

# THYROIDECTOMY WITH ULTRASONIC DISSECTOR: AN EARLY EXPERIENCE AT LADY READING HOSPITAL

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## ABSTRACT

**Objectives:** To find out operative times and frequency of complications for total thyroidectomy using ultrasonic dissector.

**Methodology:** This descriptive study was conducted at Department of Surgery Lady Reading hospital, Peshawar, from October, 2011 till September, 2012 and included 58 patients. The study included those patients who underwent total thyroidectomy using the Harmonic Focus<sup>R</sup> for benign conditions.

**Results:** The age range of the sample was 21-63 years with a mean age of 33.6±3.4 years. Only five of all patients included were male with female predominance and having a benign disease. The Mean operative time was 59.3±14.1 minutes. The mean hospital stay was 3.1±0.65 days and mean blood in drain at 24 hours was 65.6±17.14 ml. Persistent hypocalcaemia and hoarseness at one week was observed in two cases each (3.44%).

**Conclusion:** The use of ultrasonic dissector is safe and has significantly reduced operative time. Also there was less amount of blood in the drain at 24 hours.

**Key words:** Ultrasonic dissector, Harmonic Focus, Total thyroidectomy

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## INTRODUCTION

Early attempts to treat thyroid enlargement and over activity were horrifying and associated with a very high mortality and morbidity due to hemorrhage, asphyxia, hospital gangrene and air embolism<sup>1,2</sup>. Then In 1938 recurrent nerve palsies were recorded with an incidence as low as 0.3% and saw a major shift in concepts relating to operative management of enlarged thyroid gland<sup>3,4</sup>.

More interestingly the later part of the twentieth century saw another major shift in trends in thyroid surgery by the introduction of vessel sealing devices<sup>5,6</sup>. Various trials comparing the different product commercially available have shown reduction in operative times and earlier recovery<sup>7,8</sup>. More accepted versions include Harmonic<sup>R</sup> and LigaSure<sup>R</sup> series of shears<sup>9,10</sup>. These shears are optimized instruments that cut and coagulate at the same time using simple technology and newer instrument with shapes to assist easy manoeuvrability during surgery. The use of such technology was first elaborated in major open and laproscopic surgery that makes life easy for the surgeon<sup>11,12</sup>.

Over the turn of the century, surgery was optimized by newer designs of shears that include Focus<sup>R</sup> and

Precise<sup>R</sup> that had been introduced. The later resulted in better delineation of anatomy of recurrent laryngeal nerve and parathyroid gland and a decreased incidence of per-operative complications during thyroid surgery<sup>13,14</sup>.

The post-operative superficial hematoma and deep hematoma are other dreadful complications related to thyroid surgery that have been fields of focus for Focus<sup>R</sup>.

Harmonic devices such as the focus simultaneously cut and coagulate and seal vessels using ultrasonic vibrations at frequencies of 55.5 KHz. With a lower first initializing cost this product has been seen as a better alternate using a vessel sealing device in thyroid surgery in contrast to the original clamp-tie technique of thyroidectomy<sup>15</sup>. With lesser need to replace the hand instrument and easy maneuvering it makes this shear the best alternate<sup>16</sup>. The rationale of this study is to observe the frequency of complications and operative times during thyroid surgery using the shear Harmonic (Focus<sup>R</sup>).

## METHODOLOGY

This descriptive study was conducted at Department of Surgery, Lady Reading Hospital, Peshawar, From Oc-

tober, 2011 till September, 2012 and included 58 patients undergoing total thyroidectomy for benign disease. A relevant proforma was prepared and all patient presenting with goiter were evaluated in the out-patient department for inclusion in the study. The study included those patients who underwent total thyroidectomy using the Harmonic Focus<sup>R</sup>. Following rigid scrutiny a limited number of cases under peer observation, presented with modified operative technique (the hybrid technique), were documented.

From the frequency of complications depicted by other studies in recent times<sup>17-20</sup> and for a margin of error at 10%, using the WHO Sample size calculator, 58 cases were selected. The aim was to assess operative time (minutes); post-operative blood loss (milliliters); post-operative stay (days); post-operative complications (hypocalcaemia, laryngeal nerve damage). All the patients were admitted through the out-patient department, after obtaining an informed consent. The project was presented at the ethical review and was considered safe as per current practices.

Following admission necessary documentation of the relevant investigations performed via the out-patient department was reassessed by the attending surgeons and at his discretion further advised. Those with a subclinical or overtly evident earlier hyperthyroid state were reassessed. All medications including the use of beta-blockers and antithyroid agents were managed accordingly. None of the patients were given iodine compound at any point perioperatively. Thus minimal delay foreseen before the placement of patients for the next coming list on an elective basis was observed.

