 6 patients, 4 patients had colloid goiter, 5 patients had follicular adenoma, 6 patients had nodular goiter. (Figure 3)

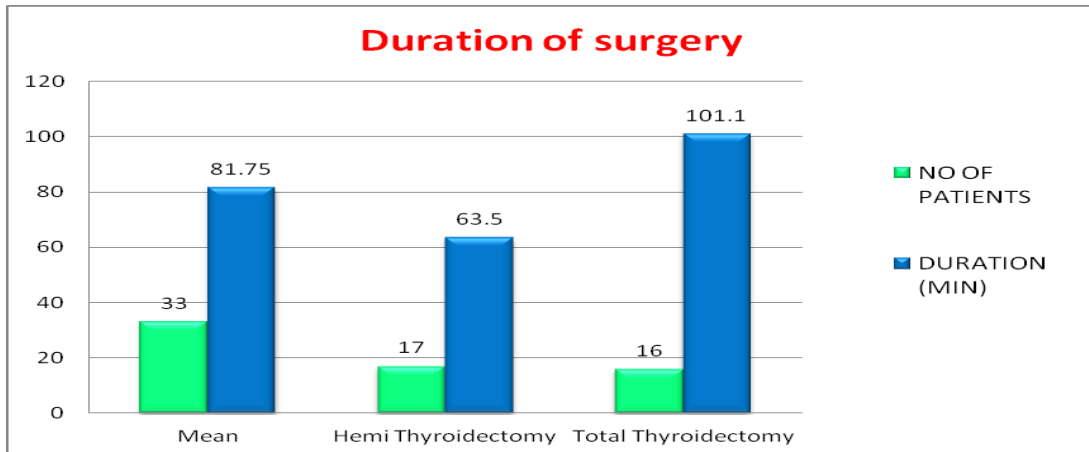


**Fig 3: Postoperative H P E**

**Duration of surgery**

By using harmonic scalpel operative time was significantly shorter. For Hemithyroidectomy mean duration 63.5 min and for Total thyroidectomy 101.1

min. highest time taken for Total thyroidectomy 126 min. Minimum duration was taken to Hemi thyroidectomy 55 min. (Figure 4)

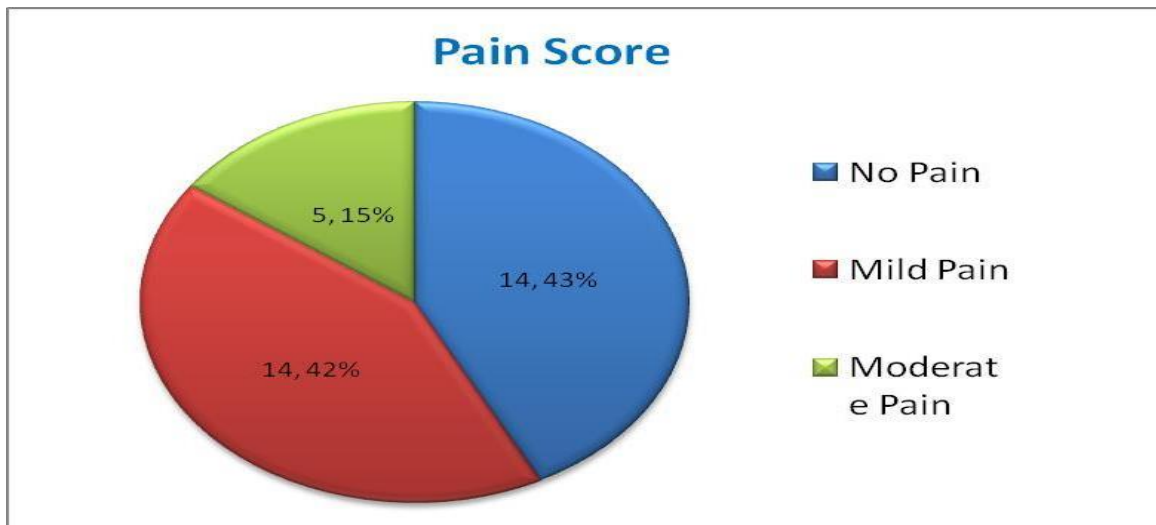


**Fig 4: Duration of surgery**

**Post operative pain score**

By Visual Analogue scale pain severity assessed. According to VAS patients in the HS group experienced significantly less pain. In total 33 patients

