Ambulatory thyroid surgery: Do the risks overcome the benefits?

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Key points

With appropriate selection, ambulatory thyroid surgery is feasible.

Thyroid surgery is unique amongst ambulatory procedures in that it is associated with a small but unpredictable risk of rapid onset compromising cervical haematoma that may require immediate treatment.

Reports of “safety” are frequently from series which are too small to give complete assurance. Postoperative haemorrhage is the only issue that makes day case surgery questionable because other risks (hypocalcaemia, nerve injury) can be mitigated.

Studies suggest 20–60% bleed will occur after 6 hours but the clinical severity of later bleeds is unclear.

The reliability of more specific data from complications occurring at home is liable to under-reporting.

The need for a tracheostomy is considerably higher when there is a delay in the recognition of symptoms (as it could be at home) and re-intervention; this underlies the increased morbidity with laryngeal and supraglottic oedema that may accompany a delay in the treatment of post-thyroidectomy bleeds.
Over the past 15 years, there has been increasing momentum in the delivery of surgical procedures towards a day case setting [1]. Controversy has persisted since thyroidectomy was first proposed as a suitable procedure and the issue remains hotly debated [2–6] despite evidence that both generic aspects of day case safety and those specific to thyroid surgery have improved considerably [7,8]. Whilst benefits in health outcomes and patient experience are cited it is the financial savings that remain the predominant driver behind ambulatory surgery. It is appropriate that costs are considered in all healthcare settings irrespective of source of funding so long as ambulatory thyroidectomy does not expose the patient to additional risk.

What is meant by ambulatory?

Medical literature often blends ambulatory surgery, which means same day discharge with a 23-hour stay model [9]. The former is now standard practice [2,9–11] for most routine cases whereas the latter, in Europe at least, is infrequent. As a consequence, the controversy only really applies to same day discharge as this is when the postoperative complications carry the most severe risk. For the purpose of this article, ambulatory thyroid surgery refers to day case thyroidectomy and is defined as that not involving an overnight stay in a hospital ward. Distinction between discharge settings is as relevant as timing. Discharge to hotel type accommodation within hospital grounds is obviously different to discharge home as is the usual setting in European countries.

Feasibility

Thyroid surgery would appear eminently suitable for a day case environment. Physiological effects, postoperative pain, impact on mobility and daily functions are usually limited. Numerous large series show it is clearly feasible with appropriate patient selection [12–16]. The recently published American consensus statement [6] details over 4500 procedures since 2006 with good outcomes. With appropriate selection, day case rates of over 80% are achievable [14,15], and even higher with large volume surgeons [17]. Inabnet et al. attribute this high rate to the use of surgery under local anaesthetic and better haemostatic techniques [14]. Local anaesthesia including cervical blocks to reduce pain and nausea has been shown to facilitate early discharge [13,15]. However, it is questionable whether such series are reproducible generally due to difficulty accurately predicting whether thyroidectomy will be straightforward. The only United States (US) population data available reviewing thyroidectomy practice shows disparate variation between populations [17]. Day case thyroidectomy is established practice in some centres in the US albeit still proportionally small numbers [13,15,17]. Proponents claim it is safe due to the low incidence of complications [16,18] but in many of these series, the number of cases included is too low for complete assurance. Even with seemingly sufficient numbers [6,13,15], the risk benefit remains questionable [5,19]. Despite The British Association of Daycare including thyroidectomy in its “basket” of suitable cases, still less than 1% of cases are performed as day cases in the UK [20].

What guidelines currently exist?

There are currently no European guidelines for day case thyroidectomy. In France, it is considered possible under “certain conditions for highly selected patients only” [21]. The British Association of Endocrine and Thyroid Surgeons (BAETS) consensus statement and subsequent open membership vote in 2011 did not endorse the practice [5]. The recent American Thyroid Association (ATA) consensus [6] does seek, but not mandate, endorsement for “a carefully selected patient population on the provision of certain precautionary measures to maximise communication and minimize the likelihood of complications” and concluded it was “worth identifying those patients and procedures for which it is reasonable, and recommending precautions for pursuing it safely”.

What cases are deemed suitable/ reasonable risk?

