

23-hour observation endocrine neck surgery: lessons learned from a case series of over 1700 patients

C. RASPANTI, C. PORRELLO, G. AUGELLO, A. DAFNOMILI, G. ROTOLO,
A. RANDAZZO, N. FALCO, T. FONTANA, R. TUTINO, G. GULOTTA

SUMMARY: 23-hour observation endocrine neck surgery: lessons learned from a case series of over 1700 patients.

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G. GULOTTA

Although the surgical procedures concerning the thyroid and the parathyroid glands are considered safe, the possible occurrence of complications (mainly hematoma and hypocalcemia) limit the short stay surgery. At our institution a 23-hour-surgery with overnight hospital

stay for endocrine neck surgical procedures was introduced since 2004. The present case series analyses the institutional results. Over 1913 endocrine neck surgery procedures, 1730 patients (90,2%) were managed according to this model. Among these patients, 92 suffered from hypocalcemia, 12 from airways obstruction due to the hematoma, 5 from bilateral nerve palsy. 15 more patients had unpredictable general disease compromising the short-stay surgery management. The goal of the discharge after 23 hours was achieved in 92,8% of cases with a mean hospital stay of 1,1days. The 23-hour observation with an overnight surgery is feasible and safe if the correct indications are observed. A considerable volume of specific activity is needed.

KEY WORDS: Short stay surgery - Thyroidectomy - Parathyroidectomy - Neck hematoma - Hypocalcemia.

Introduction

The most frequent procedures of endocrine surgery concern thyroid and parathyroid glands (1-4). There is a widespread opinion that these procedures have a very low rate of complications (5-7). According to these assumptions, thyroidectomy and parathyroidectomy are actually practiced in short hospital stay systems (8-10). Until the present century, the risks of life-threatening complications, such as haemorrhage with subsequent airway obstruction, and hypocalcaemia had limited these short stay protocols at a minimum of two postoperative days (11). These complications are quite rare. In the first-time thyroidectomy a recent national audit of the British Association of Endocrine and Thyroid Surgeons (BAETS) report the transient hypocalcaemia more

than 10% and the compressive hematoma of 1%. Moreover the transient hypocalcemia affects the 'redo' thyroid surgery with a rate of 13.2%. Although the incidence of the definitive hypoparathyroidism decreases respectively to 6,1% and 11,9% for the first-time and the "redo" surgery ones, these values should be considered on the whole high and it should worry in case of early discharge (9). As the hypocalcaemia is the most common morbidity associated with thyroid surgery, it should be the more prominent reason for the decision concerning the time of the discharge, but even the compressive hematoma, although rare, plays an important role in this decision-making, since it is a life threatening complication (12, 13). Moreover, the inferior laryngeal nerve palsy causes respiratory compromise only if bilateral (8, 9, 14). According to the literature available, at our institution a 23-hour-surgery with overnight hospital stay for endocrine neck surgery was introduced at the beginning of the XXI century and systematically adopted since 2004. The purpose of this case series study is to present the results of the institutional experience in which the complication's features were examined with the aim of highlighting how and in which circumstances these conflicted with this early discharge; moreover, we calculated the rate of discharge's delay and its causes.

Department of Surgical, Oncological and Oral Sciences,
Unit of General and Emergency Surgery,
University of Palermo, Palermo, Italy

Corresponding author: Cristina Raspanti, e-mail: cristinaraspanti@yahoo.it

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Patients and methods

We evaluated 1913 endocrine neck surgical procedures performed at our Institution (Unit of General and Emergency Surgery, Policlinico "P. Giaccone", University of Palermo, Italy) since 2004, of which a complete report was available (Table 1). The eligibility criteria started according to an internal audit previously held at our institution were: thyroidectomy (unilateral, bilateral), parathyroidectomy (conventional, mini-open under general or local anesthesia, MIVAP), simultaneous thyroidectomy and parathyroidectomy, radiofrequency ablation. We excluded all the procedures performed under treatment interfering with the hemostasis/coagulation pathway (the indication to not interrupt the antiplatelet drugs previously prescribed has progressively increased during the last years) or in the presence of condition determining the incapability of reaching satisfying coagulation parameters (INR, APTT ratio, platelet count), the advanced tumours needing neck dissection or showing local aggressiveness, the parathyroid malignancies. Diseases such as neck cysts (median, lateral), lymph node diagnostic biopsies, salivary glands excision and other neck surgical procedures, not involving endocrine neck glands, have not been considered in the present case series.

