

BAETS Consensus Statement 2011:

Day Case Thyroidectomy

Helen Doran, James England & Fausto Palazzo
on behalf of BAETS

Over the last 2 decades many routine elective procedures previously associated with both a pre and postoperative in-patient stay are being performed on a day case/out-patient/ambulatory basis. The development of safe short-acting anaesthetics, the use of local and regional rather than general anaesthetics, improved systemic postoperative pain management coupled with modern surgical techniques and technologies have created an environment that allows discharge on the day of surgery for procedures that previously required hospitalisation. The drive towards reducing inpatient hospital stay has been motivated by evidence of the benefits of enhanced recovery programmes to patient outcomes a more individualized treatment pathway and perceived patient preference. Given that the duration of hospitalization is a major determinant of the overall cost of surgical care potential cost savings have also represented a major driving force (1).

In 2000 the NHS of England set a target of performing 75% or more of all elective surgeries as a daycase (2). In 2001 thyroidectomy was added to the “basket” of procedures deemed suitable for the day case environment by the British Association of Day Surgery. The optimal extent of surgery or the specific indications that best suit this setting were not specified (3). The BAES (as it then was) was not involved in this recommendation and there are currently no specific day case thyroidectomy guidelines in the UK. Different authors have suggested selection criteria based on medical status, standard social circumstances and the extent of the thyroidectomy or associated procedures (lobectomy or total thyroidectomy, concomitant lateral neck dissection etc) (4) (5) (6). Other criteria proposed have included primary neck surgery, euthyroid status and ultrasound estimated thyroid volumes of less than 80mls (4).

The adoption of a day case thyroidectomy has polarized opinion both in the UK and Europe and therefore the BAETS as the UKs leading organization for surgeons with an interest in thyroid surgery feels that a position should be adopted by the Association. For day case thyroid surgery to be advocated in the UK it is necessary to demonstrate that it is

desirable, of benefit to the patient, hospital, and advantageous to the publicly funded healthcare system as a whole. It is essential that it does not expose the patient to any additional risk or at least that the risk-benefit analysis justifies this practice.

The purpose of this document is to assess the best available evidence on day case thyroidectomy. In the absence of well constructed randomized trials much of the data consists in small series either written by enthusiasts or by authors condemning same day discharge mainly on the grounds of danger to the patient, or anecdote and prejudice. In this review we have defined day case thyroidectomy as that which does not involve an overnight stay in a fully equipped and staffed hospital ward. We have therefore intentionally adopted the widely understood UK interpretation of “day case” which excludes 23hr stays, post operative hotel accommodation adjacent to the hospital with low grade nursing care, or other loose adoptions of the terms *ambulatory* or *day care* surgery. As a consequence some series (4) have been excluded from this review in the interest of clarity and to favour the validated larger series (7) or other systematic reviews (8).

Feasibility

There can be little doubt that thyroid surgery can be undertaken in a day case environment. The necessary equipment is available in a typical UK unit set up for day case surgery. Patients do not need to be starved after surgery and therefore do not require intravenous fluids that may mandate an in patient stay. Day case thyroidectomy has been reported in the UK (9) and can be performed for 80% of a series of over 130 hemithyroidectomies (personal communication Mr A McLaren) In the absence of larger controlled series what remains less clear is whether same day discharge is desirable, safe and worthwhile in optimally selected patients when a larger sample size is considered, perhaps in a non specialist setting.

In a move towards true day case thyroidectomy the issue of optimal patient selection is addressed in a study of 1571 one day (23 hour) thyroid procedures(4). Over two thirds were bilateral procedures and less than 2% converted to a longer in patient stay if specific criteria are met - first time neck surgery, euthyroidism and USS estimated volume <80mls. Patients with locally advanced tumours, retrosternal/intrathoracic goitre, and patients requiring lateral neck dissection were be excluded from this approach. A review of selection criteria in 2010 (10) concluded it was difficult to place strict criteria on which thyroidectomies can or should be done on a day case basis and no guidelines were suggested. Experienced clinical judgment that takes into account the underlying health of