Diongi’s series of 1571 cases showed that 98% thyroidectomies are potentially suitable for short stay (23 hour) thyroid surgery provided these are first time neck surgery in euthyroid patients with an ultrasound estimated volume of less than 80 mls, without retrosternal or intrathoracic extension in the absence of advanced cancer or requiring concomitant lateral neck dissection [22]. For day case thyroidectomy to be safe, similar medical criteria have been suggested, alongside the essential social requirements, but no European consensus exists [16,23]. The American view [6] is much clearer, specifying relative contra-indications under clinical, social and procedural categories. Clinical contra-indications in the US include thyrotoxicosis and pre-existing vocal paresis alongside criteria applicable to
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any day case procedure (cardiorespiratory co-morbidity, morbid obesity, etc.). Social factors consider the home environment, availability of primary carer, distance from hospital, communication difficulties, patient preference and understanding. Within the procedural category, contra-indications include large volume glands and retrosternal extension, plus specific intra-operative factors to reduce the risk of complications; anaesthetic choice, type and extent of surgery, nerve monitoring, haemostasis, parathyroid gland management, wound closure and extubation. For safe postoperative care, there are suggested discharge criteria (absence of neck swelling, dysphagia etc.) and emphasis on the importance of nursing and patient/carer education for the recognition of complications. Unilateral surgery compared to total thyroidectomy carries a reduced risk of laryngeal nerve dysfunction, postoperative hypocalcaemia and potentially a reduced risk of bleeding and its consequences given the smaller operative field. Indeed, unilateral surgery has been suggested as generally more suitable [16,19]. An Austrian groups’ review of over 30,000 thyroidectomies [24] would appear to support this position since no patient in their review developed a haematoma after undergoing unilateral surgery (92 of 8783 procedures, 1% cases) or became symptomatic after 20 hours.

What are the risks?

Thyroid surgery is unique to other day case procedures in that it is associated with a small but definite risk of life-threatening complications. Mortality incidence from population series are less than one per-cent [10,11] but the risk of death following a significant postoperative complication is unquantified. Reliability of more specific outcome data from complications is liable to publication bias, possibly more so in the day case setting where complications are notable by their low incidence in some single centre series. Even in Tuggle’s state-wide review of over 1000 thyroidectomies [17] where the emergency room visit and re-admission rate of 7.8 and 2.3 per-cent respectively seem typical [13,16] the total bleed rate of under 0.2% is either a reflection of high volume surgeon performance or under-reporting. The three main risks of thyroid surgery are airway obstruction from haemorrhage/laryngeal oedema, vocal cord paresis and tetany from severe hypocalcaemia. This section will consider these in turn, along with recommendations to mitigate their occurrence and impact. When postoperative complications do occur, their recognition with prompt and effective management is critical. If surgery is undertaken in the day case setting measures to deal with these events must be embedded. The ATA consensus emphasises the importance of comprehensive and reliable clinical pathways with clear communication. New technologies can potentially reduce the occurrence of complications and improve detection of impending life threatening postoperative emergencies, for example recurrent laryngeal nerve injury by endotracheal nerve monitoring and pre-empting of significant postoperative hypocalcaemia from parathyroid hormone measurement.