Once the patient's data have been collected, we highlighted, for each group (1-4: eligible for short stay surgery; group 5-8: not eligible) the causes of discharge delay and, in particular, we calculated the rate of complications conflicting with the early discharge. The patients eligible for early discharge were carefully observed and examined during all the hospital stay. Concerning the hypocalcemia, an empiric prophylaxis protocol was applied at all the patients concerned, excluding those who

underwent hemithyroidectomy or radiofrequency ablation, by administering calcium and calcitriol as follows: 12-18 hours before the surgical operation, all the patients took a dose of 50 µg of calcitriol. At discharge, calcium and calcitriol were prescribed if needed, according to the following dosage: 0.75 µg of calcitriol + 1000 to 1500 mg of calcium if calcemia levels after 24 hours were 8 ± 0.1 mg/dl (normal range: 8.6-10.2 mg/dl); 1 to 1.25 µg of calcitriol + 2000 to 3000 mg of calcium for progressively inferior values of calcemia. These doses were progressively reduced according to the results of periodic controls. It was recommended that all patients have a new blood calcium dosage sample 24 hours after their discharge and, after that, on the fourth and the seventh days for any further therapeutic adjustment. We administered the minimal calcium and vitamin D dose needed to maintain calcemia of ≥ 8.0 mg/dL. The patients that had a calcium value < 7.5 mg/dl and/or were symptomatic for hypocalcemia the day after surgery (D1) were not discharged.

All the patients that complained respiratory, voice and/or swallowing impairment during the 24h-hospital stay had a fiberoptic laryngoscopy. The discharge delay was stated if a bilateral laryngeal nerve palsy or any other laryngeal obstruction was observed, in accordance with the consulting otorhinolaryngologist. All the patients that underwent redo surgery for performing the hemostasis and evacuation in the presence of a compressive hematoma were discharged later (D2-D4, as needed).

Results

The total amount of complications or sequelae concerning the patients of the groups 1 to 4 (eligible for short

TABLE 1 - ENDOCRINE NECK SURGERY PERFORMED FROM JANUARY 2004 TO SEPTEMBER 2016.

Procedure	N°	%
1 Thyroidectomy (uni-, bilateral, completion)	1541	80,5
2 Parathyroidectomy (conventional/mini-open/MIVAP)	98	5,1
3 Thyroidectomy + parathyroidectomy	82	4,3
4 Radiofrequency ablation	9	0,5
ELIGIBLE FOR SHORT-STAY NECK SURGERY	1730	90,4
5 Thyroidectomy + neck dissection (central ± lateral)	131	6,9
6 Other aggressive tumors	12	0,6
7 Parathyroidectomy (malignancy) + (hemy)thyroidectomy	7	0,4
8 Diseases Impedimental to short stay surgery *	33	1,7
NOT ELIGIBLE FOR SHORT-STAY NECK SURGERY	183	9,6
TOTAL	1913	100

* coagulation impairment, primary, iatrogenic or associated to different chronic (renal, hepatic, etc.) diseases.

TABLE 2 - TOTAL AMOUNT OF COMPLICATION OUT OF 1730 PATIENTS ELIGIBLE FOR SHORT STAY NECK SURGERY.

Complication	n°	%
Hypocalcemia	92	5,3
Vocal cord palsy (bilateral)	5	0,3
Hematoma	12	0,7
Other*	15	0,9
TOTAL	124	7,2

