



Cryoablation of Goiter Irrespective of Thyroid Profile

Thesis

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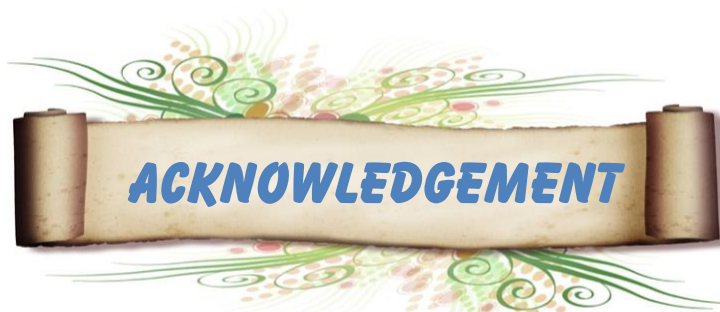
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List of Abbreviations

Abbrev.	Meaning
ACR	: American College of Radiology
ACTH	: Adrenocorticotrophic hormone
ANS	: Autonomic nervous system
ARC	: Anterior retinal cryotherapy
ATA	: American Thyroid Association.
ATC	: Anaplastic Thyroid Cancer
AVNRT	: AV nodal reentrant tachycardia
cryo	: Cryoablation is a process that uses extreme cold
DIT	: Diiodotyrosine
DOMS	: Delayed Onset Muscle Soreness
EBRT	: External beam radiation therapy
FNB	: Fine needle biopsy
FTC	: Follicular Thyroid Cancer
GABA	: γ -aminobutyric acid
HIFU	: High-intensity focused ultrasound

List of Abbreviations

IVB	: Intravitreal bevacizumab
M	: Monoiodotyrosine
MCT	: Monocarboxylate transporter
MEN	: Multiple Endocrine Neoplasia
MTC	: Medullary Thyroid Cancer
NIS	: Sodium-Iodide Symporter
PDR	: Proliferate diabetic retinopathy
PEI	: Percutaneous ethanol injection
POMC	: Pro-opiomelanocortin
PTC	: Papillary Thyroid Cancer
PTU	: Propylthiouracil
RLNs	: Recurrent laryngeal nerves
SVT	: Supraventricular tachycardia
T4	: Thyroxine
T₄	: tetra-iodothyronine
TBG	: Thyroxine-Binding Globulin
TBPA	: Thyroxine-binding prealbumin

List of Abbreviations

Tg	: Thyroglobulin
TPO	: Thyroid peroxidase
TREs	: Thyroid hormone response elements
TRH	: Thyrotropin-releasing hormone
TSH	: Thyroid hormones. serumthyrotropin
TSHr	: Thyroid stimulating hormone receptor
TTR	: Transthyretin
VH	: Vitreous hemorrhage
WBC	: Whole body cryotherapy

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Introduction

Goiter (from the Latin *gutteria*, *struma*) is a swelling of the neck resulting from enlargement of the thyroid gland (thyromegaly). Goitre is treated according to the cause (*Abraham-Nordling, et al., 2005*).

Thyroid gland can be ablated by 4 different procedures, including; medical ablation, surgical removal, radiotherapy & chemical ablation (*Bonnema et al., 2002*).

Antithyroid drugs are believed to work by inhibiting the iodination of thyroglobulin by thyroperoxidase, and, thus, the formation of tetra-iodothyronine (T₄) (*Tunbridge et al., 2007*).

A thyroidectomy is an operation that involves the surgical removal of all or part of the thyroid gland. It is a common surgical procedure that has several potential complications or sequela including: temporary or permanent change in voice, temporary or permanently low calcium, need for lifelong thyroid hormone replacement, bleeding, infection, and the remote possibility of airway obstruction due to bilateral vocal fold paralysis (*Cooper et al., 2006*).

Ablative approaches using radioiodine are increasingly proposed for the treatment of Graves' disease & multinodulargoitre, but their ophthalmologic and biological

autoimmune responses remain controversial and data concerning clinical and biochemical outcomes are limited (*Devereaux et al., 2014*).

Sonographically guided percutaneous ethanol injection for autonomously functioning thyroid nodules was first introduced in 1990 by *Livraghi et al.* The sclerotic mechanism of ethanol is cellular dehydration and protein denaturation in tissue, followed by coagulative necrosis, small vessel thrombosis, hemorrhagic infarct, and reactive fibrosis (*Verde et al., 2004*).

Cryoablation is a process that uses extreme cold (cryo) to destroy or damage tissue (ablation). Cryotherapy is the local or general use of low temperatures in medical therapy. Cryotherapy is used to treat a variety of benign and malignant tissue damage (*Costello et al., 2015*).

Ablation occurs in tissue that has been frozen by at least three mechanisms:

1. Formation of ice crystals within cells thereby disrupting membranes, and interrupting cellular metabolism among other processes;
2. Coagulation of blood thereby interrupting bloodflow to the tissue in turn causing ischemia and cell death; and
3. Induction of apoptosis, the so-called programmed cell death cascade.

(*Storrs & Carina, 2015*)