Postoperative bleeding

Postoperative haemorrhage is the critical factor determining risk acceptability for day case thyroid surgery. Whilst it is unrealistic to expect to be able to eliminate the occurrence of bleeding from the day case pathway the reduction of a significant adverse consequence may be possible with the appropriate set-up. Postoperative haemorrhage occurs between 0.9%−1.25% [3,10,13,25] and 2.1% [11] of all thyroidectomies. The frequency of life threatening airway obstruction (due to local compression and laryngeal oedema) however is much less clear. The incidence of patients requiring tracheostomy may be a surrogate marker. Of 10, 201 thyroidectomies performed over a 40-year period at the Royal North Shore hospital 124 (1.2%) required re-operation for haemorrhage with 31 (0.3%) requiring a tracheostomy [26]. This is comparable to Burkey’s data with a quarter requiring bedside decompression [25]. In Promberger’s series of over 30,000 thyroidectomies [24], there were 3 fatal outcomes (1 per 10,000 surgeries) and 9 of 591 (1.5%) bleeds requiring tracheostomy. Thirty-day mortality following thyroid surgery in the UK is 1 in 500 [10] and at least some of these deaths will be secondary to a postoperative haemorrhage. Incidence of fatal haematoma has not been reported in the large US studies. A postoperative thyroid bleed needs urgent assessment and at least a quarter require immediate perhaps even bedside intervention [3,25,26]. Intuitively, a post-thyroidectomy haemorrhage occurring at home would increase the mortality risk but there is no data to prove this. In Promberger’s series, patients requiring tracheostomy had a three-fold longer interval between skin closure and recognition of symptoms/re-operation indicating that delay in diagnosis leads to laryngeal/supraglottic oedema and increased morbidity [24]. This infers that a patient bleeding at home would fare worse due to inevitable delays in intervention, but this may not necessarily be so if such bleeds were not life threatening. To assure against an increased risk from the day case setting, a reliable form of risk stratification to identify patients with a minimal bleed risk is required. Unfortunately, even with experienced clinical judgement, there is no reliable and reproducible patient and disease specific criteria to risk stratify patients for postoperative haemorrhage. A large retrospective review of 7921 thyroidectomies and 5896 parathyroidectomies over 25 years compared 21 (0.26%) and 21 (0.36%) postoperative haematoma respectively with (non-haematoma) case-matched controls but failed to identify any reliable predictive patient or disease criteria [25]. Other reviews have also shown that the extent of thyroidectomy, hyperthyroidism, thyroid resection for malignancy...
and re-operative surgery do not reliably predict those most at risk of developing a haematoma [3,11,26]. A higher incidence of haematomas requiring evacuation in thyroid re-operations compared with primary procedures, and re-operative hyper-thyroid patients compared to euthyroid has been shown [19,24,27]. Swedish registry and Promberger’s data suggest that older age and male gender are risk factors [11,24]. Promberger also showed that the risk of postoperative haematoma was increased two fold by extent of resection and bilateral procedure and as much as seven fold between surgeons of variable experience. Assuming a 1–2% risk of postoperative bleeding [4,10–15,18,26] and recognising that bleed prediction is unreliable ensuring safe management of this complication is paramount. In day case surgery, it is the timing and severity of the bleed that is most important. Provided the necessary resources are available, an early bleed recognized and dealt with before discharge is no different to the patient treated as an in-patient. Early bleeds are perceived to be more dangerous than a later bleed, as is the severity of haemorrhage between hemi- and total thyroidectomy. Mirnezami’s review of 1571 cases suggested that all patients with significant haemorrhage display signs of bleeding within the first few hours, and those with potential airway obstruction within 4 hours [2]. Promberger’s series [24] showed 81% of postoperative haematomas occurred within 6 hours of thyroidectomy, 17% between 6 and 24 hours and only 2% after 24 hours. However, Leyre et al.’s retrospective review of nearly 7000 thyroidectomies performed in Poitier, France reporting 70 haematomata (1%) showed only 37 (53%) occurred within 6 hours [3]. The rest occurred after 6 hours (i.e.: post-discharge for the day case patient) with 26 (37%) between 7 and 24 hours from surgery and 7 (10%) after 24 hours. Likewise, Burkey’s large series found only 43% occurring within 6 hours, 37% between 7–24 hours and 19% over 24 hours [25]. Lang et al. reported 70% within 6 hours, the rest between 6 and 24 hours [19]. These retrospective reviews are unselected patients and, as commented by Lo Gerfo et al., do not consider symptoms or the possibility that intervention in those with early symptomatic haematomas may alleviate the risk of obstruction [28]. Using decision model analysis on earlier US thyroidectomy mortality data, Schwartz et al. estimated 94 haemorrhage-related deaths per 100,000 could be prevented by observation for 24 hrs (i.e., advocating a 23-hour stay) as opposed to 6 hours [29]. It appears the bleeding risk after 23 hours is generally acceptable [2,19,24]. Recent US studies with an aggregated experience of more than 1250 days case thyroidectomies reveal only 1 haematoma occurred in the first 24 hours and two others after this (haematoma rate 0.3%) [15,16]. To reduce the risk of bleeding, meticulous haemostasis irrespective of operative technique is critical and always applicable. Bleeding risk can be reduced by temporary discontinuation of anti-platelet therapy. Certain haemostatic agents [6] and newer haemostasis technologies [7] may also be useful. Leaving some or even all of the strap muscles open to facilitate haematoma decompression and pre-closure valsalva are recommended by some [6,28] with head up recovery to reduce venous bleeding and avoidance of arterial hypertension also sensible precautions. New anaesthetic techniques and agents to reduce the risk of postoperative vomiting and the use of deep extubation to reduce coughing can be considered.

**Tetanic spasm from severe hypocalcaemia**

Recognised risk factors for hypocalcaemia following thyroid surgery are total rather than hemi-thyroidectomy, hyperthyroidism, thyroid cancer and retrosternal extension [30]. National audit data demonstrates that up to a third of patients undergoing total thyroidectomy [10,11] may become hypocalcaemic and require calcium and/or vitamin D analogue supplements. As clinically significant hypocalcaemia usually occurs 48–72 hours after, thyroidectomy improved methods of detection have already been tested and refined to facilitate increasingly shorter lengths of stay. Several groups have utilised postoperative parathyroid hormone (PTH) levels as an early indicator of hypocalcaemia after total thyroidectomy [8]. Re-admission rates for hypocalcaemia should be less than 2% if appropriately treated [15]. Prophylactic calcium is used routinely in some centres [13,16] or patients may be taught to manage their own hypocalcaemia [29]. It is particularly suitable to the outpatient setting where there is limited time to available to correct hypocalcaemia in a reactive fashion once it is discovered.