* respiratory, renal, cardiac unpredictable complications; fever; psychiatric disorders; wound complications

stay neck surgery) that kept us from a 23-hour discharge are reported in the Table 2. The incidence of these complications on each group of surgical procedures is reported in the Table 3. Moreover, as the incidence of complications varies according to the different procedure assembled in the group 1, in the table 4 we calculated the incidence of complications that kept from a 23-hour discharge in the 3 subgroups (total thyroidectomy, hemithyroidectomy and completion thyroidectomy). We would underline that concerning the vocal cold palsies, 1 was bilaterally in abduction, 1 was in abduction in one side, in adduction in the other. The first one recovered in one month; the second one at the moment has recovered only the abducted vocal cord. Anyway, these two patients were discharged after we observed a stabilization of the laryngeal nerve paralysis not compromising the airway patency. Concerning the neck hematoma, in the Table 5 is reported the time of appearance. It should be noted that a patient scheduled for parathyroidectomy + thyroidectomy was accepted for short stay management. After the discharge she suffered from severe dysphagia correlated to a late neck hematoma arising nine days after the previous procedure. The patient did not complain choking. She underwent redo neck exploration without the source of the bleeding was found. After seven days a neck hematoma, with clinical characteristics similar to the previous, appeared once again, the patient underwent a second exploration without the bleeding source was identified. So the incision was left open for five days and a gauze wedding was put in the surgical site. A late closure was performed in the fifth day after the second redo exploration. No further symptoms were complained and the patient recovered regularly. We recognised the possible causes of this unexplained event: after a complete investigation of the hemostasis and coagulation readings, the only possible parameter that resulted not in accordance with the safety range was the INR, that was slightly over the limit just before the initial procedure.

One more hematoma observed at our institution appeared more than 24 hours after the surgical operation. The patient that underwent total thyroidectomy and were

TABLE 3 - COMPLICATIONS RATE CALCULATED PER SPECIFIC PROCEDURE.

Hypocalcemia	84 (5,4%)	3 (3%)	5 (6%)	0
Vocal cord palsy	5 (0,3%)	0	0	0
Hematoma	11 (0,7%)	0	1 (1,2%)	0
Other	9 (0,6%)	2 (2%)	4 (4,9%)	0
	Procedure 1	Procedure 2	Procedure 3	Procedure 4

Procedure 1 = Thyroidectomy (uni-, bilateral, completion)

Procedure 2 = Parathyroidectomy (conventional/mini-open/MTVAP)

Procedure 3 = Thyroidectomy + parathyroidectomy

Procedure 4 = Radiofrequency ablation

TABLE 4 - PERCENTAGE OF COMPLICATIONS IN THE SUBGROUPS OF THYROIDECTOMIES.

	hypocalcemia	Vocal cord palsy	hematoma	other
Total thyroidectomy (1381)	80 (5,8%)	4 (0,3%)	8 (0,7%)	6 (0,4%)
Hemithyroidectomy (106)	0	0	1 (0,9%)	2 (1,9%)
Completion thyroidectomy (54)	4 (7,4%)	1 (1,9%)	2 (3,7%)	1 (1,9%)
TOTAL (1541)	84	5	11	9

TABLE 5 - ONSET TIME OF THE COMPRESSIVE HEMATOMA.

Onset of the compressive symptoms	n°	%*	%**
< 6 hours	7	58,3	0,4
6-12 hours	3	25	0,2
12-24 hours	1	8,3	0,06
> 24 hours	1	8,3	0,06

* percentage with reference to the number of hematomas

** percentage with reference to the total amount of patients

not eligible for short stay surgery because of the antiplatelet treatment was not discontinued before the surgery, complained a compressive hematoma 30 hours after the thyroidectomy. In the table 6 we analysed the discharge delay and the readmissions for each cause. Altogether, the goal of the short stay was achieved in 92,8% of the procedures. The overall mean hospital stay was 1,1 postoperative days.

Discussion

There is no unanimous agreement in the definitions of “short stay” or “outpatient” surgery. We adopted the definition of “23-hour observation” as synonymous of outpatient surgery, likewise it has been used elsewhere (15).

TABLE 6 - DAY OF DISCHARGE FOR EACH CAUSE OF DELAY/READMISSION.

Complication	D2	D3	D4	D5	D6	D10	D12	readmission
Hypocalcemia	81	9	2					
Vocal cord palsy				1	1	2	1	
Hematoma	7	2	2					1
Other	2	2	1	6	1	1		2
TOTAL (124)	90	13	5	7	2	3	1	3

TABLE 7 - PROTOCOL OF SELECTION ADOPTED AT OUR INSTITUTION.

