

Analysis of safety of short-stay thyroid surgery

Esperienza di chirurgia tiroidea in one-day surgery

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SUMMARY

The duration of hospital stay, following surgical procedures, has undergone a significant reduction in recent years. However, there are some risks associated with short-stay thyroid surgery. An analysis has been made of data from patients who underwent short-stay thyroid surgery, analyzing the complications associated with this procedure. Overall 270 consecutive patients undergoing thyroidectomy in 2007 and 2008 were prospectively analyzed. Post-operative care included routine ward overnight observation. The discharge criteria were: stable vital signs; afebrile; no wound or airway problems; tolerating diet; and established autonomy at discharge. Data were collected regarding patients' discharge criteria status, length of hospital stay and readmission, as well as morbidity (post-operative haemorrhage, recurrent laryngeal nerve injury and hypocalcaemia) and mortality. This series comprised 175 total thyroidectomies, 93 hemi-thyroidectomies and 2 isthmusectomies. No cases of death or post-operative haemorrhage occurred in any of these patients. Permanent unilateral recurrent laryngeal nerve injury was observed in 4 patients (1.48%). Transient post-operative hypocalcaemia occurred in 23 patients, whereas permanent post-operative hypocalcaemia was observed in 8 patients (2.96%); 4 patients were re-admitted and required early calcium supplementation. Five patients failed to tolerate the diet during the immediate post-operative period. The average duration of hospital stay was 1.02 days. Considering the 4 patients who required re-admission due to hypocalcaemia, the total length of hospital stay was 1.05 days. In conclusion, the one-day surgery model is safe and effective in patients undergoing surgery for thyroid disorders.

KEY WORDS: Thyroidectomy • Length of hospital stay • Post-operative complications • Post-operative haemorrhage • Hypocalcaemia • Post-operative pain

RIASSUNTO

La durata dell'ospedalizzazione dopo interventi chirurgici ha subito in questi ultimi anni una significativa riduzione, sebbene ci siano alcuni rischi associati ad una ospedalizzazione breve dopo chirurgia tiroidea. È stata realizzata un'analisi dei dati relativi a pazienti che hanno avuto una ospedalizzazione breve dopo interventi chirurgici alla tiroide, analizzando le complicanze ad essa associate. Sono stati analizzati prospettivamente 270 pazienti sottoposti consecutivamente a tiroidectomia negli anni 2007 e 2008. L'assistenza postoperatoria includeva la permanenza notturna di routine in reparto. I criteri di dimissione erano: stabili segni vitali; assenza di febbre; nessun problema alla ferita o alle vie respiratorie; tolleranza al regime alimentare; stabilita autonomia alla dimissione. I dati erano raccolti considerando i criteri di dimissione dei pazienti, la durata dell'ospedalizzazione e della riammissione, così come la morbidità (emorragia postoperatoria, lesione del nervo laringeo ricorrente e ipocalcemia) e la mortalità. Questa serie comprendeva 175 tiroidectomie totali, 93 emitiroidectomie e 2 istmectomie. Non si sono verificati casi di morte o di emorragia postoperatoria in nessuno di questi pazienti. In 4 pazienti (1,48%) è stato osservato un danno permanente unilaterale al nervo laringeo ricorrente. In 23 pazienti c'è stata una ipocalcemia postoperatoria transitoria, mentre in 8 pazienti (2,96%) è stata osservata una ipocalcemia postoperatoria permanente; 4 pazienti sono stati nuovamente ospedalizzati e hanno necessitato di una rapida somministrazione di calcio. 5 pazienti non sono riusciti a tollerare la dieta durante l'immediato periodo postoperatorio. La durata media dell'ospedalizzazione è stata di 1,02 giorni. Considerando i 4 pazienti che hanno richiesto la riospedalizzazione a causa dell'ipocalcemia, la durata totale è stata di 1,05 giorni. In conclusione il modello di one-day surgery è sicuro ed efficace nei pazienti sottoposti a chirurgia tiroidea.