the patient, extensiveness and anticipated difficulty of the surgery, risk of post-op bleeding and social logistic factors appears necessary. Of the 13 studies reviewed (that includes a mixture of day case and 23 hour surgery) between 1998 and 2006 it appears that with meticulous pre-operative assessment based on ASA grade and the exclusion of patients with associated pathologies (cardiovascular, diabetes, COPD, nephropathy, liver impairment) general complications such as cardiac arrhythmias and pulmonary complications are extremely rare. What is less easy to mitigate is the small but extremely serious risk of life-threatening complications specific to thyroid surgery, namely airway obstruction from haemorrhage, laryngeal oedema and tetany from severe hypocalcaemia.

Enthusiast reviews (8) for Daycase thyroidectomy suggest that the complication rates in a variety of selected or unselected series are no different to those encountered in an in-patient scenario. At least one death occurred in the 13 series reviewed (4155 patients, 0.02%), but this was due to fatal post-operative toxic crisis in a patient with clinically undetected toxic goitre who had injudiciously undergone outpatient thyroidectomy (11). Most day case discussions state that surgery is safe because the majority of life-threatening complications such as bleeding following thyroid surgery occur in the immediate postoperative period and therefore discharge after 6 hours is safe. However the rate of same day discharge varies greatly in published data (56 – 100%) (6,7,11 – 18) and as definitions vary greatly even the best available evidence must be interpreted with caution. .

Ambulatory surgery in a US context may include 24hrs or less hospital stay or include patients discharged to low grade nursing accommodation situated next to or even within the hospital. Furthermore some studies include a heterogenous patient group that may include a range of indications for surgery from thyrotoxicosis to thyroid cancer, or the mixing of patients having various degrees of thyroid or parathyroid resection. Nevertheless there are some convincing series describing large numbers of patients undergoing thyroidectomy for a variety of pathologies in a day case setting. A series from Texas of 1242 consecutive thyroidectomies between March 2003 and June 2009 including all thyroidectomy types (some with concomitant central node clearance) and various indications were grouped as planned daycase and completed, planned daycase and admitted and planned admissions respectively (7). Some cases (both daycase and inpatient) had additional procedures normally performed as daycase undertaken at the same time. One thousand one hundred and thirty six were planned as a daycase procedure with 1063 completed as such (i.e. just 73 converted). They suggest that a

successful day case rate of over 80% can be achieved especially if younger, healthier patients requiring less extensive operative procedures with smaller goitres and less blood loss are selected.

Another series by Seybt and colleagues (5) reported on a prospective case series of 418 thyroidectomies of all types, for different indications and using various techniques (open and endoscopic), including 11% re-operative procedures performed in Georgia USA between February 2003 and Nov 2007. Just under half of the 418 (49.8%) were done as a daycase, 128 as inpatients with <23hr stay and 82 as in patients with a mean length of stay of 2.9 days. It is noteworthy that this series demonstrated that over 80% of patients were actually in hospital for < 24hrs. However, despite an intention to treat all as daycases only 36% of patients undergoing a total or completion thyroidectomy were discharged on the day of surgery which suggests that their experience was that unilateral surgery is better suited to a day case setting. Inabnet and colleagues (16) have championed day case thyroid surgery and attribute their high day case rate (80% of 224 cases) to improvements in anaesthesia (including surgery under local anaesthetic and sedation) and better surgical haemostatic techniques. Marohn (18) reported on 150 total / near total thyroidectomies undergoing 23hr hospitalization (not day case) achieving this in 145 (97%) of patients. Reasons for failed 23 hour discharge were post-operative haemorrhage (one patient), hypocalcaemia (4 patients), and RLN injury (3 patients) Of note is that the bleed occurred 14 hours after surgery but no comment on whether operative decompression occurred at the bedside or in the operating theatre is provided. Specht (19) showed the use of local rather than general anaesthetic in New York facilitated early discharge in 175 consecutive thyroid procedures (one third having thyroidectomy under local anaesthetic).

