Thyroid surgery as a 23-hour stay procedure

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ABSTRACT

INTRODUCTION The main barriers to short stay thyroidectomy are haemorrhage, bilateral recurrent laryngeal nerve palsy causing respiratory compromise and hypocalcaemia. This study assessed the safety and effectiveness of thyroidectomy as a 23-hour stay procedure.

METHODS All patients undergoing total or completion thyroidectomy were prescribed calcium and vitamin D₃ supplements following surgery. Retrospective analysis identified patients admitted for longer than 23 hours and any readmissions.

RESULTS A total of 164 patients were admitted for 23-hour stay thyroid surgery over a 25-month period between 2008 and 2010. Four patients (2%) required admission for longer than 23 hours. No patients required emergency intervention for postoperative haemorrhage or airway compromise. Biochemical hypocalcaemia (despite calcium supplements) was detected in one patient when measured at the outpatient clinic two weeks following surgery. Twelve patients (7.3%) attended the accident and emergency department following discharge; four required admission for intravenous antibiotics for wound infection and one for biochemical hypocalcaemia.

CONCLUSIONS This single centre UK experience demonstrates that thyroidectomy can be carried out both safely and effectively as a 23-hour stay procedure. Prophylactic prescription of calcium and vitamin D₃ reduces hypocalcaemia, and thereby also prolonged admission and readmission due to hypocalcaemia. Supplements are an acceptable, cost effective method of reducing hypocalcaemia and shortening postoperative length of stay.

KEYWORDS

Thyroidectomy – Hypocalcaemia – Postoperative complications – Day surgery

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Thyroidectomy has traditionally been performed as an inpatient procedure owing to the risk of haemorrhage, hypocalcaemia and airway compromise. Complications of first-time thyroid surgery as reported by the fourth national audit report of the British Association of Endocrine and Thyroid Surgeons (BAETS) include postoperative hypocalcaemia (10.8%), long-term hypocalcaemia (6.1%), proven recurrent laryngeal nerve palsy (1.8%) and reoperation for haemorrhage (1.0%).¹ For 'redo' thyroid surgery, the postoperative hypocalcaemia rate is 15.2%, with a long-term hypocalcaemia rate of 11.9%. It is therefore apparent that hypocalcaemia is the most common morbidity associated with thyroid surgery. Hypocalcaemia may develop following thyroidectomy as a result of damage to the parathyroid glands caused by manipulation during surgery, devascularisation or inadvertent excision and hungry bone syndrome.

In 1999 the British Association of Day Surgery recommended partial thyroidectomy as one of 17 major procedures that can be performed as a day case.² Several studies, the majority from North America, have concluded that day-case thyroidectomy is a safe and cost effective procedure.^{3–5} In the UK, the current median postoperative length of stay following total thyroidectomy is 2 days.¹ True

day surgery with no overnight stay has only increased from 3% in 2007 to 6% in 2012.¹

This study was undertaken to assess the safety and effectiveness of thyroid surgery as a short stay procedure. Short stay or 23-hour stay surgery was defined as surgery where the patient is discharged within 23 hours of the procedure while true day surgery patients are discharged the same day as the procedure with no overnight stay.

Methods

Initial study

Thyroid surgery was reviewed retrospectively at our unit over a seven-year period from 1996 to 2005 as part of an initial study investigating the relationship between length of stay and postoperative hypocalcaemia. Biochemical hypocalcaemia was defined as a corrected serum calcium level below 2.0mmol/l.

Second study

As a result of the findings of the initial study, all patients undergoing total or completion thyroidectomy were routinely prescribed prophylactic calcium and vitamin D₃ supplements

postoperatively to reduce hypocalcaemia. Two tablets of calcium carbonate/colecalciferol (calcium carbonate: 1,500mg equivalent to 600mg of elemental calcium, colecalciferol: 400iu equivalent to 10µg vitamin D₃ per tablet) were administered three times per day. Vitamin D was supplemented as it has been shown that deficiency correlates with a higher likelihood of low serum calcium and delay in discharge following total thyroidectomy.^{6,7} It has been demonstrated that vitamin D₃ supplements do not inhibit function of normal parathyroid glands.⁷⁻⁹ If the serum calcium level was within normal range at the outpatient appointment two weeks after discharge, the supplements were stopped, thereby preventing the risk of overtreatment and hypercalcaemia related complications. This practice was studied retrospectively over a 17-month period from September 2005 to January 2007.

Current study

Our unit began performing all thyroid surgery including total thyroidectomy as 23-hour stay procedures in 2007. Patient selection for 23-hour surgery is based on day surgery guidelines.¹⁰ Exclusions for short stay thyroidectomy include patients requiring admission for medical reasons, large thyroid carcinomas, lateral lymph node dissection and large retrosternal goitres. Preoperative preparation is vital in ensuring patients are fit for the procedure. This includes information on the short stay experience to ensure patients understand their likely postoperative course and are ready for discharge within 23 hours of the procedure. Patients are admitted to a dedicated short stay unit with appropriately trained personnel on the morning of their surgery.