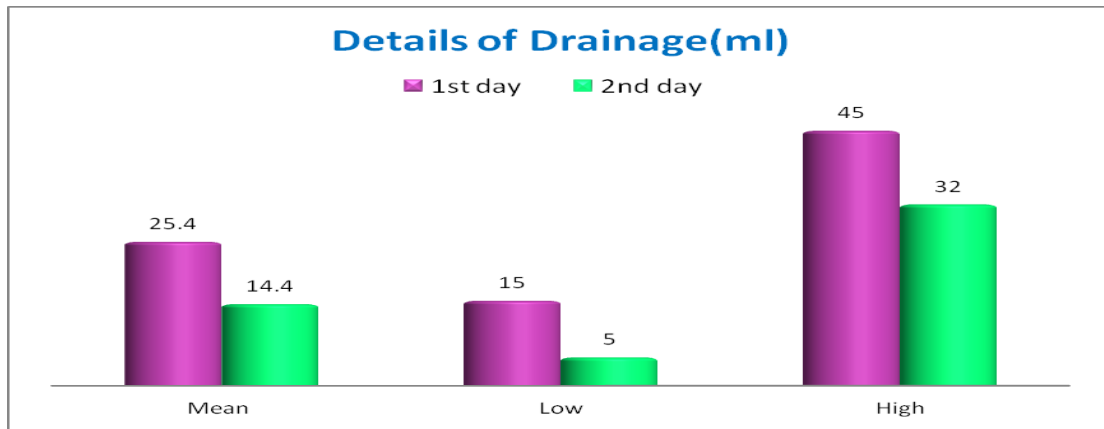
14 patients had no pain. They are pain free post operative period. 14 patients had mild pain. 5 patients had pain score 4 or more had moderate pain. (Figure 5)



**Fig 5: Post operative pain score**

Possible explanation is that the HS causes reduced tissue injury with no neuromuscular stimulation and HS would allow reduced traction and reduced manipulation of the thyroid.

**Post operative Drainage fluid volume**



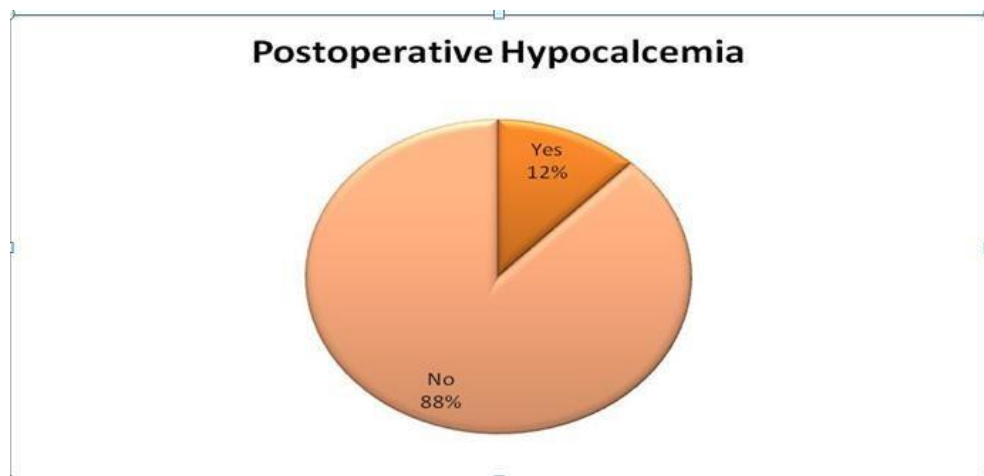
**Fig 6: Details of drainage**

By using ready vac suction drain from first 24 hours mean drainage fluid volume 25.4 ml. Second day mean drain volume is 14.4±5 ml. (Figure 6)

**Hypocalcemia**

In our study 4 patient showed clinical symptoms of hypocalcemia and their serum calcium levels are <8.0mg/dl. They require calcium supplementation temporarily. All patients recovered completely and no permanent hypoparathyroidism was registered.(Figure 7)

**RLN Injury**



**Fig 7: Postoperative hypocalcemia**

In our study no cases suffered any RLN injury. In all patients, vocal cord status normal post operation.