Benefit of the day case environment

There are a number of well recognized benefits generic to day case surgery – improved atmosphere, reduced waiting lists and a lower risk of cancellation, a perceived reduced infection risk (in particular MRSA, VRE (20), potential reduced opportunity for serious iatrogenic events and better environment for recovery at home with the psychological benefit of avoiding hospitalization.

Most day case units are experienced in patient education and anaesthetic recovery. For thyroid surgery to be possible all patients and family members must receive careful teaching with clearly written information reinforced with verbal discharge advice as well as explanations of necessary actions if complications occur. Where possible opioids and other pain relievers associated with nausea and vomiting should be avoided. The use of

local anaesthesia to facilitate early discharge from reduced pain and nausea has also proved advantageous (7),(21) (22).

Financial savings

One of the driving forces behind the promotion of day case surgery is the reduced cost and the consequent benefit to a finite-resource public funded healthcare system. Whilst many speak liberally of potential cost savings only six studies have looked specifically at the cost benefit of day case thyroid surgery. Mowschenson (14) reported 100 consecutive unselected thyroidectomies and bilateral parathyroid explorations between March 94 to 95 and demonstrated a cost saving of 30% over the in-patient equivalent. However a critical review queried whether such a difference would be seen if looking at actual cost rather than charges (as it is not expensive to simply observe a patient overnight). Overall costs or charges are so overwhelmed by the cost of the operation room time and the recovery time that the differential effect of discharge at 6 hours, or 8 hours or 23 hours (with 23hours not being classed as hospital admission so charges are much less) was thought likely to be much smaller than the cited 30%. Marohn and colleagues (18) reporting on 150 cases of total / near total thyroidectomy with all admitted over night at least. Crude cost analysis based on \$1000/day for military and \$2000/day for civilian average bed costs gave a saving of \$1540 and \$3080 per patient respectively for an average length of stay of 1.06 days compared with average pre-authorized length of stay of 2.6 days (i.e. net bed day saving 1.54 per pt). Seybt's (5) report of 418 thyroid procedures where 80.4% of all patients were in hospital for less than 24hrs showed a cost of \$7814 for ambulatory patients compared to \$10288. Samson found that the hospital cost in the Philippines was significantly less for outpatient procedures (cost of treatment per capita (pesos) and average per case: P2, 127 versus P4, 549 $P < 0.05$ (11).

In 2006 Synder et al published a randomized controlled trial comparing the use of GA versus LA in patients undergoing thyroidectomy (23). Eighty-eight percent of patients were discharged successfully less than 8 hours after surgery. The reduction in hospital stay with local anaesthesia resulted in a saving of approximately \$315 per patient. Spanknebel similarly found a significant cost saving with local anaesthesia, both in terms of operative room costs and length of stay (21).

In a UK context the saving of one night in patient stay accounts for a cost saving of £350 per night in a typical south of England district general hospital (personal communication A McLaren) to £430 in a London university hospital such as Hammersmith

Hospital. A potential additional saving is achievable if the beds are actually closed as in a true day case arrangement. Based on an Health Resource Group of just under £3,000 for a thyroidectomy the overall annual saving can be significant, perhaps as much as £20,000 per year if over 50 day case procedures are performed per annum.

Patient satisfaction

Patients' preference for same day discharge has been demonstrated generically (24). Whether this applies to a fully informed thyroidectomy patient is less clear due to the absence of a rigorously regulated control group. Four studies have reported on this issue. Mowschenson (14) looked at patient satisfaction and compared this to a control group of 30 patients undergoing Daycase laparoscopic cholecystectomy. 73% of the study group responded to the questionnaire, compared to 70% of the laparoscopic cholecystectomy group. 35% stated that they would have preferred an inpatient stay compared to 32% of the laparoscopic cholecystectomy group. It is noteworthy that nine of the thyroidectomy group were done as a planned inpatient because of patient preference, therefore it is likely that the proportion who would have preferred the procedure as an inpatient is actually higher given that those who didn't want surgery as a Daycase had already been excluded from the study. Satisfaction which is a vaguer retrospective concept is frequently adopted as a surrogate for patient preference. In Materazzi's study patients were very satisfied in 84.2%, satisfied in 9.5%, poorly satisfied in 4.3%, completely unsatisfied in 2% (4). In Samson's study of 869 cases with 655 undergoing out-patient thyroidectomy (OPT) compared to standard thyroidectomy (ST) almost all patients undergoing OPT were very pleased with the procedure compared to those with ST stating they were just pleased ($p < 0.001$) (11). Spanknebel also assessed patient satisfaction and found that very few patients expressed dissatisfaction with their experience of outpatient thyroid surgery (21).

