Recent Trends in Techniques of Thyroid Surgery

Essay

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List of Abbreviations

Abbr.	Title
ABBA	**A**xillo-bilateral-breast approach
ATC	**A**naplastic thyroid carcinoma
AUS	**A**typia of undetermined significance
BABA	**B**ilateral axillo-breast approach
CT	**C**omputed tomography
DLBCL	**D**iffuse large B-cell lymphoma
eFVPTC	**E**ncapsulated follicular' variant of Papillary Thyroid Carcinoma
FLUS	**F**ollicular lesion of undetermined significance
FN	**F**ollicular neoplasm
FNA	**F**ine-needle aspiration
FOCUS	**F**ocused curved ultra sound
FTC	**F**ollicular thyroid carcinoma
FVPTC	**F**ollicular' variant of Papillary Thyroid Carcinoma
IONM	**I**ntraoperative neuro monitoring
ITA	**T**he inferior thyroid artery
MALT	**M**ucosa-associated lymphoid tissue
MEN	**M**ultiple Endocrine Neoplasia
MIVAT	**M**inimally invasive video-assisted thyroidectomy
MTC	**M**edullary thyroid carcinoma
ND	**N**ondiagnostic
PDC	**P**oorly differentiated thyroid carcinoma
PL	**P**yramidal lobe
PTC	**P**apillary Thyroid Carcinoma

PTL : **P**rimary thyroid lymphoma

RAI : **R**adioactive iodine

RAI-U : **R**adioactive iodine uptake

RLN : **R**ecurrent laryngeal nerve

SFN : **S**uspicious for a follicular neoplasm

STA : **S**uperior thyroid artery

TGD : **T**hyroglossal duct

TRH : **T**hyrotropin-releasing hormone

TSH : **T**hyroid-stimulating hormone

TSI : **T**hyroid stimulating immunoglobulin

UNS : **U**nsatisfactory

VANS : **V**ideo-assisted neck surgery

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Abstract

Background: Thyroid surgery now days became one of the most popular endocrine surgeries, may be due to increase prevalence of thyroid diseases and increase tools of diagnosis by recent imaging and laboratory techniques. Aim of the Work: The aim of this work is to discuss the new techniques and methods used in thyroid surgeries. **Conclusion:** With all these considerations in mind, outpatient thyroidectomy is feasible and safe for the majority of thyroid operations while providing similar health-care cost savings to society as other outpatient operations. It seems reasonable to anticipate increasing utilization of outpatient thyroidectomy by experienced thyroid surgeons in the future. Ultimately, the majority of thyroidectomy procedures will be accomplished in the outpatient setting to the benefit of the patient, hospital, surgeon, insurance company, and society.

Key words: Thyroid, endocrine, outpatient operations, health care, thyroidectomy

Introduction

The history of thyroid surgery starts with Billroth, Kocher and Halsted, who developed the technique for thyroidectomy between 1873 and 1910. In general, the essential objectives for thyroidectomy are conservation of the parathyroid glands, avoidance of injury to the recurrent laryngeal nerve, an accurate hemostasis and an excellent cosmesis. In the last 20 years, major improvements and new technologies have been proposed and applied in thyroid surgery; among these are mini-invasive thyroidectomy, new devices for achieving hemostasis and dissection ***(Dionigi et al., 2010).***

Thyroid surgery involves meticulous devascularization and dissection of the thyroid gland, which has one of the richest blood supplies of all organs, with numerous blood vessels and plexuses entering its parenchyma. Therefore, hemostasis and dissecion are of paramount importance when dividing the various vessels before excising the gland ***(Challa and Surapaneni, 2012).***

Conventional thyroid surgery include clamping and tying of formal thyroid vessels (inferior, middle and superior) using 2/0 absorbable sutures, and in all other vessels absorbable 3/0 sutures were used. Recently, a number of innovative methods of hemostasis in thyroid surgery have

been tested, with. The higher cost of these techniques must be taken into consideration specially in developing countries ***(Koutsoumanis et al., 2011).***