General indications for patient's selection
<i>Social support</i>
*Availability of an adequate support for the transportation at/from home
*Availability of an adult support for at least 48 hours after the hospital discharge
<i>Access - communication</i>
*Living within 50 Km (30-40 minutes) from the hospital
*availability of an elevator at home
*Easy access to the telephone / availability of two mobile phones
*No language barriers
*No communication impairment
<i>General clinical concerns</i>
*Absence of severe clinical contraindications
*No therapy interfering with hemostasis/coagulation pathway
*Adequate mental status
*Informed consent acceptance

This definition corresponds to "one day surgery" commonly used at our Institution. The theoretical advantages of this health care model, when applicable, concern the cost savings, patient's satisfaction, minimisation of exposure to nosocomial infections, reduced postoperative immobilisation (16-19). Moreover, we think that it could give a general easing in the management of the beds, especially in high turnover surgical units. The main argument against the outpatient surgery is the fear for the bleeding, that frequently determines, in a narrow space like the surgical site after thyroidectomy, a potentially life-threatening complication that involves the airways. In fact, the cervical hematoma could lead even to death (15). Given the differences in terms of definition and protocols of treatment especially in the absence of a specific intervention other than the neck redo exploration the real incidence of this fearful complication is still unknown and ranges from <1% and >4%, but some individual surgeons reported an incidence of over 14%. The real impact of the neck hematoma depends on the specific volume of activity of the single surgeon and the specific centers (20-25). The neck hematoma showed a mean incidence in our case series of 0,7% (12 cases), ranging

between 1,2% in the simultaneous thyroidectomy + parathyroidectomy and 0 in the simple parathyroidectomy or radiofrequency ablation. Since the last decade at our institution a widespread use of hemostatic devices (sealants, patches, etc.) and energy based surgical instruments (Harmonic Scalpel, Thermal Device) has been adopted. Although a role in preventing the postoperative bleeding is not always proven for each device or instrument, this could explain the relatively favourable incidence of neck hematoma in this case series (26-31).

Hypocalcaemia may develop following thyroidectomy as a result of an injury to the parathyroid glands caused by manipulation during surgery, devascularisation or inadvertent excision and hungry bone syndrome (9). It could be a limitation to short stay surgical procedures because the tetanic crisis, although rare after thyroidectomy or parathyroidectomy, could represent a fearful and even life threatening complication, when not prevented or promptly treated (32, 33). Most frequently postoperative hypoparathyroidism is asymptomatic and transient, but in some cases it can occur with paraesthesias and spasms to the extremities or around the lips. The calcium and vitamin D supplementation can prevent the onset of the

symptoms and is the treatment suitable for the hypocalcemia as well. The permanent hypoparathyroidism is rare, but it is considered a severe complication that needs a continuous monitoring for leading the substitutive treatment. A late recovery is well documented, so the monitoring should be continued long-term for avoiding unnecessary calcium and vitamin D treatment (34, 35).

The most common cause of reduced vocal fold motility in patients that underwent thyroidectomy is recurrent laryngeal nerve neuroparaxia, due to the traction, heat, cold, and any other mechanical, thermal, electric, biochemical abnormal stimulation of the nerve. It can recover within some weeks and even several months. Voice and swallowing disorders are common after inferior laryngeal nerve palsy, although these complaints can occur even after uncomplicated thyroidectomy (36-38). A recovery of the nerve palsy within 12 months has been frequently described. The incidence of this complication seems to be higher (10%) compared to the reported incidence in the literature (7), but the permanent palsy decreases to 1% (9). If the cord paralysis is unilateral, the inpatient stay is unnecessary. The bilateral vocal fold palsy, that resulted extremely rare even at our institution (0,3%) normally appears immediately after extubation and requires immediate reintubation and, if it do not recovers in a few days, a tracheostomy is unavoidable. Of course this is a cause of discharge delay (9, 15).