A small unpublished series by one of the authors of this review (FP) demonstrated that patients provided with a questionnaire offering same day discharge after either hemi or total thyroidectomy expressed interest in this option but not when the questionnaire included the caveat that they have a very small risk of a life threatening complication at home.

Only a blinded, anonymised questionnaire to patients pre and post discharge for both in patients and day case procedures that include pain scores, satisfaction scores, willingness to repeat the procedure and whether they would recommend the procedure as a day case will allow surgeons in the future to document these patient experiences and make improvements based on these findings.

Post operative hypocalcaemia

The incidence of clinically significant hypocalcaemia following a hemithyroidectomy should be negligible, so should not represent a contraindication to day case surgery. Indeed risk factors for hypocalcaemia following thyroid surgery identified using multivariate analysis include total rather than hemi-thyroidectomy, a raised pre-op thyroxine level, thyroid cancer and substernal thyroid extensions (25). For total thyroidectomy, with current better prediction of hypocalcaemia before development of clinical symptoms (26) and improved understanding of other contributory factors (for example vitamin D deficiency), the risk of clinically significant hypocalcaemia can usually be obviated. National audit data demonstrates that up to a third of patients undergoing a total thyroidectomy (27,28) and variable proportions in individual studies (9, 12-14,18,25) may become hypocalcaemic and require calcium and/or vitamin D analogue supplements. Although the routine use of prophylactic calcium is controversial (29) its use has been used in some studies of short stay thyroid surgery (7) (9) and is indeed routine practice in some centres (5). In Sahai's UK based study (9) where routine prophylactic calcium was used eight (12 percent) of the 65 patients developed post-op hypocalcaemia after a total thyroidectomy; two (3%) were symptomatic and required readmission and treatment with additional calcium and alfacalcidol. Both were discharged the next day. The other 6 asymptomatic patients (9%) had biochemical hypocalcaemia on routine blood testing in outpatients. In Synder's study of 1242 thyroidectomies (7) receiving prophylactic calcium of the 1064 performed as a Daycase only 56 (5.2%) developed symptomatic hypocalcaemia with 8 (14%) of these requiring hospitalisation for its management. Giving routine calcium and vitamin D analogues however is not without risk since hypercalcaemia may occur with potentially serious consequences on renal function (30) (31)

Laryngeal nerve palsy

Recurrent laryngeal nerve (RLN) paralysis is a well recognised complication of thyroid surgery. A degree of reduced vocal cord mobility following thyroid surgery is common. Although most frequently caused by recurrent laryngeal nerve injury, in rare cases vocal cord paralysis may be caused by arytenoid cartilage subluxation, cricoarytenoid arthritis or neoplasm (34). The commonest cause of reduced vocal cord mobility post thyroid surgery however is RLN neuropraxia and these are expected to recover within days or weeks. The incidence of neuropraxia is as high as 10%, and of

permanent RLN injury should be under 1-2% (36, 37) although anonymised national databases where routine laryngoscopy has been used show a higher rate (32). The ongoing BAETS audit suggests that even in moderate to high volume thyroid practices the risk of permanent laryngeal nerve injury in revision thyroid surgery is approximately six times higher than in first time thyroid surgery (24).

For Daycase thyroidectomy to be safe and acceptable, the benefit of same day discharge should outweigh the risk of airway embarrassment due to RLN injury. The risk of postoperative hoarseness should be adequately explained to the patient in the preoperative workup and consenting process so that its occurrence does not cause unexpected anxiety and delayed discharge.

