Propranolol Alone For Preoperative Preparation of Thyrotoxic Patients

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ABSTRACT:

BACKGROUND:

Thyrotoxicosis is a common disease which might require surgery. Thyroidectomy without preoperative preparation exposes the patient to the fatal risk of thyrotoxic crisis. Neomercazole is the standard preoperative regimen. Propranolol might be an ideal alternative.

OBJECTIVE:

This study aims to demonstrate the safety and the convenience of the Beta-blocker propranolol in the preoperative preparation of the thyrotoxic patients.

METHODS:

Over a period from. 1998 to 2006 fifty patients undergoing thyroidectomy for thyrotoxicosis in private and governmental hospitals were preoperatively prepared using propranolol alone.

RESULT:

Propranolol was very rapid in controlling thyrotoxicosis in a dose of 160-480 mg/day. The operative and postoperative periods went on smoothly without any complications.

CONCLUSION:

Propranolol is a cheap, safe and effective in the preoperative preparation of the thyrotoxic patients and might be used as a routine.

KEY WORDS: Thyrotoxicosis, thyroidectomy, neomercazole, propranolol, preoperative preparation.

INTRODUCTION:

Thyrotoxic patients are treated using antithyroid drugs, surgery or radioiodine[1,2,3] Patients requiring thyroidectomy are traditionally preoperatively prepared using the antithyroid drug neomercazole 30-40 mg/day for 8-12 weeks [1, 2, 3].

In Iraq there were periods of lack of neomercazole forcing us to find an alternative method using the Beta-blocker propranolol[4, 5]. In addition some of our patients were noncompliant with the prolonged regular dose neomercazole regimen. Propranolol abolishes the clinical manifestations of thyrotoxicosis by acting on the target tissues [4, 5, 6, 7, 8, 9].

It also inhibits the conversion of T4 to T3 [4, 5, 6, 7, 8, 9].

The idea of using propranolol alone is dated back to 1973. At that time Thomas C Lee et al reported their first 20 thyrotoxic patients preoperatively prepared by propranolol alone([10]). In 1982 Thomas C Lee et al presented their second study of 140 patients prepared by propranolol with some modifications in that they increased the frequency of the doses (4-6 hourly) instead of giving larger doses at less frequent intervals (8 hourly)[(11)].

The favorable result of propranolol preoperative regimen is the subject of this paper.

PATIENTS AND METHODS:

Out of many patients seen at private and governmental hospitals with thyrotoxicosis fifty were selected as candidates for thyroidectomy. The indication for surgery was: Table (1).

Table (1) Indication for surgery

Indications	No. of patients
Large diffuse toxic goiter	37
Toxic multinodular goiter	11
Toxic autonomous nodule	2

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Table (2) Age and sex

Age	No. of patients	Male	Female
11-20	4	1	3
21-30	25	8	17
31-40	14	4	10
41-50	5	2	3
51-60	2	0	2

The diagnosis was made on clinical features, hormonal levels (T3, T4 and TSH), FNAC and ultrasonography.

The pulse rate of the patients ranged 85-124/min. Table (3).

Table (3) Pulse rate

Pulse rate/min.	No. of patients
85-90	3
91-100	21
101-110	17
111-120	8
121-124	1

During the selection process patients with asthma, chronic obstructive airway disease, congestive heart failure and those on psychotropic drugs were not included. Initially all patients were given 40 mg propranolol 6 hourly in the first 24 hour increased to 80 mg 6 hourly in the second 24 hours and finally increased to 80 mg 4 hourly according to the response putting great emphasis on the pulse rate (< 80/min.), the sense of inner tranquility and the improvement of the other features of thyrotoxicosis (Palpitation, tremor, anxiety and sweating). The dose of propranolol needed to control thyrotoxicosis ranged from 160-480 mg/day. Table (4)

Table (4) Dose of propranolol

Propranolol dose mg/day	No. of patients
160	12
320	31
480	7

The last dose of propranolol was given 0-2 hours before surgery. Postoperatively patients were closely observed. Vital signs were monitored at frequent intervals in the first 24 hours. Propranolol was resumed 4-6 hours after surgery. On the third postoperative day the dose was halved, then halved

Tachycardia	50	12	38
Palpitation	45	12	33
Tremor	41	11	29
Anxiety	40	10	27
Sweating	40	10	28

There were no adverse or allergic reactions to propranolol.

Intraoperative period

A variety of medications and gases were used by the anesthetist, however atropine was avoided.

The pulse rate and rhythm were within the range. There were no intraoperative complications. The time of surgery ranged 60-140 min.

Postoperative period

Propranolol resumed within 4-6 hours after surgery. Two of the patients had repeated postoperative vomiting and were unable to take oral medications; they were given slow intravenous propranolol (1 mg in 5 ml saline). Oral propranolol was then resumed after cessation of vomiting.

