Truncal Ligation of the Inferior Thyroid Arteries does not Affect the Incidence of Hypocalcaemia after Thyroidectomy

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ABSTRACT

Objective: To assess the effect of truncal ligation of the inferior thyroid arteries during bilateral subtotal thyroidectomy on the incidence of hypocalcaemia after thyroidectomy.

Design: Prospective non-randomised study.

Setting: Teaching hospital, Turkey.

Subjects: 216 patients who had bilateral subtotal thyroidectomy for non-toxic nodular goitre between 1990 and 1996.

Interventions: The trunk of the each inferior thyroid artery was simply ligated during bilateral subtotal thyroidectomy.

Main outcome measures: Clinical examination, and measurement of serum calcium, ionised calcium, and inorganic phosphate concentrations before and after operation.

Results: Four patients (2%) had low concentrations of total and ionised calcium during the postoperative period. On physical examination three of them had spasms of the facial nerve, as seen in tetany. They were given calcium supplements orally and their laboratory results returned to reference ranges within 180 days. No patients developed permanent hypocalcaemia.

Conclusion: Truncal ligation of the inferior thyroid arteries during bilateral subtotal thyroidectomy has no effect on the incidence of hypocalcaemia after thyroidectomy.

Key words: thyroid surgery, post-thyroidectomy hypocalcaemia.

INTRODUCTION

Hypocalcaemia after thyroidectomy is a rare complication and mainly depends on the operation done and the underlying thyroid disease (13, 14). Permanent hypoparathyroidism can occur in 1%–5% of patients after bilateral subtotal resection, and its incidence is higher after total thyroidectomy (8, 9). There are discrepancies among series regarding the incidence of transient symptomatic hypocalcaemia and rates of up to 20%–83% have been reported by many investigators (14). It has been suggested that truncal ligation of the inferior thyroid arteries might be responsible for hypocalcaemia after thyroidectomy but there is still controversy among this.

We therefore organised a prospective study to assess the effect of truncal ligation of the inferior thyroid arteries during bilateral subtotal thyroidectomy on the incidence of hypocalcaemia after thyroidectomy.

PATIENTS AND METHODS

We studied 216 patients who required bilateral subtotal thyroidectomy for non-toxic nodular goitre in the 4th Department of General Surgery, Ankara Numune Hospital between 1990 and 1996. To obtain a homogeneous group, those having unilateral thyroidectomy, total thyroidectomy, or unilateral ligation of the inferior thyroid artery, were not included and only cases of bilateral subtotal thyroidectomy for non-toxic multinodular goitre were studied. During the study period 193 women and 23 men were operated on; their ages ranged from 13–75 years (mean 38). Bilateral subtotal thyroidectomy was done by a standard technique; each superior thyroid vascular pedicle was divided between ligatures, and the trunk of each inferior thyroid artery was simply ligated. The posterior capsule of the lobes and the parathyroids were preserved in situ. On each side a 4–6 g remnant of thyroid tissue was left in place. In each patient, serum calcium, ionised calcium, and inorganic phosphate concentrations were measured before the operation and on the third postoperative day. The patients were also assessed for clinical signs and symptoms of hypocalcaemia during the postoperative period. The normal range of serum ionised calcium was 1.05–1.25 mmol/L. Transient symptomatic hypocalcaemia was defined as a serum ionised calcium concentration of less than 1.05 mmol/L associated with symptoms that resolved with treatment within 180 days. Patients with perma-
nent hypocalcaemia were those who required continuous treatment lasting longer than 180 days.

RESULTS

There were no differences in intraoperative blood loss, operating time, and the weight of the remnant thyroid tissue. All the preoperative serum calcium, ionised calcium and inorganic phosphate concentrations were within the reference ranges. Four patients (2%) had low concentrations of total and ionised calcium postoperatively. On physical examination three had spasms of the facial nerve similar to those seen in patients with tetany. Clinical hypocalcaemia developed on the second postoperative day in one patient and on the third postoperative day in two. One patient seemed hypocalcaemic on testing but no clinical signs or symptoms developed and she was not treated. By the 15th postoperative day, her laboratory results had returned to the reference range. Oral calcium supplementation was given to the three patients with clinical signs, and their laboratory results returned to the reference range within 180 days; it was therefore accepted that they had had transient hypocalcaemia. No case of permanent hypocalcaemia was found.

DISCUSSION

Permanent or transient hypoparathyroidism is a well known complication of total thyroidectomy, and excision of the parathyroids and vascular insufficiency are the main causes (3, 4, 12). During subtotal thyroidectomy, the risk of iatrogenic parathyroid excision is low and it has been suggested that ligation of the inferior thyroid arteries might be responsible for vascular insufficiency of the parathyroids that leads to infarction of the tissue. Halsted and Evans (7) showed that parathyroid arteries are the end arteries arising from the inferior thyroid artery, and to preserve parathyroid circulation, the inferior thyroid arteries should not be ligated during thyroid surgery. However Curtis (6) showed that anastomotic branches between the parathyroid arteries and the thyroid remnant could be enough to preserve tissue perfusion. Wade et al. (13) suggested that there would be no risk to parathyroid tissue from ligating the trunk of the inferior thyroid arteries. They also suggested that if the inferior thyroid arteries were not ligated, the increased vascularity of the thyroid remnants would demand more extensive haemostasis, and the risk of damage to the parathyroid blood supply would be increased. This is particularly important if the patient has a large goitre. Non-toxic goitres are endemic in Turkey and most patients come to clinicians with considerably enlarged goitres. We usually do thyroidectomies for symptoms related to compression of neck structures or for cosmetic reasons. In our series, bilateral subtotal thyroidectomy for non-toxic and benign goitres makes up 82% of all thyroidectomies. We excluded thyroid malignancies and toxic goitres. We think that identification of all parathyroids and meticulous surgical technique to preserve the parathyroid circulation is essential during total thyroidectomy. We also preserve the parathyroid branches of the inferior thyroid artery. The “hungry-bone” phenomenon in Graves’ disease may interfere with our results, and we also excluded these cases from the study. Bleeding is a relatively common complication in such large goitres both peroperatively and postoperatively. Truncal ligation of the inferior thyroid arteries results in a more or less bloodless field and it becomes easier to dissect the parathyroids from thyroid gland.

Nies et al. (11) and Çakmakli et al. (5) concluded that truncal ligation of the inferior thyroid arteries during bilateral subtotal thyroidectomy for non-toxic nodular goitre did not cause an increased risk of postoperative hypoparathyroidism. These clinical experiences were supported by three recent studies using laser Doppler flowmetry (1, 2, 10). In these studies blood supplies to the parathyroids other than the inferior thyroid artery were found to be equal to or in some cases even more important than that from the inferior thyroid artery. The authors found that the vessels within the thymothyroid cord and in the connective tissue between the parathyroid glands and the thyroid lobe were the other routes that supplied sufficient blood to the parathyroids to maintain their viability.

In our study only three patients (1%) had transient symptomatic hypocalcaemia and no patients developed permanent hypocalcaemia.

Our results suggest that truncal ligation of the inferior thyroid arteries during bilateral subtotal thyroidectomy has no effect on the incidence of hypocalcaemia after thyroidectomy. The inferior thyroid arteries could be ligated trunkally to obtain a bloodless field during operation particularly for larger goitres and could reduce bleeding complications postoperatively without disturbing the parathyroid circulation.

REFERENCES


Submitted March 15, 1999; submitted after revision August 3, 1999; accepted August 31, 1999

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