**Discussion**

The results of our study were compared with the available previous similar studies.

**Duration of surgery**

In study done by Hallgrimsson (2008) mean operative time was min in 27 patients. Lombardi (2008) reported mean duration was 53.1min in 100 patients. Frazzetta (2005) study shows mean duration 56min in 60 patients. In our study, mean duration in 81.75min.

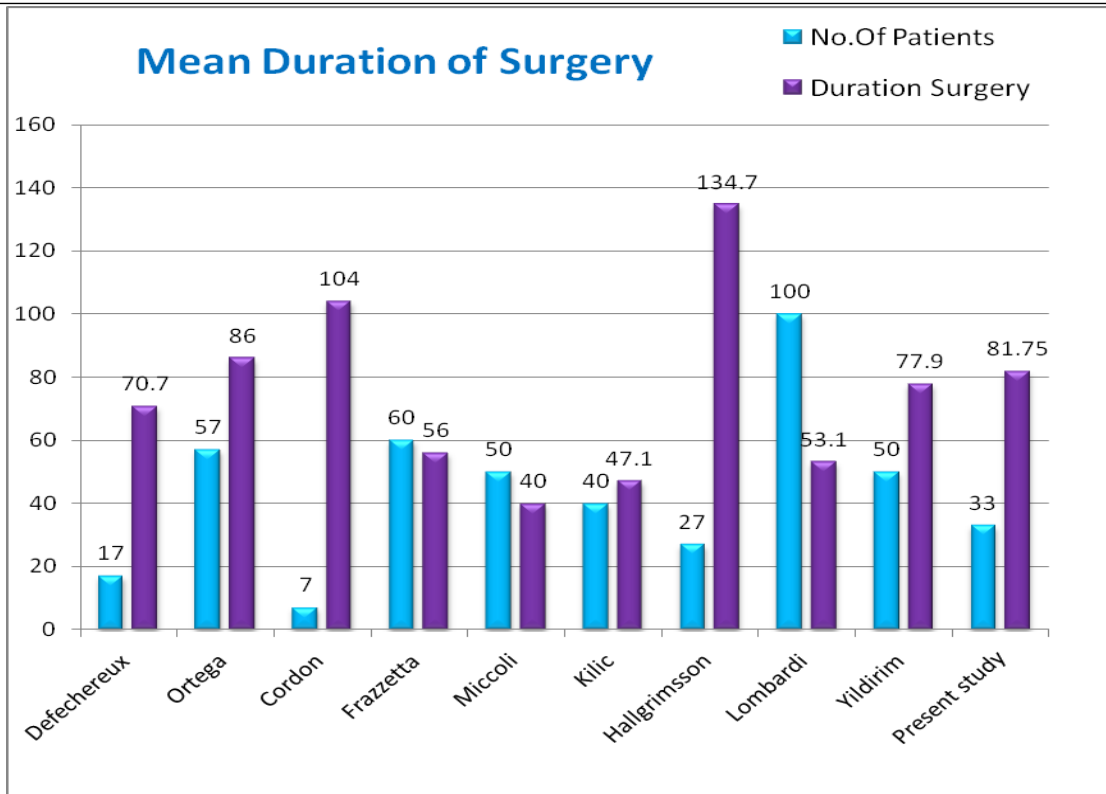


Fig 8: Duration of surgery

**Pain Score**

In 2011 Emanuele Ferri done the study shows mean Pain score of  $1.97 \pm 0.97$  and in 2006 Paolo Miccoli done the Harmonic Scalpel in thyroid surgery, mean pain score was  $3.9 \pm 1.15$ . Subsequently Ahmedereza

(Dehran university, Iran) study shows mean pain score value of  $2.3 \pm 1.23$ . In our study, mean pain score  $1.45 \pm 1.43$  which is comparable to the study done earlier.