PAROLE CHIAVE: Tiroidectomia • Durata dell'ospedalizzazione • Complicanze postoperatorie • Emorragia postoperatoria • Ipocalcemia • Dolore postoperatorio

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Introduction

The duration of hospital stay, following surgical procedures, has decreased significantly in recent years¹. Traditionally, patients undergoing thyroid surgery are observed for up to 72 h before discharge². During the last 10 years, short-stay thyroid surgery (< 24 h hospital stay) has been

performed and reported in the literature as safe and cost-effective²⁻⁶.

The benefits of this practice include reduced costs, reduced in-patient waiting lists, increased availability of in-patient beds, reduced post-operative complications and the psychological benefit of avoiding prolonged hospitalization¹.

However, there are some risks associated with short-stay thyroid surgery and it must be thoroughly addressed to guarantee patient safety. The complications related to thyroid surgery include hypocalcaemia, bleeding and haematoma formation, recurrent laryngeal nerve injury, superior laryngeal nerve injury, dysphagia, wound infection, poor wound healing, impossibility to urinate and pain⁷.

Aim of this study was to review the data of patients who underwent short-stay thyroid surgery in our Department, analysing the complications associated with this procedure.

Methods

All patients scheduled for thyroidectomy were admitted for same-day surgery. All patients underwent partial or total thyroidectomy under general anaesthesia. Thyroidectomy consisted of either the traditional operation through standard cervicotomy or the minimally invasive video-assisted approach. Suction or Penrose drains were routinely placed. Post-operative care included routine overnight ward observation. Patients were administered antiemetic agents in the operating room. Diets were advanced, as tolerated, during the immediate post-operative day. Post-operative laboratory values were not collected after operation as routine. All patients were evaluated the same evening and the next morning according to the following discharge criteria: stable vital signs; afebrile; no wound or airway problems; tolerating diet; and established autonomy at discharge, possession of a telephone, suitable home accommodation and adequate home support upon discharge. Patients not meeting these criteria remained in hospital. All patients and relatives received extensive written and verbal pre-operative and post-operative instructions as well as clear information and explanations in the hospital, delivered by the multidisciplinary team of surgeons and nurses, including risks and benefits associated with shortening of hospital stay, wound management, post-operative pain, and signs and symptoms associated with possible complications. Discharged patients were asked to keep the team informed about any discomfort occurring at home.

Regional advanced malignancies, with presence of metastases in the lateral compartment, were considered exclusion criteria. Sub-sternal goitre cases, the diagnosis of which was obtained during the pre-operative evaluation by chest X-rays and/or computed tomography (CT) scan, were not excluded.

A total of 270 consecutive patients (212 (78.5%) female, 58 (21.5%) male; mean age 47 years; range: 10-77 years;) undergoing thyroidectomy, in 2007 and 2008, at Ana Costa Hospital and Irmandade da Santa Casa da Misericórdia de Santos, Santos, Brazil, were included in this prospective analysis.

Pre-admission clinic enrollment allowed assessment of

pre-operative laboratory values for serum ionic calcium and recorded videolaryngoscopic evaluation of recurrent laryngeal nerve function. Laryngeal nerve injury was defined permanent if it persisted > 9 months after surgery. Collection of post-operative data included post-operative laboratory values for serum ionic calcium at 48 hours, if the patient presented any symptom and 1 month as routine. Patients were not considered at such risk if at least 3 parathyroid glands were identified and visually preserved in cases undergoing total thyroidectomy. Also the patients who underwent hemi-thyroidectomy were not considered at risk of hypo-parathyroidism. Serum calcium levels were measured in all patients at risk of hypoparathyroidism, on the second post-operative day after discharge. Besides providing patients with detailed information from specialized staff, oral calcium prophylaxis (calcium carbonate therapy) was administered in patients at risk of hypo-parathyroidism. Treatment was prolonged for as long as necessary and progressively reduced until complete withdrawal, depending on the calcium levels observed at scheduled blood tests.

