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Alterations in Thyroid Hormones, Cortisol, and Catecholamine Concentration in Patients after Orthopedic Surgery

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Changes in serum and plasma concentrations of thyroid hormones, cortisol, and catecholamines were measured simultaneously in 16 patients undergoing major elective orthopedic surgery. Blood samples were collected preoperatively and at 2, 6, 24, 48, 96, and 168 hr after surgery. A significant decrease in TT_3 and FT_3 and an increase in rT_3 were noted after surgery. TT_4 started to decrease 48 hr after surgery whereas FT_4 showed no significant change over the same period of time. The concentration of TSH fell progressively after surgery reaching a nadir by Day 7. The concentrations of cortisol were increased markedly throughout the course after surgery. Adrenaline and noradrenaline levels were increased markedly during the first 24 hr postsurgery. Both the thyroglobulin and TBG together with albumin concentration values were decreased after surgery as compared to preoperative values. It is concluded that the changes in thyroid hormone levels after major elective orthopedic surgery seem to be independent of changes in plasma catecholamines and/or cortisol concentrations.

INTRODUCTION

It is well established that alterations of serum thyroidal indices frequently occur in a variety of stressful events such as elective or acute surgery [1–8], thermal injury [9, 10], severe illness (e.g., [11, 12]) or hemorrhagic shock [13] in individuals who are previously euthyroid. The serum levels of total T_3 (TT_3) and free T_3(FT_3) have been found to decrease and that of reverse T_3 (rT_3) to concomitantly increase postsurgery. Although the effect of trauma on TT_3 and FT_3 concentrations is well documented, there are conflicting reports on the effects of trauma on total T_4(TT_4), free T4 (FT4), and thyrotropohin (TSH) [4, 5, 7, 14–16]. Moreover, there are few reports of the relationship of thyroid hormones to changes in TSH, cortisol, and catecholamine after orthopedic surgery. In severely thermally injured patients, Becker *et al.* [9] showed that there exists an inverse correlation between TT_3 and catecholamine concentrations (namely, adrenaline and noradrenaline); however, such a reciprocal relationship was not present during the moderate hypermetabolism after abdominal surgery [8]. Whether this reciprocal relationship between thyroid hormones and catecholamine concentrations exists during major orthopedic surgery or not is unknown.

The present work describes the sequential evaluation of serum thyroid hormone levels in relation to changes in cortisol and catecholamine concentrations in patients after major orthopedic surgery.

PATIENTS AND METHODS

Patients

Sixteen patients who were admitted for elective major orthopedic surgery participated in the present study. The clinical details of patients are given in Table 1. All patients were healthy except for their orthopedic problem and none received hormonal therapy. Informed written consent was obtained from all the patients who participated in the present study. All patients were in a postabsorptive state after an overnight fast. They were subjected to inhalation anesthesia with flouthane, nitrous oxide, and oxygen. The postoperative course was uneventful in all patients.

All operations started between 08:00 and 09:00 hours. Mean duration of surgery was 105 min (range 40–180 min). Patients received only isotonic saline and no calories during the first 24-postoperative hours.

Venous blood samples were obtained 30 min before anaesthesia and 2, 6, and 24 hr after skin incision. Further samples were collected at 48, 96, and 168 hr after skin incision (08:00–10:00 hours). Thyroid hormones, cortisol, TSH, adrenaline, and noradrenaline concen-

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