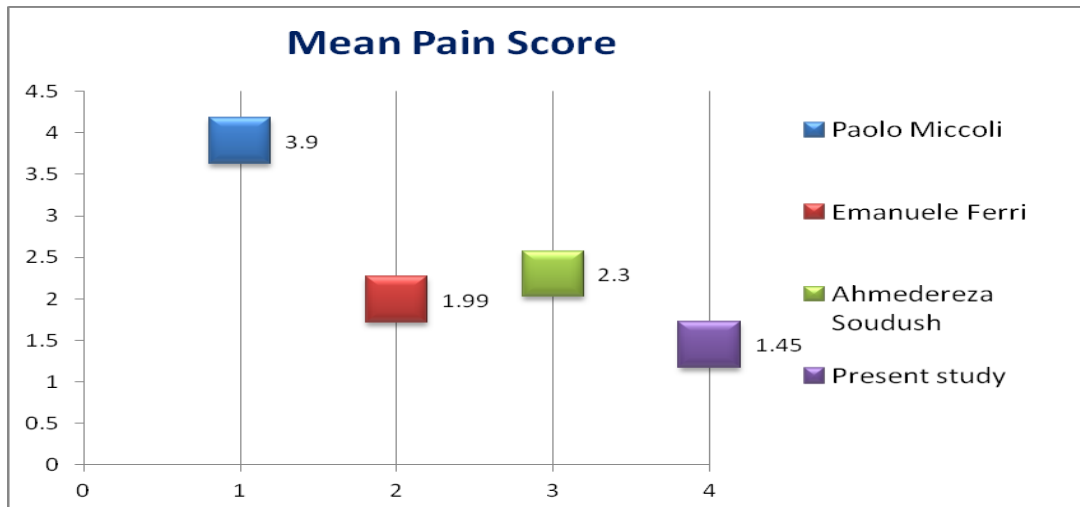
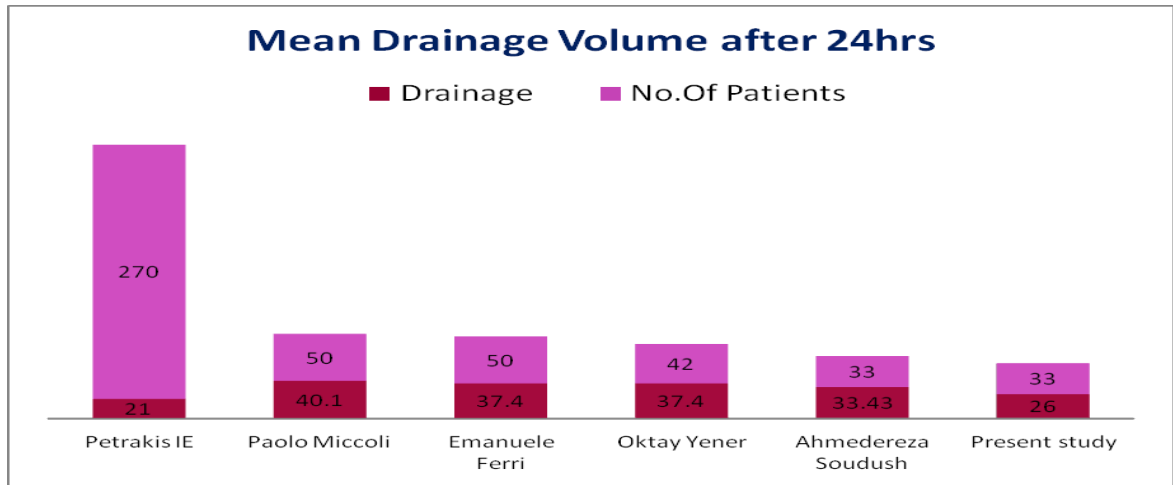


Fig 9: Mean Pain score

**Drainage Volume**

In our study mean drainage volume after 24 hrs was 26 ml ± 9.39 ml which is comparable to the previous studies shown in tables.