All patients with preliminary diagnosis of benign disease of the thyroid gland planned for total thyroidectomy were included. Those yielding malignant disease at histopathological report were also maintained and not excluded. All ages between 18-60, were included but clear evidence or FNAC suggestive of suspicious malignancy were excluded as were those that were lost to follow up in the following month.

The operative technique was the standard or conventional clamp-tie technique with the exception that there was no clamping and also that the dissection was carried out with the same instrument that was the Harmonic Shear Focus<sup>R</sup>. The incision was similar with a extended neck position and sandbag below shoulders.

All cases were performed with the standard anesthetic techniques and general anesthesia given. Drain was placed in all cases and fixed through a separate stab incision. Skin was reaposed using either skin stapler or 3/0 prolene suture (subcuticularly).

Surgeons allocated to perform were those with a minimum experience of 50 cases of documented thyroid surgeries performed before this study. They were not blinded from the inclusion of the patient in the study to avoid modification of technique, that was explained to them after arranging for a briefing regarding the use of the shear and its generator that was already under practice. All this data alongside the indication for surgery, first post-operative day calcium levels and the hoarseness, quantity of blood in drain on first post-operative day was collected and documented on the proforma.

Having collected all this data on a relevant proforma and further data observed on the improvement of cases of hoarseness over the receding weeks in the outpatient department, statistical data entered. The sequence of follow up was at one week and one month post-operatively.

The data was entered into SPSS version 16.0 for Windows<sup>R</sup> and analyzed for descriptive statistics.

## RESULTS

All the 58 patients were operated for total thyroidectomy by a vessel sealing device namely harmonic Focus<sup>f</sup> was conducted over a period of twelve months. The age range was 21-63 years with a mean age of  $33.6 \pm 3.4$  years. Only five of all patients included were male with female predominance and benign disease. Three of all patients had evidence on histopathological grounds of malignancy. But these patients were included in the study as the reports of the specimen had presented in the postoperative period..

Amongst the indications the most common was for cosmetic grounds although there were no indications to operate on behalf of the operating team. Only 5 patients (8.62%) had presented with pressure symptoms.

Duration of hospital stay was 3.1 days. The choice of incision was the same and the need for section of the sternocleidomastoid muscle was dependent on the individual case, thus accurate judgment on the amount of trauma by surgery in individual cases is hard to predict. (Table 1)

In our study only one patient that revealed hoarseness persisting beyond 1 week was observed (3.44%). The part of the observation that was intriguing that most of the patients hypocalcaemic at the end of one week gathered their parathyroid functions shortly after the surgery. (Table 2)

Considering constraints of accurate measurement of the amount of blood loss, hemostasis was measure as the amount of blood in the drain on the first post-operative day. Mean blood in drain at 24 hours was  $65.6 \pm 17.14$  ml.

**Table 1: Demographic and post-operative data**

VARIABLE	n=58
Age (Years)	33.6±3.4
Gender M:F	11.6:1
Indications for surgery	
Cosmetic	41(70.68%)
Hyperthyroidism	6(10.3%)
Patient wishes	6(10.3%)
Pressure symptoms	5(8.62%)
Diagnosis	
Multinodular goiter	25(43.1%)
Colloid goiter	11(18.96%)
Diffuse goiter	12(20.6%)
Hospital stay (days)	3.1±0.65
Mean operative time (min)	59.3±14.6

**Table 2: Post-operative complications**

VARIABLE	n=58
Hoarseness 1st day	10(17.2%)
Hoarseness 1 week	2(3.44%)
Hoarseness 1month	-
Superficial hematoma	01(1.72%)
Deep hematoma	-
Transient hypocalcaemia (1st POD)	11(18.96%)
Persistent hypocalcaemia	02(3.44%)
Wound infection	-
Blood in drain (1st post-op Days) (ml)	65.6(±17.14)

## DISCUSSION

Figures from earlier studies shows a higher frequency of complication as compared to our study and similar studies using vessel sealing devices for thyroid surgery. Although our study was not a controlled trial it was an initial experience never observed in the region before and with no convincing results from patients of this region, there was need to ascertain how useful the device was.<sup>16</sup> Safety of the procedure had been earlier shown from studies conducted by Miccoli et al.<sup>25</sup> showed reduced operative time by 14 minutes that was greatly reduced in the group that was operated using the Harmonic Focus<sup>R</sup>, that was only marginally greater than the results from that study for relevant cases. In their comparative trial the statistical evidence proved significant.