Data were recorded regarding criteria status of patients upon discharge, length of hospital stay and readmission, and morbidity (post-operative haemorrhage, recurrent laryngeal nerve injury and hypocalcaemia) and mortality.

Results

Overall, 270 patients underwent thyroidectomy, in this study, with no deaths (0%). Of these, 175 were total thyroidectomies, 93 hemi-thyroidectomies and 2 isthmectomies. The pathological evaluation revealed: multinodular goitre in 106 patients; uni-nodular goitre in 95; Graves' disease in 6; papillary carcinoma in 55; follicular carcinomas in 6; medullar carcinomas in 2; and Hashimoto's thyroiditis in one. There were 23 cases of sub-sternal goitre in whom the surgical approaches did not include sternotomy, all of whom were discharged on the first post-operative day. The suction drain was maintained for an extra day in 13 patients. As it was not considered a criterion for remaining in hospital, the drain was removed in the office, after discharge.

Post-operative haemorrhage with compromised airway did not occur in any patient (0%). Thus, surgical evacuation of the haematoma was not required. Permanent unilateral recurrent laryngeal nerve injury was observed in 4 patients (1.48%). These 4 patients had both recurrent laryngeal nerves, identified and preserved during the operation, but intense surgical manipulation of the nerves was necessary. At 9 months, the traction injuries of the nerves had not been resolved.

For all 95 patients who underwent partial thyroidectomy, pre-operative serum ionic calcium values were normal and the patients were asymptomatic when discharged. Transient post-operative hypocalcaemia occurred in 23

patients, whereas permanent post-operative hypocalcaemia was observed in 8 patients (2.96%). All 31 patients with post-operative hypocalcaemia underwent total thyroidectomy; as 20 patients in this group were considered at risk for hypoparathyroidism, they were discharged with immediate oral calcium supplementation and remained asymptomatic. The other 11 patients presented symptomatic hypocalcaemia: 7 patients received both intravenous and oral calcium supplementation and could be managed as outpatients, whereas 4 patients were re-admitted and required early calcium supplementation. They came into hospital for 1 to 3 additional days and were asymptomatic upon discharge, receiving oral calcium supplementation and with ionic calcium close to the normal rates. None of these patients subsequently presented signs of hypocalcaemia. Overall morbidity and mortality data are outlined in Table I.

Table I. Mortality and morbidity data (n = 270).

Complication	N.	%
Mortality	0	0
Post-operative haemorrhage	0	0
Permanent recurrent laryngeal nerve injury	4	1.48
Transient hypo-parathyroidism	13	8.5
Permanent hypo-parathyroidism	8	2.96

Discharge criteria

Of the 270 patients studied, 265 (98.5%) met the established discharge criteria while 5 patients failed the discharge criteria as they could not tolerate the diet during the immediate post-operative period. They required an additional day in hospital. All symptomatic patients with post-operative hypo-calcaemia presented the symptoms from the 2nd to the 7th post-operative day. Details regarding outcomes for each of the specific discharge criteria, for this study group, are outlined in Table II.

Table II. Patients' outcome (n = 270).

Criteria	N.	%
Stable vital signs	270	100
Apyretic	270	100
No wound problems	270	100
No airway problems	270	100
Tolerating diet	265	98.5
Ambulating and capable of self-care activities	270	100
Re-admissions	4 *	2.96

* Due to symptomatic hypocalcaemia.

The mean duration of hospital stay for patients undergoing thyroidectomy was 1.02 days. The 265 patients (98.5%) were discharged in the morning of post-operative day 1. As far as concerns the 4 patients who required

readmission due to hypocalcaemia, the overall duration of hospitalisation was 1.05 days.

Discussion

The duration of hospital stay, following surgical procedures, has decreased significantly, in recent years. This is particularly evident in the US, where day case surgery currently accounts for approximately 70% of all elective procedures, and is influenced, in part, by the insurance companies. The benefits of this practice include reduced costs, reduced in-patient waiting lists, increased availability of in-patient beds, reduced post-operative complications and the psychological benefit of avoiding prolonged hospitalization¹.