The complications discussed can be prevented with an adequate knowledge of the risk factors. We already discussed the measures adopted at our institution for reducing the risk of bleeding. Here we can add that the drainage, far from reducing the incidence of the bleeding and hematoma, can promote it because of the suction mechanism (39, 40). At our institution, we dropped the systematic use of the suction drainages since the minimally invasive video-assisted thyroidectomy (MIVAT) was introduced (41) and actually it is used only in selected cases. A large multi-institutional international study conducted on over 200 hematomas showed that this complication is associated with the use of a drain, or Graves' disease, antiplatelet/anticoagulation medications and large goiters. Moreover, the Authors affirm that a residual thyroid parenchima, that can be found after hemithyroidectomy or subtotal thyroidectomy, can increase the risk of bleeding (42, 43). These findings could lead to a more accurate selection of patients proposed for short stay surgery. In our routine experience we consider not eligible for short-stay neck surgery the patients under antiplatelet/anticoagulant treatment, even if the assumption of these medicaments is discontinued. On the contrary, the hemithyroidectomy is not a contraindication for the 23-hour observation endocrine neck surgery. Concerning the Grave's disease, we usually consider this a minor risk factor and we usually schedule these patients for short stay surgery (44). Concerning the hypocalce-

mia, some experiences reported a protective effect of a preoperative administering of vitamin D (45), that is a common practice at our institution. Moreover, we systematically exclude from the short stay surgery the cancers that need a neck dissection (46-47). A careful surgical technique is mandatory for preventing postoperative hypocalcemia, on the contrary the technique of ligation of the inferior thyroid artery do not have a strong importance (48). In case of coexistence of thyroid and parathyroid disease, it should be preferred of approaching both diseases at the same time for avoiding the morbidity and risks of the redo surgery (49).

The nerve injuries can be prevented with a specific knowledge of the anatomic details and pitfalls and a careful surgical dissection. Although not universally accepted, the intraoperative nerve monitoring seems to produce some advantages in terms of reducing these complications (50). Unpredictable complications such as cardiac, respiratory, renal, psychiatric, septic have been considered sporadic (less than 1%), so the indications for their prevention and treatment are attributable to standardized specific protocols. Moreover, it is unclear if the thyroiditis could increase the risk of complications (23, 24, 51). Finally we would indicate the "ideal" situation in which a short stay management can be practiced: first of all, the procedures under local anesthesia such as the minimally invasive procedures, moreover we would remember the usefulness of the radiofrequency ablation, that can lead even patients with severe comorbidities to a short stay surgery. Another field discussed is the hemithyroidectomy: in fact, we assume that it is a very good model for short stay surgery, because against a minimal increase of the risk of bleeding, it has practically no incidence of hypocalcemia.

All in all, the accurate selection of patients, according to the indications of the table 7, remains the principal measure for optimizing the results of the program of short stay surgery (15). A review performed in UK concluded that, being the bleeding very rare after 24-hours, a 23-hours surgery with overnight hospital stay is safe and suitable (52). These conclusions were confirmed in a 2011 BAETS consensus statement (53). In our opinion, a complete patient's information and the consequent informed consent is mandatory (54, 55) for achieving the best results, especially in terms of patient's satisfaction.

Conclusion

Our large case-series showed the feasibility and the effectiveness of the 23-hour surgery with overnight hospital observation for the main neck endocrine procedures, such as thyroidectomy and parathyroidectomy. The hypocalcemia is a frequent sequela of the total thy-

roidectomy and, more rarely, of the parathyroid surgery, especially in the presence of a multiglandular disease. In most cases, its management is easy and the discharge with an adequate dose of calcium and vitamin D supplementation allows of avoiding symptoms appearance for the most part. The hematoma is a very rare but severe complication, that occurred in the present series in 0,7%. It is hard to foresee and prevent and the only condition able to modify our behaviour was the coagulation impairment especially in the patients under treatment interfering with hemostasis and coagulation or under anti-platelet drugs. Anyway, we are encouraged by the results of several studies that con-

sider the occurrence of the compressive hematoma very rare after 24 hours. Finally, the vocal cord palsy is life-threatening only if it is bilateral that is a rare situation (<0,3% in our series): a careful laryngeal nerve dissection and, if available, the use of the intraoperative nerve monitoring are the only instrument that can reduce the incidence of this complication, that cannot be set at zero.

We conclude that by reducing the hospital stay some resources can be saved up and reinvested in new technologies that make the procedures safer. This goal can be obtained only in the presence of a considerable volume of specific activity.

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