In his study the number of ligatures/clips was greatly reduced in the vicinity of the vessels related to the thyroid gland, this was not the case from our study as no clips were used at all.

A full sized incision was performed in our study, thus the calculation of visual analogue score would be uniform, although this was not part of objectives of the study. In this very earlier study the length of the incision varied and thus could have confounded with the visual analogue score averages. Terris et al.<sup>26</sup> had a larger sample of consecutive patients with 216 patients using the same Harmonic<sup>R</sup> generator but using the Harmonic Ace<sup>R</sup> instead of the newer shear used in our study. The procedure performed was minimally invasive (minimally invasive video assisted thyroidectomy) in the study by

**Table 3: Comparisons of operative time in studies using ultrasonic shears for thyroidectomy**

Study	Operative time(min) FocusR	Operative time(min) Clamp Tie-Technique	Significance (p value)
Our study	59.3(±14.6) [n=58]	-	-
Miccoli et al <sup>23</sup>	33.4(16-50)(lobectomy) [n=31]	47.2(33-90)(lobectomy) [n=31]	0.0001
Terris et al <sup>24</sup>	Harmonic AceR(MIVAT) [n=216]	-	
Bove et al <sup>25</sup>	(62.7±14.1) [n=80]	72.7±13.6 [n=80]	0.019
Siperstein et al <sup>26</sup>	89 ± 20 (lobectomy) 132 ± 38 minutes [n=85]	115± 25 (lobebectomy) 161± 42 minutes [n=86]	<0.01

Terris et al. that varies greatly when comparing a 5cm incision versus a full sized incision for thyroidectomy. There were 154 hemithyroidectomies and 62 total thyroidectomies in the study group. The mean (SD) incision length (available in 182 of 216 patients) was 27.7 (6.6) mm. There were 16 complications (7.4%).

Miccoli et al.<sup>25</sup> had 62 patients included in their study but the sample size calculated for our study was in accordance with conventional technique results as the intervention was still in early days before the beginning of our study. Thus from valid studies providing the frequency of nerve injury, such as the above mentioned the deemed sample would have been much larger than the number of patients included in our study.

Newer shears commercially available also saw Bove et al.<sup>27</sup> compare 240 patients in various groups using the two techniques and the use of Ligasure Precise<sup>R</sup> shear. The difference between the shears compared was in favor of Harmonic Focus<sup>R</sup> having the shortest mean operative time and a difference of 10 minutes that was significant. (p=0.019)

In an early meta-analytic study conducted by Cirrochi et al.<sup>29</sup> there is a statistically significant reduction of the operative duration (weighted mean difference [WMD], -18.74 minutes; 95% confidence interval [CI], (-26.97 to -10.52 minutes) (P = 0.00001). (Table 3)

The indications of cases requiring surgery varied widely between studies and in the study performed by Bove et al. a fair share of the pathology proved histopathologically were malignant. In our study only three patients had evidence of malignancy that were still included in the study (5.17%). Those cases that were proved malignant after surgery, a later dated neck dissection had no impact on the outcome of the study.

To no surprise is the fact that reduction in the amount of blood in the drain following 24 hours operated with Harmonic Focus<sup>F</sup> when comparing with figures from earlier discussed studies. In the study by Miccoli et al.

alone 68ml was recorded in the drain at end of 24 hours in the conventional clamp-tie group, not comparable to the 35 ml in the Harmonic Group. (p<0.05) The amount of blood in the drain was slightly greater in our study. The study did not allow the discretion to avoid a drain in selected cases although the argument has dominated many surgeons to selectively use drain when needed<sup>29</sup>.

The frequency of complications was not very different from earlier studies using the new technique<sup>30, 31</sup>. The frequency of nerve injury judged by the fact that 116 nerves were at risk of injury, no nerve was supposedly injured that resulted in hoarseness beyond the 1 month period comparable to the study by Miccoli et al. where it was 1.4% in the Harmonic Focus<sup>R</sup> group.

The frequency of transient hypocalcemia was similar to the statistics portrayed in the meta-analytic study of Corrochi et al. but a fair majority of cases saw improvement over time. Whether it was the better delineation of anatomy or the accurate dissection resulting in hemostasis and selective transection of individual branches is hard to evaluate from the results of this study.

## CONCLUSIONS

The use of ultrasonic dissector is safe and has significantly reduced operative time. The frequency of hypoparathyroidism inferred from hypocalcaemia persisting beyond one month was lower from comparisons as was the amount of blood in the drain at 24 hours.

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#### CONTRIBUTORS

NK conceived the idea, planned and wrote the manuscript of the study. AB helped in the data analysis and write up of the manuscript. MS supervised the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.