If a patient has been appropriately worked up for surgery with effective preoperative laryngeal assessment, and the consent process is robust, a unilateral nerve paralysis should not normally result in inpatient conversion. Only rarely can a unilateral nerve injury result in airway embarrassment, usually due to vocal fold synkinesis which in any case may occur months after nerve injury (33).

Bilateral recurrent laryngeal nerve paralysis is described as rare. Its incidence is difficult to predict and if one looks hard for it has been reported to occur in 0.38% (1 in 263 cases) in one series (35), and 0.2% in Bergenfelz's report (38). As its occurrence constitutes an anaesthetic emergency, this would necessitate inpatient conversion. Due to its relative rarity, the risk of bilateral paralysis should not in itself mitigate against advocating daycase bilateral thyroid surgery and could be minimized further by patient selection. However, due to the extreme severity of the condition, it is probably unwise to consider daycase thyroidectomy in bilateral revision cases, or in cases with a pre-existing unilateral palsy.

In conclusion, the risk of RLN injury as a result of thyroid surgery is significant. This does not, however, make daycase thyroid surgery contraindicated since only in the event of bilateral recurrent nerve palsy would it be life threatening and this would be apparent in the hours following surgery. The use of routine post-operative laryngoscopy to confirm vocal cord mobility could also reduce the risk of respiratory compromise due to dysfunction.

Post operative bleeding

Bleeding after thyroid surgery is a life threatening event due primarily to local compression and laryngeal oedema. It occurs in between 0.9%-1.25% (27) (36) and 2.1% (37) of all thyroidectomies, but less than a quarter of these cases require immediate intervention (38). The mortality associated with thyroid surgery is currently estimated to be 1 in 500 (27). Whilst this is not necessarily entirely related to post operative haemorrhage it is reasonable however to assume that a proportion of post-operative haemorrhage is followed by death and that some of the mortality of thyroid surgery is not captured by the UK national registry data. A post-operative haemorrhage in the neck after thyroid surgery is an emergency that usually requires prompt assessment and frequently intervention. There is no reliable data on the survival following acute haematoma formation in a day case setting since most day case series are either too small or too unreliable due to retrospectivity to validate. Whilst it is likely that a post thyroidectomy haemorrhage experienced at home comes with a higher mortality risk this is unproven. It is also unclear whether the bleed after a hemithyroidectomy is less life threatening than after a total thyroidectomy. Ideally it would therefore be desirable to risk stratify patients in order to identify those with minimal bleed risk or in whom the extent of their surgery would minimise a life threatening consequence to a bleed.

In an attempt to identify patients at high risk of post-operative bleeding Burkey et al (38) performed a retrospective review of 7921 thyroidectomies and 5896 parathyroidectomies performed between 1976 and 2000. Whilst a study that spans 24 years may suffer with the error associated with large retrospective reviews they reported just 21 post-op haematomata requiring surgical evacuation after thyroidectomy (0.26%) and 21 haematomata after parathyroidectomy (0.36%). During the study period nine of the 42 (21%) required an urgent bedside decompression and/or intubation. Significantly, the comparison with (non-haematoma) case-matched controls failed to identify features that allow the reliable identification of an "at risk" patient population for post-operative bleeds. Burkey's findings from their own study was in keeping with the literature both at that time and now. Extent of thyroidectomy, hyperthyroidism, thyroid resection for malignancy and re-operative surgery did not predict the development of haematoma formation. However one study found a higher incidence of haematomas requiring evacuation in thyroid re-operations compared with primary procedures, and also in re-operative hyperthyroid patients compared to euthyroid (41). Bergenfelz's multicentre registry of 3660 patients undergoing thyroid and parathyroid surgery in Sweden (37) demonstrated older age and male gender as risk factors. The use of local rather than general anaesthesia does not increase the risk of bleeding (21) (22). In Spanknebel's

report of 1194 patients undergoing thyroidectomy under local anaesthesia (21) eight patients (0.7%) developed haematomas, with two occurring after 24 hours.