**Laryngeal nerve palsy**

Recurrent laryngeal nerve (RLN) paralysis is a recognized complication of thyroid surgery. Although temporary vocal cord paresis is common, the incidence of permanent RLN injury should be under 1–2% [10,11]. Where routine laryngoscopy is used, rates are much higher and in revision, thyroid surgery is approximately six times higher than in first time thyroid surgery [11]. For day case thyroidectomy, a unilateral nerve paralysis should not prevent discharge as the airway would not be unacceptably compromised unlike bilateral recurrent laryngeal nerve paralysis, which is a life threatening condition. Fortunately it is rare, reported as 0.2% (1 in 500) in Sweden’s national thyroid and parathyroid surgery registry [11] and should be apparent before discharge. Hence, the risk of bilateral paralysis is not itself a contra-indication to day case bilateral thyroid surgery but any predisposing factors for its occurrence (bilateral revision thyroid surgery or a pre-existing unilateral palsy) should be. Recurrent laryngeal nerve monitoring with a dual channel electromyographic endotracheal tube can confirm functional
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How can the risks be minimised

The ATA Consensus [6] details a comprehensive list of pre-operative, intra-operative and postoperative factors to optimise the safe and efficient performance of ambulatory surgery. In addition to those described earlier relating to the occurrence of postoperative complications, this includes defined clinical pathways and robust patient and carer education with clear written information on discharge protocols explaining the necessary actions if complications do occur. Clear defined discharge criteria are listed which include a satisfactory wound check with absence of neck swelling/haematoma, dysphonia, dyspnoea and dysphagia. There must be adequate social support and understanding of instructions. Poor patient selection can lead to unacceptable risks (for example lack of social support and understanding of instructions. Poor patient selection can lead to unacceptable risks (for example lack of social support and understanding of instructions. Poor patient selection can lead to unacceptable risks (for example lack of social support and understanding of instructions).

Potential advantages of outpatient thyroidectomy

The ATA consensus statement [6] usefully categories potential advantages of day case thyroidectomy into patient safety, patient comfort and conservation of resources. Patient safety includes reduced risk of infection and iatrogenic complications. Patient comfort includes reduced risk of cancellation, a more conducive hospital facility and the comfort and convenience of home convalescence (provided patient and carers adequately prepared prior to discharge). Although patients’ preference for same day discharge has been demonstrated generically whether this applies to a fully informed thyroidectomy patient is less clear. Mowischenson and Hodin looked at day case patient preference within their overall series, comparing to a control group of 30-day case laparoscopic cholecystectomy patients [18]. A third in each group stated that they would have preferred an inpatient stay but in the thyroidectomy group nine were planned inpatient because of patient preference, so the proportion preferring a hospital admission is probably higher. A study from the Philippines of over 800 thyroidectomy patients where three quarters were undertaken as day case showed a significant increase in satisfaction for the day case patients [12]. Spanknebel et al. also found that very few patients expressed dissatisfaction with their experience of outpatient thyroid surgery [13] but this is not necessarily comparable to preference.

Economic drivers

Worldwide, irrespective of mechanisms of healthcare funding, there is a desire for delivery of quality patient care at reduced cost. Although different healthcare systems and patient populations will generate differential cost savings, a general move towards day case thyroidectomy would have financial gains. Overall costs of day case compared to inpatient surgery are smaller but possibly less so for thyroid surgery, particularly if efficiencies in the delivery of postoperative care on short stay units are optimised. The cost saving of 30% in one study [18] related to charges rather than true costs, the latter being amenable to savings from appropriate staffing. Even with costs predominantly relating to operation and recovery room time in the US savings of around $2500 per ambulatory case are reported [15,16]. In the United Kingdom, the saving of one night stay equates to around £400, around a fifth of the National Health Service’s remuneration for this procedure. In the US, cervical blocks combined with monitored anaesthesia care in preference to general anaesthesia has shown a reduction in postoperative operative narcotics, time in operating room and length of stay [15].

Conclusion

Day case thyroid surgery is feasible but the unpredictable nature of postoperative haematoma and its potential for life threatening airway compromise tips the balance against the benefits. For some, its’ use for low risk cases is justifiable provided it is undertaken in conjunction with robust postoperative care pathways and retention of those patients where there is concern [6,24] but for others [5,9], the 23-hour model is the preferred compromise. Quality improvement by continuous outcome monitoring may help define those most at risk of bleeding and further minimise it by more widespread specialisation with improved outcomes from high volume surgeons [31].

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