All patients undergoing total or completion thyroidectomy are routinely prescribed calcium and vitamin D₃ supplements postoperatively. Patients are discharged within 23 hours of the procedure following medical review the next morning if they meet the following discharge criteria: drains removed, stable wound and airway, normal observations, ambulatory, tolerating oral intake, pain controlled with oral analgesia and responsible adult at home. Data were collected retrospectively over a 25-month period between September 2008 and October 2010. The principal outcome measure was length of hospital stay. The number of patients requiring prolonged admission and the reasons for delayed discharge were analysed. The serum calcium level measured at the outpatient appointment two weeks postoperatively was recorded. Details of accident and emergency department attendances and readmissions were obtained as a secondary outcome measure.

Results

Initial study

Sixty-two patients were included in the initial study: 76% had total thyroidectomy and 24% had subtotal procedures. Postoperatively, 37% had biochemical hypocalcaemia. Results revealed the length of stay was inversely proportional to the postoperative serum calcium level (Fig 1) and the median length of stay was greatest when the serum calcium level was <1.85mmol/l (Fig 2). The median stay

Figure 1 Relationship between length of hospital stay and postoperative serum calcium level

for the entire group was 4 days, with 3 days for normocalcaemic patients and 7 days for hypocalcaemic patients. Patient age had no correlation with length of stay or postoperative serum calcium level and was therefore not a confounding factor.

Second study

Twenty-five total thyroidectomies were analysed. All patients received postoperative supplements and 32% had biochemical hypocalcaemia but were asymptomatic. As a result of the prophylactic supplements, the hypocalcaemia group had a shorter median stay of 3.5 days compared with 7 days in the initial study. It was therefore apparent that postoperative supplemental calcium and vitamin D₃ should be administered following thyroidectomy if 23-hour surgery is to be undertaken.

Current study

During the study period, 164 patients underwent thyroid surgery and were suitable for a 23-hour stay procedure. There was a female preponderance (n=133, 81%). Operations performed included 101 thyroid lobectomies (62%), 40 total thyroidectomies (24%) and 19 completion thyroidectomies (12%) as well as debulking of the thyroid in two cases,

Figure 2 Number of patients and median length of hospital stay for different serum calcium levels

removal of ectopic thyroid tissue in one case and excision of a thyroid cyst in one case. Histology included 57 carcinoma cases (35 papillary, 13 follicular and 9 medullary/other carcinoma), 49 benign solitary nodule cases, 35 multinodular goitre cases, 16 Graves’ disease cases and 7 thyroiditis cases.

Four patients (2%) required admission for longer than twenty-three hours. Two patients were admitted for hypotension and a high drain output treated with intravenous fluids; no surgical intervention was required. One patient was admitted for chest pain that was diagnosed subsequently as being musculoskeletal in origin. One patient undergoing a total thyroidectomy was not prescribed calcium supplements in error. She experienced symptoms of hypocalcaemia despite a corrected serum calcium level of 2.02mmol/l, which was just above our threshold for diagnosis of biochemical hypocalcaemia. The symptoms resolved with oral calcium and vitamin D₃, and she was discharged the following day with no further complications. There were no mortalities and no patients required emergency intervention for postoperative haemorrhage or airway compromise.

Of the 59 total or completion procedures, 46 (78%) had serum calcium levels measured at the 2-week outpatient appointment and compliance with this protocol improved as the study progressed. Biochemical hypocalcaemia despite calcium supplements was only detected in one patient (corrected serum calcium level: 1.93mmol/l). The mean corrected serum calcium level was 2.27mmol/l (range: 1.93–2.57mmol/l). To our knowledge, no patients suffered any symptomatic side effects of hypercalcaemia as a result of routine prophylactic supplementation.

Twelve patients (7%) attended the accident and emergency department following discharge. The reason for attendance and management of each case is outlined in Table 1. No patients attended with symptoms of haemorrhage or airway compromise and only one patient (0.6%) presented with biochemical hypocalcaemia despite calcium supplements.

Continuing with the protocol described and incorporating a selective drain usage policy instead of routine use, new results for first-time lobectomy during the period July 2009 to June 2012 have demonstrated 97% of patients are discharged within 23 hours of surgery (unpublished data from an audit by BAETS). This is above the national average, which is less than 80%, and it is coupled with a low readmission rate, which is below the national average of 2.1%.

Discussion

There are several advantages of day surgery including reduced waiting times, a perceived decrease in infection risk, a better environment for recovery at home with the psychological benefit of avoiding hospitalisation, financial savings for National Health Service trusts and patient preference. In the UK, avoiding inpatient admission accounts for a cost saving of £350 per night in a typical South of England district general hospital to £430 per night in a London university hospital.¹¹ The three main barriers to day-case thyroidectomy are postoperative haemorrhage with potential airway compression, bilateral recurrent laryngeal nerve (RLN) palsy leading to respiratory compromise and hypocalcaemia.