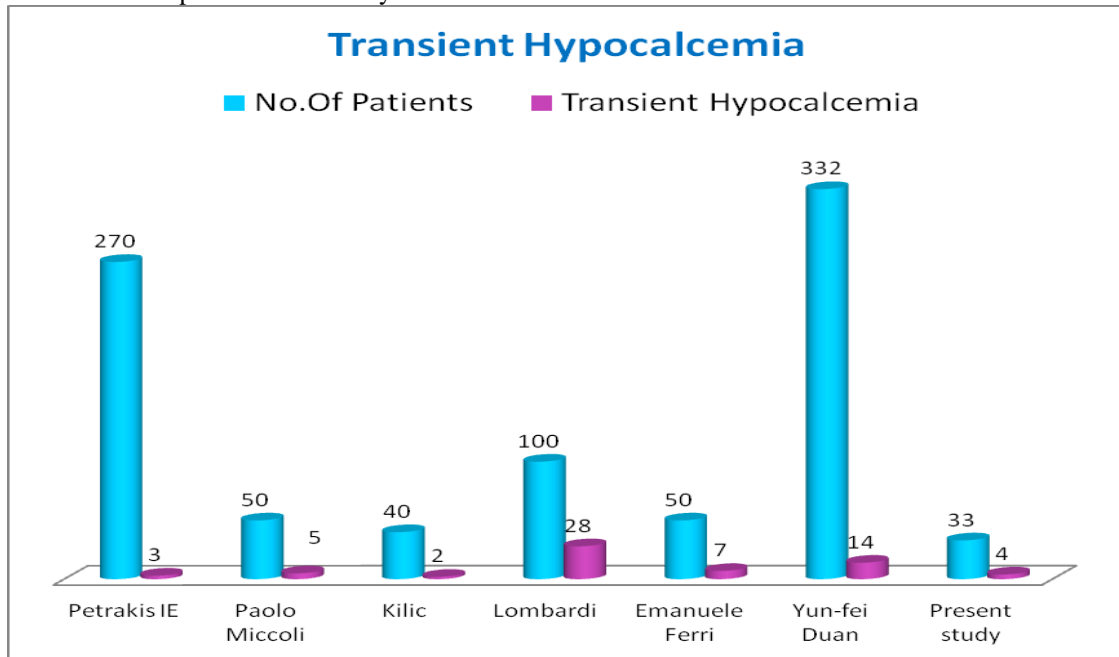
In our study 2<sup>nd</sup> 24 hrs mean drainage volume in 14.9± 8.5 ml, but comparison could not be made out because no large scale shown the 2<sup>nd</sup> 24 hrs drainage volume statistically.



**Fig 10: Mean drainage volume after 24 hours**

**Post operative transient Hypocalcemia**

From the Literature rates of post operative Hypocalcemia are approximately 5% it resolves in 80% of cases in one year. This results comparable to our study.



**Fig 11: Transient hypocalcaemia**

In our study 4 cases suffered from transient hypocalcemia a treated by oral calcium and Vit. D tablets.

But all of them recovered from the hypocalcaemia in Petrakis IE study lowest rate of Hypocalcaemia (1.1%) and in Lombardi study 28% of patient suffered from the hypocalcaemia.

### Conclusion

The present analytical study of advantages of harmonic scalpel in thyroid surgery has been carried out in Govt. Stanley Medical College, Chennai during period of Sep 2013 to Sep 2014. Based on the data and results obtained in the present study the following conclusion can be drawn. The average total duration of surgery is less by using HS in thyroid surgery. The post operative total drainage fluid volume will be less by using HS in thyroid surgery. The post operative pain is less in patients using HS for hemostasis in thyroid surgery. Post operative transient hypocalcemia was less in HS patients. No RLN injury found in the study.

### Summary

Analysis of Harmonic scalpel usage in thyroid surgery of 33 cases of thyroid swelling admitted to Govt . Stanley Medical College, Chennai. During the period of Sep 2018 to Sep 2019 has been made summarized below 33 female patients with SNG and MNG thyroid undergoing thyroidectomy included in the study. Out of 33 patient undergoing thyroidectomy by harmonic scalpel for vessel control, 16 patients were in Hemi thyroidectomy group, 17 patient were in Total thyroidectomy. Mean duration for hemi thyroidectomy is 63.5min. Mean duration for total thyroidectomy is 101.1min. Mean duration for (Hemi + Total) thyroidectomy is 81.75 min. Post Operative drainage volume in the first 24 hrs is 26 ml. Post Operative drainage volume in the second 24 hrs is 14.90 ml. Mean Pain score is 1.45. Transient hypocalcemia seen in 12% of patients, but no permanent hypocalcemia recorded. None of the case affected by RLN Injury.

**Conflict of Interest: Nil**

**Source of support: Nil**

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