Teoh's (5) initial reporting of day case thyroidectomy being safe based on 50 consecutive thyroid procedures (criticized as having insufficient patients to expect a significant bleed) has been reflected in other later and larger series; 1571 in Italy (4) and Mirnezami's systematic review of 22 original short stay reports (8). With improved surgical technology the risk of life threatening post-op haemorrhage continues to diminish but still occurs. Although there are no definitive studies comparing technologies directly no increased incidence of complications has been noted with their widespread adoption (22).

Leaving aside non peer reviewed, uncontrolled website publications the incidence of haematoma following thyroid surgery remains consistently between 1 and 2% in most reliable published series (6, 7 11 - 18). For the purposes of day case surgery what may be more important is the timing and severity of the bleed. An early bleed captured and dealt with whilst the patient is still in hospital would be presumably no different to the scenario of the patient treated as an in patient so long as theatre facilities and staff are readily available to deal with the event. The extent or severity of a bleed following a hemithyroidectomy and a total thyroidectomy have not been compared although anecdotally there appears to be a difference. Similarly the perception that early bleeds are more dangerous than a later bleed. Mirnezami's review (8) 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.

However, the authoritative retrospective review of 6830 thyroidectomies performed in Poitiers, France (39) reports 70 haematomata in just under 7000 thyroidectomies (1%). Only 37 (53%) occurred within 6 hours, i.e. at a time when the patient would still be hospitalized if operated in a day case setting. The rest occurred after 6 hours: 26 (37%) between 7 and 24 hours from surgery and 7 (10%) after 24 hours. This data mirrors previous reviews such as that by Burkey and colleagues (38) although this latter series addresses both thyroid and parathyroid surgery. In Burkey's review 57% of bleeds are documented to have occurred after 6 hours from surgery, with 37% between 7 - 24 hours and 19% over 24 hours. If this data were to be extrapolated to the series published by LoGerfo (13) who reported 134 patients sent home 6hrs after surgery, and in Spanknebel's report of 1025 cases undergoing thyroidectomy under local anaesthesia (15) with 820 sent home 6hrs post surgery half of all of their post operative haemorrhages would occur after patient discharge – unless high risk patients are truly identifiable and

treated as in-patients. For this reason these authors have argued that true daycase thyroidectomy is dangerous. By using a decision model analysis haemorrhage related deaths could be prevented by observation for 24hrs (i.e advocating a 23 hour stay) as opposed to 6h (29). Dralle's observation that 80% bleeding occurs during the first 24 hours (40% within the first 8 hours) also would appear to support this (22).

Conclusions

Day case thyroid surgery is feasible. However robust generic and disease specific criteria to fulfill safety assurance have not yet been identified due to the complex nature, incidence and time distribution of operative complications. It would appear that performing hemithyroidectomies and isthmusectomies alone on the fittest lowest risk patients would save money. Even in these situations where avoiding obviously at risk patients (Graves disease, central neck dissection, substernal goiters) life threatening complications can still occur. A significant bleed at home is likely to rapidly wipe out any cost-savings to an individual trust. The day case setting may enhance overall recovery but only if we can guarantee the prevention and detection of serious complications. Increased surgeon experience with thyroidectomy has been shown to give improved outcomes (40). Combining this with dedicated Daycase personnel and use of robust predictors of complications should increase the safety of day case thyroidectomy if adopted.