Usually, patients undergoing thyroid surgery are observed for up to 72 hours before discharge². Steckler was the first to report on the feasibility of out-patient thyroid surgery, concluding that it was both safe and cost effective⁸. Length of stay has progressively decreased from several nights to a post-operative course of less than 6 hours, in some cases⁷.

Short-stay thyroid surgery (< 24 hours hospital stay) has been performed and reported in the literature as safe and cost-effective^{5 6 9 10}, and it is becoming increasingly popular. However, some potentially lethal complications are considered strong arguments against reducing hospitalization time after thyroidectomy⁹. In fact, patient safety is central to thyroidectomy³. Knowledge of possible complications and when they can occur is important to determine how long the patient will need to remain before discharge.

The complications associated with thyroid surgery occur both with inpatient and outpatient surgery, but the time frame for monitoring is reduced in the outpatient setting. This time frame focuses special attention on hypocalcaemia and formation of haematoma⁷.

Significant morbidity, following thyroidectomy is uncommon, and occurs in less than 6% of cases¹⁰. The most serious complication related to thyroid surgery is post-operative haemorrhage with the potential for tracheal compression, airway involvement, and death. Immediate or early haemorrhage occurs in less than 1% to 2% of cases⁷.

The main factor limiting endorsement of outpatient surgery is the unknown and unpredictable rate of post-operative haematoma and possibility of subsequent respiratory distress¹. The rate of post-operative bleeding, with formation of a haematoma has been reported to be 0.1-4.3% with the rate for symptomatic haematomas being 0.1-1%^{11 12}. The use of drains and the time frame for observation are changing⁷.

Schwartz et al. reviewed post-operative bleeding in patients who had undergone thyroidectomy, and they described a critical period of time in which bleeding occurs most commonly (in all cases the potential for airway com-

promise was identified within 4 hours of surgery)². Burkey et al. performing a retrospective analysis found that 43% of haematoma presentations were within 6 hours, 38% between 7 and 12 hours, and 8% after 24 hours or more. They found that 60% of patients undergoing cervical neck exploration for symptomatic haematoma evacuation, following thyroid or parathyroid cases, presented more than 6 hours post-operatively¹³. Many studies agree that late haematomas are uncommon, and the large majority of haematomas occur in the earlier period^{7,9,13}.

It has been shown that late haematomas (>24 hours) occurred only in patients submitted to resection of substernal goitres and who had cardiac co-morbidity that required anti-coagulation/anti-platelet therapy¹⁰. In another study, it was observed that most of the "late haematomas" were superficial (above the strap muscles) and these were treated conservatively⁹. Thus, the major life-threatening complications of haemorrhage and airway compromise are uncommon with modern, meticulous surgical techniques and when they do occur, they do so during the early post-operative period (12 to 20 hours)³.

Post-operative drains allow passive or active withdrawal of post-operative haemorrhage. However, they cannot be considered a substitute for meticulous surgical dissection and haemostasis, and may predispose to post-operative infection¹. Patients with drains may require a longer post-operative hospital stay¹⁴. In our practice, patients submitted to resection of large or sub-sternal goitres, which require suction drains for a longer period, may be discharged with the drain. They return after 48 hours to have the drains removed.

Hypocalcaemia is the most common risk factor following total thyroidectomy and has traditionally represented a barrier to outpatient surgery⁷. The rates of transient vs. permanent hypocalcaemia range from 3-53% to 0.4-13%^{7,15}. Prophylactic and symptomatic supplementations have been proposed. Recommendation for routine calcium supplementation for all total thyroidectomies varies considerably in the literature. It has been shown to decrease major hypocalcaemia complications and hypocalcaemia itself, especially if used in combination with vitamin D¹⁶. In our Service, the use of calcium without symptoms is not a routine.

Pre-operative calcium, pre-operative PTH, and intra-operative PTH are unable to consistently predict post-operative hypocalcaemia. Post-operative PTH, however, has been shown to be a much faster and reliable predictor⁷. Post-operative PTH is not used in our Service. In fact, the patient may be discharged if there are no symptoms of hypocalcaemia.