A slight increase in temperature, pulse rate and systolic blood pressure were noted in the first postoperative day improving afterward.

There was no patient with the manifestation of thyrotoxic crisis. There was no mortality. All patients have been discharged by the end of the fourth postoperative day. No complication was noted after tapering and discontinuation of propranolol.

DISCUSSION:

The standard preoperative preparation of the thyrotoxic patient depends on the use of the antithyroid drug neomercazole in a dose of 30-40 mg/day for 8-12 weeks [1, 2, and 3]. This drug inhibits thyroid hormone synthesis and converts the hyperthyroid to euthyroid state, which have to be confirmed by repeating the thyroid function tests (T3, T4 and TSH) [1, 2, 3, 4, 5, 6, 7, 8, 9].

Propranolol a Beta-adrenergic blocking agent has been used alone successfully in the preparation of these patients. Propranolol acts on target tissues blocking the Beta-receptors and by interfering with the conversion of T4 to T3 [4, 5, 6, 7, 8, 9].

Advantages of propranolol

1. Prompt onset of action allows great flexibility in the timing of surgery.

2. In situations were the patients are unable to swallow an intravenous propranolol is available.

3. In a cost-conscious economy, this drug combined with surgery is the most cost effective form of definitive treatment for thyrotoxic patients.

Disadvantages of propranolol

1. Propranolol have a short half life, and therefore must be taken every 4-6 hours, otherwise the patient might escape the beneficial effect and is exposed to the risk of thyrotoxic crisis [9,12, 13, 14].

2. Propranolol cannot be used in bronchial asthma, congestive heart failure, insulin dependent diabetes and patients on psychotropic agents [13, 14].

3. Some patients might fail to respond to propranolol. One patient not included in this series was totall unresponsive. There is no explanation for th phenomenon but in general it has been found that younger patients require higher doses [14].

Anesthesia and propranolol

Atropine was not used as a pre-medication. Halothane obviates the need for atropine. Intravenous atropine 0.4-1.0 mg can be reserved for elective use during surgery to correct any significant bradycardia that may develop and not respond to a decrease in halothane concentration.

Thyroid crisis

None of our patients develop thyroid crisis. Patients with postoperative fever and tachycardia poorly responding to an increasing dose of propranolol are usually suffering from atelactasis or intercurrent infection.

CONCLUSION:

Propranolol is a cheap, quick, safe and effective in the preoperative preparation of the thyrotoxic patients.

REFERENCES:

1. R.C.G. Russel Norman S.Williams and Christopher J.K Bulstrode, Bailey and Love's Short Practice of Surgery, 24th edition, Arnold, London, 2004: 789-797.

2. Geeta Lal and Orlo H. Clark, Schwartz Principles of Surgery, 8th Edition, McGrow-Hill, New York, 2005: 1406-1410.

3. Becker DV, Choice of Therapy for Grave's Hyperthyroidism (Editorial). N. Engl. J Med, 1984, 311: 464-5.

4. Klein I, Trzepacz P, Roberts M, Levey GS. Symptom rating scale for assessing hyperthyroidism. Arch Intern Med. 1988; 148:387-90.

5. Geffner, DL, Hershman, JM. ß-adrenergic blockade for the treatment of hyperthyroidism. Am J Med 1992; 93:61.

6. Ganong WF, Review of Medical Physiology, 18th Edition, Appleton and Lange. Stamford, 1997: 302-311.

7. Laurence DR, Bennett PN, Clinical Pharmacology, 6th Edition, Churchill Livingston, Edinburgh, 1987: 497-503.

8. Laurence DR, Bennett PN, Clinical Pharmacology, 6th Edition, Churchill Livingston, Edinburgh, 1987: 683-691.

9. Revnold James EF, Parfitt K, Parsons AV et al; rtindale, the extrapharmacopia, 30th Edition; Pharmaceutical Press; London, 1993: 638-640.

10. Lee TC, Coffey R, Mackin J et al, The use of Propranolol in the surgical treatment of thyrotoxic patient, Ann. Surg., 1973, 177: 643-647.

11. Lee TC, Coffey R, Currier B et al, Ann. Surg., 1982, 195: 766-773.

12. Amundson DE, Brtodine SK (1998). Fatal case of Propranolol poisoning. Drug Intell Clin Pharm, 22: 781-782.

13. Brimacombe JR, Scully M, Swainston R (1991).

Propranolol overdose- A dramatic response to calcium chloride, Med. J Aust, 155: 267-268.

14. Elkharrat D, Bismuth CH (1982). Acute intoxication by Beta-blocking agent; no mortality in 40 cases, Int J Clin Pharm Res, 2: 207-210.