References

1. [Kehlet H, Wilmore DW.](#)
Evidence-based surgical care and the evolution of fast-track surgery
[Ann Surg.](#) 2008 Aug;248(2):189-98
2. The NHS Plan 2000
Dept. of Health
3. Basket cases and trolleys – day surgery proposals for the millennium
Cahill CJ
One Day Surg 9: 11-12, 1999
4. One-day thyroid surgery: retrospective analysis of safety and patient satisfaction on a consecutive series of 1,571 cases over a three-year period.
Materazzi G. Dionigi G. Berti P. Rago R. Frustaci G. Docimo G. Puccini M. Miccoli P.
European Surgical Research. 39(3):182-8, 2007.
5. Outpatient thyroidectomy: experience in over 200 patients.
Seybt MW. Terris DJ.
Laryngoscope. 120(5):959-63, 2010 May.
6. Feasibility study of day case thyroidectomy
Teoh YB. Tang YC. Leong HT>
ANZ J Surg. 78 : 864-866, 2008
7. Outpatient thyroidectomy is Safe and Reasonable: Experience with more than 1000 planned outpatient procedures
Synder KS et al, Hamid KS, Roberson CR, et al
J Am Coll Surg. 210 (5): 575-82 2010
8. Day-case and short-stay surgery: the future for thyroidectomy?.
Mirnezami R. Sahai A. Symes A. Jeddy T.
International Journal of Clinical Practice. 61(7):1216-22, 2007 Jul.
9. Short-stay thyroid surgery.
Sahai A. Symes A. Jeddy T.
British Journal of Surgery. 92(1):58-9, 2005 Jan.
10. Ambulatory thyroid surgery: Need for stricter patient selection criteria
Dionigi G. Rovera F. Carrafiello G. Boni L. Dionigi R.
International Journal of Surgery, 6 : S19 – S21, 2008
11. Outpatient thyroidectomy
Samson PS, Reyes FR, Saludaes WN, Angeles RP, Francisco RA, Tagorda ER.
Am J Surgery 173: 499 – 503, 1997
12. Outpatient thyroidectomy: a feasibility study.
Steckler RM.
American Journal of Surgery. 152(4):417-9, 1986 Oct.

13. Outpatient and short-stay thyroid surgery.
Lo Gerfo P. Gates R. Gazetas P.
Head & Neck. 13(2):97-101, 1991 Mar-Apr.
14. Outpatient thyroid and parathyroid surgery: a prospective study of feasibility, safety and costs
Mowschenson PM, Hodin RA
Surgery. 118: 1051 – 1053, 1995
15. Thyroidectomy using local anaesthesia: a report of 1,025 cases over 16 years.
Spanknebel K. Chabot JA. DiGiorgi M. Cheung K. Lee S. Allendorf J. LoGerfo P.
Journal of the American College of Surgeons. 201(3):375-85, 2005 Sep.
16. Safety of same day discharge in patients undergoing sutureless thyroidectomy: a comparison of local and general anaesthesia
Inabnet WB, Shifrin A, Ahmed L, Sinha P
Thyroid 18: 57 – 61, 2008
17. Outpatient thyroid surgery: should patients be discharged on the day of their procedures?
Trottier DC. Barron P. Moonje V. Tadros S
Can J Surg 2009 52 182 – 186
18. Evaluation of total/near-total thyroidectomy in a short-stay hospitalization: safe and cost-effective.
Marohn MR. LaCivita KA.
Surgery. 118(6):943-7; discussion 947-8, 1995 Dec.
- 19 Specht MC, Romero M, Barden BC, Esposito C, Fahey TJ
Characteristics of patients having thyroid surgery under regional anaesthesia
Journal of the American College of Surgeons 193 (4) : 367-372, 2001
20. Diongi G. Rovera F. Boni L. Castano P. Diongi R.
Surgical site infections after thyroidectomy
Surgical Infection, 7: S117 – 20, 2006
21. [Spanknebel K](#), [Chabot JA](#), [DiGiorgi M](#), [Cheung K](#), [Curty J](#), [Allendorf J](#), [LoGerfo P](#).
Thyroidectomy using monitored local or conventional general anesthesia: an analysis of outpatient surgery, outcome and cost in 1,194 consecutive cases.
[World J Surg](#). 2006 May;30 (5):813-24.
22. Dralle H
Impact of modern technologies on quality of thyroid surgery
Langenbecks Archives Surgery (2006) 391: 1-3
J Am Coll Surg 2001; 193: 367 - 72
23. Synder SK. Roberson CR Cummings CC Rajab MH
Local anaesthesia with monitored anaesthesia care vs generalized anaesthesia in thyroidectomy; a randomized study
Arch Surg 141: 167 - 73 2006
- 24 [Lemos P](#), [Pinto A](#), [Morais G](#), [Pereira J](#), [Loureiro R](#), [Teixeira S](#), [Nunes CS](#).