Table 1 Accident and emergency department attendances following discharge and management employed in each case					
Patient number	Reason for A&E attendance	Postoperative day	Management	Reattendance to A&E	Management
1	Wound swelling	2	Discharge (oral antibiotics)	No	
2	Wound infection	3	Admit (oral antibiotics)	No	
3	Chest pain	3	Discharge (no medical cause)	Yes (wound infection)	Admit (for IV antibiotics)
4	Wound swelling	4	Discharge	Yes (wound swelling)	Discharge
5	Paraesthesia (despite calcium supplements)	4	Admit (IV and oral calcium treatment)	No	
6	Wound swelling	6	Admit (oral antibiotics)	No	
7	Wound infection	8	Discharge (oral antibiotics)	No	
8	Shortness of breath	8	Discharge (no medical cause)	No	
9	Wound infection	11	Discharge (oral antibiotics)	No	
10	Paraesthesia (despite calcium supplements)	14	Discharge (serum calcium 2.11mmol/l)	No	
11	Wound infection	14	Admit (IV antibiotics)	No	
12	Wound infection	18	Admit (IV antibiotics)	No	
A&E = accident and emergency; IV = intravenous					

A study from the Mayo Clinic showed that after 7,921 thyroidectomies, 21 patients (0.3%) required evacuation of a haematoma following surgery.¹² Haemorrhage occurred within 6 hours of surgery in 43% of cases and in over 24 hours in only 19%. Another study reported that of 3,086 cases, 22 (0.7%) developed a haematoma that required surgical exploration.¹³ Sixteen patients (72.7%) developed a haematoma within six hours and six patients (27.3%) between six and twenty-four hours, thereby demonstrating that bleeding is rare and recognised early in cases that require surgical intervention.

The most common cause of reduced vocal cord mobility following thyroidectomy is RLN neurapraxia, which is expected to recover within several weeks. The incidence of neurapraxia is as high as 10% but that of permanent RLN injury should be under 1%.¹⁴ A unilateral nerve injury causing postoperative hoarseness would not normally require inpatient stay. Bilateral nerve paralysis is extremely rare with an incidence of 0.2%.¹⁴ It is life threatening and would be apparent immediately following surgery.

Temporary hypocalcaemia is relatively common, the incidence ranging from 27% to 35%.^{1,15} Risk factors identified through multivariate analysis include raised preoperative thyroxine level, thyroid cancer and retrosternal thyroid extension.¹⁶ Postoperative hypocalcaemia occurs 12–72 hours following surgery and temporary hypocalcaemia can be mitigated by the use of oral supplements.⁵ Supplements can also reduce readmission rates due to temporary hypocalcaemia as temporary hypocalcaemia generally resolves within a few days and calcium levels are within normal range at two weeks. There has been a recent move towards routine use of supplements, which has led to a reported reduction in the incidence and severity of hypocalcaemia.^{17,18}

Supplements will not prevent hypocalcaemia as a result of severe parathyroid damage, ischaemia or inadvertent excision and calcium levels will remain low at the two-week check despite supplements. In this instance, supplements are continued with the addition of alfacalcidol, a stronger vitamin D analogue. A diagnosis of permanent hypocalcaemia is usually made six months postoperatively if serum calcium levels remain low. A 2012 study from the US demonstrated that calcium supplementation is considerably less expensive than either the cost of overnight admission or adhering to published laboratory protocols designed to predict risk of hypocalcaemia, and that it is a safe and cost effective method of preventing hypocalcaemia.¹⁹

Several large studies have demonstrated that thyroidectomy can be carried out both safely and effectively as a day procedure. Seybt and Terris had 208 same-day discharges (49.8%) and 210 patients (50.2%) admitted for a mean of 1.8 days.⁴ Twenty-seven patients (12.3%) had transient hypocalcaemia, which included fourteen readmissions for treatment. Snyder *et al* performed 1,063 cases (94%) as an outpatient procedure as planned, where 14% were found to be hypocalcaemic in total, with 5% of patients symptomatic and hospital admission for treatment required in 14%.⁵ A UK review article on the risks following thyroidectomy published in 2012 concluded that as nearly all of the significant post-thyroidectomy bleeds occur within 24 hours of surgery,

a target of 23-hour surgery with overnight hospital admission should be an achievable and safe compromise,²⁰ and the 2011 BAETS consensus statement on day-case thyroidectomy concluded that it is feasible.¹¹

True day surgery requires thorough preoperative assessment to ensure the patient is suitable and understands the likely postoperative course. Performing thyroidectomy on a morning list, the routine avoidance of drains and postoperative recovery provided in a dedicated day unit with trained staff will contribute towards achieving this goal in a carefully selected cohort of patients. This is performed widely in the US but represents only around 6% of cases performed in the UK.¹

Conclusions

Our study is a UK-based single centre experience of 23-hour stay thyroidectomy. It has demonstrated that thyroid surgery can be carried out both safely and effectively as a 23-hour stay procedure, with provisions in place to admit the patient for longer if medically indicated. Hypocalcaemia is a common complication and has previously been a barrier to ambulatory thyroidectomy. Prophylactic prescription of calcium and vitamin D₃ supplements reduces the risk of symptomatic or biochemically diagnosed hypocalcaemia as well as the risk of admission for more than 24 hours and also of readmission with hypocalcaemia related complications.

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