Most cases of post-operative hypocalcaemia occur within 72 hours of surgery, and most develop signs more rapidly¹. In a previous study, it was observed that the incidence of asymptomatic hypocalcaemia was 24.2% 48 hours post-operatively and 6.6% 30 days post-operatively,

whereas symptomatic hypocalcaemia was 12.1% at 48 hours and 2.2% at 30 days. None of the cases presenting symptoms after 48 hours needed hospitalization or the use of intravenous calcium. In fact, 18.2% of the patients who had symptoms after 24 hours needed intravenous calcium which was administered in the outpatient unit. Most patients presenting hypocalcaemia, diagnosed after 24 hours, did not require readmission¹⁷. It has been shown that the readmission rate (0.1%) and conversion rate (0.6%) for hypocalcaemia is quite low⁹ and is comparable to findings in our patients.

The infrequent need for calcium supplementation (about 2%) suggests that routine oral calcium supplementation not only is not indicated but is also not cost-effective³. It has been proposed that proper patient education regarding the signs and symptoms of hypocalcaemia allows patients to start their own onset of calcium supplementation^{17,18}.

The incidence of specific complications following thyroidectomy is reported, in the literature, as very low, especially in specialized centres and, in particular, when surgery is performed for benign disease or malignancies that are not locally advanced^{1,7,9,10}. These complications occur within a relatively short time after the operation, usually within 24 hours⁷ and they can be rapidly identified (vacuum drainage, serum calcium sampling, indirect laryngoscopy). Therefore, a short (<24 hours) but adequate observation time after surgery can reduce, to near zero, the risk of erroneously discharging patients undergoing thyroidectomy⁹.

Many patients may experience nausea and vomiting, voiding difficulties, and post-operative pain following thyroid surgery¹. In our routine practice, the patient must have had some ingestion to be discharged. Some criteria can be used for discharging patients following thyroidectomy, such as stable vital signs, no wound or airway problems, tolerating diet, ambulating and capable of home and self-care activities and rising post-operative three-point serum calcium curve³. All these items, except the calcium curve, are used in our Service.

Materazzi et al.⁹ have developed a scrupulous selection protocol to select patients for short-stay thyroidectomy. Anaesthesia criteria include age 10-85 years, American Society of Anesthesiologists class I or II, a low intubation score, and body mass index (BMI) less than 32 kg/m². Surgical criteria include primary neck surgery, being euthyroid, gland size less than 80 ml, and no locally advanced malignancies or intra-thoracic goitres. Social criteria considered are autonomy post-discharge, possession of a telephone, suitable living situation, and adequate home support⁹. Use of criteria guidelines such as these may help select patients at low risk of complications⁷.

Suitable patient education pre- and post-operatively as well as scrupulous patient selection are of paramount importance¹. Managing complications can be made easier by patient education. Explaining signs of complications,

providing handouts, and providing patients with the ability to reach a physician or representatives, 24 hours a day, may help to detect potentially life-threatening complications in time to intervene^{2,7}.

Some new techniques and technology can be usefully employed to perform surgery. Minimally invasive surgery, harmonic scalpel and nerve monitoring can decrease not only the dissection but also the surgical time required. These new techniques may lead to even lower complication rates, but this cannot be confirmed until a large trial examining the impact of these variables is conducted⁷. Furthermore, these techniques can help but are not essential for the outcome.

One-day surgery for thyroid disease is safe, effective, and

well received by patients and relatives; it might easily substitute standard hospitalization (48 hours) in a considerable percentage of patients undergoing thyroid surgery⁹.

Conclusions

The results of this study confirm that the one-day surgery model is safe and effective in patients undergoing surgery for thyroid disease. Complication rates following short-stay thyroid surgery appear safely manageable. With increasing surgeon experience and improved patient education and selection, we are of the opinion that this approach can be considered truly safe. Hypocalcaemia is the most well known barrier to short-stay thyroidectomy.

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