Patient satisfaction following day surgery
J Clin Anesth.;21(3):200-5, 2009.

25. Risk factors post-thyroidectomy hypocalcaemia
McHenry CR. Speroff T. Wentworth D. et al
Surgery 116: 641 – 7, 1994

26 [Payne RJ](#), [Hier MP](#), [Tamilia M](#), [Mac Namara E](#), [Young J](#), [Black MJ](#).
Same-day discharge after total thyroidectomy: the value of 6-hour serum parathyroid hormone and calcium levels.
[Head Neck](#). 2005 Jan;27(1):1-7.

27. British Association Endocrine and Thyroid Surgeons 3rd Annual report
BAETS 2009

28 Lindblom P. Westerdahl J. Bergenfalz A.
Low parathyroid hormone levels after thyroid surgery: a feasible predictor of hypocalcaemia
Surgery: 131: 515 – 20, 2002

29 Therapeutic controversy: Thyroid surgery--the choice.
Schwartz AE. Clark OH. Ituarte P. Lo Gerfo P.
Journal of Clinical Endocrinology & Metabolism. 83(4):1097-105, 1998 Apr.

30. (Fritschi B et al. NDT Plus (2010) 3: 551–554

31. Horowitz MJ & Stewart AF
Hypoparathyroidism: is it time for replacement therapy?
J Clin Endocrinol Metab, 2008, 93(9):3307–3309).

32. [Jonathan W. Serpell](#), [Stacey Woodruff](#), [Michael Bailey](#), [Simon Grodski](#) and [Meei Yeung](#)
Head and Neck Oncology 2011 18:1742-1747
Recurrent Laryngeal Nerve Diameter Increases During Thyroidectomy

33. [Azadarmaki R](#), [Mirza N](#), [Soliman AM](#).
Unilateral true vocal fold synkinesis presenting with airway obstruction.
[Ann Otol Rhinol Laryngol](#). 2009 Aug;118(8):587-91.

34. [Rubin AD](#), [Sataloff RT](#)
Vocal fold paresis and paralysis.
Otolaryngol Clin North Am. 2007 Oct;40(5):1109-31, viii-ix. Review.

35. [Neil Bhattacharyya, MD](#); [Marvin P. Fried, MD](#)
Assessment of the Morbidity and Complications of Total Thyroidectomy
Arch Otolaryngol Head Neck Surg. 2002;128:389-392.

36. BAETS UK Audits: 2007,

37. [Bergenfelz A](#), [Jansson S](#), [Kristoffersson A](#), [Mårtensson H](#), [Reihner E](#), [Wallin G](#), [Lausen I](#).

Complications to thyroid surgery: results as reported in a database from a multicenter audit comprising 3,660 patients.

Langenbecks Arch Surg. 2008 Sep;393(5):667-73)

38. Reexploration for symptomatic haematomas after cervical exploration

Burkey SH, van Heerden MD, Thompson GB, Grant CS, Schleck CD, Farley DR

Surgery. 130 (6) 914 – 919, 2001

39. Does the risk of compressive hematoma after thyroidectomy authorize 1-day surgery?

Leyre P, Desurmont T, Lacoste L, Odasso C, Bouche G, Beaulieu A, Valagier A,

Charalambous C, Gibelin H, Debaene B, Kraimps JL.

Langenbecks Archives of Surgery. 393(5):733-7, 2008 Sep.

40. Stavrakis AI, Ituarte PH, KoCY, Yeh MW

Surgeon volume as a predictor of outcomes in inpatient and outpatient endocrine surgery

Surgery 2007 142(6) 887 – 99

41. Menegaux F, Turpin G, Dahman M, Leenhardt L, Chadarevian R, Aurengo A. et al.

Secondary thyroidectomy in patients with prior thyroid surgery for benign disease: a study of 203 cases

Surgery 199; ; 126:479 - 83