New techniques developed over the past decade include LigaSure diathermy and ultrasonic instrumentation. LigaSure is a bipolar diathermy system that seals vessels with reduced thermal spread. The device has been used successfully in abdominal surgery and has been introduced as a new method for hemostasis during thyroidectomy and has been widely used in diverse fields of surgery for its efficiency and safety ***(Çakabay et al., 2011).***

The FOCUS harmonic scalpel is an ultrasonically activated device that includes shears and a scalpel, thus permitting the surgeon to cut tissues and control blood loss at the same time. The FOCUS Harmonic Scalpel uses high-frequency mechanical energy to cut and coagulate tissues and vessels simultaneously without the need for knot tying ***(Amaral, 2012).***

Use of the LigaSure and FOCUS harmonic scalpel vessel sealing system for thyroid surgery is safe for thyroidectomy. Also there is a decrease in operating time compared to ordinary tie and knot which therefore reducing postoperative pain and there is less incidence of RLN injury due less heat dispersion ***(Siperstein et al., 2012).***

The current standard minimally invasive video-assisted thyroidectomy technique was developed by Miccoli at the University of Pisa and brought to North America by Terris et al. The approach uses endoscopes and endoscopic instrumentation through a 15-20 mm incision ***(Stephen Lai et al., 2013).***

Careful patient selection is required to ensure feasibility of this approach. Recent studies describe decreased postoperative pain, faster recovery, as well as improved cosmetic outcome as compared to conventional surgery, but with increased operative time ***(Bela, 2015).***

With the increasing prevalence of robotic surgery programs, more varied applications for the system have been described. To avoid a neck incision for thyroidectomy, transaxillary approaches have been described and is being used in some centers. As an extension of this approach, a transaxillary approach using the DaVinci robotic system was devised by Miccoli et al. Using a 4-6 cm axillary incision and an 8 mm medial skin incision, the surgeon introduces 4 robotic arms to perform the thyroidectomy and then follows the same steps as a conventional thyroidectomy. Although achieving a better cosmetic result without an incision on the neck, the technique is more invasive with a wider dissection necessary. A total thyroidectomy through a single sided transaxillary incision

provides significant technical difficulties. With the significant expense of using a robotic system, the operation may be cost prohibitive ***(Miccoli et al., 2013).***

Another robot-assisted technique has been described more recently using a traditional postauricular thyridectomy incision. This is described as a single-port technique and has been performed in appropriately selected patients (low body mass index, no previous neck surgery, no significant comorbidities). Lee et al., described a case series with operative times ranging from 97-193 minutes and all but the first patient being performed on in an outpatient setting ***(Lee et al., 2010).***

Aim of the Work

The aim of this work is to discuss the new techniques and methods used in thyroid surgeries.

Chapter (1)
Embryology of thyroid gland

The thyroid is the first endocrine gland to develop in the embryo. It begins to form about 24 days after fertilization from a median endodermal thickening in the floor of the primordial pharynx. This thickening soon forms a small out-pouching 'the thyroid primordium **(fig 1)**. As the embryo and tongue grow, the developing thyroid gland descends in the neck, passing ventral to the developing hyoid bone and laryngeal cartilages. For a short time the thyroid gland is connected to the tongue by a narrow tube, the thyroglossal duct. At first, the thyroid primordium is hollow but it soon becomes solid and divides into right and left lobes connected by the isthmus of the thyroid gland which lies anterior to the developing 2 and 3 tracheal rings. By seven weeks the thyroid assumes its definitive shape and reaches its final site in the neck ***(Moore et al.2013).***

The thyroglossal duct by this time has normally degenerated and disappeared. The proximal opening of the thyroglossal duct persists as a small pit in the tongue the foramen cecum'. A pyramidal lobe extends superiorly from the isthmus in about 50% of people. The pyramidal lobe may be attached to the hyoid bone by fibrous tissue and /or smooth muscle- 'the levator of thyroid gland'. A pyramidal lobe and the associated smooth muscle represent a persistent part of the distal end of the thyroglossal duct ***(Moore et al., 2013).***